Australian Government

BUILDING OUR FUTURE

NSW GOVERNMENT

M1 Pacific Motorway extension to Raymond Terrace

Waste Working Paper

Transport for NSW | July 2021

Executive summary

Background

Transport for New South Wales (Transport) proposes to construct the M1 Pacific Motorway extension to Raymond Terrace (the project). Approval is sought under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Part 9, Division 1 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Performance outcomes

This assessment has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) (SSI 7319) relating to waste. The desired performance outcome for the project in relation to waste as outlined in the SEARs (SSI 7319) is to:

- Ensure that 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.

Overview of potential waste impacts

Transport has carried out an extensive options development process for the project since 2004, which has considered the efficiencies in reuse of materials onsite. Overall, the project has the potential to impact resource use and waste generation, primarily during the construction phase which the project would seek to minimise. An overview of potential impacts is outlined below.

Resource use

The main construction materials and resources used for the project include earthworks material, concrete, asphalt, steel, water, fuel and electricity. The resource quantities required for the project's construction are unlikely to be affected by resource availability. Similarly, ongoing resource use during operation would be minimal and would include water, electricity, asphalt and concrete for road surface maintenance, and fuel for maintenance vehicles. Resource supply impacts during operation are unlikely.

Waste generation

For the purposes of this project, waste is defined as unwanted or unusable material, substances, or by-products that would arise from the project. Resources are defined as a stock or supply of materials that would be used for the project.The *Waste Avoidance and Resource Recovery Act 2001* advocates for waste to be handled according to the waste hierarchy:

- **Avoid** and reduce waste in the first instance
- **Recover** resources by reusing, recycling and recovering energy from waste
- Treat and **dispose** of waste as a last resort.

The above waste hierarchy would be applied to the project, with avoidance prioritised over recovery and disposal. The design of the project has avoided generation of wastes through pursuing a cut/fill balance, minimising spoil disposed offsite, and using prefabricated structures over the floodplain to minimise waste generation.

Construction waste would be generated during site establishment, excavating, clearing, stripping, demolition of any existing structures, earthworks and construction of roads, walls, bridges and drains. Wastes expected to be generated include surplus construction material, spoil, mulch, contaminated water, demolition materials, general construction wastes, sediments and sludge, general office wastes, wastes from vehicle and machinery operation and clean up waste. The majority of waste from the project is expected to comprise acid sulfate soils, virgin and excavated natural material and mulch.

Waste generated during construction has the potential to result in:

- Environmental impacts including:
  - Dust from stockpiling and waste transportation
  - Contaminated or sediment-laden runoff entering receiving environments (including waterways and soils) from stockpiling and demolition wastes
  - Emissions from waste transportation and increased waste volumes at landfill
  - Traffic impacts from waste transportation
  - Odour due to waste decomposition
  - Noise from waste transportation and waste disposal.
- Human health impacts such as respiratory issues from exposure to hazardous materials or dust from:
  - Large areas of Potential Acid Sulfate Soil (PASS) or actual Acid Sulfate Soils (ASS) within the construction footprint, especially in the low-lying floodplain areas next to the Hunter River and Windeyers Creek. Excavation activities have the potential to expose ASS, which would require treatment prior to reuse or disposal
  - Areas of potential contamination risk (including areas contaminated by asbestos) within the construction footprint. These are due to previous uses of the construction footprint including the former mineral sands processing site, buried waste, railway contamination, and industrial uses. Contaminated soil would require testing, classification, and possible treatment prior to reuse or disposal.
- Impacts to project sustainability:
  - Inappropriate or unnecessary disposal in landfill from being unable to reuse excess spoil or inappropriate segregation of wastes (including site office wastes)
  - Flow-on effects of landfilling, which include increasing project costs due to landfill levies and increasing processing times at facilities due to increased volumes.

Environmental, sustainability and human health impacts arising from waste generation are exacerbated when waste is incorrectly handled and managed. A preliminary characterisation of wastes, as well as their final estimated volumes, has been carried out and would be refined during detailed design. Classification of wastes would be confirmed during the construction and operation periods, according to the Waste Classification Guidelines (NSW EPA, 2014).

Environmental management measures

To manage waste impacts from the project, management plans would be implemented in the Construction Environmental Management Plan (CEMP). These plans would include a spoil management plan or procedure as part of a Waste Management Plan (WMP), and site-specific waste management plans for concrete and asphalt batching plants. These plans would outline the processes for management and handling of waste. The plans would outline requirements that would minimise risks to the environment during construction, including allowance for suitable areas for waste storage and sorting.

Further, the waste hierarchy, which prioritises avoidance of waste over resource recovery and disposal, would be used as a decision-making framework during construction and operation. This hierarchy would guide decision-making about local material sourcing and waste reuse and management as per the requirements of the CEMP.

Conclusion

The project would manage waste in accordance with NSW EPA guidelines. Overall, waste generation during construction and operation is considered comparable to other NSW road projects of this scale. Environmental management measures for impacts have been detailed in this report. With the implementation of the recommended management measures, it is expected that the construction and operational impacts of the project relating to waste are manageable and residual impacts would be minimal.

Opportunities for resource recovery and waste minimisation would be further identified during detailed design stage and planning. These opportunities would align with Transport's Environmental Sustainability Strategy 2019–2023 targets and key initiatives around resource use and waste management. As such, the project would ensure that all wastes generated during the construction and operation of the project are effectively managed in a manner that protects environmental values, thereby satisfying the SEAR relating to waste.

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1.1 Background

Transport for New South Wales (Transport) proposes to construct the M1 Pacific Motorway extension to Raymond Terrace (the project). Approval is sought under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Part 9, Division 1 of the *Environment Protection and Biodiversity Conservation Act 1999*.

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. The project would provide regional benefits and substantial productivity benefits on a national scale. The project location is shown in **Figure 1-1** within its regional context.

1.2 Project description

The project would include the following key features:

- 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.

A detailed project description is provided in Chapter 5 of the environmental impact statement (EIS). The locality of the project is shown in **Figure 1-1**, while an overview of the project is shown in **Figure 1-2**.

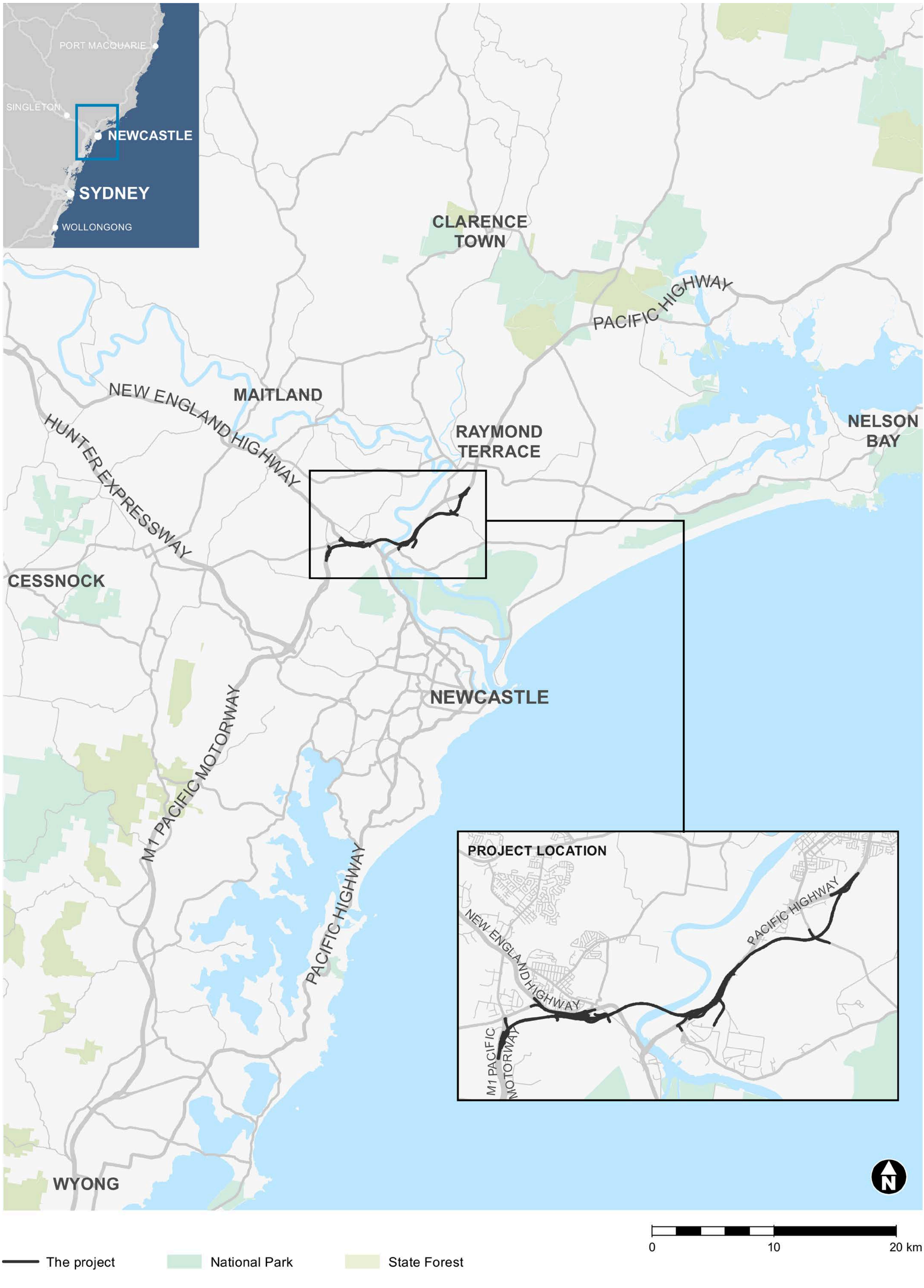
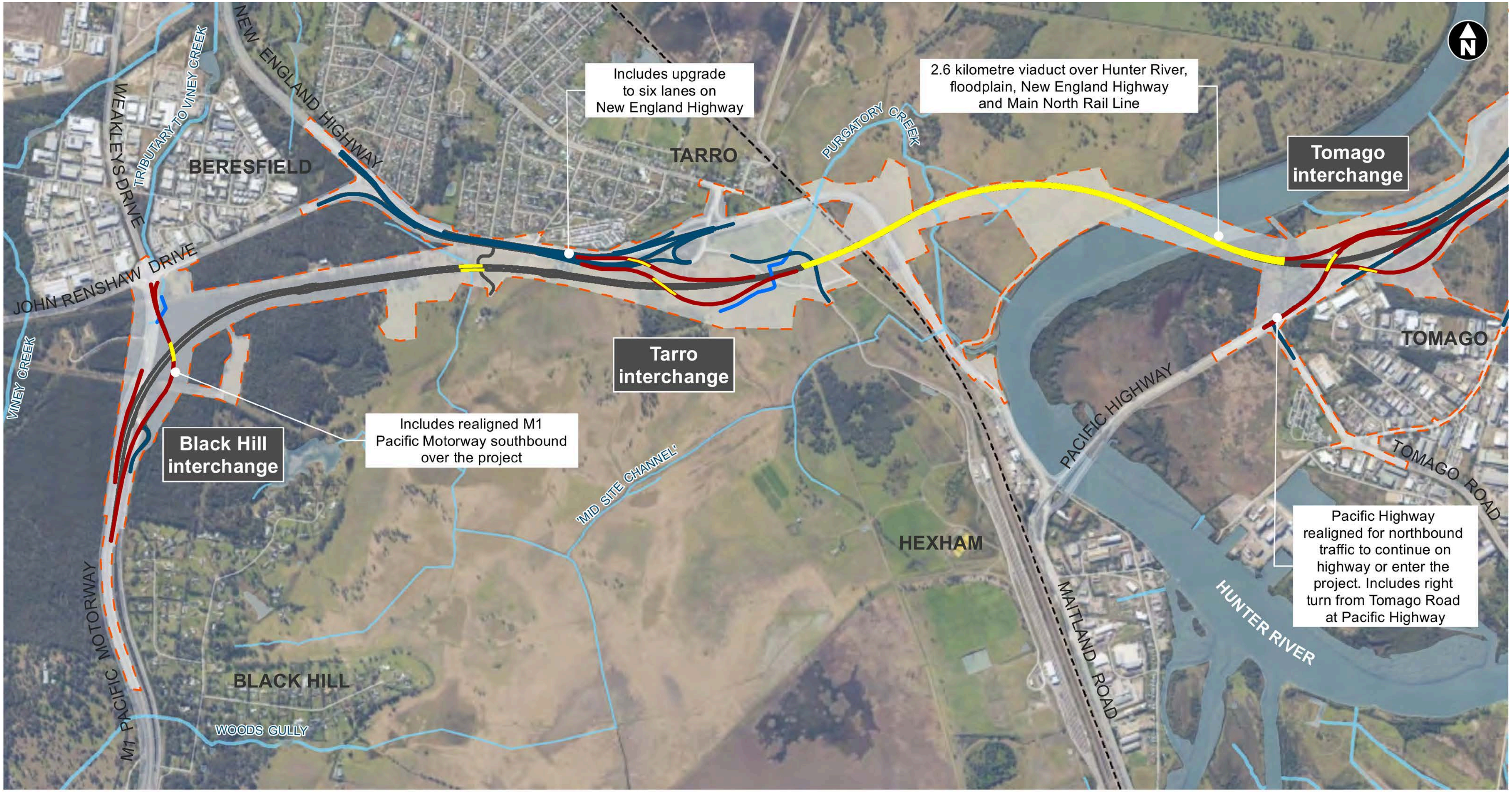


Figure 1-1 Regional context of the project



Main alignment
Adjustments to existing roads
New ramp
Creek realignment
Bridges/ Viaduct
Construction footprint
Waterways
Main North Rail Line

0 0.5 1 km

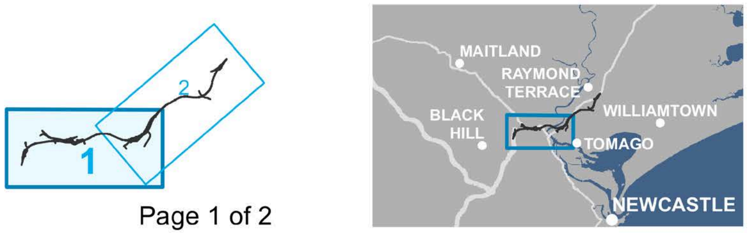


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Figure 1-2 Project key features (map 1 of 2)

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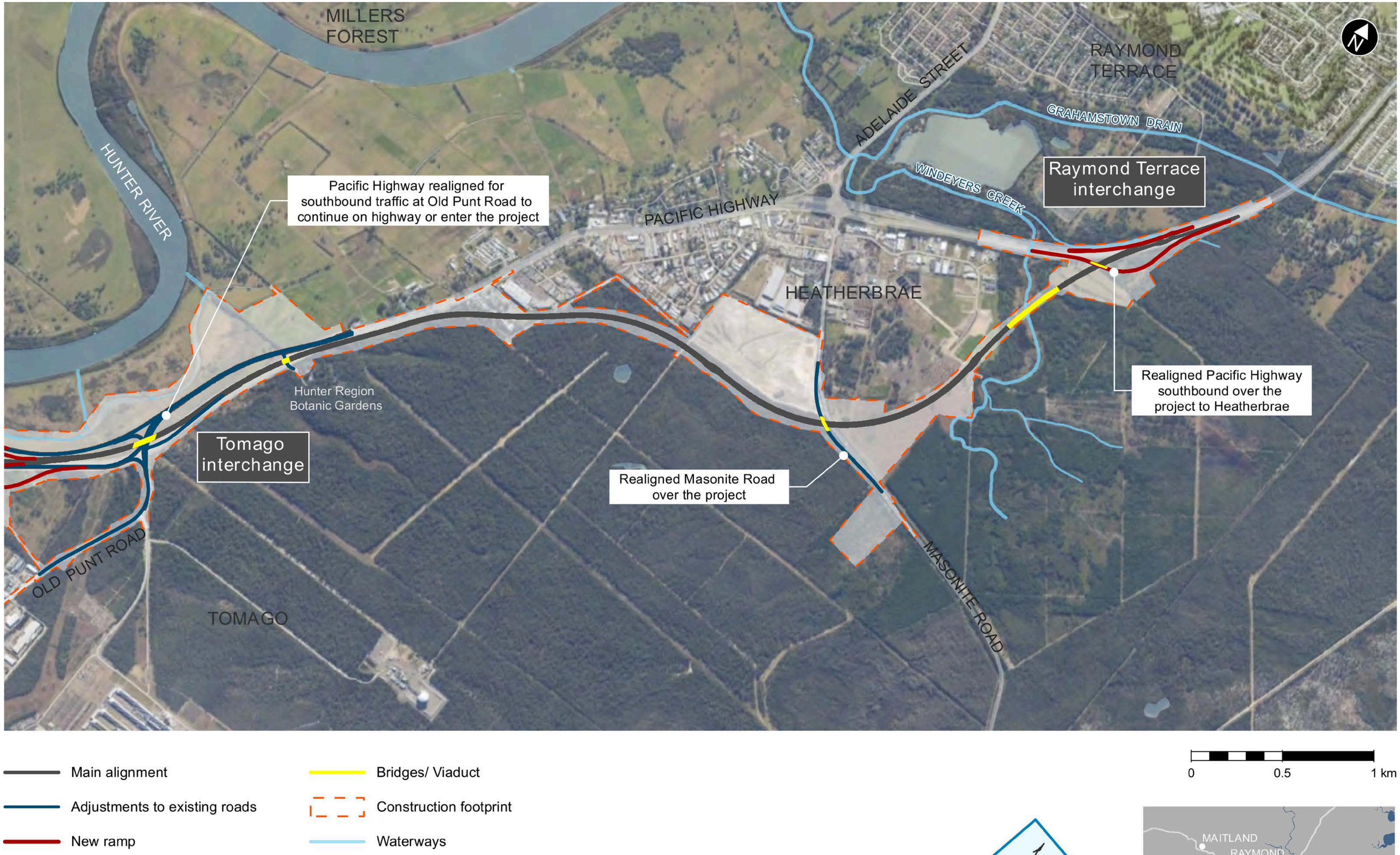

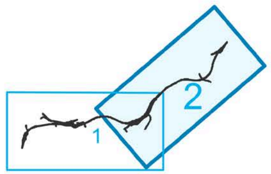

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Figure 1-2 Project key features (map 2 of 2)

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1.3 Performance outcomes

The desired performance outcome for the project relating to waste is to:

- Ensure that 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 (refer to **Chapter 6**).

1.4 Secretary's Environmental Assessment Requirements

This assessment forms part of the EIS for the project. The EIS has been prepared under Division 5.2 of the EP&A Act. This assessment has been prepared to address the SEARs (SSI 7319) relating to waste and will assist the Minister for Planning and Public Spaces to make a determination on whether or not to approve the project. It provides an assessment of potential impacts of the project on waste and outlines proposed management measures.

In 2019, revised SEARs were issued for the project, which included waste as a key issue. **Table 1-1** outlines the SEARs relevant to this assessment along with a reference to where these are addressed.

Table 1-1 SEARs relevant to waste

Secretary's requirement	Where addressed in this report
15. Waste	
1. The Proponent must assess predicted waste generated from the project during construction and operation including; a. classification of the waste in accordance with the current guidelines;	**Table 5-2** provides preliminary classifications of expected wastes.
b. estimates / details of the quantity of each classification of waste to be generated during the construction of the project, including bulk earthworks and spoil balance;	**Section 5.1.2** provides estimates of expected wastes.
c. handling of waste including measures to facilitate segregation and prevent cross contamination;	**Section 6.1** provides specific measures for management of stockpiles of waste while **Section 6.2** includes measures for managing potential waste impacts from the project
d. management of waste including estimated location and volume of stockpiles;	Location and volume of stockpiles are described in **Section 5.1.2** and shown on **Figure 4-1** (stockpiles would be within the identified ancillary facilities). **Section 6.1** and **Section 6.2** address stockpile and waste management
e. waste minimisation (particularly of unsuitable material) and reuse;	**Chapter 6** provides an overview of waste minimisation measures.
f. lawful disposal or recycling locations for each type of waste; and	**Section 4.3** identifies local waste facilities.
g. contingencies for the above, including managing unexpected waste volumes.	**Chapter 6** and **Table 6-1** outline environmental management measures, including managing unexpected waste volumes.

Secretary's requirement	Where addressed in this report
2. The Proponent must assess potential environmental impacts from the excavation, handling, storage on site, and transport and disposal of the waste particularly with relation to sediment/leachate control, noise and dust, and traffic and transport.	**Chapter 5** assess impacts of the project on waste. Chapter 6 of the Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS) assesses the water quality impacts of the project from sediment and leachate. Chapter 5 and Chapter 6 of the Noise and Vibration Working Paper (Appendix H of the EIS) assess the noise impacts of the project. Chapter 5 of the Air Quality Working Paper (Appendix R of the EIS) assesses the dust impacts of the project. Chapter 5 of the Traffic and Transport Working Paper (Appendix G of the EIS) assesses the traffic and transport impacts of the project, including haulage.

1.5 Report structure

The report is structured as follows:

- Chapter 1 – Introduces the project with a summary of the project background and assessment objectives
- Chapter 2 – Provides the policy and planning setting relating to waste and resource use, including relevant legislation
- Chapter 3 – Describes the methodology and result of the desktop assessment carried out for this assessment
- Chapter 4 – Describes the existing environment relevant to waste
- Chapter 5 – Describes the potential waste impacts that are likely to result from the project
- Chapter 6 – Describes the environmental management measures that would be implemented to manage impacts
- Chapter 7 – Concludes the report
- References
- Terms and acronyms.

2. Policy and planning setting

2.1 State legislation

2.1.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is the principal environmental legislation in NSW for waste. The Act defines:

- Waste for a regulatory context
- Management and licensing requirements for waste
- Offences and resulting penalties related to waste
- Various waste management requirements via the Protection of the Environment Operations (Waste) Regulation 2014.

The project would comply with the POEO Act's management requirements for waste and waste handling. The project would also use the classifications set out in the Act for waste types. According to the POEO Act, waste includes:

a) Any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or
b) Any discarded, rejected, unwanted, surplus or abandoned substance, or
c) Any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or
d) Any processed, recycled, re-used or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations, or
e) Any substance prescribed by the regulations to be waste.

A substance is not precluded from being waste for the purposes of the POEO Act merely because it is or may be processed, recycled, re-used or recovered.

2.1.2 Protection of the Environment Operations (Waste) Regulation 2014

The Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation) establishes requirements for:

- Waste facility reporting
- Tracking, transportation, and storage of waste
- Waste management including for special, clinical, and prescribed wastes
- The waste levy system
- Exemptions under Part 9 of the Waste Regulation.

The requirements of Clause 70 and 72 of the Waste Regulation apply to the project:

- Clause 70 of the Waste Regulation states that:
  - A person who transports waste must ensure that the waste is transported in a manner that avoids the waste spilling, leaking or otherwise escaping from any motor vehicle or trailer used to transport the waste
  - A person who transports waste must ensure that the waste is covered during its transportation unless the waste consists solely of waste tyres or scrap metal
  - A person who transports waste in the course of business must take all reasonable steps to ensure that any motor vehicle or trailer used to transport the waste is constructed and maintained so as to avoid the waste spilling, leaking or otherwise escaping from the motor vehicle or trailer.
- Clause 72 of the Waste Regulation states that when transporting waste, the following must apply:
  - A copy of any environment protection licence required to authorise the transportation of the waste must be available
  - A spill kit that is appropriate for the type of waste being transported must be onboard
  - Incompatible wastes are not transported together
  - Any material that has been segregated for recycling is not mixed with other waste in the course of transportation
  - Any liquid waste that has not been mixed with other waste is not mixed with other waste in the course of transportation
  - Liquid waste must be available for sampling by the release of suitable and accessible valves located on the top and, where appropriate, bottom of any container used to transport the waste.

These requirements have been incorporated into management measures in **Section 6.2**.

Part 9 of the Waste Regulation establishes exemptions to resource recovery. These exemptions apply to waste that is applied to land and may apply to some recovered resources that would be reused on the construction of the project such as earthworks spoil. The following resource recovery exemptions are relevant to the project:

- Excavated natural material (Excavated Natural Material Exemption 2014 (NSW EPA 2014a))
- Excavated public road material (Excavated Public Road Material Exemption 2014 (NSW EPA 2014b))
- Reclaimed asphalt pavement (Reclaimed Asphalt Pavement (RAP) Exemption 2014 (NSW EPA 2014c))
- Recovered aggregate (Recovered Aggregate Exemption (NSW EPA 2014d))
- Treated drilling muds (Treated Drilling Mud Exemption (NSW EPA 2014e))
- Raw mulch (Raw Mulch Exemption 2016 (NSW EPA 2016a)).

2.1.3 Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* advocates for waste to be handled according to the waste hierarchy:

- **Avoid** and reduce waste in the first instance
- **Recover** resources by reusing, recycling and recovering energy from waste
- Treat and **dispose** of waste as a last resort.

The above waste hierarchy would be applied to the project, with avoidance prioritised over recovery and disposal.

The NSW Waste Avoidance and Resource Recovery Strategy sits under the Act and seeks “to enable all of the NSW community to improve environment and community well-being by reducing the environmental impact of waste and using resources more efficiently.” The strategy establishes six key result areas: avoid and reduce waste generation; increase recycling; divert more waste from landfill; manage problem wastes better; reduce litter; and reduce illegal dumping.

The project design has aligned with the strategy, by designing for a cut/fill balance where possible, which would avoid waste generation. Wastes produced by the project would be reused and recycled where suitable and possible.

2.1.4 Environmentally Hazardous Chemicals Act 1985

The *Environmentally Hazardous Chemicals Act 1985* provides the NSW EPA with the authority to declare chemicals as chemical waste, and to make a chemical control order to appropriately manage the potential risk associated with any such waste to human and environmental health. There are currently five chemical control orders in place in NSW:

- Aluminum smelter wastes containing fluoride and/or cyanide
- Dioxin-contaminated waste materials
- Organotin waste materials
- Polychlorinated biphenyl compounds (PCBs)
- Scheduled chemical wastes.

In addition, a license may be required under this act for certain activities relating to manufacturing, processing, keeping, distributing, conveying, using, selling or disposing of an environmentally hazardous chemical or a declared chemical waste.

The project site may potentially contain PCBs and scheduled chemicals listed in the scheduled chemical wastes control order (EPA, 2004). Potential contaminants are outlined in the Soils and Contamination Working Paper (Appendix P of the EIS).

2.2 Commonwealth policy and plans

2.2.1 National Waste Policy 2018

The National Waste Policy 2018 is an overarching framework for individuals, businesses, and governments to manage their waste according to circular economy principles. The policy identifies the following five waste management principles:

- Avoid waste
- Improve resource recovery
- Increase use of recycled material and build demand and markets for recycled products
- Better manage material flows to benefit human health, the environment and the economy
- Improve information to support innovation, guide investment and enable informed consumer decisions.

These five principles are implemented through the Action Plan discussed in the following section.

2.2.2 National Waste Policy Action Plan 2019

The National Waste Policy Action Plan 2019 outlines a strategy to implement the five waste management principles outlined in the National Waste Policy 2018. The Action Plan aligns itself with circular economy principles and aims to implement the Policy through a set of 7 national targets.

Target 3 is applicable to the project:

- Eighty per cent average resource recovery rate from all waste streams following the waste hierarchy by 2030.

The project would aim to reuse spoil, mulch, and topsoil to avoid importing new materials. The Action Plan has been used to develop the project's targets for waste minimisation.

2.3 Relevant guidelines

2.3.1 NSW Circular Economy Policy

The NSW Circular Economy Policy defines the NSW Government's role in implementing circular economy principles across the state. A circular economy ensures resources are used efficiently and carefully by keeping products in use as much as possible. To align with this, the project would strategically plan to reuse wastes such as spoil, topsoil, and mulch from site clearing. Reuse opportunities would be factored into construction planning.

2.3.2 EPA Waste Classification Guidelines

The Waste Classification Guidelines comprise five documents published by NSW EPA:

- Waste Classification Guidelines: Part 1 Classifying Waste (NSW EPA, 2014f)
- Waste Classification Guidelines: Part 2 Immobilising Waste (NSW EPA, 2014g)
- Waste Classification Guidelines: Part 3 Waste Containing Radioactive Material (NSW EPA, 2014h)
- Waste Classification Guidelines: Part 4 Acid Sulfate Soils (NSW EPA, 2014i)
- Addendum to the Waste Classification Guidelines (2014) – Part 1: Classifying Waste (NSW EPA, 2016b).

These guidelines set out classifications for waste in NSW and have been used to pre-classify waste types for the purposes of this assessment. Testing and classification of waste would be carried out for the project in accordance with these guidelines to determine suitability for reuse or if the material requires disposal at an appropriately licensed offsite facility. The contractor would be responsible for the control of waste generation and management during construction including either transporting waste to an offsite facility or engaging a waste contractor to do so.

2.3.3 NSW Government Resource Efficiency Policy

The aim of the NSW Government Resource Efficiency Policy (GREP) (OEH, 2019) is to reduce the NSW Government's operating costs and lead by example in increasing the efficiency of its resource use.

Resource use efficiency is a key sustainability objective for the project across materials, energy and water. The project would align with and satisfy the GREP targets that are relevant for the project. Reporting is a key component of the GREP, and the project would support Transport through reporting on energy, water and waste in accordance with the GREP requirements.

The Sustainability Working Paper (Appendix T of the EIS), Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS), Climate Change Working Paper (Appendix U of the EIS) and the Air Quality Working Paper (Appendix R of the EIS) include environmental management measures seeking to improve project resource use efficiency.

2.3.4 Technical Guide: Management of Road Construction and Maintenance Wastes

The Technical Guide: Management of Road Construction and Maintenance Wastes (Roads and Maritime, 2016) outlines the need for projects to incorporate waste management principles into environmental assessments. Waste management principles from this guide are considered throughout this assessment.

2.3.5 NSW Acid Sulfate Soils Manual (the ASS Manual)

The NSW Acid Sulfate Soils Manual (the ASS Manual) (NSW EPA, 2014j) provides 'best practice' guidance for planning, assessing and managing activities in areas prone to developing acid sulfate soils (ASS). ASS and PASS have been identified within the construction footprint, and as such, the ASS Manual would guide management measures during construction, along with the Waste Classification Guidelines.

2.3.6 Environmental Sustainability Strategy 2019–2023

Transport's Environmental Sustainability Strategy 2019–2023 outlines Resource Use and Waste Management as a priority. The main objective of this priority is to minimise the use of non-renewable resources and minimise the quantity of waste disposed to landfill. Further, the strategy outlines six targets to support the achievement of this goal, listed in **Figure 2-1**.

Target	Resource use and waste management targets[7]
RW1	100% beneficial reuse of virgin excavated natural material.
RW2	100% recovery of clean concrete for beneficial reuse.
RW3	100% recycling of clean reclaimed asphalt pavement.
RW4	Minimum of 10% cement replacement material (when locally available), measured by mass, used in concrete during construction.
RW5	Minimum of 10% recycled content (when locally available) by volume in road base and sub base.
RW6	Prior to disposal of waste or wastewater an assessment of viable reuse or recycling options must be carried out.

Figure 2-1 Resource use and waste management targets

This strategy has been considered when setting out the waste management targets for the project (as discussed in **Chapter 6**). The project would address the targets by implementing initiatives within the Construction Environmental Management Plan (CEMP). Implementation opportunities for the project are outlined in **Table 2-1**.

Table 2-1 Implementation opportunities

Key initiative	Implementation on project
Monitoring and reporting on significant waste streams	Substantial waste streams generated by the project during construction would be monitored, tracked and recorded.
Ensuring the infrastructure design and construction planning considers how to minimise the generation of excess spoil	As described in **Section 5.1.2**, the road design for the project has been developed with a strategy of maintaining an earthworks balance to the south of the Hunter River.
Identifying where there is potential to recover or reuse materials on site	As described in **Section 5.1.2**, earthworks, topsoil and mulch would be re-used where possible on site. Re-use opportunities for contaminated spoil would be investigated. Targets would be implemented to facilitate recovery and reuse of materials during detailed design stage.
Substituting non-renewable materials with recycled or reused materials where they are fit for purpose, cost effective and affordable	Resource recovery and reuse would be prioritised for spoil created on the project. Further opportunities would be investigated during detailed design stage.
Managing waste to minimise transport related risks and impacts by using local disposal facilities where feasible and appropriate	As described in **Section 4.3**, local waste and recycling facilities have been identified to minimise transport distances, risks, and impacts. Further, some pre-cast concrete elements would be used in bridge, and culvert construction which would minimise chances of excess construction materials being brought to site.
Working with our supply chain to assess the feasibility of reusing key wastes, such as glass, in road construction to reduce our consumption of virgin materials	Transport would investigate opportunities to incorporate recycled aggregates into the project during detailed design stage.

2.3.7 Managing Urban Stormwater: Soils and Construction Volume 1

Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) outlines sediment and waste control as a way to mitigate the impacts of land disturbance activities on soils, landforms and receiving waters. The waste management practices described in Chapter 6 of Volume 1, including design standards, procedures for reusing and recycling construction materials, procedures for waste collection and storage during construction have been considered throughout this assessment.

2.3.8 NSW Sustainable Design Guidelines

The NSW Sustainable Design Guidelines Version 3.0 (Transport for NSW, 2013) aim to deliver sustainable development practices by embedding sustainability initiatives into the design and construction of transport infrastructure projects. Statutory and/or legislative requirements (including codes, regulations and standards) take precedence over any of the outcomes or initiatives within the guidelines. Given that the relevant aspects of the guidelines, including sustainable procurement and recycling of construction materials, have been considered through the other statutory and legislative requirements as described within this section, the guidelines have not been further described within this assessment.

3. Assessment methodology

The methodology for this assessment included:

- Reviewing likely sources of construction materials for the project
- Quantifying expected waste volumes generated during construction and operation of the project
- Reviewing expected waste classifications and streams
- Reviewing data sources and relevant reports, including:
  - M1 Pacific Motorway extension to Raymond Terrace - Concept Design and Environmental Assessment: Geotechnical Concept Design Report for Main Structures (Jacobs, 2020a)
  - M1 Pacific Motorway extension to Raymond Terrace - Concept Design and Environmental Assessment Updated 80% Concept Design - Construction Report (Jacobs, 2020b)
  - Soils and Contamination Working Paper (Appendix P of the EIS).
- Assessing the opportunities for avoidance, reduction, reuse, and recycling of waste during construction
- Assessing potential environmental impacts associated with waste management on the project
- Identifying environmental management measures to minimise potential waste impacts associated with the project.

4. Existing environment

The project is predominantly located in greenfield areas, generally next to existing road infrastructure in the lower portion of the Hunter River catchment on a low-lying, gently undulating topographic environment which includes floodplain areas. Existing land uses in and around the project include residential, rural residential, transport, agricultural, commercial and industrial. The main residential area next to the project is at Tarro.

The Soils and Contamination Working Paper (Appendix P of the EIS) has carried out site investigations and identified that there is potential for ASS, contaminated soils and asbestos to be present within the construction footprint that may pose a risk to human health during construction activities. Further discussion on existing ASS risks is included in **Section 4.1** and existing contaminated soils and asbestos risks is included in **Section 4.2**.

Local waste processing facilities that are used by the local community and existing businesses within the area have been identified in **Section 4.3**.

4.1 Acid sulfate soils

As outlined in the Soils and Contamination Working Paper (Appendix P of the EIS), the regional acid sulfate soil (ASS) maps and ASS risk maps from the Atlas of Australian Acid Sulfate Soils (CSIRO, 2020) indicate that there is a high probability of ASS being present within the Hunter River sediments and associated low lying floodplains and swamp areas within the construction footprint. The maps indicate that there is a low probability of potential ASS in northern parts of the construction footprint over the Tomago Sandbeds. The remaining portions of the construction footprint are mapped as having no known occurrence of acid sulfate soils (refer to **Figure 4-1**).

As shown in **Figure 4-1**, ASS has the potential to be in the construction footprint as described:

- Class 1 (Any works present an environmental risk) – Within the Hunter River
- Class 2 (Works below the ground surface) – On the southern side of the project between Black Hill and Hexham (between Tarro and Tomago along the alignment), on the western side of the project in Heatherbrae and Raymond Terrace, and along Windeyers Creek and Grahamstown Drain
- Class 3 (Works more than one metre below the natural ground surface) – In central Tomago, in central Black Hill and in Beresfield (adjoining the northern and western project extent)
- Class 4 (Works more than two metres below the natural ground surface) – In Tarro at the western end of the Tarro interchange, in Tomago on the eastern side of the project, along Tomago Road, Old Punt Road, the existing Pacific Highway, Heatherbrae and Raymond Terrace
- Class 5 (works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below five metres AHD and by which the water table is likely to be lowered below one metre AHD on adjacent Class 1, 2, 3 or 4 land) – At Black Hill and Beresfield.

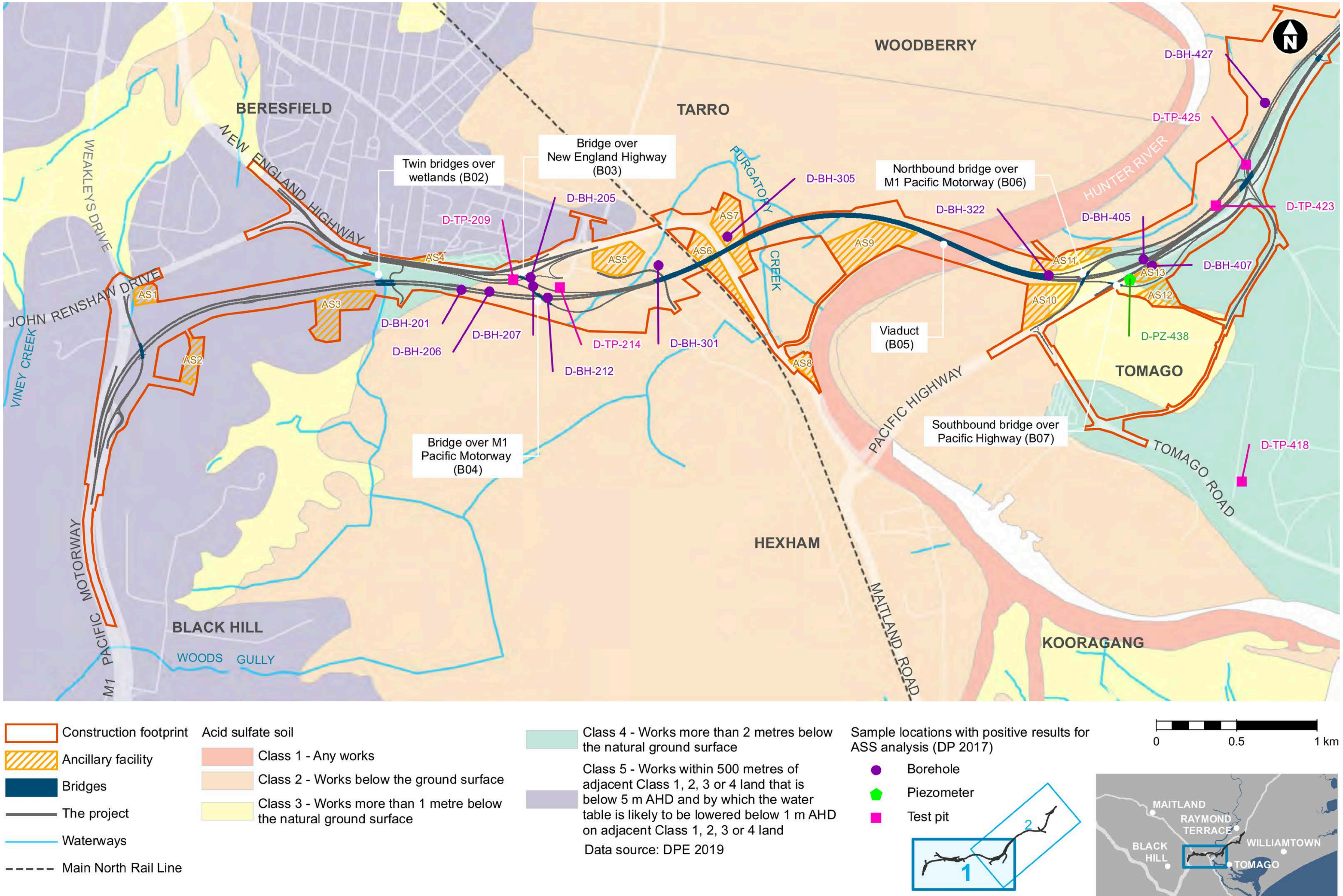

Figure 4-1 Acid sulfate soil risk areas (map 1 or 2)

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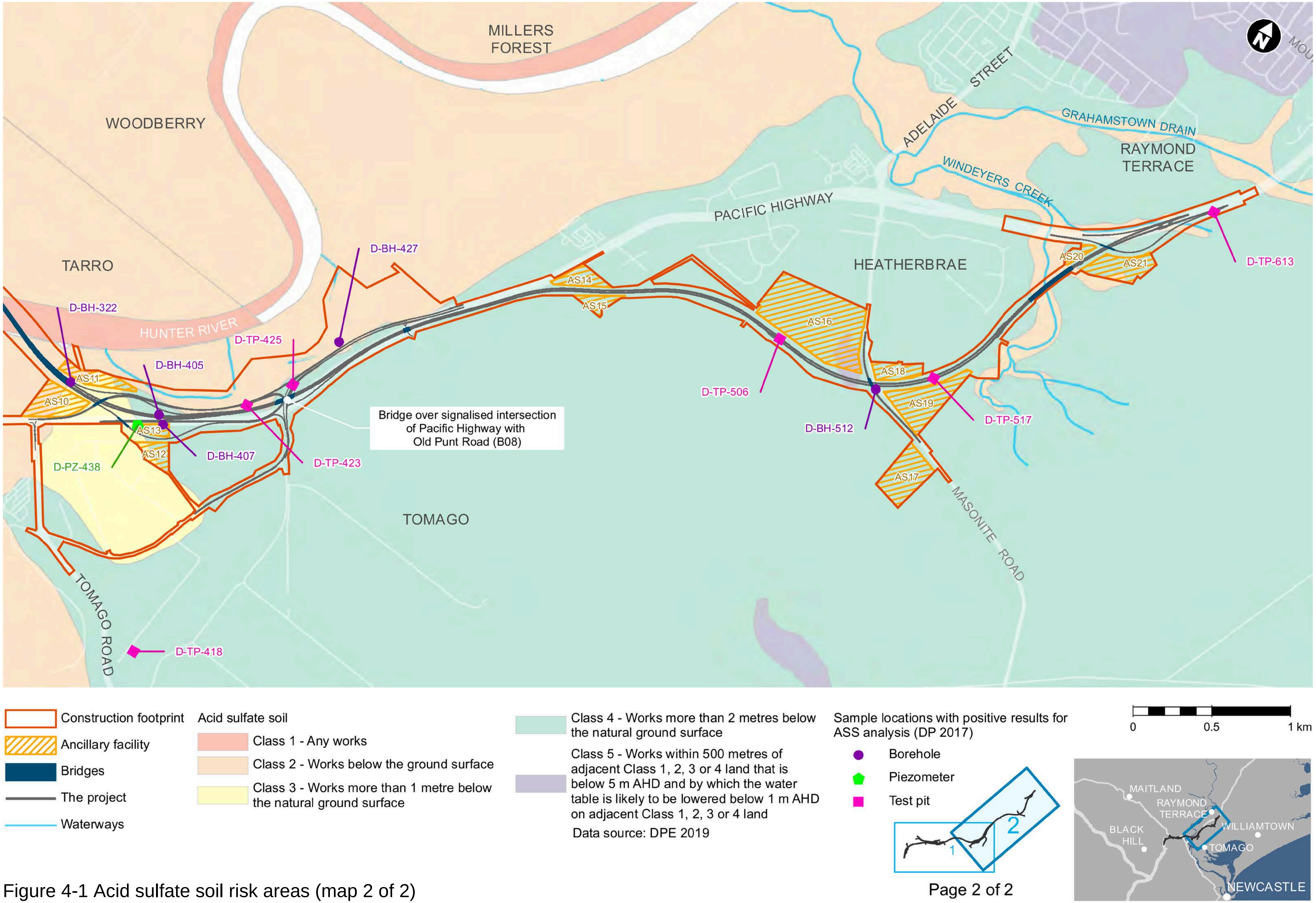

Figure 4-1 Acid sulfate soil risk areas (map 2 of 2)

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4.2 Contaminated soil and asbestos

The construction footprint includes areas of historical and current potentially contaminating activities. Historical and current potentially contaminating activities within the construction footprint include agricultural and rural land use, a former mineral sand processing site, areas of fill material and industrial land uses.

The following areas of potential contamination risk (AOPCR) have been identified within and next to the construction footprint (**Figure 4-2**):

- Five high risk AOPCR were identified within the project construction footprint. These are associated with asbestos waste at Tarro and Tomago, at 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 (including within sediments)
- Six medium AOPCR were identified including buried waste at Tomago and Heatherbrae, industrial and commercial operations at Tomago and Heatherbrae (including potential PFAS contamination), including at Raymond Terrace Wastewater Treatment Works, at the Weathertex site in Heatherbrae, along the Hunter River bank where herbicide has historically been applied and illegally dumped waste at various locations within the construction footprint
- A number of low risk AOPCR (including service stations, areas of potential fill and discarded waste) were also identified within the study area outside of the construction footprint.

Further detail regarding areas of potential contamination risk, including the impact assessment and management of these areas, is provided in the Soil and Contamination Working Paper (Appendix P of the EIS).

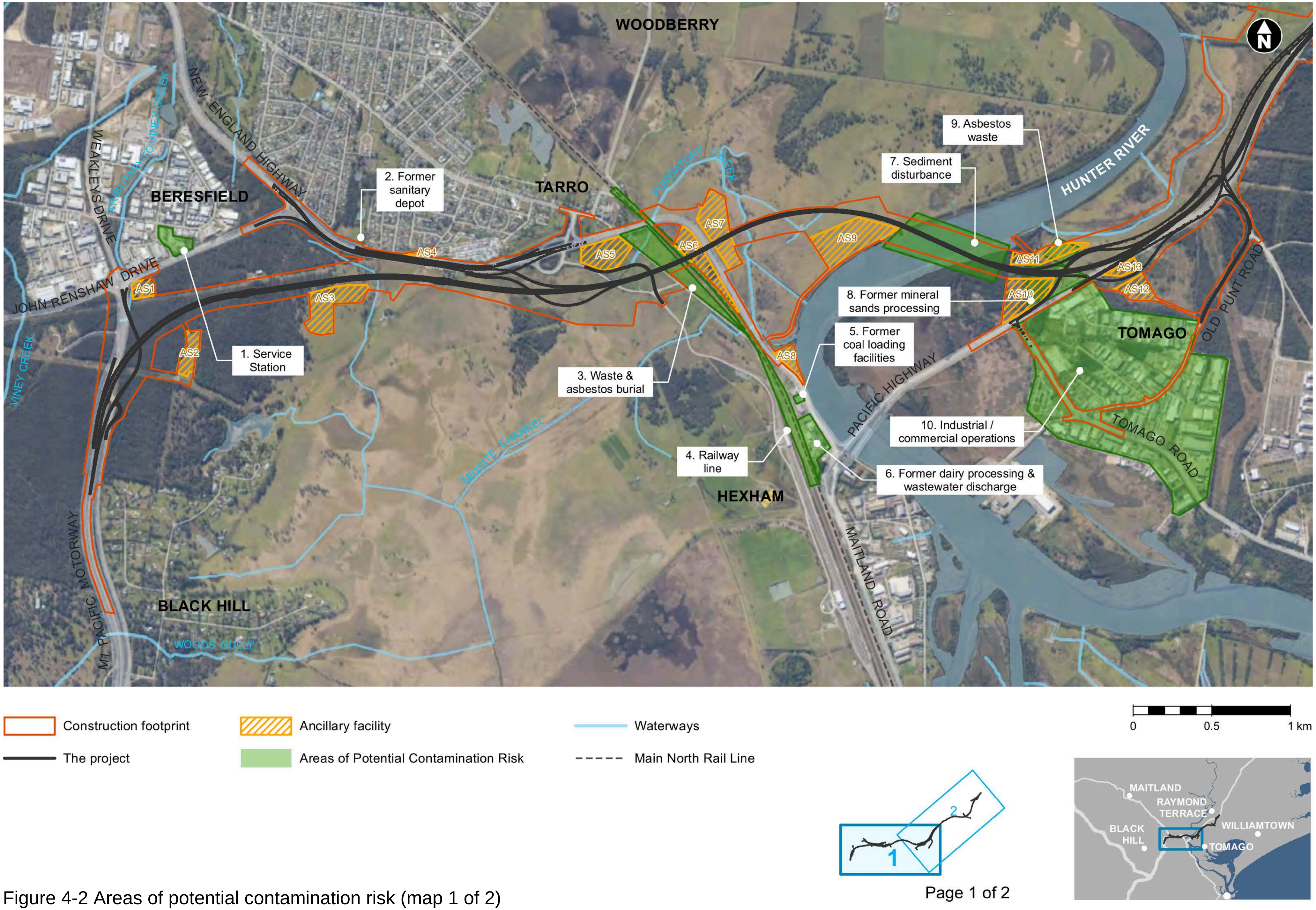

Figure 4-2 Areas of potential contamination risk (map 1 of 2)

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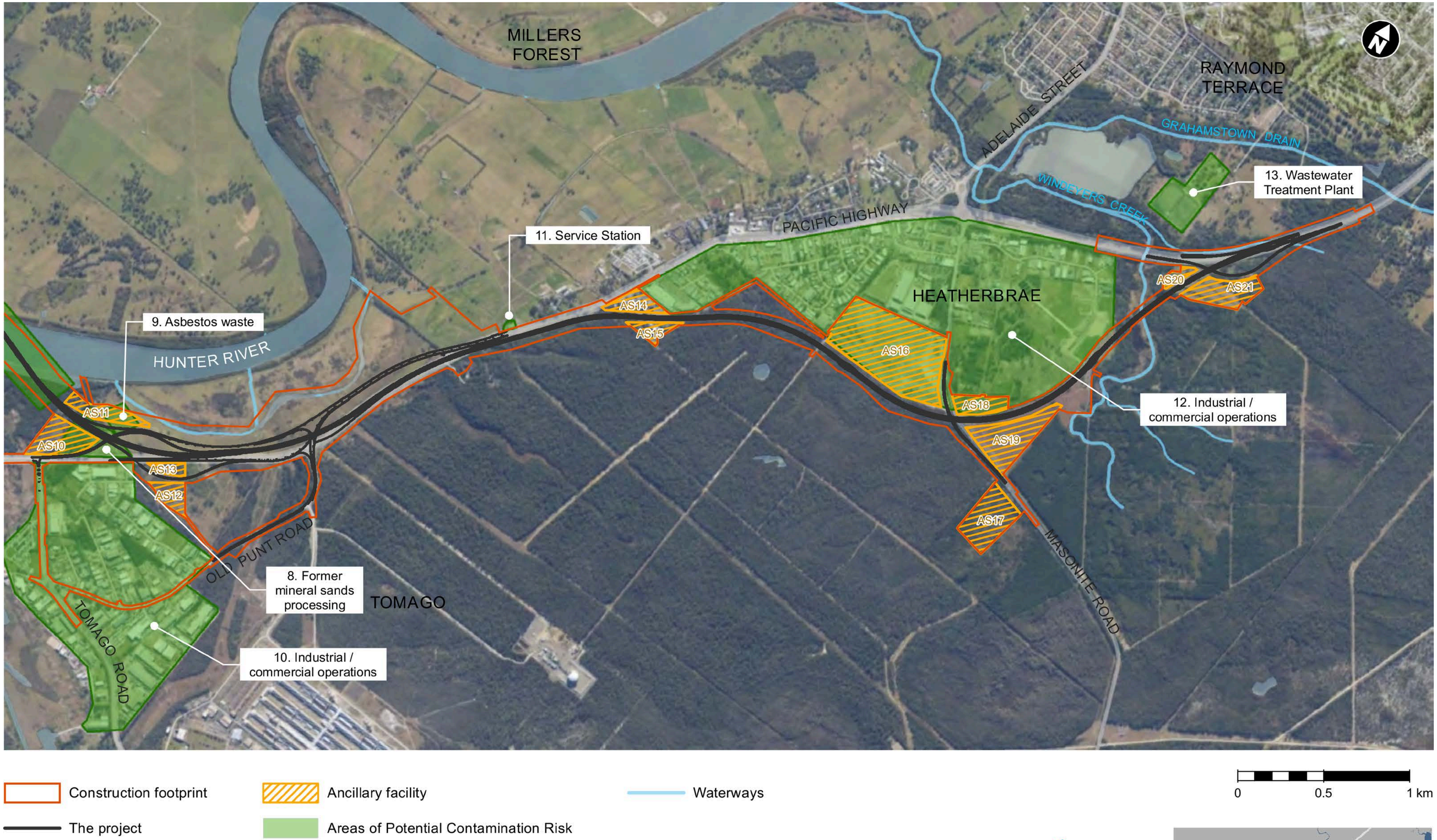

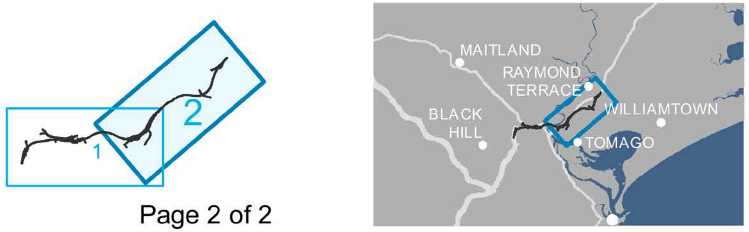

Figure 4-2 Areas of potential contamination risk (map 2 of 2)

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4.3 Waste and recycling facilities

Multiple waste and recycling facilities are located near the project for recycling and disposal of construction wastes. The closest facilities to the project are listed in **Table 4-1.**

Table 4-1 Waste management facilities close to the project

Facility	Address	Distance from project	Processing capabilities
Mount Vincent Road Waste Management Centre	109 Mount Vincent Road, East Maitland NSW 2323	About 12km west of the project	• General solid wastes including recyclables • Asbestos waste
Summerhill Waste Management Centre	141 Minmi Road, Wallsend NSW 2287	About 23km south-west of the project	• General solid wastes including recyclables • Some special wastes including asbestos waste
SUEZ Hunter	122 Woodstock St, Mayfield North NSW 2304 Australia (not open to public)	About 20km south of the project	• Special wastes • Hazardous wastes • Liquid wastes • General solid wastes
SUEZ Raymond Terrace	330 Newline Rd, Raymond Terrace NSW 2324 Australia (not open to public)	About 20km north of the project	• Special wastes • Hazardous wastes • Liquid wastes • General solid wastes

5. Assessment of potential impacts

5.1 Construction

5.1.1 Resource use

The main construction materials and resources to be used for the project would include, but not be limited to:

- Earthworks material: About 1,080,000 cubic metres imported fill would be required, primarily north of the Hunter River
- Pavement: About 355,000 cubic metres of pavement materials would be imported across the entire project, including about 140,000 cubic metres of concrete, about 60,000 cubic metres of asphalt, and 155,000 cubic metres of select material
- Bridge construction:
  - Concrete: About 70,000 cubic metres of concrete would be imported for bridge structures, not including pre-cast elements
  - Steel: About 13,500 tonnes of reinforcing steel and 12,000 tonnes of steel piles would be required for bridge structures, not including pre-cast elements
  - Pre-cast elements: Around 1,030 pre-cast girders and 185 pre-cast box segments consisting of reinforced concrete would be imported for bridge structures.
- Water: About 380 megalitres of water would be required to support construction, including for bulk earthwork, dust suppression, road surface construction, batching plants, ancillary facility, landscape watering and concrete curing purposes.

The project would also require fuel and electricity during construction however specific quantities have not been estimated, with the quantity to be estimated before construction by the contractor. The resource quantities required for the project construction are unlikely to be affected by resource availability. Chapter 5 of the EIS provides further detail on construction material required for the project.

The above estimates are based on the project design presented in Chapter 5 of the EIS, and would change as the design progresses. Where feasible, materials would be reused and recycled.

Excavated earthworks fill

Potential impacts from excavated fill material when it is stockpiled on site include:

- Risk of contaminated or sediment-laden surface water run-off from stockpiles impacting the surrounding environment
- Dust generation if stockpile is not properly dampened or at an inappropriate height
- If excess excavated fill cannot be reused on site or beneficially reused offsite then it would require disposal at a licensed waste facility
- Impacts associated with dust generation and noise impacts if substantial amounts of excess spoil require transportation. For a detailed assessment of dust and noise impacts, see Air Quality Working Paper (Appendix R of the EIS) and Noise and Vibration Working Paper (Appendix H of the EIS). A detailed assessment of potential impacts from sediment mobilisation is provided in the Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS).

The project has been developed with a strategy of maintaining an earthwork balance to the south of the Hunter River. To minimise waste, the excavated fill taken from south of the Hunter River may be used to offset the amount of imported fill needed north of the river where appropriate. This would reduce the amount of imported fill required by about 150,000 cubic metres, to an estimated 930,000 cubic metres. The cut/fill balance of the project may also change following detailed design. While it may change following detailed design, the cut/fill balance expected for the project is detailed in **Table 5-1**.

Table 5-1 Project estimated cut/fill balance

Material type	Material quantity (m^3)
Fill material	1,940,000
Cut material	860,000
Balance	**-1,080,000**

Excavated fill material sourced from cutting locations, particularly at Black Hill is anticipated to be suitable for general fill based on the known geotechnical conditions of the material. Imported fill would be sourced from quarries, local borrow pits and/or other sources, with potential fill sources including local mine backfill, former brick pits, interbedded sedimentary and volcanic rocks at Eagleton, coal ash, sand quarries, and other projects. If there is imported fill that is available that would otherwise be disposed of, this would be prioritised for use within the project in accordance with the waste hierarchy.

5.1.2 Waste generation

Use of materials during construction of the project would generate waste, which would contribute to increased greenhouse gas emissions and incur landfill levy costs.

Wastes resulting from project activities would primarily arise from site establishment, excavating, clearing, stripping, demolition of any existing structures, earthworks, construction of roads, walls, bridges and drains. Pre-cast elements would minimise waste impacts by avoiding over-ordering of materials. **Table 5-2** details potential wastes arising from construction activities, including volumes and possible classification in accordance with the Waste Classification Guidelines (as described in **Section 2.3.2**).

Table 5-2 Indicative construction waste streams and volumes

Activity	Potential waste streams produced	Expected classification	Potential waste quantity
Early works (including site establishment activities, site office establishment, utilities, and other facilities) Note that other activities may also be carried out as early works including demolition works	Surplus construction material including fencing, geofabrics, concrete, steel, timber, and sand bags	• General solid waste (non-putrescible)	Minimal

Activity	Potential waste streams produced	Expected classification	Potential waste quantity
Earthworks and drainage works (including topsoil stripping, cut and fill preparation, and vegetation clearance) Note these activities would not necessarily be carried out concurrently	Excavated contaminated materials	• Hazardous waste • Restricted solid waste • Special waste	Hazardous, restricted and special waste quantities are estimated to be minimal
	Excavated non-contaminated materials	• General solid waste (non-putrescible) • Virgin excavated natural material (VENM) • Excavated natural material (ENM) • Potential ASS	• There would be no waste from the earthwork activities if the excavated fill from south of the river is suitable for reuse. The project is estimated to generate about 80,000 m^3 of topsoil, which would be reused • Quantities of general solid waste (non-putrescible are estimated to be minimal • The project is estimated to excavate 90,000 m^3 of potential ASS, with about 50,000 m^3 estimated to be actual ASS after testing. The majority of ASS is expected to be treated and re-used on site.
	Mulch (green waste, cleared vegetation)	• General solid waste (putrescible)	• The project is estimated to generate approximately 75,000 m^3 of mulch, with about half expected to be re-used on site for landscape planting and rehabilitation of the site. • Mulch may be used during construction or applied in thicker layers to reduce the quantity of excess mulch.
	Contaminated water (e.g. generated by a spill leading to contamination of surface water or encountering (already) contaminated groundwater)	• Liquid waste	Minimal
Demolition of existing redundant infrastructure and buildings and site clearance	Demolition materials including concrete, bricks, road base, tiles, timber (untreated and treated), metals, plasterboard, carpets, electrical and plumbing fittings and furnishing (doors, windows). May also include tyres, asbestos, lead paint, abandoned vehicles and illegally dumped demolition and construction debris	• General solid waste (non-putrescible) • Special waste • Restricted solid waste • Hazardous waste	• Three dwellings would be demolished during construction. • A hazardous building materials audit would be carried out before the demolition of any structure and/or building.

Activity	Potential waste streams produced	Expected classification	Potential waste quantity
Construction of pavements and bridges, retaining structures, including finishing works (e.g. line marking, installation of roadside furniture, landscaping and demobilisation and rehabilitation of construction facilities and disturbed areas)	General construction waste including timber formwork, scrap metal, steel, concrete, plasterboards, and packaging material (crates, pallets, cartons, plastics and wrapping material)	• General solid waste (non-putrescible)	Minimal. Waste amounts are likely to be minimal due to appropriate ordering of construction materials
	Surplus construction material including fencing, sediment, gravel/crushed rock, asphalt, concrete, steel, aggregate, formwork, landscaping material and sand bags.	• General solid waste (non-putrescible)	Minimal. Surplus construction material would be reused onsite or reused at an alternate Transport project where possible
Temporary works including the construction of work platforms, hardstand areas, and sediment basins	General construction waste including timber formwork, scrap metal, steel, concrete, plasterboards and packaging material (crates, pallets, cartons, plastics and wrapping material)	• General solid waste (non-putrescible)	Minimal.
	Sediment and sludge within sediment basins	• General solid waste (non-putrescible)	Minimal. Any sediment/ sludge is expected to be treated and reused onsite
Activities at site offices	General waste from site office including putrescibles, paper, cardboard, e-waste plastics, metal (including aluminium cans), glass, site litter, cigarette butts, printer cartridges, e-waste, and sewage waste	• General solid waste (putrescible)	Volumes of waste produced would be dependent on the number of workers onsite at any one time
Operation of plant and equipment	Waste from operation and maintenance of construction vehicles and machinery including adhesives, lubricants, waste fuels, cleaning products and chemicals, and oils, engine coolant, batteries, hoses and tyres, wastewater associated with washdown water used for vehicles and equipment	• Hazardous waste • Special waste • Liquid waste	Minimal.
	Clean up waste in the event of an accidental spill of fuel or chemicals	• Hazardous waste • Liquid waste	Minimal. Any waste from spills would be dependent on the size and nature of the spill

For the purposes of providing a conservative assessment, it has been assumed that wastes such as VENM and ENM (including Potential ASS), mulch, topsoil, soil, and demolition wastes (including asbestos) would be temporarily stockpiled until the wastes could be reused on the project, reused on other projects, or disposed of at a licensed facility. Stockpiles would be located at all ancillary facilities except for AS9, as detailed in Chapter 5 of the EIS. Stockpiling would also occur at other locations within the construction footprint as required to support construction. Estimated stockpile volumes are included in **Table 5-3**. The volume of material outlined in **Table 5-3** would be spread over smaller stockpiles throughout the construction footprint.

Table 5-3 Estimated stockpile volumes

Material	Volume to be stockpiled (m^3)
Potential ASS	90,000
Excavated topsoil	80,000
Excavated fill	860,000 Not all excavated general fill would require stockpiling. If stockpiling is required the total volume in stockpile would be significantly less than the total quantity, because production of general fill from cuttings and placement in embankments would take place over time.
Mulch	75,000
Demolition materials	Three dwellings would be demolished during construction. A hazardous building materials audit would be carried out before the demolition of any structure and/or building.

Topsoil

All topsoil would be stripped and temporarily stockpiled and respread across the project where needed. Roads and Maritime Specification R178 states that topsoil would be spread at a rate of one cubic metre per 20 square metres. Based on this specification, and additional topsoil required for open drainage channels, about 70,000 cubic metres of topsoil would be required for the project. As 80,000 cubic metres of topsoil would be stockpiled (see **Table 5-3**), there would be surplus of about 10,000 cubic metres of topsoil from the project's construction. This surplus could be used to apply a thicker uniform layer of topsoil across the project, or to rehabilitate the ancillary facilities. It is therefore anticipated that topsoil would neither need to be imported, nor exported.

As the topsoil would be stripped in the initial earthworks activities and not placed until after completion of pavement works, topsoil would be stockpiled in the following locations:

- South of the Hunter River, a total plan area of approximately 15,000 square metres. Possibly utilising ancillary facilities AS1, AS2 and/or AS3 for storage
- North of the Hunter River, a total plan area of approximately 18,000 square metres. Possibly utilising ancillary facilities AS10 to 21 for storage.

Potential impacts from stockpiling topsoil on site include:

- Dust generation if stockpile is not properly dampened or at an inappropriate height
- If excess topsoil cannot be reused on site or beneficially reused offsite then it would require disposal in landfill
- Impacts associated with dust generation and noise impacts if substantial amounts of excess topsoil require transportation. For a detailed assessment of dust and noise impacts, see Air Quality Working Paper (Appendix R of the EIS) and Noise and Vibration Working Paper (Appendix H of the EIS).

Mulch waste

Vegetation clearing would produce mulch at four main locations along the project:

- Black Hill interchange to Tarro
- Hunter River to Tomago
- Tomago (north of Old Punt Road) to Masonite Road
- Masonite Road to the Raymond Terrace interchange.

The total amount of mulch produced by the project is estimated to be about 75,000 cubic metres (refer to **Table 5-2**). If stockpiling mulch is not feasible due to construction timelines, the project could engage in community giveaways and with other projects in the area to reuse the mulch.

Mulch produced on site would be used in landscaping and soil and erosion control measures for the project where possible. Tannin rich leachate could occur as a result of raw mulch being stored on site. Mulch stockpiles would require appropriate management to prevent tannins from impacting the water quality of surrounding water resources. The management of tannins is discussed in the Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS).

Demolition waste

Demolition waste may arise from the following activities:

- Demolition of buildings including: Black Hill / Hexham (rural properties), Heatherbrae (residential and commercial buildings)
- Existing drainage infrastructure may need to be removed or upgraded at Purgatory Creek for construction of access tracks
- Relocation of existing utilities at Black Hill, Tomago interchange, Heatherbrae, and Raymond Terrace interchange
- Demolition of sections of existing road infrastructure, including sections of Lenaghans Drive, Aurizon Access road, Masonite Road and the Pacific Highway
- The potential removal of sections of the existing noise wall at Black Hill.

If improperly managed, demolition waste and leachates may enter receiving environments resulting in soil, water quality and air quality impacts. These impacts are assessed and management measures proposed in the Soils and Contamination Working Paper (Appendix P of the EIS), Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS) and Air Quality Working Paper (Appendix R of the EIS).

Demolition of structures may expose site personnel to asbestos or other hazardous materials. If handled incorrectly, asbestos or other hazardous materials may impact human health. Human health impacts may be amplified if waste is incorrectly classified, stockpiled, or managed. Human health impacts are assessed in Chapter 22 of the EIS.

Wastewater

Wastewater may be classified as liquid waste and/or hazardous waste according to the Waste Classification Guidelines and may be generated by:

- Groundwater intrusion in excavations
- Tannin affected water being removed from site
- Turbid water captured in excavations and sediment basins
- Sewage from site compounds
- Contaminated groundwater inflows from cuttings and excavations (trenches, footings, piling)
- Water runoff from construction activities, including acidic runoff, vehicle washdown, concrete batching etc
- Spills leading to contamination of surface water or encountering already contaminated groundwater.

The impacts of contaminated water on the environment is assessed in the Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS).

Site office waste

Site office waste would be generated from office activities and may include general solid waste (putrescible and non-putrescible). If not appropriately managed, these wastes could result in recyclables being sent to landfill. The contractor would be responsible for the control of waste generation and management during construction including either transporting waste to an offsite facility or engaging a waste contractor to do so. The nearest landfills and recycling facilities are described in **Section 4.3**. Site office waste would be separated onsite into non-recyclable general solid waste (putrescible) and recyclable general solid waste (non-putrescible).

Regional waste facilities

Construction of the project would result in waste generation. The waste hierarchy would guide waste management, with any waste that cannot be avoided or reused being either recycled or sent to landfill. Sending project waste to landfill would have the following impacts:

- Increase project costs due to landfill levies
- Increase greenhouse gas emissions
- Increase processing times at regional waste facilities due to greater waste volumes.

Waste facilities have been identified and outlined in **Section 4.3**.

As described in **Section 2.1.3**, waste would be managed according to the waste hierarchy, which would reduce the likelihood of unexpected waste occurring during construction. As a result, the project would limit landfill waste where practicable.

Contamination and ASS

Construction activities have the potential to expose and mobilise ASS, contaminated materials, and asbestos. Relevant activities include excavation and general ground disturbance in high-risk areas, demolition of existing structures, bridge piling works, and dredging. Appropriate management, storage and disposal is the key waste-related impact associated with exposing ASS, contaminated materials, and asbestos. Wastes must be classified and, if appropriate or required by the Waste Classification Guidelines, treated and reclassified prior to reuse or disposal. Should this not occur appropriately, cross-contamination of wastes may occur and environmental pollution and human health impacts may arise.

Environmental impacts associated with exposing ASS, contaminated materials and asbestos have been assessed and management measures proposed in the Soils and Contamination Working Paper (Appendix P of the EIS), Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS) and Air Quality Working Paper (Appendix R of the EIS). Human health impacts from exposed ASS, contaminated materials and asbestos are assessed in Chapter 22 of the EIS.

5.1.3 Other impacts

During construction, waste generation may also have the following impacts:

- **Odour**: Waste generation may result in odour due to waste decomposition. Odours can affect human populations near to the construction site or waste processing facilities
- **Air quality impacts and emissions from waste generation**: These are expected to be minimal. Potential dust creation due to stockpiling of spoil from earthworks would be managed by stockpiling procedures as detailed in **Section 5.1.2**. Dust impacts from construction are further assessed in the Air Quality Working Paper (Appendix R of the EIS), while emissions from construction are assessed in the Climate Change Risk Working Paper (Appendix U of the EIS)

- **Traffic impacts from transportation of waste offsite**: Waste generated by the project that cannot be reused onsite would need to be taken offsite for processing. Traffic impacts from construction vehicle movements have been assessed in the Traffic and Transport Working Paper (Appendix G of the EIS)
- **Noise impacts from transportation and disposal of waste**: Noise impacts relating to waste are expected to be minimal compared to general noise impacts from project construction. Noise impacts are assessed in the Noise and Vibration Working Paper (Appendix H of the EIS).

Construction waste management activities would not have a significant impact on the environment or human health provided that waste is minimised and managed as detailed in the management measures provided in **Chapter 6**.

5.2 Operational impacts

5.2.1 Resource use

Ongoing resource use during operation would be minimal. Resources that may be used during operation would include; water for landscaping, electricity for road and traffic lights, asphalt and concrete for road surface maintenance, and fuel for maintenance vehicles. Resource supply impacts during operation are unlikely.

5.2.2 Waste generation

Operational waste is anticipated to be minimal and would arise from minor repair and maintenance works. Waste resulting from major repair, maintenance, or upgrade works would be assessed separately, outside of this approval. **Table 5-4** describes the expected wastes arising from operation of the project. All operational waste volumes are expected to be minimal.

Table 5-4 Indicative operational waste streams and volumes

Activity	Waste	Possible classification
Minor maintenance and repair work	Excess maintenance material including timber, concrete, steel, sediment, asphalt, sand Vegetation, mulch from landscape maintenance	• General solid waste (non-putrescible) • General solid waste (putrescible)
Wastes from vehicles and machinery	Fuels, lubricants, chemicals, tyres, batteries, metals	• Liquid waste • Hazardous waste • Special waste
Litter from vehicles	General litter such as food scraps, cigarette butts, food wrappers etc.	• General solid waste (non-putrescible) • General solid waste (putrescible)
Clean up waste resulting from a spill or accident	Fuels, lubricants, chemicals and soaked rags and bunds	• Liquid waste • Hazardous waste • Special waste
Sediment from basins, culverts and drains	Sediment	• General solid waste (non-putrescible)

Operational waste impacts are expected to be minimal due to the guidance of appropriate waste management frameworks and low volumes of waste. However, mismanagement of operational wastes could potentially result in the following impacts:

- Increased volumes of waste to landfill due to incorrect separation, management, and classification of wastes
- Environmental impacts from incorrect sorting, classification, or disposal of wastes.

Environmental impacts may also arise from spills of liquid and hazardous wastes such as fuels and lubricants during operation of the project.

5.3 Cumulative impacts

This section provides an assessment of cumulative waste impacts through consideration of other current or proposed projects in the area based on the most current and publicly available information for these projects. This is a high-level qualitative assessment.

Cumulative waste impacts may arise from the interaction of construction and operation activities of the project with other approved or proposed projects in the area. When considered in isolation, specific project impacts may be considered minor. These minor impacts may be more substantial when the impact of multiple projects on the same receivers is considered. Concurrent projects may also present resource efficiency opportunities by facilitating sharing of resources.

Projects in the vicinity that are in varying stages of delivery and planning are:

- Black Hill Employment Lands (Northern Estates) – In planning
- Kinross Industrial Heatherbrae (Weathertex) – Approved
- Black Hill Hunter Business Park, Cessnock – In planning
- Tomago Gas Fired Power Station – In planning
- Hexham Straight – In planning
- Lower Hunter Freight Corridor – In planning
- Richmond Vale Rail Trail to Shortland, including Shortland to Tarro cycleway – In planning
- Hunter Gas Pipeline – Approved.

The contribution of the project to cumulative impacts on waste in the area is considered to be moderate, given that there would potentially be other projects simultaneously undergoing construction, and that construction would be managed through the implementation of a range of environmental management measures.

Construction impacts

Construction of the project is expected to produce manageable waste quantities. Expected waste types are detailed in **Section 5.1**. Waste that is generated by the project would be managed using the waste hierarchy as a guideline. Waste that is not able to be reused onsite would be processed at a licensed waste facility as outlined in **Section 4.3**. Construction of concurrent and intersecting projects would affect the amount of waste that is generated in the area. If managed correctly, cumulative waste generation from projects would have low impacts on the regional waste facilities. With the implementation of the management measures recommended in **Section 6.2**, it is expected that the construction and operational impacts of the project relating to waste are manageable and residual impacts would be minimal.

Operational impacts

The project is expected to generate minimal waste during operation, as outlined in **Section 5.2.2**. The amounts of waste expected from the other projects in the area is expected to be minimal, except for Black Hill Employment Lands and Black Hill Business Park, which would likely generate more operational waste. However, if waste that is generated during operation is managed correctly, the cumulative impacts for regional waste facilities are likely to be low.

6. Environmental management measures

6.1 Acid sulfate soils

Stockpile locations have been identified for treating potential ASS that is encountered during earthworks activities, especially those associated with piling works for the construction of bridges, as well as excavation activities associated with drainage infrastructure. Potential treatment sites are:

- Ancillary facility AS3
- The area south of the Hunter River for the construction of piles and drainage infrastructure on the floodplain
- Ancillary facility AS10 or the former mineral sands processing site
- Ancillary facility AS21.

ASS stockpile treatment sites would be managed in accordance with Roads and Maritime Stockpile Sites Management Guideline (Roads and Maritime, 2015e). ASS treatment sites would specifically be located away from sensitive receivers. Further information on the treatment of ASS during construction of the project is outlined in the Soils and Contamination Working Paper (Appendix P of the EIS).

6.2 Environmental management measures

The following management measures detailed in **Table 6-1** have been developed to specifically manage potential waste impacts which have been predicted as a result of the proposed works. Waste measures have been developed in accordance with Transport's Environmental Sustainability Strategy 2019–2023. These measures would be incorporated into relevant Environmental Management Plans (EMPs) during construction and operation.

The environmental management measures should be read in conjunction with those outlined in the Soils and Contamination Working Paper (Appendix P of the EIS), the Surface Water and Groundwater Quality Working Paper (Appendix K of the EIS), the Traffic and Transport Working Paper (Appendix G of the EIS), the Climate Change Working Paper (Appendix U of the EIS), the Noise and Vibration Working Paper (Appendix H of the EIS), and the Air Quality Working Paper (Appendix R of the EIS).

Table 6-1 Environmental management measures

Impact	Reference	Management measure	Responsibility	Timing
Avoid, minimise and sustainably manage waste	WM01	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: • Identification of the waste types and volumes that are likely to be generated by the project • Adherence to the waste minimisation hierarchy principles of avoid/ reduce/ reuse/ recycle/ dispose • Waste management procedures to lawfully manage the handling and disposal of waste • Identification of reporting requirements and procedures for tracking of waste types and quantities • A resource management strategy detailing the process to identify reuse options for surplus materials • Site-specific waste management plans for concrete and asphalt batching plants • Spoil management procedures outlining reuse and disposal Identification of areas for management of materials.	Contractor	Detailed design/ prior to construction/ construction
Management of spoil	WM02	Spoil management procedures will be outlined in the WMP as part of the CEMP. Spoil will be beneficially reused as part of the project before alternative spoil disposal locations are considered. Any excess spoil will be managed using the following order of priorities: • Review alignment and profile refinements during detailed design • Assess opportunities to reuse excess spoil in works within the construction footprint or adjacent land • Beneficial reuse within the construction footprint for rehabilitation of ancillary sites • Transfer to other nearby Transport projects for immediate use, use on future projects, or routine maintenance • Transfer to a Transport approved site for reuse on other projects • Disposal at an approved materials recycling or licensed waste disposal facility.	Contractor	Construction

7. Conclusion

The project would generate wastes that are typical of a motorway construction project. These will be classified, according to the POEO Act as general solid waste (both putrescible and non-putrescible), liquid waste, hazardous waste, special waste or ASS. A preliminary characterisation of wastes, as well as their final estimated volumes, would occur during detailed design. Classification of wastes would be confirmed during the construction period, according to the Waste Classification Guidelines (NSW EPA, 2014).

The construction footprint was previously used as agricultural and rural land, a former mineral sand processing site, for industrial purposes, and contains areas of fill material. Due to these former activities, the site is known to have contaminated soil and ASS present, which present environmental and human health hazards. Areas of potential contamination risk and ASS have been identified in this paper. Management measures have been outlined in this report to reduce the waste impacts associated with the project encountering contaminated soil and ASS.

The waste hierarchy would guide waste management, with avoidance being prioritised over resource recovery and finally, disposal. Transport's Environmental Sustainability Strategy 2019–2023 would guide opportunities for resource recovery and waste minimisation. This includes opportunities on the project to reuse excavated materials and topsoil. Waste created by the project may be used by other projects or beneficially used offsite through resource recovery exemption provisions. Licensed waste contractors would be engaged to handle and dispose of waste appropriately.

The project has potential to result in environmental impacts (dust, emissions, water quality, soils, air quality and odour, noise and traffic and transport), sustainability impacts and human health impacts. If waste is not managed correctly these potential impacts may be exacerbated. Environmental management measures for these impacts have been detailed in this report. Following the implementation of management measures, it is expected that the construction and operational impacts of the project relating to waste are manageable and residual impacts would be minimal.

8. References

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Terms and acronyms

Term / Acronym	Description
AOPCR	Areas of Potential Contamination Risk
ASS	Acid Sulfate Soils
CEMP	Construction Environment Management Plan
EIS	Environmental Impact Statement
M12RT	M1 Pacific Motorway extension to Raymond Terrace
PASS	Potential Acid Sulfate Soils
POEO Act	Protection of the Environment Operations Act 1997
SEARs	Secretary’s Environmental Assessment Requirements
Transport	Transport for New South Wales
WMP	Waste Management Plan