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NSW GOVERNMENT

M1 Pacific Motorway extension to Raymond Terrace

Environmental impact statement – Chapter 27: Project synthesis

Transport for NSW | July 2021

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27. Project synthesis

This chapter provides a summary of the EIS for the project in response to the SEARs issued by the Secretary of the Department of Planning, Industry and Environment and detailed in **Table 27-1**.

Table 27-1 SEARs relating to the synthesis chapter

Secretary's requirement	Where addressed
2. Environmental Impact Statement	
1. The EIS must include, but not necessarily be limited to, the following: (q) a chapter that synthesises the environmental impact assessment and provides:	
− A succinct but full description of the project for which approval is sought;	A description of the project for which approval is sought is provided in **Section 27.1** and **Section 27.2**
− A description of any uncertainties that still exist around design, construction methodologies and/or operational methodologies and how these will be resolved in the next stages of the project;	A description of project uncertainties and proposed resolutions is provided in **Section 27.3**
− A compilation of the impacts of the project that have not been avoided;	Key project impacts are outlined in **Section 27.4.2**
− A compilation of the proposed measures associated with each impact to avoid or minimise (through design refinements or ongoing management during construction and operation) or offset these impacts;	Proposed measures to avoid or minimise key impacts are discussed in **Section 27.4.1**, **Section 27.4.2** and **Section 27.4.3**
− A compilation of the outcome(s) the proponent will achieve; and	The desired performance outcomes and the outcomes of the project are discussed in **Section 27.5**
− The reasons justifying carrying out the project as proposed, having regard to the biophysical, economic, social considerations, including ecologically sustainable development and cumulative impacts.	A justification for the project, with regard to biophysical, economic, social considerations and cumulative impacts is provided in **Section 27.6**

27.1 Overview of the project

The M1 Pacific Motorway was constructed to provide access between Sydney and Newcastle and was completed in 1998. Construction of the Pacific Highway bypass of Raymond Terrace was also completed in 1998. The Pacific Highway forms part of the National Land Transport Network (NLTN), connecting Sydney and Brisbane, and is a major contributor to Australia's economic activity.

Since 1996, the Australian and NSW governments have been jointly upgrading the Pacific Highway to provide a four-lane divided road from Hexham to Queensland. Although the project will not be delivered under the Pacific Highway upgrade program, completion of the project will contribute to fully realising the benefits of the program. There are only two locations on the east coast corridor linking Sydney to Brisbane where the route is an urban road with traffic signals; at Coffs Harbour and along the existing road network in the construction footprint (including at Black Hill, Hexham, Tomago and Heatherbrae). The project, together with Coffs Harbour bypass, would provide the remaining major upgrades to complete a free flowing dual carriageway route between Sydney and Brisbane.

The project would connect the existing M1 Pacific Motorway at Black Hill and the Pacific Highway at Raymond Terrace within the City of Newcastle and Port Stephens Council local government areas. Upon completion, the project would provide regional benefits and substantial productivity benefits on a national scale.

27.1.1 The completed project

Key features of the project would include:

- A 15 kilometre motorway comprised of a four lane divided road (two lanes in each direction)
- Motorway access from the existing road network via four new interchanges at:
  - Black Hill: connection to the M1 Pacific Motorway
  - Tarro: connection and upgrade (six lanes) to the New England Highway between John Renshaw Drive and the existing Tarro interchange at Anderson Drive
  - Tomago: connection to the Pacific Highway and Old Punt Road
  - Raymond Terrace: connection to the Pacific Highway.
- A 2.6 kilometre viaduct over the Hunter River floodplain including new bridge crossings over the Hunter River, the Main North Rail Line and the New England Highway
- Bridge structures over local waterways at Tarro and Raymond Terrace, and an overpass for Masonite Road in Heatherbrae
- Connections and modifications to the adjoining local road network
- Traffic management facilities and features
- Roadside furniture including safety barriers, signage, fauna fencing and crossings and street lighting
- Adjustment of waterways, including at Purgatory Creek at Tarro and a tributary of Viney Creek
- Environmental management measures including surface water quality control measures
- Adjustment, protection and/or relocation of existing utilities
- Walking and cycling considerations, allowing for existing and proposed cycleway route access
- Permanent and temporary property adjustments and property access refinements
- Construction activities, including establishment and use of temporary ancillary facilities, temporary access tracks, haul roads, batching plants, temporary wharves, soil treatment and environmental controls.

An overview of the project is provided in **Figure 27-1**. **Chapter 5** describes the project in more detail.

27.2 Construction of the project

The project would likely be built using conventional methods used on most highway projects (refer to **Section 5.4** for more detail on the construction of the project). Key construction components would include:

- Enabling work
- Construction and operation of ancillary facilities
- Drainage and water quality control measures
- Clearing, grubbing and demolition
- Bulk earthwork
- Construction of pavements
- Construction of bridges and viaducts
- Construction of roadside furniture and finishing work
- Traffic management and control
- Landscaping work.

As noted in **Section 5.4.3** and **Figure 5-25**, 21 potential ancillary construction facilities have been identified. These 21 sites have been assessed in this EIS with further investigations to be carried out during detailed design to explore opportunities to use suitable existing sites in the surrounding industrial areas in Black Hill, Beresfield, Hexham, Tomago and Raymond Terrace to potentially reduce the construction footprint.

Construction of the project is expected to begin in 2023 and be completed in 2028. Project staging may occur to most effectively and efficiently complete construction and would be dependent on the confirmed procurement and delivery strategy. The preferred procurement method would be selected and implemented giving consideration to this EIS assessment and the project's subsequent approval conditions. The preferred procurement strategy would be selected to provide best value for money to deliver the project in an efficient manner. Any potential staged opening of the project would require further assessment. Any such project staging would be further investigated as the project progresses towards construction.

Where feasible and reasonable, construction activities would be carried out during the standard construction work hours, however Transport is seeking approval for extended construction hours as the majority of work would be away from residences and sensitive receivers (particularly north of Tarro), (refer to **Section 5.4.12**). Some construction activities would also need to be carried out as out-of-hours work to ensure the safety of the public and construction crews and to minimise disruption to existing traffic flows (refer to **Section 5.4.12**).

The construction methods and management measures to minimise environmental impacts would be detailed in the Construction Environmental Management Plan (CEMP) which would be prepared by the construction contractor.

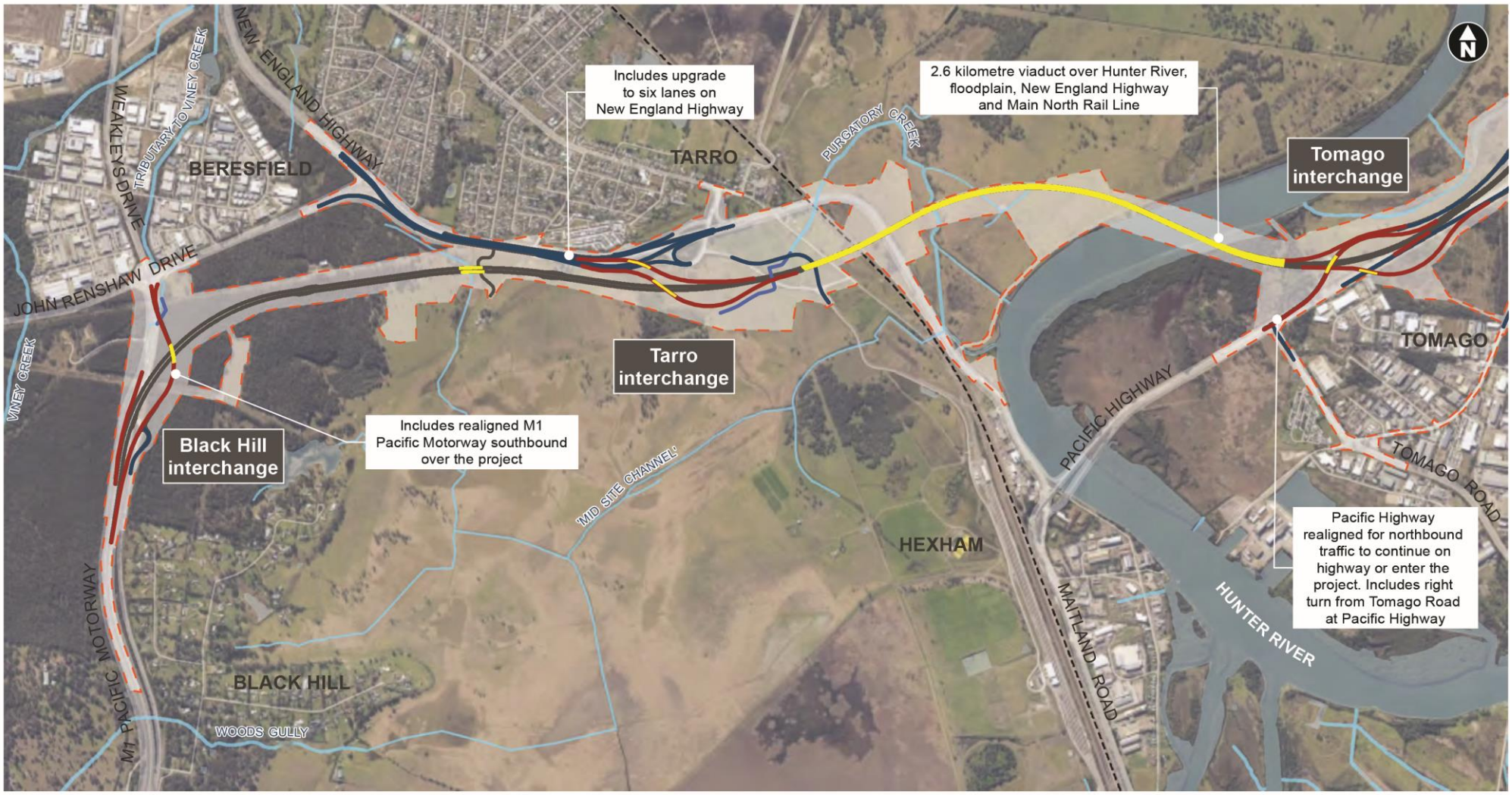

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Figure 27-1 Project key features (map 1 of 2)

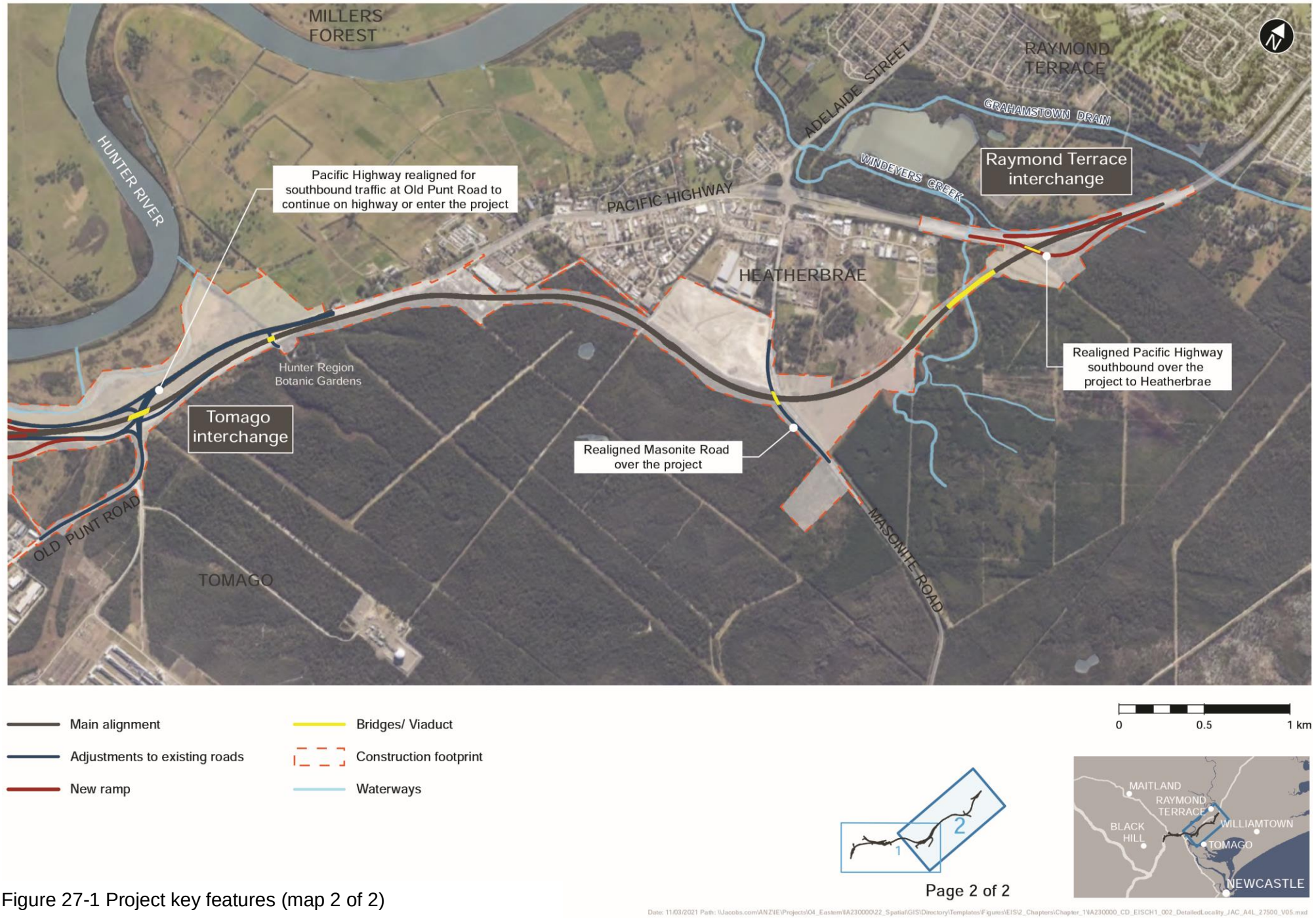

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Figure 27-1 Project key features (map 2 of 2)

27.3 Project uncertainties

The EIS is based on the concept design developed for the project. As such, the design of the project would continue to be refined during detailed design to:

- Consider alternative construction techniques
- Respond to submissions received following the exhibition of this EIS
- Avoid or minimise environmental impacts
- Respond to improved technologies or materials
- Improve value for money.

The final design may therefore vary from the concept design described in **Chapter 5**. Any changes to the project would be reviewed for consistency with the assessment contained in the EIS including relevant management measures, environmental performance outcomes and any future conditions of approval. If design refinements are not consistent, approval would be sought from the Minister for Planning and Public Spaces for any such modifications in accordance with the requirements of Division 5.2 of the EP&A Act.

Areas where further work would be carried out during detailed design to optimise the design outcomes and construction methodology include:

- Design of the alignment, intersections, bridges (including final bridge type and length), ancillary facilities, batter slope specifications, local road network upgrades and emergency crossover access
- Consultation and proposals for relocation or protection of utilities
- Design to best improve earthworks balance across the project
- Construction methodology, including staging and programming.

Table 27-2 outlines key project components that have been identified as requiring further resolution during detailed design, construction and/or operation of the project and references where these uncertainties are further described in this EIS.

Table 27-2 Resolution of project uncertainties

Project uncertainties	Proposed resolution	Timing	Where discussed
The location and layout of construction ancillary facilities, including entry and exit arrangements	Twenty-one ancillary facilities have been assessed to support project construction (refer to **Section 5.4.3** and **Figure 5-25**). The final location, use, type and number of construction ancillary facilities would be confirmed by the construction contractor prior to construction. Opportunities to use suitable existing sites in the surrounding industrial areas in Black Hill, Beresfield, Hexham, Tomago and Raymond Terrace to potentially reduce the construction footprint would be considered. The construction ancillary facilities will be established and operated in accordance with the terms of the project approval.	Detailed design	**Chapter 5**
Design of bridges and structures	Detailed design would seek to further refine and enhance the aesthetic appearance of bridges and associated structures such as piers and retaining walls while considering value for money and effective construction methods for complex structures.	Detailed design	**Chapter 5** and **Chapter 15** (urban design, landscape and visual amenity)
Cuttings and fill embankments	Cuttings and fill embankments would generally be at a slope of 2H:1V, equating to a one metre vertical rise for every two-metre horizontal run, with the exception of the Black Hill interchange, which would have a slope of 2.5H:1V with a 6.5m wide bench where required. Batter slope design would be refined during detailed design based on additional environmental, engineering, earthworks balancing and property constraints.	Detailed design	**Chapter 5**
Utilities	Depending on the utility service being relocated, work may be required to occur outside the construction footprint to meet the utility service provider requirements. However, it is expected that the utility work would be carried out in existing disturbed areas within or next to existing road/local access corridors. A strategy for managing utilities will be developed during detailed design and will include further detailed utility investigations and design, ongoing consultation, and methods for relocation work. These methods will be in accordance with environmental management measures, utility provider's requirements and construction methods.	Detailed design/ construction	**Chapter 5** and **Chapter 14** (land use and property)
Procurement strategy and project staging	Depending on the confirmed procurement and delivery strategy, project staging may occur to most effectively and efficiently complete construction. The preferred procurement method would be selected and implemented giving consideration to this EIS assessment and the project's subsequent approval conditions. The preferred procurement strategy would be selected to provide best value for money to deliver the project in an efficient manner. Any potential staged opening of the project would require further assessment. Any such project staging would be investigated further as the project progresses towards construction.	Prior to construction	**Chapter 5**

Project uncertainties	Proposed resolution	Timing	Where discussed
The final suite of noise mitigation options for road traffic noise that will be adopted and implemented	The operational road traffic noise model will be updated to identify predicted noise levels at the completion of detailed design. Operational noise and vibration mitigation measures would be identified in an Operational Noise and Vibration Review. A reasonable and feasible assessment will then be carried out in accordance with Transport's Noise Mitigation Guideline to determine the final noise mitigation options for the project (which may include noise barriers, noise walls, at-property treatments, or a combination of these). Ongoing community and stakeholder consultation to assist with informing and determining appropriate additional noise mitigation to be carried out.	Detailed design	**Chapter 8** (noise and vibration)
The final suite of environmental management measures for flooding	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. 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.	Detailed design	**Chapter 10** (hydrology and flooding)
The final suite of water quality treatments (both during construction and operation)	The proposed erosion and sediment control measures would continue to be refined and modelled should the design change as part of detailed design with the aim of further reducing the potential surface water quality impacts and to work towards meeting the NSW WQOs.	Detailed design	**Chapter 11** (surface water and groundwater quality)
Property access and acquisition	The extent of property impacts would be refined and confirmed in consultation with the property owners. The project would change existing access arrangements for a number of properties. Property access that is physically affected by the project would be reinstated to at least an equivalent standard, in consultation with the landowner. Any changes to access arrangements would be further refined in consultation with affected property owners.	Detailed design	**Chapter 14** (land use and property)

Project uncertainties	Proposed resolution	Timing	Where discussed
Presence of Per- and polyfluoroalkyl substances (PFAS)	The potential risks associated with PFAS contamination at Tarro and Heatherbrae (AOPCR 18) are currently being investigated by the NSW EPA. Areas of potential and known PFAS contamination are located near the project, at Heatherbrae (200m away) and Tarro (300m away). These sites are not located within the construction footprint and modelling for the project shows groundwater flows away from the project, decreasing the risk of PFAS occurrence in the construction footprint. As described in **Chapter 11** (surface water and groundwater quality), predicted groundwater drawdown resulting from temporary construction dewatering for the project is not predicted to interact with the areas of known or potential PFAS contamination. Notwithstanding, PFAS has been noted as a medium risk within the construction footprint. A surface water and groundwater monitoring program would be carried out prior to construction to determine if any construction management is required within the construction footprint. Transport will continue to consult with the EPA if PFAS poses a risk during the construction of the project in Tarro and Heatherbrae. Management of this risk will also be included in the Contaminated Land Management Plan (CLMP) for the project.	Prior to construction/ construction	**Chapter 11** (surface water and groundwater quality) **Chapter 16** (soils and contamination)

27.4 Summary of project impacts and management measures

This section provides a summary of the impacts of the project that could not be avoided. These impacts are discussed in detail in **Chapter 7** (traffic and transport) through to **Chapter 22** (safety and risk).

27.4.1 Key impact avoidance

Many potential impacts have been avoided through the project development process which included input from key stakeholders. The project has a detailed history of investigating and considering alternatives to achieve the project objectives and to avoid or minimise adverse impacts to the environment (refer to **Chapter 4**). The initial planning for the project saw several alternate routes and options abandoned due to potential environmental impacts or risks, particularly impacts associated with high value biodiversity areas.

As a result of the project development process, the project has avoided many environmental impacts and now achieves the following:

- Avoiding and minimising direct impacts to floodplain wetlands (west of Woodlands Close) and the Hunter Wetlands National Park, including a viaduct across the Hunter River floodplain (instead of an embankment) to avoid impacts to floodplain wetlands and associated biodiversity
- Avoiding major fragmentation of habitat by aligning the project near existing infrastructure and development
- Avoiding impacts to remnant vegetation, potential habitat for threatened species, connectivity impacts and a population of *Grevillea parviflora* subsp. *parviflora* by removing the link road at Tomago from the design
- Avoiding substantial upstream flooding impacts by replacing an embankment with a viaduct across the Hunter River floodplain. The inclusion of the viaduct in the design also avoided substantial impacts to drainage capacity, flood storage and conveyance upstream in the swamp area in Hexham and substantial local afflux
- Reducing substantial groundwater impedance and level impacts from soft soil activities, which would be required to support an embankment, through the inclusion of the viaduct in the design
- Minimising impacts to undisturbed Aboriginal heritage areas in the Black Hill landform by aligning closely with existing infrastructure and previously disturbed areas
- Avoiding severance of land either side of the project by locating the viaduct across the Hunter River floodplain.

The project has, through its design and construction methodology, sought to minimise environmental impacts. Further refinement of the design including consideration of community issues through the EIS exhibition process may further reduce and, if possible, avoid impacts.

Potential impacts would also be further avoided and minimised, where possible, through the implementation of the management measures complying with the performance outcomes identified in **Chapter 7** (traffic and transport) to **Chapter 22** (safety and risk).

27.4.2 Key project impacts

The EIS has assessed the potential environmental impacts which may occur because of the project and recommends measures to manage these impacts (refer to **Chapter 24** (summary of environmental management measures)). **Table 27-3** provides a summary of potential major impacts of the project that could not be avoided and the measures proposed to manage these impacts.

Table 27-3 Summary of key project impacts and management measures

Summary of key impacts	Construction/ operation	Management measure
Traffic and transport (refer to **Chapter 7**)		
Changes to access arrangements during construction and operation	Construction/ operation	While property access will be maintained at all times, any changes to access arrangements or alternative accesses that are necessary during construction would be completed in consultation with the landowner. Property access physically affected by the project will be reinstated to at least an equivalent standard, in consultation with the landowner. Transport will continue to liaise with landowners during subsequent stages of design to confirm access arrangements during construction and operation.
Construction traffic impacts on road network performance, including delays, increased travel times, road closures and detours, and parking impacts	Construction	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP to manage construction impacts. Consultation with emergency services, including the NSW Police, Rural Fire Service and Fire and Rescue NSW would be undertaken during detailed design and construction to ensure emergency access is maintained during construction.
Noise and vibration (refer to **Chapter 8**)		
Noise and vibration impacts at surrounding sensitive receivers from work during standard construction hours	Construction	A Construction Noise and Vibration Management Plan (CNVMP) will be prepared and implemented as part of the CEMP. The CNVMP will include measures to be implemented during construction to minimise noise and vibration impacts, including measures such as restrictions on working hours, respite periods, temporary noise barriers and location and use of vibration generating equipment. Where feasible, implementation of operational noise mitigation would be carried out within 12 months of commencement of construction.
Noise and vibration impacts at surrounding sensitive receivers from work outside of standard construction hours	Construction	An Out of Hours Work Procedure will be included as part of the CNVMP. The procedure would include scheduling of noise intensive or high noise impact work to evening periods where feasible, use of alternative plant, notification and consultation requirements, use of temporary noise barriers, respite periods and offers of reasonable and temporary alternative accommodation.
Increase in operational road traffic noise at surrounding sensitive receivers	Operation	Operational noise and vibration mitigation measures would be identified in an Operational Noise and Vibration Review during detailed design. A reasonable and feasible assessment will then be carried out in accordance with Transport's Noise Mitigation Guideline to determine the final noise mitigation options for the project (which may include noise barriers, noise walls, at-property treatments, or a combination of these).

Summary of key impacts	Construction/ operation	Management measure
Biodiversity (refer to **Chapter 9**)		
Impacts to threatened flora, fauna habitat, wetlands & aquatic habitat and reduction of the footprint of endangered ecological communities beyond those assessed and offset in this EIS	Construction	A Biodiversity Offset Strategy has been prepared that outlines how Transport intends to offset the impacts of the project. A Flora and Fauna Management Plan (FFMP) will also be prepared in accordance with the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) and implemented as part of the CEMP to address terrestrial and aquatic matters. Creek corridors will be revegetated with native riparian vegetation suitable for the local area. Aquatic protection measures will be implemented during construction 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). Procedures for protection of aquatic fauna associated with dredging or piling areas would be outlined in the FFMP.
Fragmentation of native vegetation and habitat corridors	Construction	
Hydrology and flooding (refer to **Chapter 10**)		
Impacts on surrounding land, infrastructure, property, business operations and future development due to increases in flood levels and changes to flood behaviour	Construction	A Flood Management Plan (FMP) will be prepared to detail specific measures to reduce the potential for flooding impacts during construction. 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. This may involve further flood modelling during detailed design to assess the impacts to property.
Surface water and groundwater quality (refer to **Chapter 11**)		
Surface water quality impacts during construction and operation	Construction/ operation	A Construction Soils and Water Management Plan (CSWMP) would be prepared and implemented as part of the CEMP and will outline measures to manage soil and water quality impacts associated with the construction work, including contaminated land. Surface water quality measures, including temporary sediment basins, permanent water quality basins and grassed swales, have been included in the project design. A surface water and groundwater quality monitoring program will be implemented during construction and operation of the project.

Summary of key impacts	Construction/ operation	Management measure
Aboriginal heritage (refer to **Chapter 12**)		
Impact to Aboriginal archaeological heritage items during construction	Construction	Extensive consultation and investigations have been completed with the Aboriginal community. Environmental management measures, including archaeological salvage excavation, surface collection and exclusion fencing, are described in Chapter 9 of the Aboriginal Cultural Heritage Assessment Report (**Appendix L**).
Construction impact to previously unidentified Aboriginal archaeological heritage items	Construction	An Aboriginal Cultural Heritage Management Plan (ACHMP) will be prepared for construction which will include an unexpected finds procedure.
Socio-economic (refer to **Chapter 13**)		
Temporary impacts to businesses during construction	Construction	Access will be maintained to businesses and properties during construction of the project, including rail infrastructure facilities. Where temporary access changes are proposed, these will be agreed with the affected business or property owner. A Community Communication Strategy 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.
Soils and contamination (refer to **Chapter 16**)		
Soil erosion, impacts from acid sulfate soils and offsite sedimentation during construction	Construction	A CSWMP will be prepared for the project, including a Salinity Management Plan, an Acid Sulfate Soils Management Plan (ASSMP), and erosion and sediment control plans (ESCPs) to manage potential soil impacts during construction of the project.
Impacts resulting from contaminated material, including asbestos and the former mineral sands processing site at Tomago during construction	Construction	A Remediation Action Plan prepared and implemented in consultation with the NSW EPA and approved by a NSW EPA accredited site auditor for the former mineral sands processing facility. A Contaminated Land Management Plan (CLMP) and procedures will be developed and implemented for the project as part of the CEMP.

27.4.3 Environmental management plan framework

The implementation of environmental management measures during detailed design, construction and operation of the project would minimise any potential adverse impacts arising from the proposed work on the surrounding environment. The management measures related to construction would be captured in a CEMP and associated sub-plans. The CEMP would provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation.

The CEMP would be prepared and would be reviewed and certified by Transport prior to the commencement of any on-site work. The CEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements.

Sub-plans to be prepared for the project include but may not be limited to:

- Traffic Management Plan (TMP)
- Construction Noise and Vibration Management Plan (CNVMP)
- Flora and Fauna Management Plan (FFMP)
- Flood Management Plan (FMP)
- Construction Soils and Water Management Plan (CSWMP)
  - Salinity Management Plan
  - Acid Sulfate Soils Management Plan (ASSMP)
  - Erosion and Sediment Control Plans (ESCPs).
- Aboriginal Cultural Heritage Management Plan (ACHMP)
- Contaminated Land Management Plan (CLMP)
- Non-Aboriginal Heritage Management Plan (NAHMP)
- Air Quality Management Plan (AQMP)
- Waste Management Plan (WMP)
- Sustainability Management Plan (SMP)
- Bushfire Management Plan.

During operation, the project's environmental performance would be managed under Transport's existing Environmental Management System (EMS) (or similar) for asset maintenance prepared in accordance with the AS/NZS ISO 14000 Environmental Management System series. This EMS has been developed to be consistent with the broad environmental objectives and policies set out in the Transport EMS. Transport is committed to managing its impacts on the environment and carrying out its activities to avoid, minimise or mitigate environmental impacts. Accordingly, any project-specific operational environmental management practices and procedures will be incorporated into the existing EMS.

27.5 Performance outcomes

The project design has been prepared in consideration of the 'desired performance outcomes' provided in the SEARs. These desired performance outcomes outline the broader objectives to be achieved by Transport in the design, construction and operation of the project. **Table 27-4** outlines how each performance outcome will be achieved by the project.

Table 27-4 Design performance outcomes and project outcome

Relevant SEARs desired performance outcome	Project outcome
General SEARs	
1. Environmental Impact Assessment Process The process for assessment of the proposal is transparent, balanced, well focussed and legal.	• The planning approval process for the project is transparent and legal as the process was developed in accordance with and followed the relevant approval frameworks and legislation • The assessment of key issues has considered both the benefits and the impacts of the project to present a balanced assessment. The SEARs for the project guide the EIS and help provide an assessment framework that maintains clarity and focus in the document.
2. Environmental Impact Statement The project is described in sufficient detail to enable clear understanding that the project has been developed through an iterative process of impact identification and assessment and project refinement to avoid, minimise or offset impacts so that the project, on balance, has the least adverse biophysical, social and economic impact, including its cumulative impacts.	• Adverse biophysical, social and economic impacts, including cumulative impacts, have been assessed and, where possible, the project has been refined to avoid, minimise or offset these impacts (refer to **Chapter 4** and **Chapter 24** (summary of environmental management measures)).
3. Assessment of Key Issues* Key issue impacts are assessed objectively and thoroughly to provide confidence that the project will be constructed and operated within acceptable levels of impact. *Key issues are nominated by the Proponent in the CSSI project application and by the Department in the SEARs. Key issues need to be reviewed throughout the preparation of the EIS to ensure any new key issues that emerge are captured.	• All key issues identified by the Department in the SEARs for the project were assessed objectively and thoroughly by specialists in accordance with the relevant SEARs for each key issue (refer to **Chapter 7** (traffic and transport) to **Chapter 23** (cumulative impacts)) • The benefits and impacts associated with each key issue have been assessed to provide an objective and balanced assessment.
4. Consultation The project is developed with meaningful and effective engagement during project design and preparation of the EIS.	• Community and stakeholders were regularly engaged during development of the project and preparation of the EIS, and have informed the design process (refer to **Chapter 6**).

Relevant SEARs desired performance outcome	Project outcome
Key issue SEARs	
1. Transport and Traffic Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors.	• Free flowing dual carriageway conditions are provided • Improved road network efficiency and reliability with associated travel time improvements across the road network. Travel time is expected to improve by seven to nine minutes along the M1 Pacific Motorway corridor upon opening of the project (refer to **Chapter 7** (traffic and transport)) • Improved connectivity and accessibility along the National Land Transport Network (NLTN) as a result of the interchanges at Tarro, Tomago and Heatherbrae directly accessing the project • Improved safety outcomes in the study area would be achieved through a reduction of traffic volumes on the existing road network, improvement of pedestrian access at the Hunter Region Botanic Gardens and Masonite Road, and improvement to cyclist connectivity and crossing points • The project would be compatible with existing infrastructure and future transport corridors. The project would provide a free flowing high standard, access-controlled motorway that integrates with the NLTN.
2. Noise and Vibration – Amenity Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity. Increases in noise emissions affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and wellbeing of the community.	• Management measures, including minimum working distances and respite periods, will be implemented in accordance with the relevant criteria from the Construction Noise and Vibration Guideline (Roads and Maritime Services 2016b) and Noise Criteria Guideline (Roads and Maritime Services 2015c) and a CNVMP will be prepared • The number of maximum noise level events experienced by residential receivers would be reduced compared to the existing background noise environment • About 10 per cent of receivers experience a decrease in traffic noise when the project is operational compared to existing road traffic noise levels • Operational noise mitigation measures such as quieter pavement surfaces, noise barriers and at-property noise treatments would be provided where required to minimise impacts.
3. Noise and Vibration – Structural Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on the structural integrity of buildings and items including Aboriginal places and environmental heritage. Increases in noise emissions and vibration affecting environmental heritage as defined in the *Heritage Act 1977* during operation of the project are effectively managed.	• Construction noise would not have adverse impact on the structural integrity of buildings and items • The nearest affected heritage listed structures would not be affected by vibration intensive plant and equipment associated with the proposed construction activities. Where buildings or structures are considered sensitive to vibration, appropriate vibration criteria would be determined after detailed inspections have been completed • If required, blasting will be managed in accordance with relevant standards and guidelines and a Blast Management Plan will be developed to identify any potentially affected noise and vibration sensitive sites including heritage buildings • There are no Aboriginal places, as defined under the relevant legislation, planning instruments or heritage lists, within or next to the construction footprint and surface and subsurface artefacts are not subject to potential noise or vibration impacts. The project would not have any noise and vibration impacts on Aboriginal places or items.

Relevant SEARs desired performance outcome	Project outcome
4. Biodiversity The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity. The delivery of offsets and/or supplementary measures required for the project is assured and which are equivalent to any remaining impacts from its construction and operation.	• The project has been designed to avoid and minimise direct impacts to floodplain wetlands and associated biodiversity through options selection and design of a viaduct over the Hunter River and associated floodplain • Selection of an alignment that minimises fragmentation of habitat and aligns with existing infrastructure and development • Disturbance of vegetation resulting from the construction of ancillary facilities has been minimised through the selection of ancillary facility locations where land has been previously cleared and disturbed • All residual impacts associated with the project will be offset in accordance with the Framework for Biodiversity Assessment (FBA). A Biodiversity Offset Strategy (refer to Appendix I of the Biodiversity Assessment Report (**Appendix I**) has been prepared that outlines how Transport intends to offset the impacts on the project.
5. Flooding The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards or dam failure.	• The project avoids substantial upstream flooding through the inclusion of a 2.6km viaduct instead of an embankment across the Hunter River floodplain • An FMP will be prepared for the project and will detail the processes for flood preparedness, materials management, weather monitoring, site management, flood incident management, and flood response during construction • The project would provide an alternative to the existing road network with a minimum 1 in 20 year flood immunity, improving flood immunity along the M1 Pacific Motorway corridor and reliability of the corridor for local, intra-state and inter-state movements.
6. Soils The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination.	• Five high risk and six medium risk Areas of Potential Contamination Risk (AOPCR) have been identified within the construction footprint. The high risk AOPCRs are associated with asbestos waste at Tarro and Tomago, the former mineral sands processing facility at Tomago, potentially impacted Hunter River Sediments and at locations where construction works may interact with acid sulfate soils. A CLMP would be prepared to manage these high and medium risks • A site-specific Remediation Action Plan would be prepared and implemented for the former mineral sands processing facility at Tomago • Construction would be carried out in accordance with the CSWMP. The CSWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution associated with carrying out the activity and describe how these risks will be managed and minimised during construction • ESCPs will be prepared and implemented prior to construction commencing and updated regularly during the construction period to suit specific site characteristics • An ASSMP will be prepared prior to construction of the project to outline how the acid sulfate soils will be handled, tested, treated and reused during construction to minimise impacts to the environment.

Relevant SEARs desired performance outcome	Project outcome
7. Water – Hydrology Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources.	• The project avoids permanent drawdown of the various groundwater resources during operation as the groundwater level would not be above the surface water level of the proposed permanent water quality basins • The project may result in a moderate increase to the rate, volume and velocity of stormwater discharged downstream of the project. Potential changes to stormwater discharges during construction are expected to follow the same trend of increased rates, volumes and velocity. Monitoring of these impacts is proposed for the areas immediately surrounding the project stormwater discharge locations. The requirement to provide further upgrades to existing drainage systems will be considered at detailed design • Groundwater flows, water levels, or supply capacity of the Tomago Sandbeds Catchment Area drinking water supply will not be impacted by project construction or operation as sediment and water quality controls in this location will be lined to prevent groundwater interactions • Impacts to groundwater levels and flow due to the project are expected to be negligible to minor and would be limited to the vicinity of the construction footprint. Changes to groundwater levels or flow are not anticipated to materially affect any groundwater dependent ecosystems, baseflows, or existing groundwater users • By providing a viaduct instead of an embankment across the Hunter River floodplain, the project has avoided substantial upstream flooding impacts, groundwater impedance and level impacts • Groundwater produced during project construction through temporary construction dewatering or via wick drains would be re-used where suitable for dust suppression and fill conditioning as a measure of sustainable use of the groundwater resource.
8. Water – Quality The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable).	• Modelled pollutant loads to waterways would generally be lower than current nutrient and toxicant levels within the waterways during the operation of the project (with the implementation of water quality controls). The general improvement in water quality from existing conditions works toward achieving the NSW Water Quality Objectives • Impacts to water quality during construction would be minimised through the implementation of water quality control measures, including temporary sediment basins (where runoff will be captured and treated prior to discharge), erosion and sediment controls and water quality monitoring • Impacts to water quality during operation would be minimised through the implementation of permanent water quality basins and grassed swales, as well as drainage infrastructure and scour protection to avoid erosion and sedimentation impacts to downstream receiving environments • The project has been designed and water quality measures have been applied to minimise impacts to the Tomago Sandbeds Catchment Area in consultation with Hunter Water Corporation. Pavement drainage in this area has been designed to discharge road runoff away from drinking water catchments to prevent any potential pollution impacts to the Tomago Sandbeds. Permanent water quality basins in this area will also be lined to prevent groundwater interaction.

Relevant SEARs desired performance outcome	Project outcome
9. Climate Change Risk The project is designed, constructed and operated to be resilient to the future impacts of climate change.	• Risk to the project as a result of climate change has been assessed, with flood risk being the key issue. Hydrological and hydraulic assessments would be carried out for any design changes applied during detailed design and would consider the climate change related flood risks to the project and flood impacts from the project.
10. Urban Design The project design complements the visual amenity, character and quality of the surrounding environment. The project contributes to the accessibility and connectivity of communities.	• The project's design has been developed in recognition of existing natural, built and community values • Character and quality of the environment are improved by reducing congestion and freight movements in existing road corridors and urban centres, enhanced town centre amenity in Heatherbrae because of reduced traffic • The project provides enhanced accessibility and connectivity to the existing road network and adjacent communities.
11. Visual Amenity The project minimises adverse impacts on the visual amenity of the built and natural environment (including public open space) and capitalises on opportunities to improve visual amenity.	• Adverse impacts on the visual amenity of the built and natural environment have been minimised by locating the project as much as possible within or near to existing road corridors and infrastructure • Opportunities for new views over the open Hunter River floodplain landscape will be established, enhancing the experience for motorists and cyclists with improved orientation and wayfinding • Landscaping carried out as part of the project, including vegetation planting, will assist in integrating the project within the landscape setting.
12. Socio-economic, Land Use and Property The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities. The project minimises impacts to property and business and achieves appropriate integration with adjoining land uses, including maintenance of appropriate access to properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure. Effective engagement is undertaken with stakeholders during project design and delivery.	• Direct impacts on land use and property from the project have been minimised as the project mainly passes within or near to existing road corridors and infrastructure • The project would improve access, transport connections and journey reliability, reducing congestion and travel times, and would enhance road safety and driving conditions due to the provision of a motorway standard of road • All acquisitions and associated property adjustments will be carried out in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* and the Land Acquisition Reform 2016 in consultation with landowners • Property owners and businesses will experience minimal disturbance during construction and operation of the project, with ongoing engagement and involvement during construction.

Relevant SEARs desired performance outcome	Project outcome
13. Heritage The design, construction and operation of the project facilitates, to the greatest extent possible, the long-term protection, conservation and management of the heritage significance of items of environmental heritage and Aboriginal objects and places. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.	**Aboriginal heritage** • Aboriginal stakeholder engagement was carried out during development of the project and involved engaging Aboriginal stakeholders for the project site surveys, test excavations, five Aboriginal Focus Group meetings and various other consultation • Management measures, including archaeological salvage excavation, surface collection and exclusion fencing during construction are proposed to manage impacts on Aboriginal heritage • No ongoing impacts to Aboriginal heritage are expected during operation. **Non-Aboriginal heritage** • Management measures including dilapidation surveys, barrier fencing, archival photo recording, archaeological salvage excavation, geophysical survey and archaeological test excavation are proposed to manage impacts on non-Aboriginal heritage items • The project would have a major impact on one heritage item, a minor impact on one heritage item and negligible impacts on seven heritage items.
14. Air Quality The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent practicable.	• The project has been designed to mainly pass within or near to existing road corridors or through rural areas which would minimise the amount of dust, odour and other emissions in residential areas during construction • Dust, odour and other emissions during construction would be effectively managed through the implementation of the AQMP • Roads would be less congested with the project than without the project, meaning that the 'with project' scenario is more carbon efficient and would produce fewer tonnes of carbon dioxide equivalent per vehicle kilometres travelled than the 'without project' scenario • Operation of the project does not result in any exceedances of the NSW EPA air quality impact assessment criteria for relevant pollutants or key air toxics.
15. Waste All wastes generated during the construction and operation of the project are effectively stored, handled, treated, reused, recycled and/or disposed of lawfully and in a manner that protects environmental values.	• Wastes generated during construction would be reused within the construction footprint and recycled to minimise waste where possible • The project will manage waste in accordance with relevant NSW EPA guidelines, and the WMP • Operational waste and ongoing resource use during operation is anticipated to be minimal. All operational waste management would comply with regulations set out in the POEO Act and Waste Regulation.
16. Sustainability The project reduces the NSW Government's operating costs and ensures the effective and efficient use of resources. Conservation of natural resources is maximised.	• Through alignment with the Environmental Sustainability Strategy and with Transport's Sustainability Policy, the project promotes efficient use of natural resources where feasible and avoids waste spoil on the project • An SMP (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.

Relevant SEARs desired performance outcome	Project outcome
17. Safety and Risk The project avoids, to the greatest extent possible, risk to public safety. The project is designed, constructed and operated to be resilient to the future impacts of climate change.	Construction risks to public safety, such as bushfire risk, are effectively managed through the implementation of a Bushfire Management Plan and consultation with emergency services.

27.6 Project justification and conclusion

27.6.1 Overview of project need

The Pacific Highway and New England Highway between the M1 Pacific Motorway at Black Hill and Raymond Terrace form part of the NLTN. The NLTN is a key freight route which facilitates substantial interstate freight movements between NSW, Victoria and Queensland, and particularly freight movements between Sydney, the Hunter region, northern NSW and Queensland.

The project is in one of the most highly trafficked areas of the road network in the region and is more heavily congested than adjacent high standard sections of the M1 Pacific Motorway and Pacific Highway corridor. Key issues along the M1 Pacific Motorway, Pacific Highway, and New England Highway corridors applicable to the project include:

- High traffic volumes on the New England and Pacific Highways, the M1 Pacific Motorway and John Renshaw Drive
- Lack of capacity and congestion on highly-trafficked routes
- Major delays, primarily between Beresfield, Tomago and Hexham, caused by intersection arrangements and merge/diverge locations
- Road safety
- Restrictions on heavy vehicle movements
- Accessibility for freight to major nearby existing and future employment areas
- Flood immunity of existing road corridors.

The project would help integrate the needs of the Hunter region's road network with those of the broader NLTN. By providing one of the last major upgrades required to complete a free flowing dual carriageway route between Sydney and Brisbane, the project would improve traffic efficiency and congestion due to the interaction of National, interstate, regional and local traffic, connectivity between key residential and employment areas, road safety and flood immunity.

27.6.2 Biophysical, economic and social considerations

The EIS has been prepared with regard to the key issues associated with the project and the integration of biophysical, economic and social considerations. Overall, the project would deliver a large number of benefits and opportunities including:

- Improving travel time and road network efficiency for freight and commuters on the National Land Transport Network at the key strategic junction of the M1 Pacific Motorway, the New England Highway and the Pacific Highway. Travel time is expected to improve by seven to nine minutes along the M1 Pacific Motorway corridor upon opening of the project
- Providing improved long term route reliability along the M1 Pacific Motorway corridor, particularly in relation to congestion reduction, flood immunity and high demand holiday peak travel
- Improving road safety for all road users by providing a motorway standard bypass of the existing congested road network
- Improving conditions for pedestrians and cyclists by reducing traffic volumes along the existing arterial road network, excluding the Pacific Highway at Hexham
- Providing more efficient access to facilitate economic growth for the Lower Hunter and key regional employment areas such as the Port of Newcastle, Newcastle Airport, Tomago, Beresfield and Black Hill.

It is recognised that there will be negative environmental and social impacts resulting from the construction and operation of the project and these are documented in the impact assessments included in **Chapter 7** (traffic and transport) to **Chapter 25** (environmental risk analysis).

Key impacts of the project are associated with:

- Biodiversity, including the clearance of vegetation (including threatened flora and fauna habitat)
- Noise impacts to sensitive receivers during construction and operation
- Minor increases in flood impacts to properties during construction and operation
- Impacts on both Aboriginal and non-Aboriginal cultural heritage
- Direct impacts associated with property or businesses being affected by acquisition and associated changes to access arrangements.

While some negative environmental and social impacts have been identified, management measures to mitigate any potential longer-term adverse impacts have been considered and included in **Chapter 24** (summary of environmental management measures).

27.6.3 Ecologically Sustainable Development

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

Sustainable development requires the effective integration of economic and environmental considerations in decision-making processes.

The four main principles supporting the achievement of ESD are:

- **Precautionary principle**: The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. This was applied from the early consideration of options to eliminate options that would have resulted in significant impact to high value biodiversity areas. A precautionary approach was applied to identify constraints to each of the route options. The EIS has also taken the precautionary principle with regards to assessing traffic, flooding, noise and

vibration impacts arising from the project by considering the worst case with regards to impacts from construction and operation of the project

- **Inter-generational equity**: Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations. Route selection considered the impacts on all road users and the environment to balance impacts against the project requirements and cost, ensuring that the actions of this generation do not compromise the quality of life for future generations. The project would ensure road benefits including decreased travel time, improved road safety, and increased connectivity are realised by current and future generations across the region. If the project was not carried out, travel times would continue to increase on the Pacific and New England Highways, intersections would experience further congestion, crashes would likely increase, and there would be no improvements to flood immunity or holiday peak travel times. These impacts would continue to affect current generations and future generations. The implementation of management measures (refer to **Chapter 24** (summary of environmental management measures)) would ensure the principle of inter-generational equity is met, by reducing or avoiding impacts to health, diversity and productivity of the environment as much as possible, for the benefit of future generations
- **Conservation of biological diversity and ecological integrity**: Biological diversity and ecological integrity has been a fundamental consideration of design development. Consideration of route alignments eliminated options that would have resulted in significant impact to high value biodiversity areas, including wetlands north and south of the Hunter River. Route selection for the project focused on conserving biological diversity and ecological integrity by using constraints mapping and known biological and ecological data to target avoiding impacts where possible. Where these impacts are unavoidable, all reasonable steps have been taken to minimise impacts
- **Improved valuation and pricing of environmental resources**: 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. The EIS contains a number of management measures aimed at minimising pollution and waste during project development, and offsetting biodiversity impacts.

27.6.4 Cumulative impacts

Potential cumulative impacts during construction and operation of the project have been detailed in **Chapter 23** (cumulative impacts). Consideration of projects being simultaneously and consecutively constructed included several approved and proposed developments consisting of a mix of commercial and industrial developments, and power, rail and road infrastructure projects.

During construction, the project is likely to have some overlap in construction timeframes with several other developments (as identified in **Chapter 23** (cumulative impacts)) which would have potential cumulative impacts across the construction footprint. For most key issues, the cumulative impacts of the project would be minor or negligible. It is expected, however, that cumulative impacts on biodiversity would be moderate. Further, cumulative impacts on Aboriginal heritage are expected to vary across the construction footprint, with major cumulative impacts expected for lower altitude areas at the fringe of Hexham Swamp and moderate cumulative impacts for higher altitude areas at Black Hill and the Tomago Sands area.

During operation, the project is anticipated to generate positive cumulative impacts by improving traffic efficiency, travel times and reliability across the road network. In assessing cumulative impacts, the project has considered the short to medium term impacts of major development proposals near the project (most notably the employment-driving developments proposed in the Emerging Black Hill Precinct) including impacts associated with traffic volumes, noise and air quality.

To manage the cumulative impacts of the project, consultation would be carried out with relevant stakeholders to increase the overall awareness of project timeframes and impacts. The construction contractor will review cumulative impacts before the start of construction and every six months during construction. Any new cumulative impacts will be identified, addressed appropriately and reported as part of the CEMP.

27.6.5 Conclusion

The existing NLTN between Black Hill to Raymond Terrace is a combination of John Renshaw Drive, the New England Highway and the Pacific Highway. Generally, it provides two lanes in both directions with six controlled intersections and speed limits ranging from 60 kilometres per hour to 90 kilometres per hour. Construction of the project would address the increasing congestion and travel times along the Pacific and New England highways, delays at intersections and merge points, and the delays experienced during holiday peak travel times. The project would also provide an alternative to the existing road network with a minimum 1:20 year flood immunity and a motorway standard road that would reduce crash rates along the M1 Pacific Motorway, New England Highway and the Pacific Highway.

The project would complete one of the last remaining major upgrades required to facilitate significant interstate freight movements between NSW, Victoria and Queensland. Additionally, the project would support freight servicing regional commercial and industrial activities, the Port of Newcastle, and interstate movements, resulting in local, regional and national economic benefits.

The project is in accordance with a number of key strategic planning and policy documents including but not limited to NSW State Infrastructure Strategy 2018-2038 (Infrastructure NSW 2018), Future Transport Strategy 2056 (Transport for NSW 2018a), and NSW Freight and Ports Plan 2018-2038 (Transport for NSW 2018b).

The preferred option and concept design for the project was identified and refined through an extensive assessment and review process which has been ongoing since 2004. The preferred option and concept design best meet the project objectives, has been thoroughly evaluated against the key performance criteria of function, environment and socio-economic considerations and ultimately provides value for money.

Key environmental issues have been examined throughout the design development process. Consultation has been carried out with affected community and stakeholders to identify impacts at an early stage, and where possible, avoid, minimise or identify appropriate management measures to be adopted. This has resulted in a number of design changes that have minimised many of the potential impacts.

The EIS has assessed the potential environmental impacts of the project and identified potential impacts on a range of nearby receivers, including property and business owners, and the natural environment. Although many potential impacts have been avoided or minimised through design and project development, some residual impacts are still applicable. The key impacts caused by the project include biodiversity, noise and flooding impacts, however, a range of management measures will be implemented to manage the impacts of the project and ensure that the project complies with relevant policy and guidelines.

The project is considered appropriate, justified and in the public interest as the negative impacts are outweighed by the long-term benefits of improved road safety, improved travel times and overall road network benefits for all road users by providing a free-flowing, high standard motorway in this section of the NLTN.