Transport for NSW

Marshalls Creek Bridge Replacement

Review of Environmental Factors

August 2021

BLANK PAGE

Marshalls Creek Bridge Replacement

Review of Environmental Factors

Transport for NSW | August 2021

Prepared by NGH and Transport for NSW

21.219

ISBN: 978-1-922549-20-4

Document controls

Approval and authorisation

Title	Marshalls Creek Bridge Replacement Review of Environmental Factors
Accepted on behalf of Transport for NSW by:	Prafulla KC Project Manager/Engineer
Signed:	
Dated:	30/08/2021

Document status

Document status	Date	Prepared by	Reviewed by
Draft 1	23/08/2020	J. Whieldon	M. Sutherland
Draft 2	11/11/2020	J. Whieldon	M. Sutherland
Draft 3	01/03/2021	S. Anderson	M. Sutherland
Draft 4	11/06/2021	Z. Bradley	M. Sutherland
Final 1	06/08/2021	Z. Bradley	M. Sutherland
Final 2	23/08/2021	Z. Bradley	M. Sutherland

Executive summary

The proposal

Transport for NSW (Transport) is proposing to construct a new bridge over Marshalls Creek (the proposal). The proposal is located within the Wagga Wagga Local Government Area on the Sturt Highway in East Wagga Wagga.

Key features of the proposal include:

- establishing site and compound
- relocating services including underboring
- installing waterway controls
- installing instream crossings for construction access
- carrying out earthwork and construction of crane pads
- relocating a bus stop
- diverting shared path access around the site
- installing temporary pedestrian crossing
- partially demolishing the bridge and constructing the wider bridge in two stages
- installing stormwater drains
- milling of pavement
- constructing pavement
- installing road furniture
- carrying out revegetation and site rehabilitation.

Construction is expected to start in mid-2022 and would take 12 to 16 months to complete.

Need for the proposal

Marshalls Creek Bridge was built in 1963. The bridge is a twin-span, two-lane concrete plank bridge, which is about 18 metres long and 8.5 metres wide. There is a 1.5-metre pedestrian footpath on the southern side (upstream side) of the bridge. The current pedestrian footpath is narrow and not separated from traffic by a barrier. This section of the Sturt Highway is currently a bottle neck, narrowing from four to two lanes at the bridge. This generates traffic congestion and safety issues for road users.

In August 2018, the NSW Government committed $30 million towards a Wagga Wagga Roads Upgrade Package. This included upgrading Olympic Highway intersections either side of Gobbagombalin Bridge and the Marshalls Creek Bridge replacement. This proposal is funded under that $30 million commitment. The proposal would improve road safety and increase efficiency leading to improved productivity and less congestion at Marshalls Creek Bridge.

Proposal objectives

The objectives of the proposal are to:

- improve road safety and traffic flow along the Sturt Highway
- improve pedestrian/cyclist safety and access across the bridge.

Options considered

Five options were considered for the Marshalls Creek Bridge proposal. Options focused on a bridge or culvert, the number of spans and choice of girder as shown below:

- Option 1: three x 10m span pre-stressed concrete plank (PSC) bridge with 380mm deep planks
- Option 2: two x 15m span PSC plank bridge with 600mm deep planks
- Option 3: one x 30m span bridge with 1500mm deep bulb-T
- Option 4: two uneven spans (12m and 18m) with 700mm deep planks
- Option 5: six cell reinforced concrete box culvert (3600mm span x 3600mm high)

Option 1, a three x 10m span bridge, is the preferred option. Although construction activities would occur 'on-line' and alongside live traffic, this option ultimately offers improved motorist, pedestrian/cyclist safety and accessibility, while minimising the construction footprint.

The preferred option would meet the proposal objectives, providing a four-lane bridge with a shared path, a footpath and safety barriers. This option would improve road user safety and traffic flow and meet flood considerations.

Statutory and planning framework

The proposal is for a road infrastructure facility and is to be carried out by or on behalf of Transport. The proposal can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent from council is not required.

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required.

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 Government Department of Agriculture, Water and Environment is not required.

Community and stakeholder consultation

Wagga Wagga City Council (WWCC) and the NSW State Emergency Service (SES) have been consulted about the proposal in accordance with Part 2 of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP). Appendix B contains an ISEPP consultation checklist that documents how ISEPP consultation requirements have been considered.

In addition, Riverina Water County Council (RWCC), Narellan Pools and Busabout have been consulted during the development of the project about potential impacts to their property and assets. General agency consultation was carried out with NSW Department of Primary Industries (NSW DPI).

Issues that have been raised as a result of this consultation are outlined in Appendix D.

Environmental impacts

The main environmental impacts of the proposal are:

Biodiversity

The study area is comprised of Plant Community Type (PCT) 5; River Red Gum herbaceous-grassy very tall open forest wetland and exotic vegetation. No threatened species were identified in the proposal area. Habitat within the construction footprint was considered suitable for one threatened flora species and seven threatened fauna species.

The proposed work would require the removal of up to 0.20ha of native vegetation (PCT 5), including two hollow bearing trees. The proposal would also require the disturbance of about 0.30ha of exotic vegetation and 0.15ha of planted native vegetation. The proposal would involve the removal of scour protection rock, aquatic vegetation, and creek bed gravels along the banks and within the creek.

The proposal would avoid impacts whenever possible and a flora and fauna management plan would be implemented to further avoid and minimise biodiversity impacts. No significant impact on threatened species or communities protected under the BC Act or EPBC Act is likely.

Hydrology, flooding and water quality

The proposal involves construction activities within Marshalls Creek, which flows to the Murrumbidgee River. Marshalls Creek is classified as a fourth order stream under the Strahler (1952) method and is identified as key fish habitat. The construction footprint is located within a flood prone area.

During construction there is potential for construction material, chemicals (from construction, refuelling, concrete curing or plant failure), and sediment-laden runoff from disturbed areas to enter the creeks. The removal of vegetation within the development footprint may destabilise the banks and potentially result in exposure of soils to erosion, causing sedimentation of the waterway. The risk of impact to water is likely to be short term, localised, and is unlikely to lead to a noticeable deterioration in water quality either locally or downstream. The risks are readily minimised or avoidable and manageable through the implementation of standard construction environmental controls. These controls would include implementing a soil and water management plan.

Flooding of the site during the work is possible. In the instance of a flood, a warning would be issued by the NSW State Emergency Service (SES) on expected impacts of flooding in the Wagga Wagga LGA (NSW SES 2019). Flash flooding warnings are issued within 6 to 24 hours to provide time to move plant and equipment to be above the Probable Maximum Flood height (PMF) (NSW SES 2019). A Flood Management Plan is to be prepared and implemented during construction.

Traffic and transport

During the early phase of construction, single (partial) lane closure of the bridge and approaches would be required. The lane closure would allow the removal of the pedestrian footpath on the southern side of the bridge. Temporary traffic barriers and speed restrictions of 30km/h would be installed, if necessary, to separate the construction site from passing traffic.

It is anticipated that temporary detours would be required at night (10-15 nights) during construction. Where this occurs a detour route would be established using the Sturt Highway, Eunony Bridge Road, Byrnes Road, Merino Road and the Olympic Highway for heavy vehicles, and Lake Albert Road and Kooringal Road for local traffic.

To manage traffic flow during construction, a Traffic Management Plan (TMP) would be prepared in accordance with the 'Traffic Control at Work Sites Manual' (Transport for NSW, September 2020) and current Transport Specification G10 – Control of Traffic, before commencement of construction'. The plan would provide details of traffic

management to be implemented during construction and how to manage traffic flow and driving conditions during construction.

No noticeable impacts would occur to traffic volumes on the local roads following the completion of the work. The work would result in improved traffic flow and reduced congestion in the vicinity of Marshalls Creek Bridge.

Noise and vibration

A quantitative construction noise assessment was prepared in accordance with the NSW *Interim Construction Noise Guideline (2009)* and *NSW Noise Policy for Industry (NPfI) (NSW EPA 2017).*

The predicted noise level for the proposed work was calculated using Transport for NSW's Construction Noise Estimator. Five construction scenarios were modelled: bridge removal, bridge construction, pavement milling, operation of compound site and girder installation and stich pouring.

During standard working hours, it is predicted there would be no sensitive receivers affected by the work. Parts of a nearby caravan park would experience a moderate impact. During out of hours work, it is predicted the caravan park would experience a moderate impact with the front section of the caravan park likely to experience highly intrusive noise. Residential receivers within 350m would experience a minor exceedance during night work.

Mitigation measures to minimise impact on potentially affected receivers include conducting a letterbox drop, phones calls and providing duration respite.

The proposed work is likely to generate vibration impacts during construction, especially when driving the bridge piles and using vibratory rollers during road construction. It is possible for a building at 86 Hammond Avenue to experience cosmetic damage during construction. A building condition report would be needed to be carried out prior to start of work. A construction Noise and Vibration Management Plan would also be implemented to minimise the impact of construction vibration.

No impact from operational noise or vibration is likely.

Matters of national environmental significance and Commonwealth land

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 Government Department of Agriculture, Water and Environment is not required.

Justification and conclusion

The proposed replacement of the bridge over Marshalls Creek located along the Sturt Highway in Wagga Wagga would improve the safety of road users and reduce traffic congestion.

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 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, ecological communities and their habitats as well as other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the 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 biodiversity, hydrology, traffic, and noise. Safeguards and management measures as detailed in this REF will ameliorate or minimise these expected impacts.

Contents

Tables

Figures

Appendices

1 Introduction

Transport for NSW (Transport) is proposing to construct a new bridge over Marshalls Creek (the proposal).

The proposal is located within the Wagga Wagga Local Government Area (LGA) on the Sturt Highway (HW14) in East Wagga Wagga. The Sturt Highway is a major link between Sydney and Adelaide. The location of the proposal is shown in Figure 1-1 and an overview of the proposal is provided in Figure 1-2. Section 3 describes the proposal in more detail.

The proposal involves replacing the existing two-lane bridge with a four-lane bridge and the widening of bridge approaches. The new bridge would comprise four 3.5-metre lanes, two 2.5 metre shoulders and a 3-metre-wide shared path and 1.8-metre-wide footpath on the upstream side and downstream side, respectively. There would be a separate footpath linking to the road footpaths on the downstream side. Construction of the new bridge would result in improved traffic flow and road user and pedestrian safety. The existing bridge would be demolished in stages to allow new bridge construction. The proposal is planned to start in mid-2022 and would be constructed over 12 to 16 months.

Key features of the proposal include:

- relocating services and utilities
- removing vegetation
- installing waterway controls, which may include coffer dams
- carrying out earthwork, including excavation in a waterway
- relocating a bus stop
- building a temporary pedestrian crossing and pathway
- building a temporary crane pad
- demolishing and rebuilding the bridge in two stages
- milling of pavement
- removing and installing stormwater drains
- removing and installing flood gates
- building pavement
- installing road furniture
- rehabilitating the site.

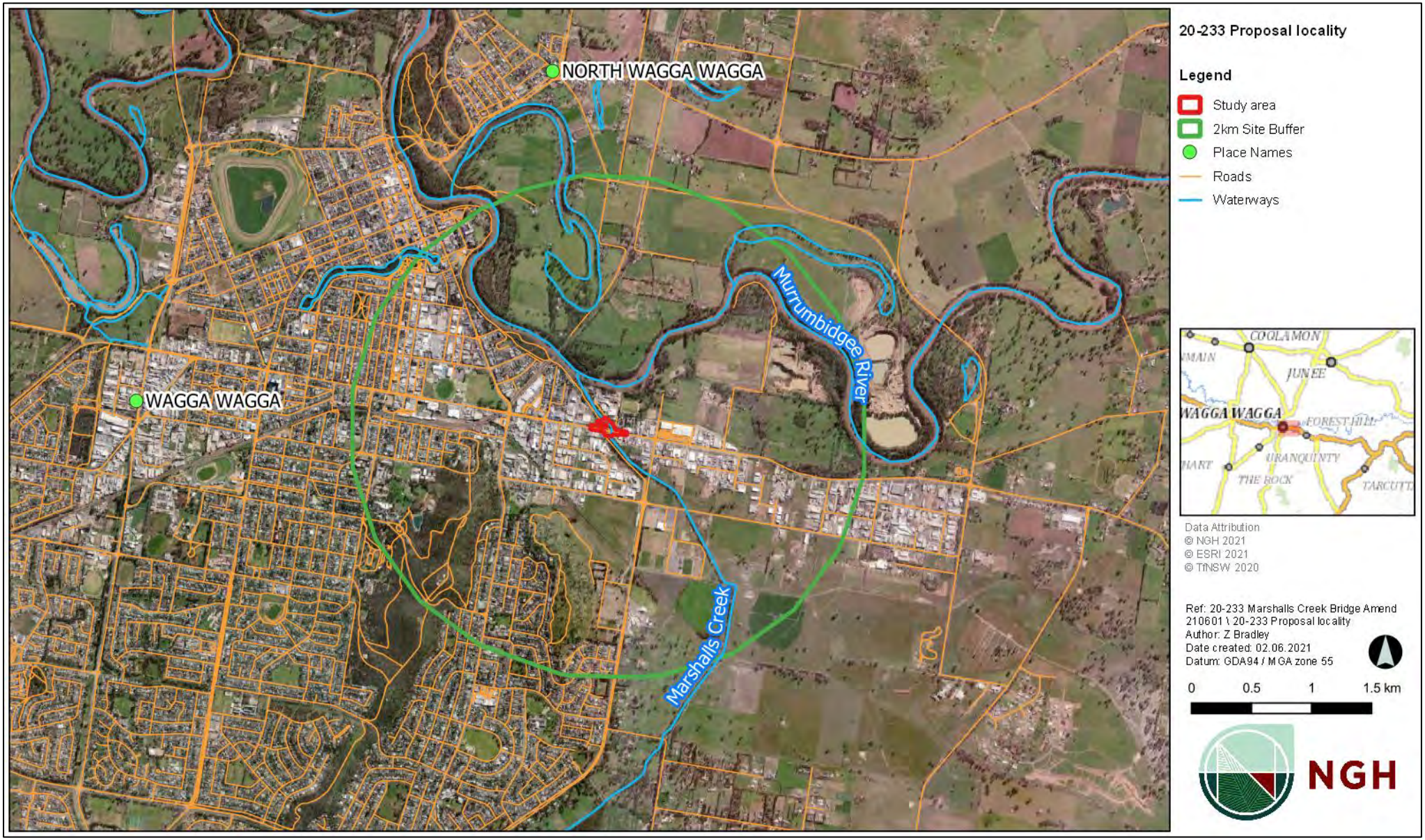


Figure 1-1 Location of the proposal

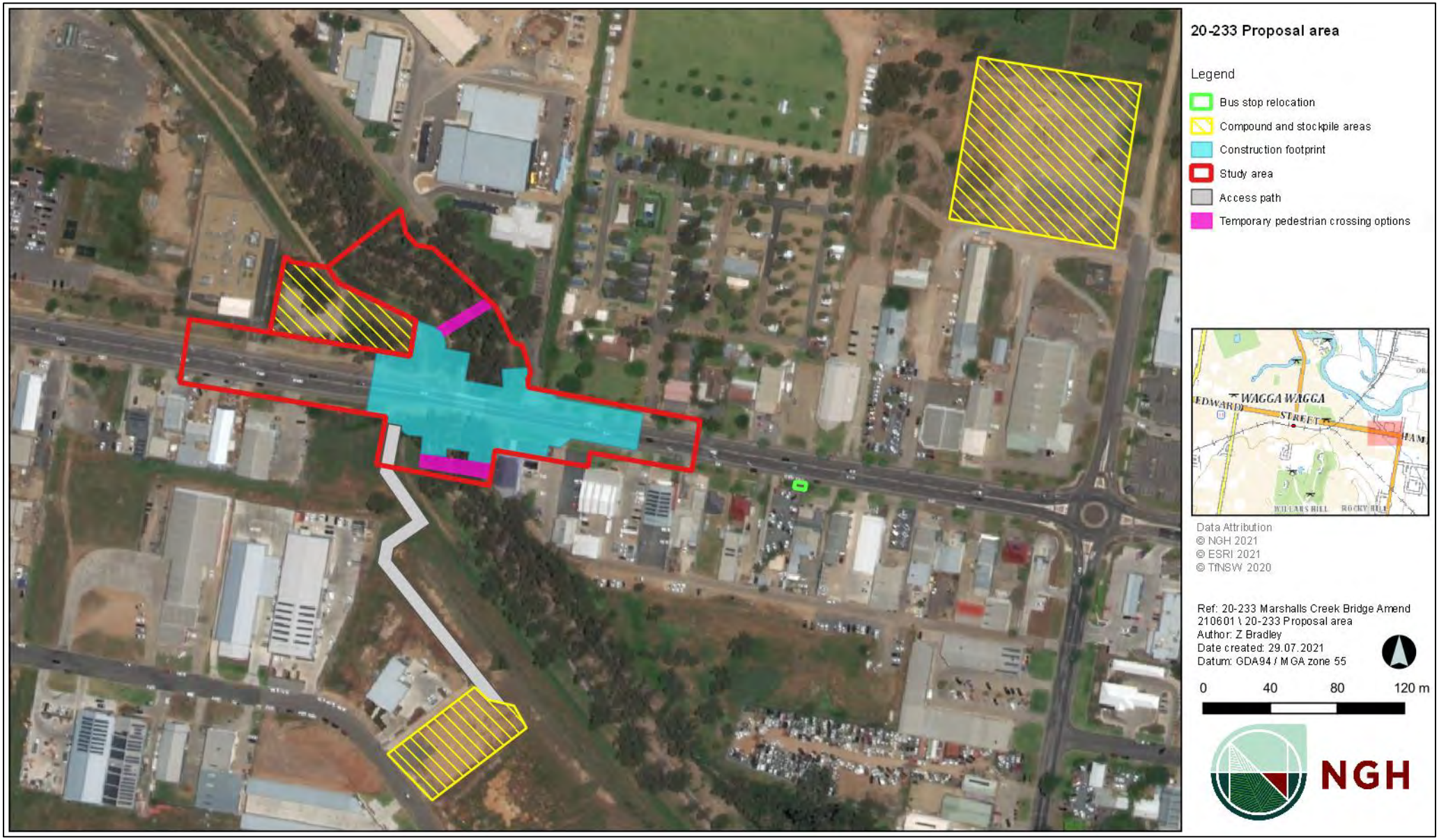


Figure 1-2 The Proposal Area

1.1 Purpose of the report

This review of environmental factors (REF) has been prepared by NGH on behalf of Transport for NSW Regional and Outer Metropolitan. For the purposes of these works, Transport for NSW 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 228 of the Environmental Planning and Assessment Regulation 2000, 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 for NSW 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 and Public Spaces 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 the environment of Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of Agriculture, Water and the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

The following definitions are used in this REF:

The Proposal: all work involved in the implementation and operation of the work described in this REF.

Operational footprint: the area of land directly impacted for the operation of the Proposal.

Construction footprint: the area of land directly impacted for the construction of the Proposal. This includes ancillary compound and stockpile sites.

Study area: Area assessed as part of this report and the site visit.

Locality: Area within 10km of the construction footprint.

2 Need and options considered

2.1 Strategic need for the proposal

Marshalls Creek Bridge (B5504) is located on the Sturt Highway (HW14) in East Wagga Wagga over Marshalls Creek. The Sturt Highway is a major link between Sydney and Adelaide and a major arterial road for Wagga Wagga.

The bridge was built in 1963 and is a twin span two lane concrete plank bridge, approximately 18 m long and 8.5 m wide. There is a 1.5 m pedestrian footpath on the southern side (upstream side) of the bridge. The current pedestrian footpath is narrow and not separated from adjacent traffic by a barrier. The existing bridge has spill-through abutments. There is a pedestrian and bicycle underpass next to the western abutment. The shared pedestrian and bicycle path at this location forms part of the Wiradjuri Walking Track. The Wiradjuri Walking Track at this location provides connectivity for pedestrians and cyclists between central Wagga Wagga and Lake Albert. This section of the Sturt Highway is currently a bottle neck to road users as the highway narrows from four to two lanes at the bridge and generates traffic congestion and safety issues.

In August 2018, the NSW Government committed $30 million towards a Wagga Wagga Roads Upgrade Package. This included upgrading Olympic Highway intersections either side of Gobbagombalin Bridge and Marshalls Creek Bridge replacement. This proposal is funded under the same $30 million commitment. The proposal would improve safety, increase efficiency, productivity and reduce congestion at the Marshall Creek Bridge.

2.2 Limitations of existing infrastructure

The noted limitations of the existing infrastructure are:

- Traffic merging/diverging from four lanes to two and back to four
- Limited pedestrian access
- No safety barrier between adjacent traffic and footpath
- No provision for cyclists on the bridge

2.3 Proposal objectives and development criteria

Proposal objectives

The objectives of the proposal include:

- Improve road safety and traffic flow along the Sturt Highway
- Improve pedestrian/cyclist safety and access across the bridge

Development criteria

The development criteria for the proposal includes:

- Maintain through traffic during construction
- Improve road safety and remove constriction on the bridge
- Improve pedestrian and cyclist safety and access
- Increase or maintain existing waterway area
- Maintain vertical clearance required for the pedestrian and cycle underpass
- Maintain existing horizontal and vertical road/bridge alignment

2.4 Alternatives and options considered

In addition to the base case, do nothing, five options were considered for replacing the bridge. Options concentrated on the bridge or culvert, number of spans and choice of girder as shown below:

- Option 1: 3 x 10m span Pre-Stressed Concrete plank (PSC) bridge with 380mm deep planks
- Option 2: 2 x 15m span PSC plank bridge with 600mm deep planks
- Option 3: 1 x 30m span bridge with 1500mm deep Bulb-T
- Option 4: 2 uneven spans (12m and 18m) with 700mm deep PSC planks
- Option 5: 6 cells x 3600mm span x 3600mm high Reinforced Concrete Box Culvert

Using Super T girders allowed a longer span but were considerably deeper causing environmental impacts in Marshalls Creek.

Methodology for selection of the preferred option

The major points of difference between the options are impacts to Marshalls Creek, cost, and constructability. Table 2.4-1 below summarises each option.

Table 2.4-1 Comparison of construction options.

Option	Girder type/ Culvert	Girder Depth/ Culvert size (mm)	Total depth of super structure (mm)	No. of span/cells	Span length (m)	Bridge length (m)	No. of piers	Piles located in Marshalls Creek?	Available waterway area (m^2)
Existing	Concrete plank	381	572	2	9	18	1	Yes	67.2
Option 1	PSC plank	380	970	3	10	30	2	No	86.3
Option 2	PSC plank	600	1,190	2	15	30	1	Yes	81.6
Option 3	Bulb - tee	1,500	2,130	1	30	30	0	No	59.4
Option 4	PSC plank	700	1,290	2	1,218	30	2	No	76.4
Option 5	PSC plank	3,600 x 3,600	-	6	3.6	21.6	-	N/A	77.7

Options 1 through to 4 would provide a 30m long, 27m wide bridge compared to the existing 18 x 8.5 m structure. The proposal would be constructed under traffic with only temporary whole of bridge closures allowed. To accommodate traffic the construction would be staged with half of the new structure demolished and constructed at a time. Traffic switched from the old section to the new bridge before demolition and construction of the second half.

The length of the longer Prestressed Concrete (PSC) planks and the Super T units is unsuitable due to site constraints including overhead power lines. As such these options have limitations and risks associated with safety and constructability.

Option 5 uses Reinforced Concrete Box Culvert (RCBC) or Slab Linked Box Culvert (SLBC) units to construct a 21.6m long, 27m wide structure. Again, the structure would be constructed in two stages to maintain constant traffic flow.

Analysis of options

Option 1 - 3 x 10 m span Pre-Stressed Plank (PSC) Bridge with 380mm deep planks.

The work required involves the construction of a three-span bridge with 380mm deep planks.

Advantages:

- Spacing of piers can avoid clashing with existing piles
- No pile cap required
- Simple construction procedure

Disadvantages:

- Staged construction needs more traffic staging
- Increased bridge width to cater for staged construction

Option 2 - 2 x 15m span PSC bridge with 600mm deep planks.

The work required involves the construction of a two-span bridge with 600mm deep planks.

- Advantages:
- Reduced span number
- Single pier
- Familiar construction procedure

Disadvantages:

- Requires a larger crane to lift heavy girders
- Increased substructure size
- Pier in the middle of water requires more environmental management
- Location of new pier may clash with existing pile in Marshalls Creek

Option 3 - 1 x 30m span bridge (1500mm deep bulb-tee).

The work required involves the construction of a single span bridge with 1500mm deep Super T (Bulb T).

Advantages:

- Single span
- No pier required
- Quick construction process
- Familiar construction procedure

Disadvantages:

- Limited supplier
- Increased depth and number of substructures
- Requires heavy crane to lift Super T
- Reduces existing waterway area
- Reduces vertical clearance for shared pedestrian underpass

Option 4 – Two uneven spans (12m and 18m) with 700mm deep planks.

The work required involves the construction of a two-span bridge with 700mm deep planks and uneven spans.

Advantages:

- Reduced span number
- Single pier
- Familiar construction procedure

Disadvantages:

- Custom plank required for unequal span
- Requires heavy crane to lift girder
- Requires deep excavation to maintain vertical clearance underpass
- Increased depth and number of substructures
- Requires heavy crane to lift girder

Option 5 – Six cell x 3600mm span x 3600mm high RCBC.

The work required involves the construction of base slab and installation of six 3600mm span x 3600 high Reinforced Cement Box culvert.

Advantages:

- Require less structural maintenance

Disadvantages

- Larger volumes of cut and fill required
- Excavation of Marshalls Creek bed and banks
- Stringent environmental requirements
- Construction and environmental footprints are larger
- High risk due to staged excavation
- Susceptible to debris blockage and scouring
- No increase in waterway area
- Complex arrangement for pedestrian and cycleway underpass

2.5 Preferred option

Option 1, a 3 x 10m span bridge, is the preferred option. Although construction activities would occur 'on-line' and adjacent to live traffic, this option ultimately offers improved motorist, pedestrian/cyclist safety and accessibility, whilst minimising construction footprint.

The preferred option would meet the proposal objectives providing a four-lane bridge including shared path and safety barrier that would improve road user safety and traffic flow and flood considerations. This option would also improve pedestrian/cyclist safety and access.

Reasons for adopting this option include:

- Best meets the proposal objectives
- Provides greater assurance of improved road safety
- Improves safety and access of pedestrian/cyclist
- Extend existing waterway area
- Constructible design and construction staging

Table 2.5-1 Expected environmental outcomes

Energy management	Expected Outcome
To use Transport's energy sources more efficiently and reduce greenhouse gas emissions	• *The proposal would improve network efficiency by saving time and reducing greenhouse emissions.*
Pollution control	
To minimise air, noise, water and pollution from Transport's operations and construction	• *All environmental safeguard measures identified by project REF would be implemented during construction. The proposal would be acceptable for noise and vibration emissions.*
Climate change resilience	
To plan and deliver transport infrastructure and operations that are resilient to the effects of climate change	• *The proposal would be resilient to the effects of climate change such as flooding.*
Resource management	
To reduce water consumption in operations, maintenance, construction and management	• *The proposal would aim to reduce water and resource consumption during construction.*
Biodiversity	
To mitigate transport impacts on biodiversity	• *All biodiversity safeguard measures identified in the project REF would be implemented during and post construction to mitigate impacts on biodiversity.*
Heritage	
To mitigate transport impacts on heritage	• *The proposal area is not heritage listed.*
Liveable communities	
To improve community experience through the delivery of transport which is integrated with surrounding land use activities	• *Construction impact management and constructability assessment would minimise negative community experience.* • *The proposal would provide a bridge with sufficient capacity to improve freight efficiency and provide acceptable travel times.*
Corporate sustainability	
To establish governance arrangements for Transport which support resources efficiency and continuous improvement in environment and sustainability performance	• *The proposal would operate under governance arrangements that support continuous improvement of sustainability performance and the sustainability performance criteria set down in the approvals.*

2.6 Design refinements

There may be minor design refinements during the detailed design phase of the proposal. Any changes to the design or methodology would be subject to further environmental assessment if needed.

3 Description of the proposal

3.1 The Proposal

Transport for NSW proposes to construct a new bridge over Marshalls Creek located on the Sturt Highway (Hammond Avenue) in East Wagga. The proposed bridge would be four lanes wide with a pedestrian pathway on the northern side and a shared pathway on the southern side. It is proposed to demolish the existing bridge and construct the proposed bridge in stages to maintain traffic flow. The proposal is shown in Figure 1-2 , Figure 3-1.

Key features of the proposal include:

- Site and compound establishment
- Services relocation including underboring
- Installation of waterway controls
- Instream crossings for construction access
- Earthwork and construction of crane pads
- Bus stop relocation
- Diversion of shared path access around the site
- Installation of temporary pedestrian crossing
- Partial bridge demolition and construction of wider bridge in two stages
- Installation of stormwater drains
- Milling of pavement
- Pavement construction
- Installation of road furniture
- Revegetation and site rehabilitation.

Bridge demolition and construction:

- Site and compound establishment
- Implementation of a Pedestrian and Traffic Control Plan (TCP)
- Implementation of environmental control measures
- Services relocation including under boring
- Construct site access from Lot 4 DP1188531 to south of bridge
- Installation of temporary crane pads either side of each abutment
- Install temporary instream construction access north and south of the bridge
- Install temporary pedestrian crossing
- Remove pedestrian footpath on the southern side
- Construct temporary pavement
- Diversion of traffic to southern side of the bridge with traffic control
- Installation of stabilised waterway controls
- Partial bridge demolition on the northern side
- Partial removal of abutments

- Installation of piles for half of the new bridge
- Install piers, abutments, and headstock for half of the new bridge
- Construct bridge deck for half of the new bridge
- Install traffic parapets and safety barrier
- Switch traffic to new bridge
- Demolish the remainder of the bridge on the southern side
- Remove remainder of abutments
- Install piles for remainder of the new bridge
- Install pier and headstock for remainder of the new bridge
- Construct bridge deck for remainder of the new bridge
- Install traffic parapets and safety barrier for the remainder of the new bridge.

Road approaches and widening:

- Public utility adjustments
- Replace drainage
- Mill existing pavement
- Foundation earthworks as required
- Modification of stormwater drains and flood gates as required
- Place and compact pavement materials
- Construct kerb and gutters
- Construction of Council levee retaining wall
- Pavement sealing work including primer seal, asphalt and concrete works
- Construct footpaths
- Line marking
- Installation of road furniture.

Demobilisation:

- Remove waste and construction materials
- Remove temporary pedestrian crossing
- Remove crane pads and instream access
- Install scour stabilisation
- Shape and stabilise disturbed beds and banks
- Re-establish shared path below bridge
- Site rehabilitation and revegetation
- Remove pedestrian diversion for shared path
- Removal of stockpile and compound site.

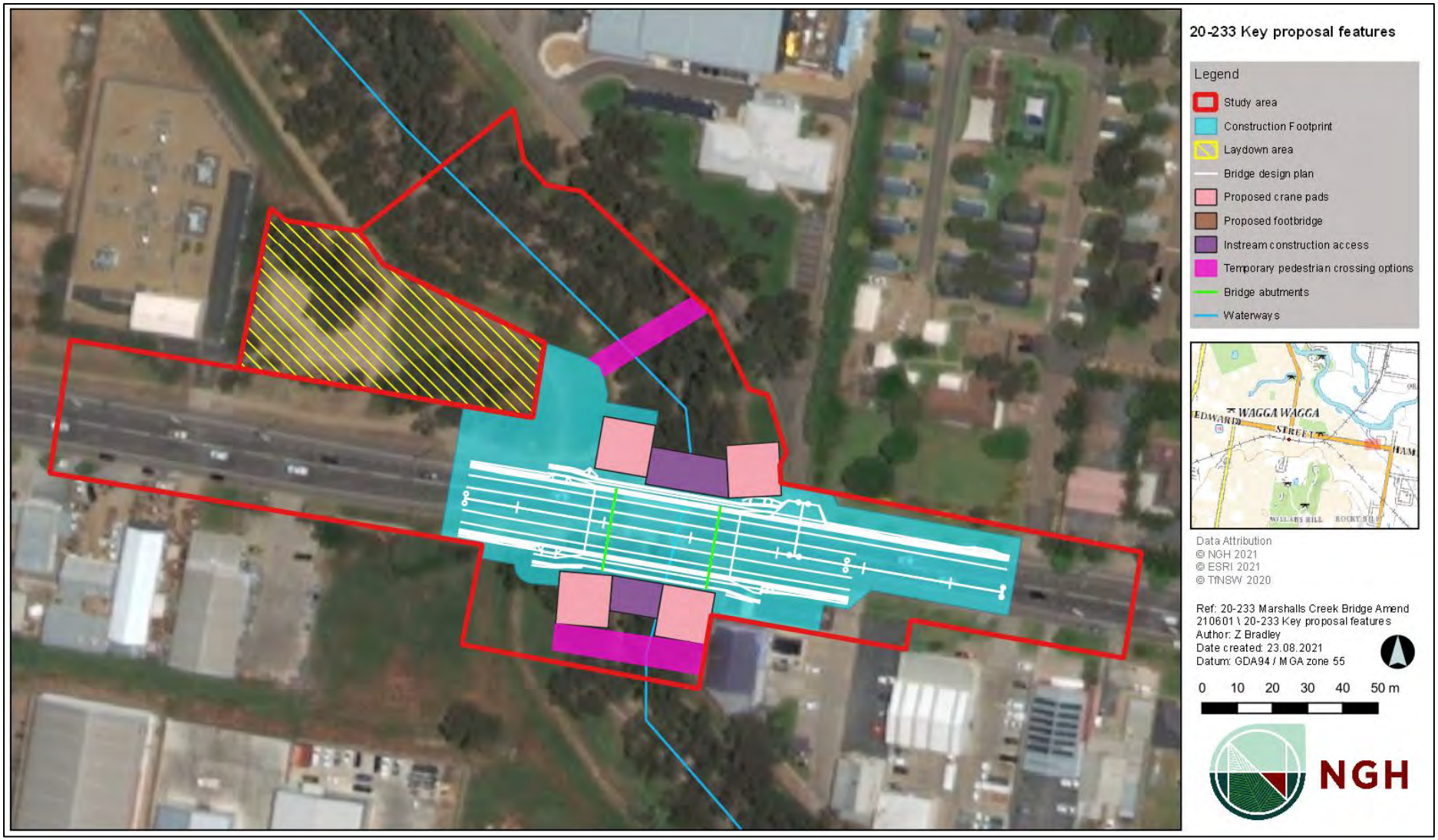


Figure 3-1 Key features of the proposal

3.2 Design

Design criteria

Marshalls Creek Bridge:

- Design and posted speed 60km
- Bridge road width of 18 m including:
- Four x 3.5m travel lanes
- Two x 2.5m shoulders
- One x 3m shared path (upstream)
- One x 1.8m pedestrian path (downstream)
- One-way cross fall of 2.5% across the bridge deck
- Maintain existing bridge deck height
- Maintain existing bridge alignment
- Maintain existing waterway area
- Maintain existing shared pedestrian underpass
- Flood friendly barrier
- Hybrid barrier for shared paths.

Road widening/ approaches:

- Design and posted speed 60km
- Sealed road width of 19 m including
  - Four x 3.5m travel lanes
  - Two x 2.5m shoulders
- Two-way cross fall of 3%
- Full depth asphalt with MCB20 sub-base pavement
- 1.5m footpaths and verges.

Engineering constraints

There are four key engineering constraints for the proposal:

- Confined work corridor
- Flood sensitivity
- Marshalls Creek
- Public utilities.

3.3 Construction activities

Work methodology

The exact detail of the construction methodology has not been defined to date. The detailed methodologies would be determined during the detailed design/construction planning phase. However, the construction of the proposal would occur in stages and an indicative work methodology is outlined below.

Bridge construction and demolition:

- Site establishment and compound erection
- Implement pedestrian diversions and Traffic Control Plan
- Implement environmental control measures
- Remove vegetation
- Services relocation
- Construct temporary pavement
- Construct temporary pedestrian crossing
- Position geotextile and place clean rock for crane pads and temporary instream creek crossings
- Divert traffic to southern side of the bridge with traffic control
- Remove pedestrian footpath on the southern side
- Install waterway environmental controls
- Partial bridge demolition on the northern side
- Partial removal of abutments
- Install piles for half of the new bridge
- Construct pier, abutments, and headstock for half of the new bridge
- Construct the deck for half of the new bridge
- Install bridge parapets and guard barrier
- Switch traffic to new bridge
- Demolish the remainder of the old bridge on the southern side
- Remove remainder of abutments
- Install piles for remainder of the new bridge
- Construct pier and headstock for remainder of the new bridge
- Construct the deck for remainder of the new bridge
- Install traffic parapets and guard barrier for the remainder of the new bridge.

Road approaches and widening:

- Public utility adjustments
- Replace drainage
- Milling of pavement
- Earthworks
- Modify stormwater drains and flood gates as required
- Pavement construction
- Construct kerb and gutters
- Construction of Council levee retaining wall
- Pavement work including primer seal, asphalt and concrete work
- Construct footpaths
- Line marking
- Installation of road furniture.

Demobilisation

- Remove waste and construction materials
- Remove temporary pedestrian crossing
- Remove crane pads and instream access
- Place rock scour stabilisation
- Shape and stabilise disturbed beds and banks

- Re-establish shared path below bridge
- Site rehabilitation and revegetation
- Remove pedestrian diversion for shared path.

Construction workforce

The size of the workforce required for the construction of the Proposal would fluctuate throughout the construction stage and final numbers would be identified by the construction contractor. It is estimated the workforce would be up to 18 people.

Construction hours and duration

Construction would take place over about 14 – 16 months, with work planned to commence mid-2022.

Work hours during construction would generally be limited to Standard Working Hours, with the exception of night work where needed for activities such as girder installation and stitch pouring.

Standard working hours:

- Monday – Friday 7:00 am to 6:00 pm
- Saturday 8:00 am to 1:00 pm
- Sunday and Public Holidays No work

The Interim Construction Noise Guidelines (EPA, 2009) recommend that work outside standard working hours only occur for the following reasons:

- The delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads
- Emergency work to avoid loss of life or damage to property or prevent environmental harm
- Maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- Public infrastructure works that shorten the length of the project and are supported by the affected community
- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours.

Plant and equipment

Plant and equipment needed for the proposal would be determined during the construction planning phase. Conventional civil construction equipment likely to be used during the work includes the following:

- Excavator
- Dump trucks
- Wacker packer
- Rollers
- Backhoe
- Loaders
- Concrete truck
- Pilling rig
- Vibrator
- Chainsaw
- Road profiler
- Trenching machine
- Crane
- Grader
- Delivery trucks
- Water cart

- Light vehicles
- Compactors
- Concrete pumps
- Bitumen trucks
- Line marking plant
- Hand tools.

Earthwork

The estimated earthwork volume for the proposed work including bridge abutment work, crane pad construction, underpass access track construction and road replacement work would be approximately 3000 m^3. The construction footprint is expected to be 0.89 ha including laydown areas.

Earthwork volumes are indicative only and may change as a result of the detailed design.

Source and quantity of materials

Several sources of materials would be required for the construction of the Proposal. These include:

- Quarry materials such as select fill, base and sub-base
- Aggregates
- Steel (reinforcement/ piles/flood gate)
- Pre-cast concrete (girder/parapets/drainage pits) structures
- Concrete
- Bitumen
- Asphalt
- Road furniture.

Most materials would be sourced from a local commercial provider. Some excavated fill materials onsite would be re-used as sub-base material.

Road and pavement material such as select fill, base and sub-base materials would be sourced from a licensed nearby quarry. Aggregates, bitumen and asphalt would be potentially sourced from the closest plant near construction site.

Steel, concrete and pre-cast concrete structures would be required for drainage, footpath and bridge work such as girders, bridge deck, parapets, piles, and bridge barriers.

Traffic management and access

To manage traffic flow during construction, a Traffic Management Plan (TMP) would be prepared in accordance with the 'Traffic Control at Work Sites Manual' (Transport for NSW, Sep 2020) and current Transport Specification *G10 – Traffic Management*, before commencement of construction. The plan would provide details of traffic management to be implemented during construction and how to manage traffic flow and driving conditions during construction

During the early phase of construction single (partial) lane closure of the bridge and approaches would be required to remove the pedestrian footpath on the southern side. Temporary traffic barriers and speed restrictions of 30km/h would be installed, if necessary, to separate the construction site from passing traffic.

It is anticipated that temporary detours would be required at night (10-15 nights) during construction. This may occur during girder installation and stitch pour for bridge deck. Where this occurs a detour route would be established utilising the Sturt Highway, Eunony Bridge Road, Byrnes Road, Bomen Road and the Olympic Highway for Heavy Vehicles, and Lake Albert Road and Kooringal Road for local traffic.

At other times during construction, traffic would be maintained through the project on the Sturt Highway. Speed limits within the construction footprint would be reduced to 20 km/h and stop/go traffic controls may be required at times. This would result in temporary traffic delays during the construction period only.

The proposal does not require any temporary restrictions or modifications to access for residences, commercial premises or agricultural land within vicinity of the construction footprint.

All construction vehicles would enter and exit the proposal site in a forward direction. The speed limit for all construction vehicles while within the proposal site would be restricted to 20 km/h.

During construction it is estimated that 15-20 construction vehicle movements per day would occur. Construction vehicles would travel to the Proposal site via the Sturt Highway.

3.4 Ancillary facilities

During construction, compound and stockpile sites would be needed. These facilities would be managed in accordance with Transport stockpile management procedure. Two potential compound and stockpile sites have been identified as suitable for use during construction. Site one is located approximately 290 m north east of Marshalls Creek Bridge (Figure 3-1). Site two is located 170 m south-east of Marshalls Creek Bridge (Figure 3-1).

Access to site one would be via the Sturt Highway and Kooringal Road. Access to site two would be from either the Sturt Highway or Nesbitt Street via the Sturt Highway, Kooringal Road, Sutton Street and Jones Street. No vegetation clearing is required at the proposed location of both stockpile and compound sites. Both sites have been subject to substantial disturbance and filling associated with past development.

The compound site would be comprised of transportable buildings, ablution facilities, a plant and materials laydown area and parking for the workforce. The stockpile site would be used to temporarily stockpile excavated and imported pavement material.

Construction and operation of the site compound and stockpile site would be managed so that it does not create odour, dust or other particulate matter. No acid sulfate soils, or contaminated waste would be stockpiled on site. The stockpile sites would be managed in accordance to Section 2.6 of the QA Specification R44 – Earthworks.

Operation of the compound and stockpile sites would generally be limited to standard work hours, with the exception of night work during girder installation and stich pouring. The nearest residential dwelling is located about 175 m northeast of site one, and 540 m north-west of site two and is unlikely to highly noise affected by the operation of site.

If it is identified that during the detailed design phase the location of the stockpile and compound sites needs to be changed, then the following must be considered when selecting an alternative site.

The alternative site is to be located:

- At least 40 metres away from the nearest waterway
- On land of low ecological and heritage conservation significance
- At least 100 metres away from residential dwellings and other land uses that may be sensitive to noise
- On relatively level ground
- On land outside the 1 in 10-year ARI floodplain.

3.5 Public utility adjustment

Public utilities located within the proposal footprint include:

- Gas pipeline
- Water main
- Electrical power poles and Street lights
- Telstra optic fibre
- NBN CO.

The APA GAS pipeline currently runs parallel to the existing highway and under the footpath across the bridge on the southern side.

The gas main would require relocation due to bridge replacement. The relocation would require underboring Marshalls Creek and connecting relocated pipe to the existing gas pipes on the southern side (east-west). The proposed gas relocation would be within the current road reserve.

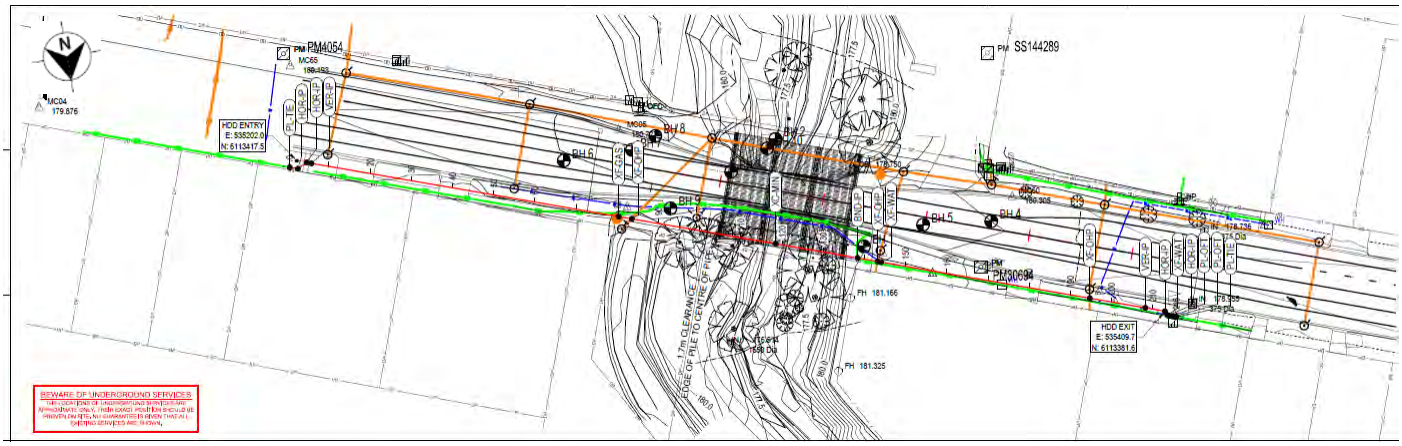


Figure 3-2 Location of existing gas main (green) and proposed gas relocation (red)

The water main is currently attached to the southern side of the bridge. Riverina water has confirmed to temporarily disconnect this service during construction period. A new water main would be attached to the bridge upon completion of construction.

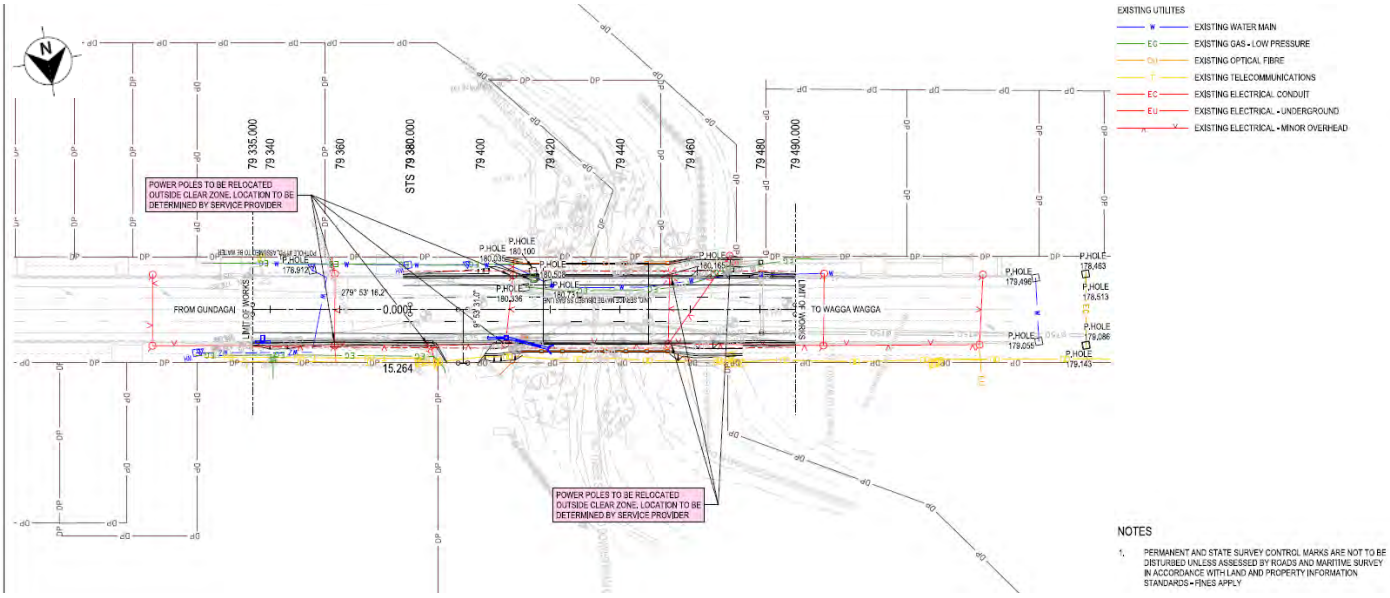


Figure 3-3 Location of existing water main (blue)

Due to the location of the bridge and approach, widening of the road is required. This would require the relocation of six power poles and four streetlights. The relocation would require underboring at three locations including Marshalls Creek (northern side) and road crossings on both sides of the bridge. The underbored cables will be connected to the existing electrical cables and street lights on the upstream and downstream side. These poles would be relocated within road reserve and streetlights would be attached to the power poles.

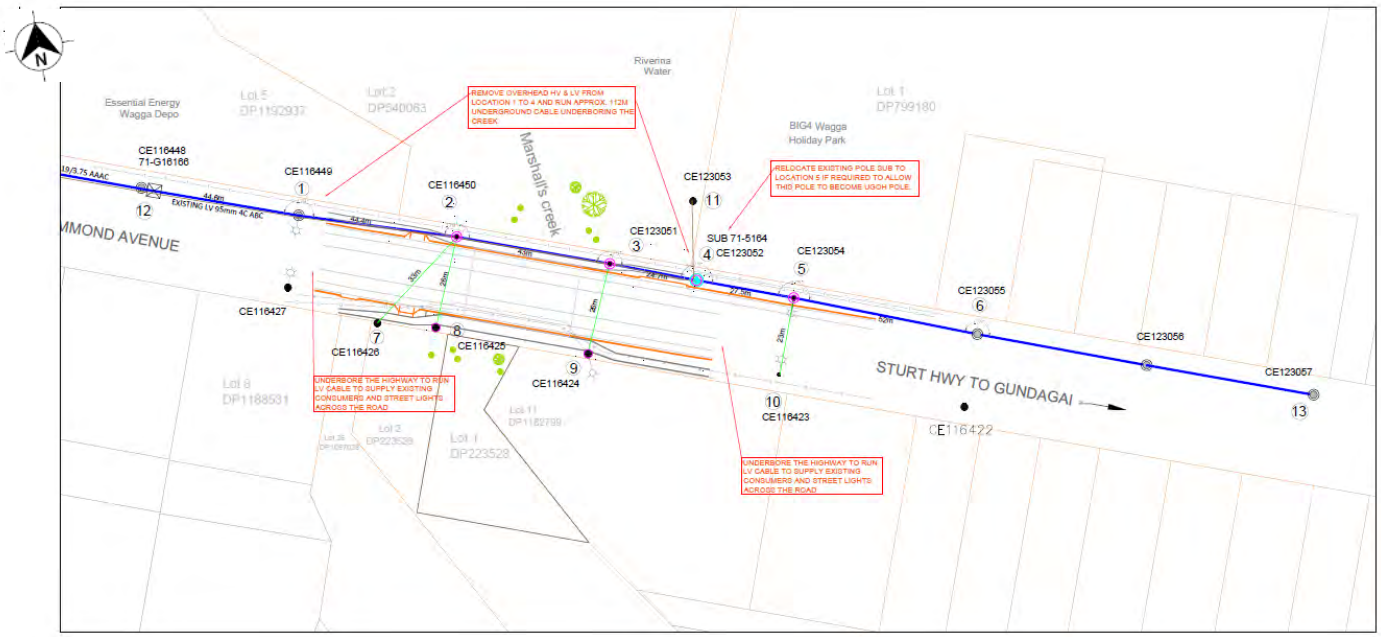


Figure 3-4a Location of proposed power poles relocation

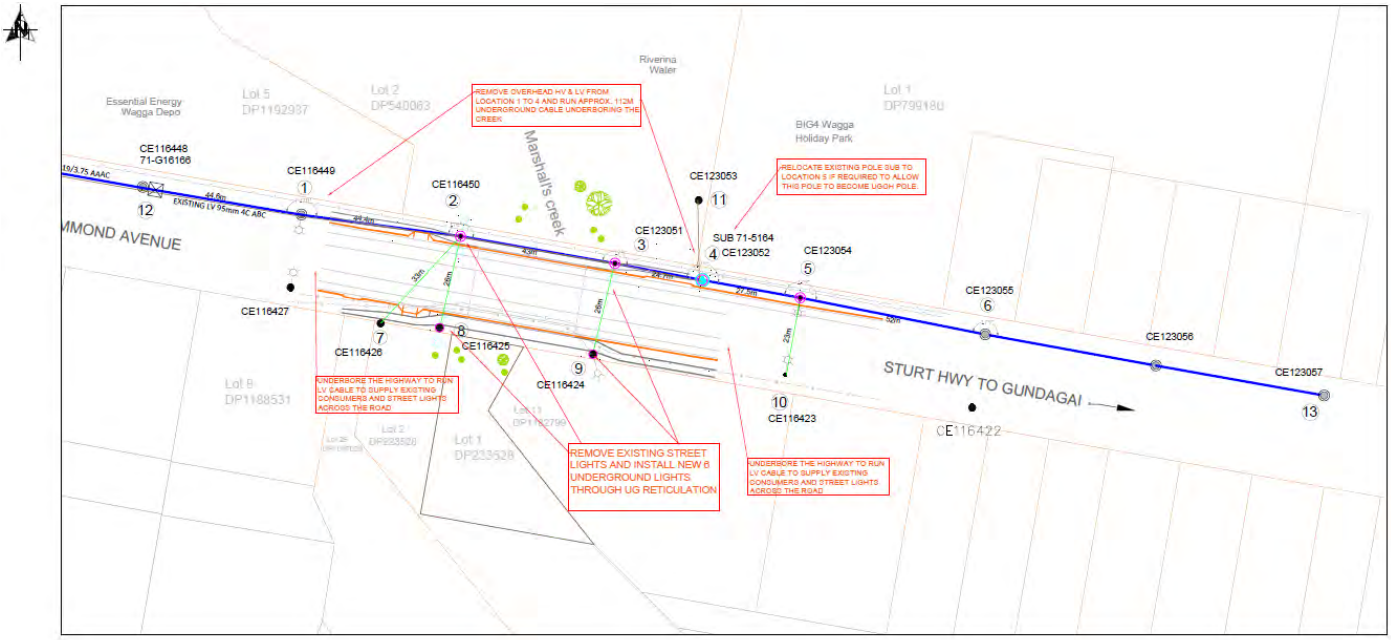


Figure 3-5b Location of proposed street lighting relocation

Telstra optic fibre and NBN CO cable would not require relocation for the proposed work. However, due to their proximity to the construction footprint protection measures would be required. The protection measures would involve concrete encasing of these assets.

Figure 3-6 Location of protection measures

3.6 Property acquisition

Property acquisition is not required for this project.

4 Statutory planning framework

4.1 Environmental Planning and Assessment Act 1979

State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of 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.

As the proposal is for a road and is to be carried out by Transport for NSW, 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 of ISEPP 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 ISEPP (where applicable), is discussed in chapter 5 of this REF.

State Environmental Planning Policy (Koala Habitat Protection) 2019

State Environmental Planning Policy – (Koala Habitat Protection) 2019 (Koala Habitat Protection SEPP) encourages the conservation and management of natural vegetation that provides habitat for Koalas. Koalas are listed under the BC Act as a vulnerable species. The Koala Habitat Protection SEPP applies to each local government area listed in Schedule 1. The study area is located within the Central West and Southern Tablelands Far West Koala Management Area, which is listed in Schedule 1.

Key to the application of the Koala Habitat Protection SEPP is determining “core Koala habitat”. Core Koala habitat means (a) an area of land where koalas are present, or (b) an area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat, and where koalas have been recorded as being present in the previous 18 years.

As per schedule 2 of the Koala Habitat protection SEPP, Koala Tree species are listed by regions (Koala Management Areas). Under the Central West and Southern Tablelands Far West Koala Management Area, two of the listed species were found within the study area.

The study area is identified on the Koala Development Application Map which forms part of the Koala Habitat Protection SEPP. This map identifies areas that have highly suitable Koala habitat.

Activities assessed under Part 5 of the EP&A Act are not subject to the Koala Habitat Protection SEPP. Koalas and their habitats are assessed under the BC Act.

Local Environmental Plan

Wagga Wagga Local Environmental Plan 2010

The Wagga Wagga Local Environmental Plan (Wagga Wagg LEP) 2010 aims to make local environmental planning provisions for land in Wagga Wagga in accordance with the relevant standard environmental planning instrument under section 3.20 of the Act.

The objectives of the Wagga Wagga LEP are:

- to optimise the management and use of resources and ensure that choices and opportunities in relation to those resources remain for future generations,
- to promote development that is consistent with the principles of ecologically sustainable development and the management of climate change,
- to promote the sustainability of the natural attributes of Wagga Wagga, avoid or minimise impacts on environmental values and protect environmentally sensitive areas,
- to co-ordinate development with the provision of public infrastructure and services.

4.2 Other relevant NSW legislation

Roads Act 1993

The objectives of this Act are:

- to set out the rights of members of the public to pass along public roads, and
- to set out the rights of persons who own land adjoining a public road to have access to the public road, and
- to establish the procedures for the opening and closing of a public road, and
- to provide for the classification of roads, and
- to provide for the declaration of RMS and other public authorities as roads authorities for both classified and unclassified roads, and
- to confer certain functions (in particular, the function of carrying out road work) on RMS and on other roads authorities, and
- to provide for the distribution of the functions conferred by this Act between RMS and other roads authorities, and
- to regulate the carrying out of various activities on public roads.

Section 138 of the Roads Act prohibits work on or over a public roadway without approval from the roads authority.

The proposed work would occur on a state road. The roads authority is the determining authority.

The relevant Road Authority for the proposal is Transport which comprises and undertakes the functions of the former RMS.

Biodiversity Conservation Act 2016

The purpose of this Biodiversity Conservation Act 2016 (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well–being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

This Act came into effect on 25 August 2017, replacing the Threatened Species Conservation Act 1995.

The BC Act regulates the clearing of native vegetation in NSW. Under Part 7 of the Act, an assessment of the potential impacts of the proposed activity on threatened species, populations, ecological communities and critical habitat listed in the BC Act must be undertaken. This includes assessment of the potential for a significant impact under section 7.3 (5-part test) and whether an impact is likely on an area of Outstanding Biodiversity Value.

The REF has assessed impacts to threatened species and communities in Section 6.1.

National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) promotes and regulates the management of national parks and historic sites or places of cultural value within the landscape and the conservation of certain fauna, native plants and Aboriginal objects and places.

The NPW Act provides the basis for legal protection and management of Aboriginal sites in NSW. All Aboriginal objects within the state of New South Wales are protected under Part 6 of the NPW Act. The implementation of the Aboriginal heritage provisions in the NPW Act is the responsibility of the Office of Environment and Heritage (OEH).

The NPW Act provides the basis for legal protection and management of Aboriginal sites in NSW. All Aboriginal objects within the state of New South Wales are protected under Part 6 of the NPW Act. The implementation of the Aboriginal heritage provisions in the NPW Act is the responsibility of the Office of Environment and Heritage (OEH).

Consent from the Director–General of the OEH is required under Section 87, for the investigation of Aboriginal sites, or Section 90, for the destruction to an Aboriginal object or Aboriginal place.

An assessment of potential impacts to Aboriginal cultural heritage is provided Section 6.6.

Biosecurity Act 2015

The objects of this Act are the following:

- To promote biosecurity as a shared responsibility between government, industry and communities
- To provide a framework for the timely and effective management of the following:
  - Pests, disease, contaminants and other biosecurity matter that are economically significant for primary production industries
  - threats to terrestrial and aquatic environments arising from pests, diseases, contaminants and other biosecurity matter
  - public health and safety risks arising from contaminants, non–indigenous animals, bees, weeds and other biosecurity matter known to contribute to human health problems
  - pests, diseases, contaminants and other biosecurity matter that may have an adverse effect on community activities and infrastructure
- To provide a framework for risk–based decision–making in relation to biosecurity
- To give effect to intergovernmental biosecurity agreements to which the State is a party
- To provide the means by which biosecurity requirements in other jurisdictions can be met, so as to maintain market access for industry.

Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.

Biosecurity risks are discussed in Section 6.1.

Heritage Act 1977

The objects of this Act are as follows:

- To promote an understanding of the State's heritage
- To encourage the conservation of the State's heritage
- To provide for the identification and registration of items of State Heritage Significance
- To provide for the interim protection of items of State Heritage Significance
- To encourage the adaptive reuse of items of State Heritage Significance
- To constitute the Heritage Council of New South Wales and confer on it functions relating to the State's heritage
- To assist owners with the conservation of items of State Heritage Significance.

Natural, cultural and built heritage is protected in NSW under the Heritage Act 1977. The Heritage Act allows for heritage items or places to be listed on the State Heritage Register, or for interim heritage orders to be made to protect heritage items or places. Approval must be obtained from the Heritage Council or local council before work can be done which might damage the item or place.

A person who wishes to demolish, move, alter or in some way develop a place, building or land covered by an interim heritage order or a State Heritage Register listing (called "environmental heritage") must first obtain approval from the Heritage Council. Any activity which might damage or destroy a tree or other vegetation on land or within a precinct relating to a heritage item also requires approval.

A person must not disturb or excavate land if they know or have reasonable cause to suspect that they might discover, expose, move or damage a relic, unless they have an excavation permit. A "relic" means any deposit, artefact, object or material evidence that relates to the non–Aboriginal settlement of NSW and that is of State of local heritage significance. Excavation permits are issued by the Heritage Council. All discoveries of relics must be notified to the Heritage Council, whether or not the person has been issued with a permit, and the location of the relic disclosed.

Heritage impacts are considered in Section 6.6 and Section 6.7.

Fisheries Management Act 1994

This Act provides conservation for fish and fish habitats and outlines approval processes for the activities that may impact on threatened species and habitats.

Key fish habitat is defined as aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species.

Marshalls Creek is identified as key fish habitat and occurs within the construction footprint.

A request for consultation was submitted to the Department of Primary Industries (DPI). No response was provided as of 2nd March 2021.

The REF has assessed impacts to key fish habitat and communities in Section 6.1.

4.3 Commonwealth legislation

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 A 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 A.

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 Environment under the EPBC Act.

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

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

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 94 of ISEPP 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 for NSW is the determining authority for the proposal. This REF fulfils Transport for NSW'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 Community involvement

Consultation with residents and local businesses, with the exception of directly impacted businesses, has not been carried out to date for the proposal.

5.2 Aboriginal community involvement

Under stage 1 of the Transport Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) guidelines, it is not a requirement to consult with the Aboriginal community about the Proposal.

5.3 ISEPP consultation

Clauses 13 to 16 of the ISEPP require consultation with councils and other public authorities for certain activities when proposing to carry out development without consent, as detailed in Appendix B.

A consultation email was sent to WWCC and NSW State Emergency Service (SES) on 30 November 2020. The email included an invitation to provide comment on the proposal and a copy of the draft REF was provided. A response was received from the SES and WWCC on 1 December 2020 (Appendix D).

Issues that have been raised as a result of consultation with WWCC are outlined below in **Table 5.3-1**.

Table 5.3-1 Issues raised through ISEPP consultation

Agency	Issue raised	Response/where addressed in REF
Wagga Wagga City Council	• The table on page 77 referring to topographical features has an elevation range of around 549 m, the particular area in question has a height of approximately 182 m. • Council indicated that a Flood Management Plan (FMP) must be developed by the contractor. Council requested the contractors to be made aware of the fact that Marshalls Creek can flood reasonably quickly and completely independently of the river. In 2012 the levee on the bridge at Marshalls Creek was closed on the 4th March and the river was only at a height of 8 m, the flooding was caused by Marshalls Creek. • The traffic control plan and bridge closure need to take into account emergency vehicle access. If this is not possible, reasonable detour routes must be identified.	• The elevation has been amended to 182 m. • Additional information regarding the likelihood of flooding of Marshalls Creek has been included in Section 6.2. Measures to maintain access to emergency vehicles, and to provide 4 weeks prior to the closure of both lanes in both directions along Hammond Avenue/Sturt Highway has been included in Section 6.3.
	• Closure of the underpass/pathway which is a part of Wiradjuri Walking Track during construction.	• Council have noted that this path will be closed. • Section 6.9
	Drainage • Council has no objection to the proposed drainage and structures.	• Sections 1 and 3.1

Agency	Issue raised	Response/where addressed in REF
	• Council has no objection to the relocation of flood gates.	• Section 3.3
	Flood sensitivities • Bridge barriers will be open type to cater for flood sensitivity. Alterations to existing flood gates.	• A temporary levee has been proposed for the construction phase of the project. Drainage works will alter existing flood gates • Section 2.5
	Bridge design • Overall bridge design will increase the existing waterway area and retain underpass.	• Section 2.5
	Detour routes • Council supports proposed heavy and light vehicle detour routes.	• Section 3.3
	• Council has no objection to the bus stop relocation and the removal of minor trees at the proposed location.	• Sections 1 and 3.1
	• Council has no objection to the relocation of street lighting as part of the bridge work.	• No objection, proposed by council • Section 3.5
NSW SES	• Ensure that emergency access is available during construction. • Traffic will be able to cross the bridge during construction. • Notification of delays in network operation to be forwarded to the SES.	• Notification to NSW SES 4 weeks prior to the closure of both lanes in both directions along Hammond Avenue/Sturt Highway has been included in Section 6.3. Refer also to Section 5.3.

5.4 Government agency and stakeholder involvement

Transport have consulted with WWCC, RWCC, Narellan Pools and Busabout as part of the development of the proposal. Consultation has occurred several times with each party between September 2019 and December 2020. Consultation has been in the form of meetings, emails and phone calls. The consultation with WWCC, RWCC, and Busabout have primarily related to access and the relocation of infrastructure.

A consultation email was also sent to NSW DPI Fisheries on 30 November 2020.

Agency / Stakeholder	Issue raised	Response/where addressed in REF
Wagga Wagga City Council **(Sept. 2019 to Aug 2020)**	• Retention of pedestrian underpass. • Stormwater and flood assets. • Bridge Design • Detour Routes • Lighting	• Section 1 and 3. Alteration of stormwater and flood assets agreed. Lighting, pedestrian access and detours agreed.
Riverina Water County Council (Dec. 2019 to Oct 2020)	• Water main relocation • Driveway width. • Alternative access. RWCC confirmed that no alternative access exists, and Sturt highway is the only entry/exit.	• Section 1 and 3 Access and water main relocation agreed.
Busabout (Sept. 2020 to Feb 2021)	• Relocation of the bus stop.	• Section 3.5 Relocation of bus shelter agreed.
NSW DPI Fisheries	• Nil Response	• N/A

5.5 Ongoing or future consultation

Future consultation is proposed regarding altered traffic conditions during construction.

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 B.

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

6.1 Biodiversity

6.1.1 Approach

Threatened Species Evaluation

Database searches were completed for records of Commonwealth and State listed threatened species, populations, and ecological communities. Searches were conducted on the 14 and 18 of May 2020 and included the following:

- NSW OEH threatened species subregion search.
- EPBC Protected Matters Search tool records within 10 km of the study area.
- NSW BioNet Atlas Search within 10 km of the study area.

Relevant literature was reviewed, which included OEH and EPBC Threatened Species Profiles.

No areas of declared outstanding biodiversity value as listed under the BC Act are present within the proposal area. The proposal area does not contain significant wetland communities.

An evaluation of the potential for threatened species to occur and be impacted by the proposal is shown in Appendix I.

Site Inspection

An initial field survey was conducted from the 14 May 2020 by an ecologist from NGH. Floristic surveys were completed to determine the vegetation communities present. The study area was surveyed using the 'random meander' method, as documented by Cropper (1993). The survey included an assessment of the condition and composition of existing vegetation. Hollow bearing trees and potential threatened species habitat were assessed. Opportunistic fauna sightings were also recorded. Species were recorded progressively with abundance recorded within proposal area. Any priority weeds were recorded opportunistically. Based on existing vegetation mapping (OEH_VIS_ID 4469) and the field survey, vegetation within the proposal area was assigned to a Plant Community Type (PCT) in accordance with the Vegetation Information System Classification Database (OEH).

An additional field survey was conducted on 12 May 2021 to assess the expanded development footprint. The survey methodology was the same as the initial field survey in 2020. During the 2021 field survey the original study area was reviewed to ensure data from the original survey remained relevant. Threatened Ecological Communities (TEC) were confirmed based on the relevant Scientific Committee – final determinations for each TEC. Botanical nomenclature follows Harden (1990–2002) and the PlantNet website, updated with recent changes recognised in Angiosperm Phylogeny Group (2016) and the Australian Plant Census.

6.1.2 Existing environment - flora

The study area is comprised of Plant Community Type (PCT) 5, River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW Southwestern Slopes Bioregion and the eastern Riverina Bioregion. (Table 6.1-2). Along the roadside and creek line the groundcover has been previously disturbed and contains a high number of exotics. A full flora species list is detailed in Appendix G. A total of 42 flora species were recorded within the study area, comprising 9 native species and 33 exotics.

Plant community types

The following plant community types were identified within the proposal area:

- PCT 5 River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW Southwestern Slopes Bioregion and the eastern Riverina Bioregion.

Exotic grassland and planted vegetation were also identified within the development footprint. The composition of vegetation within the development footprint is described below, Table 6.1-1.

Table 6.1-1: Development footprint vegetation composition

Vegetation / area	Size
River Red Gum (PCT 5)	0.20 Hectares
Exotic Grassland	0.30 Hectares
Planted vegetation	0.15 Hectares
Other (sealed road/driveway/path)	0.24 Hectares
TOTAL DEVELOPMENT FOOTPRINT AREA (including laydown)	**0.89 Hectares**

PCT was the only PCT inspected on the study site and has been detailed below, Table 6.1-2.

Table 6.1-2: Plant Community Types within study area.

PCT 5 River Red Gum herbaceous grassy very tall open forest wetland on inner floodplains in the lower slopes sub region of the NSW Southwestern Slopes Bioregion and the eastern Riverina Bioregion	
Vegetation Formation	Forested Wetlands
Vegetation Class	Inland Riverine Forests
Description	This vegetation community within the study area is a tall open forest dominated by River Red Gum (*Eucalyptus camaldulensis subsp. camaldulensis*) with trees averaging about 25 m high and a canopy cover of about 40%. In the proposal area the shrub layer is sparse with Silver Wattle (*Acacia dealbata*) and Sweet Briar (*Rosa rubiginosa*).* The ground stratum is dominated by exotic species including Purpletop (*Verbena bonariensis**), Flaxleaf Fleabane (*Conyza bonariensis**), Lamb's Tongue (*Plantago lanceolate**), Patterson's Curse (*Echium plantagineum*),* Scotch Thistle (*Onopordum acanhium**) Phalaris (*Phalaris aquatica**.), Wild Oats (*Avena fatua**), Perennial Ryegrass (*Lolium perenne *)* and Paspalum (*Paspalum dilatatum **).

	Some native species were also scattered throughout the study area. These include Common Couch (*Cynodon dactylon*), Rhodes Grass (*Chloris gayana*), Windmill Grass (*Chloris truncata*) and *Oxalis* sp.
Impact area	0.20 ha of River Red Gum is identified within the development footprint and is to be cleared as part of the proposal. 0.6 ha is identified within the broader Study area.
Condition	Moderate condition (Canopy intact, understory has a medium-high exotic component)
Conservation Status	This PCT does not form part of any Threatened Ecological Communities.
Fauna Habitat	The surrounding vegetation within the study area provides an over storey stratum for protection of a number of fauna species. Groundcover within the proposal area also provides foraging and nesting resources for native fauna. Riparian habitat is present within Marshalls Creek and includes emergent and sub-emergent vegetation.
Image	 **Figure 6-1 Example of PCT 5 within the study area.**

Material and plant laydown area

During construction, a compound and stockpile site would be required. There are two potential compound and stockpile sites that have be identified as suitable for use during construction. Site one is located approximately 290 m northeast of Marshalls Creek Bridge (**Figure 6-3**). Site two is located 170 m south-east of Marshalls Creek Bridge. Both sites have been previously cleared and disturbed and are also dominated by exotic groundcover.

Threatened Flora Species

No threatened flora species were identified during the site survey, however due to the timing of the site survey not all flora species within the study area may have been present. The occurrence of threatened flora species may not be ruled out. A search of the NSW BioNet Atlas, EPBC Protected Matters Search Tool and OEH threatened species search (by habitat and region) identified 38 threatened flora species with the potential to occur within the study area. A habitat evaluation was completed for all of these species (Appendix I). Based on this assessment habitat within the construction footprint was considered suitable for the Small Scurf-pea (*Cullen parvum*). An assessment of significance for this species have been conducted (Appendix J).

Threatened Ecological Communities (TECs)

No TEC's occur within the study area. PCT 5 does not form part of a TEC listed under the BC Act or EPBC Act.

Priority Weeds

Of the 42 flora species identified in the study area, 33 species were exotic. Six of these exotic species, Briar Rose (*Rosa rubiginosa*)*, Curse (*Echium plantagineum**), Flaxleaf Fleabane (*Conyza bonariensis*),* Khaki Weed (*Alternanthera pungens**), Bathurst Burr (*Xanthium spinosum**) and Scotch Thistle (*Onopordum acanthium**) are listed as priority weeds under the Biosecurity Act 2015

The *Biosecurity Act 2015* dictates that all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any land managers or authorities who deal with any plant has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Other exotic flora that was identified within the study area are common within the region and are often encountered within disturbed areas.

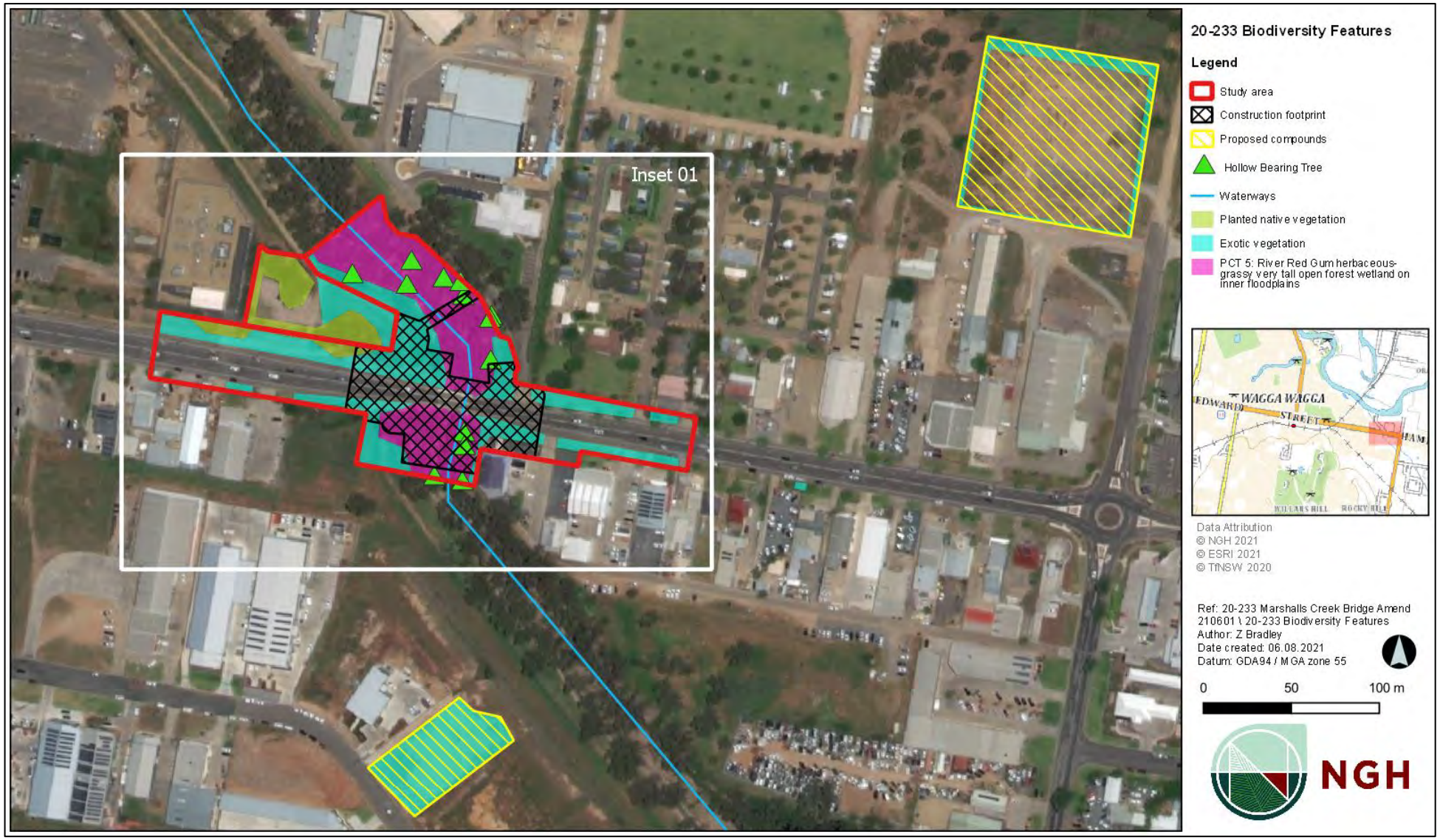


Figure 6-2 Biodiversity features

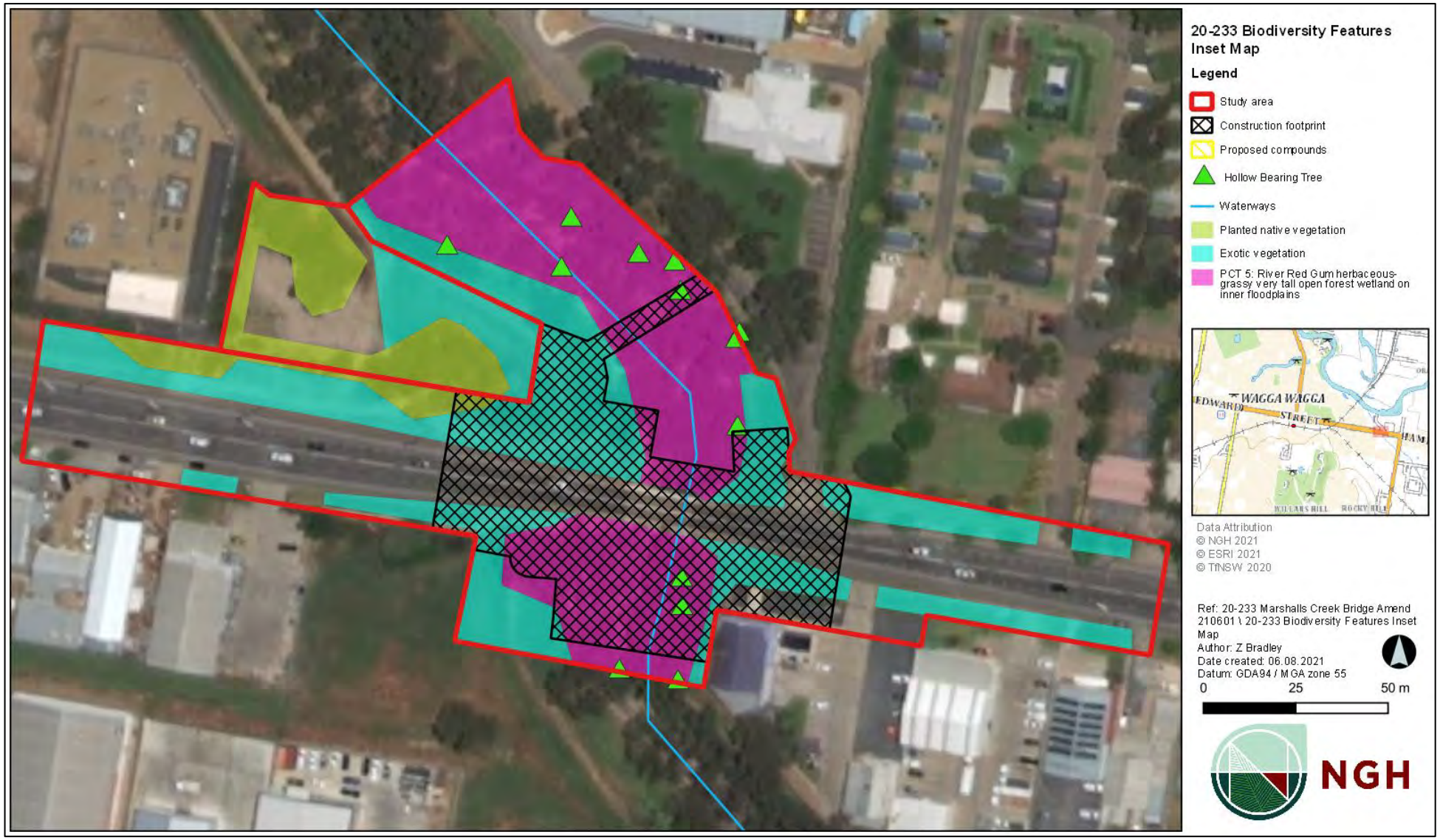


Figure 6-3 Biodiversity features within the proposal area (map 1)

6.1.3 Existing Environment - fauna

During the field surveys two bird species and one mammal was recorded. No threatened fauna was observed during the site survey. A species list has been provided in Appendix G. Fauna habitat identified during the field survey is provided in Table 6.1-3 below.

Table 6.1-3 Fauna habitat and fauna resources identified within the study area.

Habitat features	Description
Woodland vegetation	The majority of the surrounding vegetation within the study area has been previously cleared due to urban development. The limited over storey stratum that remains provides protection of a number of fauna species. Groundcover within the proposal area also provides provide foraging and nesting resources for native fauna.  Figure 6-4 Woodland vegetation within the proposal area.

Habitat features	Description
Aquatic habitat	Marshalls Creek is an intermittent creek which receives flows from the Kooringal Sewerage Treatment Works and is identified by NSW DPI as key fish habitat (Appendix E). Riparian habitat within the study area includes emergent and sub-emergent vegetation and limited imported rocky substrate and concrete in some areas.  Figure 6-5 Riparian habitat within Marshalls Creek.
Rocky outcrops and loose rock	There are no areas of rocky outcrops within the proposal area. Imported loose rock for scour protection is present at the bridge.
Fallen timber	Fallen timber is scarce within the proposal area. Any fallen timber adjacent to the creek is periodically inundated and unsuitable for ongoing habitat.
Hollow–bearing trees	Two hollow bearing trees (HBTs) were recorded within the proposal area. Both these trees are mature River Red Gums (*Eucalyptus camaldulensis*) in good condition. A further eleven HBTs were identified within the broader study area during the site visit. All HBTs within the study areas were mature trees in good condition. One tree with a hollow was harbouring a Common Brushtail Possum (*Trichosurus vulpecula*) at the time of the inspection.

Habitat features	Description
	 Figure 6-6 Example of a HBT within the study area .

Koala Habitat Assessment

Core Koala habitat has been assessed using the Koala Habitat Assessment Tool from the Commonwealth EPBC Act Referral Guidelines for the Vulnerable Koala (DOE 2014); refer to. Mature secondary food tree species are present within the proposal area: River Red Gum and Yellow Box.

The site qualifies as 'Koala Habitat' under the Guidelines; however it is not considered habitat critical to the survival of the Koala, having scored three using the Habitat Assessment Tool (Table 6.1-4). The referral guidelines indicate that proposals involving less than two hectares of habitat clearing and a score of five or less are not recommended for referral to the Commonwealth. Therefore, an Assessment of Significance is not required.

Table 6.1-4 Koala habitat assessment tool

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	
	0 (low)	None of the above.	✓

Attribute	Score	Inland	Applicable to the proposal?
			No records within 10 km of the proposal area within the last 10 years
Vegetation composition	+2 (high)		✓ River Red Gum and Yellow Box feed tree species present.
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	
	+1 (medium)	Area is part of a **contiguous landscape** < 1000 ha, but ≥ 500 ha.	
	0 (low)	None of the above.	✓ Area is not part of a contiguous landscape
Key existing threats	+2 (high)		
	+1 (medium)		✓ Some vehicle threat may be present, several residential properties located adjacent to proposal area, some dog threat may be present.
	0 (low)		

Attribute	Score	Inland	Applicable to the proposal?
		present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Habitat within the proposal area is not considered a refuge, nor does it provide important connectivity to large areas surrounding a habitat refuge
Total	**3**	**Decision: Habitat not critical to the survival of the Koala—assessment of significance not required**	

Threatened species

No threatened fauna species were identified during the site survey. However, due to the timing of the site survey, not all fauna species within the study area may have been present. The occurrence of threatened fauna species may not be ruled out. A search of the NSW BioNet Atlas, EPBC Protected Matters Search Tool and OEH threatened species search (by habitat and region) identified 49 bird, 15 mammal, three amphibian, four reptile, three fish, one invertebrate and 11 migratory species that have the potential to occur within the study area. A habitat evaluation was completed for all of these species (Appendix I). Based on this assessment the following threatened species have suitable habitat within the proposal area and may occur. Assessments of significance have been conducted for the following birds and mammals (Appendix J).

- Black Falcon - BC - V
- Little Eagle - BC - V
- Little Lorikeet - BC - V
- Turquoise Parrot - BC -V
- Superb Parrot - BC - V; EPBC - V
- Diamond Firetail - BC - V
- Corben's Long-eared Bat - BC - V; EPBC - V
- Yellow-bellied Sheathtail Bat - BC - V
- Southern Myotis - BC - V
- Squirrel Glider - BC - E

6.1.4 Potential impacts

The proposed work would require the removal of 0.20 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.30 ha of exotic vegetation and 0.15 ha of planted native vegetation. Two hollow bearing trees would be removed. Fallen timber would be retained on site where safe to do so.

Minor removal of imported rock habitat, aquatic vegetation, and creek bed gravels along the banks and within the creek would occur. This would remove some minor habitat for amphibians and fish. The habitat directly surrounding the bridge is highly disturbed, however more suitable habitat of higher quality for amphibians and fish does exist further upstream and downstream of the bridge. The installation of bridge piles may disturb the creek bed gravels but are not expected to lie within aquatic habitat or free flowing water. Further excavation of the creek banks and the installation of temporary crane pads and stabilised instream creek crossings (with pipes for stream flow) would modify the bed of the existing stream for a period of time.

Marshalls Creek is identified as key fish habitat (KFH). Completion of the habitat evaluation (Appendix I) found no threatened fish species are considered likely to occur or rely upon habitat within Marshalls Creek. The condition of the KFH within the development footprint was poor during the time of the site inspection, with limited flows, a dominance of exotic vegetation and presence of rubbish and rubble. This condition may be subject to change during periods of seasonal inundation. The temporary instream creek crossings must be designed so that the passage of fish will not be blocked.

The removal of habitat within the immediate vicinity would be temporary and rock scour protection work would be reinstated following construction of the bridge. Rehabilitation post construction would seek to improve the quality of riparian vegetation and aquatic habitat in the long term.

There would be no impact to the distribution of native vegetation locally or regionally. The existing vegetation provides good soil stability, which means that revegetation activities should occur quickly after construction is completed. It is likely that post construction, similar vegetation would recolonise the affected areas.

Birds

An assessment of significance (Appendix J) was completed for the threatened bird species with the potential to occur within the construction footprint. The assessments concluded that there is unlikely to be a significant impact due to the following:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- Two of the eleven hollow bearing trees would be impacted
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any key threatening process would be expected
- Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to individual animals of these species
- The proposal would not interfere with the recovery of these species.

Flora

An assessment of significance (Appendix J) was completed for the Small Scurf-pea. The assessment concluded that there is unlikely to be a significant impact due to the following:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any key threatening process would be expected
- Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to individual plants of this species
- The proposal would not interfere with the recovery of this species.

Mammals

An assessment of significance (Appendix J) was completed for four threatened mammal species. The assessment concluded that there is unlikely to be a significant impact due to the following:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- Two hollow bearing trees would be impacted
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any key threatening process would be expected

- Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to individual animals of this species.
- The proposal would not interfere with the recovery of this species.

Conclusion on significance of impacts

The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

The proposal is not likely to significantly impact threatened species, ecological communities or migratory species, within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999*.

Is there a real chance that the activity threatens the long term survival of nationally listed biodiversity matters?	**No**
Has the consistency of the activity with relevant recovery plans, threat abatement plans, conservation advice and guidelines provided by the Australian Government been considered?	Yes
Can suitable offsets be secured?	N/A

6.1.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	A Flora and Fauna Management Plan will be prepared in accordance with Transport for NSW's *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA, 2011) and implemented as part of the CEMP. It will include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • Requirements set out in the *landscape guideline* (RTA, 2008) • Pre-clearing survey requirements • Procedures for unexpected threatened species finds and fauna handling • Procedures addressing relevant matters specified in the *policy and guidelines for fish habitat conservation and management* (DPI Fisheries, 2013) • Protocols to manage weeds and pathogens.	Contractor	Detailed design/pre-construction	Section 4.8 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to the threatened species including birds, mammals and flora.			
Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contractor	Detailed design/pre-construction	
Biodiversity	An Environmental Work Method Statement for Clearing and Grubbing must be prepared and approved by the project Environmental Officer prior to starting work. The EWMS must include at least the following: • 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.	Contractor	Detailed design/pre-construction	
Biodiversity	Prior to the commencement of any works, a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in	Contractor	Pre-construction	Roads and Maritime Service's *Biodiversity Guidelines – Protecting and*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 2: exclusion zones* (RTA 2011).			*Managing Biodiversity on RTA Projects: Guide 2: exclusion zones* (RTA 2011).
Biodiversity	Clearing of native vegetation should be carried out in accordance with *Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of bushrock)* (RTA 2011).	Contractor	Pre-construction/ construction	*Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of bushrock)* (RTA 2011).
Biodiversity	Clearing of hollow bearing trees is to be conducted in accordance with *Transport for NSW Biodiversity Guidelines - Guide 1 (Pre-clearing process).* A qualified ecologist must be present on site during the removal of hollow bearing trees to supervise the works.	Contractor	Pre-construction /construction	Transport for NSW *Biodiversity Guidelines - Guide 1 (Pre-clearing process).*
Biodiversity	Fauna handling must be carried out in accordance with the requirements of the Transport for NSW *Biodiversity Guidelines - Guide 9 (Fauna Handling).*	Contractor	Pre-construction /construction	Transport for NSW Biodiversity Guidelines - Guide 9 (Fauna Handling).
Biodiversity	All pathogens (e.g., Chytid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management)* and *DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*	Contractor	Construction	Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management). DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*
Biodiversity	A Weed Management Plan will be developed to prevent/minimise the spread of weeds in accordance with *Guide 6 (Weed Management) in the Roads and Maritime Biodiversity Guidelines (RTA 2011).*	Contractor	Detailed design/pre-construction	Guide 6 (Weed Management) in the Transport for NSW Biodiversity Guidelines (RTA 2011).
Biodiversity	Priority weeds are to be managed according to requirements under the Biosecurity Act, 2015 and *Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines 2011*.	Contractor	Construction	Biosecurity Act (2015). Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines 2011.
Biodiversity	Any herbicide use will be undertaken according to	Contractor	Construction	Environmental Fact Sheet 18 - Herbicide

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Environmental Fact Sheet 18 - Herbicide application (RMS, 2013).			application (RMS, 2013).
Biodiversity	Pruning of mature trees is to be in accordance with Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*	Contractor	Construction	Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*
Biodiversity	All coarse woody debris is to be retained on site where possible in accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RTA 2011).* Any vegetation too large to be mulched will be placed as course woody debris (CWD) along suitable areas of Marshalls Creek, in consultation with Transport environment officer or manager.	Contractor	Construction	*Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RTA 2011).*
Biodiversity	Works are not to create an ongoing barrier to the movement of wildlife.	Contractor	Construction	
Biodiversity	Temporary instream creek crossings must be designed so that the passage of fish will not be blocked. Temporary instream creek crossings are to be designed in accordance with *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI).	Contractor	Detailed design/pre-construction	*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI)
Biodiversity	Rehabilitation of the creek bank would use native endemic riparian species.	Contractor	Post-construction	

6.2 Hydrology, flooding and water quality

6.2.1 Existing environment

The proposal is located within the Murrumbidgee Catchment managed by the Riverina Local Land Services (LLS). The climate is extremely diverse ranging from alpine conditions in the headwaters of the Snowy Mountains to the semi-arid conditions of the Riverina plains in the west (NSW DPI Water 2011).

Major rivers within the Murrumbidgee catchment area include the Yass River, the Murrumbidgee River and Goodradigbee River which flow into Lake Burrinjuck and supply irrigation water for the Riverina (NSW DPI Water 2011).

The proposal involves construction within Marshalls Creek, which flows to the Murrumbidgee River. Marshalls Creek is classified as a 4th order stream under the Strahler (1952) method and is identified as key fish habitat (KFH) (Figure 6-7, Appendix E).

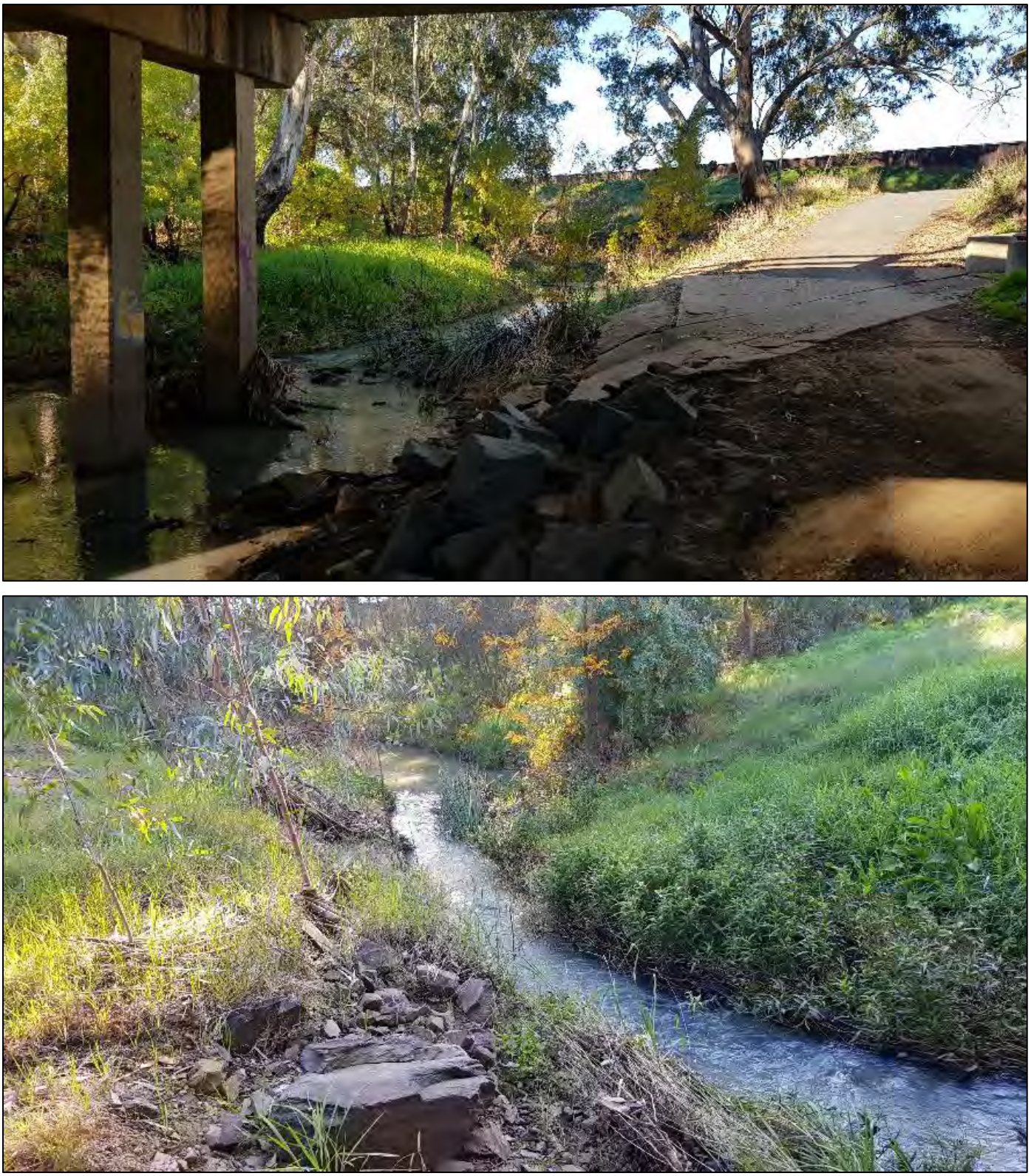


Figure 6-7 Example of the Marshalls Creek water feature within the construction footprint.

Groundwater Vulnerability

The construction footprint is land mapped as Groundwater Vulnerability by the Wagga Wagga Local Environmental Plan (LEP) 2010. The clause 7.6 of the Wagga Wagga LEP for areas mapped as Groundwater Vulnerability states:

Development consent must not be granted for development specified for the purposes of this clause on land to which this clause applies unless the consent authority is satisfied that the development—

(a) is unlikely to adversely impact on existing groundwater sources, and

(b) is unlikely to adversely impact on future extraction from groundwater sources for domestic and stock water supplies, and

(c) is designed to prevent adverse environmental impacts, including the risk of contamination of groundwater sources from on-site storage or disposal facilities.

The proposal is not listed as specified development subject clause 7.6.

Groundwater Dependent Ecosystems (GDEs)

Groundwater plays an important role in sustaining aquatic and terrestrial ecosystems, such as springs, wetlands and vegetation. Ecosystems that rely on groundwater for some or all of their water requirements are classed as Groundwater Dependent Ecosystems (GDEs). Marshalls Creek, within the study area, is mapped as having high potential for aquatic GDEs and moderate to high potential for terrestrial GDEs (Appendix E).

Flooding

The study area is flat to gently sloping located adjacent to the Murrumbidgee Floodplains, with an elevation of 185 m ASL. A search of the Wagga Wagga LEP (2010) found the construction footprint is located within a flood prone area. Some short-term localised flooding may occur on site following extreme rainfall events or from flooding in the adjacent Murrumbidgee River. The last large flood event in Marshalls Creek occurred on 4th March 2012 (Figure 6-8). The flood required the levee adjacent the western bridge abutment to be erected.

Figure 6-8 Marshalls Creek Bridge March 2012.

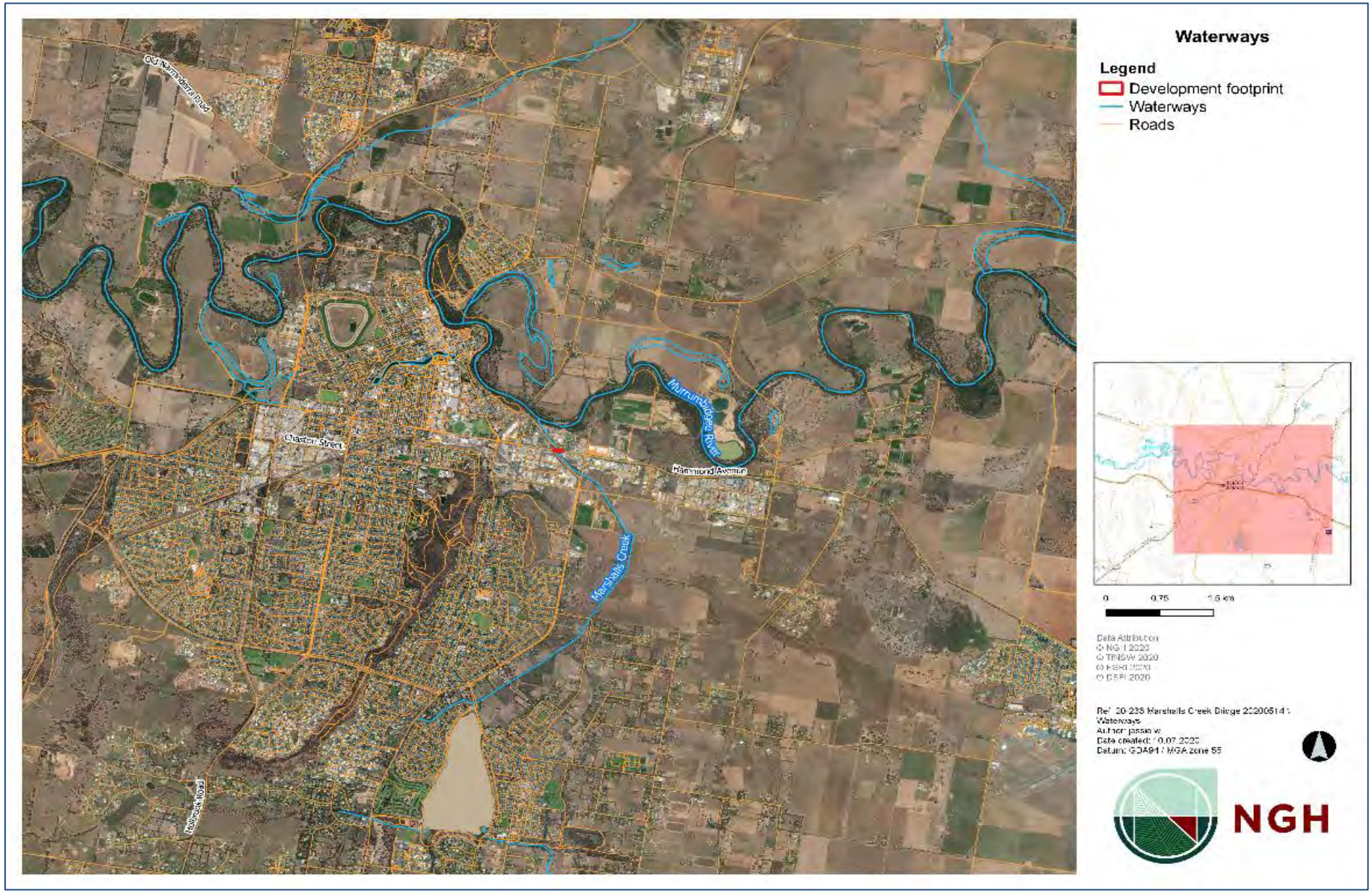


Figure 6-9 Major waterways within the study area.

Contamination

A Detailed Site Investigation (DSI) was completed by Jacobs Group (Australia) Pty Ltd for a comprehensive investigation of per- and polyfluoroalkyl substances (PFAS) at the RAAF Base Wagga, 2018. The investigation included Marshalls Creek and observed the extent of PFAS contamination was above the investigation criteria for ecological protection in surface water along Marshalls Creek drainage pathway. Marshalls Creek is a main surface water drainage pathway from the RAAF Base, where PFAS impacts are significant.

In March 2021 an Environmental Site Investigation was completed by Jones Environmental Consulting for potential contamination within the development footprint. PFAS was detected within the footprint, however it was found to be limited to shallow soil locations likely deposited by past flood events (Appendix L). The concentration of PFAS detected is below the PFAS National Environmental Management Plan (NEMP) criteria for both ecological and human health, however exposure to these chemicals should be limited.

6.2.2 Potential impacts

Impacts to surface and groundwater water quality during construction would mostly occur during bridge and road work. During this stage there is potential for construction material, chemicals (from construction work, refuelling activities, concrete curing or plant failure), and sediment-laden runoff from the work site to enter the creeks. To minimise the risk of sediment-laden runoff, stockpiles will be located outside of the waterway west of the levy bank. Pilling may also disturb the creek bed gravels disrupting sediment in the waterway. In addition, the use of piling and coffer dams has the potential to minimise the available waterway area adjacent to the bridge work. Should flooding in the Marshalls Creek catchment and or the Murrumbidgee River be predicted measures in the Flood Management Plan for the project would be activated. The Flood Management Plan would minimise the potential impacts of the work during floods.

The removal of vegetation within the development footprint may destabilise the banks and potentially result in exposure of soils to erosion hazards, causing sedimentation of the waterway. Disturbance of the channel banks during the removal of vegetation is likely to result in temporary minor increases in turbidity.

During construction, temporary creek crossings would be installed upstream and downstream of the bridge for the construction machinery. There is potential for the creek crossings to impede the flow of Marshalls Creek and disturb sediment in the waterway.

During the proposed work, temporary containment measures and the use of dewatering processes during the curing of concrete would minimise the risk of contaminants entering the creek. The risk of impact to water is likely to be short term, localised, and not lead to a noticeable deterioration in water quality either locally or downstream. The risks are also readily minimised or avoidable and manageable through the implementation of standard construction environmental controls. Considerations with regards to the known PFAS contamination in the sediment and water of Marshalls Creek will require further management, as outlined below in the mitigation measures.

PFAS exposure pathways to human receptors are through dermal contact (contact with the skin) or through incidental ingestion. Human exposure and disturbance of sediments and water from the creek will need to be managed with the mitigation measures outlined below.

The proposal may result in a number of potential contamination sources being identified on the site during construction. Fuel and oil for construction plant and equipment are potential sources of contamination. Due to the work occurring adjacent to a water course, there is potential for water contamination to occur as a result of accidental spills. Fuels and oils for refuelling would be stored in doubled bunded areas in the site compound, and refuelling activities would occur in doubled bunded areas within the designated compound site. Plant and equipment would be routinely inspected and maintained during the work. Sewage levels from toilets and ablutions would be monitored and removed from site regularly.

Flooding of the site during the work is possible. In the event of a flood, the temporary instream creek crossings may break free and be carried downstream in the floodwaters. This could result in damage to the pedestrian crossing, Marshalls Creek Bridge, and the creek bed and banks, as well as adding to debris in the waterway. In the instance of a flood in the Murrumbidgee River, a warning would be issued by the NSW State Emergency Service (SES). The warning would include the expected impacts of flooding in the Wagga Wagga LGA (NSW SES 2019). The Bureau of Meteorology would also issue a severe weather warning for flash flooding when

those conditions are expected (NSW SES 2013). Flash flooding warnings are issued within 6 to 24 hours of potential flooding. This time period would allow sufficient time to move the temporary instream crossing, plant and equipment to areas above the Predicted flood height (NSW SES 2019). These procedures will be detailed in a Flood Management Plan for the site.

Rehabilitation of disturbed areas would be staged to occur during and post construction. Operational risks to water quality would remain unchanged from the current conditions once stabilisation has been achieved.

6.2.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	Section 2.1 of QA *G38 Soil and Water Management*
Soil and water	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan The Plan will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G38 Soil and Water Management*
Soil and water	Erosion and sediment control measures will be implemented to mitigate any impacts.	Contractor	Detailed design/Pre-construction, Construction	Managing Urban Stormwater: Soils & Construction Guidelines (the Blue Book) (Landcom 2004), Section 3.1 of QA *G38 Soil and Water Management*
Soil and water	Establish erosion control and sediment capture measures, and maintain them regularly, to divert offsite stormwater, manage onsite stormwater runoff and stabilise stockpiles.	Contractor	Construction	Section 3.5 of QA *G38 Soil and Water Management,* RMS Technical Guideline

Impact	Environmental safeguards	Responsibility	Timing	Reference
				EMS-TG-010: Stockpile Site Management, the Blue Book.
Soil and water	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	Contractor	Construction	ESCP
Soil and water	Prepare an Environmental Work Method Statement (EWMS) for the work.	Contractor	Detailed design/Pre-construction	Section 3.7 of QA *G38 Soil and Water Management*, Section 3.2.4 of QA G36 *Environmental Protection*
Soil and water	There is to be no release of dirty, impacted or otherwise, water into drainage lines and/or waterways.	Contractor	Construction	SWMP
Soil and water	The creek bed gravels, creek bank and adjacent riparian vegetation will be stabilised and rehabilitated similar to pre-construction condition upon the completion of construction.	Contractor	Construction/ operation	Section 4.16 of QA G36 *Environmental* Protection
Soil and water	Temporary containment measures and the use of dewatering processes during the curing of concrete will minimise the risk of contaminants entering the creeks	Contractor	Construction	SWMP
Soil and water	Vehicle wash down and/or cement truck washout is to occur in a designated concrete washout area as approved on a site specific ESCP.	Contractor	Construction	ESCP
Soil and water	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities.	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection, SWMP, Transport for NSW Code of Practice for Water Management (RTA, 1999), EPA Bunding and Spill management Guidelines

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and trained in its use.	Contractor	Construction	SWMP
Soil and water	All fuels, chemicals and lubricants are to be stored in an impervious doubled bunded area either: • 50 m away from any aquatic habitat, flood prone areas, or on slopes steeper than 1:10 • Behind effective flood levy bank.	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection,
Soil and water	Refuelling of plant and equipment is to occur in impervious double bunded areas in accordance with a site-specific refuelling control plan.	Contractor	Construction	SWMP
Soil and water	Adequate incident management procedures will be incorporated into the Construction and Operation Environmental Management Plans, including requirement to notify EPA for incidents that cause material harm to the environment.	Contractor	Construction	CEMP, OEMP, Section 147 – 153 POEO Act.
Soil and water	A Flood Management Plan (FMP) will be prepared and implemented as part of the CEMP. The FMP will identify all reasonably foreseeable risks relating to the event of a flood and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	
Soil and water	The design of the temporary creek crossing will ensure fish passage, stability, and flow of Marshalls Creek. Rock used to construct temporary creek crossings must be clean.	Contractor	Detailed design/pre-construction	
PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.	Contractor/Transport	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0
PFAS contaminated water and sediment	Soil and water removed from the Marshalls Creek waterway are to be tested for PFAS contaminants prior to re-use or disposal in	Contractor	Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	accordance with relevant standards and requirements.			

6.3 Traffic and transport

6.3.1 Existing environment

Access to the proposal area would be via a network of sealed public roads. Major roads near the proposed work would be used as transport routes, and include:

- Hammond Avenue
- Edward Street
- Sturt Highway
- Kooringal Road
- Copland Street
- Lake Albert Road
- Eunony Bridge Road
- Byrnes Road
- Bomen Road
- Olympic Highway.

The NSW Roads and Traffic Authority (RTA) developed a set of road hierarchy classifications (Table 6.3-1), indicating typical nominal volumes in terms of average annual daily traffic (AADT) serviced by various classes of road.

Table 6.3-1 Functional classification of roads.

Type of Road	Traffic Volume (AADT)	Peak Hour Volume (vph)
Arterial	>15,000	1,500 – 5,5600
Sub-Arterial	5,000 – 20,000	500 – 1,000
Collector	2,000 – 10, 000	200 – 1,000
Local	<2,000	0 - 200

Hammond Avenue, Edward Street, Eunony Bridge Road, Byrnes Road, Bomen Road, Olympic Highway and the Sturt Highway are arterial roads and are likely to experience traffic volumes of greater than 15,000 vehicles daily. Kooringal Road, Copland Street and Lake Albert Road are sub-arterial roads and are likely to experience traffic volumes of 5,000 to 20,000 daily.

6.3.2 Potential impacts

During the early phase of construction, the Proposal would require partial lane closure of the Sturt Highway. During night works (10-15 nights), closure of both lanes in both directions would be required. Where this occurs a detour route for Heavy Vehicles would be established utilising the Sturt Highway, Eunony Bridge Road, Byrnes Road, Merino Road and the Olympic Highway. For light vehicles and local traffic Lake Albert Road and Kooringal Road would serve as a detour. Detour roads are assessed to be able to handle the increased detour traffic load in accordance with their functional classification.

Additional heavy vehicle movements are expected for the movement of plant and materials. Some additional light vehicle movements would occur because of staff needs for the proposal. These movements are considered very minor in relation to existing conditions.

When detours are in place, traffic volumes would increase on the detour routes. No impacts would occur to traffic volumes on the local roads following the completion of the work. The work would result in improved traffic flow and reduced congestion.

6.3.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • 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.	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G10 Traffic Management,* Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018)
Traffic and transport	Existing access for nearby and adjoining properties, businesses and roads is to be maintained at all times during the works unless otherwise agreed to by the affected property owner.	Contractor	Construction	TMP
Traffic and transport	Local and regional road users will be informed of any expected traffic or access changes and delays prior to construction commencing.	Contractor	Pre-construction, construction	TMP
Traffic and transport	WWCC, SES, adjoining properties and businesses will be notified 4 weeks prior to the closure of both lanes in both directions along Hammond Avenue/Sturt Highway.	Contractor	Pre-construction, construction	TMP

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	All complaints are to be recorded on a Complaints Register and attended to promptly.	Contractor	Construction	TMP

6.4 Noise and vibration

6.4.1 Methodology

The construction noise and vibration assessment has been prepared in accordance with the policies and guidance administered by the Environment Protection Authority (EPA), including:

- NSW Interim Construction Noise Guideline (ICNG) 2009
- NSW Noise Policy for Industry (NPfI) NSW EPA 2017

The NSW Interim Construction Noise Guideline (ICNG) 2009 provides guidance on the measurement and management of construction noise impacts. The guideline requires a quantitative assessment of noise impacts when works are likely to impact an individual or sensitive land use for more than three weeks in total. A quantitative noise assessment has been conducted.

The ICNG describes the 'noise management levels' (NML's), for residences and other sensitive receivers. For work during standard working hours, residences are considered noise affected when construction noise is 10 dB(A) above the rating background level (RBL) and 'highly noise affected' when construction noise is above 75 dB(A). Work outside standard working hours affect sensitive receivers when construction noise is 5 dB(A) above the RBL (ICNG 2009).

Under the RMS Noise Criteria Guideline the proposed work is considered to be "minor works" given the bridge realignment is minor and traffic volumes, percentage of heavy vehicles and speed would not increase. An operational noise assessment is not required where the minor works would not increase noise levels by more than 2.0dBA relative to the existing noise levels at the worst affected receiver. Given a 2.0dBA increase in traffic noise during operation is highly unlikely, an operational noise assessment is not necessary.

6.4.2 Existing environment

The existing noise sources are typical of a built environment. Dominant noise sources include traffic noise from light vehicles and heavy vehicles, industrial noise and residential noise.

There are over 200 sensitive receivers (mainly residential dwellings) within 1 km of the construction footprint. The closest receiver is a caravan park located 30 m north-east of the construction footprint. The closest residential dwelling is located about 350 m north-west of the construction footprint. Sensitive receivers identified as potentially noise affected are shown in Figure 6-10.

Figure 6-10 Sensitive receivers within 1 km of the construction footprint.

Background Noise Level

Background noise monitoring has not been conducted for the proposal. NGH has adopted the recommended background levels from the NSW Noise Policy for Industry 2017 (NPI). The NPI in Table 6.4-1 describes typical existing background noise levels for land within an urban residential area. These background noise levels were adopted as the RBL's for the purpose of this noise assessment.

Table 6.4-1 Average Background A-weighted sound pressure level (NSW NPI 2017)

	Daytime 0700 1800	Evening (OOHW Period 1*) 1800 2200	Night time (OOHW Period 2*) 2200 07000
Urban Residential	50	45	40

*note: OOHW = Out Of Hours Work.

Noise management levels for the proposed activity have been determined in accordance with the NSW ICNG described below and summarised in Table 6.4-2.

- Standard working hours - 10 dB(A) above background levels
- Outside standard working hours - 5 dB(A) above background levels
- Residences receiving noise levels over 75 dB(A) during standard working hours are considered highly noise affected irrespective of the RBL.

Table 6.4-2 Noise Management Levels for the proposed activity

Daytime NML (dB(A)) (RBL +10 dB(A))	OOHW Period 1 NML (dB(A)) (RBL +5 dB(A))	OOHW Period 2 NML (dB(A)) (RBL +5 dB(A))	Highly Noise Affected Level (dB(A))
60	50	45	75

For increased noise along detour road routes, noise levels at 2 dBA or less require no further assessment. Where increases of more than 2 dBA are expected, noise mitigation should be considered using Appendices B and C of Roads and Maritime's Construction Noise and Vibration Guideline.

6.4.3 Potential impacts

Construction noise and vibration

The predicted noise level for the proposed work was calculated using the Roads and Maritime Services' Construction Noise Estimator. Five construction scenarios were modelled. These are considered 'worst case scenarios' where all plant and machinery are operating continuously and concurrently (Table 6 7). This is unlikely to be the case and as such, actual noise levels would be lower than predicted.

Construction Equipment	Sound Pressure level @ 7m (dB(A))	No. of units
Scenario 1 – Bridge removal		
Dump truck	83	1
Mobile crane	88	1
Light vehicle	78	1
Pneumatic jackhammer	90	1
Water truck	82	1
Scenario 2 – Bridge construction (piling)		

Piling Rig	91	1
Concrete Truck	84	1
Mobile Crane	88	1
Concrete Pump	87	1
Light vehicle	78	1
Scenario 3 – Pavement milling		
Pavement profiler	92	1
Dump truck	85	1
Front end loader	87	1
Water truck	82	1
Scenario 4 – Operation of compound site		
Delivery truck	83	1
Light vehicle	63	3
Generator	78	1
Scenario 5 – Plank installation (night work)		
Mobile crane	88	1
Light tower	73	2

Distance based attenuation was used for each scenario to determine noise levels at receivers located within 30m, 350m, 500m and 1000m of the proposed work. The predicted noise levels for sensitive receivers within these distances for each scenario is provided in Table 6.4-3.

Table 6.4-3 Predicted noise levels based on construction scenarios (standard working hours)

Distance from construction footprint (m)	Predicted Noise Level dB(A)	Daytime NML Exceedance (dB(A)) Green no exceedance Yellow Minor exceedance Orange Substantial exceedance Red highly noise effected	Recommended Additional Mitigation Measures*
Scenario 1 – Bridge removal			
30	78	18	N, V, PC
70	70	10	N, V
80	69	9	-
180	60	0	-
Scenario 2 – Bridge construction (piling)			
30	80	20	N, V, PC
90	70	10	N, V

Distance from construction footprint (m)	Predicted Noise Level dB(A)	Daytime NML Exceedance (dB(A)) Green no exceedance Yellow Minor exceedance Orange Substantial exceedance Red highly noise effected	Recommended Additional Mitigation Measures*
100	69	9	-
210	60	0	-
Scenario 3 – Pavement milling			
30	80	20	N, V, PC
90	70	10	N, V
100	69	9	-
200	60	0	-
Scenario 4 – North western compound site			
45	66	6	-
460	41	0	-
Scenario 4 – Southern compound site			
190	51	1	-
540	39	0	-

*Note: N =Notification, V = Verification, PC = Phone call

Table 6.4-4 Predicted noise levels based on construction scenarios (OOHW hours).

Distance from construction footprint (m)	Predicted Noise Level dB(A)	OOHW Period 1 NML Exceedance (dB(A)) Green no exceedance Yellow Minor exceedance Orange Substantial exceedance Red highly noise effected	OOHW Period 2 NML Exceedance (dB(A)) Green no exceedance Yellow Minor exceedance Orange Substantial exceedance Red highly noise effected	Recommended Additional Mitigation Measures*
Scenario 4 – North-western compound site				
45	**66**	**16**	**21**	OOHW Period 1: V, N, DR OOHW Period 2: V, IB, N, DR, PC
460	**41**	**0**	**0**	OOHW Period 1: Nil OOHW Period 2: Nil
Scenario 4 – South-eastern compound site				
190	**51**	**1**	**6**	OOHW Period 1: Nil OOHW Period 2: V, N, DR
540	**39**	**0**	**0**	OOHW Period 1: Nil OOHW Period 2: Nil
Scenario 5 – Plank installation (night work)				
30	74	24	29	OOHW Period 1: V, N, DR, PC OOHW Period 2: V, IB, N, DR, PC
90	64	14	19	OOHW Period 1: N, DR OOHW Period 2: V, IB, N, DR, PC
140	59	9	14	OOHW Period 1: N, DR OOHW Period 2: V, N, DR
210	54	4	9	OOHW Period 1: - OOHW Period 2: V, N, DR
310	49	0	4	OOHW Period 1: - OOHW Period 2: N
500	44	0	0	Daytime: Nil OOHW Period 1: Nil OOHW Period 2: Nil

*Note: N =Notification, V = Verification, PC = Phone call, IB = Individual briefings, DR = Duration respite.

Construction noise predictions assumes all plant items would be operating simultaneously for each construction activity. Simultaneous operation is very unlikely and often impossible, especially on smaller sites. As a result, any predictions are conservative.

The majority of the construction work for the proposal would occur during standard working hours. Scenarios one to four model the predicted noise levels during standard working hours.

It is predicted that an exceedance of up to 20 dB(A) above the daytime NML would occur during construction at the caravan park (Table 6.4-3, Figure 6-10). The nearest residential receiver is located 270m north-west of the study area. Receivers located 210 m or further from the study area and are not expected to experience any noise exceedances during standard working hours (Table 6.4-3).

It is predicted that during the operation of the north-western compound site the caravan park would experience an exceedance of up to 6 dB(A) above the daytime NML. During the operation of the southern compound site, it is predicted that the caravan park and all residential receivers would not experience an exceedance above the daytime NML.

Out of hours work (OOHW) would be required for activities such as plank installation and stitch pouring. Scenario five (Table 6.4-4) models the predicted noise levels during these OOHW for plank installation. It is predicted that an exceedance of up to 24 dB(A) above the OOHW period 1 NML, and 29 dB(A) above the OOHW period 2 NML would occur at the caravan park (Table 6.4-4).

It is predicted that during the operation of the north-western compound site, an exceedance of up to 16 dB(A) above the OOHW period 1 NML, and 21 dB(A) above the OOHW period 2 NML would occur at the caravan park (Table 6.4-4). During operation of the south-eastern compound site an exceedance of up to 1 dB(A) above the OOHW period 1 NML, and 6 dB(A) above the OOHW period 2 NML would occur at the caravan park.

Residential receivers located within 350 m would experience an exceedance of up to 3 dB(A) above the OOHW period 2 NML only.

Additional noise impacts are expected along detour routes as a result of bridge closures during night-time work. Heavy vehicle traffic is proposed to detour along Eunony Bridge Road, Byrnes Road, Merino Road and the Olympic Highway. Light vehicle traffic is proposed to detour along Lake Albert Road and Kooringal Road. Noise modelling has shown minor impacts would be likely along Eunony Bridge Road and Kooringal Road to receivers further than 320 m from the road. Given the low density of rural housing and large set-back distances of dwellings to Eunony Bridge Road there is minimal mitigation measures proposed.

Potentially impacted residences along Kooringal Road would be numerous due to the density of dwellings in proximity to the road. Mitigation measures proposed include notification of residents within 318 m of Eunony Bridge Road and 175 m of Kooringal Road of night-time detours, date of commencement, duration of the detours and contact number for complaints regarding traffic noise. Consideration should be given to reducing the speed of vehicles along Kooringal Road during evening detours. It is noted that this may not be preferable given additional noise may be generated from vehicles braking and accelerating. Further detail of this assessment can be seen in Appendix K.

Additional mitigation measures are recommended for sensitive receivers located within 350 m of the proposed work during standard working hours and OOHW.

In the event of a flood, if the proposed heavy vehicle detour route is impassable, an alternative heavy vehicle route may be required. This route would include the Sturt Highway, Kooringal Road, Red Hill Road and the Olympic Highway. A traffic noise impact assessment would be required to be completed prior to the use of this alternative heavy vehicle route.

The proposed work is likely to generate vibration impacts during construction, especially when driving the bridge piles and using vibratory rollers during road construction. Cosmetic damage to structures could occur within up to 25 m of some vibratory rollers and 20 m of a vibratory pile driver. Given Narellan Pools building at 86 Hammond Avenue is located within 25 m of the proposed work a building condition report should be carried out prior to start of work. A Construction Noise and Vibration Plan should detail vibratory power limits or list machinery to be used to minimise the impact of vibration during construction.

Human response to vibration may be experienced within up to 100 m of some vibratory rollers and 20 m of a vibratory pile driver. The Construction Noise and Vibration Plan should detail the requirement to consult with residential and commercial premises within 100 m of the proposed work and offer respite periods where practical and reasonable.

Operational noise and vibration

The outside lane of the bridge and abutments would move about 3.5 m closer to the caravan park manager's residence on the north-eastern side of the road. The residence is set-back about 35 m from the road and

about 60 m from the new road alignment. Noise generated by traffic acceleration, deceleration and lane changes would likely decrease due to the proposal. Any change in traffic noise impact at the caravan park manager's residence is expected to be minor, however background noise monitoring prior to start of work is recommended to verify any increase in operational noise. No vibration impact from the proposal is expected once the bridge is operational.

6.4.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim *Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented, taking into account *beyond the pavement: urban design policy, process and principles* (roads and maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design/pre-construction	Section 4.6 of QA *G36 Environment Protection*
Noise and vibration	Work hours during construction will generally be limited to Standard Working Hours, except for when night work is necessary for activities such as girder installation and stitch pouring. Standard working hours: • Monday – Friday 7:00 am to 6:00 pm • Saturday - 8:00 am to 1:00 pm • Sunday and Public Holidays - No work	Contractor	Construction	
Noise and vibration	All sensitive receivers (e.g. schools, local residents) likely to be affected will be notified at least 5 days prior to commencement of any work associated with the activity that may	Contractor	Pre-construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	have an adverse noise or vibration impact. The notification will provide details of: • The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information.			
Noise and vibration	For construction during standard working hours, the Caravan Park should: • Receive a written notification letter. • Receive a phone call at least 5 days prior to commencement of any work. Phone calls may provide the affected residence with a contact telephone number for noise complaints, provide advice and the opportunity for the residence to provide any comments. • Verification of noise and vibration levels as part of routine checks of noise levels should be undertaken within a period of 14 days from the commencement of construction activities or following reasonable complaints. • Noise measurements will be consistent with the procedures documented in AS1055.1-1997 Acoustics-Description and Measurement of Environmental Noise-General Procedures. • Vibration measurements will be undertaken in accordance with the procedures documented in the OEH's Assessing Vibration-a technical guideline (2006) and BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).
Noise and vibration	For construction during OOHW, the Caravan Park should: • Receive a written notification letter.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• Receive a phone call at least 5 days prior to commencement of any work. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Receive individual briefings about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives will visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Where the resident cannot be met with individually then an alternative form of engagement should be used. • Receive duration respite.			
Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 350 m should: • Receive a written notification letter. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Receive duration respite.	Contractor	Pre-construction	
Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 500 m should: Receive a written notification letter.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).
Noise and vibration	• Where possible avoid operating plant concurrently. • The dominant noise sources (piling rig, jackhammer, mobile crane) will be: o Switched off when not required. o Used only when necessary.	Contractor	Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	• Notification of residents within 318 m of Eunony Bridge Road and 175 m of Kooringal Road of night-time detours, date of commencement, duration of the detours and contact number for complaints regarding traffic noise.	Contractor and Project manager.	Pre-construction	
Construction vibration	The Construction Noise and Vibration Plan must: • detail vibratory power limits or list machinery not to be used to minimise the impact of vibration during construction. • detail the requirement to consult with residential and commercial premises within 100 m of the proposed vibration generating activities and offer respite periods if needed and where practical and reasonable.	Contractor	Detailed design/pre-construction	
Operational noise	Background noise monitoring is to be carried out, in accordance with relevant standards, at the caravan park manager's residence at 93 Hammond Avenue prior to start of work.	Transport	Pre-construction	
Construction vibration	A building condition report is to be carried out prior to start of work for Narellan Pools (86 Hammond Avenue).	Transport	Pre-construction	

6.5 Topography, geology and soils

6.5.1 Existing environment

The subject land occurs within the floodplains of the Murrumbidgee River and Marshalls Creek. Geological mapping reveals that the bridge is built on unconsolidated sediments deposited in the quaternary, composed of alluvial sand, silt, clay, and pebble to cobble sized gravel (Geological Survey of NSW, 2020).

Urban salinity is a key cause of land degradation in Wagga Wagga and is monitored through a network of over 200 piezometers (WWCC, 2018a). For the 2017/2018 reporting period, the piezometers showed a decrease in the overall standing water levels (SWL) when compared to 2010/2011 reporting period (WWCC, 2018b).

In addition to the natural setting, Marshalls Creek and associated lands have been extensively reworked by human activities. The construction of the flood levee, the industrial subdivision of East Wagga Wagga, historic filling of the floodplain and drainage of East Wagga Wagga has substantially altered the hydrological and topographical features of the project area.

Topography, geology and soil summaries for the proposal area in the context of the Bioregion are provided in Table 6.5-1 below.

Table 6.5-1 Summary of topographic, soil and landscape features in the study area.

Category	Study area
Topography	The proposal is located on the floodplain of the Murrumbidgee River. Slope gradients are less than 1%, local relief is generally less than 2 m within the elevation range of 185 m ASL.
Geology	Marshalls Creek Bridge is built on unconsolidated sediments deposited in the quaternary, composed of alluvial pebble to cobble sized gravel, sand silt and clay (Geological Survey of NSW, 2020).
Soils	The E-spade website (https://www.environment.nsw.gov.au/) notes the area is part of the Kurrajong Plain Soil Landscape with; moderately deep alluvial soils that are subject to occasional flooding, localised waterlogging and streambank erosion (Appendix E).
Acid Sulfate Soils	There is a low probability for acid sulphate soils (ASS) to occur throughout the development site (Appendix E).

Contaminated Land

A search of the NSW EPA's Contaminated Land Record and List of Contaminated Sites Notified to the EPA was carried out on 18 May 2020. There are no identified contaminated lands within or adjacent to the proposed work.

Transport have identified that previous road works nearby encountered road materials that were impacted by coal tar. There may be some potential for the proposed road and abutment works to disturb coal tar contaminated road materials. Any contaminated soils encountered during works would be managed in accordance with Transport Guideline for the Management of Contamination (Transport, 2013) and in accordance with the NSW EPA Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the POEO (Waste) Regulation, the reclaimed asphalt pavement exemption 2014.

In 2018 a Detailed Site Investigation (DSI) was completed by Jacobs Group (Australia) Pty Ltd for a comprehensive investigation of polyfluoroalkyl substances (PFAS) at the RAAF Base Wagga. The investigation included Marshalls Creek. PFAS was recorded in surface water and sediment along Marshalls Creek and groundwater in the Gumly Gumly wetland and surrounding properties. Marshalls Creek provides a surface water drainage pathway from low lying areas west of the RAAF Base, where PFAS impacts are significant. This has been addressed in the Hydrology, Flooding and Water Quality impacts in section 6.2, however is relevant for both water and soil environmental concerns.

In March 2021 an Environmental Site Investigation was completed by Jones Environmental Consulting for potential contamination within the development footprint. PFAS was detected within the footprint, however it was found to be limited to shallow soil locations likely deposited by past flood events (Appendix L). The concentration of PFAS detected is below the PFAS National Environmental Plan (NEMP) criteria for both ecological and human health, however exposure to these chemicals should be limited.

6.5.2 Potential impacts

Potential impacts to soils and water during construction include:

- Soil erosion during construction and until landforms have been stabilised
- Sediment laden run off into waterways
- Disturbance of soils in the road verge and around vehicle and plant access points
- Disturbance of soils using under boring to relocate underground services
- Tracking of soils onto surrounding roads causing potential hazards for road users
- Groundwater and surface water contamination from potential spills and PFAS
- Potential for soil and sediment contamination.

The proposal would involve earthworks during construction. Excavation of soil and vegetation along the creek banks would be required for bridge abutments. This would potentially result in soil erosion and sedimentation of the waterway. Installation of the temporary creek crossing adjacent to the bridge and construction of the bridge piles/foundations on either side of the waterway would also disturb soils and have the potential to result in soil erosion.

The relocation of underground services will have minor disturbances on soils. Proposed methods such as under-boring has a minimal surface footprint, and this reduces potential for soil erosion.

Operation of construction machinery along the bank of the creek line would disturb vegetation and the soil surface. This may result in sedimentation of the waterway. Erosion and sediment controls would be implemented for the work during construction. Work would be revegetated and stabilised progressively and utilise the temporary creek crossings upstream and downstream of the bridge where possible.

The proposal may result in several potential contamination sources being introduced to the site and surrounds during construction. Fuel and oil for construction plant and equipment are potential sources of pollution. Due to the work occurring within proximity to a waterway there is potential for contamination to occur as a result of accidental spills. Fuels and oils for refueling would be stored in doubled bunded areas in the site compound and refueling activities would occur in doubled bunded areas within the designated compound site. Under-boring spoil has the potential for contamination from solvents added to the drilling matrix and PFAS from the RAAF base.

There is potential for human exposure and disturbance of sediments and water from the creek during construction works, this will need to be managed with the mitigation measures outlined below. The concentration of PFAS in Marshals Creek has a potential risk to human health and the environment. The concentrations of PFAS in the creek exceeded human health guidelines for recreational water use and the guidelines for ecological protection. Exposure pathways to human receptors are through dermal contact (contact with the skin) or incidental ingestion.

6.5.3 Safeguards and management measures

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

Impact	Environmental safeguards	Responsibility	Timing	Reference
	authorities (including Transport for NSW and EPA officers).			
PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.	Contractor/Transport	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0
PFAS contaminated water and sediment	Soil and water removed from the Marshalls Creek waterway are to be tested for PFAS contaminants prior to re-use or disposal in accordance with relevant standards and requirements.	Contractor	Construction	

Other safeguards and management measures that will address soil impacts are identified in section 6.2.3.

6.6 Aboriginal cultural heritage

6.6.1 Methodology

A Stage 1 Procedure for Aboriginal Cultural Heritage Consultations and Investigation (PACHCI) was completed by Transport Aboriginal Cultural Heritage Officer Andrew Whitton. The PACHCI was completed in accordance with Roads and Maritime Services (RMS) procedure for Aboriginal cultural heritage consultation and investigation (2011).

The Stage 1 assessment included a desktop risk assessment to determine whether the proposal is likely to harm Aboriginal cultural heritage or not, and whether further assessment or investigation is required (RMS, 2011). The risk assessment included an AHIMS search and review of the landscape features within the study area.

6.6.2 Potential impacts

The proposal was assessed as being unlikely to have an impact on Aboriginal cultural heritage due to the following findings:

- The project is unlikely to harm known Aboriginal objects or places
- The AHIMS search did not indicate Aboriginal objects in the study area
- The study area does contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's Due diligence Code of Practice for the Protection of Aboriginal objects in NSW and the Transport for NSW procedure. However, the cultural heritage potential of the study area appears to be reduced due to past disturbance
- There is an absence of sandstone rock outcrops likely to contain Aboriginal art.

6.6.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that an	Contractor	Detailed design/pre-construction	Section 4.9 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	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.			
Aboriginal heritage	If the scope of the proposal changes, no further work is to occur until any potential impacts on Aboriginal cultural heritage are re-assessed.	Contractor	Detailed design/pre-construction	

6.7 Non-Aboriginal heritage

6.7.1 Methodology

A search of the Australian Heritage Database, NSW Heritage Register and local heritage listings under the Wagga Wagga LEP 2010 were undertaken to determine the location of any nearby listed heritage items (refer to Appendix E).

6.7.2 Existing environment

Australian Heritage Database

A search of the National Heritage database was undertaken on the 25th June 2020. A total of 20 items/places are registered on the Register of the National Estate (RNE) a non–statutory list within the Wagga Wagga LGA. No items listed under the register of the National Estate (Non-statutory archive) occur within the construction footprint.

State Heritage Register

The NSW Heritage Act 1977 is a statutory tool designed to conserve the cultural heritage of NSW and used to regulate development impacts on the state's heritage assets. NSW Heritage Division (OEH) administers the Act. The Act details the statutory requirements for protecting historic buildings and places. This includes any place, building, work, relic, movable object, which may be of historic, scientific, cultural, social, archaeological, natural or aesthetic value.

A search of the NSW Heritage register was undertaken on the 7th July 2020. Five records of Aboriginal Places listed under the National Parks and Wildlife Act were identified within the Wagga Wagga LGA, none of these are located adjacent or within the construction footprint. Four items listed under the NSW Heritage Act were identified within the Wagga Wagga LGA, none of these are located adjacent or within the construction footprint.

State Agency Heritage Register

State agencies in NSW such as Transport are required to keep a register of heritage places managed under Section 170 of the Heritage Act. The s.170 registers are also held in the Heritage Division's State Heritage Inventory (SHI); an electronic database of statutory listed heritage items in NSW protected by heritage schedules of LEP's and State agencies. The inventory can include historical archaeological sites, maritime archaeological, industrial sites, urban landscapes including parks and gardens, private and civic buildings, and heritage items owned by State government agencies.

A search of the State Agencies Heritage register was undertaken on the 7th July 2020. The search returned 337 items listed by Local Government and State Agencies. Wagga Waterworks building listed by Local Government is located adjacent to the construction footprint within the Riverina Water depot (370 m NW).

Local Heritage

A search of the Wagga Wagga LEP was undertaken on the 7th July 2020. The Wagga Waterworks (I273) building is listed on the Wagga Wagga LEP and is located over 300m north-west of the proposed construction footprint on the Riverina Water site.

Marshalls Creek Bridge is a concrete bridge constructed by Department of Main Roads (DMR) in 1963. The Bridge is not listed on the Australian Heritage Database, State Heritage Register, State Agency Heritage Register or the Wagga Wagga LEP. However, the historical context of concrete bridges is important to note for this Proposal.

Concrete was first used in bridges across NSW in the 1890s as a suitable material for filling insides of cast iron piers and then in the form of mass concrete for abutments. The earliest use of concrete in bridge construction started in small trial structures constructed by Carter Gummow & Co in 1894 and then in 1896. A small number of other concrete bridges were built across NSW during the first years of the twentieth century, but the numbers remained relatively low.

By 1938 there was a boom period for the construction of simple, functional concrete bridges which aimed to replace decrepit timber structures or flood prone open crossings on roads (Burns and Roe Worley 2005, 90).

Of the remaining concrete bridges in NSW, majority have undergone changes to increase their width, often resulting in their original pipe or concrete railings being replaced with steel guard railing which has a better safety record in redirecting impacting vehicles. Bridges that continue to have all original features intact are therefore in the minority, particularly in rural areas where high transit speeds and narrow bridges compromise the safety of the bridge.

6.7.3 Potential impacts

No items of non–indigenous heritage occur within the construction footprint. The proposed work would not impact the Wagga Waterworks building located north-west of the construction footprint.

6.7.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/pre-construction	Section 4.10 of QA *G36 Environment Protection*

6.8 Landscape character and visual impacts

6.8.1 Approach

Visual amenity is subjective to the extent that landscape features can be perceived differently by different people. What some people may deem to be visually attractive, others may perceive as visually intrusive.

6.8.2 Existing environment

The dominant visual characteristic of the region is the Murrumbidgee River, wineries, and agricultural land used for cropping and grazing. Within the study area, the dominant visual features consist of suburban

residences, industrial premises, levee bank, parks and sporting fields. Adjacent to the proposal the area is a mix of industrial premises, creek line and arterial road.

6.8.3 Potential impacts

Minor changes to the immediate visual amenity of the construction footprint may occur during the construction. Construction of the proposal would disturb groundcover, remove vegetation, involve minor road work and the placement of stockpiles areas.

The work is unlikely to lead to any long-term change in visual amenity as a bridge already exists at the proposal area. The proposed activity involves replacement of the existing bridge with a wider four lane structure. Rehabilitation of the proposal area with similar vegetation would occur upon the completion of the work. Views along the Sturt Highway would be less enclosed as the bridge would be wider and the barriers further apart. The creation of a four-lane bridge would lead to unbroken views along the road from the west and the east. This would provide a more uniform road vista.

6.8.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape character and visual impact	A Landscaping Plan will be prepared to support the final detailed project design and implemented as part of the CEMP. The Landscaping Plan will include design treatments for: • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges and noise walls • Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape work taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas. The Landscaping Plan will be prepared in accordance with relevant guidelines, including: • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008) • *Bridge Aesthetics* (Roads and Maritime 2012)	Contractor	Detailed design/pre-construction	Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014), Landscape Guideline (RTA, 2008), *Bridge Aesthetics* (Roads and Maritime 2012), Noise Wall Design Guidelines (RTA, 2006), Shotcrete Design Guideline (RTA, 2005).

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005).			

6.9 Land use

6.9.1 Existing environment

The construction footprint is located on land zoned SP2 Infrastructure and B6 Enterprise Corridor under the Wagga Wagga LEP (2010). Land use activities surrounding the construction footprint are predominantly IN1 General Industrial and IN2 Light industrial. Other land uses are shown in Figure 6-11 and include:

- RU1 Primary Production.
- RE1 Public Recreation.
- R1 General Residential
- R3 Medium Density Residential
- Public road network.
- Electricity connection and transmission infrastructure.

6.9.2 Potential impacts

During construction there would be a temporary reduction in public access and use of the Sturt Highway/Hammond Avenue, and the Wiradjuri Walking Track within the vicinity of the construction footprint. There would be property acquisition for the relocation of services along the southern side of the bridge. No permanent change to the existing land use would occur as a result of the proposal.

During operation of the Proposal, the existing land uses would return to pre-construction use.

6.9.3 Safeguards and management measures

No additional safeguards are considered necessary.

Figure 6-11 Wagga Wagga LEP (2010) land use zones surrounding the Proposal.

6.10 Socio-economic

6.10.1 Existing environment

The Proposal is located in the Riverina, recognised for its long agricultural history. Wagga Wagga is the fifth largest inland city in Australia with a population of 62,400 (ABS 2016). Wagga Wagga has become the economic hub for regional New South Wales with a fast growing and diverse economy (WWCC 2020). The city's gross regional product in the year ending June 2019 was $3.85 billion, with the strongest growth sectors occurring in healthcare and social assistance, wholesale trade and manufacturing (WWCC 2020).

6.10.2 Potential impacts

The proposal has the potential to impact local road users, pedestrians and cyclists, access to public recreation, and access to surrounding businesses as a result of the following:

- Access (refer to Section 6.3 for assessment)
- Noise (refer to Section 6.4 for assessment)
- A shared user path passes underneath the western side of Marshalls Creek Bridge. During construction this path will be diverted around the proposal area
- Given the pedestrian path on the existing bridge will be closed during construction, temporary access across Marshalls Creek will be provided.

These impacts would be temporary and minor with the implementation of the recommended mitigation measures.

The proposal would have an overall positive socio-economic impact on Wagga Wagga LGA, with an improved road network that reduces traffic congestion and meets the needs of a growing community.

6.10.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • Mechanisms to provide details and timing of proposed activities, including changed traffic and access conditions, to affected residents, businesses, Council and shared path user groups • Contact name and number for complaints. The CP will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	Contractor	Detailed design/pre-construction	Community Involvement and Communications Resource Manual (RTA, 2008).

6.11 Other Impacts

6.11.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Air Quality	Air quality in the study area is typical of the surrounding rural region. In general, air quality is high. However, raised dust during the dryer months contributes to sporadic reductions in air quality. During autumn, the level of particulate matter in the air increases due to the burning of agricultural residues and soil cultivation for cropping. In winter, the burning of wood in solid fuel fires contributes to elevated levels of particulate matter in the atmosphere. There are no residencies or agriculture paddocks within 100 m of the proposal area.	Generation of dust and exhaust fumes.
Waste and Resources	Waste management would occur in accordance with the *Waste Avoidance and Resource Recovery Act 2001*. The objectives of this Act are: *a) To encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development.* *b) To ensure that resource management options are considered against a hierarchy of the following order:* *i. Avoidance of unnecessary resource consumption.* *ii. Resource recovery (including reuse, reprocessing, recycling, and energy recovery).* *iii. Disposal.* *c) To provide for the continual reduction in waste generation.* *d) To minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste.* *e) To ensure that industry shares with the community the responsibility for reducing and dealing with waste.*	Generation of small quantities of waste including: • General construction waste. • Excavated road material. • Domestic rubbish. • Spoil. • Concrete. • Metal. • Vegetation. • Bitumen. • Sewerage. • Fuels, oils and lubricants. As mentioned in Section 6.5 Transport have identified that previous road works nearby encountered road materials that were impacted by coal tar. There may be some potential for the proposed road and

Environmental factor	Existing environment	Potential impacts
	f) To ensure the efficient funding of waste and resource management planning, programs, and service delivery. *g) To achieve integrated waste and resource management planning, programs, and service delivery on a State–wide basis.* h) To assist in the achievement of the objectives of the *Protection of the Environment Operations Act 1997*	abutment works to disturb coal tar contaminated road materials.
Public Utilities	Public utilities including gas pipelines, water mains, electrical poles and streetlights occur within the construction footprint. The gas pipeline and water mains would be relocated by underboring beneath Marshalls Creek. The electrical power poles and streetlights would be relocated within the road reserve.	Damage to public utilities during construction or relocation.

6.11.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or EES/DPIE guidelines • Mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions • A progressive rehabilitation strategy for exposed surfaces.	Contractor	Detailed design/pre-construction	Section 4.4 of QA *G36 Environment Protection*
Air quality	All plant and equipment will be ensured to comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002.	Contractor	Construction	POEO Act (1997)
Air quality	Smoky emissions will be kept within the standards and regulations under the Protection of the Environment Operations Act 1997.	Contractor	Construction	POEO Act (1997)
Air quality	All delivery vehicles will be covered during transportation.	Contractor	Construction	N/A
Air quality	Vegetation or other materials will not be burnt on site.	Contractor	Construction	N/A
Air quality	Dust suppression techniques will be utilised in response to visible dust, such as watering dusty work areas and stockpile sites (using non-potable water where available).	Contractor	Construction	N/A
Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • Measures to avoid and minimise waste associated with the project • 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	Contractor	Detailed design/pre-construction	Section 4.11 of QA *G36 Environment Protection, Environmental Procedure - Management of Wastes on Roads and Maritime*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• Monitoring, record keeping and reporting. The WMP will be prepared in taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Transport for NSW Waste Fact Sheets.			*Services Land* (Roads and Maritime, 2014)
Waste	All waste generated by the proposed work to be classified in accordance with the NSW Waste Classification Guidelines Part 1: Classifying Wastes (DECCW 2008).	Contractor	Construction	DECCW 2008
Waste	Resource management hierarchy principles are to be followed: • 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).	Contractor	Construction	Waste Avoidance & Resource Recovery Act (2001)
Waste	All waste generated on site is to be transported off site and disposed of at landfill site licenced and able to accept General Solid Waste (non–putrescible). When transporting or depositing the waste the contractor is to comply with Section 143 of the POEO Act.	Contractor	Construction	Section 4.11.4 of QA *G36 Environment Protection*
Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	N/A
Waste	Once the work has been completed, all waste material is to be removed from site and disposed of at a licenced facility. Waste is not to be buried on site.	Contractor	Construction	N/A
Waste	Any contaminated soils encountered during works will be managed in accordance with Transport Guideline for the Management of Contamination (Transport, 2013).	Contractor	Construction	Guideline for the Management of Contamination (Transport, 2013).

Impact	Environmental safeguards	Responsibility	Timing	Reference
Utilities	Prior to the commencement of work: • The location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners • If the scope or location of proposed utility relocation work falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.	Contractor	Detailed design/pre-construction	QA G7 Utility Adjustment

6.12 Cumulative Impacts

6.12.1 Approach

Cumulative impacts are incremental environmental impacts caused by the combination of past, present, and reasonably foreseeable future actions. Cumulative impacts accumulate over time, from one or more sources. While impacts may be insignificant in isolation, significant impacts may occur when individual effects are considered in combination.

The assessment of cumulative impacts focused on the interaction of the proposed activity with other projects in the vicinity of the proposed activity within the Wagga Wagga LGA, and where construction and/or operational timeframes are likely to be concurrent.

6.12.2 Existing environment

A review of the NSW Department of Planning and Environment's (DP&E) Major Project Register conducted on 25th June 2020 identified 15 major development applications within the Wagga Wagga LGA. The closest development application is the Wagga Wagga Water Treatment Plant Modification, located about 180 m north of the Proposal. The modification received approval on 25th October 2017 and construction is now complete.

6.12.3 Potential impacts

Given the major projects within the Wagga Wagga LGA are not within the vicinity of the Proposal, cumulative impact is considered to be minimal given the small scale of the proposed activity.

6.12.4 Safeguards and management measures

No additional safeguards are required for cumulative impacts.

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.

An 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 for NSW Environment Officer, South region, prior to the commencement of any on-site work. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP will 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 would 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 would minimise any potential adverse impacts arising from the proposed work on the surrounding environment. The safeguards and management measures are summarised in Table 7.2-1.

Table 7.2-1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the Transport for NSW Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following: • 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. The endorsed CEMP will be implemented during the undertaking of the activity.	Contractor/Transport for NSW project manager	Pre-construction/detailed design	
GEN2	General - notification	All businesses, residential properties and other key stakeholders (e.g. schools, local councils) affected by the	Contractor/Transport for NSW project manager	Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		activity will be notified at least five days prior to commencement of the activity.			
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. These include adjoining residential areas requiring particular noise management measures	Contractor/Transport for NSW project manager	Pre-construction/detailed design	
BIO1	Biodiversity	A Flora and Fauna Management Plan will be prepared in accordance with Transport for NSW's *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA, 2011) and implemented as part of the CEMP. It will include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • Requirements set out in the *landscape guideline* (rta, 2008) • Pre-clearing survey requirements • Procedures for unexpected threatened species finds and fauna handling • Procedures addressing relevant matters specified in the *policy and guidelines for fish habitat conservation and management* (dpi fisheries, 2013) • Protocols to manage weeds and pathogens. • Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to the threatened species including birds, mammals and flora.	Contractor	Pre-construction	Section 4.8 of QA *G36 Environment Protection*
BIO2	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be	Contractor	Detailed design/pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		investigated during detailed design and implemented where practicable and feasible.			
BIO3	Biodiversity	An Environmental Work Method Statement for Clearing and Grubbing must be prepared and approved by the project Environmental Officer prior to starting work. The EWMS must include at least the following: • 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.	Contractor	Detailed design/pre-construction	
BIO4	Biodiversity	Prior to the commencement of any works, a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 2: exclusion zones (RMS 2011)*.	Contractor	Pre-construction	Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 2: exclusion zones (RMS 2011)*.

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO5	Biodiversity	Clearing of native vegetation should be carried out in accordance with *Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of bushrock)* (RTA 2011).	Contractor	Pre-construction /construction	*Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of bushrock)* (RTA 2011).
BIO6	Biodiversity	Clearing of hollow bearing trees is to be conducted in accordance with Transport for NSW *Biodiversity Guidelines - Guide 1 (Pre-clearing process).* A qualified ecologist must be present on site during the removal of hollow bearing trees to supervise the works.	Contractor	Pre-construction /construction	Transport for NSW *Biodiversity Guidelines - Guide 1 (Pre-clearing process).*
BIO7	Biodiversity	Fauna handling must be carried out in accordance with the requirements of the Transport for NSW *Biodiversity Guidelines - Guide 9 (Fauna Handling).*	Contractor	Pre-construction /construction	Transport for NSW Biodiversity Guidelines - Guide 9 (Fauna Handling).
BIO8	Biodiversity	All pathogens (e.g., Chytid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management)* and *DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*	Contractor	Construction	Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management). DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*
BIO9	Biodiversity	A Weed Management Plan will be developed to prevent/minimise the spread of weeds in accordance with *Guide 6 (Weed Management) in the Transport for NSW Biodiversity Guidelines (RTA 2011).*	Contractor	Detailed design/pre-construction	Guide 6 (Weed Management) in the Transport for NSW Biodiversity Guidelines (RTA 2011).

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO10	Biodiversity	Priority weeds are to be managed according to requirements under the Biosecurity Act, 2015 and *Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines RTA 2011*.	Contractor	Construction	Biosecurity Act (2015). Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines RTA 2011.
BIO11	Biodiversity	Any herbicide use will be undertaken according to *Environmental Fact Sheet 18 - Herbicide application (RMS, 2013).*	Contractor	Construction	Environmental Fact Sheet 18 - Herbicide application (RMS, 2013).
BIO12	Biodiversity	Pruning of mature trees is to be in accordance with Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*	Contractor	Construction	Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*
BIO13	Biodiversity	All coarse woody debris is to be retained on site where possible in accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RMS 2011).* Any vegetation too large to be mulched will be placed as course woody debris (CWD) along suitable areas of Marshalls Creek, in consultation with Transport environment officer or manager.	Contractor	Construction	*Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RTA 2011).*
BIO14	Biodiversity	Works are not to create an ongoing barrier to the movement of wildlife.	Contractor	Construction	
BIO15	Biodiversity	Temporary instream creek crossings must be designed so that the passage of fish will not be blocked. Temporary instream creek crossings are to be designed in accordance with *Why do Fish Need to Cross the Road? Fish Passage Requirements for*	Contractor	Detailed design/pre-construction	*Why do Fish Need to Cross the Road? Fish Passage Requirements for*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Waterway Crossings (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI)			*Waterway Crossings* (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI)
BIO16	Biodiversity	Rehabilitation of the creek bank would use native endemic riparian species.	Contractor	Post-construction	
SW1	Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	Section 2.1 of QA *G38 Soil and Water Management*
SW2	Soil and water	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan The Plan will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G38 Soil and Water Management*
SW3	Soil and water	Erosion and sediment control measures will be implemented to mitigate any impacts.	Contractor	Detailed design/Pre-construction, Construction	Managing Urban Stormwater: Soils & Construction Guidelines (the Blue Book) (Landcom 2004), Section 3.1 of QA

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
					G38 Soil and Water Management
SW4	Soil and water	Establish erosion control and sediment capture measures, and maintain them regularly, to divert offsite stormwater, manage onsite stormwater runoff and stabilise stockpiles.	Contractor	Construction	Section 3.5 of QA *G38 Soil and Water Management,* RMS Technical Guideline EMS-TG-010: Stockpile Site Management, the Blue Book.
SW5	Soil and water	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	Contractor	Construction	ESCP
SW6	Soil and water	Prepare an Environmental Work Method Statement (EWMS) for the work.	Contractor	Detailed design/Pre-construction	Section 3.7 of QA *G38 Soil and Water Management*, Section 3.2.4 of QA G36 *Environmental Protection*
SW7	Soil and water	There is to be no release of dirty, impacted or otherwise, water into drainage lines and/or waterways.	Contractor	Construction	SWMP
SW8	Soil and water	The creek bed gravels, creek bank and adjacent riparian vegetation will be stabilised and rehabilitated similar to pre-construction condition upon the completion of construction.	Contractor	Construction/ operation	Section 4.16 of QA G36 *Environmental* Protection
SW9	Soil and water	Temporary containment measures and the use of dewatering processes during the curing of concrete will minimise the risk of contaminants entering the creeks	Contractor	Construction	SWMP
SW10	Soil and water	Vehicle wash down and/or cement truck washout is to occur in a designated concrete washout area as approved on a site specific ESCP.	Contractor	Construction	ESCP
SW11	Soil and water	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW Code of Practice for Water Management	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection, SWMP,

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		(RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities.			Transport for NSW Code of Practice for Water Management (1999), EPA Bunding and Spill management Guidelines
SW12	Soil and water	An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and trained in its use.	Contractor	Construction	SWMP
SW13	Soil and water	All fuels, chemicals and lubricants are to be stored in an impervious doubled bunded area 50 m away from any aquatic habitat, flood prone areas, or on slopes steeper than 1:10.	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection,
SW14	Soil and water	Refuelling of plant and equipment is to occur in impervious double bunded areas in accordance with a site-specific refuelling control plan.	Contractor	Construction	SWMP
SW15	Soil and water	Adequate incident management procedures will be incorporated into the Construction and Operation Environmental Management Plans, including requirement to notify EPA for incidents that cause material harm to the environment.	Contractor	Construction	CEMP, OEMP, Section 147 – 153 POEO Act.
SW16	Soil and water	A Flood Management Plan (FMP) will be prepared and implemented as part of the CEMP. The FMP will identify all reasonably foreseeable risks relating to the event of a flood and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	
SW17	Soil and water	The design of the temporary creek crossing will ensure fish passage, stability, and flow of Marshalls Creek. Rock used to construct temporary creek crossings must be clean.	Contractor	Detailed design/pre-construction	
SW18	PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.	Contractor/Transport	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
T1	Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • 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.	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G10 Traffic Management,* Roads and Maritime *Traffic Control at Work Sites Manual* (RTA, 2010)
T2	Traffic and transport	Existing access for nearby and adjoining properties, businesses and roads is to be maintained at all times during the works unless otherwise agreed to by the affected property owner.	Contractor	Construction	TMP
T3	Traffic and transport	Local and regional road users will be informed of any expected traffic or access changes and delays prior to construction commencing.	Contractor	Pre-construction, construction	TMP
T4	Traffic and transport	WWCC, adjoining properties, businesses will be notified 4 weeks prior to the closure of both lanes in both directions along Hammond Avenue/Sturt Highway.	Contractor	Pre-construction, construction	TMP

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
T5	Traffic and transport	All complaints are to be recorded on a Complaints Register and attended to promptly.	Contractor	Construction	TMP
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim *Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented, taking into account *beyond the pavement: urban design policy, process and principles* (roads and maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design/pre-construction	Section 4.6 of QA *G36 Environment Protection*
NV2	Noise and vibration	Work hours during construction will generally be limited to Standard Working Hours, except for when night work is necessary for activities such as girder installation and stitch pouring. Standard working hours: • Monday – Friday 7:00 am to 6:00 pm • Saturday - 8:00 am to 1:00 pm • Sunday and Public Holidays - No work	Contractor	Construction	
NV3	Noise and vibration	All sensitive receivers (e.g. schools, local residents) likely to be affected will be notified at least 5 prior to commencement of any work associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:	Contractor	Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information.			
NV4	Noise and vibration	For construction during standard working hours, the Caravan Park should: • Receive a written notification letter. • Receive a phone call at least 5 days prior to commencement of any work. Phone calls may provide the affected residence with a contact telephone number for noise complaints, provide advice and the opportunity for the residence to provide any comments. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Noise measurements will be consistent with the procedures documented in AS1055.1-1997 Acoustics-Description and Measurement of Environmental Noise-General Procedures. • Vibration measurements will be undertaken in accordance with the procedures documented in the OEH's Assessing Vibration-a technical guideline (2006) and BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).
NV5	Noise and vibration	For construction during OOHW, the Caravan Park should: • Receive a written notification letter. • Receive a phone call at least 5 days prior to commencement of any work. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		should be undertaken within a period of 14 days from the commencement of construction activities. • Receive individual briefings about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives will visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Where the resident cannot be met with individually then an alternative form of engagement should be used. • Receive duration respite.			
NV6	Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 350 m should: • Receive a written notification letter. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Receive duration respite.	Contractor	Pre-construction	
NV7	Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 500 m should: • Receive a written notification letter.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).
NV8	Noise and vibration	Where possible avoid operating plant concurrently. The dominant noise sources (piling rig, jackhammer, mobile crane) will be: • Switched off when not required. • Used only when necessary.	Contractor	Construction	
NV9	Noise and vibration	Notification of residents within 318 m of Eunony Bridge Road and 175 m of Kooringal Road of night-time detours, date of commencement, duration of the detours and contact number for complaints regarding traffic noise.	Contractor and Project manager.	Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV10	Construction vibration	The Construction Noise and Vibration Plan must: • Detail vibratory power limits or list machinery not to be used to minimise the impact of vibration during construction. • Detail the requirement to consult with residential and commercial premises within 100 m of the proposed vibration generating activities and offer respite periods if needed and where practical and reasonable.	Contractor	Detailed design/pre-construction	
NV11	Construction vibration	A building condition report is to be carried out prior to start of work for Narellan Pools (86 Hammond Avenue).	Transport	Pre-construction	
NV12	Operational noise	Background noise monitoring is to be carried out, in accordance with relevant standards, at the caravan park manager's residence at 93 Hammond Avenue prior to start of work.	Transport	Pre-construction	
C1	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Environment Manager and/or EPA.	Contractor	Detailed design/Pre-construction, Construction	Section 4.2 of QA *G36 Environment Protection.* Guideline for the Management of Contamination (2013).
C2	Accidental spill	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport for NSW and EPA officers).	Contractor	Detailed design/Pre-construction	Section 4.3 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
C3	PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.	Contractor/Transport	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0
AH1	Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (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.	Contractor	Detailed design/pre-construction	Section 4.9 of QA *G36 Environment Protection*
AH2	Aboriginal heritage	If the scope of the proposal changes no further work is to occur until any potential impacts on Aboriginal cultural heritage is re-assessed.	Contractor	Detailed design/pre-construction	
NH1	Non-Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. • Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/pre-construction	Section 4.10 of QA *G36 Environment Protection*
LC1	Landscape character and visual impact	A Landscaping Plan will be prepared to support the final detailed project design and implemented as part of the CEMP. The Landscaping Plan will include design treatments for: • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges and noise walls	Contractor	Detailed design/pre-construction	Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014), Landscape Guideline (RTA, 2008), *Bridge Aesthetics* (Roads

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape work taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas. The Landscaping Plan will be prepared in accordance with relevant guidelines, including: • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008) • *Bridge Aesthetics* (Roads and Maritime 2012) • Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005).			and Maritime 2012), Noise Wall Design Guidelines (RTA, 2006), Shotcrete Design Guideline (RTA, 2005).
S1	Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints. The CP will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	Contractor	Detailed design/pre-construction	Community Involvement and Communications Resource Manual (RTA, 2008).

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
AQ1	Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or EES/DPIE guidelines • Mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions • A progressive rehabilitation strategy for exposed surfaces.	Contractor	Detailed design/pre-construction	Section 4.4 of QA *G36 Environment Protection*
AQ2	Air quality	All plant and equipment will be ensured to comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002.	Contractor	Construction	POEO Act (1997)
AQ3	Air quality	Smoky emissions will be kept within the standards and regulations under the Protection of the Environment Operations Act 1997.	Contractor	Construction	POEO Act (1997)
AQ4	Air quality	All delivery vehicles will be covered during transportation.	Contractor	Construction	N/A
AQ5	Air quality	Vegetation or other materials will not be burnt on site.	Contractor	Construction	N/A
AQ6	Air quality	Dust suppression techniques will be utilised in response to visible dust, such as watering dusty work areas and stockpile sites (using non-potable water where available).	Contractor	Construction	N/A
W1	Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • Measures to avoid and minimise waste associated with the project • Classification of wastes and management options (re-use, recycle, stockpile, disposal)	Contractor	Detailed design/pre-construction	Section 4.11 of QA *G36 Environment Protection, Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• 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. The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Transport for NSW Waste Fact Sheets.			
W2	Waste	All waste generated by the proposed work to be classified in accordance with the NSW Waste Classification Guidelines Part 1: Classifying Wastes (DECCW 2008).	Contractor	Construction	NSW Waste Classification Guidelines Part 1: Classifying Wastes (DECCW 2008)
W3	Waste	Resource management hierarchy principles are to be followed: • 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).	Contractor	Construction	Waste Avoidance & Resource Recovery Act (2001)
W4	Waste	All waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non–putrescible). When transporting or depositing the waste the contractor is to comply with Section 143 of the POEO Act.	Contractor	Construction	Section 4.11.4 of QA *G36 Environment Protection*
W5	Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	N/A

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
W6	Waste	Once the works have been completed, all waste material is to be removed from site and disposed of at a licenced facility. Waste is not to be buried on site.	Contractor	Construction	N/A
W7	Waste	Any contaminated soils encountered during works will be managed in accordance with Transport Guideline for the Management of Contamination (Transport, 2013).	Contractor	Construction	Guideline for the Management of Contamination (Transport, 2013).
W8	PFAS contaminated water and sediment	Soil and/or water removed from the Marshalls Creek waterway are to be tested for PFAS contaminants prior to re-use or disposal in accordance with relevant standards and requirements.	Contractor	Construction	
U1	Utilities	Prior to the commencement of work: • The location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners • If the scope or location of proposed utility relocation work falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.	Contractor	Detailed design/pre-construction	QA G7 Utility Adjustment

7.3 Licensing and Approvals

Table 7.3-1: Summary of licensing and approvals required

Instrument	Requirement	Timing
Fisheries Management Act 1994 (s199)	Notification to the Minister for Agriculture and Western NSW prior to any dredging or reclamation work.	A minimum of 28 days prior to the start of work.
Fisheries Management Act 1994 (s219)	Should the obstruction of Marshalls Creek be proposed, a permit to obstruct the free passage of fish (temporary or permanent) from the Minister for Agriculture and Western NSW is required	Prior to start of the activity.
Roads Act 1993 (s138)	The *Roads Act* requires that consent from the relevant roads authority be obtained before any work can be carried out on a public road.	Prior to start of work.

8 Conclusion

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 would result in improved road user safety and increased freight transport efficiency. Socio-economic impacts and benefits are discussed in Section 6.10.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The proposal has been designed to mitigate and/or avoid economic, environmental, and social impacts. These are discussed in Section 6.
1.3(c) To promote the orderly and economic use and development of land.	The proposal would not conflict with the existing land use within the construction footprint or result in a change of the existing land use (refer to Section 6.9).
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.	No significant impact on state or federally listed threatened biota is considered likely (refer to Section 6.1).
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposal would not impact upon Indigenous and Non-Indigenous heritage (refer to Section 6.6 and Section 6.7).
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 between the different levels of government in the State.	Not relevant to the proposal.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Not relevant to the proposal.

Ecologically sustainable development

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

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

The precautionary principle

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

This principle was considered during planning for the replacement of the bridge and the proposed footbridge alignment. The Preferred alignment that minimises vegetation clearance, with particular consideration of sensitive areas, was selected. The precautionary principle has guided the assessment of environmental impacts for this EIS and the development of mitigation measures.

Intergenerational equity

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

The proposal design would result in economic benefits in the form of reduced traffic congestion and improved road user safety for current and future generations in the surrounding area (refer to Section 6.10).

Conservation of biological diversity and ecological integrity

The proposed work would disturb a small area of habitat. Site selection for construction phase facilities including compound, crane pad, temporary access areas and stockpile sites are located in areas requiring minimal native vegetation clearance. The assessment has identified that the work would not impact significantly on the biological diversity and ecological integrity of the locality. Furthermore, safeguards have been developed that would assist in protecting aquatic habitats.

Improved valuation, pricing and incentive mechanisms

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

Environmental issues were considered as key matters in the route selection process and in the economic and financial feasibility assessments for the project proposal.

Mitigation measures for the avoidance, reuse, recycling and management of waste during construction and operation are to be implemented (refer to Section 6.12).

8.2 Conclusion

The proposed replacement of Marshalls Creek Bridge, located on the Sturt Highway Wagga Wagga, is subject to assessment under Division 5.1 of the EP&A Act. This 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 (as 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 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 short-term impacts on noise, vegetation clearing, soil disturbance and traffic. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also improve the safety of road users and reduce traffic congestion. On balance the proposal is considered justified.

Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces 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 Government Department of Agriculture, Water and Environment 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.

Zach Bradley

Environmental Consultant

NGH Consulting

Date: 23/08/2021

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

Prafulla KC

Project Manager / Engineer

Infrastructure and Place, Regional Development & Delivery South

Date: 30/08/2021

10 References

Australian Soil Resource Centre (ASRIS) (2014). Acid Sulphate Soils http://www.asris.csiro.au/mapping/viewer.htm [accessed July 2020]

Department of Agriculture, Water and the Environment (2020a). Australian Heritage Database. http://www.environment.gov.au/cgi–bin/ahdb/search.pl [accessed June 2020]

Department of Agriculture, Water and the Environment (2020b). Protected Matters Search Tool https://www.environment.gov.au/epbc/protected–matters–search–tool [accessed July 2020]

Environment Protection Authority (EPA) (2020). Contaminated Land Record http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx [Accessed May 2020]

NSW Geology Plus (2020), *Geological Survey of NSW* https://api.tiles.mapbox.com/v4/tybion.a0n6d2t9/page.html?access_token=pk.eyJ1IjoidHliaW9uIiwiYSI6IkJPWkFIRGMifQ.X8c8fyJg11-BDWz3KcOQBw#7/-32.810/147.830 [accessed June 2020]

NSW Government (2020a), *Major Projects* https://www.planningportal.nsw.gov.au/major-projects [accessed July 2020]

NSW Government (2020b) Search for NSW heritage http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx [accessed July 2020

Office of Environment and Heritage (OEH) (2016). South Western Slopes Bioregion. https://www.environment.nsw.gov.au/bioregions/NSWSouthWesternSlopesBioregion.htm [accessed May 2020]

Office of Environment and Heritage (OEH) (2020), Threatened Biodiversity Search, accessed online July 2020 at: https://www.environment.nsw.gov.au/threatenedspeciesapp/

Roads and Maritime Services (RMS) (2011). Procedure for Aboriginal cultural heritage consultation and investigation. Accessed online July 2020 at: https://www.rms.nsw.gov.au/documents/about/environment/protecting-heritage/managing-development/roads-and-maritime-services-procedure-for-aboriginal-cultural-heritage-consultation-and-investigation.pdf

Wagga Wagga City Council (WWCC) (2020). Economic Snapshot Wagga Wagga. Accessed online June 2020 at: https://wagga.nsw.gov.au/city-of-wagga-wagga/business/economic-snapshot

Wagga Wagga City Council (WWCC) (2018a). State of the Environment Report 2017/2018. Accessed online November 2020 at: https://wagga.nsw.gov.au/the-council/planning-and-reporting/community-reporting/environmental-reports

Wagga Wagga City Council (WWCC) (2018b). Wagga Wagga Urban Salinity Technical Report 2017/2018. Accessed online November 2020 at: https://wagga.nsw.gov.au/the-council/planning-and-reporting/community-reporting/environmental-reports

Terms and acronyms used in this REF

Term/ Acronym	Description
AHIMS	Aboriginal Heritage Information Management Systems
BC Act	*Biodiversity Conservation Act 2016* (NSW).
BCD	Biodiversity Conservation Division
CEMP	Construction environmental management plan
EIA	Environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Ground Dependent Ecosystems
Heritage Act	*Heritage Act 1977* (NSW)
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	NSW Interim Construction Noise Guideline (2009)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LLS	Local Land Services
MNES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
NML	Noise Management Level
NPI	the NSW Noise Policy for Industry (2017)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
OEH	Office of Environmental and Heritage (now BCD)
OOHW	Out of hours work
PACHCI	Procedure for Aboriginal cultural heritage consultations and investigation
PCT	Plant Community Type
RBL	Rating Background Level
RMS	NSW Roads and Maritime Services, now known as Transport for NSW
RWCC	Riverina Water County Council
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
TEC	Threatened Ecological Community
Transport	Transport for New South Wales
QA Specifications	Specifications developed by Transport for NSW for use with road work and bridge work contracts let by Transport for NSW.
WWCC	Wagga Wagga City Council

Appendix A

Consideration of clause 228(2) factors and matters of national environmental significance and Commonwealth land

Clause 228(2) 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 228(2) of the Environmental Planning and Assessment Regulation 2000, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
a) Any environmental impact on a community? The proposal would have minor impacts on the community during construction, including temporary air quality, noise, and traffic impacts. These impacts can be managed with the mitigation measures recommended in Section 6.3, Section 6.4 and Section 6.10.	Negative short term
b) Any transformation of a locality? Minor changes to the immediate visual amenity within the construction footprint would occur during construction due to the removal of vegetation. The proposal is consistent with the existing character and land use of the locality (refer to Section 6.9 and Section 6.8)	Negative short term
c) Any environmental impact on the ecosystems of the locality? The proposal would have minor impacts through the disturbance of 0.61 ha of vegetation, 0.20 ha of this is native vegetation (PCT 5). This vegetation is common and widespread in the locality and offers limited habitat value to the local ecosystems.	Negative long term
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There would be no impact on the locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations with implementation of identified mitigation measures.	Nil
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? No items of cultural, social or scientific significance would be impacted by the proposed work (refer to Section 6.6 and Section 6.7).	Nil
f) Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974)?* The proposed work would not significantly impact the habitat of protected fauna.	
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air (refer to Section 6.1).	Nil
h) Any long-term effects on the environment? With the implementation of the recommended mitigation measures in Section 6, the proposal would not have any long–term effects on the environment.	Nil

Factor	Impact
i) Any degradation of the quality of the environment? The proposal would cause minor biodiversity, soil and water, air, and noise impacts to the environment during construction. The mitigation measures listed in Section 6 would ensure that these impacts are limited.	Negative short term
j) Any risk to the safety of the environment? There is a potential risk of establishment and spread of weeds and pathogens during construction and maintenance of the proposal. The mitigation measures listed in Section 6.1 would ensure that the risk is limited.	Negative short term
k) Any reduction in the range of beneficial uses of the environment? No reduction in the range of beneficial uses of the environment is anticipated as a result of the proposal.	Nil
l) Any pollution of the environment? The equipment and plant used for construction are potential sources of pollution, which may impact water and air quality and the environment. The mitigation measures listed in Section 7.2 would ensure that the risk of these impacts is limited.	Negative short term
m) Any environmental problems associated with the disposal of waste? The proposal would result in the production of general construction waste and cleared vegetation, including weeds. The mitigation measures listed in Section 6.12 would ensure that the risk of environmental impacts associated with waste disposal is limited.	Negative short term
n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal is not expected to increase demands on resources in short supply. Resources required for the proposal are readily available.	Nil
o) Any cumulative environmental effect with other existing or likely future activities? Cumulative environmental effects of the proposal include the existing agricultural infrastructure within the surrounding locality and future growth within this area. The proposed works are minor, and therefore this small scale of works is not expected to contribute to any cumulative environmental effects.	Nil
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal is not in a coastal area, so there would be no impact on coastal processes and hazards.	Nil

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act, the following matters of national environmental significance and impacts on the Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of Agriculture, Water and Environment.

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?	No impact
b) Any impact on a National Heritage place?	No impact
c) Any impact on a wetland of international importance?	No impact
d) Any impact on a listed threatened species or communities?	No impact
e) Any impacts on listed migratory species?	No impact
f) Any impact on a Commonwealth marine area?	No impact
g) Does the proposal involve a nuclear action (including uranium mining)?	No impact
h) Additionally, any impact (direct or indirect) on the environment of Commonwealth land?	No impact

Appendix B

Statutory consultation checklists

Infrastructure SEPP

Certain development types

Development type	Description	Yes/No	If yes' consult with	ISEPP clause
Car Park	Does the project include a car park intended for the use by commuters using regular bus services?	No	N/A	ISEPP cl. 95A
Bus Depots	Does the project propose a bus depot?	No	N/A	ISEPP cl. 95A
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No	N/A	ISEPP cl. 95A

Development within the Coastal Zone

Issue	Description	Yes/No/ NA	If yes' consult with	ISEPP clause
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No	N/A	ISEPP cl. 15A

Note: See interactive map here: https://www.planning.nsw.gov.au/policy-and-legislation/coastal-management. Note the coastal vulnerability area has not yet been mapped.

Note: a certified coastal zone management plan is taken to be a certified coastal management program

Council related infrastructure or services

Issue	**Potential impact**	**Yes/No**	**If yes consult with**	**ISEPP clause**
Stormwater	Is the work likely to have a *substantial* impact on the stormwater management services which are provided by council?	Yes	WWCC	ISEPP cl.13(1)(a)
Traffic	Is the work likely to generate traffic to an extent that would *strain* the capacity of the existing road system in a local government area?	Yes	WWCC	ISEPP cl.13(1)(b)
Sewerage system	would the work involve connection to a council owned sewerage system? If so, would this connection have a *substantial* impact on the capacity of any part of the system?	No	N/A	ISEPP cl.13(1)(c)
Water usage	Would the work involve connection to a council owned water supply system? If	No	N/A	ISEPP

Issue	Potential impact	Yes/No	If yes consult with	ISEPP clause
	so, would this require the use of a *substantial* volume of water?			cl.13(1)(d)
Temporary structures	Would the work 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, would this cause more than a *minor* or *inconsequential* disruption to pedestrian or vehicular flow?	Yes	WWCC	ISEPP cl.13(1)(e)
Road & footpath excavation	Would the work involve more than *minor* or *inconsequential* excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	WWCC	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 work? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than *minor* or *inconsequential?*	No	N/A	ISEPP cl.14

Flood liable land

Issue	Potential impact	Yes/No	If yes consult with	ISEPP clause
Flood liable land	Is the work located on flood liable land? If so, would the work change flood patterns to more than a *minor* extent?	No	N/A	ISEPP cl.15
Flood liable land	Is the work located on flood liable land? (To any extent). If so, does the work comprise more than minor alterations or additions to, or the demolition of, a building, emergency work or routine maintenance	No	N/A	ISEPP cl.15AA

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled *Floodplain Development Manual: the management of flood liable* land published by the New South Wales Government.

Public authorities other than councils

Issue	Potential impact	Yes/No	If yes consult with	ISEPP clause
National parks and reserves	Is the work adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No	N/A	ISEPP cl.16(2)(a)
National parks and reserves	Is the work on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	N/A	ISEPP cl. 16(2)(b)
Aquatic reserves	Is the work adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No	N/A	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Is the work in the Sydney Harbour Foreshore Area as defined by the *Place Management NSW Act 1998?*	No	N/A	ISEPP cl.16(2)(d)
Bush fire prone land	Is the work 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	N/A	ISEPP cl.16(2)(f)
Artificial light	Would the work 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	N/A	ISEPP cl.16(2)(g)
Defence communications buffer land	Is the work 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	N/A	ISEPP cl. 16(2)(h)
Mine subsidence land	Is the work on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	No	N/A	ISEPP cl. 16(2)(i)

Appendix C

Proposal Design

Transport Roads & Maritime Services

WAGGA WAGGA CITY

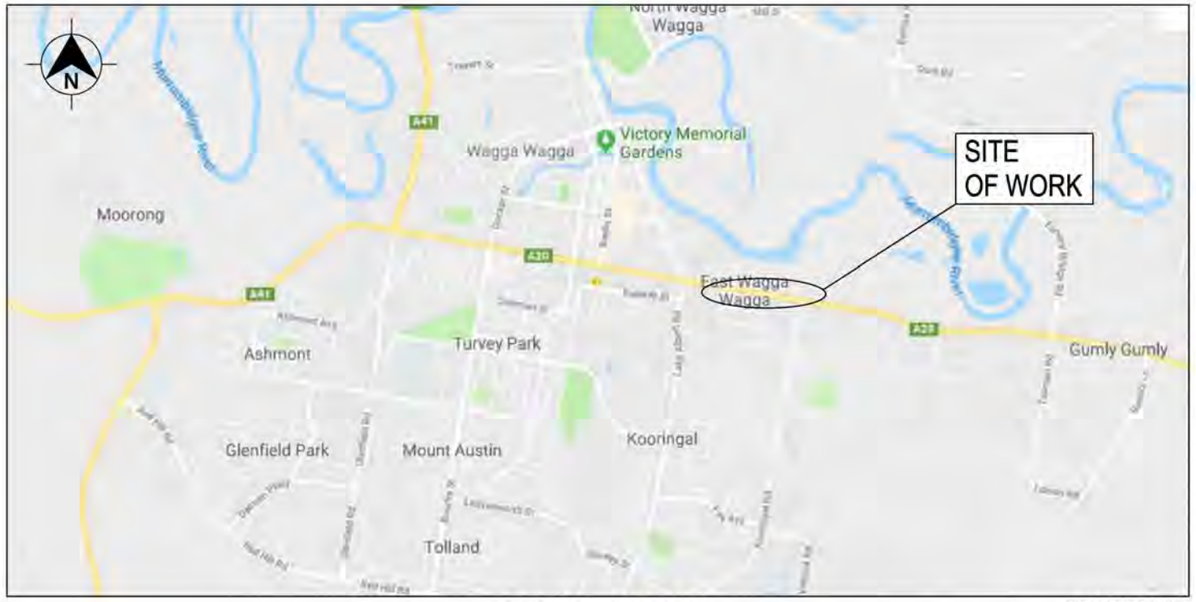
HW14 - STURT HIGHWAY

MARSHALLS CREEK BRIDGE REPLACEMENT

79.335km TO 79.490km WEST OF GUNDAGAI

ROAD DESIGN

80% DETAIL DESIGN



LOCALITY PLAN

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-01-GE.dgn		LINEAR REFERENCING START: 0014, 0080, A1, 0.280 (E 535416.597, N 6113392.866, MGA55) FINISH: 0014, 0080, A1, 0.435 (E 535263.915, N 6113419.569, MGA55)		PLOT DATE / TIME 4/03/2020 11:11:11 AM PLOT BY MckenzML	CLIENT Transport Roads & Maritime Services
PREPARED BY ROADS AND MARITIME SERVICES TECHNICAL AND PROJECT SERVICES ENGINEERING SERVICES TECHNICAL OPERATIONS AND SUPPORT ROAD DESIGN SOUTH WEST	DESIGNED SIGNED NAME M. McKENZIE TITLE ROAD DESIGNER IN TRAINING DATE	REVIEWED SIGNED NAME J. GOODEN TITLE ROAD DESIGNER DATE	VERIFIED SIGNED NAME L. CROKER TITLE LEAD ROAD DESIGN MANAGER DATE	RMS PROJECT MANAGER NAME P. KC TITLE PROJECT MANAGER/ ENGINEER VALIDATION AND ACCEPTANCE OF THESE DRAWINGS AND THE DESIGN SHOWN THEREON IS TO BE CARRIED OUT UNDER SEPARATE PROCESS	PREPARED FOR REGIONAL AND FREIGHT ASSET SOUTH WEST BRIDGE MAINTENANCE SOUTH WEST

WAGGA WAGGA CITY HW14 - STURT HIGHWAY 79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA) MARSHALLS CREEK BRIDGE REPLACEMENT			A3
RMS PROJECT No. P.0008431	DESIGN PROJECT No. SF2018 / 300270		
RMS REGISTRATION No. DS2018 / 001534			PART
ISSUE STATUS 80% DETAIL DESIGN		SHEET No. GE-0101	ISSUE

SHEET NUMBER	SHEET DESCRIPTION
GE	GENERAL (6 SHEETS)
GE-0101	COVER SHEET
GE-0102	INDEX AND STANDARD DRAWING REGISTER
GE-0103	DETAIL PLAN - HW14 - STURT HIGHWAY - MCA1 - 79300 TO 79545
GE-0104	TYPICAL CROSS SECTION
GE-0105	PRESERVATION OF SURVEY INFRASTRUCTURE - MCA1 - 79335 TO 79490
GE-0106	PRESERVATION OF SURVEY INFRASTRUCTURE - REGISTER
RD	ROAD ALIGNMENT AND DETAIL (6 SHEETS)
RD-0201	ROAD ALIGNMENT PLAN - HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490
RD-0202	ROAD ALIGNMENT PLAN - MCC1 - ACCESS No2
RD-0203	ROAD ALIGNMENT PLAN - MP00 - PATHWAY
RD-0204	ALIGNMENT SCHEDULE
RD-0205	SURVEY DISCLAIMER
RD-0206	SURVEY METADATA
RC	ROAD CROSS SECTIONS (4 SHEETS)
RC-0301	CROSS SECTION HW14 - STURT HIGHWAY - MCA1 - 79335.000 TO 79380.000
RC-0302	CROSS SECTION HW14 - STURT HIGHWAY - MCA1 - 79400.000 TO 79460.000
RC-0303	CROSS SECTION HW14 - STURT HIGHWAY - MCA1 - 79480.000 TO 79490.000
RC-0304	CROSS SECTION HW14 - STURT HIGHWAY - MP00
UT	UTILITIES (2 SHEETS)
UT-0401	UTILITIES PLAN - HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490
UT-0402	UTILITY METADATA
SM	STORMWATER MANAGEMENT (4 SHEETS)
SM-0501	STORMWATER MANAGEMENT PLAN - HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490
SM-0502	STORMWATER MANAGEMENT PLAN - DT1.1
SM-0503	STORMWATER MANAGEMENT PLAN - DT1.2
SM-0504	CULVERT SETOUT DETAILS
PV	PAVEMENT (2 SHEETS)
PV-0601	PAVEMENT PLAN - PAVEMENT DESIGN DETAILS
PV-0602	PAVEMENT PLAN - HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490
RF	ROADSIDE FURNITURE, SIGNPOSTING AND PAVEMENT MARKING (3 SHEETS)
RF-0701	ROADSIDE FURNITURE PLAN - HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79380
RF-0702	ROADSIDE FURNITURE PLAN - HW14 - STURT HIGHWAY - MCA1 - 79380 TO 79490.000
RF-0703	LINEMARKING SCHEDULE

LATEST VERSIONS OF STANDARD DRAWINGS TO BE DOWNLOADED AT TIME OF CONSTRUCTION	
STANDARD DRAWING NUMBER	DRAWING TITLE
R0210 STORMWATER DRAINAGE SERIES - HEADWALLS	
R0210 - 16	CONCRETE HEADWALLS SINGLE CELL 300mm TO 900mm DIA WITH ROCK MATTRESS PROTECTION (3 TO 1 BATTER OR FLATTER)
R0220 STORMWATER DRAINAGE SERIES - GULLY PITS	
R0220 - 29	DRAINAGE JUNCTION BOX
R0300 KERB AND CHANNEL SERIES	
R0300 - 01	STANDARD KERB AND GUTTER SHAPES (S381)
R0300 - 02	DISHED CROSSING FOR MINOR STREET JUNCTIONS AND ACCESS ROADS (S367)
R0300 - 04	STANDARD VEHICULAR CROSSING FOR USE WITH TYPE SA KERB AND CHANNEL
R0300 - 05	KERB TRANSITION TYPE SA KERB TO TYPE SF KERB (S371)
R0300 - 11	KERB RAMPS (SHEET 1)
	KERB RAMPS (SHEET 2)
	KERB RAMPS (SHEET 3)
R0800 FENCING SERIES	
R0800 - 10	PEDESTRIAN FENCE - GENERAL (SHEET 1)
	PEDESTRIAN FENCE - GENERAL (SHEET 2)
R0800 - 15	PEDESTRIAN FENCE - TYPE 1 - VERGE
R0800 - 16	PEDESTRIAN FENCE - TYPE 1 - MEDIAN

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggds03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-01-GE.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 4/03/2020 11:11:11 AM

PLOT BY: MckenzML

CLIENT: Transport Roads & Maritime Services (NSW GOVERNMENT)

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
GENERAL
INDEX AND STANDARD DRAWING REGISTER

A3

RMS REGISTRATION No. DS2018/001534

VOL

ISSUE STATUS: 80% DETAIL DESIGN

EDMS No. SF2018/300270

SHEET No. GE-0102

ISSUE

LEGEND

SHEET AREA - SCALE 1:1000

NOTES

1. PERMANENT AND STATE SURVEY CONTROL MARKS ARE NOT TO BE DISTURBED UNLESS ASSESSED BY ROADS AND MARITIME SURVEY IN ACCORDANCE WITH LAND AND PROPERTY INFORMATION STANDARDS - FINES APPLY

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-01-GE.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 10 20 30 40 — SCALE 1:1000m

CO-ORDINATE SYSTEM: MGA ZONE 55
HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY
ROADS AND MARITIME SERVICES
TECHNICAL AND PROJECT SERVICES
ENGINEERING SERVICES
DESIGN SOUTH WEST

PLOT DATE / TIME: 4/03/2020 11:11:11 AM
PLOT BY: MckenzML

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT
NSW GOVERNMENT Transport Roads & Maritime Services

PREPARED FOR
NETWORK NSW
REGIONAL SOUTH WEST
ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
DETAIL PLAN
HW14 - STURT HIGHWAY - MCA1 - 79300 TO 79545

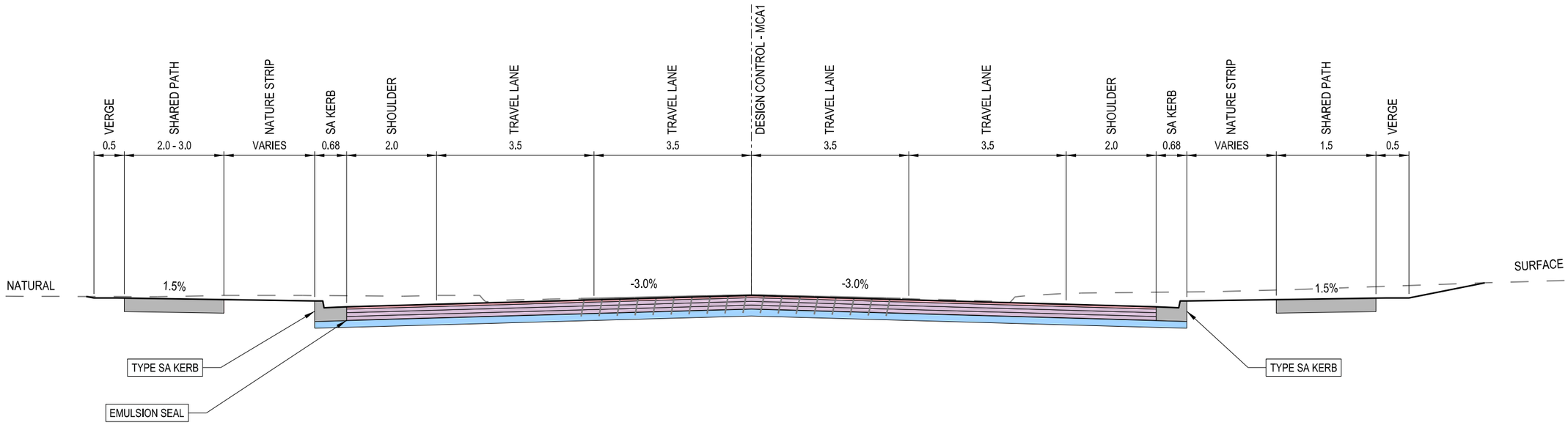
A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN
EDMS No.: SF2018/300270
SHEET No.: GE-0103
ISSUE

LEGEND

- WEARING COURSE LAYER
- BASE LAYER
- SUBBASE LAYER
- CONCRETE



TYPICAL CROSS SECTION - MCA1

NOTES

1. REFER TO SHEET PV-0601 FOR PAVEMENT DESIGN DETAILS
2. REFER TO VOLUME 6 - PAVEMENT FOR KERB AND CHANNEL SETOUT DETAILS
3. REFER TO ROADS AND MARITIME STANDARD DRAWING R0300-01 FOR STANDARD KERB AND CHANNEL SHAPES

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-01-GE.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: NOT TO SCALE

CO-ORDINATE SYSTEM: MGA ZONE 55 | HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

PLOT DATE / TIME: 4/03/2020 11:11:11 AM | PLOT BY: MckenzML

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

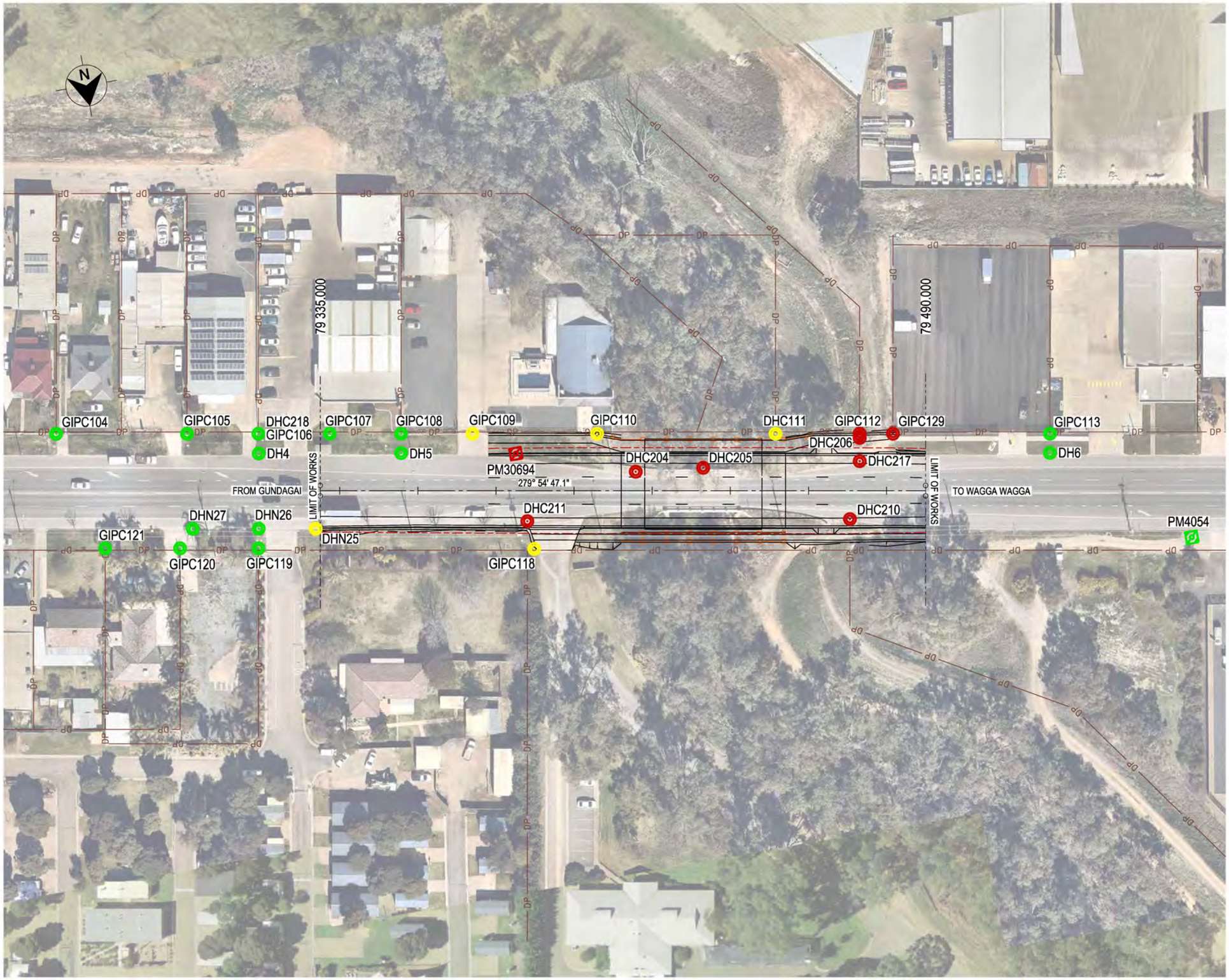
PREPARED FOR: NETWORK NSW REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
GENERAL
TYPICAL CROSS SECTION

A3

RMS REGISTRATION No. DS2018/001534 | VOL

ISSUE STATUS: 80% DETAIL DESIGN | EDMS No. SF2018/300270 | SHEET No. GE-0104 | ISSUE



LEGEND

- DP — CADASTRAL BOUNDARY OVERLAY
- TB — PROPOSED TITLE BOUNDARY
- PERMANENT / STATE SURVEY MARK
- CADASTRAL REFERENCE MARK
- SURVEY MARK IS SAFE
- SURVEY MARK IS VULNERABLE
- SURVEY MARK TO BE DESTROYED
- SURVEY MARK ALREADY GONE

POSI DISCLAIMER

CARE, PROTECTION AND PRESERVATION OF PERMANENT SURVEY AND CADASTRAL REFERENCE MARKS.

WARNING: PENALTIES APPLY FOR THE REMOVAL, DAMAGE, DESTRUCTION, DISPLACEMENT AND DISTURBANCE OF PERMANENT SURVEY AND CADASTRAL REFERENCE MARKS (SURVEY INFRASTRUCTURE) WITHOUT AUTHORISATION BY THE SURVEYOR GENERAL AS PER THE REQUIREMENTS UNDER SECTION 24 OF THE SURVEYING AND SPATIAL INFORMATION ACT 2002. AUTHORISATION MUST BE SOUGHT PRIOR TO ANY ACTIVITIES ON SITE WHICH MAY IMPACT ON THE SURVEY INFRASTRUCTURE AS DETAILED IN THE SURVEYING AND SPATIAL INFORMATION REGULATION 2017.

THIS DRAWING HIGHLIGHTS SURVEY INFRASTRUCTURE IN THE GENERAL VICINITY OF THE PROPOSED CONSTRUCTION FOOTPRINT FOR WORKS UNDER THE CONTRACT. THE SURVEY INFRASTRUCTURE SHOWN HAS BEEN DERIVED FROM AN OFFICE INTERPRETATION OF EXISTING DEPOSITED PLAN INFORMATION AND/OR SCIMS SEARCH. IT IS PROVIDED AS GENERAL INFORMATION FOR THE CONTRACTOR AND SHOULD BE VERIFIED FOR COMPLETENESS PRIOR TO ANY SITE ACTIVITY WITHIN OR NEAR CONSTRUCTION LIMITS.

ROADS AND MARITIME G71 - CONSTRUCTION SURVEYS SPECIFICATION SETS OUT THE PROCESS TO BE FOLLOWED AND ALIGNS WITH THE PROCESS DETAILED IN THE SURVEYOR GENERAL'S DIRECTIONS NO.11 PRESERVATION OF SURVEY INFRASTRUCTURE.

EXTRA CARE IS REQUIRED FOR ASSOCIATED WORKS SUCH AS:
- UTILITY ADJUSTMENTS
- TEMPORARY ACCESS TRACKS
- SITE OFFICE AND COMPOUNDS
- STOCKPILES
- ENVIRONMENTAL CONSTRAINTS LIMITS
- TRAFFIC CONTROL (IN ADVANCE OF WORKS)
- SIGNAGE PLACEMENT
- DESIGN CHANGES

ADVICE MUST BE SOUGHT FROM THE ROADS AND MARITIME SURVEYING SECTION WELL IN ADVANCE OF ANY SITE WORKS COMMENCING.

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-01-GE.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 6/03/2020 9:06:36 AM
PLOT BY: MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 10 20 30 40 — SCALE 1:1000m

CO-ORDINATE SYSTEM: MGA ZONE 55
HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY
ROADS AND MARITIME SERVICES
TECHNICAL AND PROJECT SERVICES
ENGINEERING SERVICES
DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

PREPARED FOR
NETWORK NSW
REGIONAL SOUTH WEST
ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
POSI PLAN
PRESERVATION OF SURVEY INFRASTRUCTURE - MCA1 - 79335 TO 79490

A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. GE-0105 — ISSUE

Preservation of Survey Infrastructure (POSI) Register - Job 2018/994 - MGA Zone 55 GDA94

Mark ID	Type	Source / Plan	MGA Easting	MGA Northing	Class	Order	Date	AHD	Class	Order	Date	Status	Date	Project Impact	Comments
PM4054	PM	SCIMS	535198.810	6113443.054	B	2	28/09/18	179.699	LC	L3	28/09/18	Not Found	22/07/19	Safe	No Star Pickets; status is uncertain
PM30624		SCIMS	535365.646	6113392.157	B	2	28/09/18	180.355	LC	L3	28/09/18	Found	15/08/19	To Be Destroyed	No Star Pickets
DH4	DH &W	DP1102315	535430.48	6113380.8	D	4	15/08/19	-	-	-	-	Found	15/08/19	Safe	
DH5	DH &W	DP1102315	535394.53	6113386.9	D	4	15/08/19	-	-	-	-	Found	15/08/19	Safe	
DH6	DH &W	DP707272	535230.87	6113415.5	D	4	15/08/19	-	-	-	-	Found	15/08/19	Safe	
DHN25	DH &W	N/A	535419.43	6113402.3	D	4	15/08/19	-	-	-	-	Found	15/08/19	Vulnerable	
DHN26	DH &W	N/A	535433.81	6113399.7	D	4	15/08/19	-	-	-	-	Found	15/08/19	Safe	
DHN27	DH &W	N/A	535450.44	6113396.9	D	4	15/08/19	-	-	-	-	Found	15/08/19	Safe	
GIPC104	GIP	DP20312	535480.7	6113366.9	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC105	GIP	DP362170	535447.7	6113372.6	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC106	GIP	DP377207	535429.7	6113375.8	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC107	GIP	DP377207	535411.7	6113378.9	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC108	GIP	DP365598	535393.7	6113382.1	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC109	GIP	DP380936	535375.7	6113385.2	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Vulnerable	
GIPC110	GIP	DP380936	535344.2	6113390.7	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Vulnerable	
DHC111	GIP	DP362170	535299.3	6113398.6	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Vulnerable	
GIPC112	GIP	DP84864	535276.0	6113402.3	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
GIPC113	GIP	DP84864	535230.0	6113410.6	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC118	GIP	CP2520-3110	535365.2	6113417.0	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Vulnerable	
GIPC119	GIP	DP163834	535434.7	6113404.7	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC120	GIP	DP709638	535454.5	6113401.2	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC121	GIP	DP709638	535473.4	6113397.9	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	
GIPC129	GIP	DP84864	535269.6	6113403.7	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
DHC204	DH&W	DP1182799	535336.2	6113402.0	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
DHC205	DH&W	DP1182799	535310.0	6113404.0	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
DHC206	DH&W	DP707272	535276.2	6113403.3	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
DHC210	DH&W	DP540063	535284.3	6113423.4	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
DHC211	DH&W	DP540063	535365.7	6113409.7	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
DHC217	DH&W	DP707272	535279.2	6113409.2	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	To Be Destroyed	
DHC218	DH&W	N/A	535429.6	6113375.3	E	5	29/08/19	-	-	-	-	Calculated	29/08/19	Safe	

NOTE:
Type - Refers to the physical mark.
Status - 'Calculated' infers values have been calculated from Deposited Plans or other sources, without field investigation.

Depending on the construction cycle, a mark's status may change from; Calculated -> Found -> Destroyed with change of date each time

Calculated
Found
Not Found
Gone
Destroyed
Disturbed

CLASS and Order - refer to ICSM - SP1 version 1.7

Safe	
Vulnerable	
To Be Destroyed	
Already Gone	Reported via Mark Status to Spatial Services

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-01-GE.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 5/03/2020 1:26:11 PM

PLOT BY: MckenzML

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: NOT TO SCALE

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
POSI PLAN
PRESERVATION OF SURVEY INFRASTRUCTURE - REGISTER

A3

RMS REGISTRATION No. DS2018/001534

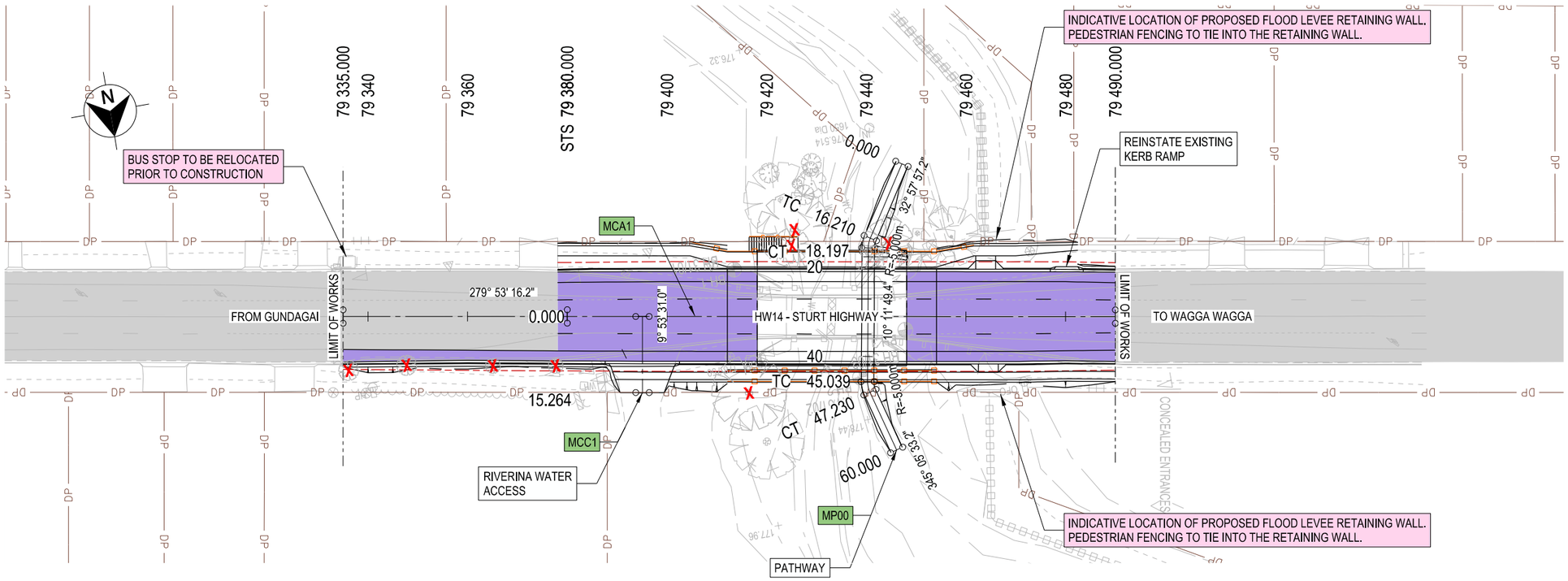
VOL

ISSUE STATUS: 80% DETAIL DESIGN

EDMS No. SF2018/300270

SHEET No. GE-0106

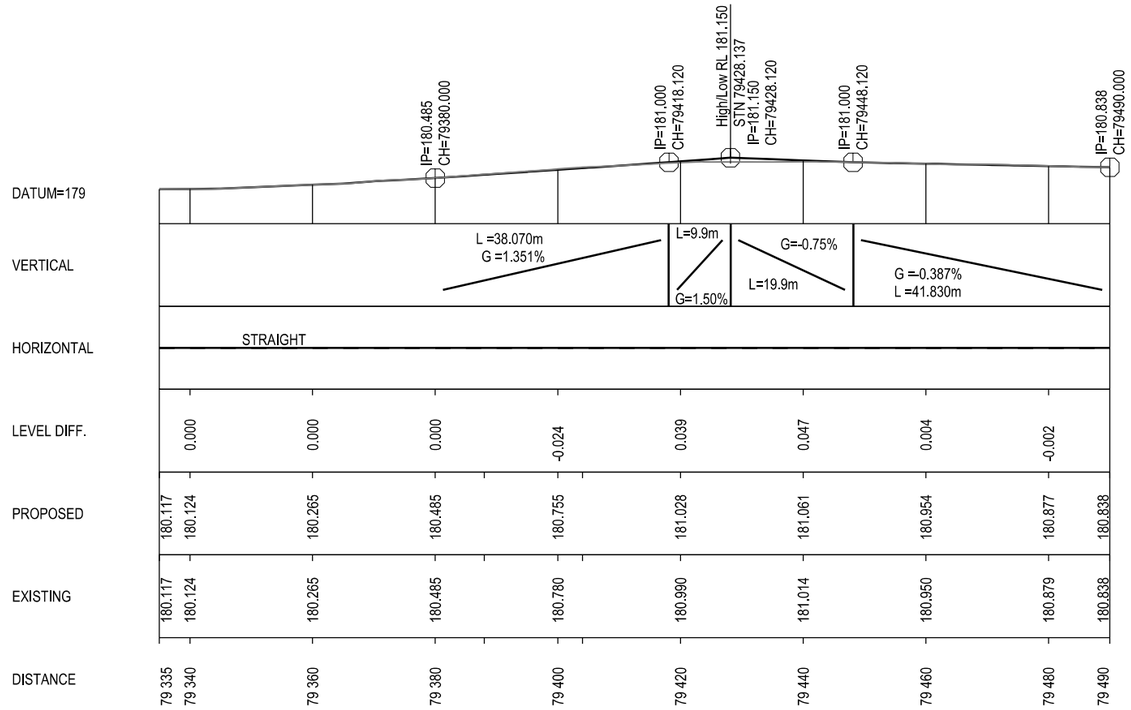
ISSUE



LEGEND

- MCA0 — CONTROL STRING LABEL
- CLEARZONE
- DP — CADASTRAL BOUNDARY OVERLAY
- PM — PERMANENT SURVEY MARK - DO NOT DISTURB
- SS — STATE SURVEY MARK - DO NOT DISTURB
- NB — SURVEY STAR PICKET MARK
- EXISTING PROPERTY GATE
- EXISTING PROPERTY FENCE
- NEW PAVEMENT TO BE CONSTRUCTED
- EXISTING PAVEMENT
- TREES TO BE REMOVED
- TREES TO BE RETAINED

PLAN VIEW - MCA1 - MAIN ALIGNMENT



LONGITUDINAL SECTION - MCA1

NOTES

1. PERMANENT AND STATE SURVEY CONTROL MARKS ARE NOT TO BE DISTURBED UNLESS ASSESSED BY ROADS AND MARITIME SURVEY IN ACCORDANCE WITH LAND AND PROPERTY INFORMATION STANDARDS - FINES APPLY
2. REFER TO SHEET RD-0204 FOR ALIGNMENT METADATA
3. REFER TO SHEET RD-0206 FOR SURVEY METADATA

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-02-RD.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: HORIZONTAL SCALE 1:1000m (0 10 20 30 40); VERTICAL SCALE 1:200m (0 2 4 6 8)

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

PLOT DATE / TIME: 6/03/2020 9:19:03 AM — PLOT BY: MckenzML

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

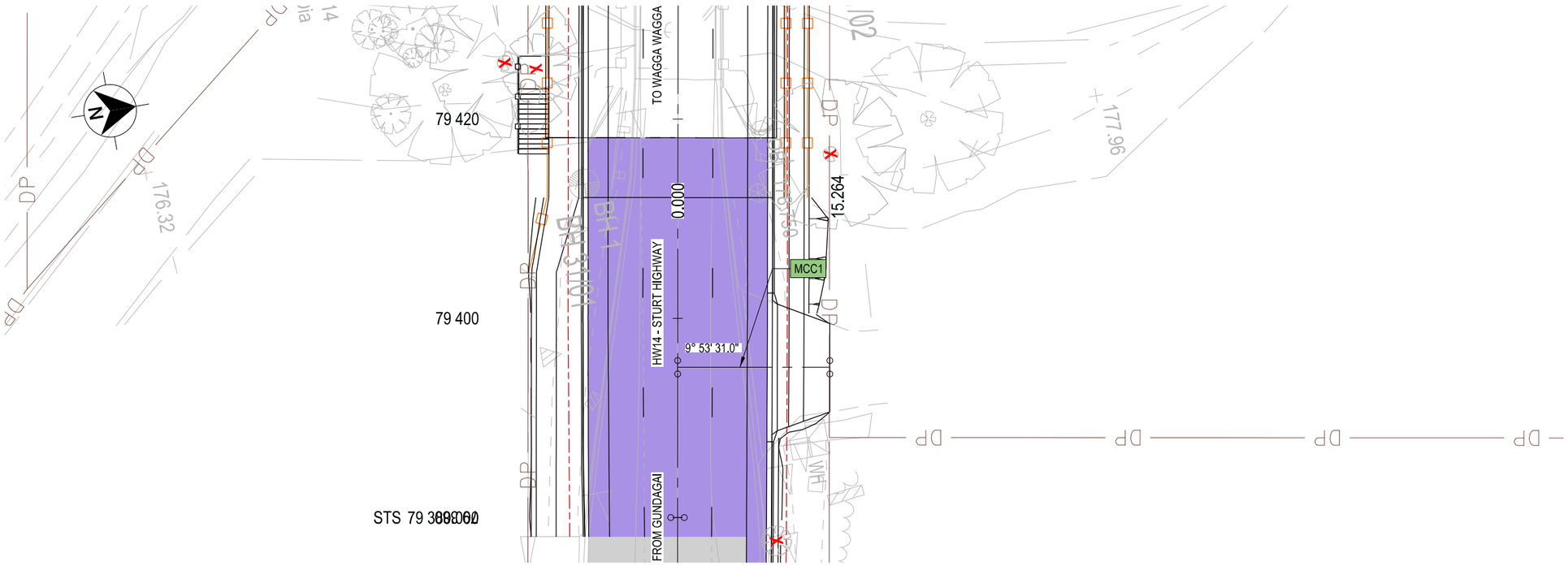
PREPARED FOR: NETWORK NSW REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROAD ALIGNMENT PLAN
HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490

A3

RMS REGISTRATION No. DS2018/001534 — VOL

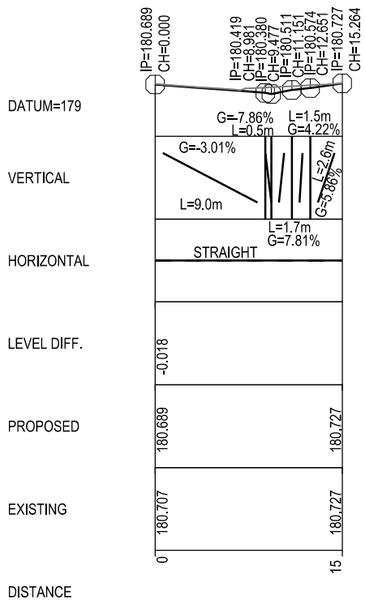
ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RD-0201 — ISSUE



PLAN VIEW - MCC1 - RIVERINA WATER ACCESS

LEGEND

- CONTROL STRING LABEL (MCA0)
- CLEARZONE
- CADASTRAL BOUNDARY OVERLAY (DP)
- PM — PERMANENT SURVEY MARK - DO NOT DISTURB
- SS — STATE SURVEY MARK - DO NOT DISTURB
- NB — SURVEY STAR PICKET MARK
- EXISTING PROPERTY GATE
- EXISTING PROPERTY FENCE
- NEW PAVEMENT TO BE CONSTRUCTED
- EXISTING PAVEMENT
- TREES TO BE REMOVED
- TREES TO BE RETAINED



LONGITUDINAL SECTION - MCC1

NOTES

1. PERMANENT AND STATE SURVEY CONTROL MARKS ARE NOT TO BE DISTURBED UNLESS ASSESSED BY ROADS AND MARITIME SURVEY IN ACCORDANCE WITH LAND AND PROPERTY INFORMATION STANDARDS - FINES APPLY
2. REFER TO SHEET RD-0204 FOR ALIGNMENT METADATA
3. REFER TO SHEET RD-0206 FOR SURVEY METADATA

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-02-RD.dgn
DESIGN LOT CODE	
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	
PLOT DATE / TIME	6/03/2020 9:19:04 AM
PLOT BY	MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: HORIZONTAL SCALE 1:500m (0 5 10 15 20); VERTICAL SCALE 1:200m (0 2 4 6 8)

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

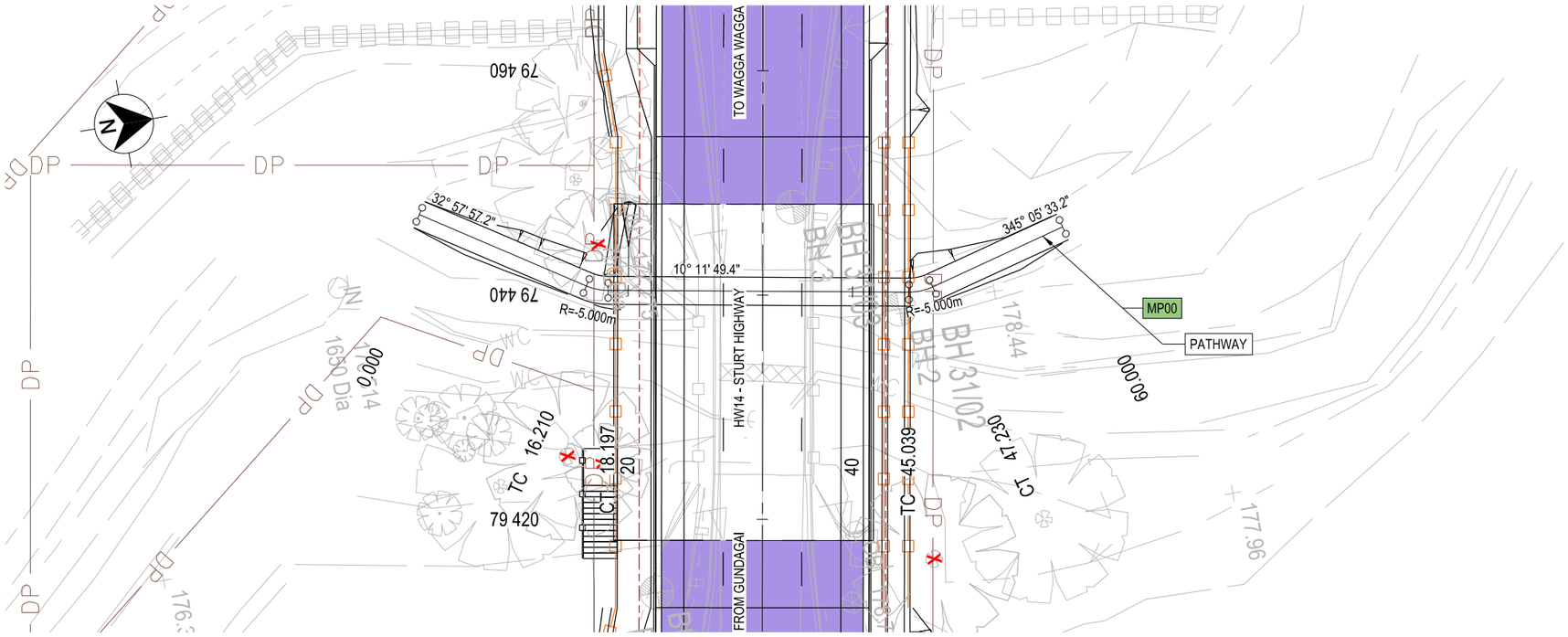
PREPARED FOR: NETWORK NSW REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROAD ALIGNMENT PLAN
MCC1 - RIVERINA WATER ACCESS

A3

RMS REGISTRATION No. DS2018/001534 — VOL

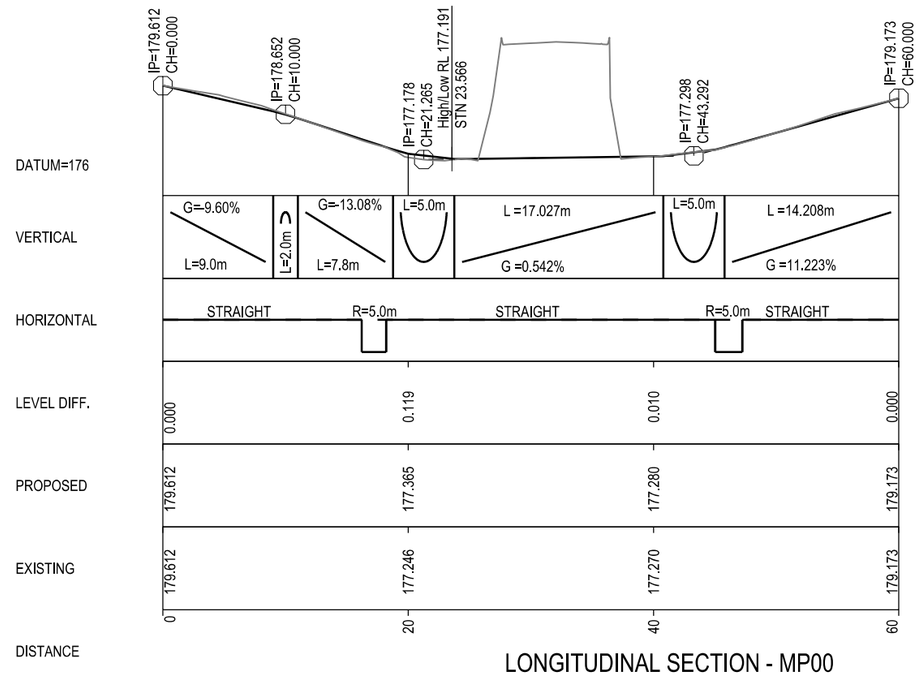
ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RD-0202 — ISSUE



PLAN VIEW - MP00 - PATHWAY

LEGEND

- MCA0 — CONTROL STRING LABEL
- CLEARZONE
- DP — CADASTRAL BOUNDARY OVERLAY
- PM — PERMANENT SURVEY MARK - DO NOT DISTURB
- SS — STATE SURVEY MARK - DO NOT DISTURB
- NB — SURVEY STAR PICKET MARK
- EXISTING PROPERTY GATE
- EXISTING PROPERTY FENCE
- NEW PAVEMENT TO BE CONSTRUCTED
- EXISTING PAVEMENT
- TREES TO BE REMOVED
- TREES TO BE RETAINED



LONGITUDINAL SECTION - MP00

NOTES

1. PERMANENT AND STATE SURVEY CONTROL MARKS ARE NOT TO BE DISTURBED UNLESS ASSESSED BY ROADS AND MARITIME SURVEY IN ACCORDANCE WITH LAND AND PROPERTY INFORMATION STANDARDS - FINES APPLY
2. REFER TO SHEET RD-0204 FOR ALIGNMENT METADATA
3. REFER TO SHEET RD-0206 FOR SURVEY METADATA

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-02-RD.dgn			6/03/2020 9:19:04 AM	MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: HORIZONTAL SCALE 1:500m (0, 5, 10, 15, 20); VERTICAL SCALE 1:200m (0, 2, 4, 6, 8)

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

PREPARED FOR: NETWORK NSW REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROAD ALIGNMENT PLAN
MP00 - PATHWAY

A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RD-0203 — ISSUE

HORIZONTAL ALIGNMENT REPORT - MCA0 - DESI LINEMARKING

POINT	CHAINAGE	EASTING	NORTHING	ELEVATION	ELEMENT	LENGTH	BEARING
START	79300.000	535451.084	6113386.893	0.000			
					STRAIGHT	35.000	279°49'37.6"
STS	79335.000	535416.597	6113392.866	0.000			
					STRAIGHT	45.000	279°53'16.2"
STS	79380.000	535372.266	6113400.594	0.000			
					STRAIGHT	110.000	279°55'59.3"
STS	79490.000	535263.914	6113419.569	0.000			
					STRAIGHT	55.000	279°49'55.1"
END	79545.000	535209.722	6113428.960	0.000			

HORIZONTAL ALIGNMENT REPORT - MCA1 - DESI FINAL

POINT	CHAINAGE	EASTING	NORTHING	ELEVATION	ELEMENT	LENGTH	BEARING
START	79335.000	535416.598	6113392.866	180.117			
					STRAIGHT	45.000	279°53'16.2"
STS	79380.000	535372.266	6113400.594	180.485			
					STRAIGHT	110.000	279°55'59.1"
END	79490.000	535263.915	6113419.568	180.838			

HORIZONTAL ALIGNMENT REPORT - MCC1 - DESI FINAL

POINT	CHAINAGE	EASTING	NORTHING	ELEVATION	ELEMENT	LENGTH	BEARING
START	0.000	535357.406	6113403.196	180.689			
					STRAIGHT	15.264	9°53'31.0"
END	15.264	535360.028	6113418.233	180.727			

HORIZONTAL ALIGNMENT REPORT - MP00 - DESI PATHWAY

POINT	CHAINAGE	EASTING	NORTHING	ELEVATION	ELEMENT	LENGTH	BEARING
START	0.000	535300.840	6113381.995	179.612			
					STRAIGHT	16.210	32°57'57.2"
TC	16.210	535309.660	6113395.595	177.840			32°57'57.2"
CC		535305.465	6113398.316		R = -5.000	1.987	
CT	18.197	535310.386	6113397.430	177.580			10°11'49.4"
					STRAIGHT	26.843	10°11'49.4"
TC	45.039	535315.138	6113423.849	177.500			10°11'49.4"
CC		535310.217	6113424.734		R = -5.000	2.191	
CT	47.230	535315.049	6113426.020	177.740			345°05'33.2"
					STRAIGHT	12.770	345°05'33.2"
END	60.000	535311.764	6113438.361	179.173			

HORIZONTAL ALIGNMENT REPORT - MD10 - DESI DRAINAGE

POINT	CHAINAGE	EASTING	NORTHING	ELEVATION	ELEMENT	LENGTH	BEARING
START	0.000	535351.792	6113412.443	178.280			
					STRAIGHT	4.880	279°44'52.1"
STS	4.880	535346.982	6113413.270	178.245			
					STRAIGHT	1.614	353°49'35.9"
STS	6.494	535346.807	6113414.874	178.245			
					STRAIGHT	1.226	11°29'39.0"
STS	7.720	535347.049	6113416.076	178.238			
					STRAIGHT	0.580	324°54'47.2"
STS	8.300	535346.715	6113416.551	178.039			
					STRAIGHT	12.199	279°54'47.1"
END	20.499	535334.698	6113418.651	177.975			

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-02-RD.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 6/03/2020 9:19:04 AM

PLOT BY: MckenzML

CLIENT: Transport NSW GOVERNMENT Roads & Maritime Services

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROAD ALIGNMENT PLAN
ALIGNMENT SCHEDULE

A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

RMS REGISTRATION No.: DS2018/001534

VOL

ISSUE STATUS: 80% DETAIL DESIGN

EDMS No.: SF2018/300270

SHEET No.: RD-0204

ISSUE

RMS DISCLAIMER FOR DETAIL SURVEYS

THE SURVEY FROM WHICH THIS MODEL WAS CREATED WAS CARRIED OUT TO COMPLY WITH THE REQUIREMENTS OF THE CLIENT, AS DEFINED IN THE SURVEY INSTRUCTION ANY PERSON OR ORGANISATION WHO RELIES ON THIS SURVEY FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT WAS CARRIED OUT, DOES SO AT THEIR OWN RISK.

SURVEY CONTROL INFORMATION IS REGARDED AS SUITABLE FOR THE SURVEY AND CORRECT AT THE TIME OF SURVEY, BUT SHOULD BE VERIFIED BEFORE BEING USED FOR ANY OTHER PURPOSE.

ANY PUBLIC UTILITIES AND SERVICES SHOWN IN THIS MODEL HAVE BEEN LOCATED BY USING VISIBLE SURFACE FEATURES ONLY AND COMPLY WITH THE REQUIREMENTS SPECIFIED BY THE CLIENT IN THE SCOPE OF WORKS. A FULL INVESTIGATION OF SUBSURFACE UTILITIES, INCLUDING A 'CLASS A' LOCATION SURVEY (REFER TO AUSTRALIAN STANDARD AS5488), MAY BE REQUIRED BEFORE CARRYING OUT ANY DESIGN OR CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA.

PROPERTY BOUNDARY OVERLAYS, WHERE SUPPLIED, VARY IN ACCURACY ACCORDING TO REQUIREMENTS SPECIFIED BY THE CLIENT IN THE SCOPE OF WORKS, AND THE UNDERLYING AGE AND ACCURACY OF THE CADASTRE. THEREFORE, A LAND SURVEY, AS DEFINED UNDER THE SURVEYING AND SPATIAL INFORMATION ACT (CURRENT VERSION), SHOULD BE UNDERTAKEN BEFORE ANY DESIGN OR CONSTRUCTION ACTIVITY IS CARRIED OUT ON OR NEAR THE LAND BOUNDARIES DEPICTED BY THIS MODEL.

PROPERTY AND STATE CONTROL SURVEY MARKS ARE PROTECTED UNDER SECTION 24 OF THE SURVEYING AND SPATIAL INFORMATION ACT. REFER TO SECTION 88 OF THE SURVEYING AND SPATIAL INFORMATION REGULATION FOR THE PROCESS TO REMOVE OR OBLITERATE MARKS.

CARE, PROTECTION AND PRESERVATION OF PERMANENT SURVEY AND CADASTRAL REFERENCE MARKS

WARNING: PENALTIES APPLY FOR REMOVAL, DAMAGE, DESTRUCTION, DISPLACEMENT, AND DISTURBANCE OF PERMANENT SURVEY AND CADASTRAL REFERENCE MARKS (SURVEY INFRASTRUCTURE) WITHOUT AUTHORISATION BY THE SURVEYOR GENERAL AS PER THE REQUIREMENTS UNDER SECTION 24 OF THE SURVEYING AND SPATIAL INFORMATION ACT 2002. AUTHORISATION MUST BE SOUGHT PRIOR TO ANY ACTIVITIES ON SITE WHICH MAY IMPACT ON THE SURVEY INFRASTRUCTURE AS DETAILED IN THE SURVEYING AND SPATIAL INFORMATION REGULATION 2017.

THIS DRAWING HIGHLIGHTS SURVEY INFRASTRUCTURE IN THE GENERAL VICINITY OF THE PROPOSED CONSTRUCTION FOOTPRINT FOR WORKS UNDER THE CONTRACT. THE SURVEY INFRASTRUCTURE SHOWN HAS BEEN DERIVED FROM AN OFFICE INTERPRETATION OF EXISTING CADASTRAL AND DEPOSITED PLANS INFORMATION AND/OR SCIMS SEARCH. THE PURPOSE OF THIS DRAWING IS TO ASSIST THE CONTRACTOR IN THE CARE AND PROTECTION OF SURVEY INFRASTRUCTURE AS REQUIRED UNDER THE LEGISLATION. IT IS PROVIDED AS GENERAL INFORMATION FOR THE CONTRACTOR AND MUST BE VERIFIED FOR COMPLETENESS PRIOR TO ANY SITE ACTIVITY WITHIN OR NEAR THE CONSTRUCTION LIMITS.

ROADS AND MARITIME G71 – CONSTRUCTION SURVEYS SPECIFICATION SETS OUT THE PROCESS TO BE FOLLOWED AND ALIGNS WITH THE PROCESS DETAILED IN THE SURVEYOR GENERAL'S DIRECTIONS NO.11 PRESERVATION OF SURVEY INFRASTRUCTURE.

EXTRA CARE IS REQUIRED FOR ASSOCIATED WORKS SUCH AS:

- UTILITY ADJUSTMENTS
- TEMPORARY ACCESS TRACKS
- SITE OFFICES AND COMPOUNDS
- STOCKPILES
- ENVIRONMENTAL CONSTRAINTS LIMITS
- TRAFFIC CONTROL (IN ADVANCE OF WORKS)
- SIGNAGE PLACEMENT
- DESIGN CHANGES

ADVICE MUST BE SOUGHT FROM THE ROADS AND MARITIME DIRECTOR SURVEYING WELL IN ADVANCE OF ANY SITE WORKS COMMENCING.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-02-RD.dgn			6/03/2020 9:19:07 AM	MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY
CO-ORDINATE SYSTEM: MGA ZONE 55 / HEIGHT DATUM: AHD	ROADS AND MARITIME SERVICES TECHNICAL AND PROJECT SERVICES ENGINEERING SERVICES DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

PREPARED FOR: NETWORK NSW REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROAD ALIGNMENT PLAN
SURVEY DISCLAIMER

A3

RMS REGISTRATION No. DS2018/001534 | VOL.

ISSUE STATUS: 80% DETAIL DESIGN | EDMS No. SF2018/300270 | SHEET No. RD-0205 | ISSUE

SURVEY PROJECT JOB No:994/2018

PRIMARY SURVEY CONTROL MARK SCHEDULE

STATION	EASTING	NORTHING	H. CLASS ORDER	SOURCE	DATE	HEIGHT	V. CLASS ORDER	SOURCE	DATE	MARK DESCRIPTION
*PM4054	535198.810	6113443.054	B/2	SCIMS	28/09/2018	179.699	LC/L3	SCIMS	28/09/2018	PIN+BOX [P]
PM30694	535365.646	6113392.157	B/2	SCIMS	28/09/2018	180.351	LD/L4	RMS	19/07/2019	PIN+BOX [P]
*SS144289	535367.169	6113443.243	E/5	RMS	2/08/2019	181.072	LD/L4	RMS	19/07/2019	BRASS PLQ [P]
MC03	535081.446	6113460.898	C/3	RMS	28/07/2019	179.815	LD/L4	RMS	19/07/2019	HILTI+DISC [C]
MC04	535140.337	6113430.580	C/3	RMS	28/07/2019	179.876	LD/L4	RMS	1/04/2013	HILTI+DISC [C]
MC65	535200.428	6113440.465	C/3	RMS	28/07/2019	180.193	LD/L4	RMS	19/07/2019	HILTI+DISC [C]
MC05	535278.983	6113425.151	C/3	RMS	1/04/2013	180.727	LD/L4	RMS	19/07/2019	HILTI+DISC [C]
MC60	535373.137	6113409.236	C/3	RMS	8/02/2016	180.305	LD/L4	RMS	12/11/2018	HILTI+DISC [C]
MC61	535468.982	6113374.049	C/3	RMS	28/07/2019	180.066	LD/L4	RMS	19/07/2019	HILTI+DISC [C]
MC06	535472.019	6113392.726	C/3	RMS	28/07/2019	180.083	LD/L4	RMS	19/07/2019	HILTI+DISC [C]
MC62	535532.474	6113362.952	C/3	RMS	28/07/2019	180.335	LD/L4	RMS	19/07/2019	HILTI+DISC [C]
MC63	535536.712	6113381.426	C/3	RMS	8/02/2016	180.347	LD/L4	RMS	19/07/2019	HILTI+DISC [C]

NOTE: *PM4054 NOT IN LEVEL TRAVERSE & *SS144289 FLY SHOT FROM RESECTION

Mean Combined Scale Factor (CSF) = 0.999585

[P] = Permanent Mark must be protected during construction in accordance with Specification G71
[C] = Suitable for construction and must not be disturbed until assessment by Surveyor
[N] = Not suitable for construction as Survey Mark may be unstable

CONTROL NETWORK DETAILS

Survey Instruction No.	:	994/2018
Project Name	:	Marshalls Creek Bridge Widening 79.23km to 79.53km W. of Gundagai
Road No. & Name	:	HW14 / STURT HIGHWAY
Job Location	:	MARSHALLS CREEK BRIDGE, WAGGA WAGGA
Horizontal Datum & Zone	:	MGA - ZONE 55
Horizontal Datum Origin	:	MC05 - PM30694
H. Control Survey Method	:	Trav
Horizontal Adjustment by	:	Compnet / (Adjustment file : 3D FIXED 2018994 CM JULY19.OUT)
Computed By	:	C. MILLER
Height Datum	:	AHD
Vertical Datum Origin	:	MC60 & MC04
V. Control Survey Method	:	Diff Levelling
Vertical Adjustment by	:	Compnet / (Adjustment file : 1D FIXED 2018994 CM 190722.OUT)
Computed By	:	C. MILLER
SCIMS Search Number & Date	:	SCIMS_180928
Control Survey Plan No.	:	N/A
Control Survey Plan Date	:	N/A
Computed by	:	N/A

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggds03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-02-RD.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 6/03/2020 9:19:10 AM

PLOT BY: MckenzML

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROAD ALIGNMENT PLAN
SURVEY METADATA

A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST ASSET

RMS REGISTRATION No. DS2018/001534

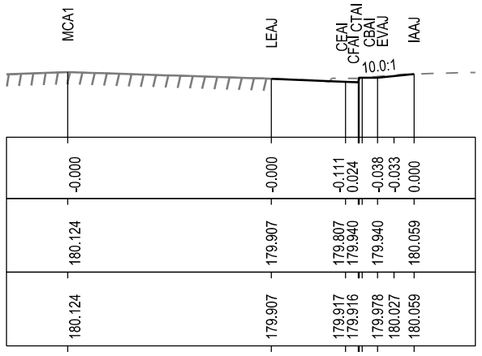
VOL

ISSUE STATUS: 80% DETAIL DESIGN

EDMS No. SF2018/300270

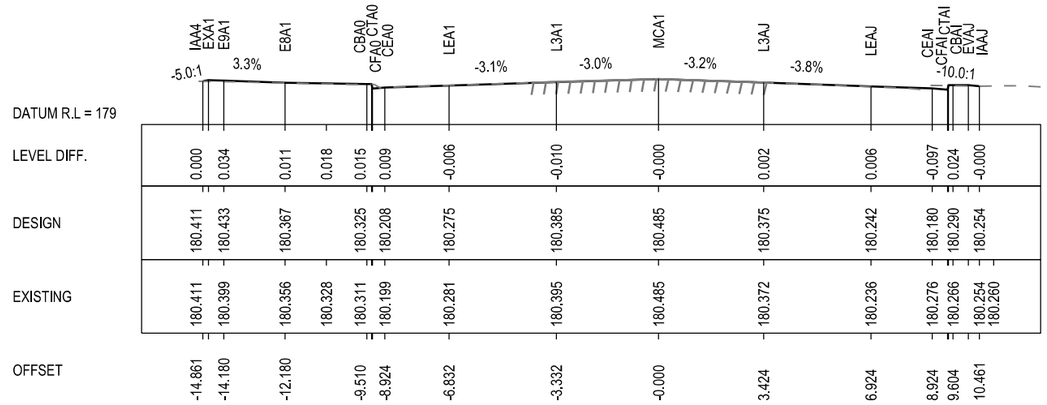
SHEET No. RD-0206

ISSUE



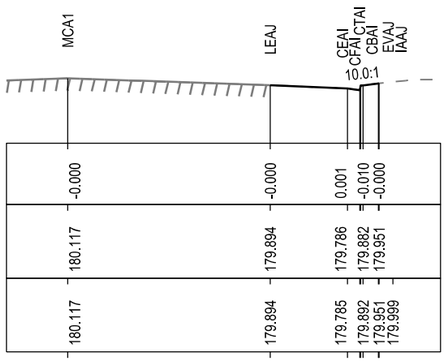
	MCA1	LEAJ	CEAI	CFAI	CTAI	CBAI	EVAJ	IAAJ
DATUM R.L = 178								
LEVEL DIFF.	-0.000	-0.000	-0.111	0.024		-0.038	-0.033	0.000
DESIGN	180.124	179.907	179.807	179.940		179.940		180.059
EXISTING	180.124	179.907	179.917	179.916		179.978	180.027	180.059
OFFSET	0.000	6.640	9.055	9.505		10.099		11.293

79340.000



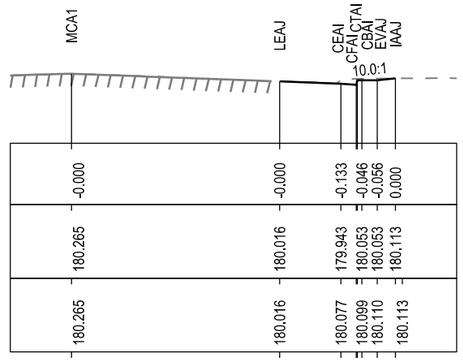
	IAA4	EXA1	E9A1	E8A1	CBA0	CFA0	CTA0	CEA0	LEA1	L3A1	MCA1	L3AJ	LEAJ	CEAI	CFAI	CTAI	CBAI	EVAJ	IAAJ
DATUM R.L = 179																			
LEVEL DIFF.	0.000	0.034		0.011		0.018	0.015	0.009	-0.006	-0.010	-0.000	0.002	0.006	-0.097		0.024		-0.000	
DESIGN	180.411	180.433		180.367			180.325	180.208	180.275	180.385	180.485	180.375	180.242	180.180		180.290		180.254	
EXISTING	180.411	180.399		180.356		180.328	180.311	180.199	180.281	180.395	180.485	180.372	180.236	180.276		180.266		180.254	180.260
OFFSET	-14.861	-14.180		-12.180			-9.510	-8.924	-6.832	-3.332	-0.000	3.424	6.924	8.924		9.604		10.461	

79380.000



	MCA1	LEAJ	CEAI	CFAI	CTAI	CBAI	EVAJ	IAAJ
DATUM R.L = 178								
LEVEL DIFF.	-0.000	-0.000	0.001		-0.010		-0.000	
DESIGN	180.117	179.894	179.786		179.882		179.951	
EXISTING	180.117	179.894	179.785		179.892		179.951	179.999
OFFSET	0.000	6.604	9.122		9.632		10.153	

79335.000



	MCA1	LEAJ	CEAI	CFAI	CTAI	CBAI	EVAJ	IAAJ
DATUM R.L = 178								
LEVEL DIFF.	-0.000	-0.000	-0.133		-0.046	-0.056		0.000
DESIGN	180.265	180.016	179.943		180.053	180.053		180.113
EXISTING	180.265	180.016	180.077		180.099	180.110		180.113
OFFSET	0.000	6.786	8.786		9.466	9.966		10.561

79360.000

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-03-RC.dgn			6/03/2020 9:19:14 AM	MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 2 4 6 8 — SCALE 1:200m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT — Transport Roads & Maritime Services

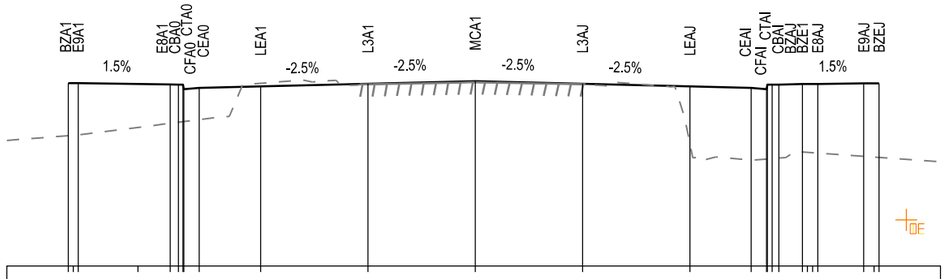
PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
CROSS SECTIONS
HW14 - STURT HIGHWAY - MCA1 - 79335.000 TO 79380.000

A3

RMS REGISTRATION No. DS2018/001534 — VOL

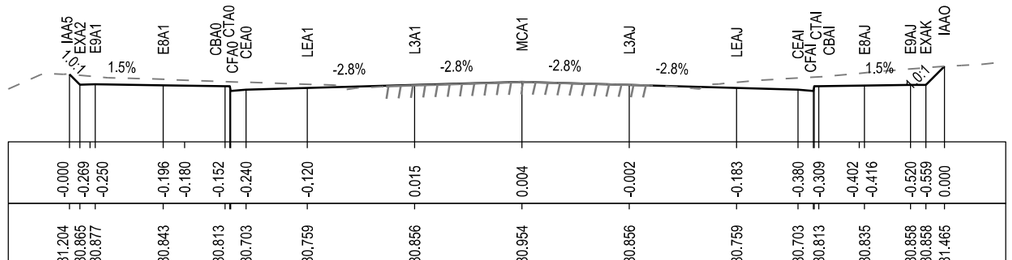
ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RC-0301 — ISSUE



DATUM R.L = 175

LEVEL DIFF.	1.713	1.686	1.414	1.266	1.056	1.034	-0.102	0.017	0.039	0.015	1.856	2.351	2.413	2.395	2.233	2.257	2.385	2.420
DESIGN	180.962	180.962	180.917	180.763	180.803	180.853	180.941	181.028	180.941	180.853	180.803	180.913	180.913	180.936	180.936	180.958	180.958
EXISTING	179.249	179.276	179.519	179.651	179.707	179.769	180.955	180.924	180.990	180.926	178.997	178.452	178.500	178.518	178.702	178.679	178.573	178.538
OFFSET	-13.270	-12.945	-9.945	-9.500	-9.000	-7.000	-3.500	-0.000	3.500	7.000	9.000	9.680	9.900	10.670	11.170	12.670	13.170

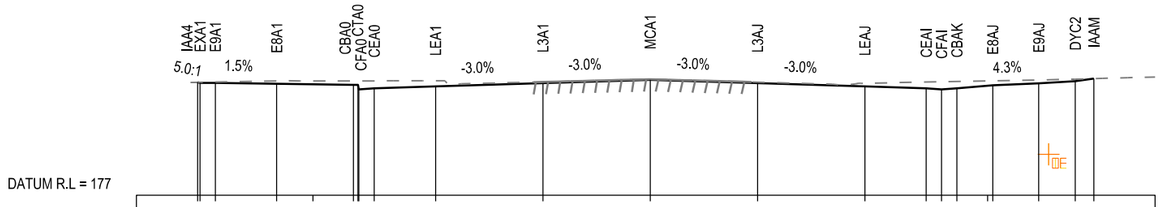
79420.000



DATUM R.L = 179

LEVEL DIFF.	-0.000	-0.269	-0.250	-0.196	-0.180	-0.152	-0.240	-0.120	0.015	0.004	-0.002	-0.183	-0.380	-0.309	-0.402	-0.416	-0.520	-0.559	0.000
DESIGN	181.204	180.865	180.877	180.843	180.813	180.703	180.759	180.856	180.954	180.856	180.759	180.703	180.813	180.835	180.858	180.858	181.465
EXISTING	181.204	181.142	181.127	181.039	181.013	180.965	180.943	180.879	180.842	180.950	180.859	180.942	181.083	181.122	181.235	181.251	181.378	181.417	181.465
OFFSET	-14.752	-14.413	-13.913	-11.697	-9.680	-9.000	-7.000	-3.500	-0.000	3.500	7.000	9.000	9.680	11.170	12.670	13.170	13.777

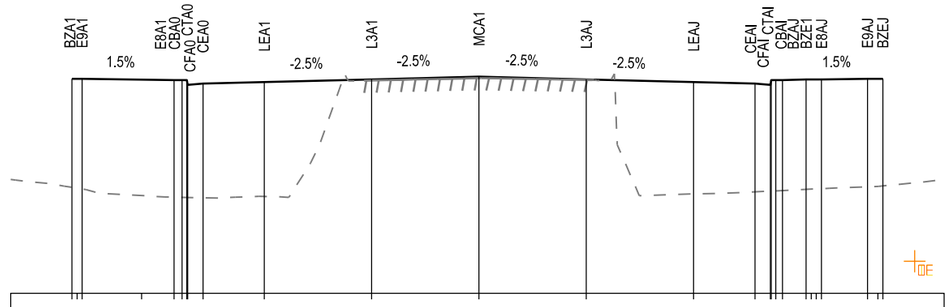
79460.000



DATUM R.L = 177

LEVEL DIFF.	-0.000	-0.024	-0.092	-0.112	-0.132	-0.242	-0.187	-0.037	-0.025	-0.034	-0.104	-0.202	-0.252	-0.222	-0.160	-0.149	-0.113	-0.060	-0.000
DESIGN	180.678	180.663	180.633	180.595	180.485	180.545	180.650	180.755	180.650	180.545	180.485	180.445	180.465	180.580	180.644	180.720	180.798
EXISTING	180.678	180.687	180.725	180.727	180.727	180.727	180.732	180.688	180.780	180.684	180.649	180.688	180.697	180.707	180.726	180.729	180.757	180.779	180.798
OFFSET	-14.755	-14.180	-12.180	-9.680	-9.000	-7.000	-3.500	-0.000	3.500	7.000	9.000	9.500	10.001	11.170	12.670	13.862	14.467

79400.000



DATUM R.L = 174

LEVEL DIFF.	3.543	3.593	3.782	3.818	3.674	3.723	3.729	0.036	0.047	0.028	3.648	3.529	3.607	3.596	3.573	3.557	3.520	3.492
DESIGN	180.995	180.995	180.950	180.796	180.836	180.886	180.973	181.061	180.973	180.886	180.836	180.946	180.946	180.968	180.968	180.991	180.991
EXISTING	177.452	177.401	177.183	177.132	177.122	177.113	177.157	180.937	181.014	180.946	177.238	177.307	177.339	177.350	177.395	177.411	177.471	177.498
OFFSET	-13.270	-12.945	-9.945	-9.500	-9.000	-7.000	-3.500	-0.000	3.500	7.000	9.000	9.680	9.900	10.670	11.170	12.670	13.170

79440.000

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

0	5	10	15	20	25	30	35	40	45	50

DRAWING FILE LOCATION / NAME
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-03-RC.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 6/03/2020 9:19:14 AM
PLOT BY: MckenzML

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
CROSS SECTIONS
HW14 - STURT HIGHWAY - MCA1 - 79400.000 TO 79460.000

A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 2 4 6 8 — SCALE 1:200m

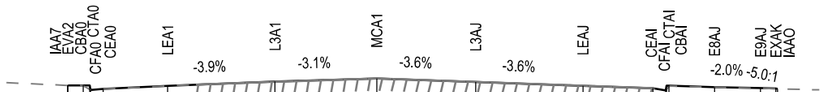
CO-ORDINATE SYSTEM: MGA ZONE 55
HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY
ROADS AND MARITIME SERVICES
TECHNICAL AND PROJECT SERVICES
ENGINEERING SERVICES
DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR
NETWORK NSW
REGIONAL SOUTH WEST
ASSET

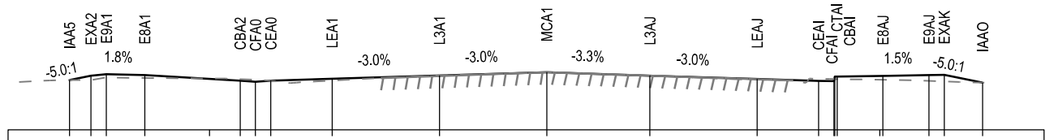
RMS REGISTRATION No. DS2018/001534
VOL
ISSUE STATUS: 80% DETAIL DESIGN
EDMS No. SF2018/300270
SHEET No. RC-0302
ISSUE



DATUM R.L = 179

	IAA7	EVA2	CBA0	CFA0	CTA0	CEA0	LEA1	L3A1	MCA1	L3AJ	LEAJ	CEAI	CFAI	CTAI	CBAI	E8AJ	E9AJ	EXAK	IAAO
LEVEL DIFF.	-0.000	0.007		0.001			0.004	0.001	-0.000	-0.001	-0.010	0.000		0.035		0.007	0.003		-0.000
DESIGN	180.615	180.613		180.497			180.598	180.735	180.838	180.722	180.596	180.520		180.600		180.556	180.526		180.500
EXISTING	180.643	180.615	180.606	180.497			180.594	180.734	180.838	180.723	180.605	180.520		180.565		180.557	180.522		180.500
OFFSET	-10.079	-9.574		-8.924			-6.820	-3.320	-0.000	3.224	6.724	9.006		9.524		11.014	12.514		13.070

79490.000



DATUM R.L = 179

	IAA5	EXA2	E9A1	E8A1		CBA2	CFA0	CEA0	LEA1	L3A1	MCA1	L3AJ	LEAJ	CEAI	CFAI	CTAI	CBAI	E8AJ	E9AJ	EXAK	IAAO
LEVEL DIFF.	0.000	0.131	0.107	0.098	-0.010	-0.048	-0.069	0.006	0.057	-0.004	-0.002	-0.004	0.025	-0.063		0.085	0.124	0.127	0.185	0.212	-0.000
DESIGN	180.623	180.764	180.814	180.791		180.607	180.567	180.607	180.667	180.772	180.877	180.766	180.661	180.601		180.741	180.763		180.785	180.793	180.542
EXISTING	180.623	180.633	180.707	180.693	180.676	180.654	180.636	180.601	180.610	180.776	180.879	180.769	180.636	180.663		180.655	180.638	180.636	180.600	180.581	180.542
OFFSET	-15.565	-14.862	-14.362	-13.109		-10.000	-9.500	-9.000	-7.000	-3.500	-0.000	3.362	6.862	8.862		9.472	10.962		12.462	12.962	14.214

79480.000

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-03-RC.dgn			6/03/2020 9:19:14 AM	MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 2 4 6 8 — SCALE 1:200m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

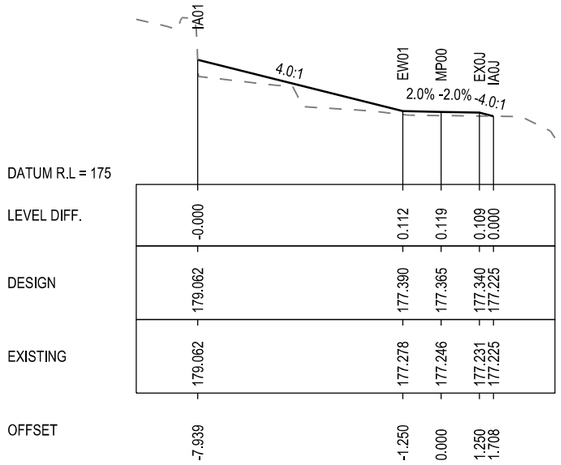
PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
CROSS SECTIONS
HW14 - STURT HIGHWAY - MCA1 - 79480.000 TO 79500.000

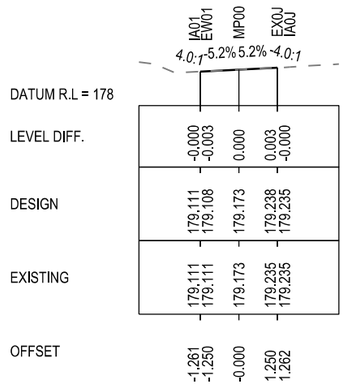
A3

RMS REGISTRATION No. DS2018/001534 — VOL

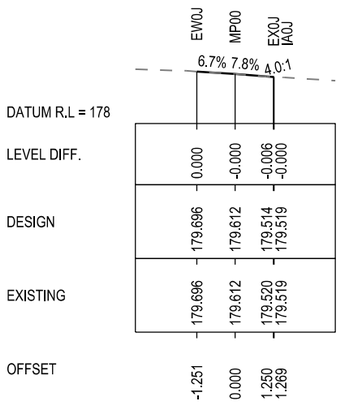
ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RC-0303 — ISSUE



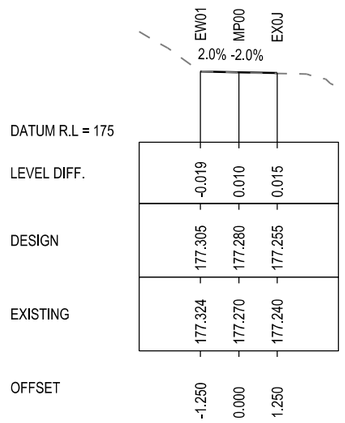
20.000



60.000



0.000



40.000

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-03-RC.dgn			6/03/2020 9:19:15 AM	MckenzML	NSW GOVERNMENT Transport Roads & Maritime Services

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 2 4 6 8 — SCALE 1:200m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

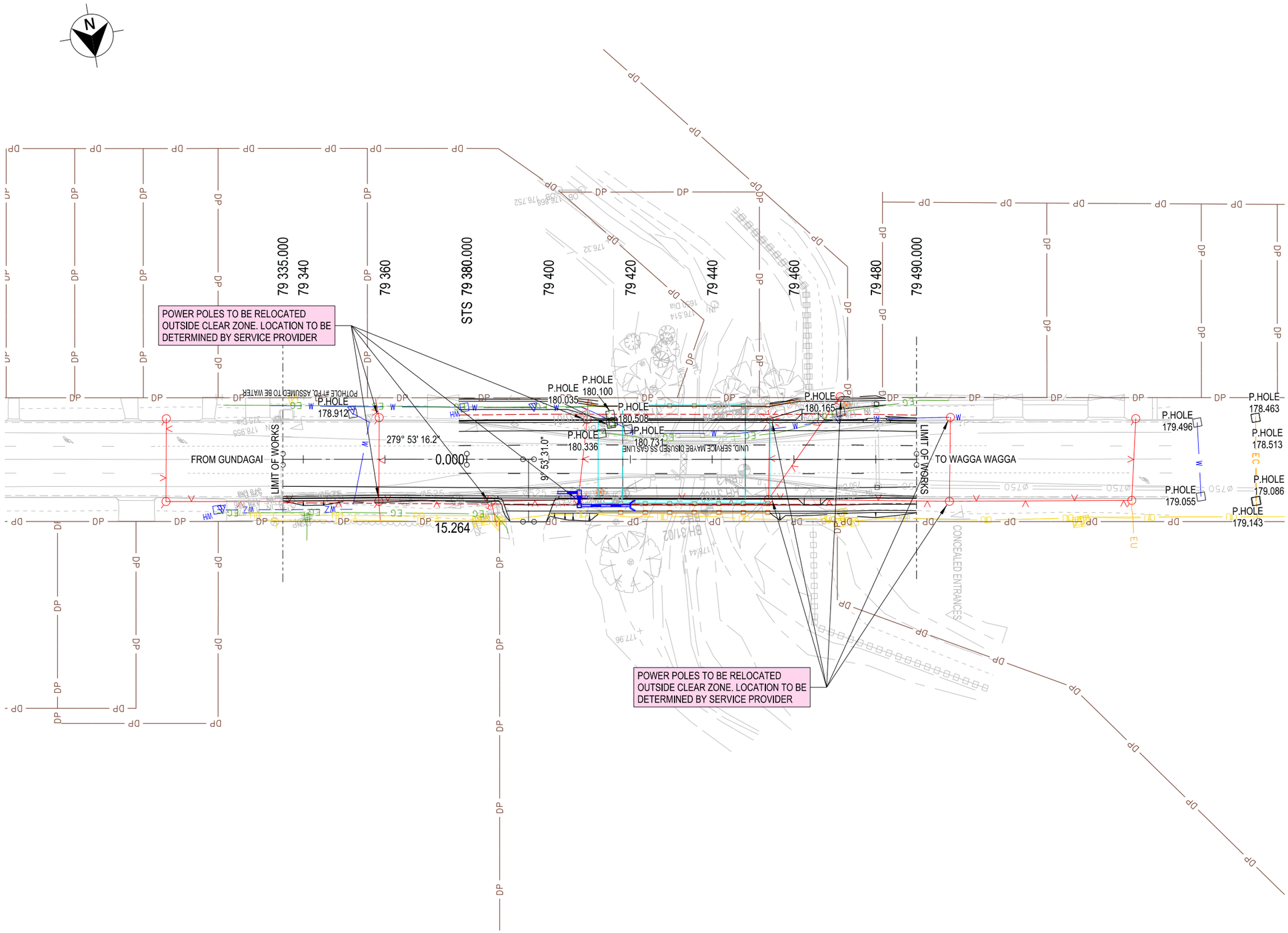
PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
CROSS SECTIONS
MP00 - PATHWAY BENEATH BRIDGE

A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RC-0304 — ISSUE



LEGEND

- DP — CADASTRAL BOUNDARY OVERLAY
- PM — PERMANENT SURVEY MARK - DO NOT DISTURB
- SS — STATE SURVEY MARK - DO NOT DISTURB
- PROPOSED UTILITY CORRIDOR
- PROPOSED DRIANAGE PIPE
- PROPOSED PIT
- PROPOSED HEADWALL
- PROPOSED BRIDGE DECK

EXISTING UTILITES

- W — EXISTING WATER MAIN
- EG — EXISTING GAS - LOW PRESSURE
- OU — EXISTING OPTICAL FIBRE
- T — EXISTING TELECOMMUNICATIONS
- EC — EXISTING ELECTRICAL CONDUIT
- EU — EXISTING ELECTRICAL - UNDERGROUND
- EXISTING ELECTRICAL - MINOR OVERHEAD

NOTES

1. PERMANENT AND STATE SURVEY CONTROL MARKS ARE NOT TO BE DISTURBED UNLESS ASSESSED BY ROADS AND MARITIME SURVEY IN ACCORDANCE WITH LAND AND PROPERTY INFORMATION STANDARDS - FINES APPLY

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-04-UT.dgn
DESIGN LOT CODE	
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	
PLOT DATE / TIME	6/03/2020 9:19:16 AM
PLOT BY	MckenzML
CLIENT	NSW GOVERNMENT Transport Roads & Maritime Services
WAGGA WAGGA CITY	A3
HW14 - STURT HIGHWAY	
MARSHALLS CREEK BRIDGE REPLACEMENT	
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)	
UTILITIES PLAN	
HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490	

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 10 20 30 40 — SCALE 1:1000m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. UT-0401 — ISSUE

SURVEY 2018994 UTILITY Metadata

QUALITY LEVEL A: HIGHEST QUALITY / POTHOLED

Pothole #	Date	MGA Easting	MGA Northing	RL	Asset Type	Material	Diameter	MX String	HZL ACC.	VRT ACC.	Comments
1	?	535397.849	6113384.781	178.912	WATER	?	?	WM06	0.010	0.020	Pothole found / assumed to be water / maybe 150mmDia and Ductile
2	Dec-18	535338.708	6113400.063	180.336	GAS	PE	68	HA02	0.005	0.010	Polyurethane (PE)
3	Dec-18	535336.032	6113398.145	180.035	GAS	PE	68	HA02	0.005	0.010	Polyurethane (PE)
4	1-Dec-18	535335.804	6113395.938	180.100	GAS	PE	68	HA02	0.005	0.010	Polyurethane (PE)
5	1-Dec-18	535335.480	6113397.705	180.508	WATER	SS	275	WM01	0.005	0.010	Stainless Steel (SS)
6	1-Dec-18	535332.104	6113400.153	180.731	WATER	SS	275	WM01	0.005	0.010	Stainless Steel (SS)
7	1-Dec-18	535280.255	6113404.974	180.165	GAS	PE	68	HA02	0.005	0.010	Polyurethane (PE)
8	2013	535196.964	6113440.503	179.055	WATER	?	?	WM05	0.005	0.010	
9	2013	535194.738	6113422.491	179.496	WATER	?	?	WM05	0.005	0.010	
10	1-Oct-14	535183.949	6113443.920	179.143	POWER	?	?	ED01	0.005	0.010	
11	1-Oct-14	535183.770	6113443.855	179.086	POWER	?	?	ED02	0.005	0.010	
12	1-Oct-14	535180.486	6113423.817	178.513	POWER	?	?	ED01	0.005	0.010	
13	1-Oct-14	535180.471	6113423.827	178.463	POWER	?	?	ED02	0.005	0.010	
14	28-Aug-19	535338.529	6113420.331	177.540	OPTIC & TELSTRA	AS	0.1	OU03,TN05	0.010	0.010	4 X Asbestos (AS) Conduits; 2 stacked high: top two located; all containing Optic fibre and Telstra
14	28-Aug-19	535338.451	6113420.201	177.519	OPTIC & TELSTRA	AS	0.1	OU03,TN05	0.010	0.010	4 X Asbestos (AS) Conduits; 2 stacked high: top two located; all containing Optic fibre and Telstra
15	28-Aug-19	535319.937	6113424.364	174.767	OPTIC & TELSTRA	AS	0.1	OU03,TN05	0.010	0.010	4 X Asbestos (AS) Conduits; 2 stacked high: top two located; all containing Optic fibre and Telstra
15	28-Aug-19	535319.885	6113424.258	174.884	OPTIC & TELSTRA	AS	0.1	OU03,TN05	0.010	0.010	4 X Asbestos (AS) Conduits; 2 stacked high: top two located; all containing Optic fibre and Telstra
16	28-Aug-19	535304.735	6113426.851	178.079	OPTIC & TELSTRA	AS	0.1	OU03,TN05	0.010	0.010	4 X Asbestos (AS) Conduits; 2 stacked high: top two located; all containing Optic fibre and Telstra
16	28-Aug-19	535304.727	6113426.759	178.075	OPTIC & TELSTRA	AS	0.1	OU03,TN05	0.010	0.010	4 X Asbestos (AS) Conduits; 2 stacked high: top two located; all containing Optic fibre and Telstra

UTILITY LEGEND ASSOCIATED WITH MX MODEL "SURVEY 20191010 UTILITY"

Quality level	Date	MX STRING	HZL ACC.	VRT ACC.	Comments
B	28-Aug-19	OU02, OU03, TN05	0.300	0.500	Noted on Plan with red text "B"
B	29-Aug-19	OU01, OU04, TN01, TN02, TN03, TN04, TN07, HA02, HA04, HA05, WM01, EU01, EU02, EU03	0.300	NA	Location Only
C	30-Aug-19	WM06	NA	NA	Interpolation only of approx. location of utility
D	31-Aug-19	WM06, WZ01	NA	NA	utilities

DISCLAIMER FOR UTILITY MODEL

The locations of utilities, which were reported to exist at the time of survey, were compiled from a combination of field techniques and available data from co-operating utility authorities.

Whilst all care was taken in locating the utilities, the Roads and Maritime Services cannot guarantee that the locations determined by this survey are without flaw of any kind. Therefore, the Authority expressly disclaims all liability for errors or omissions of any kind whatsoever or from any loss, damage or other consequences that may arise from any person relying on the locations of utilities determined by this survey. It is recommended that the users undertake "potholing" to directly confirm locations where conflict with construction/design may occur. Due caution should also be exercised during any excavation activity in places where utilities may reasonably be expected to occur, whether located or not.

This report DOES NOT replace the legal requirement for a current Dial Before You Dig search on site at the time of any excavation, boring or other works that may interfere with buried utilities. Please note under new legislation "Energy Legislation Amendment (Infrastructure Protection) Act 2009 No 31" penalties for failure to have current Dial Before you Dig Plans on site when excavating include: personal and company fines. These fines are in addition to costs required to restore any damaged utilities.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-04-UT.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 6/03/2020 9:19:16 AM

PLOT BY: MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: Transport Roads & Maritime Services (NSW GOVERNMENT)

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
UTILITIES PLAN
UTILITY METADATA AND DISCLAIMER

A3

RMS REGISTRATION No. DS2018/001534

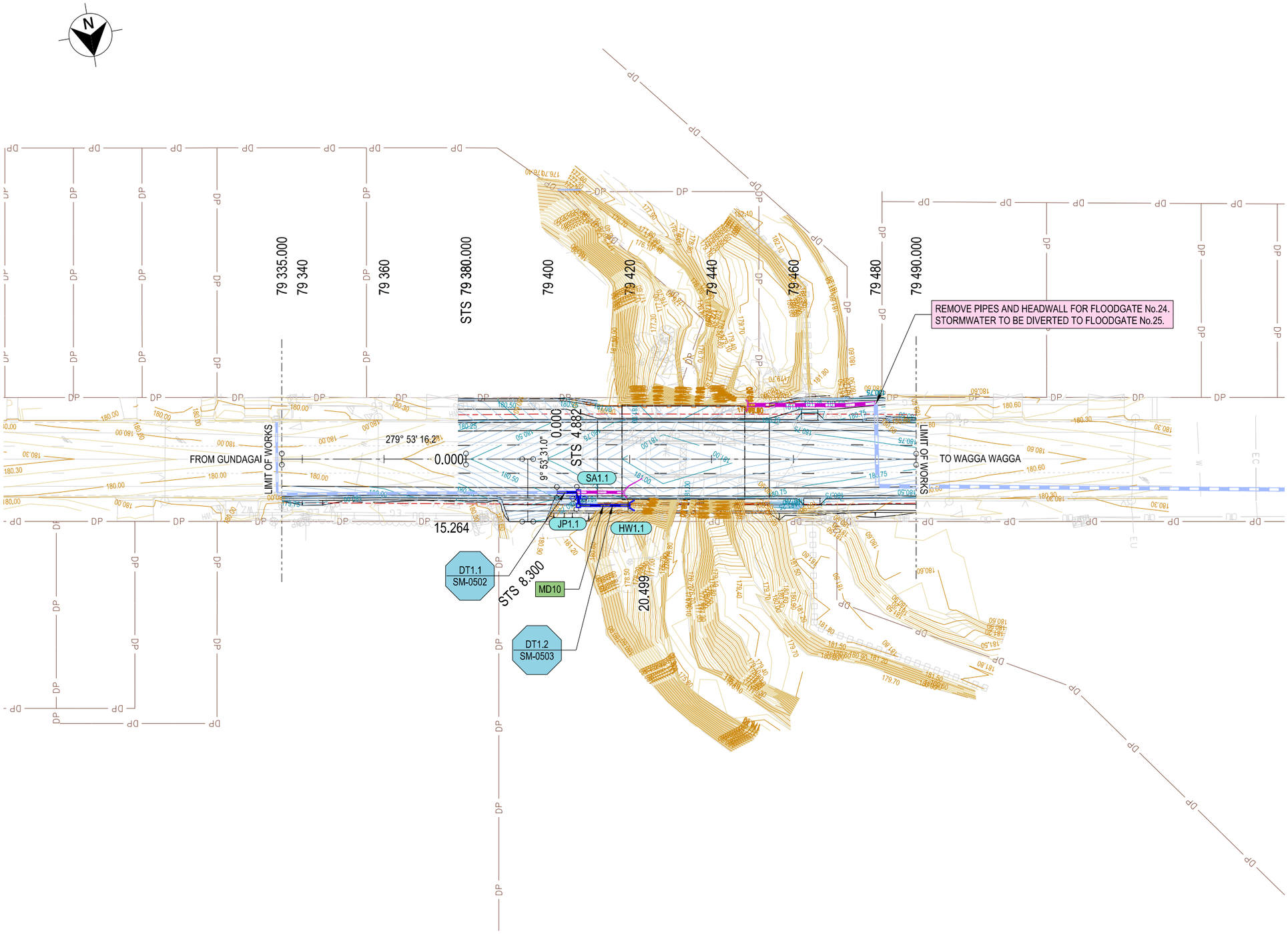
VOL.

ISSUE STATUS: 80% DETAIL DESIGN

EDMS No. SF2018/300270

SHEET No. UT-0402

ISSUE



LEGEND

- DT1.1 / 0610 — STRUCTURE LABEL / STORMWATER MANAGEMENT SHEET NUMBER
- SAS - 1,2 / 3 — STRUCTURE TYPE - DRAINAGE LINE / PIT NUMBER
- MAJOR/MINOR DESIGN CONTOURS - 250mm INTERVALS
- MAJOR/MINOR EXISTING CONTOURS - 250mm INTERVALS
- PROPOSED DRIANAGE PIPE
- PROPOSED PIT
- PROPOSED HEADWALL
- EXISTING DRAINAGE PIPE
- EXISTING DRAIN PIPE TO BE REMOVED / REPLACED
- EXISTING HEADWALL
- CULVERT / PIT REFERENCE POINT
- FLOW DIRECTION
- EXISTING COMMUNICATIONS CABLE
- EXISTING OPTIC FIBRE CABLE

NOTES

1. REFER TO SHEET SM-0504 FOR DRAINAGE SETOUT DETAILS
2. REFER TO ROADS AND MARITIME STANDARD DRAWING R0240-01 FOR INSTALLATION OF CONCRETE PIPES
3. REFER TO ROADS AND MARITIME STANDARD DRAWING SERIES R0220 FOR STANDARD GULLY PIT DETAILS

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-05-SM.dgn
DESIGN LOT CODE	
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	
PLOT DATE / TIME	6/03/2020 9:19:22 AM
PLOT BY	MckenzML
CLIENT	NSW GOVERNMENT Transport Roads & Maritime Services
WAGGA WAGGA CITY	A3
HW14 - STURT HIGHWAY	
MARSHALLS CREEK BRIDGE REPLACEMENT	
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)	
STORMWATER MANAGEMENT PLAN	
HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490	

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 10 20 30 40 — SCALE 1:1000m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

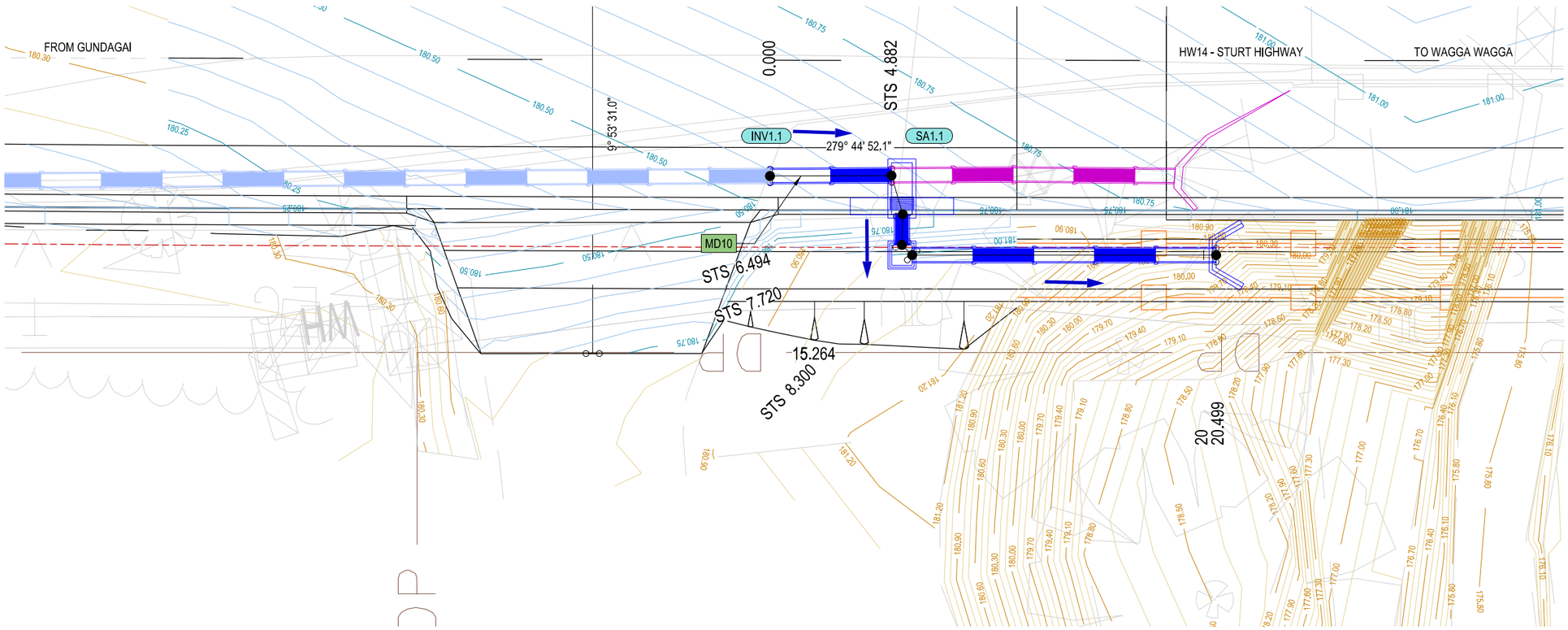
DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST ASSET

RMS REGISTRATION No. DS2018/001534 — VOL

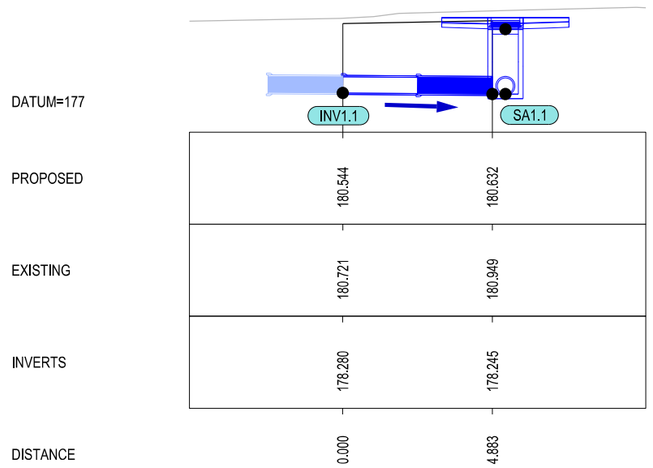
ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. SM-0501 — ISSUE



LEGEND

- DT1.1 / 0610 — STRUCTURE LABEL / STORMWATER MANAGEMENT SHEET NUMBER
- SAS - 1,2 / 3 — STRUCTURE TYPE - DRAINAGE LINE / PIT NUMBER
- MAJOR/MINOR DESIGN CONTOURS - 250mm INTERVALS
- MAJOR/MINOR EXISTING CONTOURS - 250mm INTERVALS
- PROPOSED DRIANAGE PIPE
- PROPOSED PIT
- PROPOSED HEADWALL
- EXISTING DRAINAGE PIPE
- EXISTING DRAIN PIPE TO BE REMOVED / REPLACED
- EXISTING HEADWALL
- CULVERT / PIT REFERENCE POINT
- FLOW DIRECTION
- EXISTING COMMUNICATIONS CABLE
- EXISTING OPTIC FIBRE CABLE

STRUCTURE DT1.1 - MD10 - 1/525Ø CULVERT
HW14 - STURT HIGHWAY - CH.79410.000



LONGITUDINAL SECTION - MD10 - DRAINAGE STRUCTURE DT1.1

NOTES

1. REFER TO SHEET SM-0504 FOR DRAINAGE SETOUT DETAILS
2. REFER TO ROADS AND MARITIME STANDARD DRAWING R0240-01 FOR INSTALLATION OF CONCRETE PIPES
3. REFER TO ROADS AND MARITIME STANDARD DRAWING SERIES R0220 FOR STANDARD GULLY PIT DETAILS

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-05-SM.dgn			6/03/2020 9:19:22 AM	MckenzML

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 2 4 6 8 — SCALE 1:200m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT — Transport Roads & Maritime Services

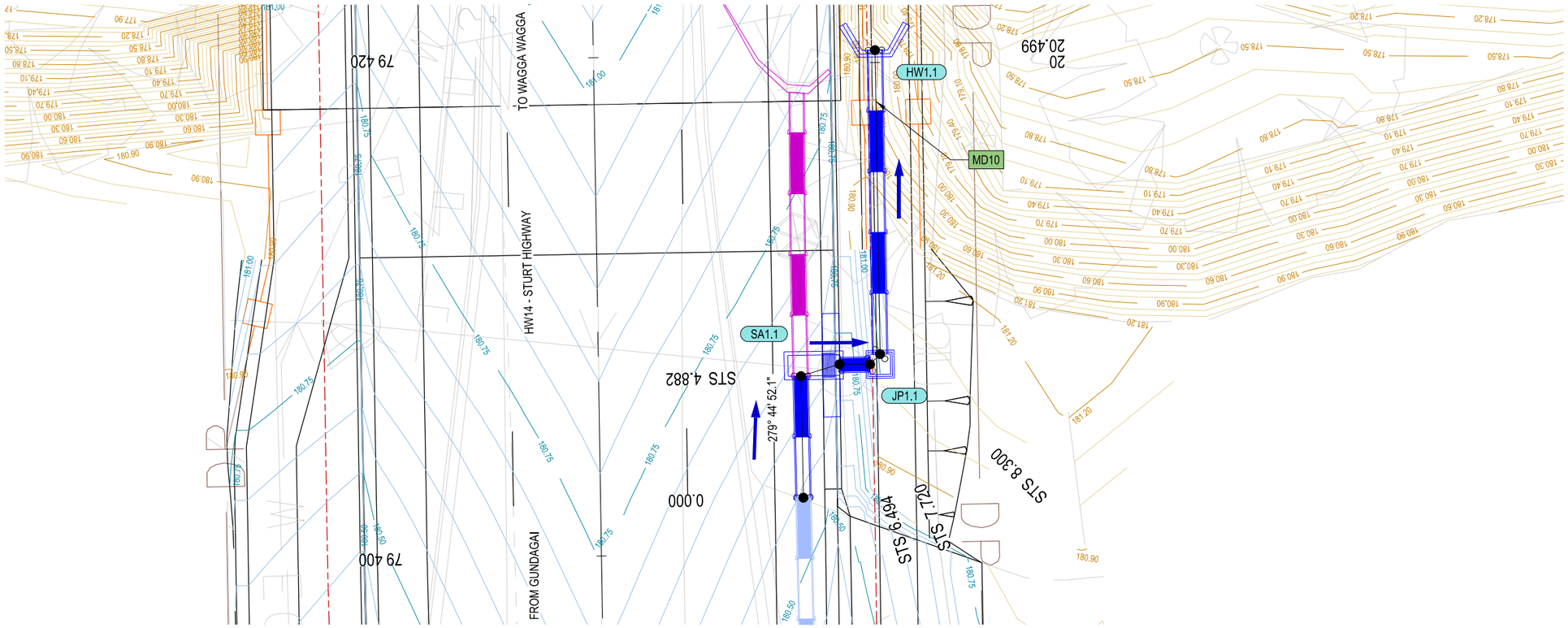
PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
STORMWATER MANAGEMENT PLAN
STORMWATER MANAGEMENT PLAN - DT1.1

A3

RMS REGISTRATION No. DS2018/001534 — VOL

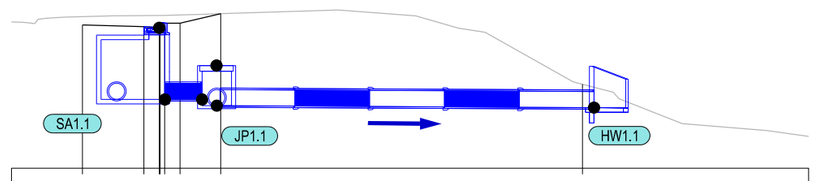
ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. SM-0502 — ISSUE



LEGEND

DT1.1 / 0610	STRUCTURE LABEL / STORMWATER MANAGEMENT SHEET NUMBER
SAS - 1,2 / 3	STRUCTURE TYPE - DRAINAGE LINE / PIT NUMBER
	MAJOR/MINOR DESIGN CONTOURS - 250mm INTERVALS
	MAJOR/MINOR EXISTING CONTOURS - 250mm INTERVALS
	PROPOSED DRIANAGE PIPE
	PROPOSED PIT
	PROPOSED HEADWALL
	EXISTING DRAINAGE PIPE
	EXISTING DRAIN PIPE TO BE REMOVED / REPLACED
	EXISTING HEADWALL
	CULVERT / PIT REFERENCE POINT
	FLOW DIRECTION
TC	EXISTING COMMUNICATIONS CABLE
OF	EXISTING OPTIC FIBRE CABLE

STRUCTURE DT1.2 - MD10 - 1/525Ø CULVERT
HW14 - STURT HIGHWAY - CH.79410.000



DATUM=176														
PROPOSED	180.672	180.617	180.727	180.727	181.040								178.735	
EXISTING		180.994	181.020	181.040				181.045					178.735	
INVERTS		178.245	178.238	178.041	178.038	178.029							177.978	177.975
DISTANCE		6.494	7.714	8.294	8.302	10.000							20.000	20.499

LONGITUDINAL SECTION - MD10 - DRAINAGE STRUCTURE DT1.2

NOTES

1. REFER TO SHEET SM-0504 FOR DRAINAGE SETOUT DETAILS
2. REFER TO ROADS AND MARITIME STANDARD DRAWING R0240-01 FOR INSTALLATION OF CONCRETE PIPES
3. REFER TO ROADS AND MARITIME STANDARD DRAWING SERIES R0220 FOR STANDARD GULLY PIT DETAILS

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-05-SM.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 2 4 6 8 — SCALE 1:200m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

PLOT DATE / TIME: 6/03/2020 9:19:23 AM — PLOT BY: MckenzML

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT — Transport Roads & Maritime Services

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
STORMWATER MANAGEMENT PLAN
STORMWATER MANAGEMENT PLAN - DT1.2

A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. SM-0503 — ISSUE

TRANSVERSE DRAINAGE STRUCTURE - DT1.1 (*CULVERT CONTROL STRING - MD10*)

TRANSVERSE STRUCTURE LABEL	CONTROL STRING MCA1 CHAINAGE	CONTROL STRING MCA1 OFFSET	ELEMENT LABEL	PIT DETAILS TYPE	PIT DETAILS REFERENCE POINT R.L	PIT DETAILS INVERT R.L	REFERENCE POINT EASTING	REFERENCE POINT NORTHING	HEADWALL DETAILS REFERENCE POINT R.L	SIZE (mm)	LENGTH (m)	CELLS	PIPE REQUIRED (m)	INSTALLATION CONDITION	SUPPORT TYPE	CLASS	COMMENTS
DT1.1	79402.211	8.140 RHS	INV1.1				535351.792	6113412.443	178.280	1/525	4.88	1	4.88	EMBANKMENT	HS3	4	
	79407.093	8.125 RHS	SA1.1	SA PIT	180.576	178.245	535346.980	6113413.271									CONSTRUCT NEW SA PIT - REFER STANDARD DRAWING R0220-02
	79402.542	9.680 RHS	SA1.1	SA PIT	180.576	178.245	535346.806	6113414.880						EMBANKMENT	HS3	4	

TRANSVERSE DRAINAGE STRUCTURE - DT1.2 (*CULVERT CONTROL STRING - MD10*)

TRANSVERSE STRUCTURE LABEL	CONTROL STRING MCA1 CHAINAGE	CONTROL STRING MCA1 OFFSET	ELEMENT LABEL	PIT DETAILS TYPE	PIT DETAILS REFERENCE POINT R.L	PIT DETAILS INVERT R.L	REFERENCE POINT EASTING	REFERENCE POINT NORTHING	HEADWALL DETAILS REFERENCE POINT R.L	SIZE (mm)	LENGTH (m)	CELLS	PIPE REQUIRED (m)	INSTALLATION CONDITION	SUPPORT TYPE	CLASS	COMMENTS
DT1.2	79402.542	9.680 RHS	SA1.1	SA PIT	180.576	178.245	535346.806	6113414.880		1/525	1.22	1	1.22	EMBANKMENT	HS3	4	
	79407.509	10.901 RHS	JP1.1	JUNCTION PIT	179.348	178.238	535347.049	6113416.076						EMBANKMENT	HS3	4	CONSTRUCT NEW JUNCTION PIT - REFER STANDARD DRAWING R0220-29
	79407.920	11.311 RHS	JP1.1	JUNCTION PIT	179.348	178.039	535346.715	6113416.551									
	79420.120	11.306 RHS	HW1.1				535334.698	6113418.651	177.975		12.20	1	12.20	EMBANKMENT	HS3	4	USE PRECAST HEADWALL - REFER STANDARD DRAWING R0210-28

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-05-SM.dgn

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 6/03/2020 9:19:23 AM

PLOT BY: MckenzML

CLIENT: NSW GOVERNMENT Transport Roads & Maritime Services

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
STORMWATER MANAGEMENT PLAN
CULVERT SETOUT DETAILS

A3

RMS REGISTRATION No. DS2018/001534

VOL

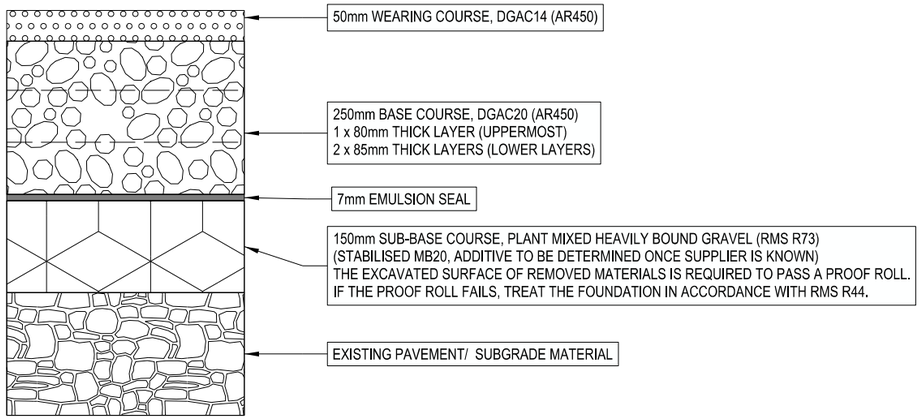
ISSUE STATUS: 80% DETAIL DESIGN

EDMS No. SF2018/300270

SHEET No. SM-0504

ISSUE

PAVEMENT TYPE 1



NOTE:
THE RECOMMENDED PAVEMENT LAYERING TREATMENT CONSISTS OF:

- MILL OUT TO -450mm EXISTING FSL
- PROOF ROLL EXPOSED SURFACE AND TREAT IN ACCORDANCE WITH RMS R44
- PLACE 150mm THICK PLANT MIXED HEAVILY BOUND LAYER
- OVERLAY WITH 300mm THICK AC

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-06-PV.dgn			6/03/2020 9:19:26 AM	McKenzML	NSW GOVERNMENT Transport Roads & Maritime Services

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY
NOT TO SCALE	ROADS AND MARITIME SERVICES TECHNICAL AND PROJECT SERVICES ENGINEERING SERVICES DESIGN SOUTH WEST
CO-ORDINATE SYSTEM: MGA ZONE 55 / HEIGHT DATUM: AHD	

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR
NETWORK NSW
REGIONAL SOUTH WEST
ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
PAVEMENT PLAN
PAVEMENT DESIGN DETAILS

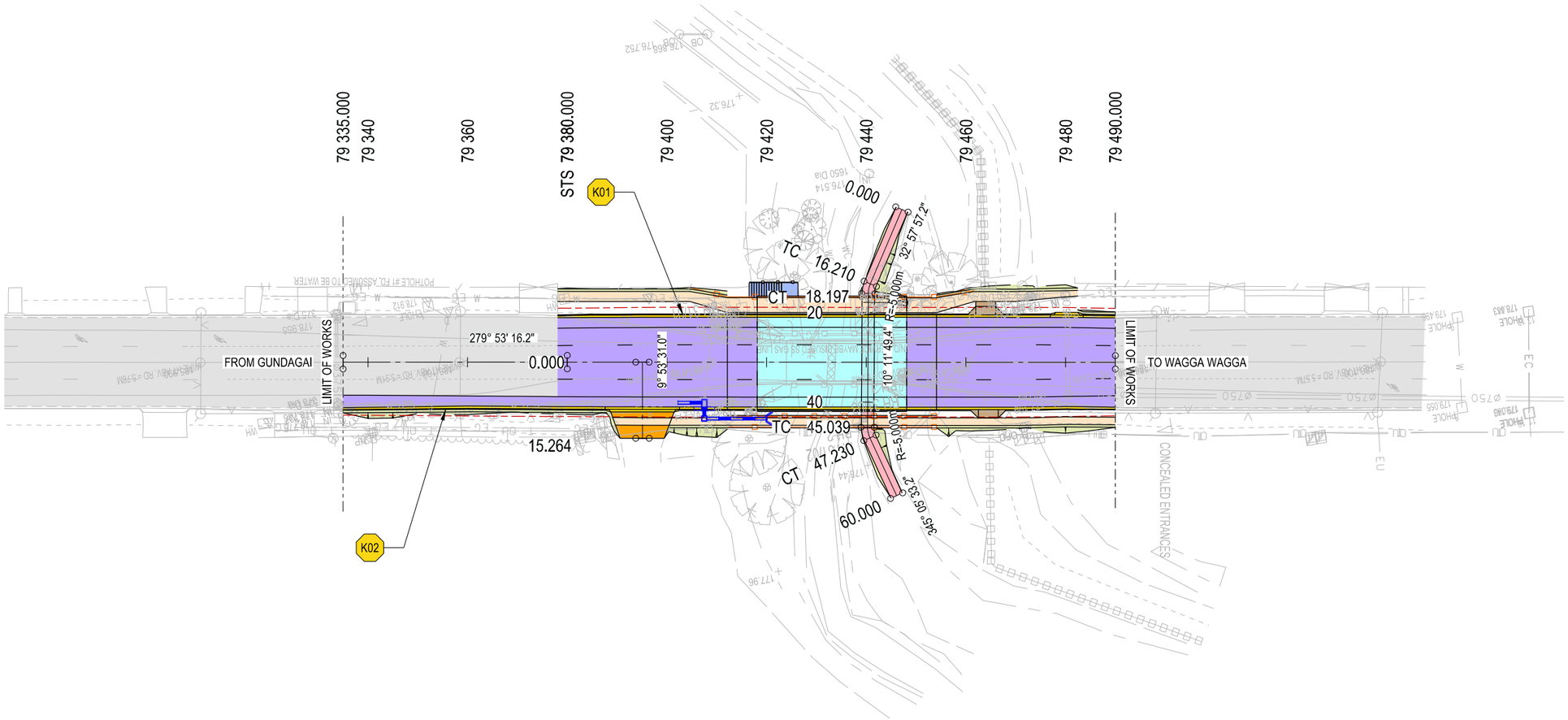
A3

RMS REGISTRATION No. DS2018/001534 | VOL

ISSUE STATUS: 80% DETAIL DESIGN | EDMS No. SF2018/300270 | SHEET No. PV-0601 | ISSUE

LEGEND

- PAVEMENT TYPE - PT01
- DRIVEWAY TO BE CONSTRUCTED
- CONCRETE KERB / MEDIAN TO BE CONSTRUCTED
- EXISTING PAVEMENT TO BE RETAINED
- VERGE / BATTER
- PEDESTRIAN PATH / CYCLEWAY TO BE CONSTRUCTED
- PEDESTRIAN PATH BENEATH BRIDGE
- STEPS TO BE CONSTRUCTED
- BRIDGE DECK
- K01 — KERB AND CHANNEL LABEL



NOTES

1. REFER TO SHEET PV-0601 FOR PAVEMENT DESIGN DETAILS
2. REFER TO ROADS AND MARITIME STANDARD DRAWING R0300-01 FOR STANDARD KERB AND CHANNEL SHAPES

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-06-PV.dgn			6/03/2020 9:19:26 AM	MckenzML	NSW GOVERNMENT Transport Roads & Maritime Services

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 10 20 30 40 — SCALE 1:1000m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

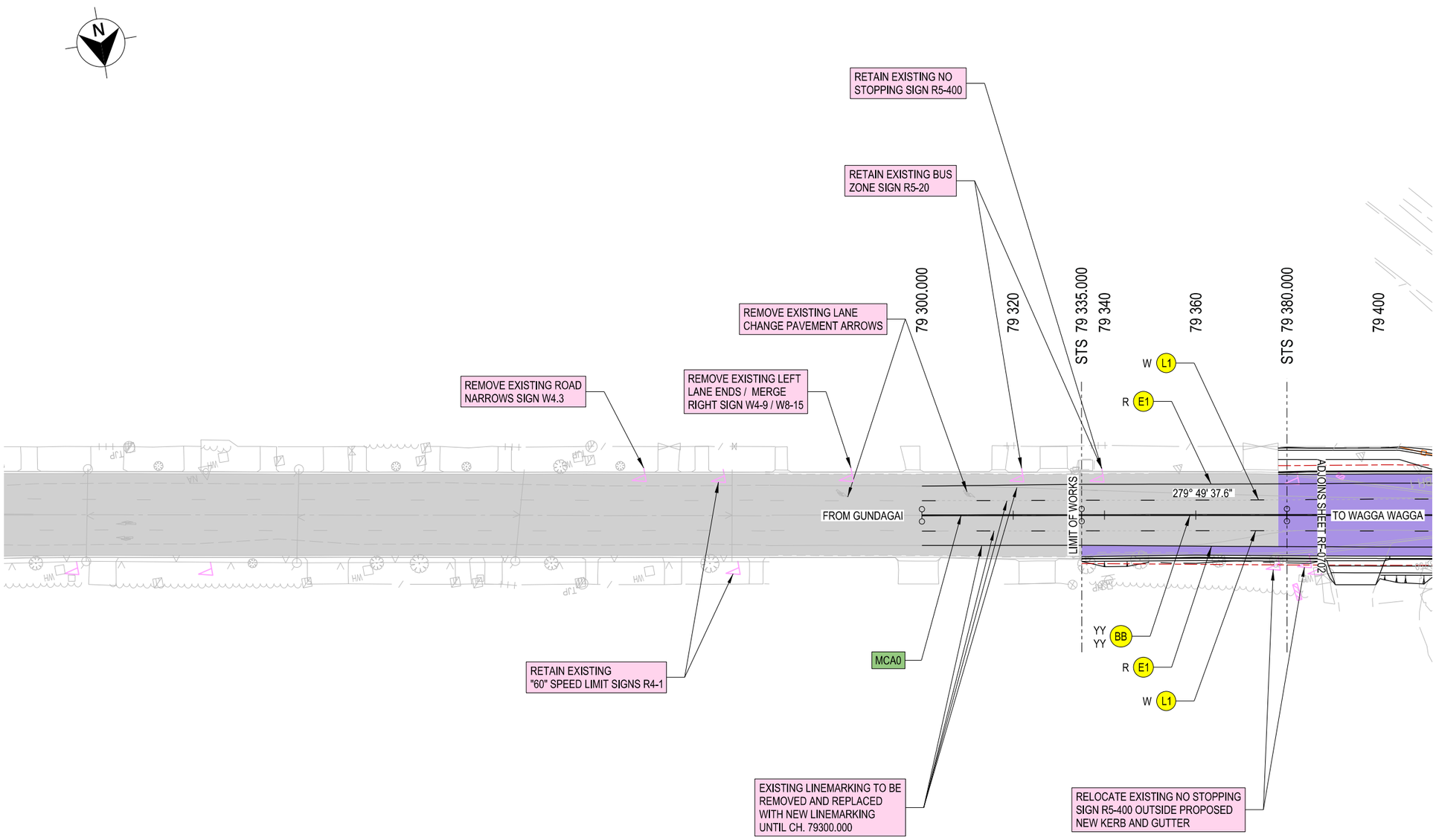
PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST, ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
PAVEMENT PLAN
HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79490

A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. PV-0602 — ISSUE



LEGEND

- MCA0 — CONTROL STRING LABEL
- CLEARZONE
- R E1 — LINEMARKING & RAISED PAVEMENT MARKER TYPE
- EXISTING SIGN
- PROPOSED PEDESTRIAN FENCING
- SB01 — SAFETY BARRIER LABEL
- NEW PAVEMENT TO BE CONSTRUCTED
- EXISTING PAVEMENT TO BE RETAINED

NOTES

1. ALL DELINEATION TO BE IN ACCORDANCE WITH ROADS AND MARITIME DELINEATION MANUAL
2. SIGNPOSTING TO BE IN ACCORDANCE WITH ROADS AND MARITIME DOCUMENT "GUIDE SIGNPOSTING" AND AS1742
3. REFER TO ROADS AND MARITIME DOCUMENT "INSTALLATION AND MAINTENANCE OF SIGNS" FOR SIGN INSTALLATION DETAILS
4. REFER TO SHEET RF-0703 FOR LINEMARKING SCHEDULES

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT
\\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-07-RF.dgn			6/03/2020 9:19:27 AM	McKenzML	NSW GOVERNMENT Transport Roads & Maritime Services

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING: 0 10 20 30 40 — SCALE 1:1000m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW, REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY

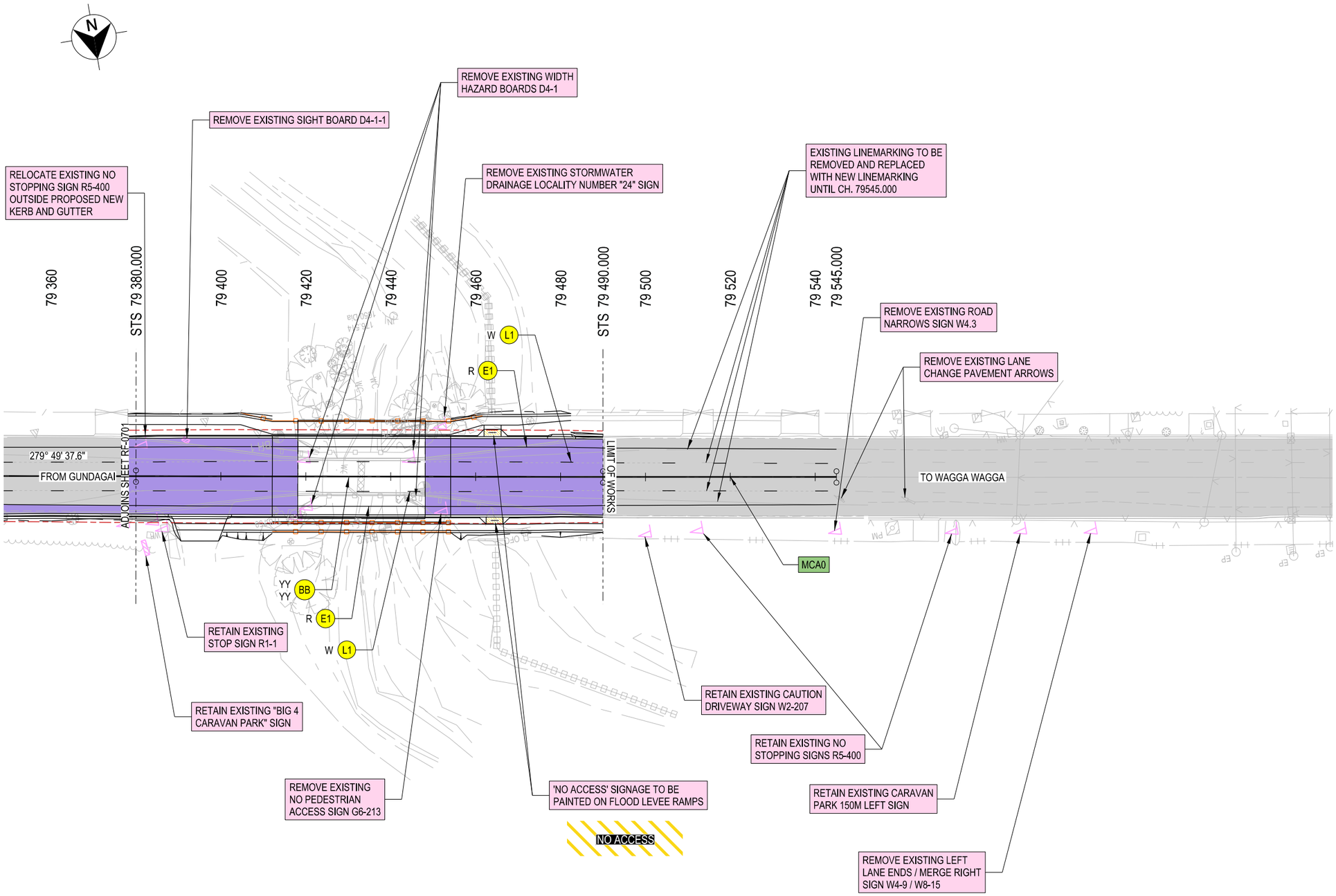
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROADSIDE FURNITURE PLAN

HW14 - STURT HIGHWAY - MCA1 - 79335 TO 79380

A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RF-0701 — ISSUE



LEGEND

- MCA0 — CONTROL STRING LABEL
- CLEARZONE
- R E1 — LINEMARKING & RAISED PAVEMENT MARKER TYPE
- EXISTING SIGN
- PROPOSED PEDESTRIAN FENCING
- SB01 — SAFETY BARRIER LABEL
- NEW PAVEMENT TO BE CONSTRUCTED
- EXISTING PAVEMENT TO BE RETAINED

NOTES

1. ALL DELINEATION TO BE IN ACCORDANCE WITH ROADS AND MARITIME DELINEATION MANUAL
2. SIGNPOSTING TO BE IN ACCORDANCE WITH ROADS AND MARITIME DOCUMENT "GUIDE SIGNPOSTING" AND AS1742
3. REFER TO ROADS AND MARITIME DOCUMENT "INSTALLATION AND MAINTENANCE OF SIGNS" FOR SIGN INSTALLATION DETAILS
4. REFER TO SHEET RF-0703 FOR LINEMARKING SCHEDULES

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG), CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-07-RF.dgn				DESIGN LOT CODE	
EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

SCALES ON A3 SIZE DRAWING: 0 10 20 30 40 — SCALE 1:1000m

CO-ORDINATE SYSTEM: MGA ZONE 55 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: ROADS AND MARITIME SERVICES, TECHNICAL AND PROJECT SERVICES, ENGINEERING SERVICES, DESIGN SOUTH WEST

PLOT DATE / TIME: 6/03/2020 9:19:27 AM — PLOT BY: MckenzML

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

CLIENT: NSW GOVERNMENT — Transport Roads & Maritime Services

PREPARED FOR: NETWORK NSW REGIONAL SOUTH WEST ASSET

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROADSIDE FURNITURE PLAN
HW14 - STURT HIGHWAY - MCA1 - 79380 TO 79490.000

A3

RMS REGISTRATION No. DS2018/001534 — VOL

ISSUE STATUS: 80% DETAIL DESIGN — EDMS No. SF2018/300270 — SHEET No. RF-0702 — ISSUE

LINEMARKING SCHEDULE - CENTRE LINE				
CONTROL	CHAINAGE	OFFSET	STRING	TYPE
MCA0	79300.000	0.000	LDA1	BB
	79545.000	0.000		

LINEMARKING SCHEDULE LHS - LANE 1				
CONTROL	CHAINAGE	OFFSET	STRING	TYPE
MCA0	79300.000	-3.190	L3A1	L1
	79378.065	-3.316		
	79400.000	-3.500		
	79480.000	-3.500		
	79490.000	-3.320		
	79545.000	-3.170		

LINEMARKING SCHEDULE LHS - LANE 2				
CONTROL	CHAINAGE	OFFSET	STRING	TYPE
MCA0	79300.000	-6.403	LEA1	E1
	79335.000	-6.746		
	79400.000	-7.000		
	79480.000	-7.000		
	79490.000	-6.820		
	79545.000	-6.542		

LINEMARKING SCHEDULE RHS - LANE 1				
MCA0	79300.000	3.468	L3AJ	L1
	79378.065	3.417		
	79400.000	3.500		
	79470.000	3.500		
	79490.000	3.224		
	79545.000	3.332		

LINEMARKING SCHEDULE RHS - LANE 2				
MCA0	79300.000	6.612	LEAJ	E1
	79335.000	6.604		
	79400.000	7.000		
	79470.000	7.000		
	79490.000	6.724		
	79545.000	6.530		

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\waggda03\cadd\CADD\Design\0014\SF2018-300270-Marshall Creek Bridge Widening\3-Microstation\03 Detail\DS2018-001534-07-RF.dgn

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 6/03/2020 9:19:28 AM

PLOT BY: MckenzML

CLIENT: Transport Roads & Maritime Services (NSW GOVERNMENT)

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY
MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
ROADSIDE FURNITURE PLAN
LINEMARKING SCHEDULE

A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL

SCALES ON A3 SIZE DRAWING:

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY:
ROADS AND MARITIME SERVICES
TECHNICAL AND PROJECT SERVICES
ENGINEERING SERVICES
DESIGN SOUTH WEST

TITLE	NAME	DATE
DRAWN	M. McKENZIE	06.12.2019
DRG CHECK	J. GOODEN	06.12.2019
DESIGN	M. McKENZIE	06.12.2019
DESIGN CHECK	J. GOODEN	06.12.2019
DESIGN MNGR	L. CROKER	06.12.2019
PROJECT MNGR	P. KC	06.12.2019

PREPARED FOR: NETWORK NSW REGIONAL SOUTH WEST ASSET

RMS REGISTRATION No.: DS2018/001534

VOL:

ISSUE STATUS: 80% DETAIL DESIGN

EDMS No.: SF2018/300270

SHEET No.: RF-0703

ISSUE:

Appendix D

Consultation

NSW STATE EMERGENCY SERVICE

Our Ref: ID 1254
Your Ref:

1st December 2020

Jessie Whieldon
NGH Consulting
PO Box 5464
Wagga Wagga NSW 2650

Via email: jessie.w@nghconsulting.com.au

Dear Jessie,

Notification under clause 15AA of the State Environmental Planning Policy (Infrastructure) 2007 in relation to the proposed Marshalls Creek Bridge Upgrade

Thank you for the notification under clause 15AA of the *State Environmental Planning Policy (Infrastructure) 2007* in relation to the proposed upgrade at Marshalls Creek Bridge, East Wagga Wagga.

The NSW State Emergency Service (NSW SES) has reviewed the proposed upgrade using the information provided with the proposal and the flood risk information (e.g. local flood Plan, flood studies etc.) available to the NSW SES. Based on this review the proposed works appear to have minimal risk to NSW SES response operations.

However, if the construction phase of the upgrades causes disruption to the operation of the road, this may impact the ability for emergency vehicles to use this route. The NSW SES requests that notification be provided where there are likely to be significant delays in the operation of the roads affected by the upgrades.

Please feel free to contact me on 0458 737 188 or via email at maria.frazer1@one.ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence.

Yours sincerely,

Maria Frazer
Coordinator Planning
NSW State Emergency Service

Cc: Jason McDonell - Unit Commander, Wagga Wagga SES Unit

NSW GOVERNMENT

STATE HEADQUARTERS
6-8 Regent Street, Wollongong NSW 2500
PO Box 6126, Wollongong DC NSW 2500
P (02) 4251 6111
F (02) 4251 6190
www.ses.nsw.gov.au
ABN: 88 712 649 015

Accepted: Water main design scope - Meeting Response

FILE | MEETING RESPONSE | ADOBE PDF

Delete | Reply | Reply All | Forward | Meeting | IM | More | Meeting Notes | Archive | Team Email | Reply & Delete | To Manager | Done | Create New | Move | Rules | Actions | Mark Unread | Categorize | Follow Up | Translate | Find | Related | Select | Zoom | Store

Delete | Respond | Meeting Notes | Quick Steps | Move | Tags | Editing | Zoom | Objective

Mon 20/07/2020 5:41 PM

Greg Vidler <gvidler@rwcc.nsw.gov.au>

Accepted: Water main design scope

To Prafulla KC

When Tuesday, 21 July 2020 10:30 AM-11:00 AM (UTC+10:00) Canberra, Melbourne, Sydney.

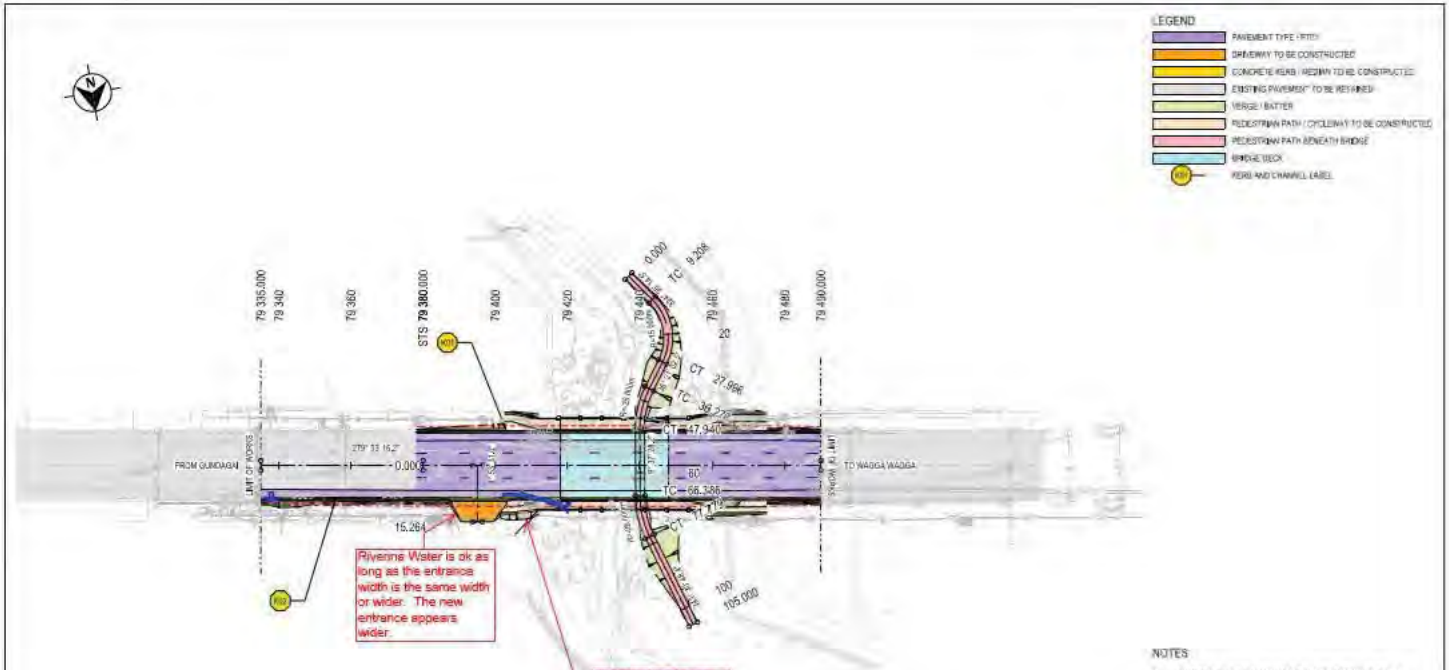
Location Microsoft Teams Meeting

Accepted Greg Vidler <gvidler@rwcc.nsw.gov.au>

Tentative No attendees have tentatively accepted.

Declined No attendees have declined.

Greg Vidler has accepted this meeting.



NOTES

1. REFER TO SHEET PA-0601 FOR PAVEMENT DESIGN DETAILS
2. REFER TO ROADS AND MARITIME STANDARD DRAWING R3100-01 FOR STANDARD KERB AND CHANNEL SHAPES

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE. BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

10							
09							
08							
07							
06							
05							
04							
03							
02							
01							

DRAWING FILE LOCATION NAME: [illegible]

INTERNAL REFERENCE FILES

REV	DATE	AMENDMENT / ISSUE DESCRIPTION	APPD	ORIGINAL

ROADS AND MARITIME SERVICES
TECHNICAL AND PROJECT SERVICES
ENGINEERING SERVICES
DESIGN SOUTH WEST

0 10 20 30 40 METRES

MGA ZONE 55 — HEIGHT DATUM: AHD

DESIGN	M. MCKENZIE	[illegible]
DRAWN	J. GOODEN	[illegible]
CHECK	M. MCKENZIE	[illegible]
COORDINATED	L. GOODEN	[illegible]
SUBMITTED	L. CROKER	[illegible]
PROJECT MGR	P. KC	[illegible]

Transport Roads & Maritime Services

WAGGA WAGGA CITY
HW14 - STURT HIGHWAY

MARSHALLS CREEK BRIDGE REPLACEMENT
79.335km TO 79.490km WEST OF GUNDAGAI (WAGGA)
PAVEMENT PLAN

HW14 - STURT HIGHWAY - MR41 - 79.335 TO 79.490

A3

REGISTRATION NO. DS2018/001534

REPRESENTS: NETWORK NSW REGIONAL SOUTH WEST ASSET

DRAWING STATUS: 80% DETAIL DESIGN

CREATED: 27/11/2020

SHEET No. PV-0602

REV

FILE MESSAGE ADOBE PDF

Ignore Junk Delete | Reply Reply All Forward | Meeting IM More | Archive Team Email Reply & Delete | To Manager Done Create New | Save Settings | Move | Rules OneNote Actions | Mark Unread | Categorize | Follow Up | Translate | Find Related Select | Zoom | Store | Insights

Delete Respond Quick Steps Objective ECM Move Tags Editing Zoom Objective

Thu 19/12/2019 8:45 AM

Greg Vidler <gvidler@rwcc.nsw.gov.au>

RE: Today's meeting

To Prafulla KC

Cc Timothy Wilson

Sent: Wednesday, 18 December 2019 4:58 PM
To: Greg Vidler <gvidler@rwcc.nsw.gov.au>; Timothy Wilson <Timothy.V.WILSON@transport.nsw.gov.au>
Subject: Today's meeting

Greg/Tim,

Please see below action from today's meeting. If I have missed anything please add in.

- Turning path analysis B-double RWCC access. Subject to analysis ,may require to widen the driveway splay on western end.
- All suitable water main relocation options are accepted to RWCC(attached to the bridge/under bore).
- Greg to send survey data(sheet pile RWCC). Prafulla to include into design.
- Include water design into main contract
- No alternative/secondary access to RWCC.
- Greg to send costing of under bore for TfNSW estimation purpose.
- Greg Vidler main contact for design approval/all communication.

Marshall's Creek Bridge replacement - RWCC pipeline details - Message (HTML)

FILE MESSAGE ADOBE PDF

Ignore Junk Delete | Reply Reply All Forward Meeting IM More | Archive Team Email Reply & Delete To Manager Done Create New | Save Settings | Move Rules OneNote Actions | Mark Unread Categorize Follow Up | Translate Find Related Select | Zoom | Store | Insights

Delete Respond Quick Steps Objective ECM Move Tags Editing Zoom Objective

Thu 24/09/2020 2:35 PM

Greg Vidler <gvidler@rwcc.nsw.gov.au>

Marshall's Creek Bridge replacement - RWCC pipeline details

To Prafulla KC

Cc Aran Beckett

You replied to this message on 1/10/2020 3:15 PM.

Good Afternoon Prafulla

We confirm that the pipe required on the replacement Marshall's creek bridge is 300mm DICL with socket spigot connections.

We would like to have 600mm of space on either side of the pipe for maintenance.

The pipe supports are required to support a 90 degrees sector at base of pipe. There are some standard brackets available.
See https://anchoragegroup.com.au/products/ and refer to the Compact Pipe Shoe Single sided AG 565 as a suitable option.

It is recommended that above ground installations of DICL pipelines be provided with one support per pipe, the supports being positioned behind the socket of each pipe.

This results in a normal maximum distance between supports of 5.7m.

Pipes should be fixed to the support with mild steel straps (available on AG 565 brackets), so that axial movement due to expansion or contraction resulting from temperature fluctuation is taken up at individual joints in the pipeline. In addition joints should be assembled with the spigot end withdrawn 5 to 10mm from the bottom of the socket to accommodate these thermal movements.

Pipes supported in this way are capable of free deflection and axial movement at the joints which accommodates small movements of the pipe supports.

FW: Bus stop relocation Marshalls Creek Bridge Replacement Project - Message (HTML)

FILE MESSAGE ADOBE PDF

Fri 5/02/2021 1:50 PM

Prafulla KC

FW: Bus stop relocation Marshalls Creek Bridge Replacement Project

To operations@busaboutwagga.com.au

Message | Busstop relocation.pdf (3 MB) | Street view 102 - 104 Hammond Avenue Sturt Highway.png (2 MB)

Hi Tim,

Thanks for your time today on the phone. As discussed confirming that Busabout Wagga is ok with the proposed location of bus stop .

Could you please confirm this via reply email.

Kind Regards,
Prafulla

From: Prafulla KC
Sent: Monday, 9 November 2020 4:41 PM
To: operations@busaboutwagga.com.au
Subject: Bus stop relocation Marshalls Creek Bridge Replacement Project

Hi Tim,

It's been a while since I have spoken with you regarding bus stop relocation.

It is proposed to relocate existing bus stop near Marshalls Creek Bridge further east ,opposite Noah's Ark Play Centre in between 102 (Murrumbidgee Car Sales) and 104 (Waterterk) Hammond Avenue. This is the only location within close proximity of existing bus stop . However as you can see from attached screenshot proposed relocation would require single tree removal in front of 104 Hammond Avenue. Wagga Wagga City Council has no objection to the proposed location and tree removal.

RE: Bustop relocation - Marsahlls Creek Bridge - Message (HTML)

FILE MESSAGE ADOBE PDF

Thu 4/06/2020 1:41 PM

Mason, Andrew <Mason.Andrew@wagga.nsw.gov.au>

RE: Bustop relocation - Marsahlls Creek Bridge

To Prafulla KC

Cc Ross, Peter; Pavitt, Henry

You replied to this message on 4/06/2020 2:35 PM.

Hello Prafulla

The tree people haven't got back to me so I am going to say we have no objections and it is good to go.

Thanks

Andrew

Andrew Mason
Temporary Project Manager

1300 292 442
d +61 2 6926 9130 | **m** 0428 266 346
e Mason.Andrew@wagga.nsw.gov.au
Wagga Wagga City Council · 243 Baylis Street (PO Box 20) · Wagga Wagga NSW 2650

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Thursday, June 4, 2020 12:49 PM
To: Mason, Andrew <Mason.Andrew@wagga.nsw.gov.au>
Cc: Ross, Peter <Ross.Peter@wagga.nsw.gov.au>
Subject: RE: Bustop relocation - Marsahlls Creek Bridge

Jessie Whieldon

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Friday, 26 June 2020 12:37 PM
To: Jessie Whieldon
Subject: FW: Geotechnical (boreoles) night work for Marshalls Creek Bridge

Hi Jessie,

Please see below no objection email from Big4 caravan park. Could you please update MWREF to work consecutive six night works (23-28 July).

Thanks.

Regards,
Prafulla

From: holiday@big4wagga.com.au [mailto:holiday@big4wagga.com.au]
Sent: Friday, 26 June 2020 12:28 PM
To: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Subject: RE: Geotechnical (boreoles) night work for Marshalls Creek Bridge

This is to confirm that Big4 Wagga Wagga has no objection to nightwork on Marshalls Creek Bridge between the dates 23-28 July.

Kind regards

Nicole Pirreca
Manager
BIG4 Wagga Wagga Holiday Park
Telephone: 02 6921 4287

BIG4 HOLIDAY PARKS

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Friday, 26 June 2020 11:41 AM
To: holiday@big4wagga.com.au
Cc: npirreca@big4wagga.com.au
Subject: Geotechnical (boreoles) night work for Marshalls Creek Bridge

Dear Lee,

As discussed could you please confirm via return email that big 4 caravan park has no objection of Transport for NSW undertaking night work (6:00pm - 6:00am) for consecutive six days (23 – 28 July) including weekends for geotechnical investigation(bore holes) work required to inform concept/detail design of Marshalls Creek Bridge.

I appreciate your cooperation in this project.

Kind Regards,

Prafulla Bahadur KC
Project Manager|Engineer
Infrastructure & Place | Regional Project Delivery
Southern and Western Project Office SaWPO
Transport for NSW

T 02 6923 6599 **M** 0437 189 149
193-195 Morgan St Wagga Wagga NSW 2650

I acknowledge the traditional owners and custodians of the land in which I work and pay my respects to the Elders past, present and future.

Before printing, please consider the environment

IMPORTANT NOTICE: This email and any attachment to it are intended only to be read or used by the named addressee. It is confidential and may contain legally privileged information. No confidentiality or privilege is waived or lost by any mistaken transmission to you. Roads and Maritime Services is not responsible for any unauthorised alterations to this email or attachment to it. Views expressed in this message are those of the individual sender, and are not necessarily the views of Roads and Maritime Services. If you receive this email in error, please immediately delete it from your system and notify the sender. You must not disclose, copy or use any part of this email if you are not the intended recipient.

From: Prafulla KC
To: Mason, Andrew; Ross, Peter
Subject: FW: Key actions from Marshalls Creek Bridge Meeting incl WWCC meeting
Date: Tuesday, 15 September 2020 10:15:00 AM

Good morning Andrew and Peter,

Wasn't sure if I have sent below meeting notes before. If I have please discard this email.

Thanks.

Regards,
Prafulla

-----Original Message-----
From: Jonathan Tasker
Sent: Wednesday, 11 September 2019 11:51 AM
To: Prafulla KC <Prafulla.KC@rms.nsw.gov.au>; Timothy Wilson <Timothy.V.WILSON@rms.nsw.gov.au>
Subject: Key actions from Marshalls Creek Bridge Meeting incl WWCC meeting

Prafulla,

Below my notes and actions from today's meeting.

1/ Confirm the suitability of the current all steel barrier Vs half height concrete with steel traffic barrier. Talk to AP
2/ Once traffic barrier type determined write to WWCC with barrier type and water way area and seek WWCC concurrence to design.
3/ WWCC to send through manual/manufacturers installation details
4/ WWCC send thru the final IFC drawings for the 2 levee end concrete structures
5/ Estimate for the concrete structures was around $80k. TfNSW can include this in the scope of what goes to tender for the bridge construction. WWCC to pay TfNSW to deliver these works.
6/ Flood gate 24 - remove this - WWCC to advise incl details on removing. Also TfNSW to send back drawings to confirm scope
7/ Flood gate 23 - need to relocate. TfNSW to send back to WWCC drawings to confirm scope.
8/ Cycleway under the bridge - 3m width concrete path. No need to have ramp up to the roadway adjacent to the current bridge. This will be closed during construction phase.
9/ Footpath either side of Sturt Highway. TfNSW provide concrete footpath to the end of the approach slab.
10/ Shared path (3m) on both sides of bridge - TfNSW to investigate options to allow ped access thru site during construction phase and will advise WWCC.
11/ Need to incl tender docs need to install temp levee during construction phase of project.

Regards,

Jonathan

Zach Bradley

From: NSW SES Risk Reduction <rra@ses.nsw.gov.au>
Sent: Monday, 30 November 2020 2:16 PM
To: Jessie Whieldon
Subject: ACK - RE: Marshalls Creek Proposed Bridge Widening - Draft REF

Dear Jessie,

Thank you for the above referral which has been registered as ID 1254.

Please note this email address for all future referrals.

Regards

Maria

NSW State Emergency Service
email: nswses.riskreduction@ses.nsw.gov.au

www.ses.nsw.gov.au

MISSION NSW SES SAVING LIVES AND PROTECTING COMMUNITIES

VISION BE THE BEST VOLUNTEER EMERGENCY SERVICE IN AUSTRALIA

FOR EMERGENCY HELP IN FLOODS AND STORMS CALL THE NSW SES ON 132 500

From: Jessie Whieldon <jessie.w@nghconsulting.com.au>
Sent: Monday, 30 November 2020 10:58 AM
To: Southern Zone Admin <shz.admin@ses.nsw.gov.au>
Subject: Marshalls Creek Proposed Bridge Widening - Draft REF

Good morning,

NGH are currently preparing a Review of Environmental Factors (REF) for the proposed widening of Marshalls Creek Bridge on behalf of Transport for NSW.

NGH has prepared the draft REF and would like to give Wagga Wagga Council the opportunity to review and provide comment to the REF. Note due to the large file size the REF can be accessed via the OneDrive link below.

https://nghenvironmental-my.sharepoint.com/:f:/g/personal/jessie_w_nghenvironmental_com_au/El52qYkYu8lNoapoSnWBLlABfl2HGgtrGsnLi84vDIznAw?e=7UVXAO

Please provide any comments regarding further details you would like NGH to address by the 18th December 2020.

Regards,
Jessie

JESSIE WHIELDON
ENVIRONMENTAL CONSULTANT

T. 02 6923 1563 **M.** 0402 734 127
E. jessie.w@nghconsulting.com.au
35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

NSW · ACT · QLD · VIC
WWW.NGHCONSULTING.COM.AU

Zach Bradley

From: Mason, Andrew <Mason.Andrew@wagga.nsw.gov.au>
Sent: Tuesday, 1 December 2020 2:56 PM
To: Jessie Whieldon
Cc: Faulkner, Warren
Subject: RE: Marshalls Creek Proposed Bridge Widening - Draft REF
Attachments: 423748_184988221613013_100003055084530_262034_1038696672_n.jpg

Hello Jessie

I have been reading through the REF as referenced below and only have a few comments to make.

- The table on PG 77 referring to topographical features has an elevation range of around 549m, the particular area in question has a height of approximately 182m
- In a few locations it is mentioned that a FMP must be developed by the contractor. They must be aware of the fact that Marshall's Creek can flood reasonably quickly and completely independently of the river. In 2012 the levee on the bridge at Marshall's Creek was closed on the 4th March and the river was only at a height of 8, the flooding was caused by Marshall's Creek. (see attached photo)
- The traffic control plan and bridge closure needs to take into account Emergency Vehicle access, if this is not possible, reasonable detour routes must be identified.

Thanks

Andrew

Andrew Mason
Project Manager

1300 292 442
d +61 2 6926 9130 | **m** 0428 266 346
e Mason.Andrew@wagga.nsw.gov.au
Wagga Wagga City Council · 243 Baylis Street (PO Box 20) · Wagga Wagga NSW 2650

From: Jessie Whieldon <jessie.w@nghconsulting.com.au>
Sent: Monday, November 30, 2020 10:57 AM
To: City of Wagga Wagga <Council@wagga.nsw.gov.au>
Subject: Marshalls Creek Proposed Bridge Widening - Draft REF

Good morning,

NGH are currently preparing a Review of Environmental Factors (REF) for the proposed widening of Marshalls Creek Bridge on behalf of Transport for NSW.

NGH has prepared the draft REF and would like to give Wagga Wagga Council the opportunity to review and provide comment to the REF. Note due to the large file size the REF can be accessed via the OneDrive link below.
https://nghenvironmental-my.sharepoint.com/:f:/g/personal/jessie_w_nghenvironmental_com_au/El52qYkYu8lNoapoSnWBLlABfl2HGgtrGsnLi84vDIznAw?e=7UVXAO

Please provide any comments regarding further details you would like NGH to address by the 18th December 2020.

Regards,
Jessie

JESSIE WHIELDON
ENVIRONMENTAL CONSULTANT

T. 02 6923 1563 **M.** 0402 734 127
E. jessie.w@nghconsulting.com.au
35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

NSW · ACT · QLD · VIC
WWW.NGHCONSULTING.COM.AU

Zach Bradley

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Wednesday, 17 February 2021 9:29 AM
To: Michial Sutherland
Subject: ISEPP
Attachments: SnipImage.JPG

From: Prafulla KC
Sent: Wednesday, 10 February 2021 12:02 PM
To: Paul Amos <Paul.AMOS@transport.nsw.gov.au>
Subject: Sent from Snipping Tool

Hi Paul,

Confirmation from Busabout about new location.

Regards,
Prafulla

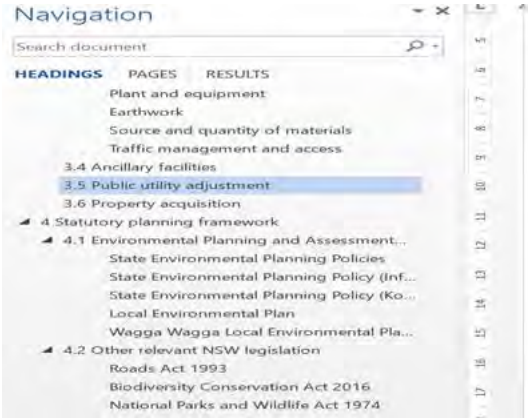
Zach Bradley

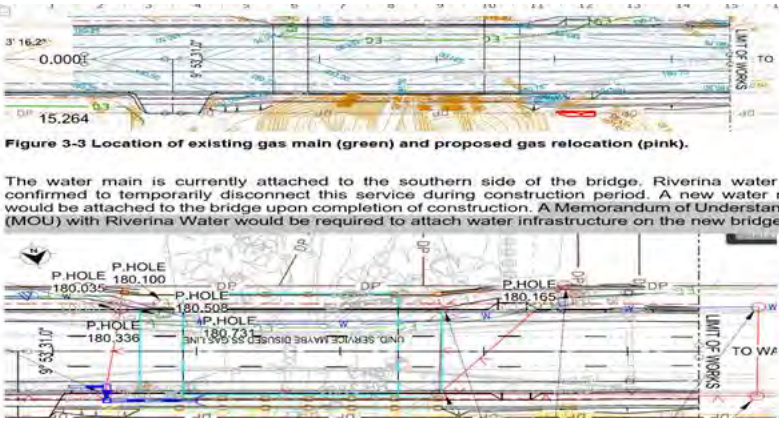
From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Thursday, 11 February 2021 2:22 PM
To: Michial Sutherland
Cc: Paul Amos
Subject: ISEPP consultation
Attachments: ISEPP consultation.docx

Hi Michial,

Please find attached additional communications to be included in the ISEPP section of the REF.

Also ,please remove "A Memorandum of Understanding (MOU) with Riverina Water would be required to attach water infrastructure on the new bridge" from Section 3.5 Water Main.





.

Thanks.

Regards,
Prafulla

Zach Bradley

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Monday, 8 February 2021 2:45 PM
To: Paul Amos; Michial Sutherland
Subject: Stakeholder communication Marshalls Creek Bridge
Attachments: WWCC.zip; Comms register Ma.xlsx

Hi Paul and Michial,

Please find attached list of communications with WWCC,RWWW and Busabout and Narellan Pool. Hopefully attached information will satisfy consultation requirement and we can finalise REF this week.

Kind Regards,

Prafulla Bahadur KC
Project Manager|Engineer
Infrastructure & Place | Regional Project Delivery
Southern and Western Project Office SaWPO
Transport for NSW

T 02 6923 6599 **M** 0437 189 149
193-195 Morgan St Wagga Wagga NSW 2650

I acknowledge the traditional owners and custodians of the land in which I work and pay my respects to the Elders past, present and future.

This email is intended only for the addressee and may contain confidential information. If you receive this email in error please delete it and any attachments and notify the sender immediately by reply email. Transport for NSW takes all care to ensure that attachments are free from viruses or other defects. Transport for NSW assume no liability for any loss, damage or other consequences which may arise from opening or using an attachment.

Consider the environment. Please don't print this e-mail unless really necessary.

Zach Bradley

From: NSW SES Risk Reduction <rra@ses.nsw.gov.au>
Sent: Monday, 30 November 2020 2:16 PM
To: Jessie Whieldon
Subject: ACK - RE: Marshalls Creek Proposed Bridge Widening - Draft REF

Dear Jessie,

Thank you for the above referral which has been registered as ID 1254.

Please note this email address for all future referrals.

Regards

Maria

NSW State Emergency Service
email: nswses.riskreduction@ses.nsw.gov.au

www.ses.nsw.gov.au

MISSION NSW SES SAVING LIVES AND PROTECTING COMMUNITIES

VISION BE THE BEST VOLUNTEER EMERGENCY SERVICE IN AUSTRALIA

FOR EMERGENCY HELP IN FLOODS AND STORMS CALL THE NSW SES ON 132 500

From: Jessie Whieldon <jessie.w@nghconsulting.com.au>
Sent: Monday, 30 November 2020 10:58 AM
To: Southern Zone Admin <shz.admin@ses.nsw.gov.au>
Subject: Marshalls Creek Proposed Bridge Widening - Draft REF

Good morning,

NGH are currently preparing a Review of Environmental Factors (REF) for the proposed widening of Marshalls Creek Bridge on behalf of Transport for NSW.

NGH has prepared the draft REF and would like to give Wagga Wagga Council the opportunity to review and provide comment to the REF. Note due to the large file size the REF can be accessed via the OneDrive link below.

https://nghenvironmental-my.sharepoint.com/:f:/g/personal/jessie_w_nghenvironmental_com_au/El52qYkYu8lNoapoSnWBLlABfl2HGgtrGsnLi84vDIznAw?e=7UVXAO

Please provide any comments regarding further details you would like NGH to address by the 18th December 2020.

Regards,
Jessie

JESSIE WHIELDON
ENVIRONMENTAL CONSULTANT

T. 02 6923 1563 **M.** 0402 734 127
E. jessie.w@nghconsulting.com.au
35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

NSW · ACT · QLD · VIC
WWW.NGHCONSULTING.COM.AU

Revised plan - Message (HTML)

FILE MESSAGE ADOBE PDF

Ignore Junk Delete | Reply Reply All Forward | Meeting IM More | Message Tracking | Archive Team Email Reply & Delete To Manager Done Create New | Save Settings Move | Rules OneNote Actions | Mark Unread Categorize Follow Up | Translate Find Related Select | Zoom Store Insights

Delete Respond Show Quick Steps Objective ECM Move Tags Editing Zoom Objective

Mon 28/09/2020 4:14 PM

Prafulla KC

Revised plan

To accounts@narellanpoolsriverina.com.au

Cc David Bolton

This is the most recent version, but you made changes to another copy. Click here to see the other versions.

Message DS2018-001534-08-PW-Easements_1.pdf (2 MB)

Hi Steve,

As discussed ,please find attached revised acquisition plan. As you can see in the plan the front of your property will not be affected by revised acquisition plan.

Please do not hesitate to contact me if you have any query regarding attached plan.

Kind Regards,

Prafulla Bahadur KC
Project Manager|Engineer
Infrastructure & Place | Regional Project Delivery
Southern and Western Project Office SaWPO
Transport for NSW

T 02 6923 6599 **M** 0437 189 149
103-105 Morgan St Wagga Wagga NSW 2650

Jessie Whieldon

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Wednesday, 1 July 2020 10:08 AM
To: Jessie Whieldon
Subject: FW: Geotechnical Investigation(boreholes) Marshalls Creek Bridge

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Jessie,

Please see below. Awaiting council's response.

Thanks.

Regards,
Prafulla

From: Greg Vidler [mailto:gvidler@rwcc.nsw.gov.au]
Sent: Wednesday, 1 July 2020 10:05 AM
To: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Subject: RE: Geotechnical Investigation(boreholes) Marshalls Creek Bridge

Good Morning Prafulla

That is fine. I have advised RWCC staff that the work will be taking place.

Please ensure that access to our Hammond Avenue site is maintained as all times.

Regards

Greg Vidler
Manager Projects

Riverina Water

91 Hammond Ave (PO Box 456)
Wagga Wagga NSW 2650

Mobile: 0417 438 046 Direct: 02 6922 0684

rwcc.nsw.gov.au

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Friday, 26 June 2020 12:12 PM
To: Greg Vidler <gvidler@rwcc.nsw.gov.au>
Subject: Geotechnical Investigation(boreholes) Marshalls Creek Bridge

Hi Greg,

We are planning to undertake geotechnical investigations at Marshall Creek Bridge area to inform development of concept/detailed design. Work includes drilling of boreholes within the existing road(eastbound lane) and around the bridge area (underpass/cycleway) to assess subsurface conditions.

It is proposed to commence drilling as night works between 6:00pm and 6:00am during 23 to 28 July, weather permitting. There will be a single lane closures on 23 and 24 July for drilling on pavement.

Please do not hesitate to contact me if you have any query in relation to proposed work.

Kind Regards,
Prafulla Bahadur KC
Project Manager|Engineer
Infrastructure & Place | Regional Project Delivery
Southern and Western Project Office SaWPO
Transport for NSW

T 02 6923 6599 **M** 0437 189 149
193-195 Morgan St Wagga Wagga NSW 2650

I acknowledge the traditional owners and custodians of the land in which I work and pay my respects to the Elders past, present and future.

received this email in error, you are requested to contact the sender and delete the email. Please consider the environment before printing this email.

Before printing, please consider the environment

RE: Bus stop relocation Marshalls Creek Bridge Replacement Project - Message (HTML)

FILE MESSAGE ADOBE PDF

Ignore Junk Delete | Reply Reply All Forward Meeting IM More | Archive Team Email Reply & Delete To Manager Done Create New | Save Settings | Move Rules OneNote Actions | Mark Unread Categorize Follow Up | Translate Find Related Select | Zoom | Store | Insights

Delete Respond Quick Steps Objective ECM Move Tags Editing Zoom Objective

Wed 10/02/2021 12:00 PM

Tim Banger <operations@busaboutwagga.com.au>

RE: Bus stop relocation Marshalls Creek Bridge Replacement Project

To Prafulla KC

You replied to this message on 10/02/2021 12:01 PM.

Good afternoon Prafulla

We do not object to the relocation of this bus zone to the site mentioned by you

Kind Regards

Tim Banger
Operations Controller, Busabout Wagga Wagga

BUSABOUT

264 Hammond Avenue, Wagga Wagga NSW 2650 | PO Box 1465, Wagga Wagga NSW 2650
P 02 5942 6600
E operations@busaboutwagga.com.au | W www.busaboutwagga.com.au

RE: Marshalls Ck bridge - electrical design - Message (HTML)

FILE MESSAGE ADOBE PDF

Mon 1/06/2020 1:33 PM

Mason, Andrew <Mason.Andrew@wagga.nsw.gov.au>

RE: Marshalls Ck bridge - electrical design

To Prafulla KC

You replied to this message on 1/06/2020 1:36 PM.

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

First Previous

Hello Prafulla

At first glance this looks fine.

If we want to increase the amount of available power at pole 7 so we can run some bigger pumps at floodgate 25, does this need to happen now or is this something Essential Energy could do later once construction is complete?

Thanks

Andrew

Andrew Mason
Temporary Project Manager

1300 292 442
d +61 2 6926 9130 | **m** 0428 266 346
e Mason.Andrew@wagga.nsw.gov.au
Wagga Wagga City Council - 243 Baylis Street (PO Box 20) - Wagga Wagga NSW 2650

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Monday, June 1, 2020 1:19 PM

Jessie Whieldon

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Wednesday, 1 July 2020 1:44 PM
To: Jessie Whieldon
Cc: Kumar Rathakrishnan
Subject: FW: Marshalls Creek Bridge Geotechnical Work(boreholes drilling)

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Jessie,

Please see below Council's response.

Regards,
Prafulla

From: Mason, Andrew [mailto:Mason.Andrew@wagga.nsw.gov.au]
Sent: Wednesday, 1 July 2020 1:42 PM
To: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Cc: Ross, Peter <Ross.Peter@wagga.nsw.gov.au>; Cahill, Timothy <Cahill.Timothy@wagga.nsw.gov.au>; Goodyer, Frank <Goodyer.Frank@wagga.nsw.gov.au>
Subject: RE: Marshalls Creek Bridge Geotechnical Work(boreholes drilling)

Hello Prafulla

I have heard nothing back from the relevant people in Council so I am going to say this is ok to go ahead.

Andrew

Andrew Mason
Project Manager

1300 292 442
d +61 2 6926 9130 | **m** 0428 266 346
e Mason.Andrew@wagga.nsw.gov.au
Wagga Wagga City Council · 243 Baylis Street (PO Box 20) · Wagga Wagga NSW 2650

From: Prafulla KC <Prafulla.KC@transport.nsw.gov.au>
Sent: Wednesday, July 1, 2020 1:27 PM
To: Mason, Andrew <Mason.Andrew@wagga.nsw.gov.au>
Subject: FW: Marshalls Creek Bridge Geotechnical Work(boreholes drilling)

Hi Andrew,

Any update on below request please? I need to include Council's response into Minor Works REF(MWREF) as part of stakeholder engagement process to finalise MWREF.

Thanks.

Regards,
Prafulla

From: Prafulla KC
Sent: Friday, 26 June 2020 11:52 AM
To: Mason, Andrew <Mason.Andrew@wagga.nsw.gov.au>
Subject: Marshalls Creek Bridge Geotechnical Work(boreholes drilling)

Hi Andrew,

We are planning to undertake geotechnical investigations at Marshall Creek Bridge area to inform development of concept/detailed design. Work includes drilling of boreholes within the existing road(eastbound lane) and around the bridge area (underpass/cycleway) to assess subsurface conditions.

It is proposed to commence drilling as night works between 6:00pm and 6:00am during 23 to 28 July, weather permitting. There will be a single lane closures on 23 and 24 July for drilling on pavement.

I am seeking Council's permission to temporary close the bike path during night works (23 – 28 July) and to use road reserve for parking work vehicles and drilling rig (within the road reserve next to Essential energy and Levee). A temporary safety fence will be erected on the site.

Please do not hesitate to contact me if you have any query in relation to this request.

Kind Regards,
Prafulla Bahadur KC
Project Manager|Engineer
Infrastructure & Place | Regional Project Delivery
Southern and Western Project Office SaWPO
Transport for NSW

T 02 6923 6599 **M** 0437 189 149
193-195 Morgan St Wagga Wagga NSW 2650

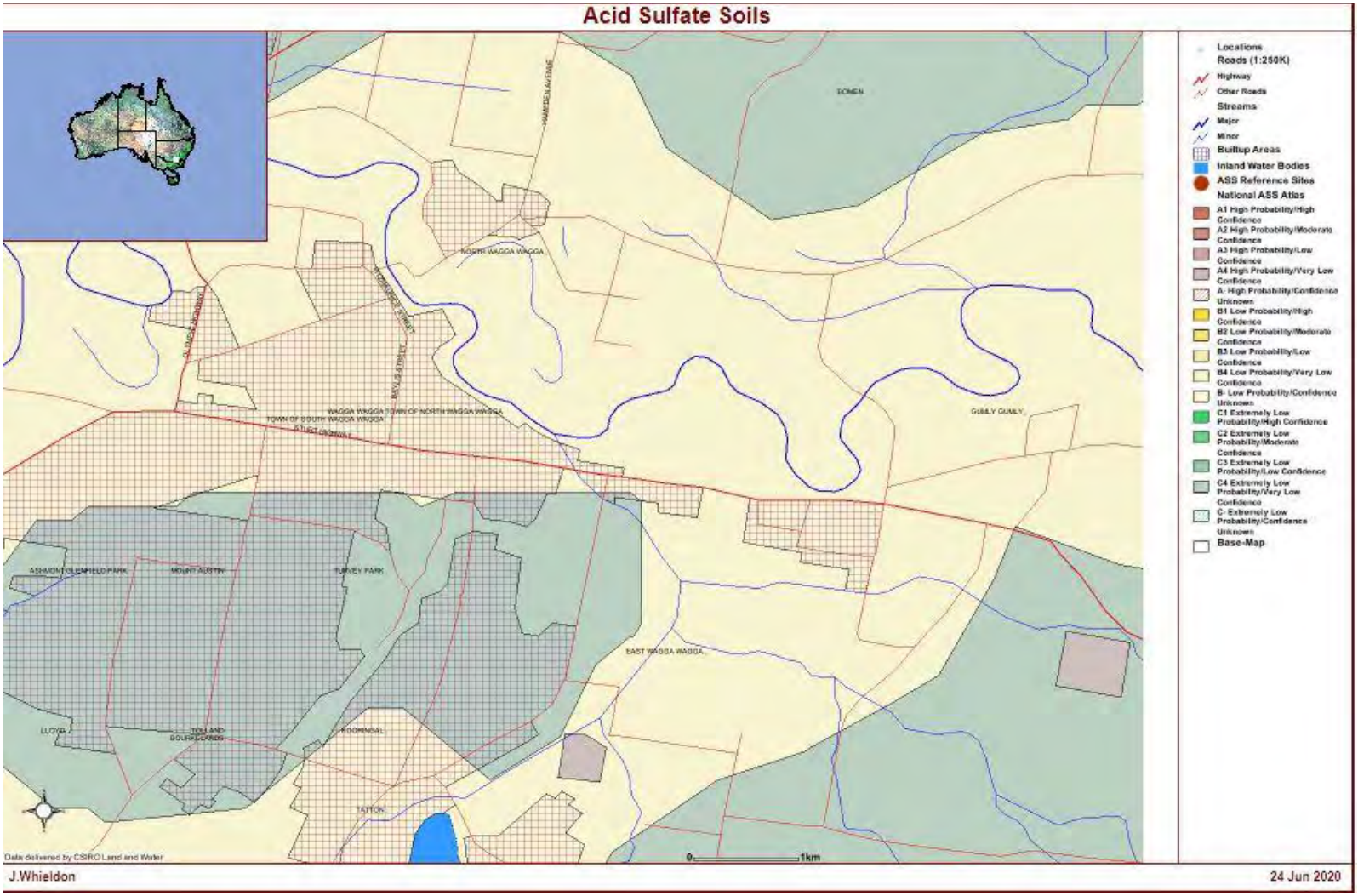
I acknowledge the traditional owners and custodians of the land in which I work and pay my respects to the Elders past, present and future.

IMPORTANT NOTICE: This email and any attachment to it are intended only to be read or used by the named addressee. It is confidential and may contain legally privileged information. No confidentiality or privilege is waived or lost by any mistaken transmission to you. Roads and Maritime Services is not responsible for any unauthorised alterations to this email or attachment to it. Views expressed in this message are those of the individual sender, and are not necessarily the views of Roads and Maritime Services. If you receive this email in error, please immediately delete it from your system and notify the sender. You must not disclose, copy or use any part of this email if you are not the intended recipient.

Appendix E

Background Searches

Acid Sulfate Soils



Soil Landscape

kp	KURRAJONG PLAIN	Alluvial

Landscape— extensive level plain of higher Murrumbidgee River floodplain. Local relief mostly <2 m; slope gradients <1%. Almost completely cleared tall woodland.

Landscape Variant— kpa— similar to **kp** but slightly higher, less flooded and has a bleached A_2 horizon.

Soils— moderately deep (80 - 150 cm) Eutrophic Brown Dermosols and Eutrophic Brown Kandosols.

Limitations— occasional flooding, waterlogging (localised), streambank erosion (localised).

LOCATION

High floodplain of Murrumbidgee River in northern part of the mapping area. Type location is the Kurrajong Plain north-east of Wagga Wagga (Map reference: 5 40175E, 61 0685*N).

LANDSCAPE

Geology and Regolith

Thick (mostly >20 m) Cainozoic alluvial sediment sequences, silty clay on top 5 - 8 m and sand, gravel and clay at depth.

Topography

Extensive level plain up to 10 m above the Murrumbidgee River normal water levels, rarely flooded (last one in 1974). Slope gradients <1%. Local relief mostly <2 m within an elevation range of 165 - 190 m, higher towards east.

Vegetation

Almost completely cleared except for very small areas of extensively cleared tall woodland in Crown reserves and along some roads. Most common tree species include river red gum, grey box, yellow box, and white box. Understorey species include wallaby grass, spear grass, brome grass, fescues, barley grass, burr medic and clovers.

Climate and Hydrology

Annual rainfall is 500 - 550 mm. Soil is moderately moist to moist during winter and spring but dry in summer and early autumn. Run-on is none to low for most parts and waterlogging may occur locally after heavy rains especially towards west. Flooding (inundation) is rare and the last one was in 1974.

Land Use/Existing Land Degradation

Dairy farming and lucerne growing under irrigation, and intensive cropping for wheat, sunflowers and grain sorghum.

Minor streambank erosion of Murrumbidgee River channels. Waterlogging in small areas, especially towards west.

Included Soil Landscapes

Small areas of Currawarna (**cw**) soil landscape have been included at isolated small sand mounds.

Landscape Variants

The areas mapped as **kpa** are slightly higher and less frequently flooded and have a soil profile including a usually bleached A_2 horizon. Otherwise, this variant has similar landscape features to the rest of the Kurrajong Plain (**kp**) soil landscape.

QUALITIES AND LIMITATIONS

Landscape Limitations

Relatively minor limitations except for occasional flooding and localised streambank erosion.

Erodibility

	Non-concentrated flows	Concentrated flows	Wind
kp1	slight	slight	slight
kp2	slight	moderate	slight

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
grazing	slight	slight	slight
cultivation	slight	moderate	slight
urban	slight	slight	slight

Foundation Hazard and Urban Capability

Low in general. Occasional flooding and minor streambank erosion may cause difficulties for roads and building foundations.

Generally low and locally (near stream and western lower parts) moderate limitations for urban development.

Rural Capability and Land Management Recommendations

Low limitations for grazing and locally (western lower part, more waterlogging) moderate limitations for cultivation.

Eroded streambanks should be fenced. Waterlogged areas may also need to be fenced and revegetated.

SOILS

Dominant Soil Materials and Their Qualities

kp1— Dark silty clay (topsoil— A_1 horizon). Brownish black to dark brown, silty light clay, moderately to weakly pedal; field pH 6.0 - 6.5.

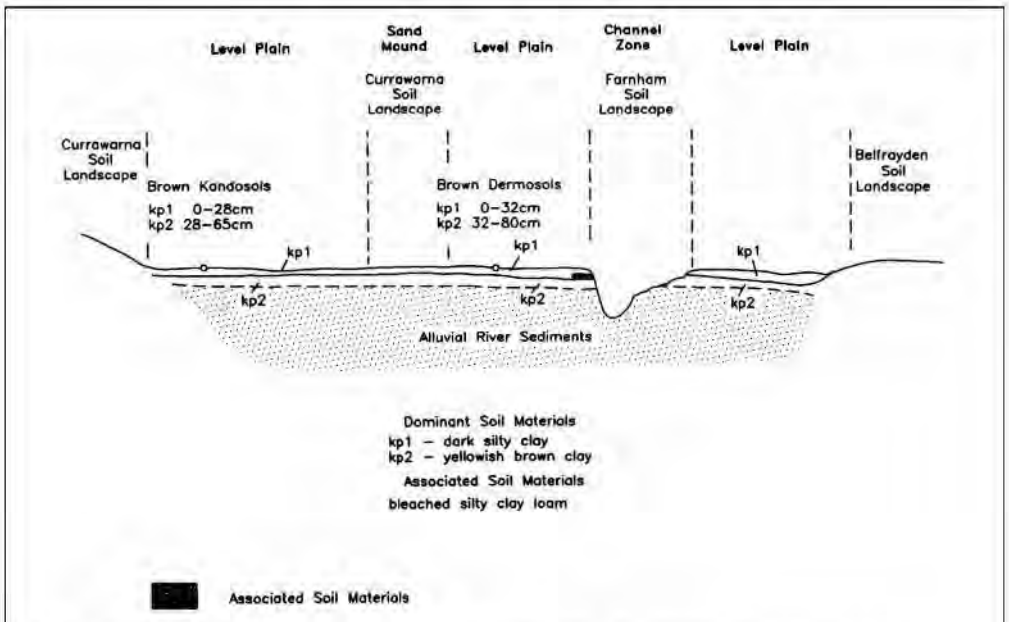
Low wet bearing strength, low fertility (localised), hardsetting (localised), sodicity (localised), high organic matter (localised).

kp2— Yellowish brown clay (subsoil— B horizon). Dull yellowish brown to brown, light clay to medium clay, moderately to weakly pedal; field pH 6.5 - 7.0.

High plasticity, low wet bearing strength, low fertility (localised).

Associated Soil Materials

Bleached silty clay loam. Commonly occurring in **kpa** landscape variant as an A_2 horizon, from 10 - 30 cm thick.



■ *Distribution diagram of Kurrajong Plain soil landscape illustrating the occurrence and relationship of dominant soil materials.*

Type Profile 1: Eastern Part

Dominance: about 50% of soil landscape.

Moderately well-drained, Haplic Eutrophic Brown Kandosols (Minimal Prairie Soils). No surface gravels.

Depth: 65 cm, rooting depth <65 cm.

Location: near Oura Road, Kurrajong Plain, about 5 km north-east of Wagga Wagga (map reference: 5 40175*E, 61 16650*N), Soil Data System card 141. Voluntary/native pasture.

Soil Material	Description
Layer 1, A, 0 - 28 cm **kp1**. Silty clay. Field pH 6.0	brownish black (7.5YR 3/2), silty light clay, weak pedality, 20 - 50 mm sub-angular blocky peds, earthy, firm (moist), coherent, moderately permeable, no coarse fragments, many roots, gradual boundary to—
Layer 2, B , 28-65 cm **kp2**. Yellowish Brown clay. Field pH 6.5.	brown (7.5YR 4/3), medium clay, weak pedality, 5 - 10 mm polyhedral peds, earthy, firm (moist), coherent, slowly permeable, no coarse fragments, common roots, underlain by clayey sediments.

Type Profile 2: Western part

Dominance: about 50% of soil landscape.

Moderately well-drained, Haplic Eutrophic Brown Dermosols (Minimal Prairie Soils).

No surface gravels.

Depth: 80 cm, rooting depth about 80 cm.

Location: roadside near Currajugle, about 10 km north-west of Wagga Wagga (Map reference: 5 22325*E, 61 18575*N), Soil Data System card 156. Voluntary/native pasture.

Soil Material	Description
Layer 1, A, 0 - 32 cm **kp1**. Dark Silty clay. Field pH 6.0	brownish black (10YR 3/2), fine sandy light clay, moderate pedality, 20 - 50 mm sub-angular blocky breaking to <2 mm crumb peds, rough-faced, firm (dry), coherent, moderately permeable, no coarse fragments, many roots, gradual boundary to—
Layer 2, B, 32-80 cm **kp2**. Yellowish Brown clay. Field pH 6.5.	dull yellowish brown (10YR 5/4), medium clay, moderate pedality, 20 - 50 mm sub-angular blocky breaking to 2 - 5 mm crumb peds, smooth-faced, firm (moist), coherent, slowly permeable, no coarse fragments, common roots, underlain by clayey alluvial sediments.

EPA Contaminated Land Search

Contaminated land

- + Management of contaminated land
- + Consultants and site auditor scheme
- + Underground petroleum storage systems
- Guidelines under the CLM Act
- NEPM amendment
- + Further guidance
- − Record of notices
  - About the record
  - Search the record
  - Search tips
  - Disclaimer
- List of NSW contaminated sites notified to EPA
- Frequently asked questions
- Forms
- + Other contamination issues
- + Contaminated Land Management Program

Home Contaminated land Record of notices

Search results

Your search for: LGA: WAGGA WAGGA CITY COUNCIL

Matched 11 notices relating to 4 sites.

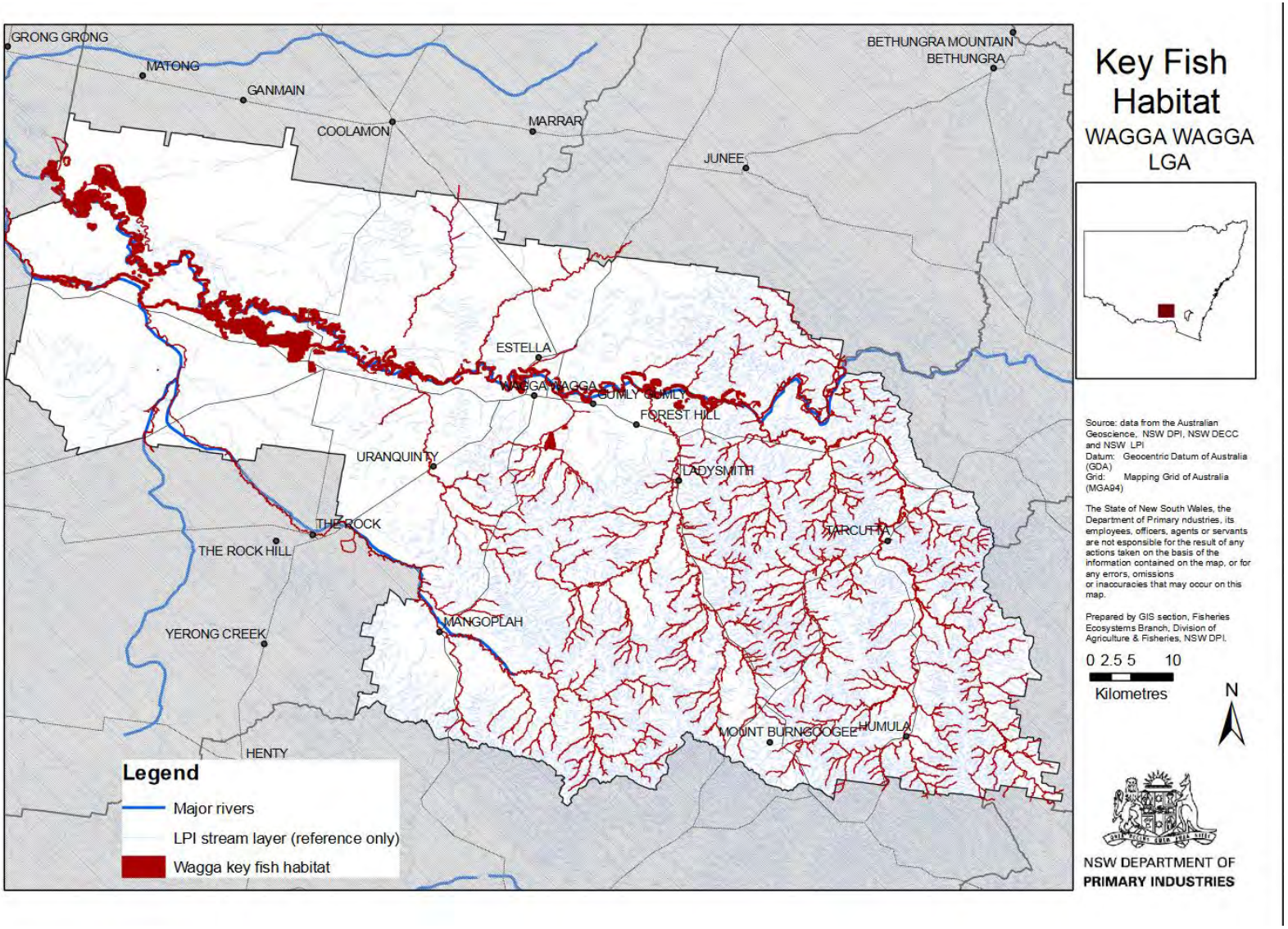
Search Again Refine Search

Suburb	Address	Site Name	Notices related to this site
TARCUTTA	(Hume Highway) 32 Sydney STREET	Mobil Service Station	3 former
WAGGA WAGGA	183 Fitzmaurice STREET	Former Dry Cleaning Facility	2 current
WAGGA WAGGA	54 Chaston STREET	Former Gasworks	1 current and 2 former
WAGGA WAGGA	Cnr Tarcutta Street and Cross STREET	Former Gasworks	2 current and 1 former

Page 1 of 1

18 May 2020

Key Fish Habitat



BioNet Records within 10km radius of the construction footprint

Scientific Name	Common Name
Ninox connivens	Barking Owl
Macrotis lagotis	Bilby
Falco subniger	Black Falcon
Melithreptus gularis	Black-chinned Honeyeater (eastern subspecies)
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Petrogale penicillata	Brush-tailed Rock-wallaby
Burhinus grallarius	Bush Stone-curlew
Ardea ibis	Cattle Egret
Brachyscome muelleroides	Claypan Daisy
Tringa nebularia	Common Greenshank
Calidris ferruginea	Curlew Sandpiper
Stagonopleura guttata	Diamond Firetail
Artamus cyanopterus	Dusky Woodswallow
Petroica phoenicea	Flame Robin
Apus pacificus	Fork-tailed Swift
Stictonetta naevosa	Freckled Duck
Callocephalon fimbriatum	Gang-gang Cockatoo
Pachycephala inornata	Gilbert's Whistler
Calyptorhynchus lathami	Glossy Black-Cockatoo
Plegadis falcinellus	Glossy Ibis
Pomatostomus temporalis	Grey-crowned Babbler (eastern subspecies)
Pteropus poliocephalus	Grey-headed Flying-fox
Melanodryas cucullata	Hooded Robin (south-eastern form)
Vespadelus baverstocki	Inland Forest Bat
Phascolarctos cinereus	Koala
Miniopterus orianae oceanensis	Large Bent-winged Bat
Gallinago hardwickii	Latham's Snipe
Gallinago hardwickii	Latham's Snipe
Hieraaetus morphnoides	Little Eagle
Glossopsitta pusilla	Little Lorikeet
Anseranas semipalmata	Magpie Goose

Lophochroa leadbeateri	Major Mitchell's Cockatoo
Tringa stagnatilis	Marsh Sandpiper
Merops ornatus	Rainbow Bee-eater
Calidris ruficollis	Red-necked Stint
Anthochaera phrygia	Regent Honeyeater
Petroica boodang	Scarlet Robin
Calidris acuminata	Sharp-tailed Sandpiper
Swainsona recta	Small Purple-pea
Myotis macropus	Southern Myotis
Chthonicola sagittata	Speckled Warbler
Circus assimilis	Spotted Harrier
Dasyurus maculatus	Spotted-tailed Quoll
Petaurus norfolcensis	Squirrel Glider
Polytelis swainsonii	Superb Parrot
Lathamus discolor	Swift Parrot
Neophema pulchella	Turquoise Parrot
Daphoenositta chrysoptera	Varied Sittella
Epthianura albifrons	White-fronted Chat
Hirundapus caudacutus	White-throated Needletail
Senecio garlandii	Woolly Ragwort
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat

EPBC Protected Matters Search

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 15/07/20 10:47:36

Coordinates
Buffer: 10.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	25
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	13
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	30
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	600 - 700km upstream
Hattah-kulkyne lakes	400 - 500km upstream
Riverland	500 - 600km upstream
The coorong, and lakes alexandrina and albert wetland	600 - 700km upstream

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Breeding known to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxias rostratus		
Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Crinia sloanei		
Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Austrostipa wakoolica		
[66623]	Endangered	Species or species habitat may occur within area
Caladenia arenaria		
Sand-hill Spider-orchid [9275]	Endangered	Species or species habitat may occur within area
Prasophyllum petilum		
Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Swainsona recta		
Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella		
Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land

[Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Broadcasting Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Commonwealth Bank of Australia
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes
Defence - BLAMEY BARRACKS - KAPOOKA
Defence - RAAF BASE WAGGA
Defence - WAGGA ARES DEPOT ; BLAMEY BKS -WAGGA WAGGA TRG DEP
Defence - WAGGA - WATER BORE SITE AP1
Defence - WAGGA - WATER BORE SITE AP2
Defence - WAGGA - WATER BORE SITE AP3

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.121142 147.387187,-35.121344 147.388453,-35.121344 147.388486,-35.121957 147.388368,-35.121783 147.387048,-35.121142 147.387187

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

IBRA Subregion Threatened Species Profile Search

NSW Department of Planning, Industry and Environment

Home > Topics > Animals and plants > Search for threatened species > Find by region and habitat

Combined geographic and habitat search

Use the form below to submit a search

IBRA	Lower Slopes	*Choose an Interim Biogeographic Regionalisation of Australia region or sub-region*
Habitat Type	Inland Riverine Forests	*Search by habitat type.*
Species Type	All species types	*You can search by all species or by a particular species.*

Search

Matching records: 56 Save to CSV

Click on column headers to sort

IBRA Subregion	Scientific name ▲	Common name	NSW status	Commonweath status	Occurrence	Vegetation class
Lower Slopes	Amphibromus fluitans	Floating Swamp Wallaby-grass	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Anseranas semipalmata	Magpie Goose	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered	Known	Inland Riverine Forests
Lower Slopes	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Austrostipa metatoris	A spear-grass	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Botaurus poiciloptilus	Australasian Bittern	Endangered	Endangered	Known	Inland Riverine Forests
Lower Slopes	Burhinus grallarius	Bush Stone-curlew	Endangered		Known	Inland Riverine Forests
Lower Slopes	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Cercartetus nanus	Eastern Pygmy-possum	Vulnerable		Predicted	Inland Riverine Forests

Lower Slopes	Certhionyx variegatus	Pied Honeyeater	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Chalinolobus picatus	Little Pied Bat	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Chthonicola sagittata	Speckled Warbler	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Circus assimilis	Spotted Harrier	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Crinia sloanei	Sloane's Froglet	Vulnerable	Endangered	Known	Inland Riverine Forests
Lower Slopes	Cullen parvum	Small Scurf-pea	Endangered		Known	Inland Riverine Forests
Lower Slopes	Daphoenositta chrysoptera	Varied Sittella	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered	Known	Inland Riverine Forests
Lower Slopes	Eleocharis obicis	Spike-Rush	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Falco hypoleucos	Grey Falcon	Endangered		Known	Inland Riverine Forests
Lower Slopes	Glossopsitta porphyrocephala	Purple-crowned Lorikeet	Vulnerable		Predicted	Inland Riverine Forests
Lower Slopes	Glossopsitta pusilla	Little Lorikeet	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Goodenia macbarronii	Narrow Goodenia	Not listed		Known	Inland Riverine Forests
Lower Slopes	Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Grus rubicunda	Brolga	Vulnerable		Known	Inland Riverine Forests
Lower	Haliaeetus		Vulnerabl		Known	Inland

Slopes	leucogaster	White-bellied Sea-Eagle	e			Riverine Forests
Lower Slopes	Hamirostra melanosternon	Black-breasted Buzzard	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Hieraaetus morphnoides	Little Eagle	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Lathamus discolor	Swift Parrot	Endangered	Critically Endangered	Known	Inland Riverine Forests
Lower Slopes	Litoria raniformis	Southern Bell Frog	Endangered	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Lophochroa leadbeateri	Major Mitchell's Cockatoo	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Lophoictinia isura	Square-tailed Kite	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Myotis macropus	Southern Myotis	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Neophema pulchella	Turquoise Parrot	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Ninox connivens	Barking Owl	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Pachycephala inornata	Gilbert's Whistler	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Petaurus norfolcensis	Squirrel Glider	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Petaurus norfolcensis - endangered population	Squirrel Glider in the Wagga Wagga Local Government Area	Endangered Population		Known	Inland Riverine Forests
Lower Slopes	Petroica boodang	Scarlet Robin	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Petroica phoenicea	Flame Robin	Vulnerable		Known	Inland Riverine

						Forests
Lower Slopes	Phascolarctos cinereus	Koala	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Pilularia novae-hollandiae	Austral Pillwort	Endangered		Known	Inland Riverine Forests
Lower Slopes	Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable	Known	Inland Riverine Forests
Lower Slopes	Rostratula australis	Australian Painted Snipe	Endangered	Endangered	Known	Inland Riverine Forests
Lower Slopes	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Sminthopsis macroura	Stripe-faced Dunnart	Vulnerable		Predicted	Inland Riverine Forests
Lower Slopes	Stagonopleura guttata	Diamond Firetail	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Stictonetta naevosa	Freckled Duck	Vulnerable		Known	Inland Riverine Forests
Lower Slopes	Tyto novaehollandiae	Masked Owl	Vulnerable		Predicted	Inland Riverine Forests

Australian Heritage Database Search

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)
Handleidon 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 Michael's 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: Thu Jun 25 12:06:51 2020

Search for NSW Heritage

Heritage NSW

Search for NSW Heritage

Return to search page where you can refine/broaden your search.

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 returned 5 records.

Aboriginal place name	Local government area	Local Aboriginal Land Council	Latitude	Longitude	Gazettal date and page numbers	Comments
Bomen Axe Quarry	Wagga Wagga	Wagga Wagga	-35.069613	147.424007	03/23/2012 p. 791	
Bomen Lagoon	Wagga Wagga	Wagga Wagga			06/30/2014 p. 2460	This Aboriginal Place is culturally sensitive. This location is an approximation and the information has been restricted by the Aboriginal Community. For more information about this Aboriginal Place please contact the Heritage Information Management Team via email ahims@environment.nsw.gov.au
Flowerdale Lagoon	Wagga Wagga	Wagga Wagga	-35.110562	147.344205	06/26/2015 p. 1900	
Wiradjuri Reserve and Cobbs Beach	Wagga Wagga	Wagga Wagga	-35.090753	147.361084	07/13/2012 p. 3352	The Wiradjuri Reserve to Cobbs Beach corner of the Murrumbidgee River is an Aboriginal camping and meeting area used from traditional to modern times.
Wollundry Lagoon and Tony Ireland Park	Wagga Wagga	Wagga Wagga	-35.109613	147.369750	06/08/2012 p. 2369-2370	Wollundry Lagoon is important to Aboriginal people for spiritual, historical, social and aesthetic reasons. It is associated with the Dreaming story of the Wawi, a reptile-like spirit residing in and protecting the Lagoon.

Section 2. Items listed under the Heritage Act.

Your search returned 4 records.

Item name	Address	Suburb	LGA	SHR
Bomen Railway Station	Main Southern railway	Bomen	Wagga Wagga	01093
Fambleton Homestead	Tarcutta Street	Tarcutta	Wagga Wagga	00351
Mobile Cook's Galley, Museum of the Riverina	Botanic Gardens Site (BGS) Baden Powell Drive	Wagga Wagga (Museum of the Riverina)	Wagga Wagga	01722
Wagga Wagga Railway Station and yard group	Main Southern railway	Wagga Wagga	Wagga Wagga	01279

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

Your search returned 337 records.

Item name	Address	Suburb	LGA	Information source
2WO Sign	14 Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Ambulance Station	56 Johnston Street	Wagga Wagga	Wagga	LGOV

[illegible]	[illegible] Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
ANZ Bank (former)	44 Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Arajoel Homestead complex	3915 Sturt Highway	Galore	Wagga Wagga	LGOV
Arajoel Siding Grain Silos	M137 Arajoel Sidings	Arajoel	Wagga Wagga	LGOV
Barowell Family Graves	2621 Westbrook Road	Oberne	Wagga Wagga	LGOV
Barters Restaurant	143-147 Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Belfrayden Silos	739 Lockhart Road	Belfrayden	Wagga Wagga	LGOV
Belmore House, Residence	44 Kincaid Street	Wagga Wagga	Wagga Wagga	LGOV
Berry Jerry Homestead	189 Berry Jerry Road	Collingullie	Wagga Wagga	LGOV
Best Family Cemetery	73A Truscott Drive	Ashmont	Wagga Wagga	LGOV
East Street Railway Gatehouse (former)	97 Railway Street	Wagga Wagga	Wagga Wagga	LGOV
Big Springs Homestead and Outbuildings	O'Brien's Creek Road	Big Springs	Wagga Wagga	LGOV
Bishops House	9 Church Street	Wagga Wagga	Wagga Wagga	LGOV
Bomen Railway Station	Dampier Street	Bomen	Wagga Wagga	SGOV
Bomen Railway Station	46 Dampier Street	Bomen	Wagga Wagga	LGOV
Bomen Stationmasters Residence	58 Dampier Street	Bomen	Wagga Wagga	LGOV
Book Book Tennis Courts	12 Mount Flint Road	Book Book	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
Brewery (former)	22-24 The Esplanade	Wagga Wagga	Wagga Wagga	LGOV
Brick Building	65 Fox Street	Wagga Wagga	Wagga Wagga	LGOV
Brucedale Hall and Tennis Courts	Olympic Highway	Brucedale	Wagga Wagga	LGOV
Brucedale Public School (former)	1563 Olympic Highway	Brucedale	Wagga Wagga	LGOV
Bryan J Hamilton Offices (former)	38 Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
Bullenbong Creek Bridge	Sturt Highway	43.7 km west of Wagga	Wagga Wagga	SGOV
Bungarabee	63 Muncarlo Road	Lower Tarcutta	Wagga Wagga	LGOV
Burrandana Hall and Tennis Court	6 Livingston State Forest Road	Burrandana	Wagga Wagga	LGOV
Burrandana School Site and Tennis Court	495 Burrandana Road	Burrandana	Wagga Wagga	LGOV
Burrandana Siding Building	495 Burrandana Road	Burrandana	Wagga Wagga	LGOV
Calvary Hospital and Chapel	22 Lewisham Avenue	Wagga Wagga	Wagga Wagga	LGOV
Canary Island Palm Trees (along the lagoon)	66 Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
CBC Bank (former)	53-55 Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
CBC Bank Building (former)	20 Sydney Street	Tarcutta	Wagga Wagga	LGOV
Charles Sturt University South Campus	College Avenue	Turvey Park	Wagga Wagga	LGOV
Cheney Graves	381 Shockeroo Road	Humula	Wagga Wagga	LGOV
Chinese Clearing Site	188 Mates Gully Road	Tarcutta	Wagga Wagga	LGOV
Christian Brothers High School and Staff Centre (former Monastery)	20 Church Street	Wagga Wagga	Wagga Wagga	LGOV
Church of Our Lady	Tarcutta Street	Lacysmith	Wagga Wagga	LGOV
Civic Precinct	243 Baylis Street	Wagga Wagga	Wagga Wagga	LGOV
Collingullie Hall	14 Urana Street	Collingullie	Wagga Wagga	LGOV

Collingullie Public School - Buildings B00A-B00C and B00E	18 Urana Street	Collingullie	Wagga Wagga	SOOV
Collingullie School	18 Urana Street	Collingullie	Wagga Wagga	LGOV
Collins Park	131 Forsyth Street	Wagga Wagga	Wagga Wagga	LGOV
Concrete Silos	9002 Tumbarumba Road	Ladysmith	Wagga Wagga	LGOV
Corner Store and Residence	105 Forsyth Street	Wagga Wagga	Wagga Wagga	LGOV
Corner Store and Residence	94 Morgan Street	Wagga Wagga	Wagga Wagga	LGOV
Corrugated Iron Cottage	42 Cynthia Street	Tarcutta	Wagga Wagga	LGOV
Corrugated Iron Shop (former)	37 Sydney Street	Tarcutta	Wagga Wagga	LGOV
Cottage	166 Tarcutta Street	Wagga Wagga	Wagga Wagga	LGOV
Cottage and Pise Building	1810 Sturt Highway	Yarragundry	Wagga Wagga	LGOV
Council Chambers (former)	Corner Baylis and Morrow Streets	Wagga Wagga	Wagga Wagga	LGOV
Court House	57 Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Cowell and Saxon Family Graves	22 Cowells Road	Forest Hill	Wagga Wagga	LGOV
Cox Cottage Ruin	O'Brien's Creek Road	Big Springs	Wagga Wagga	LGOV
Cressy Farm	1122 Westby Road	Pulletop	Wagga Wagga	LGOV
Crooyes Club	25 Fitzhardinge Street	Wagga Wagga	Wagga Wagga	LGOV
Currawarna Cemetery	10 Ganmurra Road	Currawarna	Wagga Wagga	LGOV
Currawarna Public School	70 River Street	Currawarna	Wagga Wagga	LGOV
Deepwater Woolshed and Well	5215 Old Narrandera Road	Matong	Wagga Wagga	LGOV
Dellhaven Homestead	53 Wilkinsons Road	Oberne	Wagga Wagga	LGOV
Department of Lands Building	26-28 Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
Dorset Cottage	14 Trail Street	Wagga Wagga	Wagga Wagga	LGOV
Downside Hall and Recreation Ground	58 Downside Village Road	Downside	Wagga Wagga	LGOV
Drill Hall	6 Dobbs Street	Wagga Wagga	Wagga Wagga	LGOV
Electrical Substation	10 The Esplanade	Wagga Wagga	Wagga Wagga	LGOV
Elizabeth Nugent Grave on College Creek	1615 Humula Road	Tarcutta	Wagga Wagga	LGOV
Estella Homestead, Outbuildings and Stables	20 Pine Gully Road	Estella	Wagga Wagga	LGOV
Euberta Community Centre (former school)	1557 Old Narrandera Road	Euberta	Wagga Wagga	LGOV
Euberta Hall, Tennis Courts and Recreation Reserve	Old Narrandera Road	Euberta	Wagga Wagga	LGOV
Eunonyhareenyha Cottage and 1920 Cottage	394 Oura Road	Eunonoreenya	Wagga Wagga	LGOV
Experiment Farm Manager's Residence (former)	280 Pine Gully Road	Charles Sturt University	Wagga Wagga	LGOV
Federation Timber Residency	63 Creek Street	Humula	Wagga Wagga	LGOV
Fire Station Building and Residence (former)	2 The Esplanade	Wagga Wagga	Wagga Wagga	LGOV
Fleetwood and Almond Orchard	O'Briens Creek Road	Maxwell	Wagga Wagga	LGOV
Flowerdale School	552 Flowerdale Road	Flowerdale	Wagga Wagga	LGOV
Former Cemetery	346 Pine Gully Road	Charles Sturt University	Wagga Wagga	LGOV
Former Corner Store	130 Docker Street	Wagga Wagga	Wagga Wagga	LGOV
Former Corner Store	135 Edward Street	Wagga Wagga	Wagga Wagga	LGOV
Former Docker Street Railway Gatehouse	1 Docker Street	Wagga Wagga	Wagga Wagga	LGOV
Former Malebo School	854 Old Narrandara Road	Malebo	Wagga Wagga	LGOV
Former Principal's Residence	Valder Way (off)	Charles Sturt University	Wagga Wagga	LGOV

Galore Hall and Tennis Courts	27 Hall Road	Galore	Wagga Wagga	LGOV
Galore Siding	702 Galore Road	Galore	Wagga Wagga	LGOV
Galvin Graves	24 Oberne-Umbango Road	Oberne	Wagga Wagga	LGOV
Ganawarra	47 Pearson Street	Uranquinty	Wagga Wagga	LGOV
Ganmurra Bridge	Ganmurra Road	Ganmurra	Wagga Wagga	LGOV
General Store and Residence	14 Kyeamba Street	Ladysmith	Wagga Wagga	LGOV
General Store and Residence	43 Cox Street	Mangoplah	Wagga Wagga	LGOV
Gillamagong	371 Wattle Hills Road	Maxwell	Wagga Wagga	LGOV
Glen Eith Park Stables	1310 Lower Middle Road	Kockibitoo	Wagga Wagga	LGOV
Hambleton Homestead	4557 Hume Highway	Tarcutta	Wagga Wagga	LGOV
Hambleton Outbuildings	4557 Hume Highway	Tarcutta	Wagga Wagga	LGOV
Hampden Bridge, The (Timber Truss Bridge)	Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Hareenyha Slab Shed	47 Shepherds Sidings Road	Eunonoreenya	Wagga Wagga	LGOV
Headmaster's Residence (former)	70 Gurwood Street	Wagga Wagga	Wagga Wagga	LGOV
Hill Plain Blacksmiths Shop	1205 Central Island Road	Galore	Wagga Wagga	LGOV
Holy Family Chapel	1555 Olympic Highway	Brucedale	Wagga Wagga	LGOV
Homestead and Shed Complex	5215 Old Narrandera Road	Matong	Wagga Wagga	LGOV
Hopevale	1365 Olympic Highway	Brucedale	Wagga Wagga	LGOV
House	40 Trail Street	Wagga Wagga	Wagga Wagga	LGOV
House and Store (former)	41 Sydney Street	Tarcutta	Wagga Wagga	LGOV
Humula Cemetery	Possum Plains Road	Humula	Wagga Wagga	LGOV
Humula Galvin Tennis Club	73 Creek Street	Humula	Wagga Wagga	LGOV
Humula Post Office	9 Mate Street	Humula	Wagga Wagga	LGOV
Humula Public School	21 School Street	Humula	Wagga Wagga	LGOV
Humula Public School - Buildings B00A and B00B	21 School Street	Humula	Wagga Wagga	LGOV
Humula Recreation Ground and Meeting Room	60 Douglas Street	Humula	Wagga Wagga	LGOV
Humula Recreation Ground Entrance Gates	23 Douglas Street	Humula	Wagga Wagga	LGOV
Humula Station	4 Humula Road	Humula	Wagga Wagga	LGOV
Humula Station Woolshed and Fittings	4 Humula Road	Humula	Wagga Wagga	LGOV
Inflammable Liquid Store	Corner Bent and Cynthia Streets	Tarcutta	Wagga Wagga	LGOV
Inglebrae	394 Ours Road	Eunonoreenya	Wagga Wagga	LGOV
Ivydale Woolshed	83 Ashfords Road	Gregadoo	Wagga Wagga	LGOV
Ivydale Woolshed	10 Ivydale Road	Gregadoo	Wagga Wagga	LGOV
Jersey Harvey's Cottage and Outbuildings	24 Oberne-Umbango Road	Oberne	Wagga Wagga	LGOV
Kapooka Railway Bridge	Olympic Highway	Kapooka	Wagga Wagga	LGOV
Kittegora School Site	Millwood Road	Tocyal	Wagga Wagga	LGOV
Knox Union Church	4 Pulletop Road	Pulletop	Wagga Wagga	LGOV
Kockibitoo School (former)	M65	Kockibitoo	Wagga Wagga	LGOV
Kooringal Stables and Woolshed (former)	527 Kooringal Road	Kooringal	Wagga Wagga	LGOV
Kumonin	1270 The Rock Road	Mangoplah	Wagga Wagga	LGOV
Kurralong Woolshed and Shearers' Quarters	47 Shepherds Sidings Road	Eunonoreenya	Wagga Wagga	LGOV

Kyeamba Police Residence and Angels Residence	7307 Hume Highway	Kyeamba	Wagga Wagga	LGOV
Kyeamba Shire and Mitchell Shire Office Buildings (former)	30-34 Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
Kyeamba South Homestead	7460 Lake Albert Road	Kyeamba	Wagga Wagga	LGOV
Kyeamba Station	7754 Hume Highway	Kyeamba	Wagga Wagga	LGOV
Ladysmith Memorial Hall	31 Kyeamba Street	Ladysmith	Wagga Wagga	LGOV
Ladysmith Public School - Buildings B00A and B00B	3 Tywong Street	Ladysmith	Wagga Wagga	SOOV
Ladysmith Railway Precinct		Ladysmith	Wagga Wagga	SOOV
Liquid Explosives Store	88 Hanging Rock Road	Uranquinty	Wagga Wagga	LGOV
Little Sandy Creek Slab Cottage and Woolshed	O'Briens Creek Road	Maxwell	Wagga Wagga	LGOV
Livingstone Gully School (former)	1310 Pulletop Road	Big Springs	Wagga Wagga	LGOV
Lothlorien	36 Kyeamba Street	Ladysmith	Wagga Wagga	LGOV
Lower Tarcutta Cemetery	63 Muncarlo Road	Lower Tarcutta	Wagga Wagga	LGOV
Lower Tarcutta Settlement Site	63 Muncarlo Road	Lower Tarcutta	Wagga Wagga	LGOV
Mangain Reserve Shooting Range	452 Rands Tank Road	Mangain	Wagga Wagga	LGOV
Mangoplah Hall	16 Kyeamba Street	Mangoplah	Wagga Wagga	LGOV
Mangoplah Hotel	39 Baylis Street	Mangoplah	Wagga Wagga	LGOV
Mangoplah Public School	41 Kyeamba Street	Mangoplah	Wagga Wagga	LGOV
Mangoplah Silos and Siding Store Shed	61 Darlow Street	Mangoplah	Wagga Wagga	LGOV
Mangoplah Station Complex	21 Darlow Street	Mangoplah	Wagga Wagga	LGOV
Memorial Avenue	Pearson Street	Uranquinty	Wagga Wagga	LGOV
Methodist Church (former)	36 Kyeamba Street	Ladysmith	Wagga Wagga	LGOV
Moorong Station Ruins	230 Roach Road	Moorong	Wagga Wagga	LGOV
Moreton Bay Fig	1942 The Gap Road	The Gap	Wagga Wagga	LGOV
Mount Austin Homestead (former)	22 Warranga Avenue	Mount Austin	Wagga Wagga	LGOV
Mt Erin Convent School and Chapel	Edmonson Street	Turvey Park	Wagga Wagga	LGOV
Munowy Bridge	Main Road 543	9.3 km north of Collingullie	Wagga Wagga	SOOV
Murrumbidgee Milling Company Flour Mill (former) and Outbuildings	90-82 Edward Street	Wagga Wagga	Wagga Wagga	LGOV
North Wagga Primary School	Hampden Avenue	North Wagga Wagga	Wagga Wagga	LGOV
North Wagga Public School - Buildings B00A-B00C, B00E and B00F	54 Hampden Avenue	Wagga Wagga	Wagga Wagga	SOOV
North Wagga Wagga Hall	76 Hampden Avenue	North Wagga Wagga	Wagga Wagga	LGOV
Nugent Fences	130 Nugents Road	Umbango	Wagga Wagga	LGOV
Nurmjalli Park	874 Oura Road	Euhonoreenya	Wagga Wagga	LGOV
Oberne Hall	2449 Westbrook Road	Oberne	Wagga Wagga	LGOV
Oberne House Ruin	2621 Westbrook Road	Oberne	Wagga Wagga	LGOV
Oberne Tennis Courts and School Site	Westbrook Road	Oberne	Wagga Wagga	LGOV
Old Borambola	70 Brunskills Lane	Borambola	Wagga Wagga	LGOV
Old Carmsley	314 Old Station Road	Pearson	Wagga Wagga	LGOV
Old Glenfiore Homestead and Outbuildings	3186 Sturt Highway	Alfredtown	Wagga Wagga	LGOV
Olive trees	85 Coolamon Road	Charles Sturt University	Wagga Wagga	LGOV
Oura Station Homestead	2052 Oura Road	Oura	Wagga Wagga	LGOV
Palm Tree Avenue	Peter Street	Wagga Wagga	Wagga	LGOV

			Wagga	
Pine Ridge Cottage	491 Poiles Road	Brucedale	Wagga Wagga	LGOV
Pine Tree and Fence Post	38 Bristol Street	Collingullie	Wagga Wagga	LGOV
Plaza Theatre	161-169 Baylis Street	Wagga Wagga	Wagga Wagga	LGOV
Police Station	10-20 Sturt Street	Wagga Wagga	Wagga Wagga	LGOV
Police Station (former)	52 Hampden Avenue	North Wagga Wagga	Wagga Wagga	LGOV
Pomingalarna	932 Sturt Highway	Yarragundry	Wagga Wagga	LGOV
Port Phillip Road (south of Kyeamba Station)	7154 Hume Highway	Kyeamba	Wagga Wagga	LGOV
Post Office (former)	49-51 Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Post Office (former)	28 Sydney Street	Tarcutta	Wagga Wagga	LGOV
Public school	3 Tywong Street	Ladysmith	Wagga Wagga	LGOV
Pulletop Station Manager's Cottage (former Chapel)	168 Burrandana Road	Pulletop	Wagga Wagga	LGOV
Racecourse Group of Buildings	Moorong Street	Wagga Wagga	Wagga Wagga	LGOV
Railway bridge	Near Carabost Road and Humula Eight Mile Road	Humula	Wagga Wagga	LGOV
Railway Station, Shed, Points and Siding	Cunningdroo Street	Ladysmith	Wagga Wagga	LGOV
Rathmount	The Gap Road	Malebo	Wagga Wagga	LGOV
Remains of Adelaide Road (former)	63 Muncorlo Road	Lower Tarcutta	Wagga Wagga	LGOV
Residence	259 Lake Albert Road	Kooringal	Wagga Wagga	LGOV
Residence	32 Hampden Avenue	North Wagga Wagga	Wagga Wagga	LGOV
Residence	21 Gardiner Street	North Wagga Wagga	Wagga Wagga	LGOV
Residence	96 Gardiner Street	North Wagga Wagga	Wagga Wagga	LGOV
Residence	1 Inglis Street	Lake Albert	Wagga Wagga	LGOV
Residence	103 Main Street	Lake Albert	Wagga Wagga	LGOV
Residence	59 Graham Street	Lake Albert	Wagga Wagga	LGOV
Residence	42-44 Graham Street	Lake Albert	Wagga Wagga	LGOV
Residence	5 Colong Place	Kooringal	Wagga Wagga	LGOV
Residence	17 Craft Street	Lake Albert	Wagga Wagga	LGOV
Residence	16 The Esplanade	Wagga Wagga	Wagga Wagga	LGOV
Residence	4 Morrow Street	Wagga Wagga	Wagga Wagga	LGOV
Residence	77 Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
Residence	79 Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
Residence	201 Tarcutta Street	Wagga Wagga	Wagga Wagga	LGOV
Residence	48 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Residence	136 Docker Street	Wagga Wagga	Wagga Wagga	LGOV
Residence	108 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Residence	7 Grandview Avenue	Turvey Park	Wagga Wagga	LGOV
Residence	20 Docker Street	Wagga Wagga	Wagga Wagga	LGOV
Residence	48 Trail Street	Wagga Wagga	Wagga Wagga	LGOV
Residence	93 Bourke Street	Turvey Park	Wagga Wagga	LGOV
Residence	7 Beauty Point Avenue	Wagga Wagga	Wagga Wagga	LGOV
Residence	19 Beauty Point Avenue	Wagga Wagga	Wagga Wagga	LGOV
Residence	80 Macleay Street	Turvey Park	Wagga	LGOV

			Wagga	
Residence	50 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Residence	52 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Residence	54 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Residence	46 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Residence	2 Macleay Street	Turvey Park	Wagga Wagga	LGOV
Residence	100 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Residence - Moonolana	103 Fox Street	Wagga Wagga	Wagga Wagga	LGOV
Residence (former Home of Compassion)	109 Fox Street	Wagga Wagga	Wagga Wagga	LGOV
Residence (former)	102 Peter Street	Wagga Wagga	Wagga Wagga	LGOV
Residence (former)	64 Tompson Street	Wagga Wagga	Wagga Wagga	LGOV
Residence (former)	20 Simmons Street	Wagga Wagga	Wagga Wagga	LGOV
Residential Flats - Wilstone Court	40 Fitzhardinge Street	Wagga Wagga	Wagga Wagga	LGOV
Riverine Club	231 Tarcutta Street	Wagga Wagga	Wagga Wagga	LGOV
Robertson Oval Gates and Ticket Boxes	2 Morgan Street	Wagga Wagga	Wagga Wagga	LGOV
Roman Catholic Church	5 Leitch Street	Collingullie	Wagga Wagga	LGOV
Rowan dwelling	6910 Holbrook Road	Wagga Wagga	Wagga Wagga	LGOV
School Residence (former)	2021 Kesjura Road	Ladysmith	Wagga Wagga	LGOV
Scots Church	2A Alfred Street	Gura	Wagga Wagga	LGOV
Scots Uniting Church	50 Kyeemba Street	Mangoplah	Wagga Wagga	LGOV
Semi-detached Residence	1-3 Beckwith Street	Wagga Wagga	Wagga Wagga	LGOV
Shepherds Concrete Silos	636 Shepherds Sidings Road	Shepherds Siding	Wagga Wagga	LGOV
Shockeroo Homestead	Shockeroo Road	Humula	Wagga Wagga	LGOV
Shops	9-11 Gurwood Street	Wagga Wagga	Wagga Wagga	LGOV
Slab Cottage	39 Cynthia Street	Tarcutta	Wagga Wagga	LGOV
South Wagga Public School	140 Edward Street	Wagga Wagga	Wagga Wagga	SGOV
South Wagga Public School	140 Edward Street	Wagga Wagga	Wagga Wagga	LGOV
South Wagga Public School - Building 600F	140 Edward Street	Wagga Wagga	Wagga Wagga	SGOV
South Wagga Tennis Club	40 Oates Avenue	Wagga Wagga	Wagga Wagga	LGOV
Springfield	51 East Road	North Wagga Wagga	Wagga Wagga	LGOV
St Albans Lucas Memorial Church	Westbrook Road	Westbrook	Wagga Wagga	LGOV
St Andrew's Manse	5 Church Street	Wagga Wagga	Wagga Wagga	LGOV
St Andrew's Presbyterian Church	7 Cross Street	Wagga Wagga	Wagga Wagga	LGOV
St Columba's Presbyterian Church	31 Argent Street	Tarcutta	Wagga Wagga	LGOV
St Cuthbert's Church of England Church	6 O'Connor Street	Uranquinty	Wagga Wagga	LGOV
St Francis Xavier Roman Catholic Church	39 Sydney Street	Tarcutta	Wagga Wagga	LGOV
St John's Anglican Church	Church Street	Wagga Wagga	Wagga Wagga	LGOV
St Margaret's Uniting Church	Corner Leitch Street and McDonnell Street	Collingullie	Wagga Wagga	LGOV
St Mary's Anglican Church and Hall	15 William Street	North Wagga Wagga	Wagga Wagga	LGOV
St Michael Archangels Roman Catholic Church	40 Kane Street	Mangoplah	Wagga Wagga	LGOV
St Michael's Presbytery	9 Church Street	Wagga Wagga	Wagga Wagga	LGOV
St Michael's Roman Catholic Cathedral	10 Johnston Street	Wagga Wagga	Wagga	LGOV

[illegible]	[illegible]	[illegible]	Wagga Wagga	LGOV
St Ninian's Church	16 Pioneer Avenue	Gumly Gumly	Wagga Wagga	LGOV
St Patrick's Former Catholic Church	22 Morgan Street	Uranquinty	Wagga Wagga	LGOV
St Peter's Anglican Church (former)	109 Main Street	Lake Albert	Wagga Wagga	LGOV
St Saviour's Anglican Church	2005 Kea'ura Road	Ladysmith	Wagga Wagga	LGOV
St Stephen's Uniting Church	98 Coursing Park Road	Downside	Wagga Wagga	LGOV
St Therese Roman Catholic Church	43 Mate Street	Humula	Wagga Wagga	LGOV
Stationmaster's Residence (former)	14 Station Place	Wagga Wagga	Wagga Wagga	LGOV
Stationmaster's Residence (former)	45 Abbots lane	Ladysmith	Wagga Wagga	LGOV
Stone Culvert	63 Mundarlo Road	Lower Tarcutta	Wagga Wagga	LGOV
Stone Ruin	1149 Gregadoo East Road	Gregadoo	Wagga Wagga	LGOV
Stone Ruin	Westby Road (near Nauroy)	Westby	Wagga Wagga	LGOV
Store (former) and Residence	37 Cox Street	Mangoplah	Wagga Wagga	LGOV
Street Directory and Palm Trees	Adjacent to Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Tarcutta Hotel	4504 Hume Highway	Tarcutta	Wagga Wagga	LGOV
Tarcutta House	2438 Humula Road	Tarcutta	Wagga Wagga	LGOV
Tarcutta Inn (former)	28 Mates Gully Road	Tarcutta	Wagga Wagga	LGOV
Tarcutta Memorial Hall	26 Sydney Street	Tarcutta	Wagga Wagga	LGOV
Tarcutta Railway Station Complex	2421 Humula Road	Tarcutta	Wagga Wagga	LGOV
Tarcutta Railway Station Complex Shop (former)	2421 Humula Road	Tarcutta	Wagga Wagga	LGOV
Tarcutta Remnant Railway Items (lamp room and gantry crane)	Hume Highway	Tarcutta	Wagga Wagga	SGOV
Tarcutta School Residence	31 Gresham Street (south end)	Tarcutta	Wagga Wagga	LGOV
Tarcutta Store	24 Sydney Street	Tarcutta	Wagga Wagga	LGOV
Tarra Windee and Outbuildings	1285 Mates Gully Road	Borambola	Wagga Wagga	LGOV
Temora Courthouse	De Boos Street	Temora	Wagga Wagga	SGOV
Tennis Courts	7831 Highway	Kea'ura	Wagga Wagga	LGOV
Tennis Courts and Bredden Sportsground	17 Hay Street	Tarcutta	Wagga Wagga	LGOV
Tennis Courts and Clubhouse	1446 Sturt Highway	Borambola	Wagga Wagga	LGOV
Terrace Building	106-110 Tompson Street	Wagga Wagga	Wagga Wagga	LGOV
The Gap Hall Site 7 Tennis Courts	The Gap Road	The Gap	Wagga Wagga	LGOV
The Hampden Bridge (Timber Truss Bridge)	199 Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
The Manor	38 Morrow Street	Wagga Wagga	Wagga Wagga	LGOV
The Mill House	153 Hampden Avenue	North Wagga Wagga	Wagga Wagga	LGOV
The Gremy	3018 Sturt Highway	Alfredtown	Wagga Wagga	LGOV
Timber and Slab Building on Riverside	199 Boytons Road	Euberta	Wagga Wagga	LGOV
Timber Bridge	Via 2356 Sturt Highway (Beevers Island Creek)	Collingullie	Wagga Wagga	LGOV
Timber Railway Bridge	396 Brunskills Road	Forest Hill	Wagga Wagga	LGOV
Tobacco Kiln	133 McNickle Road	Moorong	Wagga Wagga	LGOV
Toonga Homestead	3 Lower Tarcutta Road	Tarcutta	Wagga Wagga	LGOV
Toonga Shearers' Quarters	3 Lower Tarcutta Road	Tarcutta	Wagga Wagga	LGOV
Trinity Lutheran Church	48 O'Connor Street	Uranquinty	Wagga Wagga	LGOV

Union Church	53 Mate Street	Humula	Wagga Wagga	LGOV
Union Club Hotel	122-124 Baylis Street	Wagga Wagga	Wagga Wagga	LGOV
Uranquinty Cemetery	Lugsdin Road	Uranquinty	Wagga Wagga	LGOV
Uranquinty General Store	26 Morgan Street	Uranquinty	Wagga Wagga	LGOV
Uranquinty General Store Post Boxes	26 Morgan Street	Uranquinty	Wagga Wagga	LGOV
Uranquinty Hall	55-57 Pearson Street	Uranquinty	Wagga Wagga	LGOV
Uranquinty Hotel	30 Morgan Street	Uranquinty	Wagga Wagga	LGOV
Uranquinty Public School - Building B00A	25 Uranquintry Street	Uranquinty	Wagga Wagga	SGOV
Uranquinty School	Corner Pearson and Uranquinty Streets	Uranquinty	Wagga Wagga	LGOV
Uranquinty Silos	Pearson Street	Uranquinty	Wagga Wagga	LGOV
Victory Memorial Gardens	Corner Baylis and Morrow Streets	Wagga Wagga	Wagga Wagga	LGOV
Wagga Wagga (521.7 Km) Footbridge	521.7km Cassidy Pde & Brookong Ave	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Agricultural Institute	Pine Gully Road	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Ambulance Station	Johnston Street	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Base Hospital	Edward Street	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Base Hospital (c1960 building)	Edward Street	Wagga Wagga	Wagga Wagga	LGOV
Wagga Wagga Conservation Area		Wagga Wagga	Wagga Wagga	LGOV
Wagga Wagga Court House	Fitzmaurice Street	Wagga Wagga	Wagga Wagga	LGOV
Wagga Wagga Courthouse	Fitzmaurice Street	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Fire Station	36-38 The Esplanade	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga General Cemetery	380 Kooringal Road	Kooringal	Wagga Wagga	LGOV
Wagga Wagga High School - Building B00B	36 Coleman Street	Turvey Park	Wagga Wagga	SGOV
Wagga Wagga High School (1917-1930s building)	36 Coleman Street	Turvey Park	Wagga Wagga	LGOV
Wagga Wagga Police Station and Office (Former)	2-6 Sturt Street	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Public School	70 Gurwood Street	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Public School - Buildings B00A-B00E and B001	70 Gurwood Street	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Railway Precinct	Station Place	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Railway Precinct	Station Place	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Railway Station and Yard Group	20 Station Place	Wagga Wagga	Wagga Wagga	LGOV
Wagga Wagga Showground, Kyeamba Smith Hall and Grandstand	26 Bourke Street	Turvey Park	Wagga Wagga	LGOV
Wagga Wagga Viaducts	Across Murrumbidgee Flood Plain	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga Zone Substation	10-14 The Esplanade	Wagga Wagga	Wagga Wagga	SGOV
Wagga Wagga, Tarcutta Street Underbridge	520.157km Main Southern Railway	Wagga Wagga	Wagga Wagga	SGOV
Wagga Waterworks	89 Hammond Avenue	Wagga Wagga	Wagga Wagga	LGOV
Waginguberembee Graves	Central Island Road	Galore	Wagga Wagga	LGOV
Waginguberembee Log Shed	Central Island Road	Galore	Wagga Wagga	LGOV
Wandoo Stone Cottage	35 Thompsons Road	Pulletop	Wagga Wagga	LGOV
Water trough	Opposite 132 Forsyth Street	Wagga Wagga	Wagga Wagga	LGOV
Wattle Vale	45 Cootamin Street	Cartwright's Hill	Wagga Wagga	LGOV
Wesley Uniting Church	17 Johnston Street	Wagga Wagga	Wagga Wagga	LGOV
Westbrook PMG Building	110 Westbrook Road	Westbrook	Wagga Wagga	LGOV

Westby Railway Station and Turntable Site	Westby Road	Westby	Wagga Wagga	LGOV
William John Nugent Grave (relocated)	130 Nugents Road	Umbango	Wagga Wagga	LGOV
Wingole Yards	Westby Road	Westby	Wagga Wagga	LGOV
Wise Grave	449 Uranquinty and Cross Road	Uranquinty	Wagga Wagga	LGOV
Wooden Gate (Umbango Village)	130 Nugents Road	Umbango	Wagga Wagga	LGOV
Wyborn Grave Site	South Boundary Road	Pearson	Wagga Wagga	LGOV
Wynyard Woolshed	117 Lower Tarcutta Road	Tarcutta	Wagga Wagga	LGOV
Yarragundry School (former)	1431 Sturt Highway	Yarragundry	Wagga Wagga	LGOV

Wagga Wagga LEP 2010

NSW legislation

Wagga Wagga Local Environmental Plan 2010

Current version for 28 October 2020 to date (accessed 11 November 2020 at 14:46)

Schedule 5

Schedule 5 Environmental heritage

(Clause 5.10)

Part 1 Heritage items

Suburb	Item name	Address	Property description	Significance	Item No
Alfredtown	The Shanty	3016 Sturt Highway	Lot 2, DP 531706	Local	I2
Alfredtown	Old Glandore Homestead and Outbuildings	3023 Sturt Highway	Lot 2, DP 835777	Local	I1
Ashmont	Best Family Cemetery	73A Truscott Drive	Lot 167, DP 825281	Local	I3
Belfrayden	Belfrayden Silos	739 Lockhart Road	Lot 1, DP 819502	Local	I4
Big Springs	Cox Cottage Ruin	198 Flakney Road	Lot 11, DP 1057436	Local	I6
Big Springs	Big Springs Homestead and Outbuildings	54 O'Brien's Creek Road	Lot 2, DP 757261	Local	I5
Big Springs	Livingstone Gully School (former)	1310 Pulletop Road	Lot 1, DP 203140	Local	I7
Bomen	Bomen Railway Station	46 Dampier Street	Lot 3, DP 852602	State	I8
Bomen	Bomen Stationmaster's Residence	58 Dampier Street	Lot 1, DP 830096	Local	I9
Book Book	Book Book Tennis Courts	Tumbarumba Road	Lot 7006, DP 1058218	Local	I10
Borambola	Old Borambola	70 Brunskills Lane	Part Lot 1, DP 757218	Local	I16
Borambola	Tarra Wingee and Outbuildings	1285 Mates Gully Road	Lot 2, DP 1088773	Local	I11
Borambola	Borambola Park Outbuildings	Sturt Highway	Lot 693, DP 1169738	Local	I14
Borambola	Tennis Courts and Clubhouse	Sturt Highway	Lot 7003, DP 1068582	Local	I17
Borambola	Borambola Woolshed	1708 Sturt Highway	Lot 117, DP 45408	Local	I15
Borambola	Borambola, dwelling	1734 Sturt Highway	Lot 115, DP 257415	Local	I12

Brucedale	Brucedale Hall and Tennis Courts	Olympic Highway	Lot 12, DP 751422; Lot 7003, DP 1068668	Local	I23
Brucedale	Hopevale	1365 Olympic Highway	Lot 1, DP 747583	Local	I26
Brucedale	Holy Family Chapel	1555 Olympic Highway	Lot 431, DP 751422	Local	I25
Brucedale	Brucedale Public School (former)	1563 Olympic Highway	Lot 433, DP 751422	Local	I24
Brucedale	Pine Ridge Cottage	491 Poiles Road	Lot 385, DP 751422	Local	I27
Brucedale	Shepherds Concrete Silos	636 Shepherds Sidings Road	Lot 1, DP 819688	Local	I28
Burrandana	Burrandana Siding Building	495 Burrandana Road	Lot 1, DP 195092	Local	I29
Burrandana	Burrandana Hall and Tennis Court	6 Livingston State Forest Road	Lots 34 and 54, DP 754544	Local	I30
Burrandana	Burrandana School Site and Tennis Court	67 Paper Forest Road	Lot 107, DP 1168355	Local	I302
Cartwright's Hill	Wattle Vale	45 Cootamin Street	Lot 1, DP 731371	Local	I31
Charles Sturt University	Olive trees	85 Coolamon Road	Lot 5, DP 878214	Local	I34
Charles Sturt University	Experiment Farm Manager's Residence (former)	286 Pine Gully Road	Lot 167, DP 46875	Local	I35
Charles Sturt University	Former Cannery	345 Pine Gully Road	Lot 157, DP 39925	Local	I33
Charles Sturt University	Principal's Residence (former), Riverina Murray Institute of Higher Education, Cobb Elevator and Granary Building Foundations	345 Pine Gully Road	Lot 153, DP 751407	Local	I32
Collingullie	Berry Jerry Homestead	189 Berry Jerry Road	Lot 2, DP 75537	Local	I36
Collingullie	Pine Tree and Fence Post	38 Bristol Street	Lot 20, DP 843207	Local	I43
Collingullie	Roman Catholic Church	5 Leitch Street	Lot 6, Section 1, DP 758265	Local	I37
Collingullie	St Margaret's Uniting Church	1 McDonnell Street	Lot 1, Section 3, DP 758265	Local	I38
Collingullie	Yarragundry Woolshed	1988 Sturt Highway	Lot 34, DP 754573	Local	I39
Collingullie	Timber Bridge	Via 2356 Sturt Highway	Beavers Island Creek adjacent to, and including, Lot 1, DP 1127086	Local	I307
Collingullie	Collingullie Hall	14 Urana Street	Lot 1, Section 1, DP 758265	Local	I41
Collingullie	Collingullie School	18 Urana Street	Lot 116, DP 754561	Local	I42

Currawarna	Currawarna Cemetery	10 Gammurra Road	Lot 7002, DP 1072084	Local	I45
Currawarna	Currawarna Public School	70 River Street	Lot 54, DP 750832	Local	I44
Downside	St Stephen's Presbyterian Church	98 Downside Road	Lot 68, DP 751400	Local	I47
Downside	Downside Hall and Recreation Ground	58 Downside Village Road	Lots 1 and 113, DP 751400	Local	I46
Estella	Estella Homestead, Outbuildings and Stables	20 Pine Gully Road	Lot 1, DP 1048294	Local	I48
Euberta	Timber and Slab Building on Riverslie	199 Boytons Road	Lot 172, DP 750863	Local	I49
Euberta	Rathmoun	391 Cobdens Road	Lot 104, DP 750863	Local	I52
Euberta	Former Malebo School	854 Old Narrandera Road	Lot 122, DP 750863	Local	I53
Euberta	Euberta Hall, Tennis Courts and Recreation Reserve	1543 and 1557 Old Narrandera Road	Lots 217 and 218, DP 750863	Local	I51
Euberta	Euberta Community Centre (former school)	1557 Old Narrandera Road	Lot 210, DP 750863	Local	I50
Eunonoreenya	Eunonyhareenyha Cottage and 1920 Cottage	394 Oura Road	Lot 4, DP 614940	Local	I57
Eunonoreenya	Numeralla Park	874 Oura Road	Lot 13, DP 751405	Local	I58
Eunonoreenya	Inglobrae	158 Pattersons Road	Lot 1, DP 235712	Local	I56
Eunonoreenya	Hareenyha Slab Shed	47 Shepherds Sidings Road	Part Lot 1, DP 1091030	Local	I55
Eunonoreenya	Kurrajong Woolshed and Shearers' Quarters	47 Shepherds Sidings Road	Part Lot 1, DP 937663	Local	I54
Forest Hill	Cowell and Saxon Family Graves	22 Cowells Road	Lot 1, DP 576221	Local	I59
Forest Hill	Timber Railway Bridge	28 O'Hehirs Road	Lot 1, DP 950921	Local	I60
Galore	Arajoel Siding Grain Silos	M137 Arajoel Sidings	Lot 1, DP 819503	Local	I61
Galore	Wagingoberembee Graves	1152 Central Island Road	Lot 1, DP 754569	Local	I63
Galore	Wagingoberembee Log Shed	1152 Central Island Road	Lot 1, DP 754569	Local	I305
Galore	Hill Plain Blacksmith's Shop	1205 Central Island Road	Lot 59, DP 754569	Local	I62
Galore	Galore Siding	Galore Road	Lot 1, DP 1123718	Local	I65
Galore	Galore Hall and Tennis Courts	19 and 27 Hall Road	Lot 1, Section 4, DP 758427; Lot 701, DP 1024143	Local	I66
Galore	Glen Eith Park Stables	1010 Lower Middle Road	Part Lot 51, DP 750848	Local	I68

Galore	Kockibitoo School (former)	M65	Lot 36, DP 750848	Local	I69
Galore	Arajoel Homestead complex	4915 Sturt Highway	Lot 2, DP 1123786	Local	I67
Gannurra	Gannurra Bridge	Gannurra Road	Adjacent to Lot 1, DP 186535	Local	I306
Gregadoo	Stone Ruin	1149 Gregadoo East Road	Lot 1, DP 806259	Local	I71
Gregadoo	Ivydale Woolshed	9 Ivydale Road	Lot 66, DP 757231	Local	I73
Gregadoo	Ivydale	10 Ivydale Road	Lot 2, DP 333046	Local	I72
Gumly Gumly	St Ninian's Church	16 Pioneer Avenue	Lot 256, DP 757232	Local	I74
Humula	Railway Bridge	Near Carabost Road and Humula Eight Mile Road	Lot 3043, DP 1183659; Lot 1, DP 166695	Local	I124
Humula	Humula Recreation Ground Entrance Gates	Creek Street	Lot 76, DP 757235	Local	I123
Humula	Federation Timber Residence	68 Creek Street	Lot 6, Section 1, DP 758529	Local	I121
Humula	Humula Recreation Ground and Meeting Room	60 Douglas Street	Lot 76, DP 757235	Local	I122
Humula	Humula Station	4 Humula Road	Lot 15, DP 726206	Local	I125
Humula	Humula Station Woolshed and Fittings	4 Humula Road	Lot 15, DP 726206	Local	I308
Humula	Humula Galvin Tennis Club	5 Mate Street	Lots 7 and 8, Section 14, DP 758529	Local	I131
Humula	Humula Post Office	9 Mate Street	Lot 3, Section 14, DP 758529	Local	I127
Humula	St Therese Roman Catholic Church	43 Mate Street	Lot 6, Section 2, DP 758529	Local	I128
Humula	Union Church	53 Mate Street	Lot 3, Section 2, DP 758529	Local	I129
Humula	Humula Cemetery	Possum Plains Road	Lot 7304, DP 1155808	Local	I130
Humula	Humula Public School	21 School Street	Lot 1, DP 1027883	Local	I132
Humula	Shockeroo Homestead	Shockeroo Road	Lot 3, DP 1085916	Local	I134
Humula	Cheney Graves	301 Shockeroo Road	Lot 2, DP 1085916	Local	I133
Kapooka	Kapooka Railway Bridge	Olympic Highway	Road reserve, adjacent to Lot 1, DP 91552	Local	I138
Keajura	Tennis Courts	Hume Highway	Lot 7003, DP 1125974	Local	I190
Kooringal	Residence	5 Colong Place	Lot 20, DP 209543	Local	I220
Kooringal	Wagga Wagga General Cemetery	Kooringal Road	Lot 7043, DP 1029402	Local	I221
Kooringal	Kooringal Stables and Woolshed (former)	509 and 527 Kooringal Road	Lot 1, DP 160155; Lot 7, DP 806826	Local	I222

Kooringal	Residence	259 Lake Albert Road	Lot 1, DP 223331	Local	I223
Kyeamba	Kyeamba Station	7154 Hume Highway	Lot 10, DP 1021587	Local	I141
Kyeamba	Port Phillip Road (south of Kyeamba Station)	7154 Hume Highway	Lot 3, DP 757238	Local	I142
Kyeamba	Kyeamba Angel's Residence	7205 Hume Highway	Lot 66, DP 757243	Local	I139
Kyeamba	Kyeamba South Homestead	7460 Hume Highway	Lot 1, DP 1120589	Local	I140
Kyeamba	Wandoo Stone Cottage	35 Thompsons Road	Part Lot 26, DP 754570; Lot 1, DP 981533	Local	I185
Ladysmith	Railway Station, Shed, Points and Siding	Cunningdroo Street	Lot 2, DP 819851	Local	I150
Ladysmith	Methodist Church	14 Cunningdroo Street	Lot 6, Section 5, DP 758593	Local	I152
Ladysmith	Stationmaster's Residence (former)	55 Cunningdroo Street	Lot 1, DP 611752	Local	I145
Ladysmith	St Saviour's Anglican Church	2021 Keajura Road	Lot 153, DP 757253	Local	I146
Ladysmith	School Residence (former)	2031 Keajura Road	Part Lot 95, DP 757253	Local	I147
Ladysmith	General Store and Residence	14 Kyeamba Street	Lot 1, Section 4, DP 758593	Local	I148
Ladysmith	Ladysmith Memorial Hall	30 Kyeamba Street	Lot 4, Section 3, DP 758593	Local	I149
Ladysmith	Lothlorien	36 Kyeamba Street	Lot 10, Section 2, DP 758593	Local	I151
Ladysmith	Church of Our Lady	Tarcutta Street	Lot 1, DP 961685	Local	I144
Ladysmith	Concrete Silos	9002 Tumbarumba Road	Lot 1, DP 819851	Local	I143
Ladysmith	Public School	Tywong Street	Lot 180, DP 757253	Local	I153
Lake Albert	Residence	17 Craft Street	Lot 2, DP 286377	Local	I224
Lake Albert	Residence	42–44 Graham Street	Lot 12, Section 2, DP 758594	Local	I227
Lake Albert	Residence	59 Graham Street	Lot 52, DP 828996	Local	I225
Lake Albert	Residence	1 Inglis Street	Lot 1, DP 827536	Local	I226
Lake Albert	Residence	103 Main Street	Lot 2, DP 593664	Local	I228
Lake Albert	St Peter's Anglican Church (former)	109 Main Street	Lot 3, Section 1, DP 758594	Local	I229
Lower Tarcutta	Bungarabee	63 Mundarlo Road	Lot 1, DP 712460	Local	I18
Lower Tarcutta	Lower Tarcutta Cemetery	63 Mundarlo Road	Lot 145, DP 727789	Local	I21

Lower Tarcutta	Lower Tarcutta Settlement Site	63 Mundarlo Road	Lot 1, DP 712460	Local	I19
Lower Tarcutta	Remains of Adelaide Road (former)	63 Mundarlo Road	Lot 122, DP 757250	Local	I22
Lower Tarcutta	Stone Culvert	63 Mundarlo Road	Road reserve, adjacent to Lot 1, DP 712460, LID 38292	Local	I20
Mangain	Mangain Reserve Shooting Range	452 Roping Pole Road	Lot 38, DP 750841	Local	I70
Mangoplah	Mangoplah Hotel	39 Baylis Street	Lot 10, Section 19, DP 758642	Local	I160
Mangoplah	Store (former) and Residence	37 Cox Street	Lot 10, Section 22, DP 758642	Local	I161
Mangoplah	General Store and Residence	43 Cox Street	Lot 6, Section 21, DP 758642	Local	I154
Mangoplah	Mangoplah Station Complex	21 Darlow Street	Lot 3, DP 754557	Local	I156
Mangoplah	Mangoplah Silos and Siding Store Shed	61 Darlow Street and 1744 Mangoplah—The Rock Road	Lots 3 and 12, DP 227609	Local	I155
Mangoplah	St Michael Archangels Roman Catholic Church	40 Kane Street	Lot 1, Section 9, DP 758642	Local	I162
Mangoplah	Mangoplah Hall	14 Kyeamba Street	Lot 257, DP 721079	Local	I157
Mangoplah	Mangoplah Public School	41 Kyeamba Street	Lot 4, Section 10, DP 758642	Local	I158
Mangoplah	Scots Uniting Church	50 Kyeamba Street	Lots 1 and 2, Section 2, DP 758642	Local	I159
Mangoplah	Kumorin	1270 Mangoplah—The Rock Road	Lot 2, DP 604357	Local	I163
Matong	Deepwater Woolshed and Well	5215 Old Narrandera Road	Lot 36, DP 750854	Local	I165
Matong	Homestead and Shed Complex	5215 Old Narrandera Road	Lot 4, DP 750854	Local	I164
Maxwell	Fleetwood and Almond Orchard	1015 O'Briens Creek Road	Lot 99, DP 754565	Local	I167
Maxwell	Little Sandy Creek Slab Cottage and Woolshed	1015 O'Briens Creek Road	Lot 100, DP 754565	Local	I168
Moorong	Tobacco Kiln	133 McNickle Road	Lot 3, DP 714462	Local	I170
Moorong	Moorong Station Ruins	230 Roach Road	Lot B, DP 381991	Local	I169
Mount Austin	Mount Austin Homestead (former)	22 Warranga Avenue	Lot 18, DP 239030	Local	I230
Narrandera	Berembed Weir	5749 Old Narrandera Road	Lot 1, DP 750854	State	I309
North Wagga Wagga	Springfield	51 East Street	Lot 2, DP 820881	Local	I231

North Wagga Wagga	Residence	21 Gardiner Street	Lot 13, DP 1085132	Local	I232
North Wagga Wagga	Residence	96–120 Gardiner Street	Lot 1, DP 178461	Local	I238
North Wagga Wagga	North Wagga Primary School	Hampden Avenue	Lot 204A, DP 751422	Local	I234
North Wagga Wagga	Residence	32 Hampden Avenue	Lot 13, 1086179	Local	I235
North Wagga Wagga	Police Station (former)	52 Hampden Avenue	Lot 1, DP 997133	Local	I236
North Wagga Wagga	North Wagga Wagga Hall	76 Hampden Avenue	Lot 5, DP 774458	Local	I237
North Wagga Wagga	The Mill House	153 Hampden Avenue	Lot 154, DP 751422	Local	I117
North Wagga Wagga	St Mary's Anglican Church and Hall	15 William Street	Lot 15, DP 1094892	Local	I233
Oberne Creek	Galvin Graves	24 Oberne-Umbango Road	Lot 1, DP 847358	Local	I171
Oberne Creek	Janey Harvey's Cottage and Outbuildings	24 Oberne-Umbango Road	Lot 1, DP 847358	Local	I172
Oberne Creek	Oberne Tennis Courts and School Site	Westbrook Road	Lot 7003, DP 96697	Local	I176
Oberne Creek	Oberne Hall	2449 Westbrook Road	Lot 7003, DP 96697	Local	I174
Oberne Creek	Bardwell Family Graves	2607 Westbrook Road	Lot 13, DP 1061884	Local	I173
Oberne Creek	Oberne House Ruin	2607 Westbrook Road	Lot 13, DP 1061884	Local	I175
Oberne Creek	Dellhaven Homestead	53 Wilkinsons Road	Lot 1, DP 566995	Local	I177
Oura	Scots Church	2A Alfred Street	Lot 345, DP 751423	Local	I181
Oura	Oura Station Homestead	2052 Oura Road	Lots 137 and 138, DP 751397		I180
Pulletop	Pulletop Station Manager's Cottage (former Chapel)	168 Burrandana Road	Part Lot 8, DP 754564	Local	I182
Pulletop	Stone Ruin	Westby Road	Lot 112, DP 754564	Local	I188
Pulletop	Wingelo Yards	Westby Road	Lot 88, DP 754564	Local	I187
Pulletop	Cressy Farm	1122 Westby Road	Lot 1, DP 397932	Local	I183
Pulletop	Knox Union Church	1122 Westby Road	Part Lot 1, DP 532673	Local	I184
Rowan	Rowan, dwelling	6910 Holbrook Road	Part Lot 68, DP 757246	Local	I189
Tarcutta	St Columba's Presbyterian Church	31 Argent Street	Lot 209, DP 757255	Local	I191
Tarcutta	Inflammable Liquid Store	Bent Street	Lot 136, DP 757255	Local	I192
Tarcutta	Tarcutta Railway Station Complex Shop (former)	5 Comatawa Road	Lot 10, DP 1090464	Local	I200

Tarcutta	Slab Cottage	39 Cynthia Street	Lot 3, Section 10, DP 758953	Local	I194
Tarcutta	Corrugated Iron Cottage	42 Cynthia Street	Lot 8, Section 1, DP 758953	Local	I193
Tarcutta	Tarcutta School Residence	31 Gresham Street (south end)	Lot 62, DP 757255	Local	I195
Tarcutta	Tarcutta Railway Station Complex	Hume Highway	Lot 2945, DP 1182441	Local	I199
Tarcutta	Tennis Courts and Breaden Sportsground	Hume Highway	Lot 7301, DP 1154357	Local	I207
Tarcutta	Tarcutta Hotel	4504 Hume Highway	Lot 1, DP 158892	Local	I212
Tarcutta	Tarcutta Inn (former)	4514 Hume Highway	Lot 3, DP 158892	Local	I198
Tarcutta	Hambledon Homestead	4557 Hume Highway	Lot 71, DP 1153349	State	I196
Tarcutta	Hambledon Outbuildings	4557 Hume Highway	Lot 71, DP 1153349	Local	I197
Tarcutta	Elizabeth Nugent Grave on "College Creek"	1615 Humula Road	Lot 122, DP 757245	Local	I202
Tarcutta	Tarcutta House	2438 Humula Road	Lot 10, DP 1161113	Local	I201
Tarcutta	Toonga Homestead	3 Lower Tarcutta Road	Lot 51, DP 1132211	Local	I203
Tarcutta	Toonga Shearers' Quarters	3 Lower Tarcutta Road	Lot 132, DP 757255	Local	I204
Tarcutta	Wynyard Woolshed	117 Lower Tarcutta Road	Lot 4, DP 1045813	Local	I205
Tarcutta	Chinese Clearing Site	188 Mates Gully Road	Lot 191, DP 757255	Local	I206
Tarcutta	Nugent Fences	130 Nugents Road	Lot 18, DP 757254	Local	I136
Tarcutta	William John Nugent Grave (relocated)	130 Nugents Road	Lot 51, DP 757254	Local	I135
Tarcutta	Wooden Gate (Umbango Village)	130 Nugents Road	Lot 12, DP 757254	Local	I137
Tarcutta	CBC Bank Building (former)	20 Sydney Street	Lot 1, DP 309524	Local	I215
Tarcutta	Tarcutta Store	24 Sydney Street	Lot 4, DP 227896	Local	I214
Tarcutta	Tarcutta Memorial Hall	26 Sydney Street	Lot 54, DP 757255	Local	I213
Tarcutta	Post Office (former)	28 Sydney Street	Lot 2, DP 708701	Local	I209
Tarcutta	Corrugated Iron Shop (former)	37 Sydney Street	Lot 1, Section 1, DP 758953	Local	I208
Tarcutta	St Francis Xavier Roman Catholic Church	39 Sydney Street	Lot 3, Section 1, DP 758953	Local	I211
Tarcutta	House and Store (former)	41 Sydney Street	Part Lot B, DP 380915	Local	I210
The Gap	Kittegora School Site	380 Colonels Road	Lot 75, DP 750830	Local	I218

The Gap	Flowerdale School	552 Flowerdale Road	Lot 127, DP 750866	Local	I216
The Gap	The Gap Hall Site 7 Tennis Courts	146 Gap Hall-Coolamon Road	Lot 133, DP 750866	Local	I217
The Gap	Moreton Bay Fig	1942 The Gap Road	Lot 139, DP 750863 and adjacent road reserve	Local	I219
The Rock	Old Calmsley	314 Old Station Road	Lot 2, DP 1047749	Local	I284
The Rock	Gillamagong	371 Wattle Hills Road	Lot 1, DP 577969	Local	I166
Turvey Park	Wagga Wagga Showground, Kyeamba Smith Hall and Grandstand	26 Bourke Street	Lot 1, DP 62738	Local	I246
Turvey Park	Residence	93–95 Bourke Street	Lot 2, DP 39038	Local	I239
Turvey Park	Wagga Wagga High School (1917–1930s building)	36 Coleman Street	Lot 5, DP 122502	Local	I248
Turvey Park	Residence	46 Coleman Street	Lot 3, DP 17039	Local	I116
Turvey Park	Residence	48 Coleman Street	Lot 121, DP 1179835	Local	I240
Turvey Park	Residence	50 Coleman Street	Lot 7, DP 1103176	Local	I40
Turvey Park	Residence	52 Coleman Street	Lot A, DP 335080	Local	I241
Turvey Park	Residence	54 Coleman Street	Lot A, DP 340571	Local	I242
Turvey Park	Residence	100 Coleman Street	Lot 8, Sec 1, DP 12786	Local	I243
Turvey Park	Residence	108 Coleman Street	Lot 4, Sec 1, DP 12786	Local	I244
Turvey Park	Mt Erin Convent, Chapel, High School and Grounds	Edmonson Street	Lot 2, DP 543801	Local	I260
Turvey Park	Residence	7 Grandview Avenue	Lots 11 and 12, Section 3, DP 14383	Local	I247
Turvey Park	Charles Sturt University South Campus	20 Hely Avenue	Lot 2, DP 1183166	Local	I245
Turvey Park	Residence	2 Macleay Street	Lot 7, DP 37353	Local	I303
Turvey Park	Residence	80 Macleay Street	Lot B, DP 372212	Local	I249
Uranquinty	Liquid Explosives Store	88 Hanging Rock Road	Lot 11, DP 228780	Local	I287
Uranquinty	Uranquinty Cemetery	Lugsdin Road	Lot 7011, DP 1002160	Local	I286
Uranquinty	St Patrick's Roman Catholic Church	22 Morgan Street	Lot 3, Sec 12, DP 759024	Local	I288
Uranquinty	Uranquinty General Store	26 Morgan Street	Lot A, DP 340312	Local	I290
Uranquinty	Uranquinty General Store Post Boxes	26 Morgan Street	Lot A, DP 340312	Local	I291

Uranquinty	Uranquinty Hotel	30–34 Morgan Street	Lot 1, Section 4, DP 759021; Lot 2, DP 660466	Local	I289
Uranquinty	Trinity Lutheran Church	48 O'Connor Street	Lot 2, DP 529500	Local	I293
Uranquinty	St Cuthbert's Church of England Church	50–52 O'Connor Street	Lot B, DP 391953	Local	I292
Uranquinty	Memorial Avenue	Pearson Street	Road reserves adjacent to Lots 1–5, Section 3, DP 759024	Local	I304
Uranquinty	Uranquinty School	Pearson Street	Lot 181, DP 754567	Local	I297
Uranquinty	Uranquinty Silos	Pearson Street	Lot 1, DP 819900	Local	I296
Uranquinty	Ganawarra	47 Pearson Street	Lot 2, Section 3, DP 759024	Local	I294
Uranquinty	Uranquinty Hall	55–57 Pearson Street	Lot 4, Section 3, DP 759024	Local	I295
Uranquinty	Wyadra Grave Site	12 South Boundary Road	Lot 48, DP 754563	Local	I285
Uranquinty	Wise Grave	449 Uranquinty and Cross Road	Lot 1, DP 121510	Local	I298
Wagga Wagga	Union Club Hotel	122–124 Baylis Street	Lot 1, DP 217344	Local	I95
Wagga Wagga	Plaza Theatre	161–169 Baylis Street	Lot 1, DP 798370	Local	I94
Wagga Wagga	Civic Precinct	243 Baylis Street	Lot 333, DP 1009142	Local	I251
Wagga Wagga	Council Chambers (former)	243 Baylis Street	Lot 333, DP 1009142	Local	I83
Wagga Wagga	Victory Memorial Gardens	Corner Baylis and Morrow Streets	Lot 7024, DP 1043682 and Lots 7026–7028, DP 1043684	Local	I250
Wagga Wagga	Residence	7 Beauty Point Avenue	Lot 13, DP 19243	Local	I253
Wagga Wagga	Residence	19 Beauty Point Avenue	Lot 19, DP 313094	Local	I252
Wagga Wagga	Semi-detached Residence	1 Beckwith Street	Lots 19–22, DP 2910	Local	I84
Wagga Wagga	St John's Anglican Church	Church Street	Lot 5, Section 43, DP 759031	Local	I103
Wagga Wagga	St Andrew's Manse	5 Church Street	Lot 6, Section 41, DP 759031	Local	I113
Wagga Wagga	Bishops House	9 Church Street	Lot 7, Section 41, DP 759031	Local	I115
Wagga Wagga	St Michael's Presbytery	9 Church Street	Lot 1 Section 41, DP 759031	Local	I115
Wagga Wagga	Christian Brothers High School and Staff Centre (former Monastery)	14–20 Church Street	Lot 1, DP 1101346	Local	I255

Wagga Wagga	St Andrew's Presbyterian Church	Cross Street	Lot 5, Section 41, DP 759031	Local	I112
Wagga Wagga	Drill Hall	Docker Street	Lot 2, DP 83058	Local	I256
Wagga Wagga	Former Docker Street Railway Garehouse	1 Docker Street	Lot 2, DP 818398	Local	I257
Wagga Wagga	Residence	18–20 Docker Street	Lot 45, DP 15274	Local	I258
Wagga Wagga	Former Corner Store	130 Docker Street	Lot A, DP 418413	Local	I259
Wagga Wagga	Residence	136 Docker Street	Lot 3, DP 634448	Local	I89
Wagga Wagga	Murrumbidgee Milling Company Flour Mill (former) and Outbuildings	50–82 Edward Street	Lot 12, DP 1178547	Local	I100
Wagga Wagga	Former Corner Store	135 Edward Street	Lot 1, DP 12196	Local	I262
Wagga Wagga	South Wagga Public School	140 Edward Street	Lot 2, DP 882714	Local	I97
Wagga Wagga	Wagga Wagga Base Hospital (c1960 building)	260–280 Edward Street	Lot 13, DP 659184	Local	I261
Wagga Wagga	Residence	16 The Esplanade	Lot 1, DP 327353	Local	I87
Wagga Wagga	Brewery (former)	22–24 The Esplanade	Lot 1, DP 1034723	Local	I86
Wagga Wagga	Croquet Club	25 Fitzhardinge Street	Lot 333, DP 1012171	Local	I266
Wagga Wagga	Residential Flats "Wilstone Court"	40 Fitzhardinge Street	Lot 1, DP 1003930	Local	I267
Wagga Wagga	Hampden Bridge (remains) including metal pylons, bridge abutment and plaques	Fitzmaurice Street	Lot 6, DP 875316	Local	I85
Wagga Wagga	Street Directory and Palm Trees	Adjacent to 1 Fitzmaurice Street	Road Reserve, adjacent to Lot 4, DP 1035833	Local	I82
Wagga Wagga	2WG Sign	14–20 Fitzmaurice Street	SP 66519	Local	I268
Wagga Wagga	ANZ Bank (former)	44 Fitzmaurice Street	Lot C, DP 89682	Local	I108
Wagga Wagga	Post Office (former)	49–51 Fitzmaurice Street	Lot 1, DP 776578	Local	I105
Wagga Wagga	CBC Bank (former)	53–55 Fitzmaurice Street	Lot 1, DP 905502	Local	I106
Wagga Wagga	Court House	57 Fitzmaurice Street	Lot 1, Section 39, DP 759031	Local	I104
Wagga Wagga	Barters Restaurant	143–147 Fitzmaurice Street	Lot 1, DP 700199	Local	I96
Wagga Wagga	Corner Store and Residence	105 Forsyth Street	Lot 1, DP 534783	Local	I270
Wagga Wagga	Collins Park	131 Forsyth Street	Lot 1, DP 151172	Local	I102
Wagga Wagga	Water trough	Opposite 132 Forsyth Street	Road reserve, adjacent to Lot 707, DP 757249	Local	I269

Wagga Wagga	Brick Building	65 Fox Street	Lot 1, DP 797068	Local	I283
Wagga Wagga	Residence "Moonbiana"	103 Fox Street	Lot 1, DP 86968	Local	I271
Wagga Wagga	Residence (former Home of Compassion)	109 Fox Street	Lot 10, Section 48, DP 759031	Local	I91
Wagga Wagga	Headmaster's Residence (former)	Gurwood Street	Lot 9, Section 36, DP 759031	Local	I77
Wagga Wagga	Shops	9–11 Gurwood Street	Lot 1, DP 73827	Local	I119
Wagga Wagga	Wagga Waterworks	89–91 Hammond Avenue	Lot 2, DP 540063	Local	I273
Wagga Wagga	Canary Island Palm Trees (along the lagoon)	Johnston Street	Lot 7012, DP 1043680	Local	I274
Wagga Wagga	St Michael's Roman Catholic Cathedral	10 Johnston Street	Lot 8, Section 41, DP 759031	Local	I114
Wagga Wagga	Wesley Uniting Church	17–21 Johnston Street	Lot 3, DP 455778	Local	I276
Wagga Wagga	Department of Lands Building	26–28 Johnston Street	Lot 8, DP 47977	Local	I109
Wagga Wagga	Kyeamba Shire and Mitchell Shire Office Buildings (former)	30–32 Johnston Street	Lot 110, DP 1041976	Local	I110
Wagga Wagga	Bryan J Hamilton Offices (former)	38 Johnston Street	Lot 1, DP 666009	Local	I111
Wagga Wagga	Ambulance Station	54–58 Johnston Street	Lot 2, Section 38, DP 759031	Local	I275
Wagga Wagga	Residence	77 Johnston Street	Lot 1, DP 909700	Local	I80
Wagga Wagga	Residence	79 Johnston Street	Lot 1, DP 909701	Local	I81
Wagga Wagga	Belmore House. Residence	44 Kincaid Street	Lot 1, DP 124501	Local	I107
Wagga Wagga	Calvary Hospital and Chapel	22 Lewisham Avenue	Lot 1, DP 1186111	Local	I272
Wagga Wagga	Racecourse Group of Buildings: Entrance Building, Administration Building, Grandstand, Champagne Bar, Public Bar, Publican's Booth, Two Kiosks, Fountain	Corner Moorong and Travers Streets	Lot 2, DP 840187; Lot 210, DP 650311	Local	I76
Wagga Wagga	Robertson Oval Gates and Ticket Boxes	Morgan Street	Lot 7069, DP 1043666	Local	I265
Wagga Wagga	Corner Store and Residence	94 Morgan Street	Lot 1, DP 382357	Local	I277
Wagga Wagga	Fire Station Building and Residence (former)	Morrow and Sheppard Streets	Lot 3, DP 1079639	Local	I263
Wagga Wagga	Residence	4 Morrow Street	Lot C, DP 339186	Local	I279

Wagga Wagga	The Manor	38 Morrow Street	Lot 1, DP 9966	Local	I88
Wagga Wagga	South Wagga Tennis Club	40 Oates Avenue	Lots 1, 2, 13 and 14, Section 78, DP 759031	Local	I278
Wagga Wagga	Palm Tree Avenue	Peter Street	Road reserve	Local	I280
Wagga Wagga	Residence (former)	102 Peter Street	Lot 1, DP 64355	Local	I92
Wagga Wagga	Best Street Railway Gatehouse (former)	97 Railway Street	Lot 2, DP 1006140	Local	I254
Wagga Wagga	Residence (former)	20 Simmons Street	Lot 1, DP 651790	Local	I79
Wagga Wagga	Railway Station and Yard Group	Station Place	Lot 1, DP 1041553	State	I98
Wagga Wagga	Stationmaster's Residence (former)	14 Station Place	Lot 14, DP 1043109	Local	I99
Wagga Wagga	Police Station	10–20 Sturt Street	Lot 1, Section 39, DP 759031	Local	I120
Wagga Wagga	Cottage	166 Tarcutta Street	Lot 1, DP 771164	Local	I281
Wagga Wagga	Residence	201 Tarcutta Street	Lot 1, DP 1084711	Local	I282
Wagga Wagga	Riverine Club	231 Tarcutta Street	Lot 1, DP 738344	Local	I75
Wagga Wagga	Electrical Substation	10–14 The Esplanade	Lot 1, DP 1079639	Local	I264
Wagga Wagga	Residence (former)	64 Tompson Street	Lot A, DP 322416	Local	I93
Wagga Wagga	Terrace Building	106–110 Tompson Street	Lot 1, SP 42378	Local	I90
Wagga Wagga	Dorset Cottage	14 Trail Street	Lot D, DP 330690	Local	I78
Wagga Wagga	House	40 Trail Street	Lot 1, DP 86171	Local	I118
Wagga Wagga	Residence	48 Trail Street	Lot 1, DP 871069	Local	I101
Westbrook	St Albans Lucas Memorial Church	Westbrook Road	Lot 72, DP 757215	Local	I178
Westbrook	Westbrook PMG Building	1100 Westbrook Road	Lot 101, DP 757215	Local	I179
Westby	Westby Railway Station and Turntable Site	Westby Road	Lot 1, DP 1009625; Lot 1041, DP 1164534	Local	I186
Yarragundry	Pomingalarna	932 Sturt Highway	Lot 5, DP 76274	Local	I299
Yarragundry	Yarragundry School (former)	1431 Sturt Highway	Lot 144, DP 751573	Local	I300
Yarragundry	Cottage	1810 Sturt Highway	Part Lot 146, DP 751573	Local	I301

Part 2 Heritage conservation areas

Name of heritage conservation area	Identification on Heritage Map
Wagga Wagga Conservation Area	Shown by a red outline with red hatching

Appendix F

Stage 1 PACHCI

Transport
Roads & Maritime
Services

16 April 2020

Prafulla Bahadur KC
Project Manager/Engineer
Transport for NSW
193 – 195 Morgan Street
Wagga Wagga NSW 2650

Dear Prafulla,

Preliminary assessment results for *Marshalls Creek Bridge Widening,* based on Stage 1 of the *Procedure for Aboriginal cultural heritage consultation and investigation* (the procedure).

The project, as described in the *Marshalls Creek Bridge Widening Environmental Impact Assessment Minor Works and Project Review of Environmental Factors (REF) Brief (dated April 2020)* was assessed as being unlikely to have an impact on Aboriginal cultural heritage.

The assessment is based on the following due diligence considerations:

- The project is unlikely to harm known Aboriginal objects or places.
- The AHIMS search did not indicate Aboriginal objects in the study area.
- The study area does contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's *Due diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services' procedure, but, the cultural heritage potential of the study area appears to be reduced due to past disturbance.
- There is an absence of sandstone rock outcrops likely to contain Aboriginal art.

Your project may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.

If the scope of your project changes, you must contact me and your regional environmental staff Dan Francis (Ext 76634) to reassess any potential impacts on Aboriginal cultural heritage.

If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the project, all works in the vicinity of the find must cease. Follow the steps outlined in the Roads and Maritime Services' Procedure: Unexpected Heritage Items (PN 285 P02).

For further assistance in this matter do not hesitate to contact me.

Yours sincerely,

Andrew Whitton
Aboriginal Cultural Heritage Officer – South West

Office of Environment & Heritage

AHIMS Web Services (AWS)

Search Result

Purchase Order/Reference : HW14 Marshall Creek Bridg

Client Service ID : 497591

Transport for NSW - Wagga Wagga

Date: 16 April 2020

193-195 Morgan Street
Wagga Wagga New South Wales 2650
Attention: Andrew Whitton

Email: andrew.whitton@transport.nsw.gov.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -35.1216, 147.3871 - Lat, Long To : -35.1214, 147.3882 with a Buffer of 1000 meters, conducted by Andrew Whitton on 16 April 2020.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location.*

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Appendix G

Species List

Flora

Scientific Name	Common Name
Trees	
Eucalyptus camaldulensis	River Red Gum
Fraxinus angustifolia subsp. Angustifolia *	Desert Ash
Schinus molle subsp. Areira *	Pepper Tree
Casuarina cunninghamiana subsp. cunninghamiana	River Oak
*Platanus hispanica 'Acerifolia'**	Plane Tree
Shrubs	
*Rosa rubiginosa**	Sweet Briar
Acacia dealbata	Silver Wattle
Acacia linearifolia	Narrow-leaved Wattle
Callistemon sieberi	River Bottlebrush
Forbs	
*Polygonum aviculare**	Wireweed
*Lepidium africanum**	Common Peppercress
*Echium plantagineum**	Patterson's Curse
*Arctotheca calendula**	Capeweed
*Heliotropium europaeum**	Potato Weed
*Sanguisorba minor**	Sheep's Burnet
*Plantago lanceolate**	Lamb's Tongues
*Trifolium spp.**	A Clover
*Malva parviflora**	Small-flowered Mallow
*Sonchus oleraceus**	Common Sowthistle
*Rumex crispus**	Curled Dock

*Verbena bonariensis**	Purpletop
*Phalaris aquatica**	Phalaris
*Conyza bonariensis**	Flaxleaf Fleabane
*Silybum marianum**	Variegated Thistle
*Onopordum acanthium subsp. Acanthium**	Scotch Thistle
Oxalis spp.	
Enchyleanea tomentosa	Ruby Saltbush
*Galium spp.**	
*Alternanthera pungens**	Khaki Weed
*Xanthium spinosum**	Bathurst Burr
*Fumaria capreolata**	White Fumitory
Grasses	
Cynodon dactylon	Common Couch
*Paspalum dilatatum**	Paspalum
*Lolium perenne**	Perennial Ryegrass
*Panicum capillare**	Witchgrass
*Avena fatua**	Wild Oats
*Chloris gayana**	Rhodes Grass
Chloris truncata	Windmill Grass
*Eragrostis cilianensis**	Stinkgrass
*Cenchrus clandestinus**	Kikuyu Grass
*Bromus diandrus**	Great Brome

Note: * indicates exotic species

Fauna

Scientific Name	Common Name
Cracticus tibicen	Australian Magpie
Eolophus roseicapilla	Galah
Trichosurus vulpecula	Common Brushtail Possum

Appendix H

RMS Noise Calculator Results

Transport Roads & Maritime Services

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Marshalls Creek Bridge Widening
Scenario name	Scenario 1
Receiver address	
Select area ground type	Urban
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R3	
RBL or LA90 Background level (dB(A))	Day	50	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	60	
	Day (OOHW)	55	
	Evening	50	
	Night	45	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	30	*All at Representative Distance*

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - hard ground (for a conservative assessment or across the river/valley), urban or rural.
5. Select the type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
   (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
   (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Is all plant at the same representative distance to the receiver? Select Y or N (cell C24):
   (a) where Y is selected - enter the representative distance in cell C25.
   (b) where N is selected - go to step #7
7. For the scenario (e.g. shallow excavation), select plant from the drop-down list in cells A28 to A47 (e.g. dump trucks + excavator).
   (a) enter quantity for each selected plant in cells D28 to D47.
   (b) where N is selected from step #6 - enter the distance to receiver for each individual plant in cells E28 to E47.
   (c) is there line of sight to receiver? select from drop down list in cells F28 to F47
8. Identify the level above background and/or noise mangement level (see rows 57 to 62).
9. Identify and implement the relevant additional mitigation measures (see rows 63 to 65).
9. Document a summary report detailing:
   (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.)
   (b) background noise levels
   (c) noise management levels
   (d) predicted noise levels for each time period.
   (e) sleep disturbance mitigation distance for night works.
   (f) mitigation measures.
   (g) Team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	30	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Dump Trucks	108	83	1	30	Yes	0	0	30	69
Mobile Crane	113	88	1	30	Yes	0	0	30	74
Light vehicles	103	78	1	30	Yes	0	0	30	64
Pneumatic Jackhammer	113	88	1	30	Yes	0	0	30	74
Water truck	107	82	1	30	Yes	0	0	30	68

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***78***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	28							
	Day (OOHW)	28							
	OOHW Period 1	33							
	OOHW Period 2	38							
Level above NML (dB(A))	Standard hours	18	23	13	23	13	18	3	8
	Day (OOHW)	23	23	13	23	13	18	3	8
	OOHW Period 1	28		13	23	13	18	3	8
	OOHW Period 2	33		13	23			3	8
Additional mitigation measures	Standard Hours	N, V	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	-	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	-	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			N	V, N, R2, DR

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	70	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Dump truck	108	83	1		Yes	0	0	70	61
Mobile crane	113	88	1		Yes	0	0	70	66
Light vehicles	103	78	1		Yes	0	0	70	56
Pneumatic jackhammer	113	88	1		Yes	0	0	70	66
water truck	107	82	1		Yes	0	0	70	60
					Yes	0	0		-888
Total SPL $L_{Aeq(15minute)}$ (dB(A))		***70***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*20*							
	Day (OOHW)	*20*							
	OOHW Period 1	*25*							
	OOHW Period 2	*30*							
Level above NML (dB(A))	Standard hours	*10*	15	5	15	5	10		0
	Day (OOHW)	*15*	15	5	15	5	10		0
	OOHW Period 1	*20*		5	15	5	10		0
	OOHW Period 2	*25*		5	15				0
Additional mitigation measures	Standard Hours	*N, V*	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	*V, N, R1, DR*	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	*V, N, R1, DR*		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	*AA, V, IB, N, PC, SN, R2, DR*		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	80	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Dump truck	108	83	1		Yes	0	0	80	60
Mobile crane	113	88	1		Yes	0	0	80	65
Light vehicles	103	78	1		Yes	0	0	80	55
Pneumatic jackhammer	113	88	1		Yes	0	0	80	65
water truck	107	82	1		Yes	0	0	80	59
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		**69**							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	19							
	Day (OOHW)	19							
	OOHW Period 1	24							
	OOHW Period 2	29							
Level above NML (dB(A))	Standard hours	9	14	4	14	4	9		
	Day (OOHW)	14	14	4	14	4	9		
	OOHW Period 1	19		4	14	4	9		
	OOHW Period 2	24		4	14				
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	-	-	-
	Day (OOHW)	N, R1, DR	N, R1, DR	-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR		N	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	180	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Dump truck	108	83	1		Yes	0	0	180	51
Mobile crane	113	88	1		Yes	0	0	180	56
Light vehicles	103	78	1		Yes	0	0	180	46
Pneumatic jackhammer	113	88	1		Yes	0	0	180	56
water truck	107	82	1		Yes	0	0	180	50
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		***60***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*10*							
	Day (OOHW)	*10*							
	OOHW Period 1	*15*							
	OOHW Period 2	*20*							
Level above NML (dB(A))	Standard hours	*0*	5		5		0		
	Day (OOHW)	*5*	5		5		0		
	OOHW Period 1	*10*			5		0		
	OOHW Period 2	*15*			5				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	*N, R1, DR*	N, R1, DR	-	N, R1, DR	-	-	-	-
	OOHW Period 1	*N, R1, DR*		-	N, R1, DR	-	-	-	-
	OOHW Period 2	*V, IB, N, PC, SN, R2, DR*		-	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	350	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Dump Trucks	108	83	1	30	Yes	0	0	350	43
Mobile Crane	113	88	1	30	Yes	0	0	350	48
Light vehicles	103	78	1	30	Yes	0	0	350	38
Pneumatic Jackhammer	113	88	1	30	Yes	0	0	350	48
Water truck	107	82	1	30	Yes	0	0	350	42

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***52***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*2*							
	Day (OOHW)	2							
	OOHW Period 1	*7*							
	OOHW Period 2	*12*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*2*							
	OOHW Period 2	*7*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*V, N, R2, DR*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	500	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Dump Trucks	108	83	1	30	Yes	0	0	500	38
Mobile Crane	113	88	1	30	Yes	0	0	500	43
Light vehicles	103	78	1	30	Yes	0	0	500	33
Pneumatic Jackhammer	113	88	1	30	Yes	0	0	500	43
Water truck	107	82	1	30	Yes	0	0	500	37

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***48***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	3							
	OOHW Period 2	8							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	3							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	N		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	1000	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Dump Trucks	108	83	1	30	Yes	0	0	1000	30
Mobile Crane	113	88	1	30	Yes	0	0	1000	35
Light vehicles	103	78	1	30	Yes	0	0	1000	25
Pneumatic Jackhammer	113	88	1	30	Yes	0	0	1000	35
Water truck	107	82	1	30	Yes	0	0	1000	29

Total SPL L Aeq(15minute) (dB(A))	***39***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	-		-	-			-	-

Transport Roads & Maritime Services

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Marshalls Creek Bridge Widening
Scenario name	Scenario 2
Receiver address	
Select area ground type	Urban
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R3	
RBL or LA90 Background level (dB(A))	Day	50	
	Evening	45	
	Night	40	
LAeq[15minute] Noise mangement level (dB(A))	Day	60	
	Day (OOHW)	55	
	Evening	50	
	Night	45	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	30	*All at Representative Distance*

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - hard ground (for a conservative assessment or across the river/valley), urban or rural.
5. Select the type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
   (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
   (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Is all plant at the same representative distance to the receiver? Select Y or N (cell C24):
   (a) where Y is selected - enter the representative distance in cell C25.
   (b) where N is selected - go to step #7
7. For the scenario (e.g. shallow excavation), select plant from the drop-down list in cells A28 to A47 (e.g. dump trucks + excavator).
   (a) enter quantity for each selected plant in cells D28 to D47.
   (b) where N is selected from step #6 - enter the distance to receiver for each individual plant in cells E28 to E47.
   (c) is there line of sight to receiver? select from drop down list in cells F28 to F47.
8. Identify the level above background and/or noise mangement level (see rows 57 to 62).
9. Identify and implement the relevant additional mitigation measures (see rows 63 to 65).
9. Document a summary report detailing:
   (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
   (b) background noise levels.
   (c) noise management levels.
   (d) predicted noise levels for each time period.
   (e) sleep disturbance mitigation distance for night works.
   (f) mitigation measures.
   (g) Team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	30	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Piling rig - driven	116	91	1	30	Yes	0	0	30	77
Mobile Crane	113	88	1	30	Yes	0	0	30	74
Light vehicles	103	78	1	30	Yes	0	0	30	64
Concrete truck	109	84	1	30	Yes	0	0	30	70
Concrete pump	112	87	1	30	Yes	0	0	30	73

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***80***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	30							
	Day (OOHW)	30							
	OOHW Period 1	35							
	OOHW Period 2	40							
Level above NML (dB(A))	Standard hours	20	25	15	25	15	20	5	10
	Day (OOHW)	25	25	15	25	15	20	5	10
	OOHW Period 1	30		15	25	15	20	5	10
	OOHW Period 2	35		15	25			5	10
Additional mitigation measures	Standard Hours	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V,N, R1, DR	V, IB, N, R1, DR, PC, SN	V,N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V,N, R1, DR	V, IB, N, R1, DR, PC, SN	V,N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, N, R2, DR	V, N, R2, DR

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	90	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Piling rig - driven	116	91	1		Yes	0	0	90	67
Mobile crane	113	88	1		Yes	0	0	90	64
Light vehicles	103	78	1		Yes	0	0	90	54
Concrete truck	109	84	1		Yes	0	0	90	60
concrete pump	112	87	1		Yes	0	0	90	63
					Yes	0	0		-888
Total SPL $L_{Aeq(15minute)}$ (dB(A))		***70***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*20*							
	Day (OOHW)	*20*							
	OOHW Period 1	*25*							
	OOHW Period 2	*30*							
Level above NML (dB(A))	Standard hours	*10*	15	5	15	5	10		0
	Day (OOHW)	*15*	15	5	15	5	10		0
	OOHW Period 1	*20*		5	15	5	10		0
	OOHW Period 2	*25*		5	15				0
Additional mitigation measures	Standard Hours	*N, V*	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	*V, N, R1, DR*	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	*V, N, R1, DR*		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	*AA, V, IB, N, PC, SN, R2, DR*		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)
Representative distance (m)	100	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Piling rig - driven	116	91	1		Yes	0	0	100	66
Mobile crane	113	88	1		Yes	0	0	100	63
Light vehicles	103	78	1		Yes	0	0	100	53
Concrete truck	109	84	1		Yes	0	0	100	59
concrete pump	112	87	1		Yes	0	0	100	62
					Yes	0	0		-888
Total SPL $L_{Aeq(15minute)}$ (dB(A))		***69***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*19*							
	Day (OOHW)	*19*							
	OOHW Period 1	*24*							
	OOHW Period 2	*29*							
Level above NML (dB(A))	Standard hours	*9*	14	4	14	4	9		
	Day (OOHW)	*14*	14	4	14	4	9		
	OOHW Period 1	*19*		4	14	4	9		
	OOHW Period 2	*24*		4	14				
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	-	-	-
	Day (OOHW)	*N, R1, DR*	N, R1, DR	-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 1	*V, N, R1, DR*		-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 2	*V, IB, N, PC, SN, R2, DR*		N	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	210	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Piling rig - driven	116	91	1		Yes	0	0	210	57
Mobile crane	113	88	1		Yes	0	0	210	54
Light vehicles	103	78	1		Yes	0	0	210	44
Concrete truck	109	84	1		Yes	0	0	210	50
concrete pump	112	87	1		Yes	0	0	210	53
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		***60***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*10*							
	Day (OOHW)	*10*							
	OOHW Period 1	*15*							
	OOHW Period 2	*20*							
Level above NML (dB(A))	Standard hours	*0*	5		5		0		
	Day (OOHW)	*5*	5		5		0		
	OOHW Period 1	*10*			5		0		
	OOHW Period 2	*15*			5				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	*N, R1, DR*	N, R1, DR	-	N, R1, DR	-	-	-	-
	OOHW Period 1	*N, R1, DR*		-	N, R1, DR	-	-	-	-
	OOHW Period 2	*V, IB, N, PC, SN, R2, DR*		-	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	350	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Piling rig - driven	116	91	1	30	Yes	0	0	350	51
Mobile Crane	113	88	1	30	Yes	0	0	350	48
Light vehicles	103	78	1	30	Yes	0	0	350	38
Concrete truck	109	84	1	30	Yes	0	0	350	44
Concrete pump	112	87	1	30	Yes	0	0	350	47

Total SPL L Aeq(15minute) (dB(A))	***54***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*4*							
	Day (OOHW)	*4*							
	OOHW Period 1	*9*							
	OOHW Period 2	*14*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*4*							
	OOHW Period 2	*9*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*V, N, R2, DR*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	500	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Piling rig - driven	116	91	1	30	Yes	0	0	500	46
Mobile Crane	113	88	1	30	Yes	0	0	500	43
Light vehicles	103	78	1	30	Yes	0	0	500	33
Concrete truck	109	84	1	30	Yes	0	0	500	39
Concrete pump	112	87	1	30	Yes	0	0	500	42

Total SPL L Aeq(15minute) (dB(A))	***50***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*0*							
	Day (OOHW)	*0*							
	OOHW Period 1	*5*							
	OOHW Period 2	*10*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*0*							
	OOHW Period 2	*5*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*V, N, R2, DR*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	1000	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Piling rig - driven	116	91	1	30	Yes	0	0	1000	38
Mobile Crane	113	88	1	30	Yes	0	0	1000	35
Light vehicles	103	78	1	30	Yes	0	0	1000	25
Concrete truck	109	84	1	30	Yes	0	0	1000	31
Concrete pump	112	87	1	30	Yes	0	0	1000	34

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***41***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	*1*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	-		-	-			-	-

Transport Roads & Maritime Services

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Marshalls Creek Bridge Widening
Scenario name	Scenario 3
Receiver address	
Select area ground type	Urban
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R3	
RBL or LA90 Background level (dB(A))	Day	50	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	60	
	Day (OOHW)	55	
	Evening	50	
	Night	45	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1000	*All at Representative Distance*

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - hard ground (for a conservative assessment or across the river/valley), urban or rural.
5. Select the type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
   - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
   - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Is all plant at the same representative distance to the receiver? Select Y or N (cell C24):
   - (a) where Y is selected - enter the representative distance in cell C25.
   - (b) where N is selected - go to step #7
7. For the scenario (e.g. shallow excavation), select plant from the drop-down list in cells A28 to A47 (e.g. dump trucks + excavator)
   - (a) enter quantity for each selected plant in cells D28 to D47.
   - (b) where N is selected from step #6 - enter the distance to receiver for each individual plant in cells E28 to E47.
   - (c) is there line of sight to receiver? select from drop down list in cells F28 to F47.
8. Identify the level above background and/or noise mangement level (see rows 57 to 62).
9. Identify and implement the relevant additional mitigation measures (see rows 63 to 65).
9. Document a summary report detailing:
   - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
   - (b) background noise levels.
   - (c) noise management levels .
   - (d) predicted noise levels for each time period.
   - (e) sleep disturbance mitigation distance for night works.
   - (f) mitigation measures.
   - (g) Team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	30	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1	30	Yes	0	0	30	78
Dump truck	110	85	1	30	Yes	0	0	30	71
Front end loader	112	87	1	30	Yes	0	0	30	73
Water truck	107	82	1	30	Yes	0	0	30	68

Total SPL L Aeq(15minute) (dB(A))	***80***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	30							
	Day (OOHW)	30							
	OOHW Period 1	35							
	OOHW Period 2	40							
Level above NML (dB(A))	Standard hours	20	25	15	25	15	20	5	10
	Day (OOHW)	25	25	15	25	15	20	5	10
	OOHW Period 1	30		15	25	15	20	5	10
	OOHW Period 2	35		15	25			5	10
Additional mitigation measures	Standard Hours	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V,N, R1, DR	V, IB, N, R1, DR, PC, SN	V,N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V,N, R1, DR	V, IB, N, R1, DR, PC, SN	V,N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, N, R2, DR	V, N, R2, DR

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	90	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1		Yes	0	0	90	68
Dump Truck	110	85	1		Yes	0	0	90	61
Front ent loader	112	87	1		Yes	0	0	90	63
Water truck	107	82	1		Yes	0	0	90	58
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		***70***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	20							
	Day (OOHW)	20							
	OOHW Period 1	25							
	OOHW Period 2	30							
Level above NML (dB(A))	Standard hours	10	15	5	15	5	10		0
	Day (OOHW)	15	15	5	15	5	10		0
	OOHW Period 1	20		5	15	5	10		0
	OOHW Period 2	25		5	15				0
Additional mitigation measures	Standard Hours	N, V	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	V, N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	100	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1		Yes	0	0	100	67
Dump Truck	110	85	1		Yes	0	0	100	60
Front ent loader	112	87	1		Yes	0	0	100	62
Water truck	107	82	1		Yes	0	0	100	57
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		**69**							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	19							
	Day (OOHW)	19							
	OOHW Period 1	24							
	OOHW Period 2	29							
Level above NML (dB(A))	Standard hours	9	14	4	14	4	9		
	Day (OOHW)	14	14	4	14	4	9		
	OOHW Period 1	19		4	14	4	9		
	OOHW Period 2	24		4	14				
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	-	-	-
	Day (OOHW)	N, R1, DR	N, R1, DR	-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR		N	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	100	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1		Yes	0	0	100	67
Dump Truck	110	85	1		Yes	0	0	100	60
Front ent loader	112	87	1		Yes	0	0	100	62
Water truck	107	82	1		Yes	0	0	100	57
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		**69**							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	19							
	Day (OOHW)	19							
	OOHW Period 1	24							
	OOHW Period 2	29							
Level above NML (dB(A))	Standard hours	9	14	4	14	4	9		
	Day (OOHW)	14	14	4	14	4	9		
	OOHW Period 1	19		4	14	4	9		
	OOHW Period 2	24		4	14				
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	-	-	-
	Day (OOHW)	N, R1, DR	N, R1, DR	-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR		N	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	190	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1		Yes	0	0	190	59
Dump Truck	110	85	1		Yes	0	0	190	52
Front ent loader	112	87	1		Yes	0	0	190	54
Water truck	107	82	1		Yes	0	0	190	49
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		**61**							

Workbook last modified: 21m ago

		Residential receiver	Non-residential receivers						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	11							
	Day (OOHW)	11							
	OOHW Period 1	16							
	OOHW Period 2	21							
Level above NML (dB(A))	Standard hours	1	6		6		1		
	Day (OOHW)	6	6		6		1		
	OOHW Period 1	11			6		1		
	OOHW Period 2	16			6				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	N, R1, DR	N, R1, DR	-	N, R1, DR	-	-	-	-
	OOHW Period 1	N, R1, DR		-	N, R1, DR	-	-	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR		-	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	350	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1	30	Yes	0	0	350	52
Dump truck	110	85	1	30	Yes	0	0	350	45
Front end loader	112	87	1	30	Yes	0	0	350	47
Water truck	107	82	1	30	Yes	0	0	350	42

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***54***

			Non-residential receivers						
		Residential receiver	*Classroom at schools and other educational institutions*	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*4*							
	Day (OOHW)	*4*							
	OOHW Period 1	*9*							
	OOHW Period 2	*14*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*4*							
	OOHW Period 2	*9*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*V, N, R2, DR*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	500	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1	30	Yes	0	0	500	47
Dump truck	110	85	1	30	Yes	0	0	500	40
Front end loader	112	87	1	30	Yes	0	0	500	42
Water truck	107	82	1	30	Yes	0	0	500	37

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***49***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*4*							
	OOHW Period 2	*9*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	*4*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*N*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)
Representative distance (m)	1000	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Pavement profiler	117	92	1	30	Yes	0	0	1000	39
Dump truck	110	85	1	30	Yes	0	0	1000	32
Front end loader	112	87	1	30	Yes	0	0	1000	34
Water truck	107	82	1	30	Yes	0	0	1000	29

Total SPL L Aeq(15minute) (dB(A))	***41***

			Non-residential receivers						
		Residential receiver	*Classroom at schools and other educational institutions*	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	*1*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	-		-	-			-	-

Transport Roads & Maritime Services

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Marshalls Creek Bridge Widening
Scenario name	Scenario 4
Receiver address	
Select area ground type	Urban
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R3	
RBL or LA90 Background level (dB(A))	Day	50	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	60	
	Day (OOHW)	55	
	Evening	50	
	Night	45	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	45	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Delivery truck	108	83	1		Yes	0	0	45	65
Light vehicle	88	63	3		Yes	5	0	45	50
Generator	103	78	1		Yes	0	0	45	60
					Yes	0	0		-888

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***66***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*16*							
	Day (OOHW)	*16*							
	OOHW Period 1	*21*							
	OOHW Period 2	*26*							
Level above NML (dB(A))	Standard hours	*6*	11	1	11	1	6		
	Day (OOHW)	*11*	11	1	11	1	6		
	OOHW Period 1	*16*		1	11	1	6		
	OOHW Period 2	*21*		1	11				
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	-	-	-
	Day (OOHW)	*N, R1, DR*	N, R1, DR	-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 1	*V, N, R1, DR*		-	N, R1, DR	-	N, R1, DR	-	-
	OOHW Period 2	*V, IB, N, PC, SN, R2, DR*		N	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y		investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)
Representative distance (m)	460	*All at Representative Distance*	

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Delivery truck	108	83	1		Yes	0	0	460	39
Light vehicle	88	63	3		Yes	5	0	460	24
Generator	103	78	1		Yes	0	0	460	34
					Yes	0	0		-888

Total SPL L Aeq(15minute) (dB(A))	***41***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	*1*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	-		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	190	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Delivery truck	108	83	1		Yes	0	0	190	50
Light vehicle	88	63	3		Yes	5	0	190	35
Generator	103	78	1		Yes	0	0	190	45
					Yes	0	0		-888

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***51***

			Non-residential receivers						
		Residential receiver	*Classroom at schools and other educational institutions*	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*1*							
	Day (OOHW)	*1*							
	OOHW Period 1	*6*							
	OOHW Period 2	*11*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*1*							
	OOHW Period 2	*6*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*V, N, R2, DR*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	540	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Delivery truck	108	83	1		Yes	0	0	540	37
Light vehicle	88	63	3		Yes	5	0	540	22
Generator	103	78	1		Yes	0	0	540	32
					Yes	0	0		-888

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***39***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	-		-	-			-	-

Transport Roads & Maritime Services

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Marshalls Creek Bridge Widening
Scenario name	Scenario 5
Receiver address	
Select area ground type	Urban
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R3	
RBL or LA90 Background level (dB(A))	**Day**	50	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	**Day**	60	
	Day (OOHW)	55	
	Evening	50	
	Night	45	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	30	*All at Representative Distance*

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Esti
investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	30	74
Daymakers	98	73	1		Yes	0	0	30	59

Total SPL L Aeq(15minute) (dB(A))	***74***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*24*							
	Day (OOHW)	*24*							
	OOHW Period 1	*29*							
	OOHW Period 2	*34*							
Level above NML (dB(A))	Standard hours	*14*	19	9	19	9	14		4
	Day (OOHW)	*19*	19	9	19	9	14		4
	OOHW Period 1	*24*		9	19	9	14		4
	OOHW Period 2	*29*		9	19				4
Additional mitigation measures	Standard Hours	*N, V*	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	*V, N, R1, DR*	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	*V, N, R1, DR*		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	*AA, V, IB, N, PC, SN, R2, DR*		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	N

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	90	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	90	64
Daymakers	98	73	1		Yes	0	0	90	49
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		***64***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	14							
	Day (OOHW)	14							
	OOHW Period 1	19							
	OOHW Period 2	24							
Level above NML (dB(A))	Standard hours	4	9		9		4		
	Day (OOHW)	9	9		9		4		
	OOHW Period 1	14			9		4		
	OOHW Period 2	19			9				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	N, R1, DR	N, R1, DR	-	N, R1, DR	-	-	-	-
	OOHW Period 1	N, R1, DR		-	N, R1, DR	-	-	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR		-	V, N, R2, DR			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	140	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	140	59
Daymakers	98	73	1		Yes	0	0	140	44
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		**59**							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours	9							
	Day (OOHW)	9							
	OOHW Period 1	14							
	OOHW Period 2	19							
Level above NML (dB(A))	Standard hours		4		4				
	Day (OOHW)	4	4		4				
	OOHW Period 1	9			4				
	OOHW Period 2	14			4				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR		-	-	-	-	-	-
	OOHW Period 2	V, N, R2, DR		-	N			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	210	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	210	54
Daymakers	98	73	1		Yes	0	0	210	39
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL $L_{Aeq(15minute)}$ (dB(A))		***54***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours	*4*							
	Day (OOHW)	*4*							
	OOHW Period 1	*9*							
	OOHW Period 2	*14*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*4*							
	OOHW Period 2	*9*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*V, N, R2, DR*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	310	*All at Representative Distance*

investigated on a project-by-project basis. Please contact a Roads and Maritime noise specialist for more information).

Type/ model plant (See Sources Sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	310	49
Daymakers	98	73	1		Yes	0	0	310	34
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
Total SPL L Aeq(15minute) (dB(A))		***49***							

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*4*							
	OOHW Period 2	*9*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	*4*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*N*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	350	*All at Representative Distance*

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Est investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Type/ model plant (See Sources Sheet)	SWL L Aeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	350	48
Daymakers	98	73	1		Yes	0	0	350	33

Total SPL L Aeq(15minute) (dB(A))	***48***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1	*3*							
	OOHW Period 2	*8*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	*3*							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	*N*		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	500	*All at Representative Distance*

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Esti
investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	500	43
Daymakers	98	73	1		Yes	0	0	500	28

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***44***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	*60*	55	65	55	65	60	75	70
	Day (OOHW)	*55*	55	65	55	65	60	75	70
	OOHW Period 1	*50*		65	55	65	60	75	70
	OOHW Period 2	*45*		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2	*4*							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	-		-	-			-	-

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1000	*All at Representative Distance*

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Est investigated on a project-by-project basis. Please contact a Roads and Maritime noise speciliast for more information)

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Mobile crane	113	88	1		Yes	0	0	1000	35
Daymakers	98	73	1		Yes	0	0	1000	20

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***35***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	Standard hours	60	55	65	55	65	60	75	70
	Day (OOHW)	55	55	65	55	65	60	75	70
	OOHW Period 1	50		65	55	65	60	75	70
	OOHW Period 2	45		65	55			75	70
Level above background (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Level above NML (dB(A))	Standard hours								
	Day (OOHW)								
	OOHW Period 1								
	OOHW Period 2								
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-		-	-	-	-	-	-
	OOHW Period 2	-		-	-			-	-

Appendix I

Threatened Species Evaluations

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for Wagga Wagga in the *Atlas of NSW Wildlife*[1] and those identified as potentially occurring in the area according to the Commonwealth EPBC *Protected Matters Search Tool*[2].

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

Present: Potential or known habitat is present within the study area

Absent: No potential or known habitat is present within the study area

Likelihood of occurrence

Unlikely: Species known or predicted within the locality but unlikely to occur in the study area

Possible: Species could occur in the study area

Present: Species was recorded during the field investigations

Possible to be impacted

No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species

Yes: The proposal could impact this species or its habitats. An AoS has been applied to these entities.

[1] The *Atlas of NSW Wildlife* is administered by the NSW Department of Environment & Heritage (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

[2] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of the Environment and Energy.

Evaluation of the likelihood and extent of impact on threatened flora species

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Grasses				
Austrostipa wakoolica **A spear-grass** **BC- E, EPBC-E**	Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, with localities including Manna State Forest, Matong, Lake Tooim, Merran Creek, Tulla, Cunninyeuk and Mairjimmy State Forest. Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils. Habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Associated species include Callitris glaucophylla, Eucalyptus microcarpa, E. populnea and Austrostipa eremophila.	**Present** Silty creek banks in study area.	**Unlikely** Proposal does not occur along the Murray River tributaries, no Speargrasses were identified during the site survey.	**No** Species unlikely to occur in study area
Amphibromus fluitans **Floating Swamp Wallaby-grass** **BC-V, EPBC - V**	There are many historic collections in the City of Greater Albury. It has been recorded recently in lagoons beside the Murray River near Cooks Lagoon (Shire of Greater Hume), Mungabarina Reserve, East Albury, at Ettamogah, Thurgoona, near Narranderra, and also further west along the Murray River (near Mathoura) and in Victoria. Amphibromus fluitans grows mostly in permanent swamps. The species needs wetlands which are at least moderately fertile, and which have some bare ground, conditions which are produced by seasonally-fluctuating water levels. Habitats in south-western NSW include swamp margins in mud, dam and tank beds in hard clay and in semi-dry mud of lagoons with Potamogeton and Chamaeraphis species. Wetlands inhabited by this species that are converted to deep, permanent dams are unsuitable for continued habitation by this species.	**Absent** No suitable swamps/wetlands or wetland margins in study area	**Unlikely** Suitable habitat not present	**No** Species unlikely to occur in study area

[3] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.
OEH threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Austrostipa metatoris **A spear-grass** **BC-V, EPBC-V**	This species grows in sandy areas of the Murray Valley. It occurs on sandhills, sandridges, undulating plains and flat open mallee country. It grows on red to re-brown clay-loam to sandy-loam soils. Associated species include *Eucalyptus populnea, E. intertexta, Callitris glaucophylla, Casuarina cristata, Santalum acuminatum* and *Dodonaea viscosa*.	**Absent** Proposal does not occur in the Murray Valley region. Associated species not present.	**Unlikely** Suitable habitat not present	**No** Species unlikely to occur in study area
Herbs & Forbs				
Ammobium craspedioides **Yass Daisy** **BC-V, EPBC- V**	This species is found from near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes. It is primarily found in the Yass region. Mostly found in moist or dry forests, Box-Gum Woodland and secondary grassland created from clearing these communities. Appears to be resistant to grazing.	**Absent** Not Box-Gum woodland or secondary grassland communities in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Brachyscome muelleroides **Claypan Daisy, Mueller Daisy** **BC-V, EPBC-V**	Occurs in the Wagga Wagga, Narranderra, Tocumwal and Walbundrie areas. Also occurs in north-central Victoria (only along the Murray from Tocumwal to the Ovens River). Only five sites have precise locality details, and four of these are on Morundah Station in NSW. Occurs in seasonally damp situations such as shallow depressions and around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland, grassy woodland and open forest habitats, growing in association with various grasses and seasonal aquatic plants such as *Marsilea* species. Associated species include *Pycnosorus globosus, Agrostis avenacea, Austrodanthonia duttoniana*, and *Calotis anthemoides*. Victorian collections have generally come from open positions on the Murray River floodplain, swampy River Red Gum (*Eucalyptus camaldulensis*) Forest and damp depressions.	**Present** Swampy River Red Gum creek in study area.	**Unlikely** Habitat is present, however it is highly disturbed and dominated by a thick groundcover of exotic species. This species has been recorded within 10 km of the proposal area however the record is over 20 years old	**No** Species unlikely to occur in study area
Caesia parviflora var. minor **Small Pale Grass-lily** **BC-E**	Known occurrences of this species in NSW are in Barcoongere State Forest, between Grafton and Coffs Harbour. It may be more common than currently thought because grass lillies are rarely identified on a variety scale. This species is found in dry sclerophyll forests, grassy woodlands, heathlands and wet sclerophyll forests. It is found in damp habitat, on sandstone.	**Absent** Damp woodland is present in the study area, however there is no sandstone.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Carex raleighii **Raleigh Sedge** **BC-E**	Raleigh Sedge is confined to areas of over 1000 metres on the Southern Tablelands. It is primarily found in Kosciuzko National Park, the Snowy Plain and on the headwaters of Tantawangalo creek (South East Forests National Park). This species grows in sphagnum bogs, high mountain wetlands and damp grasslands. It is also found along stream-edges in the sub-alpine plains.	**Absent** Proposal area is below 1000 m in elevation.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Cullen Parvum **Small Scurf-pea** **BC- E**	Known NSW populations of the Small Scurf-pea (*Cullen parvum*) are in Jindera, Galong and Young and in and south-west of Wagga Wagga. In Victoria, it has been found in the Red Gum Woodlands in Barmah State Park. This species is found primarily in grassland, River Red Gum Woodland and Box-Gum Woodland. It has also been found on grazed land and next to drainage lines and watercourses. Plants are more easily found in winter or spring because they die back in dry seasons, surviving underground.	**Present** River Red Gum Woodland along a watercourse occurs within the study area.	**Possible** Suitable habitat present	**Yes** AoS completed
Dichanthium setosum **Bluegrass** **BC-V, EPBC- V**	Bluegrass is known to the New England Tablelands, North West Slopes and Plains and the Central Western Slopes in NSW. It frequently occurs on private property. The soils it prefers are basaltic black soils and red-brown loams with clay subsoil. It is associated with disturbed woodland, pasture and grassy roadside vegetation. It is unclear whether this is because it prefers disturbed habitat, or because the habitat type is frequently disturbed. It appears to have a tolerance for a wide range of habitat types.	**Absent** Grassy woodland not present in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Euphrasia arguta **Euphrasia arguta** **BC-CE, EPBC-CE**	This species is predicted in the Inland Slopes. It grows in open forest with grassy and shrubby understoreys and grassland. It has also been found on roadsides. It was thought to be extinct but was rediscovered in 2008 at Nundle State Forest in eucalypt forest. Historical records indicate it occurs mostly in grassy areas near rivers at elevations of up to 700m above sea level.	**Absent** Grassy woodland not present in study area. Study area is below 700m.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Euphrasia collina subsp. Meulleri **Mueller's Eyebright** **BC- E, EPBC-E**	This species has not been recorded in NSW in over 100 years. Now, it is now only known in the Mornington Peninsula, near Melbourne. Habitat is in heathy and grassy woodland and in sandy open forests.	**Absent** Grassy woodland not present in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Senecio garlandii **Woolly Ragwort** **BC- V**	It is found between Temora, Bethungra, Albury and Chiltern (Victoria). It may also occur at Burrinjuck. It grows on sheltered slopes of rocky outcrops. It occurs in dry sclerophyll forests, grassy woodlands, semi-arid woodlands and on rocky cliffs.	**Absent** No sheltered slopes or rocky outcrops in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Swainsona murrayana **Slender Darling Pea** **BC-V, EPBC-V**	Occurs from South Australia through south-west Victoria and central NSW to south-east Queensland. Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. Found in grassland, herbland, and open Black-box woodland, often in depressions. Has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. Plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains.	**Absent** Characteristic vegetation communities not present.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Swainsona recta **Small Purple-pea** **BC-E, EPBC- E**	It has been recorded previously at Carcoar, Culcairn and Wagga Wagga but is thought to be extinct from these areas. Populations are still present in Queenbeyan, the ACT and Wellington-Mudgee areas. Plants are commonly found on railway easements. It occurs in the grassy understory of woodlands, and open-forests dominated by Blakely's Red Gum *Eucalyptus blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida* and Long-leaf Box *E. goniocalyx. They are found in dry sclerophyll forests, grasslands, and grassy woodlands.*	**Absent** No dry sclerophyll forests, grasslands, or grassy woodlands in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Swainsona sericea **Silky Swainson-pea** **BC-V**	This species has been found from the Northern Tablelands to the Southern Tablelands and further inland. It is found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland, as well as in Box-Gum Woodland and with cypress-pines. It is also found in arid shrublands, Riverine Chenopod Shrublands, dry and wet sclerophyll forests, woodlands and grasslands.	**Absent** Characteristic vegetation communities not present.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Epiphytes and Climbers				
Tylophora linearis **Tylophora linearis** **BS- V, EPBC-E**	Tylophora linearis grows in dry scrub and open forest. It is found in both grassy and shrubby dry sclerophyll forests. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii*. Also grows in association with *Acacia hakeoides, Acacia lineata, Melaleuca uncinata, Myoporum* species and *Casuarina* species	**Absent** No grassy or dry shrubby forest in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Ferns and cyads				
Pilularia novae-hollandiae **Austral Pillwort** **BC-E, EPBC- not listed**	The Austril Pillwort (*Pilularia novae-hollandiae*) has been found in Sydney, Oolambeyan National Park, Canberra, at Lake Cowal and in parts of Victoria. It is also found in the Riverina between Albury and Urana. It is found in shallow swamps and waterways. It is commonly found in table drains and on the side of the road. It can be difficult to find, given it is most likely ephemeral.	**Present** Vegetated waterway in study area.	**Unlikely** Study area is outside species known distribution and there are no records within 10 km.	**No** Species unlikely to occur in study area
Shrubs				
Acacia meiantha **Acacia meiantha** **BC-E, EPBC-E**	It is found in the Central Tablelands. Specifically, they have been found in Clarence, Mullions Range and Aarons Pass. They are predicted in the Inland Slopes to occur in dry sclerophyll forests or woodland with shrubby understorey. They grow on sandy to clayey soil.	**Absent** No woodland with shrubby understorey in study area.	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
Acacia phasmoides **Phantom Wattle** **BC-V, EPBC-V**	The only known location in NSW is the Woomagarma National Park in Greater Hume Shire. It is also found at Burrowa-Pine Mountain National Park in Victoria. It grows in shrubby woodland on sandy, granitic soil near creeks or in rocky crevices.	**Absent** No woodland with shrubby understorey and granitic soil in study area.	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Grevillea wilkinsonii **Tumut Grevillea** **BC-E, EPBC-E**	The main location this species is found is in a 6km stretch of Goobarrangandra River, east of Tumut. The only other place it is known is between two private properties at Gundagai. At Goobarrangandra River, plants are found close to the water in open, sunny areas and in rocky, loamy soils. The associated native vegetation in the Goobarragandra sites are typically remnant riverine shrub communities adjacent to open-forest, with the most common tree species being Blakely's Red Gum (*Eucalyptus blakelyi*), Apple Box (*E. bridgesiana*), Yellow Box (*E. melliodora*), and Red Stringybark (*E. macrorhyncha*) and with Kurrajongs (*Brachychiton populneus*) sometimes growing in nearby paddocks.	**Absent** Associated species not present. No riverine scrub communities in study area.	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Homoranthus darwinioides **Homoranthus darwinioides** **BC-V, EPBC- V**	Occurs in the central tablelands and western slopes of NSW, from Putty to the Dubbo district. It is also found west of Muswellbrook between Merriwa and Bylong and north of Muswellbrook to Goonoo SCA. It grows in woodland habitat with shrubby understoreys, typically in gravely sandy soils. They have been recorded on flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes and on roadsides.	**Absent** No woodland with shrubby understory in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Indigofera efoliata **Leafless Indigo** **BC-E, EPBC- E**	This species is extremely rare and may be extinct. It was found near to Dubbo. It can be difficult to identify because it dies back in adverse conditions. It has been found in dry sclerophyll forests and grassy woodlands. It grows on slight rises in stony red-brown sandy loam.	**Absent** No dry sclerophyll forest or grassy woodland in study area.	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Persoonia marginata **Clandulla Geebung** **BC-V, EPBC-V**	This species is found in dry sclerophyll forest and woodland. It grows in sandstone and clayey soil and is only found in the Capertee district in central-eastern NSW.	**Absent** No dry sclerophyll forest or open woodland in study area.	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Pomaderris cotoneaster **Cotoneaster Pomaderris** **BC-E, EPBC-E**	This species is known from the Nungatta area, northern Kosciusko National Park, the Tantawangalo area (South-East Forests National Park), Badgery's Lookout (Tallong), Bungonia State Conservational Area, Yerranderie, Kanangra- Boyd National Park, Canyonleigh and Ettrema Gorge (Morton National Park). The Cotoneaster Pomaderris is primarily found in forested areas and prefer friable soils. They generally grow amongst rocks adjacent to streams and at the bottom of steep slopes.	**Absent** No forested communities with rocky outcrops in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Pomaderris queenslandica **Scant Pomaderris** **BC-E**	This species is widely scattered in north-east NSW. It is known on many locations on the north coast and on the New England Tablelands and North West Slopes in NSW. It is mostly found in eucalypt forest and sheltered woodlands with a shrubby understorey, and occasionally along creeks.	**Absent** No sheltered woodlands with a shrubby understory in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Ziera ingramii **Keith's Ziera** **BC-E, EPBC-E**	It is primarily found in Goonoo SCA, north-east of Dubbo. It is found in dry sclerophyll forests in light sandy soils. It is mostly found in woodland or open forests with a shrubby to heathy understorey on red-brown and yellow-brown sandy loams. It occurs on gentle rocky slopes or near the crests of low rises in undulating terrain, above 390m altitude.	**Absent** No woodlands with a shrubby understory or rocky slopes in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Zieria obcordate **Aieria obcordate** **BC-E, EPBC-E**	This species only occurs in Wuuluman area near Wellington and Crackerjack Rock. It grows in eucalypt woodland or shrubland dominated by species of *Acacia.* It is also found in *Eucalypt* and *Callitris* dominated woodland. It occurs on sites with an altitude of 500-830 metres. This species prefers areas that are shaded and have well-draining soil. It is primarily found in sandy soil and occasionally between granite boulders.	**Absent** No woodland dominated by Acacia's or areas of sandy soil with granite boulders in study area.	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Orchids				
Diuris tricolor **Pine Donkey Orchid** **BC-V**	It is sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the far north of NSW. Localities include the Condobolin-Nymagee road, Wattamondara towards Cowra, Cooyal, Adelong, Red Hill north of Narrandera, Coolamon, near Darlington Point, Eugowra, Girilambone, Dubbo, Muswellbrook, and several sites west of Wagga Wagga. Associated species include *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta*, Ironbark and *Acacia* shrubland. The understorey is often grassy with herbaceous plants such as *Bulbine* species. It is found in sandy soils, either on flats or small rises. Also recorded from a red earth soil in a Bimble Box community in western NSW.	**Absent** Characteristic species not present in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Caladenia arenaria **Sand-hill Spider Orchid** **BC-E, EPBC- E**	The Sand-hill Spider Orchid occurs in the south west planes and western south west slopes of NSW. It has been recorded from Nangus and Adelong and may have been sighted near Cootamundra. It is currently thought to occur only in the Riverina between Urana and Narranderra. This species grows in sandy soil within woodlands and is associated with White Cypress Pine (*Callitris glaucophylla*). It may be difficult to identify because it becomes dormant and survives underground during hot summers.	**Absent** Characteristic species not present in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Caladenia concolor **Crimson Spider Orchid** **BC-E, EPBC-V**	The only known South-Western Slopes Inland location of this species is to the west of Jingellic, NSW. It is found in dry sclerophyll forests and grassy woodlands. It is commonly amongst low heathy shrubs and within Box-Ironbark ecosystems. They typically grow in gravelly or stony sand and clay loam, and always in well-draining soil.	**Absent** No dry forests, grassy woodland or heathy shrubs in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Caladenia tessellate **Thick Lip Spider Orchid** **BC-E, EPBC-V**	The Thick Lip Spider Orchid (*Caladenia tessellate*) has been found in Sydney, Wyong, Ulladulla and Braidwood. It is also found on the east coast of Victoria, from east Melbourne, up to near the NSW boarder. It is primarily found in grassy sclerophyll woodland, but has been found in low woodland, in stony soil. In Victoria, it is found in healthlands, grassy or heathy woodlands and grassy or sedgy open forests. Typically, this species occurs on clay loam or sandy soils.	**Absent** No grassy or heathy woodland with stony soils in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Diuris pedunculata **Small Snake Orchid** **BC-E, EPBC-E**	This species is found in north east NSW. It grows on grassy slopes or flats, in peaty or clayey or stony loam soils in moist areas. It is also found on shale and trap soils, fine granite and among boulders. It has been found in open areas of dry sclerophyll forests with grassy understories, in riparian forests, swap forests, sub-alpine grasslands and herbfields.	**Absent** No grassy slopes or flats in peaty, clayey or stony loam soils in study area.	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Prasophyllum petilum **Tarengo Leek Orchid** **BC-E. EPBC-E**	The Tarengo Leek Orchid is known to occur in Boorowa, Queanbeyan, Ilford, Delegate and west of Muswellbrook. This species has been found in open grassy woodland and grassland and prefers moist environments. It is found primarily in loam, clay or sandy soils.	**Absent** No grassy woodland or grasslands in study area.	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Aladenia tensa **Greencomb Spider-orchid** **EPBC - E**	Grows on red-brown sandy loams on rises in open woodland dominated by Yellow Gum (Eucalyptus leucoxylon sens. lat.) and Rottnest Island Pine (Callitris preissii). Its habitat, between the Little Desert and Big Desert, was formerly expansive and extended into SA (Carr 1991). This species has also been recorded from Black Box (Eucalyptus largiflorens)/Yellow Gum woodland and mallee/heathland	**Absent** Characteristic species not present	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Trees				
Eucalyptus aggregate **Black Gum** **BC-V, EPBC-V**	This species is found in the NSW Central and Southern Tablelands, and small numbers occur in Victoria and the ACT. It typically occurs in the cooler, higher, wetter areas of the tablelands. They grow on alluvial soils on cold, poorly-drained flats and hollows next to creeks and rivers. Often found in open, grassy woodland with other Eucalypt species and few shrubs.	**Absent** No open grassy woodlands in study area.	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
Eucalyptus alligatrix subsp. Alligatrix **BC-V, EPBC- V**	Only known at a single location south-west of Rylston. It grows in dry sclerophyll woodland on shallow relatively infertile soils (grey brown loam with ironstone). It may have been part of a more-extensive open woodland community prior to the commencement of clearing and grazing.	**Absent** No dry woodland in study area.	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
Eucalyptus cannonii **Capertree Stringybark** **BC-V**	The Capertee Stringybark is predominantly restricted to the central tablelands and slopes of NSW between the Golden Highway and the Mitchell Highway. The species' distribution is bounded from east of Bathurst, to Wallerwang near Lithgow, north along the western edge of Wollemi National Park and north-west to Mudgee; isolated occurrences are known from a short way north of Goulburn River National Park between Dunedoo and Merriwa.	**Absent** Study area is outside species known distribution	**Unlikely** Species not detected during site survey	**No** Species unlikely to occur in study area
Eucalyptus robertsonii subsp. Hemisphaerica **Robertson's Peppermint** **BC-V, EPBC- V**	It is only known in the central tablelands in NSW, from Orange to Burraga. This species occurs in grassy or dry sclerophyll forest or woodland, in sheltered locations. It grows on quartzite ridges, upper slopes and on shallow clay.	**Absent** No grassy or dry woodland in study area.	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
EECs				

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions **BC – E**	Tall woodland or open forest dominated by Fuzzy Box Eucalyptus conica, often with Grey Box Eucalyptus microcarpa, Yellow Box Eucalyptus melliodora, or Kurrajong Brachychiton populneus. Buloke Allocasuarina luehmannii is common in places. Shrubs are generally sparse, and the groundcover moderately dense, but varies with season. Found on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly found in the Dubbo-Narromine-Parkes-Forbes area. Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes. Community often occurs upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats. Shrubs include Wilga, Deane's Wattle, Hop Bush, Cassia, Water Bush and Sifton Bush.	**Absent** Characteristic species not present.	**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia **EPBC- E**	Predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt and ranges from central New South Wales through northern and central Victoria into South Australia. In NSW it can be transitional between the temperate lower slopes and tablelands occupied by, e.g. the EPBC Act-listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community, and the semi-arid floodplain communities. Generally occurs in landscapes of low-relief such as flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. The ecological community may extend to more elevated hillslopes on the fringes of its range where it intergrades with other woodland or dry sclerophyll forest communities. Often occurs on productive soils derived from alluvial or colluvial materials but may occur on a range of substrates. Soils include: duplex soils; red-brown earths; gradational soils; non-calceric and calceric browns with variable textures including sandy clay loam, clay loam, sandy loam, loam, heavy clay; and loams with quartzite surface stones and rocky outcroppings in the Mount Lofty Ranges. Gilgai topography may be present. The ecological community tends to occupy drier sites within the belt of grassy woodlands in south-eastern Australia (Prober and Thiele, 1993). The mean annual rainfall associated with the distribution of the ecological community lies in the range 375-700 mm/year. The typical structure of ecological community is a woodland to open forest with a canopy dominated by eucalypts and an understorey with a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and graminoids. Tussock grasses dominate the ground layer vegetation, though other graminoids or forbs may be common. Chenopods also may be present in the ground layer. The tree canopy is dominated (≥ 50% canopy crown cover) by Eucalyptus microcarpa (Grey Box). Widespread associated tree species that may be present include: Allocasuarina luehmannii (Buloke), Brachychiton populneus (Kurrajong), Callitris glaucophylla (White Cypress Pine), Eucalyptus albens (White Box), E. camaldulensis (River Red Gum), E. conica (Fuzzy Box), E. leucoxylon (Yellow Gum, SA Blue Gum), E. melliodora (Yellow Box) and E. populnea (Bimble Box, Poplar Box). The ground layer also is highly variable in development and composition, ranging from almost absent to mostly grassy to forb-rich. Ground layer flora commonly present include one or more of the graminoid genera: Austrodanthonia, Austrostipa, Elymus, Enteropogon, Dianella and Lomandra; and one or more of the chenopod genera: Atriplex, Chenopodium, Einadia, Enchylaena, Maireana, Salsola and Sclerolaena. Derived grasslands are a special state of the ecological community, whereby the canopy and mid layers have been mostly removed to <10% crown cover but the native ground layer remains largely intact, with 50% or more of the total vegetation cover being native.	**Absent** Characteristic species not present.	**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Mallee and Mallee-Broombush dominated Woodland and Shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion **BC-CEEC**	A low woodland that occurs in the West Wyalong area. The trees are *Eucalyptus polybractea* (Blue Mallee), *Eucalyptus behriana* (Bull Mallee), *Eucalyptus viridis* (Green Mallee), *Eucalyptus dumosa* (White Mallee) which may occur in varying proportions and not necessarily together. Understorey shrubs and groundcovers can be present in varying densities, from sparse to dense depending on site management history and substrate. *Melaleuca uncinata* (Broombush) may or may not occur. Mainly occurs on red loamy soils. Has been recorded from the local government areas of Bland and Temora, within the NSW South Western Slopes Bioregion, but may occur elsewhere in the Bioregion. Has a very highly restricted distribution, with known occurrences falling within a region of less than 4000 km2 bounded by Lake Cowal - Temora - Ardlethan - Ungarie. Occurs mainly on private lands and roadside easements.	**Absent** Characteristic species not present.	**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions **BC-EEC, EPBC-EEC**	Scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes Acacia pendula (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and summer grasses are more common further north. In some areas the shrub and canopy stratum may have been reduced or eliminated by clearing or heavy grazing, leaving derived grassland that may still constitute this community. This EEC is known from parts of the Local Government Areas of Berrigan, Bland, Bogan, Carrathool, Conargo, Coolamon, Coonamble, Corowa, Forbes, Gilgandra, Griffith, Gwydir, Inverell, Jerilderee, Lachlan, Leeton, Lockhart, Moree Plains, Murray, Murrumbidgee, Narrabri, Narranderra, Narromine, Parkes, Urana, Wagga Wagga and Warren, and but may occur elsewhere in these bioregions.	**Absent** Characteristic species not present.	**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions **BC - EEC**	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions is the name given to the ecological community dominated by White Cypress Pine (*Callitris glaucophylla*). Sandhill Pine Woodland is characterised by an open tree stratum, which may be reduced to isolated individuals or may be absent as a result of past clearing. The tree layer is dominated by *C. glaucophylla*, either in pure stands or with a range of other less abundant trees or tall shrubs. In the Riverina bioregion and the far south-western portion of the NSW South Western Slopes bioregion, the community is typically associated with prior streams and aeolian source-bordering dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. Sandhill Pine Woodland typically occupies red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries, and on parts of the sandplain in south-western NSW. The structure of the community varies depending on past and current disturbances, particularly clearing, logging, grazing and soil erosion, with species composition of sites being influenced by their size, recent rainfall or drought conditions and by their disturbance history, including grazing, land clearing and fire.	**Absent** Characteristic species not present.	**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Species	Description of habitat[3]	Presence of habitat	Likelihood of occurrence	Possible impact?
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland **BC – E** **EPBC - CE**	Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. Commonly co-occurring eucalypts include Apple Box (E. bridgesiana), Red Box (E. polyanthemos), Candlebark (E. rubida), Snow Gum (E. pauciflora), Argyle Apple (E. cinerea), Brittle Gum (E. mannifera), Red Stringybark (E. macrorhyncha), Grey Box (E. microcarpa), Cabbage Gum (E. amplifolia) and others. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (Themeda australis), Poa Tussock (Poa sieberiana), wallaby grasses (Austrodanthonia spp.), spear-grasses (Austrostipa spp.), Common Everlasting (Chrysocephalum apiculatum), Scrambled Eggs (Goodenia pinnatifida), Small St John's Wort (Hypericum gramineum), Narrow-leafed New Holland Daisy (Vittadinia muelleri) and blue-bells (Wahlenbergia spp.). Shrubs are generally sparse or absent, though they may be locally common. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant. Some of the component species (e.g. wattles, she-oaks, native legumes) fix nitrogen that is made available to other species in the community, while fallen timber and leaves recycle their nutrients. Disturbed remnants are considered to form part of the community, including where the vegetation would respond to assisted natural regeneration.	**Absent** Characteristic species not present.	**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Evaluation of the likelihood and extent of impact on threatened fauna

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Aves				
Anseranas semipalmata **Magpie Goose** **BC-V**	Typically found in shallow wetlands (less than 1m deep) with dense growth of rushes or sedges. Occupies both aquatic and terrestrial habitats. Found in arid and riverine shrublands (Chenopod formation), forested wetlands, freshwater wetlands, dry ephemeral swamps, floodplains, grasslands and semi-arid woodlands. Wetlands are important habitat, particularly those on floodplains and large shallow wetlands created by runoff. Nests are formed in trees over deep water. Breeding can occur in summer and winter, and is dependent on rain and water levels.	**Absent** No large shallow wetlands with dense growth of rushes or sedges in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Anthochaera phrygia **Regent Honeyeater** **BC - CE** **EPBC – CE**	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS, 1999 177 /id) (Pizzey, 1997). A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS, 1999 177 /id) (Pizzey, 1997).	**Absent** No box-ironbark woodlands in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Ardeotis australis **Australian Bustard** **BC-E**	This species primarily inhabits inland Australia. Breeding now only occurs in the north-west region of NSW. It mainly occurs in tussock and hummock grasslands (with a preference for tussock). Occasionally they occur on pastoral and cropping land and near dams. They breed on bare ground on low sandy ridges or stony rises between grassland and shrubland cover.	**Absent** No tussock and hummock grasslands or bare ground on low sandy ridges in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

[4] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's *Species Profiles and Threats* database (SPRAT) unless otherwise stated.
OEH threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Artamus cyanopterus cyanopterus **Dusky Woodswallow** **BC – V**	The dusky woodswallow are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. The species primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Most breeding activity occurs on the western slopes of the Great Dividing Range.	**Absent** No dry open forest or woodlands in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Botaurus poiciloptilus **Australasian Bittern** **EPBC – E** **BC - E**	In NSW, this species occurs along the coast and is frequently recorded in the Murray-Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.). Nests are built in secluded places in densely-vegetated wetlands on a platform of reeds.	**Absent** No permanent freshwater wetlands with tall dense vegetation in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Burhinus grallarius **Bush Stone-curlew** **BC - E**	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	**Absent** No open woodlands with fallen timber in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Calidris ferruginea **Curlew Sandpiper** **EPBC - CE**	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh.	**Absent** No mudflats, coastal areas, lakes, dams or waterholes with bare edges of mud or sand in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Callocephalon fimbriatum **Gang-gang Cockatoo** **BC-V**	In NSW, this species is found from the south-eastern coast to the Hunter region, and west to the Central tablelands and south-west slopes. It is common in the ACT. During spring and summer, it is found in tall mountain forests and woodlands. There is a preference for heavily timbered and mature wet sclerophyll forests. During autumn and winter, species move to lower altitudes and occupy drier, more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas. It may also occur in sub-alpine Snow Gum woodland and temperate rainforests. Prefers old growth forest and woodlands that have eucalypt hollows (10cm in diameter or larger and 9m above the ground).	**Absent** Moist woodland is present, however the site lacks suitable hollows.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Calyptorhynchus lathami **Glossy Black-Cockatoo** **BC-V**	This species is widespread throughout eastern to central NSW. They occur in open forest and woodlands on the coast and the Great Dividing Range. Clack Sheoak and Forest Sheoak are important food sources. Inland birds feed on other Sheoaks including Drooping Sheoak, Allocasuaraina diminuta, A. gymnathera and Belah. They are dependent on large hollow-bearing eucalpyts for nesting. Where food sources are appropriate, they inhabit dry and wet sclerophyll, forests, forested wetlands, grassy woodlands, freshwater wetlands, heathlands, rainforests and semi-arid woodlands.	**Absent** Moist woodland is present, however the site lacks suitable hollows and Sheoaks.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Certhionyx variegatrus **Pied Honeyeater** **BC - V**	Inhabits wattle shrub, primarily Mulga (Acacia aneura), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (Eremophila spp.); also from mistletoes and various other shrubs (e.g. Grevillea spp.); also eats saltbush fruit, berries, seed, flowers and insects.	**Absent** The study area has almost no shrub layer and characteristic species are not present	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Chthonicola sagittate **Speckled Warbler** **BC - V**	Lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	**Absent** No rocky ridges or gullies with scattered native tussock grasses in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Circus assimilis **Spotted Harrier** **BC – V**	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.	**Absent** No native grassland in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Climacteris picumnus victoriae **Brown Tree Creeper (Eastern Species)** **BC – V**	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Hollows in standing dead or live trees and tree stumps are essential for nesting.	**Absent** River Red Gums are present in the study area, however the site lacks shrubs and fallen timber.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Daphoenositta chrysoptera **Varied Sittella** **BC - V**	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	**Present** Eucalypt forest in study area.	**Possible** Suitable habitat present.	**Yes** AoS completed
Ephippiorhynchus asiaticus **Black -necked Stork** **BC - E**	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries.	**Present** Watercourses in study area.	**Unlikely** Study area outside species known distribution	**No** Species unlikely to occur in study area
Epthianura albifrons **White-fronted Chat** **BC-V**	This species is widespread throughout NSW, mostly in the southern end of the state. Typically found in temperate to arid climates and occasionally sub-tropical areas. Occurs in foothills and lowlands up to 1000m above sea level. It is found in saltmarsh vegetation, open grasslands and sometimes in low shrubs adjacent to wetland areas. Nests are open cut and built-in low vegetation (23cm-2.5m above the ground).	**Absent** No saltmarsh vegetation, open grasslands or low shrubs in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Falco hypoleucos **Grey Falcon** **BC - E**	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW.	**Absent** Wooded watercourse in study area, however the locality has more than 500 mm in rainfall.	**Unlikely** Suitable habitat not present. Species may be a vagrant visitor	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Falco subniger **Black Falcon** **BC-V**	The black falcon is widely distributed in NSW, mostly occurring inland. They occur in woodland, shrubland and grassland in the arid and semi-arid zones. They use wetlands and streams for hunting. They also use remnant vegetation occasionally.	**Present** Wooded watercourse in study area.	**Possible** Suitable habitat present, species has been recorded within 10 km .	**Yes** AoS completed
Glossopsitta porphyrocephala **Purple-crowned Lorikeet** **BC - V**	Found in open forests and woodlands, particularly where there are large flowering eucalypts. Also recorded from mallee habitats. Breeds away from feeding areas, utilising hollow branches or holes in trees. Also roosts in dense vegetation up to several kilometres away from feeding areas.	**Present** Flowering eucalypts with hollows in study area, however the site is highly disturbed.	**Unlikely** Suitable habitat present, however, there are no records within 10 km.	**No** Species unlikely to occur in study area
Glossopsitta pusilla **Little Lorikeet** **BC-V**	This species is found along the coast and Great Divide regions of eastern Australia and is found as far west as Dubbo and Albury. Primarily found in the canopy of open *Eucaluptus* forest and woodland and also found with *Angophora, Melaleuca* and other tree species. They utilise paddock and other remnant trees as a supplementary food source. Roost in treetops. Nests are in hollows in the limb or trunk of smooth barked Eucalypts. The entrance is approximately 3cm and 2-15m above the ground.	**Present** Eucalypt woodland with hollows in study area.	**Possible** Suitable habitat present. Records found nearby to the site	**Yes** AoS completed
Grantiella picta **Painted Honeyeater** **BC – V** **EPBC – V**	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	**Present** Eucalypt woodland in study area.	**Unlikely** Suitable habitat present, however, there are no records within 10 km.	**No** Species unlikely to occur in study area
Grus rubicunda **Brolga** **BC-V**	Brolgas feed in dry grassland and ploughed paddocks and are depended on wetlands, particularly shallow swamps. They are found in arid shrublands, forested wetlands, freshwater wetlands, grasslands, saline wetlands and semi-arid woodlands (grassy and shrub formation)	**Absent** No forested wetlands, freshwater wetlands, grasslands, saline wetlands or semi-arid woodlands in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Haliaeetus leucogaster **White-bellied Sea-Eagle** **BC - V**	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby.	**Absent** No areas of large open water study area.	**Unlikely** Suitable habitat not present, species may be a vagrant visitor and fly over the site.	**No** Species unlikely to occur in study area
Hamirostra melanosternon **Black-breasted Buzzard** **BC - V**	Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands. Breeds from August to October near water in a tall tree.	**Present** Timbered watercourse in study area.	**Unlikely** Suitable habitat present, however, there are no records within 10 km.	**No** Species unlikely to occur in study area
Hieraaetus morphnoides **Little Eagle** **BC - V**	The Little Eagle occurs as a single population throughout NSW. It occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	**Present** Riparian woodland in study area.	**Possible** Suitable habitat present. Records found nearby to the site	**Yes** AoS completed
Ixobrychus flavicollis **Black Bittern** **BC - V**	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. During the day, roosts in trees or on the ground amongst dense reeds.	**Absent** No areas of dense vegetation study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Leipoa ocellate **Malleefowl** **EPBC-V**	Occurs in NSW in the south west centred on Mallee Cliffs NP and extending east to near Balranald and scattered records as far north as Mungo NP. Also occurs in the Scotia mallee including Tarawi NR and Scotia Sanctuary and is part of a larger population north of the Murray River in South Australia. Further east, a population continues to persist in the Goonoo forest near Dubbo. Outside these areas, occasional records have been made in the Pilliga forests Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species. Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers. Mainly forage in open areas on seeds of acacias and other native shrubs (Cassia, Beyeria, Bossiaea), buds, flowers and fruits of herbs and various shrubs, insects (cockroaches, ants, soil invertebrates), and cereals if available. Incubate eggs in large mounds that contain considerable volumes of sandy soil.	**Absent** No mallee communities in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Limosa limosa **Black-tailed Godwit** **BC - V**	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Roosts and loafs on low banks of mud, sand and shell bars.	**Absent** Proposal is not in a coastal area. No muddy lakes or swamps in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Lophoictinia isura **Square-tailed Kite** **BC - V**	Found in a variety of timbered habitats including dry woodlands and open forests. Particularly prefers timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	**Present** Timbered watercourse in study area.	**Unlikely** Suitable habitat present, however, there are no records within 10 km. Species may be a vagrant visitor.	**No** Species unlikely to occur in study area
Lophochroa leadbeateri **Major Mitchell's Cockatoo** **BC-V**	In NSW this species occurs commonly as far east as Bourke and Griffith and is scattered further east than that. They are found in treed and treeless inland habitats and are always close to water. Nest in tree hollows in the latter half of the year. Nests are at least 1km apart. They are found in arid shrublands, dry sclerophyll forests, forested woodlands, grasslands and semi-arid woodlands.	**Absent** Timbered watercourse is present, however the site lacks suitable hollows for long term use	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Lathamus discolour **Swift Parrot** **BC - E** **EPBC - CE**	Occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*. They breed in Tasmania from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum Eucalyptus globulus.	**Absent** Feed tree species not present, site is highly disturbed.	**Unlikely** Suitable habitat not present. Species may be a vagrant vistor	**No** Species unlikely to occur in study area
Melanodryas cucullate cucullate **Hooded Robin** **BC -V**	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches.	**Absent** Site lacks structurally diverse habitat features.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Melithreptus gularis gularis **Black-chinned Honeyeater** **BC - V**	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (Eucalyptus sideroxylon), White Box (E. albens), Inland Grey Box (E. microcarpa), Yellow Box (E. melliodora), Blakely's Red Gum (E. blakelyi) and Forest Red Gum (E. tereticornis). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	**Absent** No dry woodland in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Neophema pulchella **Turquoise Parrot** **BC - V**	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Nests in tree hollows, logs or posts, from August to December. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine Syncarpia glomulifera, Black She-oak Allocasuarina littoralis, Blackwood Acacia melanoxylon, Rough-barked Apple Angophora floribunda, Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species.	**Present** Eucalypt woodland with hollows in study area.	**Possible** Suitable habitat present. Records found nearby to the site	**Yes** AoS completed

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Ninnox connivens **Barking Owl** **BC - V**	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species. Requires very large permanent territories in most habitats due to sparse prey densities. Eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used.	**Absent** Timbered watercourse in study area, however the site lacks large areas of permanent habitat..	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Ninox strenua **Powerful Owl** **BC - V**	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine Syncarpia glomulifera, Black She-oak Allocasuarina littoralis, Blackwood Acacia melanoxylon, Rough-barked Apple Angophora floribunda, Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species. Nests in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	**Absent** Timbered watercourse in study area, however the site lacks large areas of permanent habitat.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Numenius madagascariensis **Eastern Curlew, Far Eastern Curlew** **EPBC - CE**	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. The Eastern Curlew mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The Eastern Curlew roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands.	**Absent** No intertidal sandflats or mudflats in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Oxyura australis **Blue-billed Duck** **BC -V**	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. Will feed by day far from the shore, particularly if dense cover is available in the central parts of the wetland. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies. Usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes.	**Absent** No permanent wetlands with deep water and dense vegetation in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Pachycephala inornata **Gilberts Whistler** **BC - V**	The Gilbert's Whistler occurs in a range of habitats within NSW, though the shared feature appears to be a dense shrub layer. It is widely recorded in mallee shrublands, but also occurs in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests, though at this stage it is only known to use this habitat along the Murray, Edwards and Wakool Rivers. Within the mallee the species is often found in association with an understorey of spinifex and low shrubs including wattles, hakeas, sennas and hop-bushes. In woodland habitats, the understorey comprises dense patches of shrubs, particularly thickets of regrowth Callitris pine. Parasitic 'cherries' (Exocarpus species) appear to be an important habitat component in Belah and Red Gum communities, though in the latter case other dense shrubs, such as Lignum and wattles, are also utilised.	**Absent** River Red Gum forest present, however the site has limited understorey growth and no Exocarpus species present.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Pandion cristatus **Eastern Osprey** **BC - V**	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	**Absent** Proposal does not occur in a coastal area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Petroica boodang **Scarlet Robin** **BC – V**	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	**Absent** Wet forested woodland present however the site lacks an abundance of fallen timber.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Petroica phoenicea **Flame Robin** **BC – V**	The Flame Robin is endemic to SE Australia, and ranges from near the Queensland border to SE South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The ground layer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains).	**Absent** Study area lacks a groundcover dominated by native grasses.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Petroica rodinogaster **Pink Robin** **BC - V**	Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Nests are situated in an upright or oblique fork, from 30cm to 6m above the ground, in deep undergrowth.	**Absent** No dense vegetated gullies in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Polytelis swainsonii **Superb Parrot** **EPBC – V, BC - V**	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box.	**Present** River Red Gum woodland with hollows in study area.	**Possible** Suitable habitat present. Many records found nearby	**Yes** AoS completed

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Pomatostomus temporalis temporalis **Grey-crowned Babbler (eastern subspecies)** **BC-V**	The eastern subspecies (*temporalis)* occurs from Cape York south through Queensland, NSW and Victoria and formerly to the south east of South Australia. In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Birds are generally unable to cross large open areas. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. Build and maintain several conspicuous, dome-shaped stick nests about the size of a football. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, and old nests are often dismantled to build new ones. Breed between July and February.	**Absent** No Box-Gum woodland in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Rostratula australis **Australian Painted Snipe** **EPBC - E**	They feed in shallow water or at the waters' edge and on mudflats. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites. Primarily occurs along the east coast from north Queensland (excluding Cape York) to the Eyre Peninsula in South Australia, including the majority of Victoria and NSW. In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds.	**Absent** No mudflats in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Stagonopleura guttata **Diamond Firetail** **BC – V**	The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW. Also found in the Australian Capital Territory, Queensland, Victoria and South Australia. Groups separate into small colonies to breed, between August and January. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).	**Present** Riparian River Red Gum woodland with hollows in study area.	**Possible** Suitable habitat present.	**Yes** AoS completed
Stictonetta naevosa **Freckled Duck** **BC-V**	This species breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system. It typically occurs in south-eastern and south-western Australia but disperses during drought. In these times it can occur in coastal NSW and Victoria. They prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. When these areas are dry, the move to other waters such as lakes, reservoirs, farm dams and sewage ponds. Nests are usually found in dense vegetation at or near water level. They usually breed between October and November, but can also at other times.	**Absent** No swamps with dense vegetation in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Tyto novaehollandiae **Masked Owl** **BC – V**	Extends from the coast where it is most abundant to the western plains. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Habitat for this species is also widespread throughout the dry eucalypt forests of the tablelands, western slopes and the undulating wet-dry forests of the coast. Optimal habitat includes an open understorey and a mosaic of sparse (grassy) and dense (shrubby) ground cover on gentle terrain. Roosts in hollows in live or occasionally dead eucalypts; dense foliage in gullies; and caves. Nest in old hollow eucalypts, live or dead, in a variety of topographic positions, with hollows greater than 40 cm wide and greater than 100 cm deep. Hollow entrances are at least 3 m above ground, in trees of at least 90 cm diameter at breast height. A specialist predator of terrestrial mammals, particularly native rodents. Home range has been estimated as 400-1000 ha according to habitat productivity.	**Absent** Eucalypt woodland present, however the site lacks suitable understorey complexity.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Migratory Species				

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Actitis hypoleucos **Common Sandpiper** **EPBC - CE**	A group of shorebirds (also called waders) which occupy a particular area of Botany Bay and includes the characteristic assemblage of the following 20 species: Bar-tailed Godwit (*Limosa lapponica*), Red Knot (*Calidris canutus*), Great Knot (*Calidris tenuirostris*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Red-necked Stint (*Calidris ruficollis*), Common Sandpiper (*Actitis hypoleucos*), Terek Sandpiper (*Xenus cinereus*), Latham's Snipe (*Gallinago hardwickii*), Grey-tailed Tattler (*Heteroscelus brevipes*), Grey Plover (*Pluvialis squatarola*), Pacific Golden Plover (*Pluvialis fulva*), Common Greenshank (*Tringa nebularia*), Masked Lapwing (*Vanellus miles*), Marsh Sandpiper (*Tringa stagnatilis*), Ruddy Turnstone (*Arenaria interpres*), Pied Oystercatcher (*Haematopus longirostris*), Sooty Oystercatcher (*Haematopus fulinginosus*), Whimbrel (*Numenius phaeopus*), and Eastern Curlew (*Numenius madagascariensis*). Occurs on the relict muddy sand marginal shoal of the Georges River between Taren Point and Shell Point in Botany Bay. Some species identified within this community can also be found foraging and roosting at other locations within Botany Bay. In Botany Bay the shorebird community utilises roosting and foraging habitat (intertidal mud flats and sand flats),the proximity of mangroves (*Avicennia marina*) is important as roosting habitat.	**Absent** Proposal does not occur in a coastal area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Apus pacificus **Fork-tailed Swift** **EPBC - M**	This species breeds in the north-east and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia. It is common in the Kimberley, uncommon to moderately common near north-west, west and southeast coasts and rare to scarce elsewhere. They never settle voluntarily on the ground and spend most of their lives in the air, living on the insects they catch in their beaks.	**Present** Timbered watercourse in study area.	**Unlikely** Study area outside species known distribution. Species is almost exclusively aerial.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Calidris acuminate **Sharp-tailed Sandpiper** **EPBC - M**	A group of shorebirds (also called waders) which occupy a particular area of Botany Bay and includes the characteristic assemblage of the following 20 species: Bar-tailed Godwit (*Limosa lapponica*), Red Knot (*Calidris canutus*), Great Knot (*Calidris tenuirostris*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Red-necked Stint (*Calidris ruficollis*), Common Sandpiper (*Actitis hypoleucos*), Terek Sandpiper (*Xenus cinereus*), Latham's Snipe (*Gallinago hardwickii*), Grey-tailed Tattler (*Heteroscelus brevipes*), Grey Plover (*Pluvialis squatarola*), Pacific Golden Plover (*Pluvialis fulva*), Common Greenshank (*Tringa nebularia*), Masked Lapwing (*Vanellus miles*), Marsh Sandpiper (*Tringa stagnatilis*), Ruddy Turnstone (*Arenaria interpres*), Pied Oystercatcher (*Haematopus longirostris*), Sooty Oystercatcher (*Haematopus fulinginosus*), Whimbrel (*Numenius phaeopus*), and Eastern Curlew (*Numenius madagascariensis*). Occurs on the relict muddy sand marginal shoal of the Georges River between Taren Point and Shell Point in Botany Bay. Some species identified within this community can also be found foraging and roosting at other locations within Botany Bay. In Botany Bay the shorebird community utilises roosting and foraging habitat (intertidal mud flats and sand flats). For some species (Terek Sandpiper, Grey-tailed Tattler), the proximity of mangroves (*Avicennia marina*) is important as roosting habitat.	**Absent** Proposal does not occur in a coastal area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Calidris ferruginea **Curlew Sandpiper** **EPBC -M**	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh.	**Absent** No mudflats in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Calidris melanotos **Pectoral Sandpiper** **EPBC - M**	This species breeds in high-arctic tundra from the Yamal Peninsula eastwards to the Bearing Strait in Siberia and in arctic Alaska and Canada,. It is known to migrate mostly through the USA and mexico and spends most of its non-breeding months in South America. A small number of these birds are known to reach Australia and are believed to be concentrated in south-eastern Australia. This species prefers freshwater mudflats.	**Absent** No mudflats in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Gallinago hardwickii **Latham's Snipe, Japanese Snipe** **EPBC - M**	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Absent** No wetlands with dense vegetation in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Hirundapus caudacutus **White-throated Needletail** **EPBC - M**	White-throated Needletails often occur in large numbers over eastern and northern Australia. They arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. White-throated Needletails are non-breeding migrants in Australia.	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** Species unlikely to be impacted by the proposal**.**
Myiagra cyanoleuca **Satin Flycatcher** **EPBC - M**	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea.. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher is a migratory species, moving northwards in winter to northern Queensland and Papua New Guinea, returning south to breed in spring..	**Absent** No heavily forest gullies in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Fish				
Galaxius rostratus **Flathead Galaxias** **CE EPBC** **CE FM**	Below 150 m in altitude. Billabongs, lakes, swamps, and rivers, with preference for still or slow-flowing waters.	**Absent** Study area is above 150 m altitude	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Maccullochella peelii **Murray Cod** **EPBC - V**	Found extensively throughout the Murray Darling Basin in the south-eastern region of Australia. Murray cod are able to live in a wide range of habitats from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. They typically spawn eggs onto firm substrates such as hollow logs, rocks, pipes and clay banks, from spring to early summer.	**Absent** Creek in study area is less than 5 m deep and lacks sheltered areas of rock, timber and overhanging banks.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Macquaria australasica **Macquarie Perch** **EPBC - E**	They are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries. The species spawn in spring or summer in shallow upland streams or flowing parts of rivers where the eggs which settle among stones and gravel of the stream or river bed.	**Absent** Creek in study area lacks river/lake features with no areas of stone or gravel.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Mammals				
Chalinolobus dwyeri **Large-eared Pied Bat** **BC – V** **EPBC - V**	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies.	**Absent** No crevices in cliffs, old mine workings or mud nests in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Chalinolobus picatus **Little Pied Bat** **BC – V**	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.	**Present** Tree hollows present	**Unlikely** Suitable habitat present, however, there are no records within +70 km	**No** Species unlikely to occur in study area.

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Cercartetus nanus **Eastern Pygmy-possum** **BC - V**	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (e.g. grass-tree skirts).	**Present** Tree hollows present	**Unlikely** Suitable habitat present, however, there are no records within +80 km	**No** Species unlikely to occur in study area.
Dasyurus maculatus **Spotted-tailed Quoll** **BC-V, EPBC-E**	In NSW, this species only known to occur in the east. It occupies a range of habitats including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. They use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces for dens. They use communal waste sites, which typically occur on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. They can be identified by characteristic twisted faeces.	**Absent** Riparian woodland present, however, the site lacks diverse structural features	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area.
Falsistrellus tasmaniensis **Eastern False Pipistrelle** **BC-V**	It is found on the south-east coast and ranges of Australia. They prefer moist habitats with trees more than 20m tall. They prefer to roost in eucalypt hollows but have been found under loose bark on trees. They hibernate in winter, and females are pregnant during late spring to early summer. Found in dry sclerophyll forests, forested wetlands, freshwater wetlands, grassy woodlands, heathlands and rainforests.	**Present** Tree hollows present	**Unlikely** Suitable habitat present, however there are no records within +30 km	**No** Species unlikely to occur in study area.
Miniopterus schreibersii oceanensis **Eastern Bentwing – bat** **BC - V**	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Cold caves are used for hibernation in southern Australia. Hunt in forested areas, catching moths and other flying insects above the tree tops.	**Absent** No derelict mines, storm-water tunnels, buildings and other man-made structures suitable for roosting in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Myotis Macropus **Southern Myotis** **BC - V**	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish.	**Absent** Tree hollows present, the proposal area is more than 100 km inland.	**Possible** Suitable habitat not present. Records available for species near the site	**Yes** AoS completed

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Nyctophilus corbeni **Corben's Long-eared Bat, South-eastern Long-eared Bat** **BC - V** **EPBC - V**	Inhabits a variety of vegetation types, including mallee, bulloke Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	**Present** Eucalypt woodland with hollows in study area.	**Possible** Suitable habitat present.	**Yes** AoS completed
Petaurus australis **Yellow-bellied Glider** **BC - V**	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Roosts in hollows of large trees.	**Absent** Proposal does not occur in a high rainfall area with nutrient rich soils.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Petaurus norfolcensis **Squirrel Glider** **BC - E**	Inhabits a wide range of open forest, woodland and riverine forest habitats. Utilise remnants of various sizes, including small remnants and even small stands of trees within Travelling Stock Reserves, roadside reserves or private land. Often utilise linear remnant vegetation along roadsides or rivers and streams. Eucalypt species known to provide suitable denning and foraging resources include (but are not restricted to): Blakely's Red Gum (Eucalyptus blakelyi), Grey Box (E. microcarpa), Red Box (E. polyanthemos), Mugga Ironbark (E. sideroxylon), River Red Gum (E. camaldulensis), White Box (E. albens) and Yellow Box (E. melliodora). Require abundant tree hollows for refuge and nest sites, so are more likely to inhabit mature or old growth forest.	**Present** River Red Gums present, abundance of suitable hollows.	**Likely** Suitable habitat present and observations have been made nearby.	**Yes** AoS completed
Petrogale penicillate **Brush-tailed Rock-wallaby** **BC-E, EPBC-V**	In NSW this species occurs from the Queensland boarder down to Shoalhaven and as far west as the Warrumbungle Ranges. They habitat rocky escarpments, outcrops and cliffs. They prefer complex structures with fissures, caves and ledges. They are primarily found in North and sometimes South facing slopes. They are heavily associated with sense arboreal cover (especially fig trees). They are found on slopes near dense rainforest, wet and dry sclerophyll forest, vine ticket and open forest.	**Absent** No rocky escarpments, outcrops or cliffs in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Phascogale tapoatafa **Brush-tailed Phascogale** **BC-V**	This species is mainly found to the east of the Great Dividing Range, with occasional records to the west. They prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. They are also found in heath, swamps, rainforest and wet sclerophyll forest. They nest and take shelter in tree hollows with entrances 2.5-4cm wide.	**Absent** No open forest in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Phascolarctos cinereus ***Koala*** **BC - V** **EPBC - V**	In NSW it mainly occurs on the central and north coasts with some populations in the western region. The koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains.	**Present** Eucalypt woodland with feed tree species in study are	**Possible** Suitable habitat present.	**No** Refer to section 6.5
Pteropus poliocephalus **Grey-headed Flying-fox** **BC – V** **EPBC - V**	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	**Absent** No gullies with dense vegetation in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Saccolaimus flaviventris **Yellow-bellied Sheathtail-bat** **BC – V**	Roosts in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March.	**Present** Tree hollows present	**Possible** Suitable habitat present. Records available within Wagga City limits.	**Yes** AoS completed
Amphibians				
Crinia sloanei **Sloane's Froglet** **BC-V**	This species is widely distributed in the floodplains of the Murray Darling Basin. It has been found in dry sclerophyll forests (shrub/grass formation), forested wetlands (Blakely's Red Gum x Dirty Gum, River Red Gum herbaceous, River Red Gum swampy woodland wetland), freshwater wetlands, grassy woodlands (floodplain transition woodlands) and water bodies such as rivers, lakes and streams.	**Absent** River Red Gum present, however the site lacks grassy aquatic vegetation and is highly disturbed.	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Litoria booroolongensis **Booroolong frog** **BC – E** **EPBC - E**	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	**Absent** Creek occurs within the proposal area, however the site lacks cobble banks and submerged rock structures.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Litoria raniformis **Growling Grass Frog, Southern Bell Frog** **BC - E** **EPBC - V**	Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. During the breeding season animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crops. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.	**Absent** No Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs in study area.	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area
Reptiles				
Aprasia parapulchella **Pink-tailed Worm-lizard, Pink-tailed Legless Lizard** **EPBC – V** **BC - V**	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks.	**Absent** No open woodland with a native groundcover or rocky outcrops in study area.	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Delmar impar **Striped Legless Lizard** **BC – V** **EPBC - V**	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass Themeda australis, spear-grasses Austrostipa spp. and poa tussocks Poa spp., and occasionally wallaby grasses Austrodanthonia spp. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.	**Absent** No open woodland with a native groundcover or surface rocks in study area.	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area
Hoplocephalus bitorquatus **Pale-headed Snake** **BC -V**	Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas. Shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees.	**Present** Riparian woodland with hollows in study area.	**Unlikely** Suitable habitat present, however study area is outside species known distribution and there are no records within 10 km	**No** Species unlikely to occur in study area
Varanus rosenbergi **Rosenberg's Goanna** **BC - V**	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	**Absent** No termite mounds in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Invertebrates				
Synemon plana **Golden Sun Moth** **BC-E, EPBC-CE**	This species is found between Queanbeyan, Gunning, Young and Tumut. It is found in Natural Temperate Grasslands and grassy Box-Gum Woodlands only when the groundcover is dominated by wallaby grasses. These areas are typically low and open. Bare ground between tussocks is important habitat.	**Absent** No Box-Gum grassy woodland with wallaby grasses in study area.	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
E BC = listed as Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016* **E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*** **V BC = listed as Vulnerable under Schedule 2 of the *Biodiversity Conservation Act 2016.*** **V EPBC = listed as Vulnerable under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*** **M EPBC = listed as Migratory under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.***		**CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*** **CAMBA = Chinese-Australia Migratory Bird Agreement** **JAMBA = Japan- Australia Migratory Bird Agreement**		

Appendix J

Threatened species assessments of significance

Biodiversity Conservation Act FIVE–part test

Part 7.3 of the *Biodiversity Conservation Act 2016* (BC Act) specifies five factors to be taken into account in deciding whether a development is likely to significantly affect threatened species, populations or ecological communities, or their habitats, listed at the state level under the *Biodiversity Conservation Act 2016*.

This *Five-part Test* characterises the significance of likely impacts associated with the proposal on the following species:

- Birds
- Varied Sittella (*Daphoenositta chrysoptera*) –V
- Black Falcon (*Falco subniger*) –V
- Little Eagle (Hieraaetus morphnoides) – V
- Superb Parrot (*Polytelis swainsonii*) - V
- Turquoise Parrot (*Neophema pulchella*) - V
- Little Lorikeet (*Glossopsitta pusilla*) - V
- Diamond Firetail (*Stagonopleura guttata*) - V
- Mammals
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – V
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) – V
- Southern Myotis (*Myotis Macropus*) – V
- Squirrel Glider (*Petaurus norfolcensis*) - E
- Flora
- Small Scurf-pea (*Cullen parvum*) – E

a) In the case of a threatened species, whether the proposed development is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
Birds: Varied Sittella, Black Falcon, Little Eagle, Superb Parrot, Turquoise Parrot, Little Lorikeet, Diamond Firetail
Potential habitat for Varied Sittella, Black Falcon, Little Eagle, Superb Parrot, Turquoise Parrot, Little Lorikeet, and Diamond Firetail occurs within the study area. These species were not detected during the site survey; however no targeted surveys were completed. The proposed work would require the removal of 0.20 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.30 ha of exotic vegetation and 0.15 ha of planted native vegetation. Two hollow bearing trees would be removed and fallen timber would be retained on site.

While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. It is unlikely that the proposal would have an adverse impact on the life cycle of these species, such that a viable local population is likely to be placed at risk of extinction.

Mammals: Corben's Long-eared Bat, Yellow-bellied Sheathtail Bat, Southern Myotis, Squirrel Glider

The bats identified above are known to roost in tree hollows, crevices and under loose bark and the squirrel glider is known to roost exclusively in tree hollows. Potential habitat for these mammals occurs within the construction footprint. These species were not detected during the site survey; however no targeted surveys were completed.

The proposal would result in the removal of approximately 0.20 ha (PCT 5) of suitable roosting habitat. Two hollow bearing trees would be removed and fallen timber would be retained on site. Mitigation measures are proposed for the removal of hollow-bearing trees.

While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. With the implementation of mitigation measures, it is unlikely that the proposal would have an adverse impact on the life cycle of these species, such that a viable local population is likely to be placed at risk of extinction.

Flora: Small Scurf-pea

The Small Scurf-pea population is known to occur in grasslands, River Red Gum Woodland and Box-Gum Woodland. There are four key management areas for this species, none of which occur within the proposal area. This species can occur on grazed land, usually along table drains or adjacent to drainage lines or watercourses. The site survey was conducted outside the survey period for this species.

The proposed work would require the removal of 0.20 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.30 ha of exotic vegetation and 0.15 ha of planted native vegetation.

Whilst there is potential for the Small Scurf-pea to occur within the proposal area, the proposal would also only impact a small area of low-quality habitat and is considered unlikely to have an adverse impact upon the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

b) In the case of an endangered ecological community, or critically endangered ecological community, whether the proposed development or activity:

a. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

b. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Birds

Not applicable

Mammals

Not applicable

Flora

Not applicable

c) In relation to the habitat of a threatened species or ecological community:

i. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

ii.	**Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
iii.	**The importance of the habitat to be removed, modified, fragmented or isolated to the long term survival of the species or ecological community in the locality.**
Birds	
i.	The proposed work would require the removal of 0.20 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.30 ha of exotic vegetation and 0.15 ha of planted native vegetation. Two hollow bearing trees would be removed.
ii.	The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.20 ha) of potential habitat. The area of habitat is unlikely to become further fragmented or isolated from other areas of habitat as a result of the proposal.
iii.	Habitat within the construction footprint is low-quality and frequently disturbed. It is considered unlikely that the habitat to be disturbed is important to the long-term survival of the community in the locality.
Mammals	
i.	The proposal would require the permanent removal of approximately 0.20 ha (PCT 5) of suitable roosting habitat. Two hollow bearing trees would be removed.
ii.	The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.20 ha) of potential habitat. The area of habitat is unlikely to become further fragmented or isolated from other areas of habitat as a result of the proposal.
iii.	Habitat within the construction footprint is low-quality and frequently disturbed. It is considered unlikely that the habitat to be disturbed is important to the long-term survival of the community in the locality.
Flora	
i.	The proposed work would require the removal of 0.20 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.30 ha of exotic vegetation and 0.15 ha of planted native vegetation.
ii.	The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.20 ha) of potential habitat. The area of habitat is unlikely to become further fragmented or isolated from other areas of habitat as a result of the proposal.
iii.	Habitat within the construction footprint is low-quality and frequently disturbed. It is considered unlikely that the habitat to be disturbed is important to the long-term survival of the community in the locality.
d)	**Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).**
There are no declared areas of outstanding biodiversity value within the proposal area.	
e)	**Whether the proposed development or activity is part of a key threatening process or is likely to increase the impact of a key threatening process.**
The BC Act lists numerous key threatening processes (KTP's). KTP's relevant to the proposal include the following: • Clearing of native vegetation. • Invasion of native plant communities by exotic perennial grasses. • Invasion and establishment of exotic vines and scramblers. **Clearing of Native Vegetation**	

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the Scientific Committee's determination, it was found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity.' Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off-site impacts such as downstream sedimentation. Disturbed native roadside vegetation would also be cleared as a result of the proposal. The proposal has the potential to increase the impact of this KTP. However, the contribution of this proposal would be relatively minor given the minimal amount of habitat to be removed and the extent of habitat that would remain in the local area.

Invasion of native plant communities by exotic perennial grasses

A number of exotic perennial grasses including Buffel Grass (*Cenchrus ciliaris*), Coolatai Grass (*Hyparrhenia hirta*), African Lovegrass (*Eragrostis curvula*), Chilean Needlegrass (*Nassella neesiana*) and Serrated Tussock (*Nassella trichotoma*) invade and may dominate native plant communities, competing with, and displacing, many native species. Dense monocultures of perennial grasses that develop after invasion threaten local vegetation at all sites that are affected. This may result in local and regional declines of many native species and communities, possibly to the extent that they become endangered.

The proposal involves disturbance that can lead to the establishment of exotic perennial grasses. During the site survey, none of the exotic perennial grasses listed were identified in the construction footprint. The proposal has the potential to introduce species into the proposal area. As part of the mitigation measures, it has been recommended that construction machinery would be cleaned prior to entering and exiting work sites, and regular targeted control of priority weeds would be undertaken to reduce the risk of weeds being introduced and spread. With the implementation of these measures, the proposal would be unlikely to increase the impact of this KTP.

Invasion and establishment of exotic vines and scramblers

A large number of exotic vines and scramblers have become established in New South Wales, which have significant adverse impacts on biodiversity. They can smother native vegetation and seedlings, and prevent recruitment, especially in riparian areas. The proposal involves disturbance that could lead to the establishment of exotic vines and scramblers. During the site survey, no exotic vines or scramblers were identified in the study area. As part of the mitigation measures, it has been recommended that construction machinery would be cleaned prior to entering and exiting work sites, and regular targeted control of weeds would be undertaken to reduce the risk of exotic vines and scramblers being introduced. With the implementation of this measure, the proposal would be unlikely to increase the impact of this KTP.

Conclusion

The impacts of the proposal on the assessed threatened species listed under the BC Act are manageable and further assessment is not required. A significant impact is considered unlikely, based on the following conclusions:

- The amount of habitat would be removed or disturbed by the proposal that is relatively small in the local context
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any Key Threatening Process would be expected
- Mitigation measures have been recommended and can be implemented

EPBC Act Significant Impact Assessment

Vulnerable Species

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. These assessments characterise the significance of likely impacts associated with the proposal on the following **Vulnerable** species:

- Birds
- Superb Parrot (Polytelis swainsonii)
- Bats
- Corben's Long-eared Bat (*Nyctophilus corbeni*)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
a) Will the action lead to a long term decrease in the size of an important population of a species?
Superb Parrot
Potential foraging habitat for the Superb Parrot occurs within the study area. These species were not detected during the site survey; however no targeted surveys were completed. The proposed work would require the removal of 0.20 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.30 ha of exotic vegetation and 0.15 ha of planted native vegetation. Two hollow bearing trees would be removed and fallen timber would be retained on site. While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. It is unlikely that the proposal would have an adverse effect on the species such that it would lead to a long-term decrease in the size of an important population.
Corben's Long-eared Bat
Corben's Long-eared bat roosts in tree hollows, crevices and under loose bark. Potential foraging and roosting habitat for Corben's Long-eared Bat occurs within the construction footprint. This species was not detected during the site survey; however no targeted surveys were completed. The proposal would result in the removal of approximately 0.20 ha (PCT 5) of suitable roosting habitat. Two hollow bearing trees would be removed and fallen timber would be retained on site. While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. With the implementation of mitigation measures, it is unlikely that the proposal would have an adverse effect on the species such that it would lead to a long-term decrease in the size of an important population.
b) Will the action reduce the area of occupancy of an important species?
Superb Parrot
The removal of previously disturbed roadside habitat and other low-quality habitat could reduce the area of occupancy of this species. The proposal area is not located in a known important population of this species, these species are highly mobile, would forage over large areas, and similar habitat is widespread in the locality. In this context, the removal of a relatively small area of potential habitat as a result of the proposal is considered unlikely to reduce the area of occupancy of an important population of this species.
Corben's Long-eared Bat

The removal of disturbed roadside habitat could reduce the area of occupancy of this species. The proposal area is not located in a known important population of this species, these species are highly mobile, would forage over large areas, and similar habitat is widespread in the locality. In this context, the removal of a relatively small area of potential habitat as a result of the proposal is considered unlikely to reduce the area of occupancy of an important population of this species.

c) Will the action fragment an existing important population into two or more populations?

Superb Parrot

The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.15 ha) of potential habitat. The removal of this habitat is unlikely to fragment an existing important population into two or more populations.

Corben's Long-eared Bat

The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.056ha) of potential habitat. The removal of this habitat is unlikely to fragment an existing important population into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Superb Parrot

The proposal area does not occur in areas of critical habitat for this species.

Corben's Long-eared Bat

The proposal area does not occur in areas of critical habitat for this species.

e) Will the action disrupt the breeding cycle of an important population?

Superb Parrot

Superb Parrots breed in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers in hollow bearing trees between September and January. The proposal would only result in the removal of foraging habitat and it is considered unlikely that the proposal would disrupt the breeding cycle of an important population of these species.

Corben's Long-eared Bat

Corben's Long-eared Bat breeds during autumn with young born in late spring to summer. No hollow-bearing trees which provide potential breeding habitat would be impacted by the proposal. The proposal area is not located in a known important population of these species. In this context, the removal of a relatively small area of potential habitat as a result of the proposal is considered unlikely to disrupt the breeding cycle of an important population of these species.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Superb Parrot

The proposed work would require the removal of 0.20 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.30 ha of exotic vegetation and 0.15 ha of planted native vegetation. Two hollow bearing trees would also be removed.

Given the current size and distribution of the population and the small area of habitat to be removed, is considered unlikely that the proposal would lead a decline in the species population.

Corben's Long-eared Bat

The proposal would require the permanent removal of approximately 0.20 ha (PCT 5) of suitable roosting and foraging habitat. Two hollow bearing trees would be removed.

Given the current size and distribution of the population and the small area of habitat to be removed, is considered unlikely that the proposal would lead a decline in the species population.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat?

A number of invasive flora species, including some priority weeds, have been recorded on the site. The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.

h) Will the action introduce disease that may cause the species to decline?

The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds and the introduction of soil borne diseases to the site. The proposal would therefore be unlikely to result in the introduction of invasive species or diseases that are harmful becoming established in their potential habitat.

i) Will the action interfere substantially with the recovery of the species?

Superb Parrot

The National Recovery Plan for Superb Parrot lists the following specific objectives:

1. Determine population trends in the Superb Parrot
2. Increase the level of knowledge of the Superb Parrot's ecological requirements
3. Develop and implement threat abatement strategies
4. Increase community involvement in and awareness of the Superb Parrot recovery program.

The proposal would not interfere with any of these objectives.

Corben's Long-eared Bat

No recovery plan has been prepared for Corben's Long-eared Bat.

Conservation Advice by the Threatened Species Scientific Committee lists the following conservation and management actions:

- Protect known and potential habitat of key populations, including within conservation reserves, from habitat loss and fragmentation
- Provide relevant state government land management agencies, CMA/NRM regional bodies and local shires with the location of key populations under their jurisdiction to incorporate these into planning mechanisms to assist in habitat protection
- Incorporate findings of research into the impact of forestry practices into forest management to protect key populations
- Where feasible, undertake habitat renewal actions to link habitat supporting known populations or potential habitat
- Retain hollow-bearing trees and provide for hollow tree recruitment where possible
- Incorporate key population locations into the planning and decision-making process for major infrastructure projects, such as the development of new roads and pipeline routes, and extractive industries
- Implement control programmes of feral species identified as having a known or potential impact on key populations
- If grazing is assessed as posing a threat to the species, ensure relevant land owners/managers use an appropriate management regime and stock density that does not detrimentally affect this species (does not reduce foraging habitat)

- As a precautionary approach, while detailed information is being collected on the appropriate fire regimes for this species, map all areas of old growth mallee within the range of this species, and take these into consideration when planning fuel reduction burns
- Once investigations into impact of fire frequency and intensity are complete, incorporate this information into fire management plans across the species' range
- Encourage landholders on private property or leaseholders on crown land supporting key populations to minimise habitat loss and fragmentation, and enhance habitat values by participating in voluntary conservation and incentive programmes
- As a precautionary approach, while information is being collected on impacts of agrichemicals on this species, constrain the use of agrichemicals, especially in and around areas that have been identified as important populations
- Identify opportunities for community involvement in the conservation of the south-eastern long-eared bat
- More precisely assess population size, distribution, demographics, ecological requirements by targeted surveys and surveys of poorly known areas
- Design and implement a long-term monitoring programme.

The proposal would not interfere with any of these conservation and management actions.

Conclusion

The impacts of the proposal on the assessed threatened species and populations listed under the EPBC Act are considered to be manageable and further assessment is not required. A referral to the commonwealth under the EPBC Act is not required based on the impacts assessed. A significant threat is considered unlikely based on the following conclusions:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- No fragmentation of the habitat would occur
- No substantial contribution to any key threatening process would be expected
- Mitigation measures have been recommended and can be implemented

Appendix K

Detour traffic noise assessment

Background

Transport for NSW (TfNSW) are proposing to undergo widening of the Marshalls Creek Bridge on the Sturt Highway in East Wagga Wagga, NSW. Night-time bridge closures have been proposed for the work. The proposal involves the demolition of the existing bridge and construction of a new bridge in two stages. The location of the work is shown in Attachment A.

A Review of Environmental Factors (REF) was prepared to assess the likely impacts of the proposal on the environment and to outline potential feasible and reasonable mitigation measures, where appropriate. The REF included a construction and operational noise and vibration assessment for works at the bridge but did not include a noise assessment for the increased traffic on detour routes.

This noise assessment aims to determine the expected level of noise impact resulting from detoured traffic. Mitigation measures, subject to reasonability and feasibility, will also be recommended.

Proposed Detour Route

The proposed detour route for the closure of Marshalls Creek Bridge for Heavy Vehicles would be established utilising the Sturt Highway, Eunony Bridge Road, Byrnes Road, Merino Road and the Olympic Highway. For light vehicles and local traffic, Lake Albert Road and Kooringal Road would serve as a detour.

The chosen routes are considered preferable as they are existing approved heavy and light vehicle routes with good visibility at intersections. Although these routes would be the formally advertised and sign posted detour routes, it is considered likely that local traffic would use alternative roads.

Noise Policy

The EPA's *Interim Construction Noise Guideline* (ICNG) does not explicitly address construction related traffic noise but refers to the *NSW Road Noise Policy* (RNP) for traffic on public roads.

TfNSW's Construction Noise and Vibration Guideline presents guidance based on standard practices within the RNP. For TfNSW projects an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2dBA due to construction traffic or a temporary reroute due to a road closure. Where increases are 2dBA or less then no further assessment is required.

Where noise levels increase by more than 2dBA (2.1dBA) further assessment is required using TfNSW's Noise Criteria Guideline. This documents TfNSW's approach to implementing the Road Noise Policy.

Since noise from construction traffic is not permanent, guidance to feasible and reasonable noise mitigation differs from operational traffic noise. On this project, temporary detours would be put in place for night work (up to 15 nights) during construction.

Noise Criteria

Where increases in noise levels generated from a temporary reroute due to a road closure are 2 dBA or less then no further assessment is required. Where increases of more than 2 dBA are expected, noise mitigation should be considered using Appendices B and C of Roads and Maritime's Construction Noise and Vibration Guideline.

Existing and anticipated traffic

The noise impact assessment for detoured traffic is based published traffic volumes from:

- TfNSW Traffic Volume Viewer (www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes)
- Integrated Movement Study (URAP com. WWCC, 2008)
- Wagga Wagga Special Activation Precinct (SAP) Transport and Traffic Plan (WSP, com. DPIE, 2020)

The following methods were used to estimate current road volumes associated with the works:

- 2010 hourly data from 10pm – 7am has been used to estimate conditions at Marshall Creek Bridge.
- The traffic volumes used are based on historic counts and a year-on-year traffic growth of 2% to estimate current day traffic volumes (Table 1).
- The percentage of light and heavy vehicles on the Sturt Highway west of Forest Hill (Station 95174) has been used to estimate the traffic mix at Marshalls Creek Bridge.
- The traffic night time mix at Station 95174 was found to be approximately 25% heavy vehicles and 75% light vehicles.
- Traffic volumes on the Sturt Highway east of Lake Albert Road (Station 95486) have been used as a conservative estimate of the traffic volume at Marshalls Creek Bridge.
- Estimates of traffic volume between 10pm and 7am have used 8% of total traffic volumes. Data is sourced from 2008 and 2015 for Lake Albert Road, Kooringal Road and Eunony Bridge Roads (Table 2).

Table 1: Detoured traffic volumes

Location	Description	Count (year)	Estimated volume 2021
Marshalls Creek Bridge LV	Night-time 10pm to 7am both directions	1926 (2010)	2394
Marshals Creek Bridge HV	Night-time 10pm to 7am both directions	640 (2010)	796

AV = All Vehicles LV = Light Vehicles HV = Heavy Vehicles

Table 2: Base traffic volumes (before detour)

Location	Description	Count (year)	Estimated volume 2021
Lake Albert Rd @ Fay Ave. AV	Night-time 10pm to 7am both directions	830 (2008)	1074
Lake Albert Rd, S of Edward St. AV	Night-time 10pm to 7am both directions	1245 (2008)	1611
Kooringal Rd, N of Fay Ave. AV	Night-time 10pm to 7am both directions	544 (2008)	704
Kooringal Rd, S of Fay Ave. AV	Night-time 10pm to 7am both directions	541 (2008)	700
Eunony Bridge Road AV	Night-time 10pm to 7am both directions	295 (2015)	332
Byrnes Rd. AV	Night-time 10pm to 7am both directions	245 (2013)	287

AV = All Vehicles LV = Light Vehicles HV = Heavy Vehicles

Impact Assessment

Assumptions

The noise impact from detoured traffic on Lake Albert Road, Kooringal Road and Eunony Bridge Roads has been estimated using the traffic volumes above. The traffic volumes above have been used in the Roads and Maritime Services' Construction Noise Estimator to assess impacts. It has been assumed that between 10pm and 7 am that heavy vehicles on Lake Albert Road and Kooringal Road would be approximately 11.5% due to the low level of industrial development in Lake Albert and Kooringal. The Eunony Bridge Road has been assumed to be 70% heavy vehicles based on the road acting as the Bomen industrial suburb access and occurring outside normal industrial worker hours. Calculations have been carried out for both 100% and 75% of the detoured heavy vehicles using Eunony Bridge Road. The worst case scenario would be that 100% of detoured heavy vehicle traffic would use the detour. It is assumed that about 75% of detoured heavy vehicle traffic would use the detour. Calculations have been carried out for 100% and 65% of the detoured light vehicles traffic would use Kooringal Road. It is assumed that 100% of detoured light vehicle traffic will use Lake Albert Road.

Results

TfNSW's Traffic Noise Estimator tool has been used to calculate the expected increase in traffic noise for the following scenarios. The 'developed settlements' and 'new road' options were selected in the Construction Traffic Noise Estimator tool.

Expected levels of impact generated by detour traffic during construction are summarised in Table 3 below. Construction Traffic Noise Estimator sheets are provided in Attachment B.

Table 3: Estimated impact from traffic from detours

Location	Scenario	Estimated volume 2021	Detour Volume	Noise Change >2dB(A)? Mitigation Required?
Eunony Bridge Road, 10pm to 7am	Existing plus 100% detoured HV	332	1128	Yes / Yes
Eunony Bridge Road, 10pm to 7am	Existing plus 75% detoured HV	332	929	Yes / Yes
Kooringal Road, 10pm to 7am	Existing plus 100% detoured LV	704	3098	Yes / Yes
Kooringal Road, 10pm to 7am	Existing plus 65% detoured LV	704	2260	Yes / Yes
Lake Albert Road 10pm to 7am	Existing plus 100% detoured LV	1074	3468	No / No

Where residents experience an increase of more than 2dB(A) above existing traffic noise they are deemed to be impacted by the detour. Residents along Eunony Bridge Road and Kooringal Road would experience a noise increase more than 2dB(A) under the option proposed above. Detoured heavy vehicles along Eunony Bridge Road would need to be about 100 vehicles or less to meet the 2dB(A) criteria. Detoured light vehicles along Kooringal Road would need to be about 380 vehicles or less to meet the 2dB(A) criteria. Mitigation distances are below 318 m under all scenarios when criteria are exceeded.

Conclusion

The results of noise modelling for detoured traffic while Marshalls Creek Bridge is closed to traffic during night-time construction of the bridge widening has shown the likely impact would be along Eunony Bridge

Road and Kooringal Road. Given the low density of rural housing and large set-back distances of dwellings to Eunony Bridge Road, minimal mitigation measures . Potentially impacted residences along Kooringal Road would be numerous due to the density of dwellings in proximity to the road.

The mitigation distance of 318 metres along Eunony Bridge Road is based on the unlikely worst-case scenario of all detoured heavy vehicle traffic using the Eunony Bridge Road route and the conservative selection of variables in the modelling of expected noise levels, such as a noisier road surface than the actual road surface. These same limitations apply for light vehicles along the Kooringal Road. Recommended mitigation measures are listed below.

Management and Mitigation Measures
Night-time detours would require written notification of residents:

- within 318 m of Eunony Bridge Road
- within 175 m of Kooringal Road.

Notification is to include date of commencement, duration of the detours and contact number for complaints regarding traffic noise.

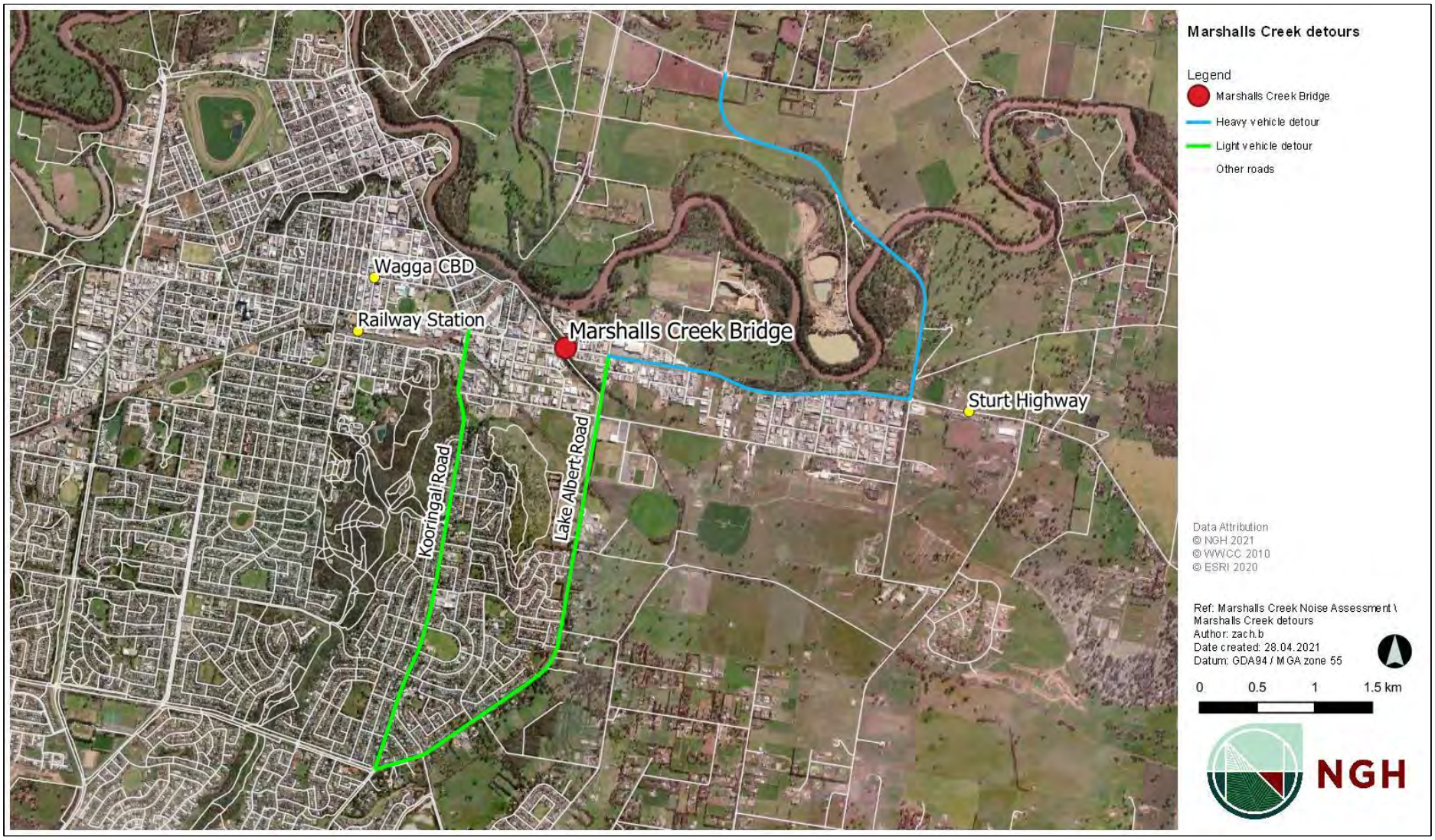
Consideration should be given to reducing the speed of vehicles along Kooringal Road. It is noted that this may not be preferable given additional noise may be generated from vehicles braking and accelerating.

Attachments

Attachment 1 – Proposed detour routes

Attachment 2 – Construction Noise Estimator Tool Sheets

Attachment 1 – Proposed detour routes



Attachment 2 - Construction Noise Estimator Tool Sheets

A2.1 - Estimated Noise Impact 100% HV detour Eunony Bridge Rd

Transport Roads & Maritime Services

Road Traffic Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Ground type	Developed settlements (urban and suburban areas)	
Road surface	DGA	
Road type	New road	Note that a road is new if a road's functional class change temporarily to a collector road changes the functional clas

	Day	Night
Noise criteria (residences)	55	50
Existing speed	80	80
Speed during construction	80	80

	Day (7am to 10pm)		Night (10pm to 7am)	
Existing traffic	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Direction (1)	1	1	50	116
Direction (2)	1	1	50	116
Additional traffic				
Direction (1)	0	0	0	398
Direction (2)	0	0	0	398

	Day	Night
Change in noise levels (dBA)	0.0	6.3
Mitigation level (dBA)	55	50
Is the change in noise level greater than 2.0 dBA?	No	Yes
Require consideration of additional mitigation measures?	No	Yes
Mitigation distance (m)		376

To assess noise impacts from constru
should be undertaken by evaluating w
then no further assessment is require
controlling criterion then the receiver
the assessment methodology is simila
shall be due to noise level increase]

Mitigation Measures
Management of construction related t
- Scheduling and routing of vehicle m
- Speed of vehicles
- Driver behaviour and avoidance of t
- Ensuring vehicles are adequately sil
Where noise impacts are greater than
and reasonable:
- temporary noise barriers
- at-receiver noise mitigation
Feasible and reasonable consideratio
- time of day of the noise increase an
- time of use of affected receivers
- how many decibels the noise levels
- how long the mitigation will provide

Calculating noise level at the receiver

Distance to receiver (m)	
Direction (1)	20
Direction (2)	20

	Day	Night
Predicted noise levels (dBA) @ 1m from the façade	37.6	68.2

Note:
(1) Noise reports present noise levels rounded to the nearest integer and differences between two noise levels rounded to a single decimal place.
(2) noise barriers more than 3 metres high, if designed using Roads and Maritime guidelines, would generally provide an insertion loss of around 5 dB(A) at the
(3) noise barriers more than 5 metres high, if designed using Roads and Maritime guidelines, would generally provide an insertion loss of around 10 dB(A) at the

A2.2 Estimated Noise Impact 75% HV detour Eunony Bridge Rd

Transport Roads & Maritime Services

Road Traffic Noise Estimator

Please input information into yellow cells

Please pick from drop-down list in orange cells

Ground type	Developed settlements (urban and suburban areas)
Road surface	DGA
Road type	New road

Note that a road is new if a road's functional class changes
temporarily to a collector road changes the functional class

	Day	Night
Noise criteria (residences)	55	50
Existing speed	80	80
Speed during construction	80	80

	Day (7am to 10pm)		Night (10pm to 7am)	
Existing traffic	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Direction (1)	1	1	50	116
Direction (2)	1	1	50	116
Additional traffic				
Direction (1)	0	0	0	299
Direction (2)	0	0	0	299

	Day	Night
Change in noise levels (dBA)	0.0	5.4
Mitigation level (dBA)	55	50
Is the change in noise level greater than 2.0 dBA?	No	Yes
Require consideration of additional mitigation measures?	No	Yes
Mitigation distance (m)		318

To assess noise impacts from constru
should be undertaken by evaluating w
then no further assessment is require
controlling criterion then the receiver c
the assessment methodology is simila
shall be due to noise level increase]

Mitigation Measures
Management of construction related t
- Scheduling and routing of vehicle m
- Speed of vehicles
- Driver behaviour and avoidance of th
- Ensuring vehicles are adequately sil
Where noise impacts are greater than
and reasonable:
- temporary noise barriers
- at-receiver noise mitigation
Feasible and reasonable consideratio
- time of day of the noise increase and
- time of use of affected receivers
- how many decibels the noise levels
- how long the mitigation will provide b

Calculating noise level at the receiver

Distance to receiver (m)	
Direction (1)	20
Direction (2)	20

	Day	Night
Predicted noise levels (dBA) @ 1m from the façade	37.6	67.2

Note:
(1) Noise reports present noise levels rounded to the nearest integer and differences between two noise levels rounded to a single decimal place.
(2) noise barriers more than 3 metres high, if designed using Roads and Maritime guidelines, would generally provide an insertion loss of around 5 dB(A) at the
(3) noise barriers more than 5 metres high, if designed using Roads and Maritime guidelines, would generally provide an insertion loss of around 10 dB(A) at the

A2.3 Estimated Noise Impact 100% LV detour Kooringal Rd

Transport Roads & Maritime Services

Road Traffic Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Ground type	Developed settlements (urban and suburban areas)	
Road surface	DGA	
Road type	New road	Note that a road is new if a road's functional class changes duri a collector road changes the functional class of the collector ro
	Day	Night
Noise criteria (residences)	55	50
Existing speed	70	70
Speed during construction	70	70

	Day (7am to 10pm)		Night (10pm to 7am)	
Existing traffic	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Direction (1)	1	1	312	41
Direction (2)	1	1	312	41
Additional traffic				
Direction (1)	0	0	1197	0
Direction (2)	0	0	1197	0

	Day	Night
Change in noise levels (dBA)	0.0	4.6
Mitigation level (dBA)	55	50
Is the change in noise level greater than 2.0 dBA?	No	Yes
Require consideration of additional mitigation measures?	No	Yes
Mitigation distance (m)		175

To assess noise impacts from constr test should be undertaken by evaluat 2dBA or less then no further assessr levels exceed the controlling criterior Mitigation Guideline. [note: the asses noise mitigation under the NMG shal

Mitigation Measures
Management of construction related
- Scheduling and routing of vehicle n
- Speed of vehicles
- Driver behaviour and avoidance of
- Ensuring vehicles are adequately s

Where noise impacts are greater tha feasible and reasonable:
- temporary noise barriers
- at-receiver noise mitigation

Feasible and reasonable considerati
- time of day of the noise increase ar
- time of use of affected receivers
- how many decibels the noise levels
- how long the mitigation will provide

Calculating noise level at the receiver

Distance to receiver (m)		
Direction (1)	20	
Direction (2)	20	
	Day	Night
Predicted noise levels (dBA) @ 1m from the façade	37.0	64.0

Note:
(1) Noise reports present noise levels rounded to the nearest integer and differences between two noise levels rounded to a single decimal place.

A2.4 Estimated Noise Impact 65% LV detour Kooringal Rd

Transport Roads & Maritime Services

Road Traffic Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Ground type	Developed settlements (urban and suburban areas)	
Road surface	DGA	
Road type	New road	Note that a road is new if a road's functional class changes duri a collector road changes the functional class of the collector ro
	Day	Night
Noise criteria (residences)	55	50
Existing speed	70	70
Speed during construction	70	70

	Day (7am to 10pm)		Night (10pm to 7am)	
Existing traffic	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Direction (1)	1	1	312	41
Direction (2)	1	1	312	41
Additional traffic				
Direction (1)	0	0	778	0
Direction (2)	0	0	778	0

	Day	Night
Change in noise levels (dBA)	0.0	3.4
Mitigation level (dBA)	55	50
Is the change in noise level greater than 2.0 dBA?	No	Yes
Require consideration of additional mitigation measures?	No	Yes
Mitigation distance (m)		142

To assess noise impacts from constr test should be undertaken by evaluat 2dBA or less then no further assessr levels exceed the controlling criterior Mitigation Guideline. [note: the asses noise mitigation under the NMG shal

Mitigation Measures
Management of construction related
- Scheduling and routing of vehicle n
- Speed of vehicles
- Driver behaviour and avoidance of
- Ensuring vehicles are adequately s

Where noise impacts are greater tha feasible and reasonable:
- temporary noise barriers
- at-receiver noise mitigation

Feasible and reasonable considerati
- time of day of the noise increase ar
- time of use of affected receivers
- how many decibels the noise levels
- how long the mitigation will provide

Calculating noise level at the receiver

Distance to receiver (m)		
Direction (1)	20	
Direction (2)	20	
	Day	Night
Predicted noise levels (dBA) @ 1m from the façade	37.0	62.8

Note:
(1) Noise reports present noise levels rounded to the nearest integer and differences between two noise levels rounded to a single decimal place.

A2.5 Estimated Noise Impact 100% LV detour Lake Albert Rd

Transport Roads & Maritime Services

Road Traffic Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Ground type	Developed settlements (urban and suburban areas)	
Road surface	DGA	
Road type	New road	Note that a road is new if a road's functional class changes duri a collector road changes the functional class of the collector ro
	Day	Night
Noise criteria (residences)	55	50
Existing speed	60	60
Speed during construction	60	60

	Day (7am to 10pm)		Night (10pm to 7am)	
Existing traffic	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Direction (1)	1	1	950	124
Direction (2)	1	1	950	124
Additional traffic				
Direction (1)	0	0	1197	0
Direction (2)	0	0	1197	0

	Day	Night
Change in noise levels (dBA)	0.0	2.0
Mitigation level (dBA)	55	50
Is the change in noise level greater than 2.0 dBA?	No	No
Require consideration of additional mitigation measures?	No	No
Mitigation distance (m)		

To assess noise impacts from constr test should be undertaken by evalua 2dBA or less then no further assessr levels exceed the controlling criterior Mitigation Guideline. [note: the asses noise mitigation under the NMG shal

Mitigation Measures
Management of construction related
- Scheduling and routing of vehicle n
- Speed of vehicles
- Driver behaviour and avoidance of
- Ensuring vehicles are adequately s

Where noise impacts are greater tha feasible and reasonable:
- temporary noise barriers
- at-receiver noise mitigation

Feasible and reasonable considerati
- time of day of the noise increase ar
- time of use of affected receivers
- how many decibels the noise levels
- how long the mitigation will provide

Calculating noise level at the receiver

Distance to receiver (m)		
Direction (1)	20	
Direction (2)	20	
	Day	Night
Predicted noise levels (dBA) @ 1m from the façade	36.4	65.4

Note:
(1) Noise reports present noise levels rounded to the nearest integer and differences between two noise levels rounded to a single decimal place.

Appendix L

Environmental Site Investigation: Marshalls Creek Bridge Widening Project

jones environmental consulting

Environmental Site Investigation: Marshalls Creek Bridge Widening Project, Wagga Wagga, New South Wales

Prepared for: Transport for NSW

24 March 2021

This page has been left intentionally blank

Distribution

Environmental Site Investigation: Marshalls Creek Bridge Widening Project, Wagga Wagga, New South Wales
24 March 2021

Status	Copies	Distributed to
V1 draft	1 PDF	Transport for NSW
V2 final	1 PDF	Transport for NSW
V3 final	1 PDF	Transport for NSW

Jones Environmental Consulting Pty Ltd

497 Parnall Street, Lavington, NSW, 2641
m: +61 424 490 551
ABN: 21 632 445 446

Author:

Patricia Jones
Senior Environmental Scientist

Table of Contents

Appendices

1. Introduction

Jones Environmental Consulting Pty Ltd (JEC) were engaged by Transport for NSW (TfNSW) to carry out a detailed site investigation (DSI) in general accordance with National Environment Protection Measures 2013 (NEPM) for potential contamination for the Marshalls Creek Bridge Widening Project.

Marshalls Creek Bridge (B5504) over the Marshalls Creek is located on the Sturt Highway (HW14) in East Wagga Wagga. The Sturt Highway is a major link between Sydney and Adelaide.

A detailed environmental investigation of the nature and extent of contaminants of concern at a site located on a section of the Stuart Hwy, Marshalls Creek Bridge, Wagga Wagga, New South Wales (the site), see Appendix A, Figure 1.

1.1. Background

It is understood that the site is intended to be demolished following construction of a new four lane bridge over Marshalls Creek.

TfNSW has carried out desktop investigations relating to contamination that may be present within the project footprint. These investigations suggested there may be potential for the following contaminants:

- Coal-tar contamination on and in the vicinity of the project area; and
- Per- and poly- fluoroalkyl substances (PFAS) contamination within and along Marshalls Creek.

From information provided within the Request for Proposal (RFP) JEC understands that the DSI is required to carry out sampling (soil, water and sediment) and laboratory analysis of the above matrixes for potential contamination. Where there is known contamination, the sampling program must investigate both the known contaminated site, and the area in the immediate vicinity (both laterally and vertically) of the known contamination. Investigation results are to be compared to specific criteria for each chemical of concern in relation to the current and intended land use. The investigation report must include:

- A description of the contaminated areas of the site;
- Contaminate concentrations in relation to the guideline criteria;
- Potential impacts on the environment and human health; and
- Areas that require further management or remediation.

1.2. Objectives

The objective of the investigation was to provide an indication of the current site contamination status to assist in the proposed development and construction of the upgrade to the Marshalls Creek Bridge replacement.

1.3. Scope

The scope of the investigation was developed through consultation with TfNSW and comprised:

- Drilling and sampling of soils from four bore holes spaced across the site in a general grid-based pattern to a maximum depth of 2.5 metres below ground surface (mbgs).
- Four sediment samples to be collected from Marshalls Creek.
- Two surface water samples to be collected from Marshalls Creek near the existing bridge.
- Analyses of selected soil samples for contaminants of concern including per- and polyfluoroalkyl substances (PFAS); Total Recoverable Hydrocarbons (TRH); Benzene, Toluene, Ethylbenzene, Xylene (BTEX); Poly-Aromatic Hydrocarbons (PAH); Metals; Per- and poly- fluoroalkyl substances (PFAS); and Asbestos.
- Evaluation and interpretation of results with respect to the adopted screening levels.

2. Soil assessment

2.1. Methodology

JEC carried out a soil investigation at the site on 1 March 2020. Field activities are summarised below in Table 2.1. All works were undertaken in general accordance with:

- Assessment of Site Contamination (ASC) NEPM (as amended in 2013) Schedule B(2) Guidelines on Site Characterisation (ASC NEPM);
- PFAS National Environmental Management Plan 2.0 (PFAS NEMP) (HEPA, 2020);
- WA Department of Environmental Regulation, Interim Guidelines on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS, Contaminated Site Guidelines (DER, Version:2.1, 2017).

Table 2.1: Field work methodology

Activity	Detail / Comments
Date of Works	1 March 2020
Soil Sampling Method	A GEMCO HS7 drilling rig was used to collect soil samples from the surface, 0.5mbgs, 1.0 and 2.0 mbgs. Sampling locations are shown in Appendix A, Figure 2. Work was conducted in general accordance with JEC standard operating procedures (SOP). Soil samples were collected off the auger and sealed in laboratory supplied bottles including a 250 mL polypropylene sample containers specifically for the collection of PFAS soil samples. A clean pair of disposable nitrile gloves was used for each sample. All sample containers were uniquely labelled, placed in eskies with double bagged ice and dispatched for analysis to Australian Laboratory Services (ALS) Laboratories under standard chain-of-custody documentation procedures. Copies of the chain of custody documentation and laboratory analytical reports are presented in Appendix D.
Surface water Sampling method	Surface water samples were collected from Marshalls Creek bridge. Surface water samples were collected from upstream and downstream of the Marshalls Creek Bridge. Surface water were collected by inserting a sampling container (polypropylene or HDPE) with the opening pointing down to avoid the collection of surface films.
Decontamination of Sampling Equipment	Decontamination of the sampling equipment was completed between samples with a three-stage rinse procedure using certified PFAS free detergent, Liquinox®, to reduce the risk of cross contamination.
Soil Screening	Soil samples were screened using a Photoionisation Detector (PID) which was calibrated daily to 100ppmv iso-butylene calibration gas.

Activity	Detail / Comments
	For all samples analysed an additional sample was taken, sealed in a plastic bag and the headspace measured with the photoionization detector (PID). Soil laboratory analytical results are included in Appendix D.
Laboratory Analysis	Selected soil, surface water and sediment samples were analysed for Total Recoverable Hydrocarbons (TRH); Benzene, Toluene, Ethylbenzene, Xylene (BTEX); Poly-Aromatic Hydrocarbons (PAH); Metals; Per- and poly-fluoroalkyl substances (PFAS); and Asbestos. The primary laboratory was ALS. The secondary laboratory was Eurofins-MGT.

2.2. Field Observations

2.2.1. Site Description

The site contained a duel lane roadway and associated bridge spanning Marshalls Creek, Wagga Wagga. Marshalls Creek flowed from the south-east to the north-west through the site. A walking track ran parallel to the creek running under the bridge.

2.2.2. Soil

During field work, soil types were classified in accordance with the Unified Soil Classification System (USCS). General subsurface conditions encountered during this assessment are summarised in Table 2.2 below with detailed bore logs provided in Appendix C.

Table 2.2: Site Specific Geology

Depth (mbgs)	Soil Description
0.0-0.3	ASPHALT
0.3-1.8	Sandy CLAY: Red/brown, medium plasticity, with traces of river cobble and gravels at depth. Fill was observed across all soil bores included in the investigation. Natural material was not encountered due to refusal with a cobble/gravel layer.

3. Regulatory framework

The regulatory framework relevant to conducting this investigation is outlined in the below sections. Specific investigation screening values for soil and waters are provided in Appendix B, Tables 1-2.

3.1. Commonwealth

- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 2013).
- PFAS National Environmental Management Plan 2.0 (PFAS NEMP) (HEPA, 2020).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000).

3.2. State

The main regulatory instruments for managing contamination of land or waters within New South Wales include:

- Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011).
- Guidelines for the NSW Site Auditor Scheme (3rd Edition) (NSW EPA, 2017).

4. Data Quality

4.1. Field Quality Assurance / Quality Control Program

DSI on this project was completed in general accordance with Australian Standard AS4482.1 (2005) *Guide to the sampling and investigation of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds* which specify sampling protocols, number and type of sample containers per sampling location, sample preservation methods, approved holding times, sample identification codes, QC sample requirements and chain of custody documentation procedures.

In addition to the primary samples, two soil intra-laboratory (duplicate) quality control samples were collected to assess aspects of field protocols, laboratory performance and to classify the validity of the laboratory data. The blind coded intra-laboratory soil sample duplicates were sent to the primary laboratory (ALS). Two soil inter-laboratory (triplicate) quality control samples were also collected and sent to the secondary laboratory (Eurofins/MGT) to assess the validity of the laboratory data.

One rinsate (QC6) sample was collected off the lead auger following sampling to assess for cross contamination potentially caused by equipment. The rinsate sample reported concentrations below the laboratory Limit of Reporting (LOR). Additionally, a trip blank (QC7) sample was included in the transport of collected samples to assess whether any cross contamination of samples may have occurred during couriering of samples to the laboratories.

4.2. Field Replicate Samples

A total of 14 primary soil and two surface water samples were collected across the site and were submitted for analysis. In addition to the primary samples, one soil and one surface water intra-laboratory (duplicate) quality control samples were collected to assess aspects of field protocols, laboratory performance and to classify the validity of the laboratory data.

The blind coded intra-laboratory soil sample duplicates were sent to the primary laboratory (ALS). One soil and surface water inter-laboratory (triplicate) quality control samples were also collected and sent to the secondary laboratory (Eurofins/MGT) to assess the validity of the laboratory data.

All relative percent difference (RPD) values for field duplicates showed reasonable correlation between the primary and replicate samples. Soil duplicate and triplicate results, and RPD calculation results, are presented in Tables 3A and 3B, Appendix B.

Replicate samples collected from the site are summarised in Table 4.1 below.

Table 4-1: Replicate Samples

Primary sample	Sample type	Intra-laboratory sample	Laboratory	Inter-laboratory sample	Laboratory
SS1	Water	QC1	ALS	QC2	Eurofins
SB4_0.4-0.6	Soil	QC4	ALS	QC5	Eurofins

RPD values for primary, duplicate and triplicate soil samples were generally reported to be within the acceptable range of ±50 per cent. The following RPDs were reported outside the accepted target range:

- Both the soil duplicate and triplicate sample pairs (S3B4_0.4-0.6/QC4 and S3B4_0.4-0.6/QC5) recorded elevated RPD for Polycyclic aromatic hydrocarbons (PAHs).
- It is considered that this exceedance of the acceptance range is associated with analyte concentration that was reported close to the detection limit, were minor differences can result in high RPDs. Additionally, given the nature of the sample being of fill material which is generally of heterogenous material variations within the soil profile are expected.

One rinsate (QC3) sample was collected from a pair of nitrile gloves with another (QC6) sample collected off the lead auger following sampling to assess for cross contamination potentially caused by the equipment. The rinsate samples reported concentrations below the laboratory LOR.

One trip blank (QC7) sample was collected during soil sampling to assess whether contamination may have been introduced to samples during shipping and field handling activities. The trip blank sample reported concentrations below the laboratory LOR.

4.3. Laboratory QC Results

ALS and Eurofins conducted an internal quality control (QC) program comprising matrix duplicates on sample matrices (refer Appendix D). Relative percentage differences (RPD) between samples and laboratory duplicates were within acceptance limits.

Spiked sample analyses recorded recoveries that were all within acceptable control limits (70-130% and 30%-130% for phenols) and are considered acceptable with the exception of three laboratory matrix spikes which could not be determined. The laboratory provided the following explanation for the result: The matrix spike recovery was not determined as background levels were greater than the upper data quality objective.

The results of laboratory blanks were below detection limits indicating that there is a low potential for sample contamination as a result of handling in the laboratory.

4.4. QC Conclusions

On the basis of the field and laboratory QC results, it is considered that the field and laboratory programs have provided acceptable QC results and that the results of the sampling and analysis program are sufficiently reliable.

5. Assessment Criteria

Assessment criteria presented below has been based on the applicable scenario (commercial/industrial land use) which is generally consistent with the proposed site setting.

The criteria presented below are intended to apply to a Tier 1 risk assessment, based on certain site-specific characteristics. Where concentrations of a Contaminants of Potential Concern (COPC) exceed the generic assessment criteria, further consideration of the specific exposure pathway is required which may warrant further investigation, assessment or the development of a strategy to mitigate the potential risks identified.

5.1. Health investigation levels

Tables 1 and 2 (Appendix B) provide a summary of the laboratory data assessed against the adopted health based soil and surface water investigation levels.

5.1.1. Soil

The assessment criteria proposed for this project were sourced from:

- NEPC (1999) National Environment Protection (Assessment of Site Contamination) Amendment Measure (No. 1) 2013 (NEPM).
- Friebel and Nadebaum (2011); CRC Care Technical Report No. 10 – Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater.
- PFAS National Environmental Management Plan 2.0 (PFAS NEMP) (HEPA, 2020).

NEPC (1999 as amended) provides health and ecological based soil investigation levels for various exposure settings. JEC consider that the exposure setting for the Marshalls Creek Project site is reasonably represented for commercial/industrial land use described in Section 3 of NEPM Schedule B7.

Based on NEPM Schedule B1, Guideline on the Investigation Levels for Soil and Groundwater, the following criteria were adopted:

- Table 1A(1) - Health-based Investigation Levels for Commercial/Industrial D.
- Table 1A(3) – Soil HSLs for vapour intrusion for Commercial/Industrial (HSL D).

For compounds where the allowable soil vapour Health screening levels (HSL) exceeds the chemical constituent saturation concentration, HSL for direct contact pathways listed in Table B4 of CRC CARE Technical Report No.10 (Friebel and Nadebaum; 2011) have been adopted as the health risk screening level for this assessment. The values adopted assume conservative characteristics regarding site conditions; namely, a sand soil profile.

The HSL presented within Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report No. 10 were developed on a scientifically defensible basis and have been subject to independent and expert peer review prior to publication. Consequently, the approach described in CRC CARE Technical Report No. 10 has been

adopted for health risk screening for worker exposure by direct contact regarding the presence of petroleum hydrocarbons in the subsurface, within the limitations of that report.

The PFAS NEPM guidelines for industrial / commercial values have been adopted to screen for human health exposure to PFAS for the site.

5.1.2. Surface water

The PFAS NEMP includes guideline values for the sum of PFOS and PFHxS and for PFOA in drinking water and recreational water for the protection of human health. The recreational water use guidelines address potential exposures through whole body contact (primary contact) with water including incidental ingestion of water and dermal contact while bathing.

5.2. Ecological Investigation Levels

The assessment criteria for Ecological Investigation Levels (EILs) proposed for this project was sourced from:

- NEPC (1999) National Environment Protection (Assessment of Site Contamination) Amendment Measure (No. 1) 2013 (NEPM).

In accordance with Section 2.5 of NEPM Schedule B1, EILs for the purposes of EIL derivation, a contaminant incorporated in soil for at least two years is considered to be aged for the purpose of EIL derivation. The majority of contaminated sites are likely to be affected by aged contamination. As no site specific EIL levels are available at the time of this assessment we will be referring to Ecological Screening Levels (ESLs).

Based on NEPM Schedule B1, Guideline on the Investigation Levels for Soil and Groundwater, the following ESLs for petroleum hydrocarbons were adopted:

- Table 1B(6) – Soil ESLs for Commercial/Industrial Use.

The PFAS NEMP includes soil guideline values for ecological protection for both direct exposure and indirect exposure. Direct exposure applies specifically to protection of organisms that live within, or are closely associated with, the soil while indirect exposure considers effects on organisms associated with bioaccumulation and / or off-site transport.

Table 1 (Appendix B) provides a summary of the laboratory data assessed against the adopted EIL/ESLs.

6. Results of investigation

Tabulated laboratory analysis results are provided in Appendix B following this report and are summarised in the sections below. The NATA-endorsed laboratory reports are included in Appendix D.

6.1.1. Soil & sediment results compared to human health criteria

Tabulated laboratory analysis results for human health are provided in Table 1 following this report. The laboratory analysis results for soil, in comparison to the adopted human health criteria, showed no concentrations of contaminants of concern recorded above the adopted human health criteria in a commercial/industrial setting.

6.1.2. Soil & sediment results compared to ecological criteria

Tabulated laboratory analysis results for Ecological criteria are provided in Table 1 following this report. The laboratory analysis results for soil, in comparison to the adopted ecological criteria, showed:

Concentrations of metals and/or organic compounds below the adopted ecological investigation levels in a commercial/industrial setting (NEPM EIL).

Concentrations of benzo(a)pyrene (between 11 mg/kg and 21 mg/kg) were recorded in two separate locations (SB3 and SB4) above ecological screening levels in a commercial/industrial setting (NEPM ESL).

6.1.3. Surface water compared to human health criteria

Tabulated laboratory analysis results for human health criteria are provided in Table 2, Appendix B, following this report. The laboratory analysis results for surface water sample collected from upstream (SW1) and downstream (SW2) of Marshalls Creek Bridge, in comparison to the adopted human health criteria, showed concentrations were recorded below the adopted human health criteria for drinking and recreation water use.

6.1.4. Surface water compared to protection of ecosystem

Tabulated laboratory analysis results compared to the protection of freshwater ecosystems criteria (95% species protection) are provided in Table 2, Appendix B, following this report. The laboratory analysis results for the surface water sample collected, SW1 and SW2, in comparison to the adopted ecological criteria, showed concentrations were recorded below the adopted criteria for the protection of freshwater ecosystems.

6.2. Extent of contamination

PFAS was measured in soil above the laboratory reporting limit in hand auger locations HA2 and HA3 and sediment samples SED3 and SED4 (see Appendix A, Figure 2) however all results were below the adopted screening criteria for human health and ecological screening criteria.

The distribution of PFAS impacted soils is not considered to be consistent with widespread contamination across the site with no concentrations of PFAS detected within the roadway material

investigation area. The PFAS impact appears to be limited to shallow soils locations (HA2, HA3, SED3 and SED4) likely associated with flood events (see Appendix A, Figure 2).

Concentrations of PAHs and TPHs were also detected within soil bores SB3 and SB4. JEC suggests that these detected concentrations within deeper soils were due to cross-contamination from overlaying road based material which entered the soil bore during the sampling process rather than road-based material being present within the fill material at depth.

There was no noted observation of asbestos containing material (ACM) on site and additional samples collected for analysis of asbestos did not detect ACM fibres.

6.3. Discussions and Conclusion

While widespread elevated contamination arising from nearby off-site source migration, namely PFAS, does not appear to have occurred on site detection of PFAS concentrations above detection limits were recorded within soil and sediment samples on site. Although all recorded concentrations of PFAS were below the adopted criteria for both ecological and human health criteria given the persistent nature of these chemicals exposure to these chemicals should be limited.

It is understood that previous construction works along the Olympic Highway west of Marshall Creek Bridge revealed the presence of coal tar from soil investigations, however no coal tar was found within fill material encountered on site as part of this investigation.

Elevated concentrations of benzo(a)pyrene detected within fill material encountered in the roadway exceeding ecological screening levels however are not considered to pose a low risk to the ecosystem given the material is likely to be pathed limiting access to these soils.

While the surface water samples collected from upstream and downstream of the site did not recorded laboratory analytical concentrations of PFAS above the adopted human health or ecological criteria JEC suggests that consideration of all potential contaminants be considered in forming appropriate safety documents for site uses.

Based on the sampling results within the area of investigation as well as taking into account current and proposed land use, the concentrations of contaminants of concern in the soil, sediment and surface water are not considered to be a risk to human health or the environment.

6.4. Recommendations

Any soil that is to be disposed off-site should be classified in accordance with the NSW EPA 2014, “Waste Classification Guidelines, Part 1: Classifying Waste”.

7. Limitations

Findings contained within this report are the result of discrete/specific sampling methodologies used in accordance with normal practices and standards, with some variations as indicated in the report. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site within the sampled areas. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

In conducting this review and preparing the report, current guidelines for assessment and management of contaminated land were generally followed. This work has been conducted in good faith in accordance with JEC's understanding of the client's brief and general accepted practice for environmental consulting.

This report should be read in conjunction with the *Important Information About your Environmental Report*, immediately following this report.

Statement of Limitations

Important information about your Environmental Report

1. Introduction

This report has been prepared by Jones Environmental Consulting for you, as Jones Environmental Consulting's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Jones Environmental Consulting may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Jones Environmental Consulting has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

2. Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination posed in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

3. Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Jones Environmental Consulting.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Jones Environmental Consulting should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

4. Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Jones Environmental Consulting would be pleased to assist with any investigation or advice in such circumstances.

5. Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

6. Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Jones Environmental Consulting assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Jones Environmental Consulting be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

7. Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Jones Environmental Consulting prepared the report and has familiarity with the site, Jones Environmental Consulting is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Jones Environmental Consulting disowns any responsibility for such misinterpretation.

8. Data should not be separated from the report

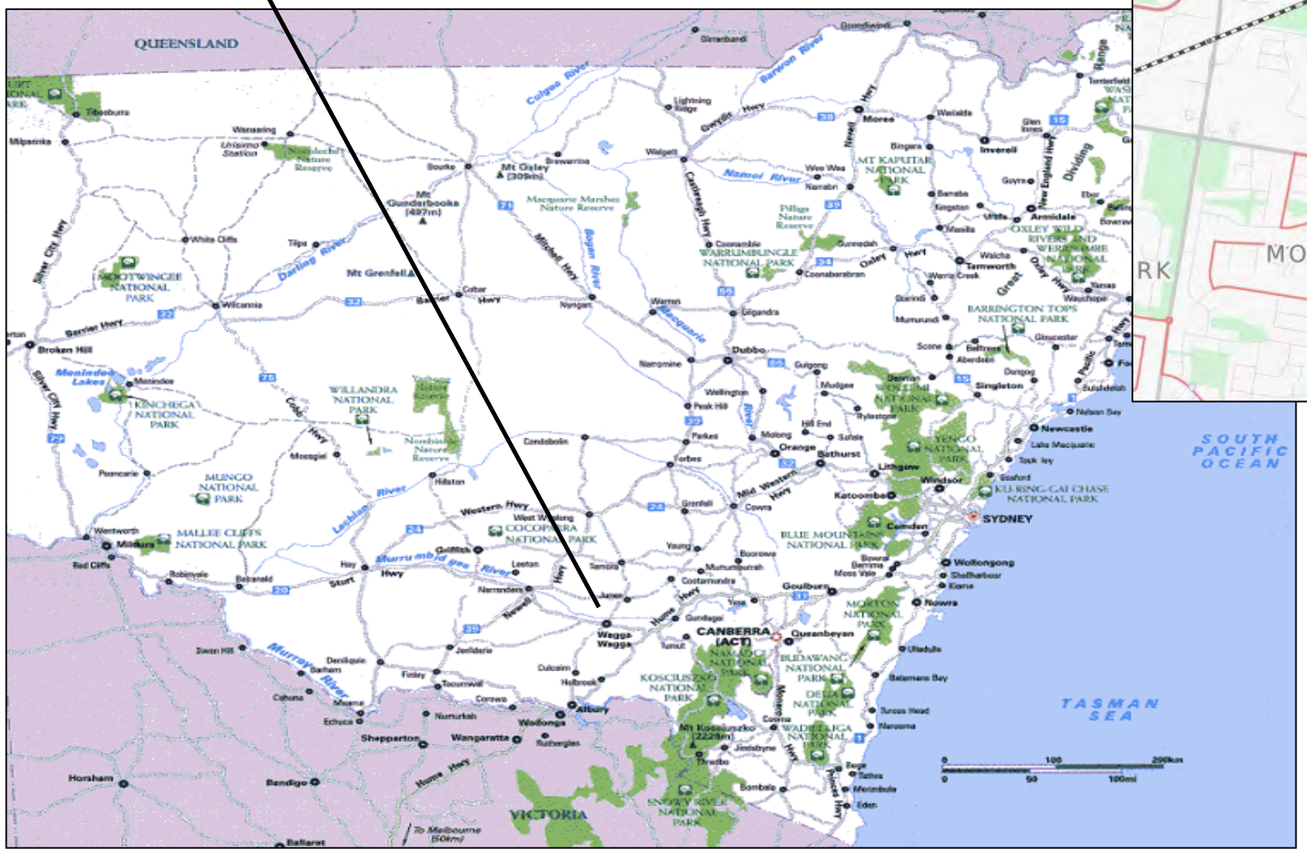
The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way. This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

9. Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Appendix A - Figures

Wagga Wagga, NSW



drawn	RJ		client: Roads and Maritime Services	
approved	PJ		project: Environmental Site Assessment Marshalls Creek Bridge Widening, Wagga Wagga, NSW	
date	15/03/2020		title: Site Locality Plan	
scale	NTS		project no: JE10122	figure no: FIGURE 1
original size				

drawn	RJ
approved	PJ
date	15/03/2020
scale	NTS
original size	

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: **Roads and Maritime Services**

project: **Environmental Site Assessment**
Marshalls Creek Bridge Widening, Wagga Wagga, NSW

title: **Sampling Locations**

project no: **JE10122**

figure no: **FIGURE 2**

This page has been left intentionally blank

Appendix B - Laboratory Summary Table

Table 1
Laboratory Analytical Results - Soil
JE10122

										Field ID	HA1	HA2	HA3	SB1_0.4-0.6	SB1_1.0-1.2	SB2_0.4-0.6	SB3_0.4-0.6	SB3_1.0-1.2	SB4_0.4-0.6	SB4_1.0-1.2	SED1	SED2	SED3	SED4
										Date	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020
	Unit	EQL	CRC Care HSL-D Commercial / Industrial	NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand 0-1m	NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand 1-2m	NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind	NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil 0-2m	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil	PFAS NEMP 2020 Table 2 Health Industrial/Commercial	PFAS NEMP 2020 Table 3 Ecological guideline for soil Ecological exposure *^direct / ^^indirect*														
Asbestos																									
Asbestos (Trace)	g/kg	0.1									No	No	No	No			No		No						
Cyanides																									
Cyanide (WAD)	mg/kg	1												<1	<1	<1	<1	<1	<1	<1					
TRH																									
C6-C10	mg/kg	10	26,000											<10	<10	<10	<10	<10	<10	<10					
C6-C10 (F1 minus BTEX)	mg/kg	10		260	370		215																		
C10-C16 (F2 minus Naphthalene)	mg/kg	50					170																		
C10-C40 (Sum of total)	mg/kg	50																							
C10-C16	mg/kg	50	20,000																						
C16-C34	mg/kg	100	27,000				2,500																		
C34-C40	mg/kg	100	38,000				6,600																		
BTEX																									
Benzene	mg/kg	0.1	430	3	3		95							<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					
Toluene	mg/kg	0.1	99,000				135							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Ethylbenzene	mg/kg	0.1	27,000				185							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Xylene (m & p)	mg/kg	0.2												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Xylene (o)	mg/kg	0.1												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Xylene Total	mg/kg	0.3	81,000	230			95																		
Total BTEX	mg/kg	0.2																							
PFOS/PFOA																									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	0.5									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of PFAS (WA DER List)	µg/kg	0.2									<0.2	**1.3**	**2.2**	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	**1.8**	**2.1**	**1.8**
Perfluorohexanoic acid (PFHxA)	µg/kg	0.2									<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
Sum of PFHxS and PFOS	µg/kg	0.2							20000		<0.2	**1.3**	**2.2**	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	**1.8**	**1.8**	**1.6**
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	0.5									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorobutanoic acid (PFBA)	µg/kg	1									<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002									<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	µg/kg	0.2									<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	0.2									<0.2	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
Perfluorooctanesulfonic acid (PFOS)	mg/kg	0.0002								1^ | 0.14^^	<0.0002	**0.0008**	**0.0022**	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0018	**0.0018**	**0.0016**
Perfluoropentanoic acid (PFPeA)	µg/kg	0.2									<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005									<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005									<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002							**50**	10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	**0.0003**	**0.0002**
Phenols																									
3&4-Methylphenol (m&p-cresol)	mg/kg	1												<1	<1	<1	<1	<1	<1	<1					
2,4,5-Trichlorophenol	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
2,4,6-Trichlorophenol	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
2-Methylphenol	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
4-chloro-3-methylphenol	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Pentachlorophenol	mg/kg	2						660						<2	<2	<2	<2	<2	<2	<2					
Phenol	mg/kg	0.5						240,000						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Chlorinated Hydrocarbons																									
1,1,1,2-tetrachloroethane	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
1,1,1-trichloroethane	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
1,1,2,2-tetrachloroethane	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
1,1,2-trichloroethane	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
1,1-dichloroethene	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
1,2-dichloroethane	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Carbon tetrachloride	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Chloroform	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Dichloromethane	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Trichloroethene	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Tetrachloroethene	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Vinyl chloride	mg/kg	4												<4	<4	<4	<4	<4	<4	<4					
Halogenated Benzenes																									
Chlorobenzene	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Hexachlorobenzene	mg/kg	0.05						80						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Inorganics																									
Cyanide Total	mg/kg	1												<1	<1	<1	<1	<1	<1	<1					
Fluoride	mg/kg	40												**350**	**320**	**420**	**270**	**290**	**200**	**240**					
Moisture Content (dried @ 103°C)	%	1																							
MAH																									
Styrene	mg/kg	0.5												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Metals																									
Arsenic	mg/kg	5				160		3,000						**10**	**8**	<5	**8**	**8**	**16**	**23**					
Beryllium	mg/kg	1						500						<1	<1	<1	<1	<1	<1	<1					
Cadmium	mg/kg	1						900						<1	<1	<1	<1	<1	<1	<1					
Chromium (hexavalent)	mg/kg	0.5						3,600						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					
Lead	mg/kg	5				1800		1,500						**19**	**20**	**5**	**274**	**30**	**52**	**26**					
Mercury	mg/kg	0.1						730						<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	**0.1**					
Molybdenum	mg/kg	2												<2	<2	<2	<2	<2	<2	<2					
Nickel	mg/kg	2				55		6,000						**24**	**16**	**4**	**13**	**13**	**12**	**14**					
Selenium	mg/kg	5						10,000						<5	<5	<5	<5	<5	<5	<5					
Silver	mg/kg	2												<2	<2	<2	<2	<2	<2	<2					
Organochlorine Pesticides																									
4,4-DDE	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
a-BHC	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Aldrin	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
b-BHC	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Chlordane	mg/kg	0.05						530						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Chlordane (cis)	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Chlordane (trans)	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
d-BHC	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
DDD	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
DDT	mg/kg	0.2				640								<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					
Dieldrin	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Endosulfan I	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Endosulfan II	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Endosulfan sulphate	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Endrin	mg/kg	0.05						100						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Endrin aldehyde	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
g-BHC (Lindane)	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Heptachlor	mg/kg	0.05						50						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Heptachlor epoxide	mg/kg	0.05												<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Organophosphorous Pesticides																									
Chlorpyrifos	mg/kg	0.05						2,000						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
PAH																									
Acenaphthene	mg/kg	0.5												<0.5	<0.5	<0.5	**2.3**	**2.9**	**3.0**	**2.4**					
Acenaphthylene	mg/kg	0.5												<0.5	<0.5	<0.5	**2.7**	**3.5**	**5.0**	**5.0**					
Anthracene	mg/kg	0.5												<0.5	<0.5	<0.5	**7.5**	**9.2**	**13.3**	**10.6**					
Benz(a)anthracene	mg/kg	0.5												**0.6**	<0.5	<0.5	**15.3**	**17.6**	**25.7**	**21.6**					
Benzo(a) pyrene	mg/kg	0.5					1.4							<0.5	<0.5	<0.5	**11.0**	**13.0**	**21.0**	**17.6**					
Benzo(b+j)fluoranthene	mg/kg	0.5												<0.5	<0.5	<0.5	**12.8**	**15.7**	**24.1**	**18.6**					
Benzo(g,h,i)perylene	mg/kg	0.5												<0.5	<0.5	<0.5	**5.8**	**6.3**	**11.9**	**10.1**					
Benzo(k)fluoranthene	mg/kg	0.5												<0.5	<0.5	<0.5	**3.8**	**5.0**	**5.9**	**5.6**					
Chrysene	mg/kg	0.5												**0.5**	<0.5	<0.5	**13.0**	**14.7**	**22.5**	**18.4**					
Dibenz(a,h)anthracene	mg/kg	0.5												<0.5	<0.5	<0.5	**1.6**	**1.8**	**3.0**	**2.5**					
Fluoranthene	mg/kg	0.5												**1.0**	**0.8**	<0.5	**31.3**	**36.7**	**53.5**	**42.4**					
Fluorene	mg/kg	0.5												<0.5	<0.5	<0.5	**3.7**	**5.1**	**4.8**	**4.1**					
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5												<0.5	<0.5	<0.5	**4.8**	**5.6**	**9.9**	**8.1**					
Naphthalene	mg/kg	0.5	11,000			370								<0.5	<0.5	<0.5	**4.1**	**5.6**	**5.2**	**3.6**					
Phenanthrene	mg/kg	0.5												<0.5	**0.5**	<0.5	**33.2**	**43.9**	**64.0**	**48.5**					
Pyrene	mg/kg	0.5												**1.1**	**0.8**	<0.5	**32.1**	**37.1**	**57.5**	**47.4**					
PAHs (Sum of total)	mg/kg	0.5						4,000						**3.2**	**2.1**	<0.5	**185**	**224**	**330**	**266**					
PCBs																									
PCBs (Sum of total)	mg/kg	0.1						7						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Solvents																									
Methyl Ethyl Ketone	mg/kg	5												<5	<5	<5	<5	<5	<5	<5					
TPH																									
C6-C9	mg/kg	10												<10	<10	<10	<10	<10	<10	<10					
C10-C14	mg/kg	20																							
C15-C28	mg/kg	50																							
C29-C36	mg/kg	50																							
TPH C10-C14 Fraction after Silica Cleanup	mg/kg	50												<50	<50	**60**	<50	<50	<50	<50					
TPH C15-C28 Fraction after Silica Cleanup	mg/kg	100												<100	<100	**270**	**210**	**330**	**280**	**210**					
TRH >C10-C16 (after silica gel clean-up)	mg/kg	50												<50	<50	**90**	<50	<50	<50	<50					
TPH C29-C36 Fraction after Silica Cleanup	mg/kg	100												<100	<100	**360**	<100	**210**	**150**	**130**					
TRH >C34-C40 (after silica gel clean-up)	mg/kg	100					6,600							<100	<100	**550**	<100	**150**	**110**	**100**					
TRH C10-C36 (Total) (after silica gel clean-up)	mg/kg	50												<50	<50	**690**	**210**	**540**	**430**	**340**					
TRH >C16-C34 (after silica gel clean-up)	mg/kg	100					2,500							<100	<100	**430**	**260**	**450**	**370**	**280**					
C10-C36 (Sum of total)	mg/kg	50												<50	<50	**690**	**210**	**540**	**430**	**340**					

Table 2
Laboratory Analyical Results - Surface water
JE10122

					Field ID	SW1	SW2
					Date	1/03/2020	1/03/2020
	Unit	EQL	PFAS NEMP 2020 Table 1 Health Drinking Water	PFAS NEMP 2020 Table 1 Health Recreational Water	PFAS NEMP 2018 Table 5 Freshwater 95%		
PFOS/PFOA							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	**µg/L**	0.05				<0.05	<0.05
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	**µg/L**	0.01					
Sum of PFAS (WA DER List)	**µg/L**	0.01				<0.01	<0.01
Perfluorohexanoic acid (PFHxA)	**µg/L**	0.02				<0.02	<0.02
Sum of PFHxS and PFOS	**µg/L**	0.01	0.07	2		<0.01	<0.01
Sum of US EPA PFAS (PFOS + PFOA)*	**µg/L**	0.01					
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	**µg/L**	0.05				<0.05	<0.05
Perfluorobutanoic acid (PFBA)	**µg/L**	0.1				<0.1	<0.1
Perfluorobutane sulfonic acid (PFBS)	**µg/L**	0.02				<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	**µg/L**	0.02				<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	**µg/L**	0.01				<0.02	<0.02
Perfluorooctanesulfonic acid (PFOS)	**mg/L**	0.00001			0.00013	<0.00001	<0.00001
Perfluoropentanoic acid (PFPeA)	**µg/L**	0.02				<0.02	<0.02
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	**mg/L**	0.00005				<0.00005	<0.00005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	**mg/L**	0.00005				<0.00005	<0.00005
Perfluorooctanoic acid (PFOA)	**mg/L**	0.00001	0.00056	0.01	0.22	<0.00001	<0.00001

Table 3A
Laboratory Analyical Results - Soil Replicates
JE10122

		Lab Report Number	EM2003501	EM2003501		EM2003501	705825	
		Field ID	SB4_0.4-0.6	QC4		SB4_0.4-0.6	QC5	
		Date	1/03/2020	1/03/2020		1/03/2020	1/03/2020	
		Matrix Type	soil	soil	RPD	soil	soil	RPD
	Unit	EQL						
TRH								
C6-C10	**mg/kg**	10	<10	<10	0	<10	<20	0
BTEX								
Benzene	**mg/kg**	0.1	<0.2	<0.2	0	<0.2	<0.1	0
Toluene	**mg/kg**	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Ethylbenzene	**mg/kg**	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Xylene (m & p)	**mg/kg**	0.2	<0.5	<0.5	0	<0.5	<0.2	0
Xylene (o)	**mg/kg**	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Xylene Total	**mg/kg**	0.3		<0.5			<0.3	
Total BTEX	**mg/kg**	0.2		<0.2				
PAH								
Acenaphthene	**mg/kg**	0.5	3.0	1.6	61	3.0	3.5	15
Acenaphthylene	**mg/kg**	0.5	5.0	2.9	53	5.0	2.9	53
Anthracene	**mg/kg**	0.5	13.3	7.5	56	13.3	11	19
Benz(a)anthracene	**mg/kg**	0.5	25.7	16.4	44	25.7	18	35
Benzo(a) pyrene	**mg/kg**	0.5	21.0	13.5	43	21.0	18	15
Benzo(b+j)fluoranthene	**mg/kg**	0.5	24.1	15.0	47	24.1	12	67
Benzo(g,h,i)perylene	**mg/kg**	0.5	11.9	8.2	37	11.9	8.8	30
Benzo(k)fluoranthene	**mg/kg**	0.5	5.9	3.7	46	5.9	13	75
Chrysene	**mg/kg**	0.5	22.5	15.4	37	22.5	18	22
Dibenz(a,h)anthracene	**mg/kg**	0.5	3.0	2.2	31	3.0	4.1	31
Fluoranthene	**mg/kg**	0.5	53.5	33.0	47	53.5	41	26
Fluorene	**mg/kg**	0.5	4.8	3.2	40	4.8	6.2	25
Indeno(1,2,3-c,d)pyrene	**mg/kg**	0.5	9.9	6.6	40	9.9	12	19
Naphthalene	**mg/kg**	0.5	5.2	2.7	63	5.2	5.7	9
Phenanthrene	**mg/kg**	0.5	64.0	37.5	52	64.0	50	25
Pyrene	**mg/kg**	0.5	57.5	35.0	49	57.5	43	29
PAHs (Sum of total)	**mg/kg**	0.5	330	204	47	330	270	20
TPH								
C6-C9	**mg/kg**	10	<10	<10	0	<10	<20	0

Table 3B
Laboratory Analyical Results - Soil Replicates
JE10122

		Lab Report Number	EM2003501	EM2003501		EM2003501	705825	
		Field ID	SW1	QC1		SW1	QC2	
		Date	1/03/2020	1/03/2020		1/03/2020	1/03/2020	
		Matrix Type	water	water	RPD	water	water	RPD
	Unit	EQL						
PFOS/PFOA								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05		
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	µg/L	0.01					0.01	
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	0	<0.01		
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	0.01	0
Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.01					0.01	
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	0	<0.02		
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05		
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	0	<0.02		
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02		
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	0	<0.02		
Perfluorooctanesulfonic acid (PFOS)	mg/L	0.00001	<0.00001	<0.00001	0	<0.00001	0.00001	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/L	0.00005	<0.00005	<0.00005	0	<0.00005		
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/L	0.00005	<0.00005	<0.00005	0	<0.00005	<0.00005	0
Perfluorooctanoic acid (PFOA)	mg/L	0.00001	<0.00001	<0.00001	0	<0.00001	<0.00001	0

Table 4
Laboratory Analyical Results - Field Blanks
JE10122

		Lab Report Number	EM2003501	EM2003501	EM2003501
		Date	1/03/2020	1/03/2020	1/03/2020
			QC3	QC6	QC7
		Type	Rinsate	Rinsate	Trip Blank
		Matrix Type	water	water	water
	Unit	EQL			
TRH					
C6-C10	µg/L	20		<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20		<20	<20
C10-C16 (F2 minus Naphthalene)	µg/L	100		<100	
C10-C40 (Sum of total)	µg/L	100		<100	
C10-C16	µg/L	100		<100	
C16-C34	µg/L	100		<100	
C34-C40	µg/L	100		<100	
BTEX					
Benzene	µg/L	1		<1	<1
Toluene	µg/L	2		<2	<2
Ethylbenzene	µg/L	2		<2	<2
Xylene (m & p)	µg/L	2		<2	<2
Xylene (o)	µg/L	2		<2	<2
Xylene Total	µg/L	2		<2	<2
Total BTEX	µg/L	1		<1	<1
PFOS/PFOA					
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	<0.02	
Perfluorooctanesulfonic acid (PFOS)	mg/L	0.00001	<0.00001	<0.00001	
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/L	0.00005	<0.00005	<0.00005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/L	0.00005	<0.00005	<0.00005	
Perfluorooctanoic acid (PFOA)	mg/L	0.00001	<0.00001	<0.00001	
Metals					
Arsenic	mg/L	0.001		<0.001	
Cadmium	mg/L	0.0001		<0.0001	
Chromium (III+VI)	mg/L	0.001		<0.001	
Copper	mg/L	0.001		<0.001	
Lead	mg/L	0.001		<0.001	
Mercury	mg/L	0.0001		<0.0001	
Nickel	mg/L	0.001		<0.001	
Zinc	mg/L	0.005		<0.005	
PAH					
Naphthalene	µg/L	5		<5	<5
TPH					
C6-C9	µg/L	20		<20	<20
C10-C14	µg/L	50		<50	
C15-C28	µg/L	100		<100	
C29-C36	µg/L	50		<50	
C10-C36 (Sum of total)	µg/L	50		<50	

This page has been left intentionally blank

Appendix C - Borelogs

jones environmental consulting

SOIL LOG SB1

PROJECT NUMBER JE10122
PROJECT NAME ESI, Marshalls Creek Bridge, W
CLIENT RMS
ADDRESS Sturt Highway, Wagga Wagga

PID	Samples	Analysed	Drilling Method	Depth (m)	Graphic Log	Moisture	Material Description	Additional Observations	Elevation (m)
			SS	0.1, 0.2, 0.3			Asphalt	Asphalt: Cored by RMS	-0.1, -0.2, -0.3
0.3	SB1_0.4-06	Y		0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1, 1.1, 1.2		M	Sandy CLAY: Red/Brown, medium plasticity, with traces of river cobble and gravels	FILL	-0.4, -0.5, -0.6, -0.7, -0.8, -0.9, -1, -1.1, -1.2
0.0	SB1_1.0-1.2	Y							
				1.3			Termination Depth at: 1.3 m		-1.3
				1.4, 1.5, 1.6, 1.7, 1.8, 1.9					-1.4, -1.5, -1.6, -1.7, -1.8, -1.9

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 29 March 2020

jones environmental consulting

SOIL LOG SB2

PROJECT NUMBER JE10122
PROJECT NAME ESI, Marshalls Creek Bridge, W
CLIENT RMS
ADDRESS Sturt Highway, Wagga Wagga

PID	Samples	Analysed	Drilling Method	Depth (m)	Graphic Log	Moisture	Material Description	Additional Observations	Elevation (m)
			SS				Asphalt	Asphalt: Cored by RMS	
				0.1					-0.1
				0.2					-0.2
				0.3		M	CLAY: Dark Brown, medium plasticity, some medium to coarse gravel	FILL	-0.3
	SB2_0.4-0.6	Y		0.4					-0.4
0.1				0.5					-0.5
				0.6					-0.6
				0.7					-0.7
				0.8					-0.8
				0.9					-0.9
				1					-1
				1.1					-1.1
				1.2					-1.2
				1.3					-1.3
				1.4					-1.4
				1.5					-1.5
				1.6					-1.6
	SB2_1.6-1.8	N							
0.0				1.7					-1.7
				1.8			Termination Depth at: 1.8 m		-1.8
				1.9					-1.9

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 29 March 2020

jones environmental consulting

SOIL LOG SB3

PROJECT NUMBER JE10122
PROJECT NAME ESI, Marshalls Creek Bridge, W
CLIENT RMS
ADDRESS Sturt Highway, Wagga Wagga

PID	Samples	Analysed	Drilling Method	Depth (m)	Graphic Log	Moisture	Material Description	Additional Observations	Elevation (m)
			SS	0.1			Asphalt	Asphalt: Cored by RMS	-0.1
				0.2					-0.2
				0.3		M	Sandy CLAY: Dark Brown, medium plasticity, sand fine, some medium to coarse gravel	FILL: gravel angular	-0.3
	SB3_0.4-06	Y		0.4					-0.4
0.2				0.5					-0.5
				0.6					-0.6
				0.7					-0.7
				0.8					-0.8
				0.9					-0.9
	SB3_1.0-1.2	Y		1					-1
0.1				1.1					-1.1
				1.2			Termination Depth at: 1.2 m		-1.2
				1.3					-1.3
				1.4					-1.4
				1.5					-1.5
				1.6					-1.6
				1.7					-1.7
				1.8					-1.8
				1.9					-1.9

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 29 March 2020

jones environmental consulting

SOIL LOG SB4

PROJECT NUMBER JE10122
PROJECT NAME ESI, Marshalls Creek Bridge, W
CLIENT RMS
ADDRESS Sturt Highway, Wagga Wagga

PID	Samples	Analysed	Drilling Method	Depth (m)	Graphic Log	Moisture	Material Description	Additional Observations	Elevation (m)
			SS				Asphalt	Asphalt: Cored by RMS	
				0.1					-0.1
				0.2					-0.2
				0.3		M	Gravely, Sandy CLAY: Dark Brown, medium plasticity, sand fine, gravel medium to coarse	FILL	-0.3
	SB4_0.4-0.6	Y		0.4					-0.4
0.3				0.5					-0.5
				0.6					-0.6
				0.7					-0.7
				0.8					-0.8
				0.9					-0.9
				1			Termination Depth at: 1 m		-1
				1.1					-1.1
				1.2					-1.2
				1.3					-1.3
				1.4					-1.4
				1.5					-1.5
				1.6					-1.6
				1.7					-1.7
				1.8					-1.8
				1.9					-1.9

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 29 March 2020

SOIL LOG HA1

PROJECT NUMBER JE10122
PROJECT NAME ESI, Marshalls Creek Bridge, W
CLIENT RMS
ADDRESS Sturt Highway, Wagga Wagga

PID	Samples	Analysed	Drilling Method	Depth (m)	Graphic Log	Moisture	Material Description	Additional Observations	Elevation (m)
	HA1_0.0-0.2		HA			D	CLAYEY Sand: light brown	FILL	
				0.05					-0.05
0				0.1					-0.1
				0.15					-0.15
				0.2					-0.2
							Termination Depth at: 0.2 m		
				0.25					-0.25
				0.3					-0.3
				0.35					-0.35
				0.4					-0.4
				0.45					-0.45
				0.5					-0.5
				0.55					-0.55
				0.6					-0.6
				0.65					-0.65
				0.7					-0.7
				0.75					-0.75
				0.8					-0.8
				0.85					-0.85
				0.9					-0.9
				0.95					-0.95

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 29 March 2020

jones environmental consulting

SOIL LOG HA2

PROJECT NUMBER JE10122
PROJECT NAME ESI, Marshalls Creek Bridge, W
CLIENT RMS
ADDRESS Sturt Highway, Wagga Wagga

PID	Samples	Analysed	Drilling Method	Depth (m)	Graphic Log	Moisture	Material Description	Additional Observations	Elevation (m)
	HA2_0.0-0.2		HA			D	CLAYEY Sand: light brown	FILL	
				0.05					-0.05
0				0.1					-0.1
				0.15					-0.15
				0.2					-0.2
							Termination Depth at: 0.2 m		
				0.25					-0.25
				0.3					-0.3
				0.35					-0.35
				0.4					-0.4
				0.45					-0.45
				0.5					-0.5
				0.55					-0.55
				0.6					-0.6
				0.65					-0.65
				0.7					-0.7
				0.75					-0.75
				0.8					-0.8
				0.85					-0.85
				0.9					-0.9
				0.95					-0.95

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 29 March 2020

jones environmental consulting

SOIL LOG HA3

PROJECT NUMBER JE10122
PROJECT NAME ESI, Marshalls Creek Bridge, W
CLIENT RMS
ADDRESS Sturt Highway, Wagga Wagga

PID	Samples	Analysed	Drilling Method	Depth (m)	Graphic Log	Moisture	Material Description	Additional Observations	Elevation (m)
	HA3_0.0-0.2		HA			D	CLAYEY Sand: light brown	FILL	
				0.05					-0.05
0				0.1					-0.1
				0.15					-0.15
				0.2					-0.2
							Termination Depth at: 0.2 m		
				0.25					-0.25
				0.3					-0.3
				0.35					-0.35
				0.4					-0.4
				0.45					-0.45
				0.5					-0.5
				0.55					-0.55
				0.6					-0.6
				0.65					-0.65
				0.7					-0.7
				0.75					-0.75
				0.8					-0.8
				0.85					-0.85
				0.9					-0.9
				0.95					-0.95

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 29 March 2020

This page has been left intentionally blank

Appendix D - Laboratory Certificates

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2003501**	Page	: 1 of 22
Client	: **Jones Environmental**	Laboratory	: Environmental Division Melbourne
Contact	: PATRICIA JONES	Contact	: Larissa Burns
Address	: 497 Parnall Street Lavington Lavington 2641	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9644
Project	: JE10122	Date Samples Received	: 03-Mar-2020 11:00
Order number	: ----	Date Analysis Commenced	: 04-Mar-2020
C-O-C number	: ----	Issue Date	: 13-Mar-2020 11:42
Sampler	: RUSSELL JONES		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 21		
No. of samples analysed	: 21		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Arenie Vijayaratnam	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EK040T: EM2003406 #2, Poor matrix spike recovery for Fluoride due to matrix effects.
- EP080: Poor surrogate recovery for duplicate sample EM2003501_19. Confirmed by re-analysis. Unable to confirm via re-extraction due to the compromising of volatile compounds by sample homogenisation.
- EP080: Particular sample EM2003501_19 shows positive hits. Confirmed by re-analysis.
- EP231X: Some samples required dilution prior to extraction due to matrix interferences. LOR values have been adjusted accordingly.
- EG035T: EM2003501 #2 Poor matrix spike recovery for total mercury due to sample matrix.
- EP231X: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB1_0.4-0.6	SB1_1.0-1.2	SB2_0.4-0.6	SB3_0.4-0.6	SB3_1.0-1.2
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-001	EM2003501-002	EM2003501-003	EM2003501-004	EM2003501-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	7.5	9.4	12.9	11.2	7.5
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	----	No	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	----	No	----
Asbestos Type	1332-21-4	-	--	-	----	----	-	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	----	----	No	----
Organic Fibre	----	0.1	g/kg	No	----	----	No	----
Sample weight (dry)	----	0.01	g	65.7	----	----	140	----
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	----	----	U.DALKIN	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	10	8	<5	8	8
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Lead	7439-92-1	5	mg/kg	19	20	5	274	30
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg	24	16	4	13	13
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Silver	7440-22-4	2	mg/kg	<2	<2	<2	<2	<2
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	<1	<1
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	<1	<1	<1	<1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	350	320	420	270	290
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB1_0.4-0.6	SB1_1.0-1.2	SB2_0.4-0.6	SB3_0.4-0.6	SB3_1.0-1.2
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-001	EM2003501-002	EM2003501-003	EM2003501-004	EM2003501-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	**90**	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	**430**	**260**	**450**
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	**550**	<100	**150**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	**1070**	**260**	**600**
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	**60**	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	**270**	**210**	**330**
C29 - C36 Fraction	----	100	mg/kg	<100	<100	**360**	<100	**210**
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	**690**	**210**	**540**
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB1_0.4-0.6	SB1_1.0-1.2	SB2_0.4-0.6	SB3_0.4-0.6	SB3_1.0-1.2
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-001	EM2003501-002	EM2003501-003	EM2003501-004	EM2003501-005
				Result	Result	Result	Result	Result
EP074A: Monocyclic Aromatic Hydrocarbons - Continued								
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP074B: Oxygenated Compounds								
2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	<5	<5	<5
EP074E: Halogenated Aliphatic Compounds								
Vinyl chloride	75-01-4	4	mg/kg	<4	<4	<4	<4	<4
1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	**4.1**	**5.6**
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	**2.7**	**3.5**
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	**2.3**	**2.9**
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	**3.7**	**5.1**
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	**0.5**	<0.5	**33.2**	**43.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB1_0.4-0.6	SB1_1.0-1.2	SB2_0.4-0.6	SB3_0.4-0.6	SB3_1.0-1.2
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-001	EM2003501-002	EM2003501-003	EM2003501-004	EM2003501-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	7.5	9.2
Fluoranthene	206-44-0	0.5	mg/kg	1.0	0.8	<0.5	31.3	36.7
Pyrene	129-00-0	0.5	mg/kg	1.1	0.8	<0.5	32.1	37.1
Benz(a)anthracene	56-55-3	0.5	mg/kg	0.6	<0.5	<0.5	15.3	17.6
Chrysene	218-01-9	0.5	mg/kg	0.5	<0.5	<0.5	13.0	14.7
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	12.8	15.7
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	3.8	5.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	11.0	13.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	4.8	5.6
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	1.6	1.8
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	5.8	6.3
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	3.2	2.1	<0.5	185	224
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	16.4	19.4
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	16.4	19.4
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	16.4	19.4
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB1_0.4-0.6	SB1_1.0-1.2	SB2_0.4-0.6	SB3_0.4-0.6	SB3_1.0-1.2
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-001	EM2003501-002	EM2003501-003	EM2003501-004	EM2003501-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	75.2	87.8	77.5	77.0	81.0
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	77.8	86.5	80.1	81.3	83.2
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	67.4	81.6	80.9	84.0	86.6
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	90.6	84.3	77.0	84.5	92.7
Toluene-D8	2037-26-5	0.5	%	101	99.1	89.6	96.0	108
4-Bromofluorobenzene	460-00-4	0.5	%	101	101	90.6	98.8	106
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	90.7	94.4	74.8	85.2	86.2
2-Chlorophenol-D4	93951-73-6	0.5	%	89.7	92.6	69.0	86.5	86.8
2.4.6-Tribromophenol	118-79-6	0.5	%	72.1	74.5	57.1	79.7	83.7
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	92.6	106	90.6	91.0	91.5
Anthracene-d10	1719-06-8	0.5	%	112	105	96.2	110	106
4-Terphenyl-d14	1718-51-0	0.5	%	124	113	117	105	106
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	97.2	89.0	82.0	88.9	98.5
Toluene-D8	2037-26-5	0.2	%	95.2	93.4	84.3	90.5	102
4-Bromofluorobenzene	460-00-4	0.2	%	104	98.6	92.8	106	118

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB1_0.4-0.6	SB1_1.0-1.2	SB2_0.4-0.6	SB3_0.4-0.6	SB3_1.0-1.2
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-001	EM2003501-002	EM2003501-003	EM2003501-004	EM2003501-005
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	97.5	97.0	92.5	65.0	60.0
13C8-PFOA	----	0.0002	%	83.0	81.0	71.0	65.0	60.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB4_0.4-0.6	SB4_1.0-1.2	HA1	HA2	HA3
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-006	EM2003501-007	EM2003501-008	EM2003501-009	EM2003501-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	----	----	0.3	0.3	3.7
Moisture Content	----	1.0	%	7.2	9.3	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	No	No	No
Asbestos Type	1332-21-4	-	--	-	----	-	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	----	No	No	No
Organic Fibre	----	0.1	g/kg	No	----	No	Yes	Yes
Sample weight (dry)	----	0.01	g	68.5	----	47.8	44.1	53.3
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	----	U.DALKIN	U.DALKIN	U.DALKIN
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	16	23	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	<1	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Lead	7439-92-1	5	mg/kg	52	26	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Nickel	7440-02-0	2	mg/kg	12	14	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	----	----
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	<1	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	200	240	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB4_0.4-0.6	SB4_1.0-1.2	HA1	HA2	HA3
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-006	EM2003501-007	EM2003501-008	EM2003501-009	EM2003501-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**370**	**280**	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	**110**	**100**	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**480**	**380**	----	----	----
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	**280**	**210**	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**150**	**130**	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**430**	**340**	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB4_0.4-0.6	SB4_1.0-1.2	HA1	HA2	HA3
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-006	EM2003501-007	EM2003501-008	EM2003501-009	EM2003501-010
				Result	Result	Result	Result	Result
EP074A: Monocyclic Aromatic Hydrocarbons - Continued								
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074B: Oxygenated Compounds								
2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Vinyl chloride	75-01-4	4	mg/kg	<4	<4	----	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	----	----	----
Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	----	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	**5.2**	**3.6**	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	**5.0**	**5.0**	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	**3.0**	**2.4**	----	----	----
Fluorene	86-73-7	0.5	mg/kg	**4.8**	**4.1**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB4_0.4-0.6	SB4_1.0-1.2	HA1	HA2	HA3
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-006	EM2003501-007	EM2003501-008	EM2003501-009	EM2003501-010
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	0.5	mg/kg	64.0	48.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	13.3	10.6	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	53.5	42.4	----	----	----
Pyrene	129-00-0	0.5	mg/kg	57.5	47.4	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	25.7	21.6	----	----	----
Chrysene	218-01-9	0.5	mg/kg	22.5	18.4	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	24.1	18.6	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	5.9	5.6	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	21.0	17.6	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	9.9	8.1	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	3.0	2.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	11.9	10.1	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	330	266	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	30.9	25.8	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	30.9	25.8	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	30.9	25.8	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	0.0005	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	0.0008	0.0022
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB4_0.4-0.6	SB4_1.0-1.2	HA1	HA2	HA3
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-006	EM2003501-007	EM2003501-008	EM2003501-009	EM2003501-010
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	**0.0013**	**0.0022**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0005	<0.0005	<0.0002	**0.0013**	**0.0022**
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**78.4**	**81.2**	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**80.2**	**81.5**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**87.1**	**87.8**	----	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	**82.8**	**85.9**	----	----	----
Toluene-D8	2037-26-5	0.5	%	**100**	**99.8**	----	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	**101**	**95.4**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**86.7**	**87.6**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**87.8**	**88.6**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**85.3**	**80.4**	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**92.4**	**93.2**	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**114**	**119**	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**103**	**104**	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**87.6**	**91.8**	----	----	----
Toluene-D8	2037-26-5	0.2	%	**94.9**	**93.4**	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**102**	**103**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB4_0.4-0.6	SB4_1.0-1.2	HA1	HA2	HA3
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-006	EM2003501-007	EM2003501-008	EM2003501-009	EM2003501-010
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	80.0	65.0	94.5	115	112
13C8-PFOA	----	0.0002	%	65.0	60.0	88.5	84.5	85.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SED1	SED2	SED3	SED4	QC4
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-013	EM2003501-014	EM2003501-015	EM2003501-016	EM2003501-019
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.1	3.9	7.0	6.6	----
Moisture Content	----	1.0	%	----	----	----	----	9.3
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	2.7
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	2.9
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	1.6
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	3.2
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	37.5
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	7.5
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	33.0
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	35.0
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	16.4
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	15.4
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	15.0
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	3.7
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	13.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	6.6
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	2.2
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	8.2
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	----	204
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	20.1
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	20.1
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	20.1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	1010
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	490
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	1500
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	90

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SED1	SED2	SED3	SED4	QC4
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-013	EM2003501-014	EM2003501-015	EM2003501-016	EM2003501-019
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	**1310**
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	**320**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	**1720**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	**90**
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	----	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	**3**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	**0.0018**	**0.0018**	**0.0016**	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0003**	**0.0002**	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SED1	SED2	SED3	SED4	QC4
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-013	EM2003501-014	EM2003501-015	EM2003501-016	EM2003501-019
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	**0.0018**	**0.0018**	**0.0016**	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	**0.0018**	**0.0021**	**0.0018**	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	**69.2**
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	**68.5**
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	**66.2**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	**74.7**
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	**90.5**
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	**85.1**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	**80.0**
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	**85.9**
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	**92.4**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**104**	**95.5**	**106**	**82.5**	----
13C8-PFOA	----	0.0002	%	**81.0**	**83.0**	**85.5**	**76.0**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW1	SW2	QC1	QC3	QC6
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-011	EM2003501-012	EM2003501-017	EM2003501-018	EM2003501-020
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	<0.001
Copper	7440-50-8	0.001	mg/L	----	----	----	----	<0.001
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	<0.001
Lead	7439-92-1	0.001	mg/L	----	----	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	<0.005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	<0.0001
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	----	----	<20
C10 - C14 Fraction	----	50	µg/L	----	----	----	----	<50
C15 - C28 Fraction	----	100	µg/L	----	----	----	----	<100
C29 - C36 Fraction	----	50	µg/L	----	----	----	----	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	----	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	----	----	<20
>C10 - C16 Fraction	----	100	µg/L	----	----	----	----	<100
>C16 - C34 Fraction	----	100	µg/L	----	----	----	----	<100
>C34 - C40 Fraction	----	100	µg/L	----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	----	----	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	----	----	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	----	----	<1
Toluene	108-88-3	2	µg/L	----	----	----	----	<2
Ethylbenzene	100-41-4	2	µg/L	----	----	----	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	----	<2
ortho-Xylene	95-47-6	2	µg/L	----	----	----	----	<2
^ Total Xylenes	----	2	µg/L	----	----	----	----	<2
^ Sum of BTEX	----	1	µg/L	----	----	----	----	<1
Naphthalene	91-20-3	5	µg/L	----	----	----	----	<5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW1	SW2	QC1	QC3	QC6
			Client sampling date / time	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00	01-Mar-2020 00:00
Compound	CAS Number	LOR	Unit	EM2003501-011	EM2003501-012	EM2003501-017	EM2003501-018	EM2003501-020
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	----	94.3
Toluene-D8	2037-26-5	2	%	----	----	----	----	98.2
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	----	114
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	95.0	91.9	83.4	93.3	91.6
13C8-PFOA	----	0.02	%	74.9	77.4	73.7	79.0	78.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QC7	----	----	----	----
			Client sampling date / time	01-Mar-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2003501-021	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L	<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**98.9**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**105**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**113**	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	SB1_0.4-0.6 - 01-Mar-2020 00:00	Tan soil with rock matter.
EA200: Description	SB3_0.4-0.6 - 01-Mar-2020 00:00	Brown clay like soil with rock matter.
EA200: Description	SB4_0.4-0.6 - 01-Mar-2020 00:00	Brown clay like soil.
EA200: Description	HA1 - 01-Mar-2020 00:00	Beige clay like soil.
EA200: Description	HA2 - 01-Mar-2020 00:00	Beige clay like soil with rock and organic matter.
EA200: Description	HA3 - 01-Mar-2020 00:00	Beige clay like soil with rock and organic matter.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	36	140
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	38	128
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	33	139
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	62	122
Toluene-D8	2037-26-5	64	120
4-Bromofluorobenzene	460-00-4	66	124
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2003501**	Page	: 1 of 22
Client	: **Jones Environmental**	Laboratory	: Environmental Division Melbourne
Contact	: PATRICIA JONES	Contact	: Larissa Burns
Address	: 497 Parnall Street Lavington Lavington 2641	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9644
Project	: JE10122	Date Samples Received	: 03-Mar-2020
Order number	: ----	Date Analysis Commenced	: 04-Mar-2020
C-O-C number	: ----	Issue Date	: 13-Mar-2020
Sampler	: RUSSELL JONES		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 21		
No. of samples analysed	: 21		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Arenie Vijayaratnam	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2899374)									
EM2003501-001	SB1_0.4-0.6	EG005T: Arsenic	7440-38-2	5	mg/kg	10	9	0.00	No Limit
EM2003501-001	SB1_0.4-0.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	24	24	0.00	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	19	13	37.8	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
EM2003519-003	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	8	9	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	7	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	70	74	5.92	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2899451)									
EM2003484-008	Anonymous	EA055: Moisture Content	----	0.1	%	19.7	19.1	3.39	0% - 50%
EM2003501-002	SB1_1.0-1.2	EA055: Moisture Content	----	0.1	%	9.4	9.7	3.23	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2902320)									
EM2003501-008	HA1	EA055: Moisture Content	----	0.1	%	0.3	0.6	65.6	No Limit
EM2003786-003	Anonymous	EA055: Moisture Content	----	0.1	%	16.7	15.4	8.58	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2899375)									
EM2003501-001	SB1_0.4-0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2899375) - continued									
EM2003519-003	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 2898723)									
EM2003406-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2003459-005	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2899293)									
EM2003459-005	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EM2003501-001	SB1_0.4-0.6	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QC Lot: 2899295)									
EM2003501-001	SB1_0.4-0.6	EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 2899314)									
EM2003406-001	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	320	300	6.35	No Limit
EM2003459-005	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	310	240	26.2	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2903065)									
EM2003501-001	SB1_0.4-0.6	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2903066)									
EM2003616-003	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EM2003501-001	SB1_0.4-0.6	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2903066) - continued									
EM2003501-001	SB1_0.4-0.6	EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2903066)									
EM2003616-003	Anonymous	EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EM2003501-001	SB1_0.4-0.6	EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 2903067)									
EM2003501-001	SB1_0.4-0.6	EP071SG-S: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 2903067)									
EM2003501-001	SB1_0.4-0.6	EP071SG-S: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 2897634)									
EM2003501-001	SB1_0.4-0.6	EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 2897634)									
EM2003501-001	SB1_0.4-0.6	EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 2897634)									
EM2003501-001	SB1_0.4-0.6	EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074E: Halogenated Aliphatic Compounds (QC Lot: 2897634) - continued									
EM2003501-001	SB1_0.4-0.6	EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	5	mg/kg	<4	<4	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 2897634)									
EM2003501-001	SB1_0.4-0.6	EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 2897634)									
EM2003501-001	SB1_0.4-0.6	EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2897716)									
EM2003484-010	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EM2003484-001	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2903068)									
EM2003501-001	SB1_0.4-0.6	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2897716)									
EM2003484-010	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2897716) - continued									
EM2003484-010	Anonymous	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2003484-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.1	1.0	12.8	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.1	1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	0.6	0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.6	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.6	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2903068)									
EM2003501-001	SB1_0.4-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.0	0.7	27.4	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.1	0.8	28.7	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2903068) - continued									
EM2003501-001	SB1_0.4-0.6	EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	0.6	<0.5	20.6	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2897635)									
EM2003501-001	SB1_0.4-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2897717)									
EM2003484-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM2003484-010	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2903051)									
EM2003501-019	QC4	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2897635)									
EM2003501-001	SB1_0.4-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2897717)									
EM2003484-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM2003484-010	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2903051)									
EM2003501-019	QC4	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 2897635)									
EM2003501-001	SB1_0.4-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 2897635) - continued									
EM2003501-001	SB1_0.4-0.6	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 2903051)									
EM2003501-019	QC4	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	3	8	99.8	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2898241)									
EM2003484-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EM2003501-005	SB3_1.0-1.2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2908548)									
EM2003501-007	SB4_1.0-1.2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2898241)									
EM2003484-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EM2003501-005	SB3_1.0-1.2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2908548)									
EM2003501-007	SB4_1.0-1.2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2908548) - continued									
EM2003501-007	SB4_1.0-1.2	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2898241)									
EM2003484-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EM2003501-005	SB3_1.0-1.2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2908548)									
EM2003501-007	SB4_1.0-1.2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020T: Total Metals by ICP-MS (QC Lot: 2894860)									
EM2003112-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.024	0.020	16.9	No Limit
EM2003349-007	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2894860) - continued									
EM2003349-007	Anonymous	EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2893827)									
EM2003485-002	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2003512-005	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2893501)									
EM2003542-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2894628)									
EM2003112-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM2003563-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	1020	890	14.4	0% - 20%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2893501)									
EM2003542-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2894628)									
EM2003112-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM2003563-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	1010	870	14.6	0% - 20%
EP080: BTEXN (QC Lot: 2894628)									
EM2003112-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM2003563-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	17	16	0.00	0% - 50%
		EP080: Toluene	108-88-3	2	µg/L	87	78	10.3	0% - 20%
		EP080: Ethylbenzene	100-41-4	2	µg/L	24	21	12.0	0% - 50%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	122	108	11.7	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	45	40	11.6	0% - 20%
		EP080: Naphthalene	91-20-3	5	µg/L	50	51	0.00	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2896571)									
EM2003501-018	QC3	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2896571) - continued									
EM2003501-018	QC3	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EM2003561-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.06	0.07	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.13	0.14	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2896571)									
EM2003501-018	QC3	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EM2003561-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2896571)									
EM2003501-018	QC3	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM2003561-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2899374)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	95.0	78.5	107
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	102	85.4	114
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	88.8	76.2	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	91.6	78.4	106
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	102	78.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	99.9	79.9	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	95.6	92.0	110
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	93.5	80.0	108
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2899375)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	97.5	76.9	110
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2898723)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	74.8	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2899293)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	92.1	70.0	130
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2899295)								
EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	20 mg/kg	93.5	70.0	130
EK040T: Fluoride Total (QCLot: 2899314)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	93.5	75.2	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2903065)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	129	63.2	133
EP068A: Organochlorine Pesticides (OC) (QCLot: 2903066)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	71.8	126
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	73.2	72.2	125
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	84.4	74.2	124
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	82.0	69.1	124
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.2	65.1	125
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.2	66.6	122
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.6	71.8	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	82.9	71.1	124
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	81.8	64.8	128
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	70.2	126
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	80.7	72.1	124
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	81.8	68.0	122

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP068A: Organochlorine Pesticides (OC) (QCLot: 2903066) - continued								
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.8	73.0	124
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	76.2	55.8	130
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	81.5	72.0	124
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.5	72.0	127
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	83.2	66.3	131
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	62.4	131
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	81.6	55.4	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2903066)								
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.0	67.4	126
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2903067)								
EP071SG-S: C10 - C14 Fraction	----	50	mg/kg	<50	688 mg/kg	59.2	55.2	120
EP071SG-S: C15 - C28 Fraction	----	100	mg/kg	<100	3100 mg/kg	77.7	70.9	137
EP071SG-S: C29 - C36 Fraction	----	100	mg/kg	<100	1490 mg/kg	78.6	66.8	129
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2903067)								
EP071SG-S: >C10 - C16 Fraction	----	50	mg/kg	<50	1050 mg/kg	58.7	51.5	122
EP071SG-S: >C16 - C34 Fraction	----	100	mg/kg	<100	3960 mg/kg	81.0	71.0	132
EP071SG-S: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	78.6	50.8	119
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2897634)								
EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	100	69.9	120
EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	102	70.9	115
EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	108	69.8	114
EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	108	69.2	118
EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	1 mg/kg	110	69.8	115
EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	117	73.2	119
EP074B: Oxygenated Compounds (QCLot: 2897634)								
EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	10 mg/kg	96.9	61.2	128
EP074E: Halogenated Aliphatic Compounds (QCLot: 2897634)								
EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	10 mg/kg	103	46.0	138
EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	1 mg/kg	88.6	61.7	119
EP074: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	1 mg/kg	118	74.6	144
EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	1 mg/kg	89.5	62.4	115
EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	1 mg/kg	87.6	57.7	112
EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	1 mg/kg	88.9	73.0	116
EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	1 mg/kg	94.1	65.5	117
EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	1 mg/kg	95.0	75.6	115
EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	1 mg/kg	99.3	62.6	116
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	1 mg/kg	90.2	63.2	105

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP074E: Halogenated Aliphatic Compounds (QCLot: 2897634) - continued								
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	1 mg/kg	117	72.3	127
EP074F: Halogenated Aromatic Compounds (QCLot: 2897634)								
EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	1 mg/kg	111	72.8	112
EP074G: Trihalomethanes (QCLot: 2897634)								
EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	1 mg/kg	96.1	71.8	116
EP075(SIM)A: Phenolic Compounds (QCLot: 2897716)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	97.8	80.6	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	96.6	82.4	124
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	96.7	80.9	128
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	92.4	69.9	121
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	85.3	63.9	120
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	88.4	64.8	123
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	6 mg/kg	58.2	20.0	117
EP075(SIM)A: Phenolic Compounds (QCLot: 2903068)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	86.9	80.6	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	88.8	82.4	124
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	85.7	80.9	128
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	81.9	69.9	121
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	76.8	63.9	120
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	89.1	64.8	123
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	6 mg/kg	34.8	20.0	117
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2897716)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	101	84.6	128
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	98.3	76.9	127
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	101	85.3	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	98.5	82.1	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	110	85.4	133
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	115	88.7	136
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	112	83.4	136
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	117	85.1	140
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	112	80.7	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	120	85.2	141
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	90.0	68.5	120
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	91.2	80.1	132
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	89.0	67.4	120
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	96.7	66.0	126
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	97.7	65.4	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2897716) - continued								
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	95.3	67.8	127
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2903068)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	90.9	84.6	128
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	90.7	76.9	127
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	94.3	85.3	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	90.3	82.1	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	103	85.4	133
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	113	88.7	136
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	105	83.4	136
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	109	85.1	140
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	105	80.7	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	110	85.2	141
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	87.0	68.5	120
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	83.9	80.1	132
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	82.2	67.4	120
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	88.2	66.0	126
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	88.5	65.4	127
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	88.4	67.8	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2897635)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	104	61.2	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2897717)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	750 mg/kg	101	71.8	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3040 mg/kg	103	83.9	125
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1450 mg/kg	106	77.9	119
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2903051)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	82.8	61.2	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2897635)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	102	59.5	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2897717)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1090 mg/kg	100	72.2	128
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3930 mg/kg	103	82.1	122
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	268 mg/kg	127	55.1	131
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2903051)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	80.5	59.5	125
EP080: BTEXN (QCLot: 2897635)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2897635) - continued								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	92.6	62.7	119
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	103	66.6	126
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	104	66.3	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	115	67.5	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	114	73.0	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	117	61.2	123
EP080: BTEXN (QCLot: 2903051)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	82.7	62.7	119
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	88.3	66.6	126
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	85.6	66.3	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	90.0	67.5	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	90.5	73.0	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	105	61.2	123
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2898241)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.4	70.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.8	70.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2908548)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	70.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	70.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2898241)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	84.6	70.0	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.8	70.0	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.0	70.0	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.0	70.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2908548)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	100	70.0	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	70.0	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	70.0	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	70.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2898241)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	85.6	70.0	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.4	70.0	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2898241) - continued								
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	80.0	70.0	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.0	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2908548)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	106	70.0	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	70.0	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	112	70.0	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	70.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 2894860)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	89.2	113
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	86.4	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.5	86.9	110
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	103	86.9	109
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	88.3	110
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	105	87.9	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	86.7	114
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2893827)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.5	72.6	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2893501)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3330 µg/L	102	44.8	125
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16500 µg/L	85.6	51.3	135
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7800 µg/L	82.2	49.4	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2894628)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	116	65.5	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2893501)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5690 µg/L	94.2	47.3	129
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	20700 µg/L	84.3	50.4	133
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1510 µg/L	79.6	45.2	136
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2894628)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	110	64.3	126
EP080: BTEXN (QCLot: 2894628)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	102	69.8	124
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	117	73.6	126
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	116	72.0	126

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080: BTEXN (QCLot: 2894628) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	125	71.5	132
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	121	76.5	132
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	103	70.5	127
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2896571)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	73.6	72.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	80.8	68.0	131
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.0	65.0	140
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2896571)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	74.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	75.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	76.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	107	71.0	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2896571)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	88.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	80.8	67.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	80.0	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	93.2	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2899374)							
EM2003501-002	SB1_1.0-1.2	EG005T: Arsenic	7440-38-2	50 mg/kg	98.1	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.0	84.0	116
		EG005T: Lead	7439-92-1	250 mg/kg	95.8	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	98.0	78.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2899375)							
EM2003501-002	SB1_1.0-1.2	EG035T: Mercury	7439-97-6	0.5 mg/kg	# 126	76.0	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2898723)							
EM2003406-002	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	60.5	58.0	114
EM2003406-002	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	70.6	58.0	114

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2899293)							
EM2003406-002	Anonymous	EK026SF: Total Cyanide	57-12-5	40 mg/kg	99.9	70.0	130
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2899295)							
EM2003501-002	SB1_1.0-1.2	EK028SF: Weak Acid Dissociable Cyanide	----	40 mg/kg	90.6	70.0	130
EK040T: Fluoride Total (QCLot: 2899314)							
EM2003406-002	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	# 57.0	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2903065)							
EM2003501-002	SB1_1.0-1.2	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	119	44.0	144
EP068A: Organochlorine Pesticides (OC) (QCLot: 2903066)							
EM2003501-002	SB1_1.0-1.2	EP068: gamma-BHC	58-89-9	0.5 mg/kg	76.1	22.0	139
		EP068: Heptachlor	76-44-8	0.5 mg/kg	76.7	18.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	55.9	23.0	136
		EP068: Dieldrin	60-57-1	0.5 mg/kg	76.2	42.0	136
		EP068: Endrin	72-20-8	0.5 mg/kg	80.5	23.0	146
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	70.3	20.0	133
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2903067)							
EM2003501-003	SB2_0.4-0.6	EP071SG-S: C10 - C14 Fraction	----	688 mg/kg	104	56.0	110
		EP071SG-S: C15 - C28 Fraction	----	3100 mg/kg	103	57.0	107
		EP071SG-S: C29 - C36 Fraction	----	1490 mg/kg	103	62.0	112
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2903067)							
EM2003501-003	SB2_0.4-0.6	EP071SG-S: >C10 - C16 Fraction	----	1050 mg/kg	98.6	57.0	109
		EP071SG-S: >C16 - C34 Fraction	----	3960 mg/kg	105	59.0	113
		EP071SG-S: >C34 - C40 Fraction	----	280 mg/kg	77.6	68.0	144
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2897634)							
EM2003501-002	SB1_1.0-1.2	EP074: Benzene	71-43-2	2 mg/kg	97.2	51.0	137
		EP074: Toluene	108-88-3	2 mg/kg	100	59.0	141
EP074E: Halogenated Aliphatic Compounds (QCLot: 2897634)							
EM2003501-002	SB1_1.0-1.2	EP074: 1.1-Dichloroethene	75-35-4	2 mg/kg	87.2	29.0	141
		EP074: Trichloroethene	79-01-6	2 mg/kg	81.4	50.0	126
EP074F: Halogenated Aromatic Compounds (QCLot: 2897634)							
EM2003501-002	SB1_1.0-1.2	EP074: Chlorobenzene	108-90-7	2 mg/kg	99.7	65.0	133
EP075(SIM)A: Phenolic Compounds (QCLot: 2897716)							
EM2003484-001	Anonymous	EP075(SIM): Phenol	108-95-2	3 mg/kg	76.7	63.0	117
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	70.4	56.0	122
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	45.2	15.3	139
EP075(SIM)A: Phenolic Compounds (QCLot: 2903068)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 2903068) - continued							
EM2003501-003	SB2_0.4-0.6	EP075(SIM): Phenol	108-95-2	3 mg/kg	82.2	63.0	117
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	61.0	56.0	122
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	24.0	15.3	139
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2897716)							
EM2003484-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	76.1	67.0	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	76.8	52.0	148
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2903068)							
EM2003501-003	SB2_0.4-0.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	87.9	67.0	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	114	52.0	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2897635)							
EM2003501-002	SB1_1.0-1.2	EP080: C6 - C9 Fraction	----	28 mg/kg	89.8	42.0	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2897717)							
EM2003484-002	Anonymous	EP071: C10 - C14 Fraction	----	750 mg/kg	91.8	53.0	123
		EP071: C15 - C28 Fraction	----	3040 mg/kg	88.5	70.0	124
		EP071: C29 - C36 Fraction	----	1450 mg/kg	87.6	64.0	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2903051)							
EM2003529-003	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	69.0	42.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2897635)							
EM2003501-002	SB1_1.0-1.2	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	87.8	39.0	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2897717)							
EM2003484-002	Anonymous	EP071: >C10 - C16 Fraction	----	1090 mg/kg	89.7	65.0	123
		EP071: >C16 - C34 Fraction	----	3930 mg/kg	87.7	67.0	121
		EP071: >C34 - C40 Fraction	----	268 mg/kg	82.0	44.0	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2903051)							
EM2003529-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	65.4	39.0	129
EP080: BTEXN (QCLot: 2897635)							
EM2003501-002	SB1_1.0-1.2	EP080: Benzene	71-43-2	2 mg/kg	87.7	50.0	136
		EP080: Toluene	108-88-3	2 mg/kg	99.2	56.0	139
EP080: BTEXN (QCLot: 2903051)							
EM2003529-003	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	76.0	50.0	136
		EP080: Toluene	108-88-3	2 mg/kg	79.5	56.0	139
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2898241)							
EM2003484-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	84.8	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	93.6	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	89.6	50.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2908548)							
EM2003501-007	SB4_1.0-1.2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	76.0	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	72.0	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	104	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2898241)							
EM2003484-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	99.4	30.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	85.2	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	92.4	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	86.4	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	113	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2908548)							
EM2003501-007	SB4_1.0-1.2	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	67.2	30.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	88.0	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	68.0	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	92.0	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	84.0	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2898241)							
EM2003484-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	102	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	94.0	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	91.2	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	107	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2908548)							
EM2003501-007	SB4_1.0-1.2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	84.0	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	84.0	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	80.0	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	64.0	50.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2894860)							
EM2003112-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	103	82.0	118
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	75.0	129
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.3	80.0	118
		EG020A-T: Copper	7440-50-8	1 mg/L	101	81.0	115
		EG020A-T: Lead	7439-92-1	1 mg/L	108	83.0	121
		EG020A-T: Nickel	7440-02-0	1 mg/L	98.4	80.0	118
		EG020A-T: Zinc	7440-66-6	1 mg/L	100	74.0	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2893827)							

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2893827) - continued							
EM2003498-006	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	84.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2894628)							
EM2003112-002	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	122	43.0	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2894628)							
EM2003112-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	# 124	44.0	122
EP080: BTEXN (QCLot: 2894628)							
EM2003112-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	119	68.0	130
		EP080: Toluene	108-88-3	20 µg/L	125	72.0	132
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2896571)							
EM2003501-020	QC6	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	76.0	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	89.2	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.4	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2896571)							
EM2003501-020	QC6	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	99.8	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	75.0	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	76.2	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	77.2	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	112	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2896571)							
EM2003501-020	QC6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	91.0	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	82.2	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	83.4	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	89.6	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2003501**	Page	: 1 of 14
Client	: **Jones Environmental**	Laboratory	: Environmental Division Melbourne
Contact	: PATRICIA JONES	Telephone	: +6138549 9644
Project	: JE10122	Date Samples Received	: 03-Mar-2020
Site	: ----	Issue Date	: 13-Mar-2020
Sampler	: RUSSELL JONES	No. of samples received	: 21
Order number	: ----	No. of samples analysed	: 21

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG035T: Total Recoverable Mercury by FIMS	EM2003501--002	SB1_1.0-1.2	**Mercury**	7439-97-6	126 %	76.0-116%	**Recovery greater than upper data quality objective**
EK040T: Fluoride Total	EM2003406--002	Anonymous	**Fluoride**	16984-48-8	57.0 %	70.0-130%	**Recovery less than lower data quality objective**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EM2003112--002	Anonymous	**C6 - C10 Fraction**	C6_C10	124 %	44.0-122%	**Recovery greater than upper data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container / *Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) HA1, HA2, HA3, SED1, SED2, SED3, SED4	**01-Mar-2020**	**----**	----	----	**09-Mar-2020**	15-Mar-2020	✓
Soil Glass Jar - Unpreserved (EA055) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2, QC4	**01-Mar-2020**	**----**	----	----	**06-Mar-2020**	15-Mar-2020	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag (EA200) SB1_0.4-0.6, SB3_0.4-0.6, SB4_0.4-0.6, HA1, HA2, HA3	**01-Mar-2020**	**----**	----	----	**04-Mar-2020**	28-Aug-2020	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**11-Mar-2020**	28-Aug-2020	✓	**11-Mar-2020**	28-Aug-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**11-Mar-2020**	29-Mar-2020	✓	**11-Mar-2020**	29-Mar-2020	✓
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**07-Mar-2020**	29-Mar-2020	✓	**10-Mar-2020**	14-Mar-2020	✓
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK026SF) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**07-Mar-2020**	15-Mar-2020	✓	**07-Mar-2020**	21-Mar-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK028SF) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**07-Mar-2020**	15-Mar-2020	✓	**07-Mar-2020**	21-Mar-2020	✓
EK040T: Fluoride Total							
Soil Glass Jar - Unpreserved (EK040T) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**06-Mar-2020**	29-Mar-2020	✓	**11-Mar-2020**	29-Mar-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	19-Apr-2020	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	19-Apr-2020	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	19-Apr-2020	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	19-Apr-2020	✓
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	19-Apr-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP074A: Monocyclic Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**06-Mar-2020**	08-Mar-2020	✓	**06-Mar-2020**	08-Mar-2020	✓
EP074B: Oxygenated Compounds							
Soil Glass Jar - Unpreserved (EP074) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**06-Mar-2020**	08-Mar-2020	✓	**06-Mar-2020**	08-Mar-2020	✓
EP074E: Halogenated Aliphatic Compounds							
Soil Glass Jar - Unpreserved (EP074) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**06-Mar-2020**	08-Mar-2020	✓	**06-Mar-2020**	08-Mar-2020	✓
EP074F: Halogenated Aromatic Compounds							
Soil Glass Jar - Unpreserved (EP074) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**06-Mar-2020**	08-Mar-2020	✓	**06-Mar-2020**	08-Mar-2020	✓
EP074G: Trihalomethanes							
Soil Glass Jar - Unpreserved (EP074) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**06-Mar-2020**	08-Mar-2020	✓	**06-Mar-2020**	08-Mar-2020	✓
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM)) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	19-Apr-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) QC4	**01-Mar-2020**	**06-Mar-2020**	15-Mar-2020	✓	**06-Mar-2020**	15-Apr-2020	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	19-Apr-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2, QC4	**01-Mar-2020**	**06-Mar-2020**	15-Mar-2020	✓	**06-Mar-2020**	15-Apr-2020	✓
Soil Glass Jar - Unpreserved (EP080) QC4	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	15-Mar-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, SB4_1.0-1.2, QC4	**01-Mar-2020**	**06-Mar-2020**	15-Mar-2020	✓	**06-Mar-2020**	15-Apr-2020	✓
Soil Glass Jar - Unpreserved (EP080) QC4	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	15-Mar-2020	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) QC4	**01-Mar-2020**	**10-Mar-2020**	15-Mar-2020	✓	**10-Mar-2020**	15-Mar-2020	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, HA1, HA2, HA3, SED1, SED2, SED3, SED4	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
HDPE Soil Jar (EP231X) SB4_1.0-1.2	**01-Mar-2020**	**11-Mar-2020**	28-Aug-2020	✓	**11-Mar-2020**	20-Apr-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, HA1, HA2, HA3, SED1, SED2, SED3, SED4	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
HDPE Soil Jar (EP231X) SB4_1.0-1.2	**01-Mar-2020**	**11-Mar-2020**	28-Aug-2020	✓	**11-Mar-2020**	20-Apr-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, HA1, HA2, HA3, SED1, SED2, SED3, SED4	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
HDPE Soil Jar (EP231X) SB4_1.0-1.2	**01-Mar-2020**	**11-Mar-2020**	28-Aug-2020	✓	**11-Mar-2020**	20-Apr-2020	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SB1_0.4-0.6, SB1_1.0-1.2, SB2_0.4-0.6, SB3_0.4-0.6, SB3_1.0-1.2, SB4_0.4-0.6, HA1, HA2, HA3, SED1, SED2, SED3, SED4	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
HDPE Soil Jar (EP231X) SB4_1.0-1.2	**01-Mar-2020**	**11-Mar-2020**	28-Aug-2020	✓	**11-Mar-2020**	20-Apr-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG020A-T) QC6	**01-Mar-2020**	**05-Mar-2020**	28-Aug-2020	✓	**05-Mar-2020**	28-Aug-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG035T) QC6	**01-Mar-2020**	**----**	----	----	**04-Mar-2020**	29-Mar-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
QC6	**01-Mar-2020**	**04-Mar-2020**	08-Mar-2020	✓	**05-Mar-2020**	13-Apr-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC6, QC7	**01-Mar-2020**	**05-Mar-2020**	15-Mar-2020	✓	**05-Mar-2020**	15-Mar-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
QC6	**01-Mar-2020**	**04-Mar-2020**	08-Mar-2020	✓	**05-Mar-2020**	13-Apr-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC6, QC7	**01-Mar-2020**	**05-Mar-2020**	15-Mar-2020	✓	**05-Mar-2020**	15-Mar-2020	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
QC6, QC7	**01-Mar-2020**	**05-Mar-2020**	15-Mar-2020	✓	**05-Mar-2020**	15-Mar-2020	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW1, SW2, QC1, QC3, QC6	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	28-Aug-2020	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
SW1, SW2, QC1, QC3, QC6	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	28-Aug-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW1, SW2, QC1, QC3, QC6	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	28-Aug-2020	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
SW1, SW2, QC1, QC3, QC6	**01-Mar-2020**	**06-Mar-2020**	28-Aug-2020	✓	**09-Mar-2020**	28-Aug-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	20	15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060A. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
WAD Cyanide by Segmented Flow Analyser	EK028SF	SOIL	In house: Referenced to APHA 4500-CN-O. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Hydrogen cyanide is liberated from a slightly acidified (pH 4.5) and is dialysed. Tight cyanide complexes that would not be amenable to oxidation by chlorine are not converted. Iron cyanide complexes are precipitated with zinc acetate. Liberated HCN diffuses through a membrane into a stream of sodium hydroxide where it is carried as CN- The cyanide in caustic solution is buffered to pH 5.2 and further converted to cyanogen chloride by reaction with chloramine-T. Cyanogen chloride subsequently reacts with 4 ¿pyridine carboxylic and 1,3 - dimethylbarbituric acids to give a red colour complex. This colour is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.

Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
Volatile Organic Compounds	EP074	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

FREIGHT

CHAIN OF CUSTODY

ALS

CLIENT: JEC	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☒ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:		
PROJECT: JE10122		COC SEQUENCE NUMBER (Circle)
ORDER NUMBER:		COC: 1 2 3 4 5 6 7
PROJECT MANAGER: Patricia Jones	CONTACT PH: 0424490551	OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact: Yes No N/A
Free ice / frozen ice blocks present upon receipt: Yes No N/A
Random Sample Temp on Receipt: °C
Other Comment:

SAMPLER: Russell Jones	SAMPLER MOBILE:	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY: / RECEIVED BY:
	EDD FORMAT (or default):			
Email Reports to (will default to PM if no other addresses are listed): patricia@jonesenvironmental.net		DATE/TIME: 2/3/20	DATE/TIME:	DATE/TIME: / DATE/TIME: 3/3, 16:00
Email Invoice to (will default to PM if no other addresses are listed): russell@jonesenvironmental.net				

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). | Additional Information

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS (P231)	P-7/4Short	TPH/BETX/PAH	ASBESTOS	TPH (C6-C9)/BTEX	TPH/BTEX/METALS /PFAS
1	SB1 0.4-0.6	1/3/20	S	1 X SOIL JAR, 1 X PFAS SOIL JAR		X	X		X		
2	SB1 1.0-1.2	1/3/20	S	1 X SOIL JAR, 1 X PFAS SOIL JAR		X	X				
3	SB2 0.4-0.6	1/3/20	S	1 X SOIL JAR, 1 X PFAS SOIL JAR		X	X		[redacted]		
4	[redacted]										
4	SB3 0.4-0.6	1/3/20	S	1 X SOIL JAR, 1 X PFAS SOIL JAR		X	X		X		
5	SB3 1.0-1.2	1/3/20	S	1 X SOIL JAR, 1 X PFAS SOIL JAR		X	X				
6	SB4 0.4-0.6	1/3/20	S	1 X SOIL JAR, 1 X PFAS SOIL JAR		X	X		X		
7	SB4 1.0-1.2	1/3/20	S	1 X SOIL JAR, [redacted]		X	X				
8	HA1	1/3/20	S	1 X PFAS SOIL		X			X		
9	HA2	1/3/20	S	1 X PFAS SOIL		X			X		
10	HA3	1/3/20	S	1 X PFAS SOIL		X			X		
11	SW1	1/3/20	W	1 X PFAS WATER		X					
12	SW2	1/3/20	W	1 X PFAS WATER		X					
13	SED 1	1/3/20	S	1 X PFAS SOIL		X					
14	SED 2	1/3/20	S	1 X PFAS SOIL		X					
15	SED 3	1/3/20	S	1 X PFAS SOIL		X					
16	SED 4	1/3/20	S	1 X PFAS SOIL		X					
17	QC1	1/3/20	W	1 X PFAS WATER		X					
18	QC3	1/3/20	W	1 X PFAS WATER		X					
19	QC4	1/3/20	S	1 X PFAS SOIL				X			
20	QC6	1/3/20	S	2 X VIALS, 1 X AMBER, 1 X METAL, 1 X PFAS							X
21	QC7	1/3/20	W	2 X VIALS						X	
				TOTAL		19	8	1	6	1	1

Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.

Environmental Division Melbourne
Work Order Reference
EM2003501

Telephone : + 61-3-8549 9600

4/3

4/3

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

eurofins | Environment Testing

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Jones Environmental Consulting
497 Parnall St
Lavington
NSW 2641

Attention: **Patricia Jones**

Report **705825-W**
Project name
Project ID JE10122
Received Date Mar 04, 2020

Client Sample ID			**QC2**
Sample Matrix			**Water**
Eurofins Sample No.			**M20-Ma05380**
Date Sampled			**Mar 01, 2020**
Test/Reference	LOR	Unit	
Per- and Polyfluoroalkyl Substances (PFASs) - Short			
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05
13C2-6:2 FTSA (surr.)	1	%	161
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.01
18O2-PFHxS (surr.)	1	%	128
13C8-PFOS (surr.)	1	%	132
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01
13C8-PFOA (surr.)	1	%	173
Sum (PFHxS + PFOS)*	0.01	ug/L	0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.01

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs) - Short	Brisbane	Mar 06, 2020	14 Days

- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)

eurofins | Environment Testing

ABN – 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Jones Environmental Consulting
Address: 497 Parnall St
Lavington
NSW 2641

Project Name:
Project ID: JE10122

Order No.:
Report #: 705825
Phone: 0424 490 551
Fax:

Received: Mar 4, 2020 3:58 PM
Due: Mar 12, 2020
Priority: 5 Day
Contact Name: Patricia Jones

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Moisture Set	Eurofins | mgt Suite B4	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC2	Mar 01, 2020		Water	M20-Ma05380			X
2	QC5	Mar 01, 2020		Soil	M20-Ma05381	X	X	
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Per- and Polyfluoroalkyl Substances (PFASs) - Short									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			ug/L	< 0.05			0.05	Pass	
Perfluorohexanesulfonic acid (PFHxS)			ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)			ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)			ug/L	< 0.01			0.01	Pass	
LCS - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	89			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	92			50-150	Pass	
Perfluorooctanoic acid (PFOA)			%	100			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short				Result 1					
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B20-Ma06830	NCP	%	100			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B20-Ma06830	NCP	%	87			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B20-Ma06830	NCP	%	83			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B20-Ma06830	NCP	%	99			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Per- and Polyfluoroalkyl Substances (PFASs) - Short				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B20-Ma06829	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B20-Ma06831	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B20-Ma06829	NCP	ug/L	0.51	0.52	2.0	30%	Pass	
Perfluorooctanoic acid (PFOA)	B20-Ma06829	NCP	ug/L	0.39	0.36	7.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.

Authorised By

Asim Khan	Analytical Services Manager
Sarah McCallion	Senior Analyst-PFAS (QLD)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

eurofins | Environment Testing

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Jones Environmental Consulting
497 Parnall St
Lavington
NSW 2641

Attention: **Patricia Jones**

Report **705825-S**
Project name
Project ID JE10122
Received Date Mar 04, 2020

Client Sample ID			**QC5**
Sample Matrix			**Soil**
Eurofins Sample No.			**M20-Ma05381**
Date Sampled			**Mar 01, 2020**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	63
TRH C15-C28	50	mg/kg	830
TRH C29-C36	50	mg/kg	300
TRH C10-C36 (Total)	50	mg/kg	1193
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	83
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	5.7
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	110
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	104.3
TRH >C16-C34	100	mg/kg	970
TRH >C34-C40	100	mg/kg	140
TRH >C10-C40 (total)*	100	mg/kg	1220
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	28
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	28
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	28
Acenaphthene	0.5	mg/kg	3.5
Acenaphthylene	0.5	mg/kg	2.9
Anthracene	0.5	mg/kg	11
Benz(a)anthracene	0.5	mg/kg	18
Benzo(a)pyrene	0.5	mg/kg	18
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	12
Benzo(g.h.i)perylene	0.5	mg/kg	8.8
Benzo(k)fluoranthene	0.5	mg/kg	13
Chrysene	0.5	mg/kg	18

Client Sample ID			QC5
Sample Matrix			Soil
Eurofins Sample No.			M20-Ma05381
Date Sampled			Mar 01, 2020
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Dibenz(a.h)anthracene	0.5	mg/kg	4.1
Fluoranthene	0.5	mg/kg	41
Fluorene	0.5	mg/kg	6.2
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	12
Naphthalene	0.5	mg/kg	8.5
Phenanthrene	0.5	mg/kg	50
Pyrene	0.5	mg/kg	43
Total PAH*	0.5	mg/kg	270
2-Fluorobiphenyl (surr.)	1	%	89
p-Terphenyl-d14 (surr.)	1	%	91
% Moisture	1	%	10

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B4			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Mar 05, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Mar 05, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Mar 05, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Mar 05, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Melbourne	Mar 05, 2020	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
% Moisture	Melbourne	Mar 04, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

ABN – 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Jones Environmental Consulting
Address: 497 Parnall St
Lavington
NSW 2641

Project Name:
Project ID: JE10122

Order No.:
Report #: 705825
Phone: 0424 490 551
Fax:

Received: Mar 4, 2020 3:58 PM
Due: Mar 12, 2020
Priority: 5 Day
Contact Name: Patricia Jones

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Moisture Set	Eurofins | mgt Suite B4	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC2	Mar 01, 2020		Water	M20-Ma05380			X
2	QC5	Mar 01, 2020		Soil	M20-Ma05381	X	X	
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	100			70-130	Pass	
TRH C10-C14	%	74			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	91			70-130	Pass	
Toluene	%	96			70-130	Pass	
Ethylbenzene	%	95			70-130	Pass	
m&p-Xylenes	%	112			70-130	Pass	
Xylenes - Total	%	107			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Naphthalene			%	104			70-130	Pass	
TRH C6-C10			%	96			70-130	Pass	
TRH >C10-C16			%	71			70-130	Pass	
LCS - % Recovery									
Polycyclic Aromatic Hydrocarbons									
Acenaphthene			%	89			70-130	Pass	
Acenaphthylene			%	84			70-130	Pass	
Anthracene			%	72			70-130	Pass	
Benz(a)anthracene			%	87			70-130	Pass	
Benzo(a)pyrene			%	87			70-130	Pass	
Benzo(b&j)fluoranthene			%	90			70-130	Pass	
Benzo(g.h.i)perylene			%	100			70-130	Pass	
Benzo(k)fluoranthene			%	108			70-130	Pass	
Chrysene			%	96			70-130	Pass	
Dibenz(a.h)anthracene			%	106			70-130	Pass	
Fluoranthene			%	109			70-130	Pass	
Fluorene			%	83			70-130	Pass	
Indeno(1.2.3-cd)pyrene			%	121			70-130	Pass	
Naphthalene			%	84			70-130	Pass	
Phenanthrene			%	79			70-130	Pass	
Pyrene			%	108			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M20-Ma10251	NCP	%	84			70-130	Pass	
TRH C10-C14	S20-Ma03180	NCP	%	79			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M20-Ma10251	NCP	%	76			70-130	Pass	
Toluene	M20-Ma10251	NCP	%	84			70-130	Pass	
Ethylbenzene	M20-Ma10251	NCP	%	86			70-130	Pass	
m&p-Xylenes	M20-Ma10251	NCP	%	101			70-130	Pass	
o-Xylene	M20-Ma10251	NCP	%	88			70-130	Pass	
Xylenes - Total	M20-Ma10251	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M20-Ma10251	NCP	%	116			70-130	Pass	
TRH C6-C10	M20-Ma10251	NCP	%	80			70-130	Pass	
TRH >C10-C16	S20-Ma03180	NCP	%	75			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M20-Ma05425	NCP	%	85			70-130	Pass	
Acenaphthylene	M20-Ma05425	NCP	%	80			70-130	Pass	
Anthracene	M20-Ma05425	NCP	%	80			70-130	Pass	
Benz(a)anthracene	M20-Ma05425	NCP	%	77			70-130	Pass	
Benzo(a)pyrene	M20-Ma05425	NCP	%	79			70-130	Pass	
Benzo(b&j)fluoranthene	M20-Ma05425	NCP	%	79			70-130	Pass	
Benzo(g.h.i)perylene	M20-Ma05425	NCP	%	89			70-130	Pass	
Benzo(k)fluoranthene	M20-Ma05425	NCP	%	96			70-130	Pass	
Chrysene	M20-Ma05425	NCP	%	87			70-130	Pass	
Dibenz(a.h)anthracene	M20-Ma05425	NCP	%	94			70-130	Pass	
Fluoranthene	M20-Ma05425	NCP	%	102			70-130	Pass	
Fluorene	M20-Ma05425	NCP	%	78			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M20-Ma05425	NCP	%	112			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Naphthalene	M20-Ma05425	NCP	%	78			70-130	Pass	
Phenanthrene	M20-Ma05425	NCP	%	74			70-130	Pass	
Pyrene	M20-Ma05425	NCP	%	100			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M20-Ma10239	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S20-Ma03159	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S20-Ma03159	NCP	mg/kg	130	200	40	30%	Fail	Q15
TRH C29-C36	S20-Ma03159	NCP	mg/kg	120	170	36	30%	Fail	Q15
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M20-Ma10239	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M20-Ma10239	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M20-Ma10239	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M20-Ma10239	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M20-Ma10239	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M20-Ma10239	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M20-Ma10239	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M20-Ma10239	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S20-Ma03159	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S20-Ma03159	NCP	mg/kg	220	320	37	30%	Fail	Q15
TRH >C34-C40	S20-Ma03159	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	B20-Ma02939	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M20-Ma05424	NCP	%	18	17	8.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Asim Khan	Analytical Services Manager
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

eurofins | Environment Testing

ABN – 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Jones Environmental Consulting
Address: 497 Parnall St
Lavington
NSW 2641

Project Name:
Project ID: JE10122

Order No.:
Report #: 705825
Phone: 0424 490 551
Fax:

Received: Mar 4, 2020 3:58 PM
Due: Mar 12, 2020
Priority: 5 Day
Contact Name: Patricia Jones

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Moisture Set	Eurofins | mgt Suite B4	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC2	Mar 01, 2020		Water	M20-Ma05380			X
2	QC5	Mar 01, 2020		Soil	M20-Ma05381	X	X	
Test Counts						1	1	1

eurofins | Environment Testing

Melbourne
6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Jones Environmental Consulting**
Contact name:	Patricia Jones
Project ID:	JE10122
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Mar 4, 2020 3:58 PM
Eurofins reference:	**705825**

Sample information

- ☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ Attempt to chill was evident.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Appropriate sample containers have been used.
- ☑ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Asim Khan on Phone : or by e.mail: AsimKhan@eurofins.com

Results will be delivered electronically via e.mail to Patricia Jones - patricia@jonesenvironmental.net.

18

CHAIN OF CUSTODY

EUROFINS

CLIENT: JEC	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☑ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE:		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: JE10122		COC SEQUENCE NUMBER (Circle)	Free Ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt. °C
PROJECT MANAGER: Patricia Jones	CONTACT PH: 0424490551	OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Russell Jones	SAMPLER MOBILE:	RELINQUISHED BY:	RECEIVED BY: Morris (Aus)	RELINQUISHED BY:	RECEIVED BY: Anh To
	EDD FORMAT (or default):				
Email Reports to (will default to PM if no other addresses are listed): patricia@jonesenvironmental.net		DATE/TIME: 2/3/20	DATE/TIME: 3/3 11:00	DATE/TIME:	DATE/TIME: EF 4/2/20 9:58pm FCE 8.6 Courier
Email Invoice to (will default to PM if no other addresses are listed): russell@jonesenvironmental.net					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).		Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS (SHORT)	TPH/BTEX/PAH	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	QC2	1/3/20	W	1 x soil jar		X		
	QC5	1/3/20	S	1 x soil jar			X	
				TOTAL		1	1	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

705825

Em 2003501

This page has been left intentionally blank