CHAPTER 23

Waste and resource management

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT

ARTC | INLAND RAIL
An Australian Government Initiative

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23. Waste and resource management

23.1 Summary

The main wastes generated during construction include spoil (excavated material), vegetation, demolition waste and ballast. Earthwork requirements would be subject to further refinement during detailed design to minimise the final volume of spoil as far as practicable, and options to reuse spoil and ballast would be investigated prior to construction. Construction waste generation would not have a significant impact on the environment with the implementation of the Waste Management Sub-plan for the proposal, which would consider waste types, estimated quantities for management, excavated material management, and mitigation strategies, as well as contingencies for any unexpected waste volumes that may arise throughout construction of the proposal.

Operational waste, including general waste streams and waste generated from track maintenance procedures, would be managed in accordance with ARTC's existing operational controls, and the impact is expected to be minimal.

23.2 Approach

This chapter is an assessment of the potential waste and resource management associated with the Albury to Illabo (A2I) section of the Inland Rail program (the proposal).

23.2.1 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs) related to waste and resource management, and where in the environmental impact statement (EIS) these requirements have been addressed, are detailed in Appendix A: Secretary's Environmental Assessment Requirements.

23.2.2 Relevant legislation, policies and guidelines

The assessment was undertaken in accordance with the waste hierarchy outlined in the *Waste Avoidance and Resource Recovery Act 2001* (NSW). This hierarchy, which is considered at all stages of design development and construction planning, involves:

- avoiding unnecessary resource consumption
- promoting resource recovery, including reuse, reprocessing, recycling and energy recovery
- disposing of wastes appropriately, where avoidance and recovery are not feasible.

The assessment was also undertaken with reference to the following:

- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)—the POEO Act establishes the procedures for environmental control and for issuing environmental protection licences, including for matters such as waste
- Protection of the Environment Operations (Waste) Regulation 2014 (the Waste Regulation)—the Waste Regulation regulates matters such as the obligations of consignors (producers and agents), transporters, and receivers of waste in relation to waste transport licensing and tracking requirements
- *NSW Waste Avoidance and Resource Recovery Strategy 2014–2*1 (NSW EPA, 2014a)
- *Waste Classification Guidelines* (NSW Environment Protection Authority (EPA), 2014b)
- *National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 1998* (NEPC, 1998)
- *NSW Sustainable Design Guidelines Version 4.0* (Transport for NSW (TfNSW), 2017b)
- ARTC Earthworks and Materials Management Framework (ARTC, 2020).

23.2.3 Methodology

The assessment involved:

- reviewing the regulatory frameworks relating to waste management
- identifying potential waste-generating activities
- identifying the likely classification of waste in accordance with relevant legislation and guidelines
- estimating each waste type likely to be generated
- identifying measures reflecting the waste hierarchy (avoid, reduce, re-use/recycle and dispose).

Estimates of waste arising from the proposal are indicative only and may differ from the amount actually generated. Nonetheless, the measures remain applicable to the proposal in minimising resource demand, waste generation and landfill disposal.

23.2.4 Key risks

An environmental risk assessment was undertaken for the proposal (refer Appendix E: Environmental risk assessment). Potential impacts associated with waste include:

- generation of excess spoil that cannot be reused onsite (unsuitable for reuse or insufficient space) and needs to be disposed of
- inappropriate management of waste generated during construction
- increased resource demand on local and regional resources resulting in a resource becoming in short supply
- inappropriate management of waste generated during maintenance.

The proposal is unlikely to produce significant amounts of waste during operation due to the general nature of operation. Most of the waste produced is expected to be from the construction phase; however, designs have been optimised to minimise waste generation from the proposal as far as practicable. Based on the risk assessment of the proposal, these are considered to be of low to medium risk.

23.3 Impact assessment—construction

23.3.1 Waste-generating activities

The activities likely to generate potential waste during construction of the proposal relevant to each precinct are outlined in Table 23-1.

TABLE 23-1 ACTIVITIES LIKELY TO GENERATE POTENTIAL WASTE DURING CONSTRUCTION OF THE PROPOSAL

Description of works	Typical waste streams
Bridge modification/replacement	▸ Excavated material ▸ Concrete piping ▸ Mixed demolition waste ▸ Mixed construction waste.
Footbridge removal/replacement	▸ Mixed demolition waste ▸ Mixed construction waste.
Gantry works	▸ Mixed demolition waste ▸ Mixed construction waste.
Track lowering	▸ Excavated material ▸ Vegetation cleared ▸ Track replacement (sleepers, ballast, rail) ▸ Concrete piping ▸ Mixed demolition waste ▸ Mixed construction waste.
Track slews and related works	▸ Excavated material ▸ Track replacement (sleepers, ballast, rail) ▸ Concrete piping ▸ Mixed demolition waste ▸ Mixed construction waste.

Waste from site preparation may include green waste such as vegetation, roots and tree stumps, as well as general rubbish and debris.

Local accommodation at various towns would be used for construction staff. In addition, temporary site compounds and storage facilities, some with office facilities and amenities would be established for the construction of the proposal. The establishment of these site compounds would generate small quantities of construction waste such as metals, wood, concrete, etc.

Wastewater generated by operating site compounds would include greywater and sewerage from site amenities and wash-down water used for vehicles and amenities, which would be transported for offsite disposal.

Food waste, wastepaper and cardboard, plastic, metal (including aluminium cans), glass, and electrical waste would be generated by construction staff, as well as from any office facilities included within the site compounds. Maintenance fluids generated during plant and equipment operation include paints, solvents, lubricants, and oils.

Hydrocarbon and water mixtures or emulsions would be generated in plant and equipment wash-down areas within site compounds.

Waste generated during construction would include packaging waste such as pallets, plastic film wrap, cable reels, and metal straps/bands and by-products of the construction process such as concrete, wood, metal, and ballast.

23.3.2 Estimated quantities and classification of waste to be generated

Table 23-2 summarises the potential waste types, their waste class, and quantities estimated to be generated during construction.

These estimations, and their waste classifications, would be confirmed during further design development and incorporated into the Construction Environmental Management Plan (CEMP) prepared for the proposal. This includes assessment of excess excavated material to determine the waste classification and required management response, and would be carried out in accordance with ARTC's *Earthworks and Materials Management Framework*. Section 23.5.1, section 20.3.2 and section 20.5.2 further discusses the hierarchy for managing excavated material and the approach to manage potentially contaminated soils.

TABLE 23-2 CONSTRUCTION WASTE CLASSIFICATION AND QUANTITIES

		Estimated quantity per precinct*			
Waste type	**Waste classification (EPA NSW)**	**Albury (m^3)**	**Greater Hume–Lockhart (m^3)**	**Wagga (m^3)**	**Junee (m^3)**
Excavated material	General solid waste (non-putrescible)*	27,300	7,800	28,400	68,500
Vegetation cleared	General solid waste (non-putrescible)	1,200	–	400	80
Track replacement (sleepers, ballast, rail)	General solid waste (non-putrescible)	3,800	2,200	6,100	5,200
Concrete piping	General solid waste (non-putrescible)	25	–	10	–
Mixed construction waste	General solid waste (non-putrescible)	45	–	40	15
Mixed demolition waste	General solid waste (non-putrescible)	100	75	550	400
Domestic waste (garbage)	General solid waste (putrescible)	200	50	150	100
Domestic waste (commingles)	General solid waste (non-putrescible)	200	50	200	100
Domestic waste (cardboard)	General solid waste (non-putrescible)	200	50	200	100
Domestic waste (food organics)	General solid waste (putrescible)	20	5	20	10

* subject to classification of excavated material, including contamination.

As discussed in Technical Paper 13: Contamination, spoil or material being reused onsite would need to be tested to inform waste classification and/or beneficial reuse of spoil. As the design of the proposal progresses, further investigation during this stage would assist in informing waste management (including management of contamination) during construction.

Note that the above waste types are provided as general categories only, and should not be considered an exhaustive list of material types and/or volumes. Examples of additional waste streams that may generated include:

- metal from welding and temporary and permanent fencing
- aggregate from track works
- timber from temporary and permanent fencing
- electrical and electronic waste from site-office facilities and public utility works
- waste from vehicle/plant equipment.

23.3.3 Impacts of improperly managed waste

Potential impacts associated with aspects of waste generation and management during construction are outlined in Table 23-3. Construction waste management activities would not have a significant impact on the environment with the implementation of the mitigation and management measures outlined in section 23.5.

TABLE 23-3 IMPACTS OF IMPROPERLY MANAGED WASTE

Waste lifecycle	Impacts of improperly managed waste
Waste generation, including excavation and handling	▸ Dust from excavation, handling and movement of waste onsite ▸ Erosion and sedimentation due to runoff from excavations ▸ Mobilisation of acid sulfate or saline soils, where present ▸ Sediment laden/contaminated runoff and leachate generation, which, if located near to receiving watercourses, can impact water quality ▸ Noise from plant and equipment movement.
Waste storage and separation	▸ Odours and dust from stockpiling/storage of spoil and other wastes ▸ Cross-contamination of wastes due to improper segregation ▸ Erosion and sedimentation due to runoff from temporary stockpiles ▸ Sediment laden/contaminated runoff and leachate generation, which, if located near to receiving watercourses, can impact water quality ▸ Contamination of soils due to improper storage.
Waste transportation and disposal	▸ Dust from loading waste onto vehicles and movement of waste collection on haul roads ▸ Road traffic noise from waste collection vehicles and from movement of spoil ▸ Traffic due to haulage of spoil to reuse locations (such as use for fill) and/or disposal locations ▸ Odours from loading waste onto vehicles and movement of waste collection vehicles to disposal or recycling facilities ▸ Mud tracking on road from waste collection vehicles ▸ Regulatory non-compliance ▸ Contamination of recycling facilities/landfills ▸ Contamination of soils, groundwater and/or surface water.

23.3.4 Waste and stockpile locations

Waste would be stored temporarily within the proposal site, including at compounds, before being transferred offsite for recycling and disposal. Stockpiles would be contained within the areas shown in figures 8-1 to 8-14 in Chapter 8: Construction of the proposal. Where temporary stockpiles are required outside of these areas, stockpiles would be fully contained within the proposal site. The volume of each stockpile would vary during the construction period according to the construction worked being carried out.

23.3.5 Offsite recycling and waste disposal

A majority of rural landfills are operated by local councils that only accept domestic waste. Given this, larger landfills and transfer stations are the preferred waste facilities for disposal as they generally accept both domestic and commercial waste. Arrangements would be made with suitable waste-management facilities to ensure that the waste types and quantities from the proposal can be accepted prior to haulage.

Table 23-4 lists some of the waste management facilities located within the region that may be considered for the disposal of waste from the proposal.

TABLE 23-4 LOCAL WASTE FACILITIES

Facility name	Waste types accepted
Albury Waste Management Centre	General solid waste—construction and demolition waste Contaminated hazardous waste (including asbestos) Green waste
Gregadoo Waste Management Centre	General putrescible waste Green waste Unsorted construction and demolition waste (penalty rate applies for inclusion of >20% recoverable materials)
Junee Landfill Facility	Green waste Demolition/Trade waste

23.4 Impact assessment—operation

23.4.1 Waste-generating activities

Waste generated from operating activities of the proposal are likely to be minimal; most of the waste is expected to come from track maintenance procedures.

Small quantities of green waste may be generated during maintenance activities as a result of vegetation control, herbicide use and maintenance of the entire rail corridor. Other general debris and litter are expected to be collected during maintenance under existing ARTC operations.

Maintenance of plant and vehicles would be conducted in line with existing ARTC provisioning centres and do not form part of the proposal; therefore, any waste produced from plant and vehicle maintenance during operation has not been considered further in this assessment.

23.4.2 Classification of waste to be generated

A summary of the waste types, and classification predicted to arise during operations, is in Table 23-5.

TABLE 23-5 OPERATIONAL WASTE CLASSIFICATION AND QUANTITIES

Activity	Waste type	Waste classification
Vegetation and landscaping maintenance	Green waste	General solid waste (non-putrescible)
Track maintenance	Excavated material	General solid waste (non-putrescible)
	Timber	General solid waste (non-putrescible)
	Concrete	General solid waste (non-putrescible)
	Electricals	General solid waste (non-putrescible)
	Rubbish and debris	General solid waste (non-putrescible)
	Waste metal	General solid waste (non-putrescible

23.4.3 Potential impacts

Potential impacts associated with waste generation and management during operation would be consistent with those identified for construction of the proposal (refer to section 23.3.3); however, impacts would be minor in comparison due to the much smaller quantities generated. Operational waste, including general waste streams, would be managed in accordance with ARTC's existing operational controls, and the impact is expected to be minimal.

23.5 Mitigation and management

23.5.1 Approach to mitigation and management

Approach to mitigation and management

ARTC is committed to minimising the environmental impact of the proposal and is investigating opportunities to reduce actual impact areas where practicable. Mitigation and management measures for waste can be incorporated into the design, construction and operation of the proposal, in line with relevant waste regulations and existing ARTC policy, in order to ensure consistency in the waste management procedures throughout the entirety of the proposal.

Waste management during construction and/or operation would also be undertaken in accordance with ARTC's existing procedures, relevant environment protection licences and applicable ARTC resource recovery orders and exemptions. Implementation of these measures would help ensure that waste from the proposal is managed in accordance with any legislative requirements for waste disposal and waste tracking.

The Waste Management Sub-plan (WMP) for the proposal would form part of the Construction Environmental Management Plan (CEMP) for proposal. The WMP would cover waste types, estimated quantities for management, excavated material management and mitigation strategies as well as contingencies for any unexpected waste volumes that may arise throughout construction of the proposal. Waste auditing and monitoring would be undertaken to ensure that the WMP is scaled with actual waste volumes.

The WMP would comply with the conditions of approval, relevant regulatory requirements including waste and occupational health and safety legislation, and industry standards and guidelines as well as Infrastructure Sustainability (IS) requirements.

The implementation of these mitigation measures would ensure impacts from potential residual risks or waste arisings from the proposal are minimised.

Waste management hierarchy

All wastes generated during the construction and operation of the proposal are to be effectively stored, handled, treated, reused, recycled and/or disposed of lawfully and in a manner that protects environmental values. Waste generated from the proposal will be managed in line with the waste management hierarchy that aims to maximise waste diversion from landfill. Principles of the waste management hierarchy are described in Table 23-6.

TABLE 23-6 WASTE MANAGEMENT HIERARCHY

Activity	Approach
Avoid	Maximise efficiency and avoid unnecessary consumption through avoiding waste-generating products and behaviours.
Reduce/treat	Maximise efficiency and avoid unnecessary consumption through reducing the quantities of waste-generating materials and behaviours required to be undertaken within the proposal.
Re-use/recycle	Re-use, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources.
Dispose	Some types of waste, such as hazardous chemicals or asbestos, cannot be safely recycled and direct treatment or disposal is the most appropriate management option.

The principles of the waste management hierarchy would be applied for each waste type. Note that not all activities in the hierarchy would be applicable and some waste types that are not able to be reused or treated may require disposal.

Waste segregation

Throughout the proposal, waste would be segregated into six different waste streams to minimise contamination (and improve the quality of materials for recycling) as well as increase waste diversion from landfill. The proposed approach to managing the different types of construction waste in accordance with the waste management hierarchy, including measures to facilitate segregation and prevent cross contamination, are in Table 23-7.

TABLE 23-7 CONSTRUCTION WASTE MANAGEMENT MEASURES

Waste type	Hierarchy	Management measure and reduction opportunities
Green waste (green waste and organics)	Avoid	Clearing would be minimised as far as practicable by placing temporary infrastructure in cleared areas, as well as optimisation of the construction footprint to reduce the extent of clearing.
	Reduce	Areas to be cleared would be marked to reduce incidental clearing.
	Re-use	As far as practicable, cleared material would be chipped, mulched and stockpiled for reuse during finishing works. Materials with special habitat value, such as hollow bearing logs or trees, would be selectively removed for re-use or placed in nearby vegetated areas.
	Dispose	Noxious weeds would be disposed of in accordance with relevant guidelines/requirements.
Rubbish and debris (general waste)	Avoid	All personnel onsite would be mindful of consumption behaviours to avoid generating waste where possible.
	Reduce	All personnel onsite would be provided with waste training on how to use the waste bin system at each site compound and the level of source separation of waste required onsite prior to drop-off at site compounds.
	Dispose	Any rubbish or debris that is not recyclable would be placed in the general waste bin for collection by an authorised contractor and disposed of offsite.
Food waste (general waste)	Recycle	Food waste that is free from contamination (i.e. no plastics, metals or paper/cardboard) would be stored in organics bins at each site compound, for collection by an authorised contractor, and sent for composting offsite.
	Dispose	Any food waste that is contaminated would be placed in the general waste bin at each site compound, for collection by an authorised contractor, and disposed of offsite.
Wastewater (other)	Dispose	Wastewater/sewage from site compound amenities/ablutions would be removed by an authorised contractor for disposal in accordance with regulatory requirements.
Excavated material (other)	Reduce	The proposal is designed to adhere to the natural ground profile, where practicable, in order to reduce earthworks.
	Re-use	All excavated material is expected to be re-used either for track formation/construction where practicable in accordance with ARTC's *Earthworks and Materials Management Framework*.

Waste type	Hierarchy	Management measure and reduction opportunities
	Recycle	Surplus material that cannot be re-used is to be considered for onsite recycling, where practicable.
	Dispose	Only small quantities of contaminated spoil would require offsite disposal at a licensed facility. Any surplus material may also be re-used offsite where the requirements of ARTC's resource recovery order and exemption issued by the NSW EPA for excavated material* is met.
Topsoil (other)	Re-use	Topsoil would be stockpiled for re-use during rehabilitation as far as practicable. Stockpiles would be managed to maintain soil structure and quality.
	Treat	Low-quality topsoil would be treated with ameliorants to improve structure and fertility.
	Recycle	Topsoil that cannot be re-used is to be considered for onsite recycling, where practicable.
	Dispose	Surplus or unusable topsoil would be disposed of at locations within the rail corridor where it does not result in adverse changes in flood or overland flow behaviour, or re-used offsite where the surplus topsoil meets the requirements of ARTC's resource recovery order and exemption issued by the NSW EPA for excavated material.*
Concrete (other)	Avoid	Precast elements would be used where practicable (e.g. sleeper and culverts). Procurement of surplus concrete powder would be avoided by adhering to the *Sustainable Procurement Guide* and the *NSW Government Resource Efficiency Policy*.
	Re-use	Sleepers would be reclaimed and re-used where appropriate in line with ARTC procedures.
	Recycle	Concrete waste would be crushed and recycled, where practicable.
	Dispose	Concrete waste that cannot be recycled would be collected and stored in designated storage areas for offsite disposal by an authorised contractor.
Ballast	Avoid	Procurement of surplus ballast would be avoided by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).
	Recycle	Surplus ballast that cannot be re-used is to be considered for onsite recycling, where practicable.
	Dispose	All unusable ballast would be placed into spoil mounds, or re-used offsite where the requirements of ARTC's resource recovery order and exemption issued by the NSW EPA for excavated material* is met.
Metal	Avoid	Procurement of surplus metal, including rail, would be avoided by adhering to the procurement plan. Scrap metal would be reduced by limiting offcuts.
	Recycle	Suitable rail offcuts or scrap metal (including metal bands from packaging of construction materials and hot waste from welding) would be reclaimed and reused as per ARTC procedures. Any materials not reused onsite would be stored for collection by an authorised contractor and recycled offsite. Market demand for this recyclable waste would also be considered.
Wood (green waste and organics)	Avoid	Procurement of surplus wood would be avoided by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b)..
	Re-use	Wood waste or treated wood would be stored onsite for re-use, where practicable.
	Recycle	Wood waste or treated wood that cannot be re-used onsite (including cable reels from packaging) would be collected in designated recycling containers for offsite disposal by an authorised contractor, where recycling is considered feasible. Market demand for this recyclable waste would be considered.
	Dispose	Any contaminated or treated wood that is not suitable for recycling or does not meet the ARTC's resource recovery order and exemption for waste timbers will be stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Glass (paper, cardboard, cans and bottles)	Recycle	Glass waste would be stored in dedicated glass bins at each site compound, for collection by an authorised contractor and recycled offsite, where feasible.
	Dispose	Where recycling is not considered feasible, the waste would be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Plastic	Avoid	Procurement of surplus plastic would be avoided by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).

Waste type	Hierarchy	Management measure and reduction opportunities
	Recycle	Plastic waste would be stored in recycling bins at each site compound, for collection by an authorised contractor and recycled offsite.
	Dispose	Where recycling is not considered feasible, the waste would be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Rubber (other)	Avoid	Procurement of surplus rubber (e.g. gloves, earplugs, tyres) would be avoided by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).
	Dispose	Rubber waste will be disposed of in the general waste bin for collection by an authorised contractor for offsite disposal.
Paper (paper, cardboard, cans and bottles)	Avoid	Procurement of surplus paper would be avoided as far as practicable by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).
	Reduce	Wastepaper from office/administration facilities would be minimised as far as practicable by enabling 'secure print' feature on all printers and by encouraging double-sided printing.
	Recycle	Wastepaper would be stored in recycling bins at each site compound, for collection by an authorised contractor, and recycled offsite, where feasible.
	Dispose	Where recycling is not considered feasible, the waste would be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Cardboard (paper, cardboard, cans and bottles)	Avoid	Procurement of surplus cardboard would be avoided as far as practicable by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).
	Recycle	Waste cardboard would be stored in recycling bins at each site compound, for collection by an authorised contractor, and recycled offsite, where feasible.
	Dispose	Where recycling is not considered feasible, the waste would be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Aluminium cans (paper, cardboard, cans and bottles)	Recycle	Aluminium scraps would be stored in recycling bins at each site compound, for collection by an authorised contractor, clubs or charities, and recycled offsite.
Electrical waste (other)	Avoid	Procurement of surplus appliances and cabling would be avoided as far as practicable by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).
	Re-use	Product stewardship arrangements would be sought, with a view to some electrical appliances being re-used under return to supplier arrangements.
	Recycle	Electrical waste would be stored in dedicated bins at each site compound, for collection by an authorised contractor, and recycled offsite, where feasible. Market demand for this recyclable waste would also be considered.
	Dispose	Where recycling is not considered feasible, the waste would be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite drop off.
Oil, grease, lubricants, oily rags and filters (general waste)	Avoid	Procurement of surplus oil, grease, and lubricants would be avoided as far as practicable by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).
	Recycle	Only waste oil and oil filters would be stored at each site compound for collection by an authorised contractor, and recycled offsite, where feasible.
	Dispose	The waste would be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal. Where feasible, containers holding oil, grease, and lubricants would be washed prior to disposal or stored separately for disposal as hazardous waste.
Pallets (general waste)	Avoid	Procurement of surplus pallets would be avoided as far as practicable by adhering to the *Sustainable Procurement Guide* (DoE, 2020) and the *NSW Government Resource Efficiency Policy* (OEH, 2019b).
	Reduce	Delivery of material on pallets would be limited as far as practicable. If materials have to be delivered to site on pallets, ensure that pallets are returned to the supplier at time of delivery, where practicable.

Waste type	Hierarchy	Management measure and reduction opportunities
	Re-use	Product stewardship arrangements would be sought, with a view to pallets being re-used under the stewardship of the supplier.
	Recycle	Options to recover wood from pallets by chipping, for re-use as mulch, would be pursued where practicable (i.e. if untreated and uncontaminated).
	Dispose	Wood pallets not suitable for reuse or recycling would be stored in designated waste storage areas for collection by an authorised contractor for offsite drop-off.

* Excavated material under ARTC's excavated material 2020 order and exemption includes soil, sand, ballast, rock or aggregate that is derived through activities within the rail corridor, and that satisfies the requirements of that order and exemption.

TABLE 23-8 OPERATIONAL WASTE MANAGEMENT MEASURES

Waste type	Hierarchy	Management measure and reduction opportunities
Green waste (green waste and organics)	Re-use	As far as practicable, green waste generated from maintenance activities would be chipped, mulched and re-used for vegetation management or collected by an authorised contractor and recycled offsite.
	Dispose	Noxious weeds would be disposed of in accordance with relevant guidelines/requirements.
Rubbish and debris (general waste)	Recycle	Rubbish and debris and any unexpected waste encountered during general track and corridor maintenance may include spoil, wood, concrete, electrical waste and other litter. Such wastes would be collected by an authorised contractor and recycled offsite, where recycling is considered feasible.
	Dispose	Where rubbish, debris and litter are not suitable to be reused, the waste would be collected by an authorised contractor and disposed offsite at a suitably licensed facility.

23.5.2 Mitigation measures

Measures that will be implemented to address potential impacts on waste and resource management measures are listed in Table 23-9.

TABLE 23-9 WASTE AND RESOURCE MANAGEMENT MITIGATION MEASURES

Stage	Ref.	Impact/issue	Mitigation measure
Detailed design/ pre-construction	WM1	Excess waste generation	Detailed design would include measures to minimise spoil generation as far as practicable. This would include a focus on optimising the design to minimise spoil volumes and the reuse of material onsite.
Detailed design/ pre-construction	WM2	Management of spoil	A spoil management strategy would be developed to define the preferred approach to managing spoil. The strategy would include: ▸ confirming spoil quantities ▸ undertaking appropriate investigations and surveys, including geotechnical investigations ▸ consideration of the approvals and land application of waste exemptions required, associated lead time and any associated sampling and reporting obligations ▸ defining the preferred option for reusing and/or disposing of any spoil that cannot be reused ▸ the outcomes of the strategy would inform the construction waste management sub-plan.
Construction	WM3	Construction waste and spoil management	All waste generated would be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014a) and disposed of in accordance with the relevant requirements of the Protection of the Environment Operations (Waste) Regulation 2014.
Operation	WM4	Operation waste management	Operational waste, including general litter clean up, would be managed in accordance with ARTC's existing operational maintenance requirements and the waste hierarchy principles in the *Waste Avoidance and Resource Recovery Act 2001* (NSW).

23.5.3 Expected effectiveness

ARTC would engage appropriately licensed waste contractors to manage the collection, recycling or disposal of waste that cannot be reused onsite. Waste contractors would also be required to provide evidence of the works' compliance with legislative requirements, conditions of approval, and standards and guidelines.

Auditing and monitoring would be undertaken to ensure that management approaches provided in the environmental management plans are implemented and appropriate. As such, the management of waste throughout the project, by implementing the measures described in this section, is considered to be effective. Implementation of these measures would help ensure that waste from the proposal is managed in an environmentally sound manner, and in accordance with any legislated requirements for waste disposal and waste tracking.

23.5.4 Interactions between mitigation measures

Mitigation measures in other chapters that are relevant to the management of biodiversity include:

- Chapter 20: Soils and contamination, specifically details measures that address contaminated soils and hazardous materials.

There are no mitigation measures identified in the assessment of other environmental aspects that are likely to affect the assessment of waste.

23.5.5 Residual risk

Residual impacts are impacts of the proposal that may remain after implementation of the mitigation and management measures detailed in section 23.5.1 and 23.5.2. These residual impacts are summarised in Table 23-10.

Further information on the approach to the environmental risk assessment, including descriptions of criteria and risk ratings, is provided in Appendix E: Environmental risk assessment.

TABLE 23-10 RESIDUAL RISK MANAGEMENT—WASTE

Stage	Potential impact	Pre-mitigated rating	Mitigation measures[1]	Residual risk rating	Residual risk management[2]
Construction	Generation of excess spoil which cannot be reused on site (unsuitable for reuse or insufficient space) and needs to be disposed of.	High	WM1, WM2, WM3	Medium	N/A
Construction	Inappropriate management of waste generated during construction	Low	WM3	Low	N/A
Construction	Increased resource demand on local and regional resources resulting in a resource becoming in short supply	Medium	ARTC procurement procedures and WMP	Low	N/A
Operation	Inappropriate management of waste generated during maintenance	Low	WM4	Low	N/A

1. As described in Table 23-9.
2. For residual impacts with a risk rating of medium or above.