



Australian Government

**BUILDING OUR FUTURE**



# M1 Pacific Motorway extension to Raymond Terrace

Environmental impact statement –  
Chapter 24: Summary of environmental  
management measures

Transport for NSW | July 2021



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## 24. Summary of environmental management measures

This chapter collates the environmental management measures for the project that have been identified through the impact assessment process in response to the SEARs, detailed in **Table 24-1**. All management measures listed in **Table 24-2** will be incorporated into the Construction Environmental Management Plan (CEMP) and/or operational framework for the project as required.

Table 24-1 SEARs (environmental management measures)

Secretary's requirement	Where addressed
2. Environmental Impact Statement	
1. The EIS must include, but not necessarily be limited to, the following:	
(l) measures to avoid, minimise or offset impacts must be linked to the impact(s) they treat, so it is clear which measures will be applied to each impact;	<b>Section 24.1.1</b> provides a summary of environmental management measures detailed in <b>Chapter 7</b> (traffic and transport) to <b>Chapter 23</b> (cumulative impacts).

### 24.1 Environmental management framework

A number of environmental management measures have been identified in order to minimise adverse environmental impacts which could potentially arise as a result of the project. These management measures will be incorporated into the detailed design and applied during the construction and operation of the project.

The main project specific environmental management plan to ensure that appropriate practices are followed during construction is the CEMP. A CEMP for the project will be prepared in accordance with DPIE's Environmental Management Plan Guideline for Infrastructure Projects (DPIE 2020g) and will detail how the performance outcomes, commitments, and environmental management measures for the project will be implemented and achieved during all stages of construction. The CEMP will also provide the roles and responsibilities of key construction personnel and describe how environmental risks associated with the project will be managed and be complemented by the various sub-plans included in **Table 24-2**.

The CEMP would also include reference to all relevant Transport for NSW environmental processes and procedures that are commonly used and proven control measures during the delivery of major road infrastructure projects. These processes and procedures serve to comply with relevant NSW environmental legislation, regulation and guidelines. Management measures included in **Table 24-2** are in addition to these existing Transport processes.

The CEMP will be prepared prior to construction of the project (or as required) and will be reviewed and certified by Transport 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.

#### 24.1.1 Summary of management measures

A summary of the environmental management measures that will be implemented during the construction and operation of the project is presented in **Table 24-2**.

Table 24-2 Environmental management measures for the project

Impact	Reference	Environmental management measure	Responsibility	Timing
Traffic and transport				
Management of traffic during construction	TT01	<p>A Traffic Management Plan (TMP) will be prepared and implemented in accordance with the Traffic Control at Work Sites Manual (Roads and Maritime Services 2018b) and QA Specification G10 Control of Traffic. The TMP will include:</p> <ul style="list-style-type: none"> <li>• Confirmation of haulage routes, including minimisation of haulage movements during peak periods on routes where feasible.</li> <li>• Access management plan to ensure access to properties can be maintained where it is safe and feasible during construction</li> <li>• Site specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• Measures to manage temporary changes to the road network including use of barriers, lane occupancies or temporary road closures</li> <li>• Measures to maintain pedestrian and cyclist access (including communication, signage and alternative routes)</li> <li>• Requirements and methods to consult and inform the local community of impacts on the local road network (including for out of hours work)</li> <li>• Access to ancillary and construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads</li> <li>• A response plan for any construction traffic incident</li> <li>• Consideration of other developments that may be under construction to minimise traffic conflict and congestion.</li> </ul>	Contractor	Prior to construction/ construction
Property access	TT02	Existing accesses to properties and businesses will be maintained during construction. Where this is not feasible or reasonable, temporary alternative access arrangements will be provided following consultation with the affected property and business owners.	Transport / Contractor	Detailed design/ prior to construction/ construction
	TT03	Access will be maintained to rail infrastructure facilities along Aurizon access road. Transport will liaise with Aurizon and ARTC during detail design and construction.	Transport / Contractor	Detailed design/ prior to construction/ construction
Impacts to bus services	TT04	Any changes to bus stops will be implemented in consultation with Transport, relevant councils, and relevant bus operators.	Contractor	Prior to construction/ construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Emergency vehicle access	TT05	Where possible, access for emergency vehicles will be maintained at all times during construction. Any site-specific requirements will be determined in consultation with the relevant emergency services agency.	Contractor	Construction
Maritime impacts	TT06	A navigational channel would be provided during construction within the Hunter River	Contractor	Construction
Damage or impacts on local road infrastructure	TT07	A road dilapidation report will be prepared before impacts on local roads commence. The report will document the existing conditions of local roads. This report will be issued to councils and stakeholders as relevant.	Contractor	Prior to construction
Noise and vibration				
General construction noise and vibration	NV01	<p>A Construction Noise and Vibration Management Plan (CNVMP) would be prepared for the project to mitigate and manage noise and vibration impacts. The CNVMP would include:</p> <ul style="list-style-type: none"> <li>• All potential significant noise and vibration generating activities associated with the activity</li> <li>• Measures to be implemented during construction to minimise noise and vibration impacts, such as restrictions on working hours, respite periods, staging, placement and operation of ancillary facilities, temporary noise barriers, haul road maintenance, and controlling the location and use of vibration generating equipment</li> <li>• A monitoring program to assess performance against relevant noise and vibration criteria</li> <li>• Process for the implementation of respite periods to provide residents with respite from ongoing impact</li> <li>• Arrangements for consultation with affected receivers, including notification and complaint handling procedures</li> <li>• Contingency measures to be implemented in the event of noncompliance with noise and vibration criteria.</li> </ul>	Contractor	Prior to construction/ construction
	NV02	Where reasonable and feasible, implementation of recommended operational noise mitigation would be carried out within 12 months of construction activities commencing.	Transport / Contractor	Prior to construction/ construction
Vibration impacts to residential and commercial structures	NV03	Where vibration generating activities will be carried out within minimum working distances for cosmetic damage, vibration monitoring will be carried out. Where monitoring indicates cosmetic damage criteria are exceeded, alternative low vibration work practices will be investigated and implemented.	Contractor	Construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Vibration impacts to utilities	NV04	Where works are within 25m of utilities consultation will be carried out with the relevant utility authorities to establish site specific mitigation measures to manage potential vibration impacts.	Contractor	Construction
Vibration impacts to heritage structures	NV05	Heritage items within 100m of vibration intensive work are to be considered on a case by case basis and further investigation would be carried out during detailed design to confirm the structural integrity (i.e. structurally sound or unsound) of all potentially affected structures. Where items are considered sensitive to vibration, appropriate vibration criteria would be determined after detailed inspections have been completed.	Contractor	Prior to construction/ construction
Blasting	NV06	If blasting is to be included as part of the construction work, the CNVMP would include a Blast Management Plan (BMP). The BMP would be prepared in consultation with the EPA, demonstrating that all blasting and associated activities would be carried out in a manner that would not generate unacceptable noise and vibration impacts or pose a substantial risk impact to residences and sensitive receivers.	Contractor	Prior to construction/ construction
Operational road traffic noise impacts	NV07	Operational noise and vibration mitigation measures would be identified in an Operational Noise and Vibration Review (ONVR). Requirements for mitigation measures, including quieter noise pavements, noise barriers, and at-property treatments, would be reviewed as part of the ONVR and as the detailed design progresses. Detailed information on floorplans and facade construction for school classrooms, places of worship and childcare centres determined to exceed the applicable Noise Criteria Guideline (NCG) (Roads and Maritime Services 2015c) internal noise criteria will be obtained during design development. The implementation of treatments would be carried out in accordance with the Noise Mitigation Guideline (NMG) (Roads and Maritime Services 2015d).	Transport / Contractor	Detailed design/ construction/ prior to operation
Operational road traffic noise impacts	NV08	Within 12 months of starting project operation, actual operational noise performance would be compared to predicted operational noise performance to analyse the effectiveness of the operational road traffic noise mitigation measures. Additional reasonable and feasible mitigation would be considered where any additional receivers are identified as qualifying for consideration of noise mitigation under the NMG.	Transport / Contractor	Operation



Impact	Reference	Environmental management measure	Responsibility	Timing
Impacts from Out of Hours Works	NV09	<p>An Out of Hours Work Procedure will be included as part of the CNVMP. The procedure will follow the approach in Roads and Maritime Services' Construction Noise and Vibration Guideline (Roads and Maritime Services 2016b) and include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• Scheduling of noise intensive or high noise impact work to evening periods where feasible</li> <li>• Use of alternative plant and equipment and/or construction techniques to minimise noise</li> <li>• Notification and consultation requirements including preparation of a 'look ahead' program for likely out of hours work</li> <li>• Use of temporary noise barriers</li> <li>• Respite periods</li> <li>• Representative noise monitoring</li> <li>• Offers of reasonable and temporary alternative accommodation or an act of good will</li> <li>• Use of negotiated agreements.</li> </ul>	Contractor	Construction
Biodiversity				
Loss of vegetation and habitat for flora and fauna including threatened species	B01	<p>A Flora and Fauna Management Plan (FFMP) will be prepared in accordance with the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011). It will address terrestrial and aquatic matters and include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>• Plans for the construction footprint and adjoining areas showing native vegetation, flora and fauna habitat, threatened species and endangered ecological communities</li> <li>• Procedures addressing relevant matters specified in the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011)</li> <li>• Procedures for the protection of aquatic fauna associated with instream works.</li> </ul> <p>All personnel working on site will receive training to ensure awareness of requirements of the FFMP and relevant statutory responsibilities.</p>	Contractor	Detailed design/ prior to construction
	B02	Pre-clearing surveys will be carried out in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (Guide 1: Pre-clearing process) (RTA 2011).	Contractor	Prior to construction
	B03	If any threatened species, not assessed in the biodiversity assessment, are identified in the construction footprint, the unexpected species find procedure is to be followed under 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011).	Contractor	Construction
	B04	Vegetation and habitat removal will be carried out in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (Guide 4: Clearing of vegetation and removal of bushrock) (RTA 2011).	Contractor	Construction



Impact	Reference	Environmental management measure	Responsibility	Timing
	B05	Revegetation will be carried out in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 3: Re-establishment of native vegetation) and the Landscape Plan prepared for the project.	Contractor	Construction
	B06	Re-use of woody debris and bushrock and installation of nest boxes would be carried out in accordance with the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011), Guide 5 & Guide 8.	Contractor	Construction
Potential impacts to aquatic habitat	B07	Aquatic habitat will be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) and where practicable, Section 3.3.2 Standard precautions and mitigation measures of the 'Policy and guidelines for fish habitat conservation and management Update 2013' (DPI 2013a)	Contractor	Construction
Fragmentation of habitat and barrier effects and fauna mortality during operation	B08	Fauna crossing and exclusion fencing structures would be designed and constructed to facilitate fauna connectivity and exclusion across the project in accordance with the Biodiversity Assessment Report.	Transport/ Contractor	Detailed design/ construction
Edge effects on adjacent native vegetation and habitat	B09	Exclusion zones will be set up at the limit of clearing in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 2: Exclusion zones).	Contractor	Construction
Injury and mortality of fauna during clearing and construction	B10	Fauna will be managed in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 9: Fauna handling).	Contractor	Construction
Invasion and spread of weeds	B11	Weed species will be managed in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 6: Weed management).	Contractor	Construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Invasion and spread of pest animal, pathogens and disease	B12	Pest species and pathogens will be managed in accordance Guide 2: Exclusion zones of the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011), the Commonwealth <i>Biosecurity Act 2015</i> , NSW <i>Biosecurity Act 2015</i> and where relevant, the Australian Ballast Water Management Requirements.	Contractor	Construction
Noise, light and vibration	B13	The need for artificial lighting during construction and operation will be minimised where feasible, including directing lighting away from vegetated areas where practicable.	Contractor	Detailed design/ construction
Hydrology and flooding				
Flooding impacts during construction	FH01	<p>A Flood Management Plan (FMP) will be prepared for the project and will detail the processes for flood preparedness, materials management, weather monitoring, site management and flood incident management.</p> <p>The FMP will also address procedures and responsibilities for flood response (preparation of site upon receipt of flood warning, evacuation of site personnel) during and recovery following a flood event.</p> <p>The FMP will also include:</p> <ul style="list-style-type: none"> <li>• Consideration of temporary traffic arrangements to minimise impact on flood evacuation route traffic capacity.</li> <li>• Appropriate measures to manage potential flood impact associated with temporary ancillary facilities subject to flooding within 20% AEP flood level</li> <li>• Where feasible, the size of the ancillary facilities and the height and extent of temporary access tracks will be reduced to minimise flood impacts</li> <li>• Ancillary facilities will also be designed to provide for conveyance of flood flows in order to minimise flooding impacts to adjacent properties and environment.</li> </ul>	Transport/ Contractor	Prior to construction
Potential changes to flood impacts resulting from detailed design	FH02	<p>Any changes to the design described in this EIS would be further investigated during detailed design, including further flood investigations and hydrological and hydraulic modelling to ensure the flood immunity objectives and performance criteria for the project are met.</p> <p>The detailed design will consider refinement to temporary and permanent access roads to further reduce flood afflux with impacts to drainage capacity, where reasonable and feasible.</p>	Transport / Contractor	Detailed design
Flooding impacts on property	FH03	<p>Consultation will be carried out with landowners impacted by flood affects from the project which exceed the flood management objectives (afflux, change in flood hazard, change in time of inundation) about reasonable and feasible management measures.</p> <p>Further modelling may be carried out at detailed design to assess impacts to property.</p>	Transport/ Contractor	Detailed design

Impact	Reference	Environmental management measure	Responsibility	Timing
Impacts on existing drainage systems	FH04	Existing hydraulic capacity of drainage systems will be maintained during construction where practicable.	Contractor	Construction
	FH05	<p>The requirement to provide further upgrades to existing drainage systems will be considered at detailed design where there is:</p> <ul style="list-style-type: none"> <li>• An increase of more than 20 per cent in the peak discharge rate during operation</li> <li>• An increase in drainage system capacity within the project footprint but where downstream infrastructure has not been upgraded.</li> </ul>	Contractor	Detailed design
Impacts to flood mitigation schemes	FH06	The design of temporary and permanent works will ensure there is minimal impact to the function and flow capacity of the Hunter Valley Flood Mitigation Scheme or as otherwise agreed during consultation with operators of the scheme.	Transport/ Contractor	Detailed design
Impacts to river banks immediately downstream of project discharge locations during construction	FH07	Monitoring of temporary construction phase stormwater discharge locations to minimise downstream geomorphological impacts from the project will be included in the Construction Soils and Water Management Plan.	Contractor	Construction
Impacts to river banks immediately downstream of project discharge locations during operation	FH08	<p>The project design aims to ensure that stormwater discharge velocities are controlled at the project outlet to ensure minimal downstream impacts occur immediately downstream of the project.</p> <p>A geomorphological survey will be completed of the waterways downstream of the discharge points where there is greater than 20 per cent increase in stormwater discharge from the project. Waterways (channels and banks) immediately downstream of these project discharge locations will be monitored for a minimum period of twelve months or until establishment and stabilisation. Monitoring will look for evidence of initiation of erosion and scour and, if required, carry out appropriate remediation measures.</p>	Transport/ Contractor	Operation
Impact to surface water and groundwater hydrology	FH09	Baseline monitoring of hydrological attributes would be carried out prior to the commencement of construction, with ongoing monitoring during construction and the initial stages of operation (refer to Hydrology and Flooding Working Paper ( <b>Appendix J</b> )).	Transport/ Contractor	Prior to construction / construction/ operation

Impact	Reference	Environmental management measure	Responsibility	Timing
Surface water and groundwater quality				
General	WQ01	<p>A Construction Soils and Water Management Plan (CSWMP) would be developed as a sub plan of the CEMP and will outline measures to manage soil and water quality impacts associated with the construction work, including contaminated land. The CSWMP would include but not be limited to:</p> <ul style="list-style-type: none"> <li>Measures to minimise/manage erosion and sediment transport both within the construction footprint and offsite including requirements for the preparation of erosion and sediment control plans (ESCP) for all progressive stages of construction and the implementation of erosion and sediment control measures</li> <li>Erosion and sediment control measures, which will be implemented and maintained in accordance with Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (DECC 2008)</li> <li>Measures to manage stockpiles including locations, separation of waste types, sediment controls and stabilisation in accordance with the Stockpile Site Management Guideline (Roads and Maritime Services 2015e).</li> <li>Procedures for dewatering (including waterways, wetlands and excavations and temporary sediment basins) including relevant discharge criteria.</li> <li>Concrete waste management procedures</li> <li>Measures to manage accidental spills including the requirement to maintain materials such as spill kits, an emergency spill response procedure and regular visual water quality checks when working near waterways</li> <li>Measures to manage tannin leachate and potential saline soils</li> <li>Controls for sensitive receiving environments which may include but not be limited to identification of 'no go' zones for construction plant and equipment (where applicable).</li> </ul>	Contractor	Prior to construction/ construction/ operation
	WQ02	A soil conservation specialist will be engaged for the duration of construction of the project to provide advice on the planning and implementation of erosion and sediment control including review of the CSWMP and ESCP.	Transport / Contractor	Prior to construction/ construction/ operation
Water reuse	WQ03	<p>A water reuse strategy will be developed as part of the CEMP for both construction and operational phases of the project to reduce reliance on potable water.</p> <p>Any water from sediment basins will be checked to ensure compliance with ANZG (2018) Water Quality Guidelines prior to reuse.</p>	Contractor	Detailed design/ prior to construction/ construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Discharge of saline groundwater to drinking catchment	WQ04	Basins and swales within the Tomago Sandbeds drawdown area will be lined during construction and operation.	Contractor	Detailed design
Discharge of saline groundwater to surface waterways	WQ05	Basins TB04, TB06, TPB10 (PB12), TPB18 (PB24), PB14 and PB15 shall be further investigated to confirm requirement for lining to avoid discharge of saline groundwater to surface waterways during construction and operation.	Transport	Detailed design
Surface water quality and groundwater quality impacts	WQ06	A water quality monitoring program will be developed in accordance with the Guidelines for Construction Water Quality Monitoring (RTA 2003b). The program will monitor surface water quality and groundwater quality during construction and during operation.	Transport / Contractor	Prior to construction/ construction/ operation
Aboriginal heritage				
Impacts on known Aboriginal sites	AH01	<p>An Aboriginal Cultural Heritage Management Plan (ACHMP) will be prepared in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (Roads and Maritime Services 2011b) and Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime Services 2015f). The ACHMP will be prepared in consultation with all relevant Aboriginal groups.</p> <p>The ACHMP will include:</p> <ul style="list-style-type: none"> <li>• Details of investigations completed or planned to be carried out and any associated approvals required</li> <li>• Mapping of areas of Aboriginal heritage value and identification of protection measures to be applied during construction</li> <li>• Procedures to be implemented if previously unidentified Aboriginal objects, including skeletal remains, are discovered during construction</li> <li>• An induction program for construction personnel on the management of Aboriginal heritage values</li> <li>• Opportunities for on-going Aboriginal community engagement in the project.</li> </ul>	Transport / Contractor	Prior to construction
	AH02	Archaeological salvage excavation, surface collection and exclusion fencing as detailed in Table 9-1 of the Aboriginal Cultural Heritage Assessment Report must be carried out in accordance with the methodology specified in the Chapter 9 of the Aboriginal Cultural Heritage Assessment Report ( <b>Appendix L</b> ).	Contractor / Transport	Prior to construction/ construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Socio-economic				
Community consultation	SE01	<p>A Community Communication Strategy (CCS) will be prepared for the project to facilitate communication with the community and stakeholders including relevant Government agencies, Councils, adjoining affected landowners and businesses, residents, motorists and other relevant stakeholders that may be affected by the project. The strategy will:</p> <ul style="list-style-type: none"> <li>• Identify people or organisations to be consulted during the delivery of the project</li> <li>• Set out procedures and mechanisms for the regular distribution of information about the project</li> <li>• Outline mechanisms to keep relevant stakeholders updated on site construction activities, schedules and milestones</li> <li>• Outline avenues for the community to provide feedback (including a 24-hour, toll free project information and complaints line) or to register complaints and through which Transport will respond to community feedback</li> <li>• Outline a process to resolve complaints and issues raised.</li> </ul>	Transport/ Contractor	Prior to construction
Business impacts	SE02	Signage will be provided in accordance with Transport signage policy to inform the travelling public about services in Beresfield and Heatherbrae.	Transport	Construction/ prior to operation
Land use and property				
Property acquisition	LU01	All partial and full acquisitions and associated property adjustments will be carried out in accordance with the requirements of the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> and the Land acquisition reform 2016 in consultation with landowners. This will include the provision of monetary compensation determined in accordance with the provisions of the Act.	Transport	Prior to construction
	LU02	Property adjustments will be completed in consultation with property owners/business managers.	Transport / Contractor	Prior to construction/ construction
Rehabilitation of affected land	LU03	Land subject to temporary use will be rehabilitated as soon as practicable to an appropriate condition, taking into consideration the location, land use characteristics, area and adjacent land uses. This will be carried out in consultation with the land owner.	Transport / Contractor	Construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Urban design and visual amenity				
Landscape character and visual impacts including during construction	UD01	<p>An Urban Design and Landscape Plan (UDLP) will be prepared to support the project. The plan will present an integrated urban design for the project, providing practical detail on the application of design principles and objectives identified in the EIS. The plan will include:</p> <ul style="list-style-type: none"> <li>• Location and identification of existing vegetation and proposed landscaped areas, including species to be used</li> <li>• Built elements including retaining walls, bridges and noise barriers</li> <li>• Walking and cyclist elements including footpath locations, paving types and pedestrian crossings</li> <li>• Fixtures such as lighting, fencing and signs</li> <li>• Details on the staging of landscape work including related environmental controls such as erosion and sedimentation controls and drainage</li> <li>• Procedures for monitoring and maintaining landscaped or rehabilitated areas</li> <li>• The project will consider CPTED principles during detailed design to minimise safety and security risks to all users and communities in the study area. The project will carry out CPTED reviews at each milestone by a qualified professional. Additional recommendations as a result of reviews will be implemented where reasonable and feasible</li> <li>• Water sensitive urban design solutions.</li> </ul> <p>The plan will be prepared in accordance with Transport urban design policy guidelines including:</p> <ul style="list-style-type: none"> <li>• Beyond the Pavement – Urban design approach and procedures for road and maritime infrastructure planning, design and construction (Transport for NSW 2020a)</li> <li>• Landscape design guideline: Design guideline to improve the quality safety and cost effectiveness of green infrastructure in road corridors (Roads and Maritime Services 2018a)</li> <li>• Bridge Aesthetics: Design Guidelines to improve appearance of bridges in NSW (Transport for NSW 2019a)</li> <li>• Noise wall design guideline: Design guideline to improve the appearance of noise walls in NSW (Transport for NSW 2016a)</li> <li>• Shotcrete Design Guideline: Design guidelines to avoid, minimise and improve the appearance of shotcrete in NSW (Transport for NSW 2016b)</li> <li>• Water sensitive urban design guideline, Applying water sensitive urban design principles to NSW transport projects (Transport for NSW 2017b).</li> </ul>	Contractor	Prior to construction
	UD02	Disturbed areas outside the operational footprint and within the construction footprint will be revegetated following completion of construction activities.	Contractor	Construction



Impact	Reference	Environmental management measure	Responsibility	Timing
	UD03	Cut batters and fill embankments for the project will be designed to allow revegetation to assist with the integration of the project into the surrounding landscape where possible depending on site conditions.	Contractor	Construction
	UD04	Project construction elements such as fencing and hoardings will be designed to minimise impacts to landscape character and visual amenity where practicable	Transport/ Contractor	Prior to construction/ construction
	UD05	Temporary and permanent lighting will be installed and operated in accordance with AS/NZS1158 Lighting for Roads and Public Spaces.	Transport/ Contractor	Prior to construction/ construction
Aboriginal cultural heritage	UD06	The project detailed design will incorporate relevant Aboriginal cultural heritage elements of Beyond The Pavement (Transport for NSW 2020a) and Designing With Country (GANSW 2020), where practical.	Transport/ Contractor	Prior to construction/ construction
Soils and contamination				
Soil and groundwater contamination	SC01	<p>A Contaminated Land Management Plan (CLMP) and procedures prepared in accordance with TfNSW's Guideline for the Management of Contamination (Roads and Maritime Services 2013c) will be developed and will include:</p> <ul style="list-style-type: none"> <li>Control measures to manage identified areas of potential contamination risk (AOPCRs), where the risk has been assessed as being medium or high and is confirmed within the construction footprint</li> <li>Procedures for managing unexpected contamination (including buried waste, illegal dumping and asbestos)</li> <li>Requirements for the disposal of contaminated waste in accordance with the <i>Protection of the Environment Operations Act 1997</i> and the Protection of the Environment Operations (Waste) Regulation 2014.</li> </ul>	Contractor	Prior to construction/ construction
Salinity	SC02	<p>A Salinity Management Plan will be prepared and implemented as part of the CSWMP and in accordance with the NSW Department of Primary Industries (2014) Salinity Training Handbook. The plan will include (but not be limited to):</p> <ul style="list-style-type: none"> <li>Identification and management of saline groundwater discharge sites</li> <li>Identification of areas sensitive to salinity and subject to saline soil import limitations (such as the Tomago Sandbeds Catchment Area)</li> <li>Testing and reuse conditions of saline soils</li> <li>Requirements for reuse of saline water.</li> </ul>	Contractor	Prior to construction/ construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Acid sulfate soils	SC03	An Acid Sulfate Soils Management Plan (ASSMP) will be prepared and implemented as part of the CSWMP and in accordance with TfNSW's Guidelines for the Management of Acid Sulfate Materials (RTA 2005c) and the Acid Sulfate Soil Manual (ASSMAC 1998). The ASSMP will outline how potential ASS within sediments of the waterways and soils that will be disturbed within the construction footprint will be handled, tested, treated and reused during construction.	Contractor	Prior to construction/ construction
Former mineral sands processing facility	SC04	A Remediation Action Plan prepared and implemented in accordance with TfNSW Guideline for the Management of Contamination (Roads and Maritime Services 2013c), in consultation with NSW EPA and approved by a NSW EPA accredited site auditor for the former mineral sands processing facility.	Contractor	Prior to construction/ construction
Non-Aboriginal heritage				
Non-Aboriginal heritage impacts	NA01	<p>A Non-Aboriginal Heritage Management Plan (NAHMP) would be prepared prior to construction in consultation with Heritage NSW. As a minimum, the NAHMP would include the following:</p> <ul style="list-style-type: none"> <li>• A list, plan and maps with GIS layers showing the location of identified heritage items both within, and near, the construction footprint</li> <li>• Procedures to be implemented during construction to avoid or minimise impacts on items of heritage significance including protective fencing</li> <li>• The Unexpected Heritage Items Procedure (Transport for NSW 2019b) which will be followed in the event that unexpected heritage finds are uncovered during construction</li> <li>• A procedure for the unexpected discovery of human skeletal remains as per the Skeletal remains: guidelines for the management of human skeletal remains (NSW Heritage Office 1998).</li> </ul>	Transport/ Contractor	Prior to construction
Hannell Family Vault	NA02	<ul style="list-style-type: none"> <li>• A dilapidation survey will be carried out.</li> <li>• Barrier fencing will be erected between the construction project activities and vault structure.</li> </ul>	Contractor	Prior to construction/ construction
Glenrowan Homestead	NA03	<ul style="list-style-type: none"> <li>• Archival photographic recording of Site 2 will be carried out prior to demolition.</li> <li>• Archaeological salvage excavation at Site 3 under the supervision of an Excavation Director, who meets the NSW Heritage Council criteria will be carried out prior to works proceeding.</li> <li>• A dilapidation survey will be carried out.</li> <li>• Architectural noise treatment at the main house at Site 1 would be sympathetic to the heritage values of the item.</li> </ul>	Contractor	Prior to construction
Residence, 29 Eastern Avenue, Tarro	NA04	<ul style="list-style-type: none"> <li>• A dilapidation survey will be carried out.</li> <li>• Architectural noise treatment at the heritage residence would be sympathetic to the heritage values of the item.</li> </ul>	Contractor	Prior to construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Tarro Historic Site	NA05	<p>If construction works are to take place within the site curtilage further archaeological investigation under the supervision of an Excavation Director, who meets the NSW Heritage Council criteria, would be carried out as follows:</p> <ul style="list-style-type: none"> <li>Non-invasive survey using ground penetrating radar or other appropriate geophysical inspection technique will be carried out across the curtilage of the heritage item to assist in identifying the presence of burials or other archaeological features.</li> <li>Following the non-invasive survey, archaeological test excavation of the heritage item within the construction footprint will be carried out to confirm presence and nature of archaeological relics in accordance with a research design and methodology to be developed.</li> </ul>	Contractor	Detailed design/ prior to construction/ construction
Tarro Substation and Pumping Station	NA06	<ul style="list-style-type: none"> <li>A dilapidation survey will be carried out.</li> </ul>	Contractor	Detailed design/ prior to construction/ construction
Newcastle Crematorium and Our Lady of Lourdes Church	NA07	Architectural noise treatment at the heritage buildings would be sympathetic to the heritage values of the item.	Contractor	Detailed design/ prior to construction/ construction
Air quality				
Adverse air quality during construction	AQ01	<p>Preparation and implementation of an Air Quality Management Plan (AQMP) to minimise risks to air quality. The AQMP will identify:</p> <ul style="list-style-type: none"> <li>Potential sources of air pollution (including odours and dust) during construction</li> <li>Air quality management objectives consistent with relevant published guidelines</li> <li>Identification of all dust and odour sensitive receivers</li> <li>Measures to manage dust</li> <li>Requirements to separate temporary project specific asphalt batching plants, if feasible, from the nearest residences by at least 300m</li> <li>Community notification and complaint handling procedures.</li> </ul>	Contractor	Detailed design/ prior to construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Waste				
Avoid, minimise and sustainably manage waste	WM01	<p>A Waste Management Plan (WMP) will be prepared and implemented to manage and minimise the generation of waste and encourage reuse of materials. It will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• Identification of the waste types and volumes that are likely to be generated by the project</li> <li>• Adherence to the waste minimisation hierarchy principles of avoid/ reduce/ reuse/ recycle/ dispose</li> <li>• Waste management procedures to lawfully manage the handling and disposal of waste</li> <li>• Identification of reporting requirements and procedures for tracking of waste types and quantities</li> <li>• A resource management strategy detailing the process to identify reuse options for surplus materials</li> <li>• Site-specific waste management plans for concrete and asphalt batching plants</li> <li>• Spoil management procedures outlining reuse and disposal</li> <li>• Identification of areas for management of materials.</li> </ul>	Contractor	Detailed design/ prior to construction/ construction
Management of spoil	WM02	<p>Spoil management procedures will be outlined in the WMP. Spoil will be beneficially reused as part of the project before alternative spoil disposal options are considered. Any excess spoil will be managed using the following order of priorities:</p> <ul style="list-style-type: none"> <li>• Review alignment and profile refinements during detailed design</li> <li>• Assess opportunities to reuse excess spoil in works within the construction footprint or in adjacent land</li> <li>• Beneficial reuse within the construction footprint for rehabilitation of ancillary facilities</li> <li>• Transfer to other nearby Transport projects for immediate use, use on future projects, or routine maintenance</li> <li>• Transfer to a Transport approved site for reuse on other projects</li> <li>• Disposal at an approved materials recycling or licensed waste disposal facility.</li> </ul>	Contractor	Construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Sustainability				
Project sustainability outcomes	SU1	<p>A Sustainability Management Plan (or similar framework) for the project will be developed and implemented during detailed design and construction, detailing measures to meet the project's sustainability objectives and targets. The Sustainability Management Plan will:</p> <ul style="list-style-type: none"> <li>• Demonstrate leadership and commitments to sustainability</li> <li>• Adopt relevant sustainability performance targets in accordance with the Transport Sustainability Strategy</li> <li>• Identify sustainable procurement requirements</li> <li>• Document the process for the identification, assessment and implementation of sustainability initiatives and opportunities</li> <li>• Document the process to be used to monitor and review of sustainability performance against achieving the project's sustainability targets</li> <li>• Outline the documentation and reporting requirements for sustainability on the project.</li> </ul>	Transport/ Contractor	Prior to construction/ construction
Climate change and greenhouse gas				
Flood Risk	CC01	Hydrological and hydraulic assessments would be carried out for any design changes during detailed design and would consider the climate change related flood risks to the project and flood impacts from the project.	Contractor	Detailed design
Safety and risk				
Bushfire	HS01	<p>A Bushfire Management Plan prepared in accordance with the Planning for Bush Fire Protection 2006 (Rural Fire Service 2006).</p> <p>Measures to be implemented to manage bushfire risk include:</p> <ul style="list-style-type: none"> <li>• Community notifications in the event of a bushfire</li> <li>• Ensuring plant and equipment are fitted with appropriate spark arrestors, where practicable</li> <li>• Ensuring site workers are informed of the site rules including designated smoking areas and putting rubbish in designated bins</li> <li>• Obtaining hot work permits and implementing total fire bans as required</li> <li>• Implementing adequate storage and handling requirements for potentially flammable substances in accordance with the relevant guidelines.</li> </ul>	Contractor	Prior to construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Subsidence risk	HS02	<ul style="list-style-type: none"> <li>Potential residual risks surrounding the un-remediated exploration shaft near the John Renshaw Drive road corridor would be managed by the contractor.</li> </ul>	Contractor	Prior to construction/ construction
Cumulative impacts				
Cumulative impacts	CI01	The construction contractor will review traffic impacts before the start of construction and as required during construction. Any changes to manage cumulative traffic impacts will be included in the Traffic Management Plan (TMP).	Contractor	Prior to construction/ construction