CHAPTER

21

Waste and resource management

Helidon to Calvert Environmental Impact Statement

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

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21.1 Summary

The waste generated during construction and operation will vary in different phases of the Project. The majority of spoil produced will be reused as fill and it is anticipated that a small portion will be required to be disposed of as waste. With the exception of spoil, no significant waste streams have been identified for the Project.

The Project design calculates that approximately 3,638,000 cubic metres (m^3) of cut material (other than rock) from tunnelling and rail works may be generated during construction. Approximately two-thirds of the excavated material will be reused within the Project as fill, leaving approximately 1,349,000 m^3 of spoil that will need to be managed or treated for potential re-use within the Project and on adjacent Inland Rail projects.

A range of mitigation measures will be implemented to ensure that, during construction and operation, waste is avoided, reused or recycled wherever possible. A Waste Management Sub-plan will be prepared, including:

- Waste reduction targets
- Processes for documenting waste volumes and types
- Requirements for waste segregation and temporary storage onsite
- Waste tracking for when waste is disposed of offsite
- Appropriate record keeping and reporting.

Based on the waste analysis undertaken, the capacity of the potential waste facilities is sufficient to accommodate waste generated from the Project. This will be confirmed with operators when construction timing for the Project is determined. The Project will not be applying for any waste-related Environmentally Relevant Activities (ERAs); however, the Project will ensure that any contractors managing waste will be appropriately licensed.

Management of all waste materials will be undertaken in accordance with the Project Waste Management Plan and the Spoil Management Strategy (refer Appendix T: Spoil Management Strategy).

The volume of waste generated by each of the waste streams will be further refined during detailed design to more accurately assess the receiving waste management facilities and waste disposal options for the Project.

21.2 Scope of chapter

The purpose of this chapter is to describe baseline conditions of the Helidon to Calvert (H2C) Project (the Project) relevant to waste and resource management planning. The Project consists of approximately 47 kilometres (km) of single-track, dual-gauge railway. New dual-gauge track rail infrastructure will connect Helidon in the east of Toowoomba to Calvert near Ipswich within a combination of greenfield and brownfield development. An approximately 850 metres (m) long tunnel is proposed through the Little Liverpool Range. A detailed description of the Project is provided in Chapter 6: Project description.

To provide context for the assessment that follows, significant waste is defined as waste generation from the Project that is in excess of 10 per cent of the current waste generation rates within the region at a broad category level. Below the 10 per cent threshold, waste will be managed through business-as-usual practices that are undertaken in accordance with statutory requirements and broad policy directives at the time. These statutory requirements are subject to amendment from time to time to reflect advances in waste management policy and therefore considered consistent with reasonable best practice at the time.

This chapter describes the waste streams that are likely to be generated by the Project through construction and operational (including maintenance) phases of development and the potential impacts on the surrounding environment. The Project is expected to be operational for in excess of 100 years. The design life of structures is 100 years to support this operational objective and the decommissioning of the Project cannot be foreseen at this point in time. If the Project, or elements of it, are subject to plans for decommissioning, the waste generated as a result of decommissioning will be estimated in accordance with a decommissioning plan.

Construction of the Project will generate green waste through clearing heavily vegetated areas within the new rail corridor. This chapter assesses the likely generation of green waste from vegetation clearing in addition to the aspects of general waste and spoil generation arising from the construction of the Project. Spoil production is discussed in Appendix T: Spoil Management Strategy.

Sustainability considerations as they relate to waste and resource management are discussed in Chapter 7: Sustainability. A founding principle of the Strategy is the adoption of the waste management hierarchy depicted in Figure 21.1.

Mitigation measures and waste and resource management strategies are proposed, aligning with the *Waste Reduction and Recycling Act 2011* (Qld) (WRR Act) and the *Queensland Waste Management and Resource Recovery Strategy* (Queensland Government, 2019b) (WMRRS) to avoid or minimise adverse impacts from waste and resource management on environmental values and sensitive receptors within the waste and resource management study area Figure 21.2.

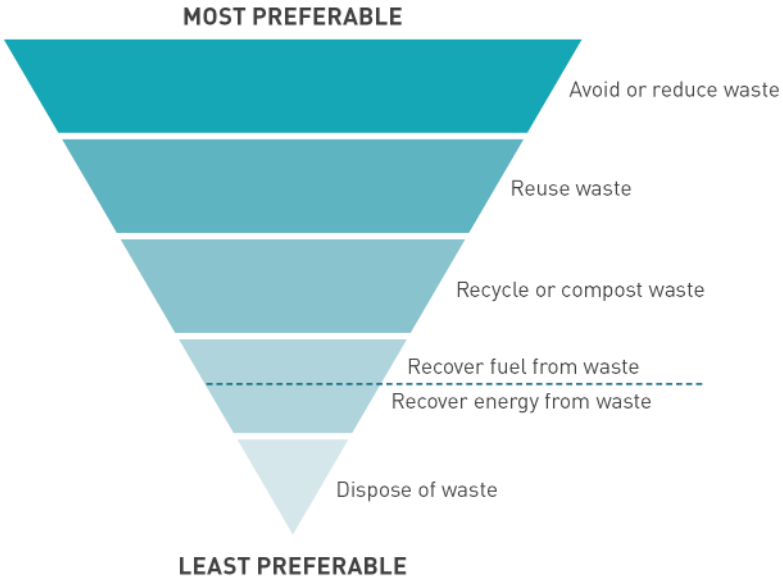


FIGURE 21.1: WASTE AND RESOURCE MANAGEMENT HIERARCHY

Source: Waste Management and Resource Recovery Strategy (Queensland Government, 2019b)

21.3 Terms of Reference requirements

This chapter has been prepared in accordance with the final Terms of Reference (ToR) for an Environmental Impact Statement (EIS) issued in October 2017 as detailed in Table 21.1 Compliance of the EIS against the full ToR is documented in Appendix B: Terms of Reference Compliance Table.

TABLE 21.1: TERMS OF REFERENCE—WASTE

Terms of Reference requirements		Where addressed
Impact assessment		
11.169.	For wastes, besides wastewater (which is addressed in the Water section of this ToR), describe and quantify all expected significant waste streams (including spoil) from the proposed Project activities during the construction and operational phases of the Project.	Section 21.7 Appendix T: Spoil Management Strategy, Section 2
11.170.	Describe potential spoil disposal sites and their ability to service the Project.	Section 21.7.1.5 Appendix T: Spoil Management Strategy, Sections 2 and 3
11.171.	Define and describe the objectives and practical measures for protecting or enhancing environmental values from impacts by waste. Take into account best practice waste management strategies as outlined in the National Waste Policy 2009 and the Waste Reduction and Recycling Act 2011 and the Environmental Protection Regulation 2008.	Sections 21.7.3 and 21.9 Appendix T: Spoil Management Strategy, Section 4
11.172.	Describe the quantity, and physical and chemical characteristics of waste rock, any attributes that may affect its dispersal in the environment, and its associated risk of causing environmental harm.	Section 21.7.1.3 The physical and chemical characteristics of geology and soils are addressed in Chapter 9: Land Resources, Section 9.6 Appendix T: Spoil Management Strategy, Section 2.1

Terms of Reference requirements		Where addressed
Mitigation measures		
11.173.	Assess the proposed management measures against the preferred waste management hierarchy, namely: avoid waste generation; cleaner production; reduce; recycle; reuse; reprocess and reclaim; waste to energy; treatment; disposal. This includes the generation and storage of waste.	Sections 21.7.3 and 21.9 Chapter 23: Draft Outline Environmental Management Plan, Section 23.13.12 Appendix T: Spoil Management Strategy, Section 4
11.174.	Describe how nominated quantitative standards and indicators may be achieved for waste management, and how the achievement of the objectives would be monitored, audited and managed.	Sections 21.6.5 and 21.9 Appendix T: Spoil Management Strategy, Section 4
11.175.	Detail waste management planning for the proposed Project especially how these plans would be applied to prevent or minimise environmental impacts due to waste at each stage of the Project.	Sections 21.7.3 and 21.9 Appendix T: Spoil Management Strategy, Section 4
11.176	Provide details on natural resource-use efficiency (such as energy and water), integrated processing design, and any co-generation of power and by-product reuse as shown in a material/energy flow analysis.	Natural resource-use efficiency, including by-product reuse, is primarily addressed in Chapter 7: Sustainability, Section 7.5. Options for co-generation of energy are identified in Table 21.11. Integrated processing design and co-generation of power are not applicable to the Project

21.4 Legislation, policies, standards and guidelines

Waste and resource management is primarily regulated by the Queensland State Government, with the Australian Government providing broad policy guidance. Local governments are responsible for managing waste within their area as required by regulatory framework.

The legislation, policy and guidelines relevant to waste and resource management in the context of the Project are described in Table 21.2. It should be noted that the waste and resource recovery landscape within Queensland is currently undergoing a process of reform and will likely be subject to substantial change during the timing of both the finalisation of the EIS process and the construction of the Project.

Additional detail is provided in Chapter 3: Project approvals.

TABLE 21.2: REGULATORY CONTEXT

Legislation, policy or guideline	Relevance to the Project
Commonwealth	
National Environment Protection Measures (Implementation) Act 1998 (NEPM)	The *National Environment Protection Measures (Implementation) Act 1998* (Cth) makes provision for national environment protection measures (NEPMs), which set out agreed national objectives for protecting or managing particular aspects of the environment including air quality, land contamination, hazardous wastes and the re-use and recycling of materials. The following NEPMs relate to waste and resource management in the context of the Project: ▸ National Environment Protection (National Pollutant Inventory) Measure 1998. The National Pollutant Inventory tracks pollution across Australia to ensure the community has access to information about the emission and transfer of toxic substances that may affect them locally. The Australian Government requires all major polluters to submit annual reports of their emissions to air. ▸ National Environment Protection (Used Packaging Materials) Measure (2011). Where possible, all efforts will be made for sustainable procurement of goods by considering the entire life cycle of the material. The material procurement will consider the reusability and recycled content of the material. The packaging from materials used in the Project will be recycled or re-used where possible.

Legislation, policy or guideline	Relevance to the Project
National Environment Protection Measures (Implementation) Act 1998 (NEPM) (continued)	▸ National Environment Protection (Movement of Controlled Waste between States and Territories) Measure (1998). The movement of controlled waste is not likely to be undertaken as part of construction or operation (including maintenance) phases of the Project. ▸ National Environment Protection (Assessment of Site Contamination) Measure (1999). Where required, contaminated land within the Project will be assessed and managed in accordance with principles of the NEPM. Chapter 9: Land resources provides more details on the areas identified to be on the Environmental Management Register (EMR) and Contaminated Land Register (CLR), including areas used for explosive production or storage.
National Greenhouse and Energy Reporting Act 2007 (NGER Act)	Provides a framework for the reporting and dissemination of information in relation to greenhouse emissions.
National Waste Policy 2018	The *National Waste Policy 2018* (Cth) supports Australia's waste and resource management direction to 2030 and also supports Australia's International obligations regarding environment. The policy provides a framework on how to better manage waste as a collective action by governments, individuals and communities.
Australian Dangerous Goods Code (National Transport Commission, 2018)	The Australian Dangerous Goods Code (2018) sets out the technical requirements and guidelines for transportation of dangerous goods across Australia. The transportation of waste that may be classified as a dangerous good must be undertaken in accordance with specific requirements. Dangerous goods anticipated to be used by the Project are further described in Chapter 20: Hazard and risk.
State	
Environmental Protection Act (Qld) 1994 (EP Act)	The *Environmental Protection Act 1994* (Qld) (EP Act) is Queensland's overarching environmental legislative framework for the protection and management of environmental values. The aim of the EP Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes, on which life depends. A wide range of tools are provided to meet these objectives, including environmental protection policies and licensing of activities with the potential to cause environmental harm. Section 13 (1), Subdivision 2 of the EP Act defines waste as anything other than an end of waste resource that is: ▸ Left over or an unwanted by-product from an industrial, commercial, domestic or other activity ▸ Surplus to the industrial, commercial, domestic or other activity generating the waste. Certain waste management activities undertaken as part of the Project, including the disposal at landfill and transport of waste, are prescribed as Environmentally Relevant Activities (ERA) and require approval under the EP Act. Under Section 319 of the EP Act, ARTC has a general environmental duty to ensure that unlawful environmental harm does not occur as a result of any actions associated with the Project, including waste management activities. Any potential environmental harm must be promptly reported to the Department of Environment and Science (DES) in accordance with the EP Act. ARTC will monitor the construction of the Project and associated works at all times through the implementation of the draft Outline Environmental Management Plan (EMP) (refer to Chapter 23: Draft Outline Environmental Management Plan). A Waste Management Sub-plan will also be developed as part of the Construction Environmental Management Plan (CEMP), outlining the specific waste streams and treatment options for the Project.

Legislation, policy or guideline	Relevance to the Project
Environmental Protection Regulation (Qld) 2019 (EP Regulation)	The Environmental Protection Regulation 2019 (EP Regulation) provides the framework for administering activities that produce, transport and manage waste (including regulated and general waste). The EP Regulation categorises ERAs and sets out the administrative provisions used to regulate them. In the context of waste and resource management for the Project, it may require an ERA for the following activities (subject to the minimum thresholds prescribed by regulation being met or exceeded): ▸ ERA 57—Regulated waste transport ▸ ERA 8—Chemical storage ▸ ERA 33—Crushing, milling, grinding or screening: Under the EP Regulation, an approval for ERA 33 is not required for extracting material from a place for constructing a road or railway at the place. As such, an approval for ERA 33 will only be required for the crushing, milling, grinding or screening of material exceeding 5,000 tonnes per year if the activity is undertaken outside of the Project. The type and location of ERAs required to support construction of the Project are yet to be confirmed. Therefore, the Project is not seeking approval for ERAs as part of the EIS assessment process. On the basis that the Project is given approval to proceed, any recommendations within the Coordinator-General's report for the Project will be considered for later development approvals, including for ERAs under the EP Act. The EP Regulation was amended in February 2019 to incorporate a risk-based method for regulated waste classification to be categorised as Category 1 and Category 2. The category of waste informs the testing required, tracking documentation and ultimately the aggregate environmental score that determines the category of ERA applied to the activity that generates, transports and manages the waste. The Project will need to ensure that the generation, characterisation, transport, storage, treatment and disposal is undertaken in accordance with these regulatory provisions. The EP Regulation defines regulated waste as a waste that is: ▸ Commercial or industrial waste, whether or not it has been immobilised or treated ▸ Of a type, or contains a constituent of a type, mentioned in Schedule 9, Part 1 of the EP Regulation.
Waste Reduction and Recycling Act 2011 (Qld)	The *Waste Reduction and Recycling Act 2011* (Qld) Sets out the order waste will be managed in for the Project, based on the waste management hierarchy and provides guidance on the requirements of the exempt waste application process. The WRR Act provides a strategic framework for managing waste through a waste and resource management hierarchy (refer Figure 21.1). Under the WRR Act, the management of priority wastes are of strategic importance, due to the high disposal impacts, social impacts, potential resource savings and business opportunities associated in their recovery. This piece of legislation also enables the Queensland Government to work with industry and the community in identifying the most appropriate management options for priority wastes. The management of waste activities associated with the Project will largely be underpinned by the WRR Act waste and resource management hierarchy. The WRR Act was amended in 2019 to reinstate provisions for application of a waste levy as an instrument to encourage resource recovery and reduce the disposal of waste to landfill. The introduction of a waste levy will increase the cost of waste disposal to landfill and is initially set at $75 for non-regulated waste. A $5 annual rise for the first four years post-implementation is attached to the levy. Waste disposed to a landfill site may be exempt from the levy if the waste is demonstrated to be beneficially used at the leviable disposal site for rehabilitation, capping, profiling or batter construction.

Legislation, policy or guideline	Relevance to the Project
Waste Reduction and Recycling Regulation 2011 (Qld)	Umbrella legislation for strategic management of Queensland's waste industry. Promotes waste avoidance and reduction and resource recovery and efficiency actions. The Queensland State Government has developed a new Waste Management and Resource Recovery Strategy (WMRRS) to reduce the amount of waste generated and grow the resource recovery and recycling industry. A waste levy was incorporated into legislation by amendment in 2019 and commenced on 1 July 2019.
Queensland Waste Management and Resource Recovery Strategy (WMRRS) (Queensland Government, 2019b)	The Queensland Government has released a new WMRRS, underpinned by a waste disposal levy. The waste strategy supersedes the 2014–2024 strategy and aims to reduce the impact of waste on the environment by focusing on recycling and resource recovery practices for sustainable and long-term waste management. The WMRRS provides plans and strategies towards 2050 on future management of waste in Queensland to achieve the set targets. The document will be used to ensure the content of the EIS waste chapter is aligned with Queensland future waste strategies.
Recycling and Waste in Queensland 2018 (Department of Environment and Science (DES), 2018c)	The report presents data and trends in waste recovery and disposal in Queensland, which will be used to provide a benchmark for the assessment of the generated waste from this Project.
Biosecurity Act 2014 and Biosecurity Regulation 2016 (Qld)	Provides a framework for an effective biosecurity system for Queensland to minimise biosecurity risks and respond to impacts on biosecurity. Under this Act, there is a biodiversity obligation to manage biosecurity risks and threats. According to this legislation, the carrier soil is a biosecurity risk. In the Project, a part of the alignment will transverse through Biodiversity Zone 2. The carrier soil is not categorised as waste, and soil management will be required to follow the procedures outlined in Biosecurity Regulation 2016 (Qld).

21.5 Methodology

The following tasks have been undertaken to complete the waste and resource management assessment for the Project.

21.5.1 Identifying the existing environment

The environmental values that may be affected by waste generated by the Project were identified using publicly available information, aerial maps, legislation and guidelines and other relevant chapters of the EIS (Chapter 7: Sustainability and Chapter 9: Land resources). The waste management facilities, spoil disposal locations and their capacities were also considered (using publicly available information) to determine their ability to accept and accommodate the estimated generated waste and spoil.

21.5.2 Identifying Project waste streams

The WMRRS and EP Regulation were used to assist classifying the expected produced waste. The approximate quantities of the generated waste are estimated based on the design information, design bill of quantities and relevant industry-accepted practices in waste generation estimation at the time of preparing the EIS. It is anticipated the quantities may change after detailed design has progressed. For comparison purposes, waste data provided in *Recycling and Waste in Queensland 2018* (DES, 2018c) has been used.

21.5.3 Basis of significance

To aid the assessment of potential impacts and provide quantitative definition (in accordance with the Project ToR), the adopted waste generation basis of significance comprises:

- Less than 10 per cent of current waste generation within the region (for that category) is deemed to be insignificant and able to be managed under current waste management arrangements. Mitigation measures for these wastes are covered under standard industry practice that complies with statutory requirements and policy
- Greater than 10 per cent of current waste generation within the region (for that category) is deemed to be significant and requires specific mitigation measures. These wastes and their mitigation measures are presented within this chapter and within the Appendix T: Spoil Management Strategy.

The 10 per cent value has been adopted and is considered appropriate. This is a common figure used in materiality assessments.

21.5.4 Identifying potential impacts

The management of waste streams will be aligned with waste management hierarchy (refer Figure 21.1) and all potential management options will be followed up before disposal at landfill. For any residual waste streams, the impacts were identified and the location and capacity of the surrounding waste management facilities and their waste acceptance criteria were considered.

21.5.5 Impact assessment

Potential impacts relating to waste and resource management were then assessed using a risk assessment methodology based on the likelihood and consequence of a potential impact, followed by the resultant level of risk. The impact assessment risk methodology is described in Chapter 4: Assessment methodology.

In addition to the methodology described in Chapter 4: Assessment methodology, and as noted in Section 21.5.3, a definition of significance (10 per cent above current waste generation rates within the region—based on category as defined within the EP regulation 2019) has been applied to enable a risk-based assessment against the ToR.

21.5.6 Identifying mitigation and management measures

To achieve reasonable best practice for significant waste, mitigation measures were developed in accordance with the waste management hierarchy of:

- Avoid waste generation and promote cleaner production
- Reduce
- Re-use/treat
- Recycle
- Recover fuel/energy from waste
- Disposal.

Business-as-usual waste management practices are developed to conform to policy and regulatory requirements that are in force at the time. Consequently, waste targets are embedded (where reasonable and practical) in the waste management system's response to the regional needs. Business-as-usual waste management practices are applied to waste streams that are deemed insignificant (i.e. those waste streams from the Project that contribute less than 10 per cent additional waste to the pre-existing condition). The assessment has assumed that the system has at least 10 per cent latent capacity to manage these waste streams over the duration of the Project.

Opportunities for avoiding the generation of waste are subject to an optimisation process that will continue through detailed design (post-EIS). Optimisation has not occurred as part of the design effort that has informed the EIS. Mitigation measures are presented focusing on re-use and avoidance within the waste management hierarchy.

Table 21.11 provides a breakdown on how the identified mitigation measures correlate to the waste management hierarchy.

Where appropriate, protocols are outlined for the safe collection, storage, handling and transport of identified waste streams. The outcome achieved will be the protection of environmental values and community perceptions, as well as meeting expected auditing and compliance requirements.

21.6 Environmental values and existing conditions

21.6.1 Existing environment

The Project is located within South East Queensland (SEQ) and predominantly follows the West Moreton System rail corridor and the protected Gowrie to Grandchester future public passenger transport corridor, where grazing is the predominant land use, combined with other agricultural land uses including irrigated seasonal horticulture and cropping.

Municipal waste generated within the Project region is managed by Lockyer Valley Regional Council (LVRC) through collection, material recovery and disposal activities and associated infrastructure. In the broader SEQ region, commercial and industrial (C&I) and construction and demolition (C&D) waste arising from development projects is predominantly managed through waste management contractors and, in some instances, their associated facilities, with local councils providing secondary and supplementary services for these waste streams. Table 21.3 provides a breakdown on the categories of waste generated and disposed of to landfill in the SEQ region.

TABLE 21.3: WASTE DISPOSAL RATE IN SEQ

Waste type	SEQ region 2017/2018[1] (tonnes)
C&I waste	1,116,108
C&D waste	2,354,502
General waste (municipal waste)	1,287,508
Green waste[2]	354,817
Regulated waste (including asbestos, contaminated soil)	Not reported regionally

Table notes:
1 Recycling and Waste in financial year 2018 (DES, 2018c)
2 Denotes amount managed by local authorities and accounts for approximately 90 per cent of total green waste collected and managed within the region

21.6.2 Environmental values

The environmental values that may be affected by Project waste production for each phase include:

- Sensitive receptors: human, environment, businesses and the receiving environment: air, water bodies and surrounding flora and fauna
- Available landfill capacity for waste disposal
- Health and safety of the site personnel and nearby sensitive receptors
- Visual amenity
- Depletion of resources as a result of importing material from quarries
- Increased traffic and associated disruption such as noise, dust and traffic
- Productive capability of land (i.e. its potential for agricultural or other uses)
- The diversity of ecological processes and associated ecosystems surrounding the Project
- Sustainability of natural resources (e.g. construction materials, fuel and water).

21.6.3 Identified waste streams

The generation of waste will occur throughout the Project life cycle. The Project will generate solid and liquid wastes, which can broadly be classified as:

- Green waste from vegetation clearance
- C&D waste (including spoil)
- General waste (municipal waste)
- Regulated wastes that are required to be managed in accordance with EP Regulation requirements—both Category 1 and Category 2 regulated waste have unique handling and disposal requirements to manage specific hazards and risks associated with them
- Recyclables, which are waste streams that can be reconditioned and reprocessed to be re-used.

An estimate of quantities of the waste materials generated by the Project during construction is provided in Table 21.5, where Table 21.7 outlines the waste streams expected to be generated during operation of the Project.

21.6.4 Licensed waste management contractors and facilities

The management of waste for the Project will be aligned with the waste management hierarchy referred to in Section 21.2 and Section 21.5.6 and, where possible, the generation of waste and disposal to landfill will be minimised. However, there will be some residual waste remaining as a result of Project activities that will need to be disposed at licensed waste management facilities. Due to the extent of the Project, the western extremities of the Project may seek to use the waste facilities in the Toowoomba region, while those in the east will be in a position to efficiently use waste disposal and composting facilities around Ipswich, including the commercial facilities located at Swanbank, New Chum and Ti Tree.

Figure 21.2 shows the location of these facilities relative to the Project.

It should be noted that while there are existing waste management facilities within the Lockyer Valley, these facilities may not have sufficient capacity to accept large volumes of construction waste due to their smaller size and objective to service the local communities only. However, this assumption is dependent on the volume of waste generated and disposed of by the local community at the time of construction and the available capacity of the facilities at the time of Project delivery.

Facilities in the Toowoomba, Lockyer Valley and Ipswich local government areas will have the potential to accept both construction and general waste streams arising from the Project. Considering environmental impacts and costs associated with waste transportation (based on the industry experience of a haul route distance of 50 km for bulk construction waste and 15 km for general consolidated waste) waste management facilities were identified that have the capacity to accept Project-generated waste during construction and operation. Identified facilities are provided in Table 21.4, where the first four facilities are the closest major facilities to have the capacity to service the Project. The available and permissible annual capacities of waste management facilities are commercially sensitive and not typically disclosed. However, based on preliminary consultation and the assessment of the current licence limits for waste acceptance, it is expected these waste management facilities will be able to accommodate the generated waste that may be generated by the Project. The waste acceptance criteria and acceptance rate will be confirmed in consultation with the relevant operator when the timing for construction of the Project is determined. Consultation will also be ongoing with the Department of Transport and Main Roads about managing spoil transport, acknowledging the key drivers of safety for road users, traffic management, and pavement life.

The Project will not be applying for any waste-related ERAs; however, the Project will ensure that any contractors managing waste will be appropriately licensed.

For spoil disposal, the Toowoomba Waste Management Centre, New Chum Landfill, Ti Tree Bioenergy and Remondis Swanbank Renewable Energy & Waste Management Facility are the major facilities that will accept clean fill material. However, only New Chum landfill, Ti Tree Bioenergy and Remondis Swanbank Renewable Energy & Waste Management Facility have the capacity to receive contaminated spoil material. Prior approvals and testing may be required for some of these facilities to determine the fate of the spoil. Should the test results indicate contamination within the spoil material, a disposal permit may need to be obtained.

Consultation has been undertaken with facilities operated by LVRC (Gatton Landfill). Preliminary consultation has also been undertaken with the landfill operators of New Chum Solid Waste Landfill, Ti Tree Bioenergy, Remondis Swanbank Renewable Energy & Waste Management Facility and Lantrak Waste and Recycling Facility.

The discussions conducted by ARTC confirmed the serviceability and interest of these facilities in the acceptance of waste from this Project. ARTC will continue to engage with relevant parties prior to the construction of the Project to confirm these potential spoil disposal sites. Consultation undertaken with operators is further described in Chapter 5: Stakeholder engagement and Appendix C: Consultation Report.

21.6.5 Performance requirement

The Waste Management Sub-plan for the Project (prepared under the Draft Outline EMP refer Chapter 23: Draft Outline Environmental Management Plan) as part of the CEMP and will include the principles of the EP Act, WRR Act, and WMRRS. The Waste Management Sub-plan will provide management processes for key waste streams and the adaptation of the waste hierarchy to avoid the production of waste in the first instance, followed by re-use, treatment and recycling. The current targets for 2026 require a minimum diversion of 75 per cent for C&D waste and 55 per cent for general waste from landfill. As these targets reflect current government policy, they will be treated as minimum requirements for the Project.

To assess the performance of the waste management activities against the determined targets, the generated waste streams and quantities would be monitored regularly (e.g. monthly) and audited at least annually from the source of generation to the destination, which could be either be a waste disposal facility or a recycling facility. Suitable records for the waste types and quantities will be kept and will be available to demonstrate the conformance with the agreed targets.

The monitoring and auditing requirements for waste management will be incorporated within the Waste Management Sub-plan.

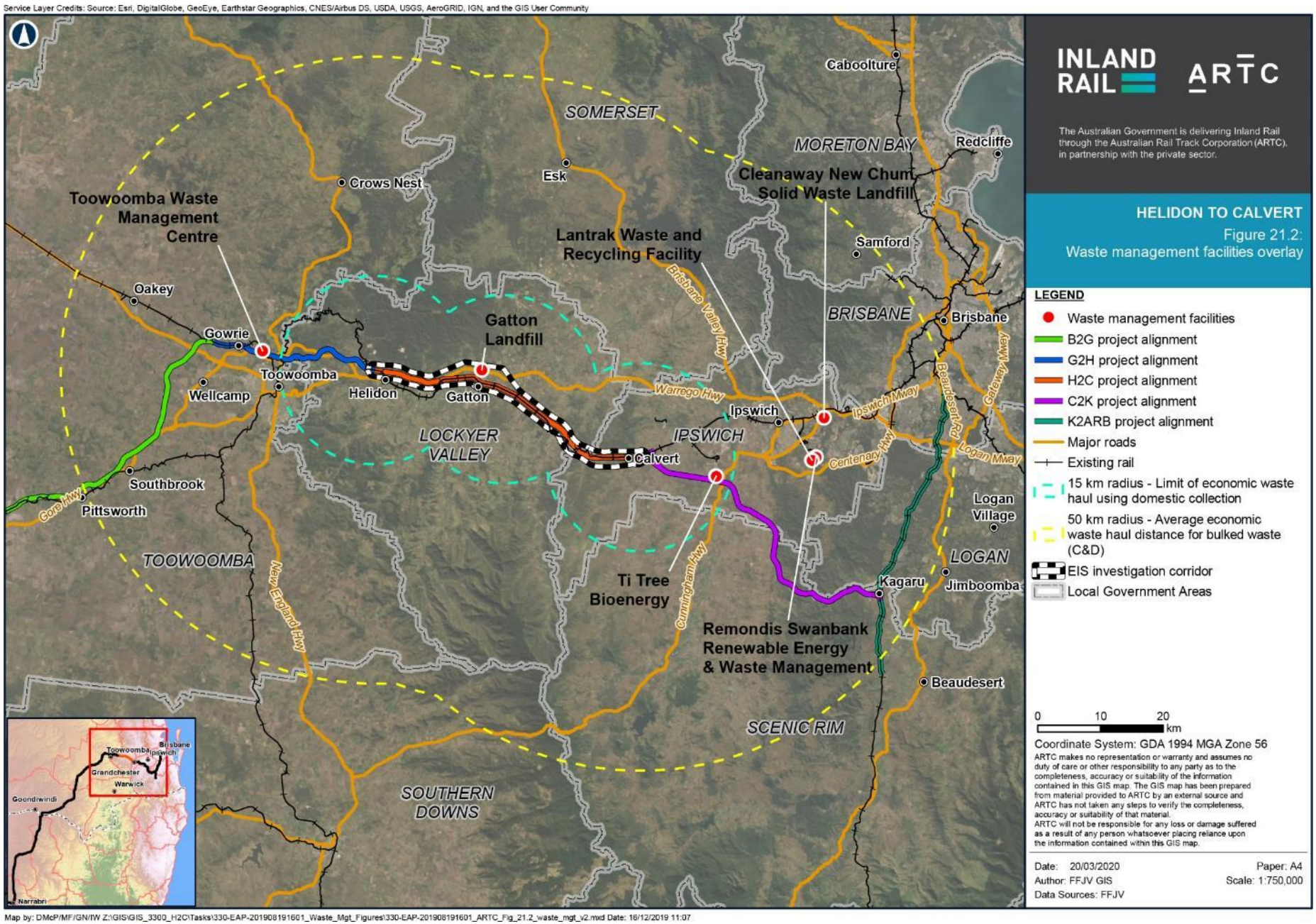
TABLE 21.4: WASTE MANAGEMENT FACILITIES

Facility	Type	Operator	Location	Capacity (tonnes/year)[1]	Lifespan[2]	Waste stream accepted
Toowoomba Waste Management Centre	Landfill	Toowoomba Regional Council	Hermitage Road, Cranley	>100,000 but <200,000	20+ years	▸ Mixed general waste ▸ Contaminated soil (with prior approval from Toowoomba Regional Council Waste Services) ▸ Clean fill ▸ Treated timber
New Chum Landfill	Landfill	Cleanaway	100 Chum St, New Chum	>200,000	5+ years	▸ Some C&I* ▸ C&D** ▸ Green waste ▸ Contaminated soil ▸ Clean fill
Remondis Swanbank Renewable Energy & Waste Management Facility	Landfill and Transfer Station	Remondis	Swanbank Road, Swanbank	>200,000	15+ years	▸ C&I ▸ C&D ▸ Green waste ▸ General (putrescible and non-putrescible) ▸ Regulated waste ▸ Clean fill ▸ Contaminated soil
Ti Tree Bioenergy	Landfill (Bioreactor)	Veolia/JJ Richards JV	Champions Way, Willowbank	>200,000	50+ years	▸ C&I ▸ C&D ▸ Green waste ▸ General (putrescible and non) ▸ Regulated ▸ Contaminated Soil ▸ Clean fill
Gatton Landfill	Landfill	LVRC	Fords Road, Gatton	>10,000 but <20,000	5+ years	▸ C&I ▸ C&D ▸ Asbestos (prior approval required) (regulated waste) ▸ Green waste ▸ Scrap metal, concrete ▸ Recyclable material ▸ E-waste ▸ Tyres (regulated waste) ▸ Motor oil (regulated waste)

Facility	Type	Operator	Location	Capacity (tonnes/year)[1]	Lifespan[2]	Waste stream accepted
Laidley Transfer Station	Transfer Station	LVRC	Burgess Road, Laidley Heights	Not applicable	Indefinite (transfer station, not ultimate waste repository)[3]	▸ Commercial waste ▸ Green waste ▸ Scrap metal ▸ Recyclable material ▸ Concrete
Helidon Transfer Station	Transfer Station	LVRC	Seventeen Mile Road, Helidon	Not applicable	Indefinite (transfer station, not ultimate waste repository)[3]	▸ Green waste ▸ Scrap metal ▸ Recyclable material ▸ E-waste ▸ Motor oil
Grantham Transfer Station	Transfer Station	LVRC	Back Ma Road, Grantham	Not applicable	Indefinite (transfer station, not ultimate waste repository)[3]	▸ Green waste ▸ Scrap metal ▸ Recyclable material ▸ E-waste
Greater Toowoomba	Transfer	Toowoomba	270 O'Mara Road,	Not applicable	Indefinite (transfer station, not ultimate waste repository)[3]	▸ Green waste (vehicles over 4.5 tonnes) ▸ Commercial waste (vehicles up to 4.5 tonnes) ▸ Scrap metal (vehicles over 4.5 tonnes) ▸ Inert waste ▸ Untreated timber
Lantrak Waste Management Facility	Landfill and Transfer Station	Lantrak	1 Memorial Drive, Swanbank	>200,000	20+ years	▸ C&I ▸ C&D ▸ Green waste ▸ General (putrescible and non-putrescible) ▸ Regulated
Riverview Recycling and Refuse Centre	Transfer station	Ipswich City Council	81 Riverview Road, Riverview	Not applicable	Indefinite (transfer station, not ultimate waste repository)[3]	▸ Green waste ▸ Steel and scrap metal ▸ E-waste ▸ Concrete
Candy Soil	Soil Manufacturer	Candy Soil	237–239 Mount Crosby Rd, Tivoli	Not applicable	Indefinite (soil manufacturing)[3]	▸ C&D (soil)
Greenbank Waste and Recycling Facility	Transfer Station	Logan City Council	124 Pub Lane, New Beith	Not applicable	Indefinite (transfer station, not ultimate waste repository)[3]	▸ C&I ▸ C&D ▸ Domestic

Facility	Type	Operator	Location	Capacity (tonnes/year)[1]	Lifespan[2]	Waste stream accepted
Logan Village Waste and Recycling Facility	Transfer Station	Logan City Council	1432 Waterford Tamborine Road, Logan Village	Not applicable	Indefinite (transfer station, not ultimate waste repository)[3]	▸ C&I ▸ C&D ▸ Domestic
Jimboomba Landfill	Non-operational landfill (potential to accept clean fill)	Logan City Council	356 Mundoolun Road, Jimboomba	Limited. 30,000m^2 site Rehab volume <100,000m^3	Currently under investigation, dependant on future land use	▸ Clean soil for profile and capping if compliant with specifications
Browns Plains Waste and Recycling Facility	Landfill and transfer station	Logan City Council	41 Recycle Way, Heritage Park	100,000–200,000t/yr	5+ years	▸ Some commercial and industrial waste ▸ Construction and demolition waste ▸ Green waste ▸ Some regulated waste

Table notes
1: Capacity is the equivalent of permissible intake
2: Lifespan = Expected minimum operational horizon
3: Operation permitted for as long as ERA is in force
*C&I: Commercial and Industrial
**C&D Construction and Demolition


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Caboolture
SOMERSET
MORETON BAY
Redcliffe
Esk
Crows Nest
Cleanaway New Chum Solid Waste Landfill
Toowoomba Waste Management Centre
Lantrak Waste and Recycling Facility
Samford
Oakey
Brisbane Valley Hwy
Gatton Landfill
BRISBANE
Brisbane
Gowrie
Toowoomba
Helidon
Gatton
Warrego Hwy
Wellcamp
Ipswich
Ipswich Mway
Beaudesert Rd
Gateway Mway
LOCKYER VALLEY
IPSWICH
Centenary Hwy
Logan Mway
Calvert
Southbrook
Gore Hwy
Pittsworth
Logan Village
TOOWOOMBA
New England Hwy
Ti Tree Bioenergy
Cunningham Hwy
LOGAN
Kagaru
Jimboomba
Remondis Swanbank Renewable Energy & Waste Management
Beaudesert
SCENIC RIM
SOUTHERN DOWNS
Toowoomba
Brisbane
Ipswich
Grandchester
Warwick
Goondiwindi
Narrabri
INLAND RAIL
ARTC
The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.
HELIDON TO CALVERT
Figure 21.2:
Waste management facilities overlay
LEGEND
Waste management facilities
B2G project alignment
G2H project alignment
H2C project alignment
C2K project alignment
K2ARB project alignment
Major roads
Existing rail
15 km radius - Limit of economic waste haul using domestic collection
50 km radius - Average economic waste haul distance for bulked waste (C&D)
EIS investigation corridor
Local Government Areas
0 10 20
km
Coordinate System: GDA 1994 MGA Zone 56
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21.7 Waste classification

The EP Regulation is used to assist in classifying the waste that is expected to be produced by the Project. Generated waste has been classified into four groups:

- General (municipal)— comprising putrescible materials (like to decay), which can also contain recyclables
- C&D—waste from C&D activities
- C&I— generated by commercial/business activities
- Green waste— from trees, grass clippings, trimmings and any other material from landscaping or clearing and grubbing works
- Regulated waste—requires specific controls or actions as defined by legislation. Regulated waste is any waste that contains chemicals and elements as defined in Schedule 9 of the EP Regulation and is categorised into two groups based on the risk level. Handling and transport of regulated waste is tracked from point of generation to landfill disposal.

Based on a review of the assumed construction method and the design information, waste streams and their quantities were estimated where possible. The quantities produced were then assessed against data available for Queensland waste disposal to landfill in Table 21.3.

The quantities and waste types will be refined and finalised during the detail design process and will be incorporated into a Waste Management Sub-plan as part of the CEMP.

21.7.1 Construction phase waste

The waste generated during the construction of the Project will be produced from:

- Site preparation:
  - Removal of the existing structures including culverts and bridges, overpasses and any structures and dwellings as part of future land acquisition determined at the time of detail design
  - Vegetation clearing and grubbing, which includes grass slashing and tree and stump removal
  - Topsoil stripping
  - Temporary and permanent fencing
- Civil works:
  - Preparation of laydown and stockpile areas
  - Embankment preparation
  - Access tracks and roads including realignments
  - Tunnel portal development
  - Demolition
  - Waste generated from site compounds and facilities
- Structure construction:
  - Rail structures (ballast, sleepers and rails) and associated infrastructure
  - Offices
  - Drainage
  - Bridges
  - Tunnel and associated support infrastructure.

Based on the design, the quantities of waste expected to be generated during construction phase are presented in Table 21.5. The quantities of waste were estimated based on information from the constructability assessment, design documentation and bill of quantities for the Project. These details will be subject to further refinement during progression of the detailed design, post-EIS. All procured material (i.e. concrete, steel, timber and ballast) will be required to meet material specifications and an assumption of 2 per cent of the total quantity has been made for unsuitable material and potential wastage. This calculation is generated based on the waste allowance made in the bill of quantities for the Project. Where unavailable, the density of waste types has been informed from *Integrated Solid Waste Management: Engineering Principles and Management Issues* (Tchobanoglous et al., 1993).

Following the basis of significance described in Section 21.5.3, no significant waste streams have been identified for the Project, with the exception of spoil (and therefore in accordance with the ToR) do not require assessment. For most of the waste streams, their contribution in the context of the existing waste management system is less than 1 per cent, or practically immeasurable. The insignificant waste streams expected to be produced by the Project have been categorised at a broad level only, as they will be managed by the contractor who will be required to comply with industry standards and all statutory requirements pertaining to waste and resource management through condition of contract. It is expected that the insignificant waste streams that have volumes of less than 10 per cent of current waste generation within the region will be managed using the pre-existing and business as usual arrangements.

There are no accommodation camps proposed for this Project and it is assumed the waste generated from compounds is mainly general office waste with some potential for recycling that will be managed as business as usual through the existing waste management system. The site amenities and compounds will be returned to suppliers for re-use and, therefore, construction decommissioning waste is expected to be small. The construction of the Project is estimated take place over a period of approximately four years.

The management of wastewater during this phase is discussed in Chapter 13: Surface water and hydrology. It is anticipated that potential stormwater discharges will have a negligible impact on surrounding areas. Water collected from within the tunnel infrastructure will require specific management in regard to release into receiving waters. The collected water will be required to meet relevant water quality objectives and will likely require processing through a water treatment plant including hydrocarbon separation.

In accordance with the Draft Outline EMP (refer Chapter 23: Draft Outline Environmental Management Plan), the contractor will prepare a Waste Management Sub-plan as part of the CEMP. The CEMP will detail: waste targets, performance objectives for documenting waste volumes, and requirements for corrective measures (among other matters).

TABLE 21.5: WASTE CLASSIFICATION AND QUANTITY DURING THE CONSTRUCTION PHASE

Stage	Activity	Waste/ resource	Waste classification	Estimated quantity	Residual % of annual existing waste generation in Queensland
Site preparation and civil earthworks	Vegetation clearance	Grass, tree logs and stumps	Green waste	Approximately 465 hectares (ha)	Not applicable—to be re-used within the Project
	Topsoil stripping	Topsoil	Soil	Approximately 351,000 m^3	Not applicable—to be re-used within the Project
	Access tracks, bulk earthworks, tunnel portal development	Spoil	C&D waste	Approximately 1,349,000 m^3 (including fire ant carrier soil)	26
	Compound waste/ office waste	Litter, packaging, paper, aluminium	General waste (including recyclables)	100 tonnes	0.0005
	Decommissioning of existing structures	Asbestos cement material (ACM)	Regulated waste	Unquantified	No data[1]
Major structures construction	Installation/construction of rail system	Ballast	C&D waste	Approximately 5,100 tonnes	0.05
	Installation/construction of rail system	Sleepers	C&D waste	Approximately 2,300 sleepers	Unquantified
	Installation/construction of rail system	Rail (steel)	C&D waste	Approximately 253 tonnes	0.003
	Construction of culverts crossing and concrete pipes	Precast concrete	C&D waste	Approximately 170 precast concrete units	Unquantified
	Construction of bridges/viaducts	Precast concrete	C&D waste	Unqualified	Unquantified
	Construction of culverts, bridge/viaducts	In-situ concrete	C&D waste	Approximately 3,000 m^3	0.07
	Construction of structures	Waste oil, solvents, paints, coolants	Regulated waste	Unquantified	No data[1]

Table notes
1 Data on regional proportion of regulated waste not available

21.7.1.1 Spoil production

The Project is anticipated to generate approximately 3,638,000 m³ of excavated material from tunnelling and rail works during construction. The design attempted to achieve a net cut to fill balance to reduce the import of material and dispose of surplus or unsuitable material to landfill.

Approximately two-thirds of the excavated material will be re-used within the Project as fill, leaving an excess of approximately 1,349,000 m³ of spoil, including fire ant carrier soil. Spoil is the surplus of cut material that is not required to be re-used in the Project's functional formation or is unsuitable for re-use due to its excavated untreated characteristics. Such material may be re-used within or outside the disturbance footprint for landscaping or other purposes, subject to satisfying a range of requirements.

Excavated material may not meet the specifications for re-use within the Project, (in accordance with ARTC Earthworks Material Specification ETC-08-03) due to factors such as:

- Compaction requirements. Materials that are unsuitable to be re-compacted to a suitable density to achieve the minimum California Bearing Ratio design requirements to achieve the required engineering design characteristics.
- Moisture content. Based on the natural moisture content, the material may either be too wet or too dry in its current condition to meet the required specifications or consistency.
- Organic content. Materials with organic content are typically considered unsuitable due to being highly compressible, degradable and/or susceptible to collapse. These materials may be suitable for use in topsoil and vegetation rehabilitation applications with blending.
- Dispersive. Dispersive materials have a high potential for erosion; therefore, it is recommended their use is restricted to areas where they are not exposed to free water.
- Contamination. Contaminants may be present in the material due to several factors. Based on the land uses, the potential may be present to encounter hydrocarbons (fuel and oil storage and use), pesticides and herbicides, hazardous materials (asbestos and lead paint).
- Reactivity. Reactive materials with significant shrink–swell potential may lead to excessive movement within the fill.
- Acidity: Acidic soils such occur with a pH less than 5.5. There is limited potential to encounter acid sulfate soils within the disturbance footprint.

Oversize materials: blasted or ripped rock with particles larger than 150 mm are typically excluded from earthworks, as they cannot be adequately compacted. It should be noted that the use of spoil for other supposed (landfill capping as an example) is not considered disposal but is considered use to support restoration of degraded land. Appendix T: Spoil Management Strategy discusses the management of spoil in more detail.

The Project will pass through Fire Ant Zone 2, which will result in excavation within the top one metre of soil where fire ant colonies may be found. This excavation may lead to the generation of approximately 140,000 m³ of spoil. The fire ant carrier spoil is currently not categorised as waste in the regulation and therefore is not assessed in the waste classification. Some waste management facilities within the biosecurity zone can accept fire ant carrier spoil. These facilities are typically similar to those discussed in Section 21.2 for accepting general waste spoil.

Another biosecurity threat is the spread of noxious weeds during movement and handling of spoil and waste material. This aspect will need to be tightly controlled by the construction contractor. Appropriate checks and controls will be in place including identification of weed risk areas, surveillance, audit compliance and vehicle wash down. Chapter 11: Flora and fauna discusses the identification and management of weeds in more detail.

21.7.1.2 Spoil management hierarchy

The cut and fill assessment has been undertaken for the Project in isolation, for the purpose of informing the EIS. In the future detailed design and execution phases of the Project and adjacent Inland Rail projects, there will be opportunities to optimise the use and placement of spoil material outside of the extent of each individual project. It is not appropriate to undertake this level of assessment until the Project contractors have been appointed and the design (including earthwork balance and placement strategies) have been further progressed. The assessment of the cumulative impacts of combining the management of spoil across more than one project will be undertaken once the detailed design and earthwork balance and placement strategies are available. Cumulative impacts for the current spoil disposal approach are presented in Chapter 22: Cumulative impacts.

Spoil produced by the Project will be managed in accordance with Appendix T: Spoil Management Strategy, considering the spoil management hierarchy as presented in Table 21.6 and Figure 21.3.

TABLE 21.6: SPOIL MANAGEMENT HIERARCHY

Rank	Options	Example
1	Avoid and reduce spoil	Reduce the amount of spoil generated by the Project by reducing the extent and scale of cut where there is not an immediate re-use opportunity in proximity to the source location (e.g. sections of the Project where a surplus of material will be generated)
2	Re-use within the rail corridor	Re-use within the Project, subject to the material complying with the ARTC Earthworks Material Specification (ETC-08-03), to establish formation, fill embankments and mounds within short haulage distance of the source location
3	Re-use for environmental works and land restoration	Examples include res-use for: ▸ Rehabilitation of native vegetation ▸ Landscaping ▸ Land reinstatement, including end-of-life mines and quarries, subject to satisfying closure and operational requirements ▸ Landfill covers (day and interim covers) and final capping (where deemed suitable)
4	Re-use on other development	Re-use for fill embankments and mounds on projects within a reasonable haulage distance from the site, prioritising other Inland Rail projects
5	Dispose offsite as waste	Disposal of excess spoil as waste at an approved facility licensed to receive the material. Offsite disposal to landfill will only occur if the material is considered unsuitable without treatment for other uses, e.g. due to contamination

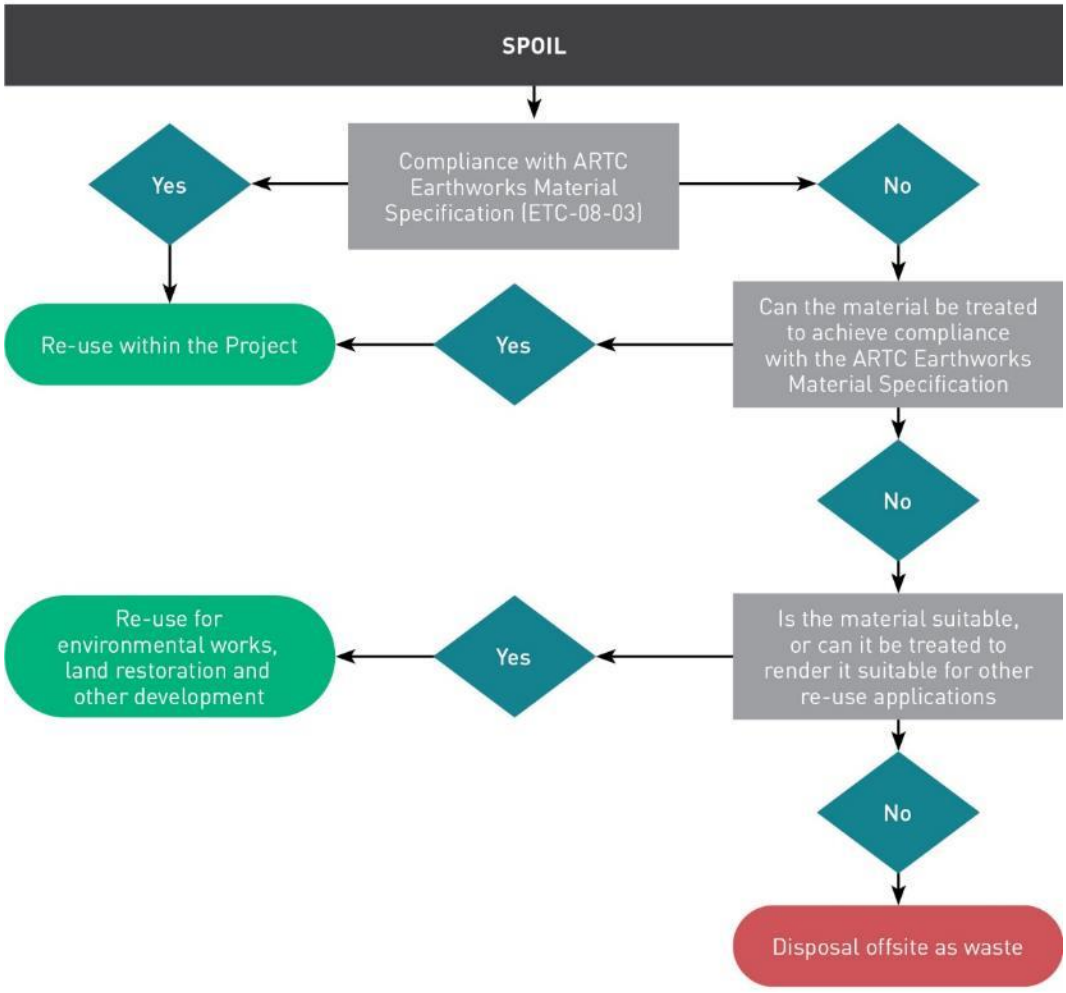


FIGURE 21.3: SPOIL MANAGEMENT HIERARCHY

21.7.1.3 Waste rock

Waste rock is a term typically derived from the resources industry, where waste rock sometimes has pyritic qualities. Chapter 9: Land resources provides information on the geology and soils generated from the Project, including management requirements in the event that acidic materials are encountered during Project activities.

No waste rock is expected to be generated from the Project.

Based on the assessment of desktop information and field investigations, rock with acid-producing qualities has not been identified within the Project disturbance footprint. All rock that is won through excavation has been assumed to be re-used on the Project and is not defined as a waste. This re-use will be subject to the material being tested to determine the waste classification and suitability for re-use, in accordance with the guidelines, specifications and CEMP implemented for the Project.

If rock is not contaminated, it may be crushed and re-used onsite as aggregate for fill, construction pads/laydown areas or road base. Under the EP Regulation, an approval for ERA 33 is not required for the extraction of material from a place for constructing a road or railway at the place. An approval for ERA 33 will only be required for the crushing, milling, grinding or screening of material exceeding 5,000 tonnes per year, if the activity is undertaken outside of the Project. It has been assumed that such activities would be undertaken by a third-party commercial operation that would be responsible for obtaining the requisite ERA to allow this activity to occur. As such, these places are not included within this assessment.

In accordance with the Draft Outline EMP (refer Chapter 23: Draft Outline Environmental Management Plan), soil conditions across the disturbance footprint will be appropriately characterised at a suitable scale through additional geotechnical surveys during the detailed design phase of the Project to inform design and required management measures.

21.7.1.4 Contaminated land

A Tier 1 Preliminary Site Investigation (contaminated land assessment) has been undertaken for the Project (refer Chapter 9: Land resources), in line with the processes and guidance detailed in the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (Cth) (ASC NEPM). As per Chapter 9: Land resources, the disturbance of existing contaminated land at the construction phase of the Project has not been identified as a significant risk (with mitigation). It should be noted that the extent and type of contamination has not yet been defined for the Project.

In accordance with the Draft Outline EMP (refer Chapter 23: Draft Outline Environmental Management Plan), a targeted contaminated land investigation will be undertaken during the detailed design phase (post-EIS). This will determine the likelihood of contaminated land, potential risks to human health/environment and required management measures. A contaminated land management strategy will be developed and implemented for the Project (refer Chapter 9: Land resources). Any contaminated land encountered as a result of Project activities will be segregated and stockpiled separately in accordance with regulatory requirements pertaining to contaminated land management and procedures identified in the Project's CEMP, including the Soil Management Sub-plan.

Prior to construction, the contractor will ensure that the requirements of Chapter 5, Division 1 and Division 2, of the EP Regulation are adhered to, particularly the testing and characterisation of regulated wastes and their intended treatment or disposal.

Chapter 20: Hazard and risk further details contaminated land that may arise as a result of the Project, providing an assessment of impacts and mitigation measures.

21.7.1.5 Potential spoil disposal locations

The Toowoomba Waste Management Centre, New Chum Landfill, Ti Tree Bioenergy and Remondis Swanbank Renewable Energy & Waste Management Facility are the closest major facilities that can accept clean fill material. The locations of these facilities are shown in Figure 21.4.

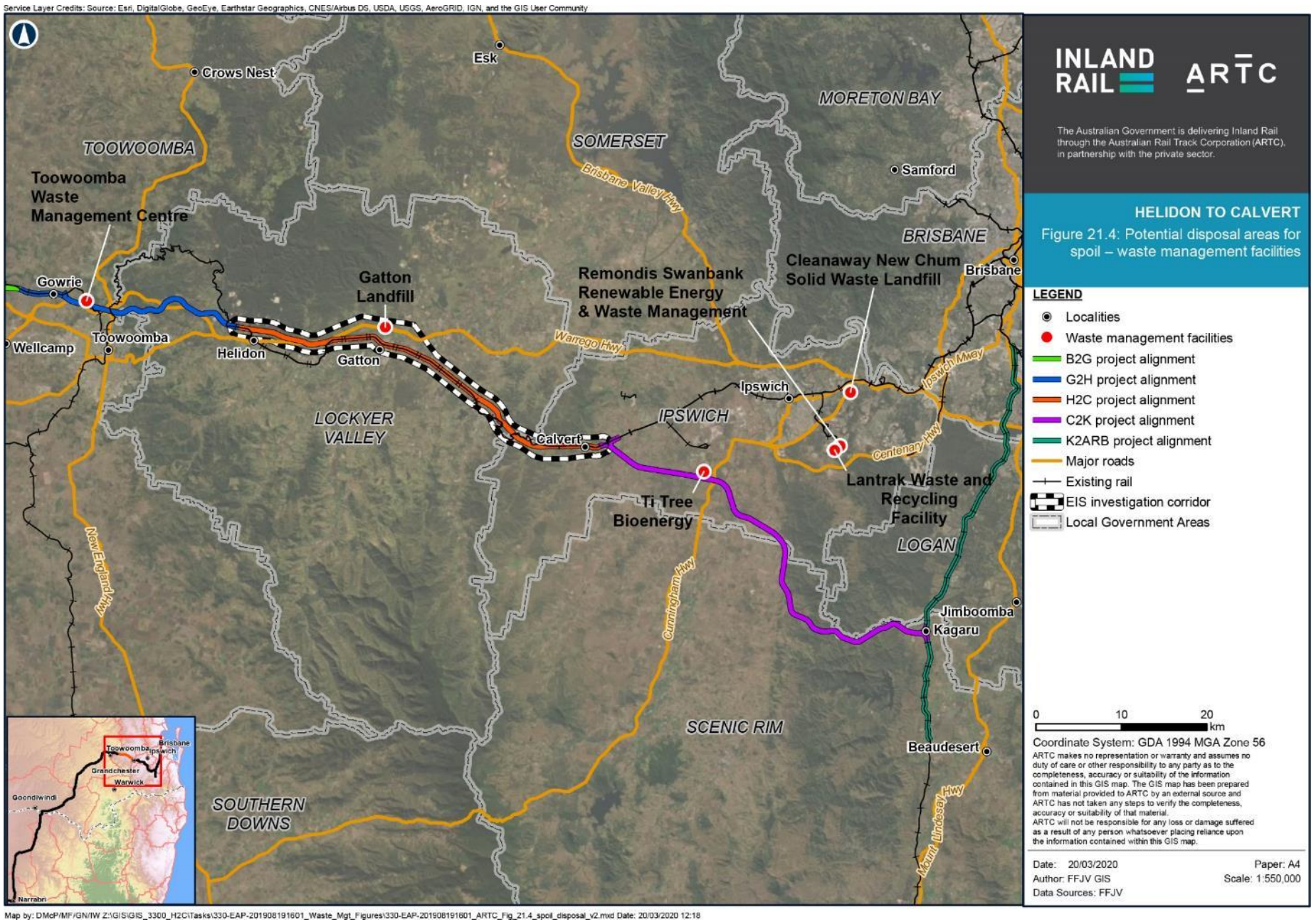
There is an opportunity for the generated spoil to be used as a daily cover at these sites. However, only New Chum Landfill, Ti Tree Bioenergy and Remondis Swanbank Renewable Energy & Waste Management Facility have the capacity to receive contaminated spoil material. Closed or closing landfills within the region, borrow areas, disused quarries and mines that require rehabilitation may also be suitable locations for receiving clean spoil that is deemed unsuitable for use within the disturbance footprint. These locations will not be licensed to accept waste and may not be able to accept contaminated spoil (if it is produced); however, exemptions may be granted to accept clean soil to assist in the partial rehabilitation. Furthermore, the acceptance of clean spoil on these sites to aid in partial rehabilitation without stockpiling is contingent on the timing of spoil generation. Appendix T: Spoil Management Strategy provides more details on management and the re-use locations for spoil.

Any spoil material that cannot be re-used due to composition and, properties and/or specification compliance will be treated to allow re-use and avoid disposal.

21.7.1.6 Spoil transport

Appendix T: Spoil Management Strategy provides the overarching principles to guide the storage, treatment, re-use and/or disposal of spoil generated during the Project construction works.

Spoil will be transported by registered road trucks, with temporary construction access roads provided along the Project. These access roads would be used to transport tunnel spoil from the portals to embankment zones. Local spoil haulage may also involve transport on public roads. Appendix U: Traffic Impact Assessment provides detailed information on the haulage routes used for the Project, assuming a worst-case scenario of 1,349,000 m^3 of spoil (excess cut) to be transported by road.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Crows Nest
Esk
MORETON BAY
TOOWOOMBA
SOMERSET
Brisbane Valley Hwy
Samford
Toowoomba Waste Management Centre
BRISBANE
Cleanaway New Chum Solid Waste Landfill
Brisbane
Gowrie
Gatton Landfill
Remondis Swanbank Renewable Energy & Waste Management
Wellcamp
Toowoomba
Helidon
Gatton
Warrego Hwy
Ipswich Mway
Ipswich
LOCKYER VALLEY
IPSWICH
Calvert
Centenary Hwy
Lantrak Waste and Recycling Facility
Ti Tree Bioenergy
LOGAN
New England Hwy
Cunningham Hwy
Jimboomba
Kagaru
SCENIC RIM
Beaudesert
SOUTHERN DOWNS
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Warwick
Goondiwindi
Narrabri
INLAND RAIL
ARTC
The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.
HELIDON TO CALVERT
Figure 21.4: Potential disposal areas for spoil – waste management facilities
LEGEND
Localities
Waste management facilities
B2G project alignment
G2H project alignment
H2C project alignment
C2K project alignment
K2ARB project alignment
Major roads
Existing rail
EIS investigation corridor
Local Government Areas
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Coordinate System: GDA 1994 MGA Zone 56
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21.7.2 Operational phase waste

It is anticipated the waste generated during the operational phase will arise primarily from maintenance activities such as rail track replacement and upgrades with estimated quantities of approximately 1,300 tonnes for rail and 11,000 sleepers for the life of the asset, which is equivalent to less than 1 per cent of Queensland's annual C&D waste generation. Other activities include site inspections, vegetation management, and general removal of litter within the Project.

The wastes anticipated to be generated during the operational phase of the Project are shown in Table 21.7. These wastes have not been further analysed because they are expected to be typical of the current networks of freight rail and, therefore, not identified as significant (refer Section 21.5.3).

TABLE 21.7: WASTE CLASSIFICATION AND QUANTITY DURING THE OPERATIONAL PHASE

Stage	Activity	Waste/resource	Waste classification
Site maintenance	Vegetation management	Vegetation	Green waste
	General maintenance	Debris, litter and packaging	General waste
	Track repair	Timber, metal, contaminated soil, paint, diesel	C&D/regulated waste
	Infrastructure maintenance	Chemical containers, scrap metal, oil spills	C&D/regulated waste
	Site visit	Oil spills, solvent spills	Regulated waste

21.7.3 Waste storage areas

Designated waste storage areas will be provided at each construction work front for sorting and segregating waste prior to collection by licensed contractors. Each storage area will be provided on hardstand and have a suitable containment system for the waste stream being stored. Good housekeeping and regular removal of residual waste would be practiced to maintain safety, facilitate identification of reusable items and minimise pests. As these waste streams are deemed insignificant, no further analysis has been undertaken with management deferring to industry standard practice.

21.8 Potential impacts

21.8.1 Potential impacts during construction and operation

The likelihood of potential impact of the generated waste during the phases of construction and operation without mitigation is shown in Table 21.8.

TABLE 21.8: LIKELIHOOD OF PROJECT'S POTENTIAL IMPACTS ON ENVIRONMENTAL VALUES

Environmental value	Potential impact	Construction	Operation (& maintenance)
Depletion of natural resources Sustainability of natural resources (e.g. construction materials, fuel and water)	Excessive use of natural resources and disposal of excess as waste to landfill	Possible	Unlikely
Available landfill capacity for waste disposal	Airspace consumption and material reduction of community access to landfill	Likely	Unlikely
Sensitive receptors: human, environment, businesses and the receiving environment: air, water bodies and surrounding flora and fauna Health and safety of the site personnel and nearby sensitive receptors Productive capability of land (i.e. Its potential for use for agricultural or other uses) The diversity of ecological processes and associated ecosystems surrounding the Project	Uncontrolled release of waste can cause contamination of land, surface waters, ground water and the dependant ecosystems, which can affect the productivity of the land, introducing new pests and diseases and changes in the ecosystem	Possible	Possible
Increased traffic and attendant disruption such as noise, dust and traffic	Increase in greenhouse gas emissions arising from waste transportation activities	Almost certain	Unlikely
Visual amenity	Decrease in visual amenity due to waste related traffic	Likely	Unlikely

21.9 Mitigation measures

The management of waste for the Project will be aligned with the waste management hierarchy. The most preferred approach is to avoid/reduce the generation of waste entirely. The effectiveness of mitigation measures will be monitored to determine their adequacy and effectiveness. The collected data will then be assessed against the targets established in the Queensland WMRRS and Section 21.7 to determine the significance of the generated waste stream on the environment.

Mitigation measures proposed for the Project include considerations in design and the additional measures to manage the environmental impacts during all phases. The impacts are initially assessed with consideration of the design mitigation measures and then reassessed to determine residual risk after the inclusion of proposed additional mitigation measures.

ARTC has an Inland Rail Environmental and Sustainability Policy (ARTC, 2018a), which provides sustainability-related commitments throughout design, construction and operation of the Project. The *ARTC Inland Rail Sustainable Procurement Policy* (ARTC, 2018b) also details commitments for sustainable procurement to drive positive economic and social outcomes, while providing a benefit to the environment through reduced resource use and greenhouse gas emissions. This policy is included in Appendix F: Corporate Policies.

21.9.1 Design considerations

The mitigation measures and controls presented in Table 21.9 have been factored into the Project design. These design measures have been identified through collaborative development and consideration of environmental constraints and issues. These design measures are relevant to the construction and the operational phases of the Project. The waste and resource management chapter has been prepared on the basis of design effort undertaken to date and further optimisation of the design will occur. It is expected that detailed design will fully characterise the material that will be generated during construction, its volume and to enhance excavated material re-use within the Project and adjacent projects.

TABLE 21.9: INITIAL MITIGATION MEASURES OF RELEVANCE TO WASTE AND RESOURCE MANAGEMENT

Aspect	Initial mitigation measures
Waste	▸ Optimisation of the Project vertical alignment to reduce the quantity of spoil material generated ▸ Permanent operational and temporary construction disturbance footprint limited to the extent required for construction to reduce clearing requirements ▸ Cut and fill balance and minimisation of transport requirements for import and landfill disposal of spoil considered.

21.9.2 Proposed mitigation measures

To manage Project risks during construction, a number of mitigation measures have been proposed for future phases of Project delivery, as presented in Table 21.10. These proposed mitigation measures have been identified to address Project-specific issues and opportunities and meet legislative requirements, accepted Government plans, policies and practices.

Table 21.10 identifies the relevant Project phase, the aspect to be managed, and the proposed mitigation measure, which is then factored into the assessment of residual risk in Table 21.12.

Chapter 23: Draft Outline Environmental Management Plan provides further context and the framework for implementation of these proposed mitigation and management measures.

TABLE 21.10: PROPOSED WASTE AND RESOURCE MANAGEMENT DESIGN OBJECTIVES AND MITIGATION MEASURES

Delivery phase	Aspect	Proposed design objectives and mitigation measures
Detailed design	Waste	▸ Cut and fill balance and minimisation of transport requirements for import/disposal of spoil to be considered further during detailed design by implementing the spoil management hierarchy presented in Appendix T: Spoil Management Strategy. ▸ Establish waste reduction targets for design and construction. ▸ A waste reduction review will be undertaken to identify opportunities to meaningfully achieve the waste reduction targets through detailed design and construction of the Project. ▸ Consideration of alternative approaches to materials used, construction and operational techniques and maintenance of a process to achieve a less resource intensive and more efficient process, in accordance with relevant design standards. For example, material specifications will consider aspects such as use of prefabricated materials, percentage of recycled content and percentage of material rejection to reduce waste generation from the Project. ▸ Establish waste reporting requirements for the pre-construction, construction and commissioning phases of the Project and incorporate into the Waste Management Sub-plan.
Pre-construction	Waste	Develop a Waste Management Sub-plan as part of the CEMP, which complies with the Project's conditions of approval and relevant regulatory requirements, including: ▸ Waste targets (or waste reduction targets) to be achieved for the Project ▸ Waste reporting requirements ▸ General protocols and performance objectives for keeping the work site clean and tidy ▸ Describe potential waste impacts, waste streams and estimated volumes ▸ Identify temporary waste storage areas and disposal locations onsite and offsite (including stockpiles and landfilling) ▸ Ensure waste disposal is undertaken in line with NEPM criteria for disposal sites ▸ Requirements for waste segregation e.g. green waste, spoil, C&D waste, general waste, regulated waste and recyclables ▸ Requirements for secure temporary storage, collection frequency and disposal/recycling requirements ▸ Effluent management for construction staff amenities ▸ Procedures and reporting/documentation requirements for ensuring waste transporters and receivers are appropriately licensed according to the type of waste ▸ Requirements for training, inspections, audits, corrective action, notification and classification of environmental incidents, record keeping, monitoring and performance objectives for handover on completion of construction.
	Hazardous waste	▸ Waste from the Project works must be tested, treated and managed in accordance with the EP Act. ▸ A hazardous material and waste survey will be undertaken prior to demolition of structures (e.g. sheds, houses/buildings). If asbestos or other hazardous materials are identified in these structures, a Hazardous Materials and Waste Management Plan will be developed and implemented as part of the Waste Management Sub-plan.

Delivery phase	Aspect	Proposed design objectives and mitigation measures
Construction and commissioning	Waste	▸ Where practicable, spoil will be re-used within the disturbance footprint through treatment, amelioration or drying, and any material that cannot be treated for appropriate re-use may then be disposed offsite. ▸ Identify opportunities to achieve waste reduction targets appropriate to the scope of the construction works. ▸ Reduce the amount of spoil generated through construction methodology. For example, the use of roadheader in tunnelling construction allows for accurate cut while maintaining efficient spoil management. ▸ Implement the Construction Spoil Management Plan as described in the Land Resources Sub-plan. ▸ All cut material of appropriate suitability for re-use will be stockpiled separately and re-used onsite, where possible. ▸ Careful specification of construction material requirements to avoid overestimation. ▸ Source good quality construction materials, in accordance with relevant design standards. ▸ Purchase construction materials in bulk to minimise packaging waste. ▸ Develop and implement administrative controls on the transportation of waste materials from the Project, within the disturbance area and offsite. ▸ Ensure plant and equipment used in the Project is appropriately maintained. ▸ Construction maintenance activities, refuelling, concrete washout will be carried out in defined locations with appropriate measures in place to reduce the potential for impacts to waterways, aquatic habitats, and groundwater. ▸ Portable toilets and amenities to be serviced and maintained to ensure efficient operation and minimise environmental risks associated with their operation and decommissioning. ▸ Contractors to adhere to the practices of the WRR Act waste and resource management hierarchy, which sets out an order of preference for options for managing waste from avoiding, to re-using, recovering, treating and disposing of waste. ▸ Appropriate waste bins, facilitating segregation of waste, to be located at key site compounds to facilitate segregation and prevent cross contamination. ▸ Comply with the waste reporting requirements established in the Waste Management Sub-plan.
	Hazardous waste	▸ Hazardous and/or contaminated waste will be classified and disposed in accordance with the Waste Management Sub-plan. ▸ Hazardous or dangerous waste (e.g. asbestos, chemicals, oils) will be correctly stored, managed and disposed of by a licensed contractor or facility and in accordance with the relevant occupational health and safety legislative and regulatory obligations, including wastes generated as a result of demolition.
Operation	Waste	▸ Maintenance activities during operations to adhere to the practices of the WRR Act waste and resource management hierarchy, which sets out an order of preference for options for managing waste from avoiding, to reusing, recovering, treating and disposing of waste.

The proposed waste and resource management mitigation measures have followed the waste management hierarchy. Where possible, the generation of waste and disposal to landfill will be avoided by limiting the land disturbance only to the footprint of the Project and by application of sustainable procurement in material quality and quantities. Any surplus material such as concrete and excavated material if it is not contaminated as per NEPM guidelines or if treated where initially found unsuitable, may be re-used as a subgrade/fill material where it conforms to the required specification. Any waste material that cannot be re-used, recycled or it is not viable to recover its energy for this Project, will be transported to nearby waste management facilities for further management. Table 21.11 represents how potential impacts can be mitigated according to a waste management hierarchy to achieve an overall reduced environmental impact.

The integrated processing design and co-generation of power is not applicable to the Project. However, there is potential for the energy stored in the organic waste material to be recovered as fuel by the production of compost. The efficiency of this process is highly subject to quantity and quality of the feedstock as well the technology used.

While initial consultation has been undertaken, further liaison with operators of waste receival facilities will be undertaken during the detailed design process (post-EIS) to inform the construction approach regarding staging of works and the assignment of waste disposal destinations from construction work fronts. This information will also be used in the development of the Waste Management Sub-plan for the Project.

TABLE 21.11: WASTE AND RESOURCE MANAGEMENT OPTIONS

Potential impact	Waste and resource stream	Classification	Avoid/reduce	Re-use/recycle	Disposal
Airspace consumption and material reduction of community access to landfill	Cleared vegetation	Green waste	minimise disturbance and clearing required, where practical	▸ Re-use logs, stumps and mulch in reinstatement areas or deliver to a licensed facility for recycling ▸ Energy stored in green waste can be recovered as fuel	▸ Not suggested
Airspace consumption and material reduction of community access to landfill Increase in greenhouse gas emissions arising from waste transportation activities	Concrete, timber, metal	C&D	Detailed design for infrastructure to accurately specify material requirements to avoid overestimation Source high-quality materials	▸ Re-use or repurpose for applications onsite ▸ Crushed concrete may be used as aggregate for fill, construction pads/laydown areas or road base ▸ Recover reusable metal including stakes, drums, wire and steel where practical ▸ Segregate and store onsite in designated areas for removal by appropriately qualified personnel to licensed facility for recycling	▸ No suggested
Excessive use of natural resources and dispose the excess as waste	Soil (topsoil)	C&D	Where practical minimise the permanent operational and temporary construction disturbance footprint	▸ Topsoil may be re-spread over batters/used for revegetation ▸ Direct placement of topsoil is preferred to stockpiling	▸ Not suggested

Potential impact	Waste and resource stream	Classification	Avoid/reduce	Re-use/recycle	Disposal
Excessive use of natural resources and dispose the excess as waste	Spoil	C&D	Reduce the amount of spoil being generated through design and construction methodology	▸ Re-use in the Project to fill embankments for rail line and drainage ▸ Re-use for reinstatement onsite ▸ Re-use as an embankment fill for other Inland Rail projects ▸ Re-use for land reclamation or remediation works for quarries and borrow pits ▸ Treat unsuitable materials to required re-use standards	▸ Disposal of excess spoil as waste at an approved facility licensed to receive the material only if not suitable for re-use and recycling
Airspace consumption and material reduction of community access to landfill	Debris and litter	General waste	Buy in bulk to minimise packaging waste	▸ Reduce, re-use or recycle wastes where possible ▸ Provide separate recyclable materials receptacle near site offices ▸ Transportation of recyclable materials by appropriately qualified personnel to licensed facility for recycling	▸ Only for materials that could not be recycled or re-used ▸ Collection in covered bins/containers with appropriate signage ▸ Service regularly to avoid vermin and pests ▸ Transportation of waste by appropriately qualified personnel to licensed facility
Uncontrolled release of waste can cause contamination of land, surface waters and dependant ecosystems, which can lead to vegetation dieback, reduced quality of crops and animal husbandry	Hazardous substances (i.e. paint, solvents and chemicals) Waste oil, including absorbent materials, containers, filters and rags	Regulated waste	Avoid spills through implementation of standard operating procedures Ensure staff are trained in the correct use of equipment	▸ Collect in appropriately bunded and covered area, where practical	▸ Waste tracking systems to be maintained for the disposal of regulated waste ▸ Transportation of waste by appropriately qualified personnel to licensed facility

21.9.3 Impact assessment

In the assessment of potential impacts, the methodology in Chapter 4: Assessment methodology for qualitative risk assessment of potential environmental values was followed. The outcome is in Table 21.12, where the initial rating assumes the design parameters in Table 21.9 have already been implemented and the residual risks are outcomes of the proposed design objectives and mitigation measures in Table 21.10. The initial risk levels were then compared to the residual risk levels to assess the effectiveness of the mitigation measures.

The medium pre-mitigated risk attributed to airspace consumption has assumed the spoil generated from the Project will not be re-purposed within other parts of the Project and/or adjoining Inland Rail projects (such as Gowrie to Helidon and Calvert to Kagaru). However, with the implementation of proposed mitigation measures, including re-use within the Project as fill or for reinstatement works, the risk of potential impact is downgraded to low.

Appendix T: Spoil Management Strategy discusses the management options for spoil in more detail.

In summary, the following options can be considered for the management of spoil:

- Use in the construction of Rail Maintenance Access Roads
- Fill material for other Inland Rail projects including Gowrie to Helidon and Calvert to Kagaru
- Rehabilitation of the existing quarries around Helidon
- Daily cover for waste management facilities in the region
- Fill material for the development of the Gatton West Industrial Zone project
- Fill material for the extension of the rail formation for future crossing loops
- Disposal at a designated waste facility that accepts soil.

TABLE 21.12: WASTE AND RESOURCE MANAGEMENT RISK ASSESSMENT

		Initial risk			Residual risk		
Potential impact	Phase	Likelihood	Consequence	Risk	Likelihood	Consequence	Risk
Excessive use of natural resources and dispose of the excess as waste	Construction	Possible	Moderate	Medium	Unlikely	Moderate	Low
	Operation & maintenance	Unlikely	Minor	Low	Unlikely	Minor	Low
Airspace consumption and material reduction of community access to landfill	Construction	Likely	Minor	Medium	Unlikely	Minor	Low
	Operation & maintenance	Unlikely	Minor	Low	Unlikely	Minor	Low
Uncontrolled release of waste	Construction	Possible	Moderate	Medium	Unlikely	Moderate	Low
	Operation & maintenance	Possible	Moderate	Low	Unlikely	Moderate	Low
Increase in greenhouse gas emissions arising from additional waste transportation activities	Construction	Almost certain	Minor	Medium	Possible	Minor	Low
	Operation & maintenance	Unlikely	Minor	Low	Unlikely	Minor	Low
Decrease in air quality and visual amenity due to waste related traffic	Construction	Likely	Minor	Medium	Possible	Minor	Low
	Operation & maintenance	Unlikely	Minor	Low	Unlikely	Minor	Low

21.10 Cumulative impacts

The construction of the Project will generate a number of waste streams that will be managed by maximising opportunities to avoid or reduce, re-use and recycle using standard industry practice. However, there will be waste streams for which this cannot be achieved, and these will be disposed of within appropriately licensed facilities.

Cumulative impacts arising from waste management activities on surrounding environmental values and sensitive receptors will largely be the product of waste disposal adversely affecting airspace consumption of local waste management infrastructure, thereby reducing the local community's access to these services.

The projects considered to have a potential for cumulative impacts relating to waste and resource management are those with an overlapping construction timeframe and potential for shared demand on existing waste management facilities. In this context, the projects that may result in cumulative impacts have been identified as:

- Gowrie to Helidon (ARTC)
- Calvert to Kagaru (ARTC)
- Bromelton State Development Area
- InterLinkSQ.

Gowrie to Helidon and Calvert to Kagaru projects are both ARTC projects and, despite the potential for cumulative impacts on receiving waste management facilities, ARTC will be able to liaise with the relevant contractors and operators to negotiate appropriate waste disposal arrangements across the three Inland Rail projects.

The spoil that is generated from the Project alone and the adjoining Inland Rail projects have been assessed independently. The strategy for the disposal of the spoil is consistent with the waste management hierarchy and seeks to reuse the material for beneficial purposes in close proximity to the Project, where possible. Disposal to landfill will be avoided, as much as possible. In the event that landfill is identified as the most appropriate location for the spoil, the material will be used as an interim cover in addition to final closure capping and rehabilitation.

As for Bromelton State Development Project and InterLinkSQ, the construction period may extend to 2037 reducing the potential construction phase overlap with the Project construction timeframe. Spoil material and C&D waste such as concrete from these projects can be crushed up and be used as an aggregate or fill if determined to be geotechnically suitable which consequently will reduce the need to borrow material from quarries and therefore reducing the overall environmental impact of the Project. The risk of cumulative impacts from the interaction of these projects with the Project is considered to be of low significance with mitigation and management measures in place. However, this can be specifically determined prior to the commencement of construction when exact quantities, construction methods and Project-specific disposal locations have been determined.

21.11 Conclusion

The waste quantities and streams generated during construction, operation and maintenance of the Project will vary in different phases. The proposed construction works will produce the greatest quantity of waste mainly categorised as C&D, which includes concrete, steel, timber and spoil in addition to the green waste, will be generated as result of clearing and grubbing activities. The waste generated during the operation and maintenance phase will mainly include general waste, green waste and some C&D and regulated waste arising from repair and maintenance works.

No significant waste streams (with the exception of spoil) have been identified for the Project. As waste streams are not considered significant, they have been categorised at a broad level and will be managed in accordance with standard industry practice and accommodated within the capacity of existing waste management arrangements that exist in the Project locality.

The control measures recommended to manage the waste streams are aligned with the waste management hierarchy. The recommendations will effectively mitigate the potential impact on the environmental values and the sensitive receptors. Avoidance is the priority and landfill disposal is the least preferred and last option.

Disposal facilities that accept clean fill/contaminated soil include: Ti Tree Bioenergy; Toowoomba Waste Management Centre; New Chum Landfill; and, Remondis Swanbank Renewable Energy & Waste Management Facility. The requirements and capacity of each facility to accept spoil will be determined at the time of construction and prior to disposal.

A range of potential impacts associated with waste from the execution of the Project have been identified and mitigation measures for those impacts proposed. Impacts will be managed throughout the life of the Project. Performance and monitoring requirements have also been identified for the management of the generated waste streams. The mitigation measures and the monitoring requirements will be assessed again during the detail design and construction phases to ensure their currency and applicability to ensure:

- Implementation of waste management strategies into the detail design
- Development and implementation of a Waste and Resource Management Sub-plan within the CEMP
- Development and implementation of appropriate procedures for the storage, handling, treatment and transport of waste for all Project phases
- Spoil management strategy within the CEMP. Wastes generated during operation of the Project are expected to be typical of the current networks of freight rail and assumed to be of insignificant quantities when compared to wastes generated during construction of the Project.

The proposed mitigation measures will be implemented to reduce the impact of the generated waste streams on the environment that could occur during handling, treatment, storage and transport throughout the lifecycle of the Project. This will include avoiding the generation of waste by optimising the design, followed by implementation of sustainable procurement, and later during the Project delivery, by promoting re-using and recycling generated waste material. It is anticipated that with implementation of effective waste control measures, the Project will not pose significant risk to the surrounding environment and sensitive receptors as a result of waste generation and management.

The volume of waste generated by each of the waste streams will be further refined during detailed design (post-EIS) to more accurately assess the receiving waste management facilities and waste disposal options for the Project.