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Recycled Materials in Rail Infrastructure

Reference Guide – May 2025

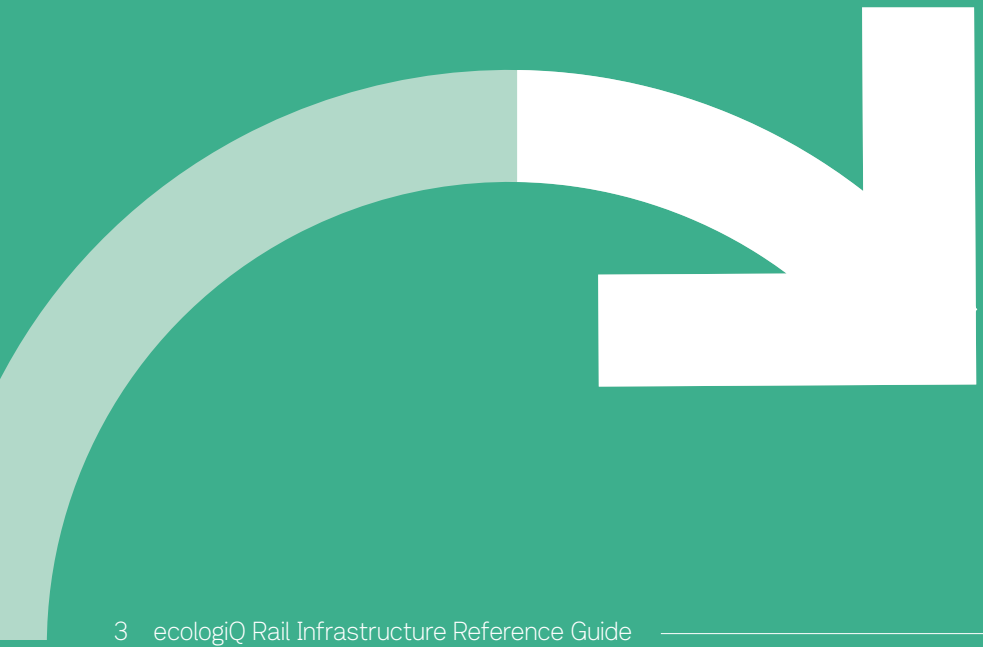
Purposely Greener Infrastructure

VICTORIA State Government

Contents

1. Introduction

The *Reference Guide for Recycled Materials in Rail Infrastructure* (this guide) is part of a strategic Victorian Government commitment to optimise the use of recycled and reused materials in rail construction.



The guide provides a summary of current industry standards, specifications and documents from Rail Transport Operators (RTOs) in Victoria, the Department of Transport and Planning (DTP) and Australian standards that support the use of recycled materials in rail infrastructure.

RTOs that form the basis of this guide include:

- Victorian Rail Track Corporation (VicTrack)
- Metro Trains Melbourne (MTM)
- V/Line
- Australian Rail Track Corporation (ARTC)
- Yarra Trams.

180+ major road and rail projects are delivered under Victoria's Big Build, which provides an invaluable opportunity to change how waste is used in Victoria and increase the use of recycled and reused materials in transport infrastructure construction.

This guide builds upon and complements the considerable work undertaken across the Victorian Government to encourage the use of recycled materials in construction and more broadly. Several valuable resources include:

- Recycling Victoria Strategic Plan (Department of Environment, Land, Water and Planning)
- Extractive Resources Strategy (Department of Jobs, Precincts and Regions)
- Social Procurement Framework (Buying for Victoria)
- Recycling and Resource Recovery Infrastructure Evidence Base Report (Infrastructure Victoria)
- Victorian Recycling Infrastructure Plan (Recycling Victoria).

1.1 How to use these guidelines

This guide is intended for use by designers, contractors, department or project sustainability leads, asset owners and others working on major rail infrastructure projects during the planning, pre-tender and construction stages.

This guide can be utilised to efficiently identify what recycled materials can be used in certain rail infrastructure applications.

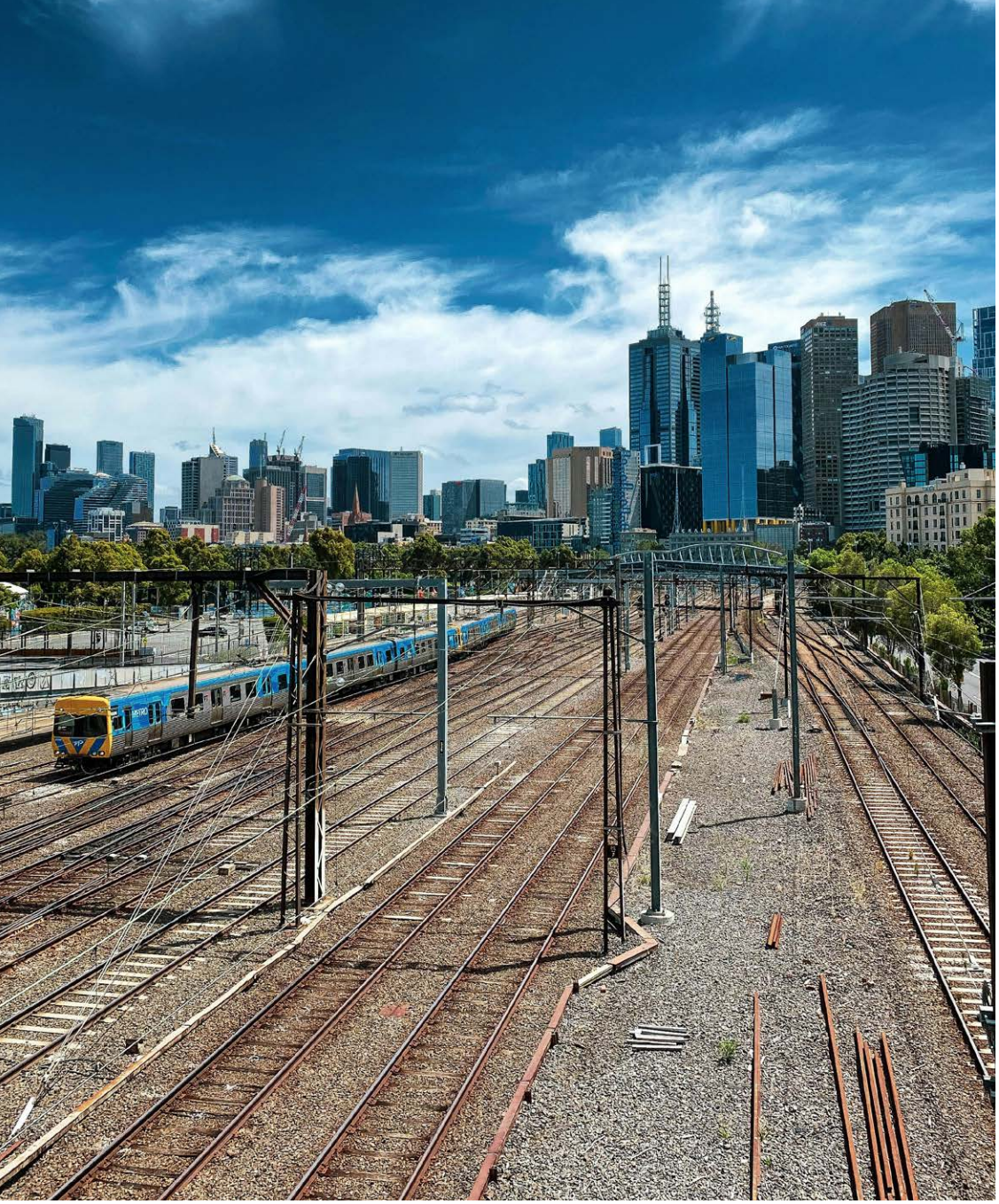
The applications outlined are primarily track and civil. Many of the applications are considered safety and/or service critical assets, and therefore are subject to appropriate systems assurance procedures.

Suppliers can use this guide to determine potential areas of development and demand.

This guide does not replace current DTP or RTOs standards. It is to be used as a quick-reference guide to identify opportunities for using recycled materials and other reuse applications in line with current design and construction standards.

Information in this guide has been drawn from RTOs' documentation at the time of publishing and is to be read in conjunction with the latest standards, specifications, contract documents, codes of practice and technical notes.

This guide should be read in conjunction with the Reference Guide for Recycled Materials in Road Infrastructure (road guide), when considering road pavement and other road-related applications common to rail projects, as well as the Reference Guide for Recycled Materials in Ancillary Infrastructure (ancillary guide). These documents are available on the ecologiQ Knowledge Hub.



1.2 Using recycled materials

Reuse: There are a variety of well-established reuse applications within rail infrastructure that enable the remaining serviceability of products and materials to be utilised on the network. These applications are subject to quality assessment and approvals to ensure rail asset quality is maintained.

Recycled materials: Supplementary cementitious materials (SCMs) in concrete, crushed glass, recycled steel and recycled crushed concrete are commonly used in construction to supplement traditional virgin materials.

There are additional opportunities in materials not currently utilised such as, but not limited to, recycled plastic piping and ballast reuse that would be expected to see more uptake of in the coming years. These materials can provide quality, cost-saving and availability opportunities and offer long-term environmental and social benefits.

Type Approvals: All products that are part of safety or service-critical rail infrastructure must undergo 'Type Approval' – a robust assessment process by the relevant RTOs – prior to their application on the network. This ensures only products/materials with proven performance are used.

The use of recycled products and their allowable limits in materials are not overly prescribed or excluded from the Type Approval process. Guidance to navigate the Type Approval process and identification of opportunities to increase the uptake of products containing recycled material is detailed within this guide.

2. Reference Documents

Table 1 describes the technical documentation available from DTP and principal RTOs, including the access requirements. The specific technical documents referenced in this guide are further outlined in *Appendix A*.

Notes:
1. Throughout this guide and in Appendix A, links are provided only for those documents that are public access.

Table 1 – Reference documents

Infrastructure Manager	Description / Technical library	Access requirements[1]
Victorian Rail Track Corporation (VicTrack)	Standards to inform the design, construction, commissioning, operation and decommissioning of VicTrack assets and infrastructure. Telecommunications Engineering Standards Library	Limited documents are public access; additional documents may be requested.
DTP	DTP standards form the primary reference for recycled material allowances and material specification requirements within road infrastructure and are appropriate for use for many rail applications, where not documented in RTO standards. Technical publications DTP Drawing Management System	Documents located in the Technical publications library are public access. The Drawing Management System requires authorisation to access, and may require a relevant Government department or agency sponsor.
Metro Trains Melbourne (MTM)	MTM standards, specifications and technical notes. MTM Document Portal	Public access.
V/Line	V/Line standards, specifications and technical notes. V/Line Network Access Portal (VNAP)	User registration required.
Australian Rail Track Corporation (ARTC)	ARTC procedures, specifications and technical notes. ARTC Extranet	Public access.
Yarra Trams	Infrastructure; Operational Control and Management Systems; Rolling Stock; and Engineering Management Systems documents. Standards List	Limited documents are public access, others may be accessed via the DTP Drawing Management System.
Victorian Infrastructure Delivery Authority (VIDA)	Metro Tunnel Project Office (MTPO) and Level Crossing Removal Project (LXRP) are major delivery bodies, with their sustainability policies supporting the implementation of reuse and recycled materials within projects. Rail Projects Victoria sustainability policy LXRP sustainability policy	Public access.

3. General Considerations

The following points should be considered when exploring opportunities for the use of recycled and reused materials in the construction of rail infrastructure.

Rail industry:

The Victorian rail network is managed by five principle rail transport operators. Each is responsible for providing and maintaining the infrastructure and to ensure the safety of rail infrastructure. The key stakeholders and core agreements are illustrated in *Figure 1*.

- VicTrack: asset owner for most of Victoria's rail land and infrastructure. The majority of VicTrack's assets are leased to the DTP, who in turn operates public transport services via franchise agreements with transport operators
- MTM: Metropolitan rail network
- V/Line: Regional rail network
- ARTC: Interstate network (and interstate freight operator)
- Yarra Trams: Melbourne light rail tram network.

Refer to *Section 7* for overview of the Victorian Tourist and Heritage Rail network.

Other rail industry bodies include:

- **Freight Operators:** ARTC (interstate) and Pacific National
- **Peak Body:** Australasian Railway Association (ARA)
- **Australian Research Centres for Rail:** Australian Centre for Railway Innovation (ACRI), under the National Transport Research Organisation (NRTO) Rail, Rail Industry Safety & Standards Board (RiSSB)
- **Rail Research Centres for Victoria:** Monash Institute of Railway Technology (IRT)
- **Victorian Universities undertaking relevant research:** Swinburne University of Technology, RMIT University

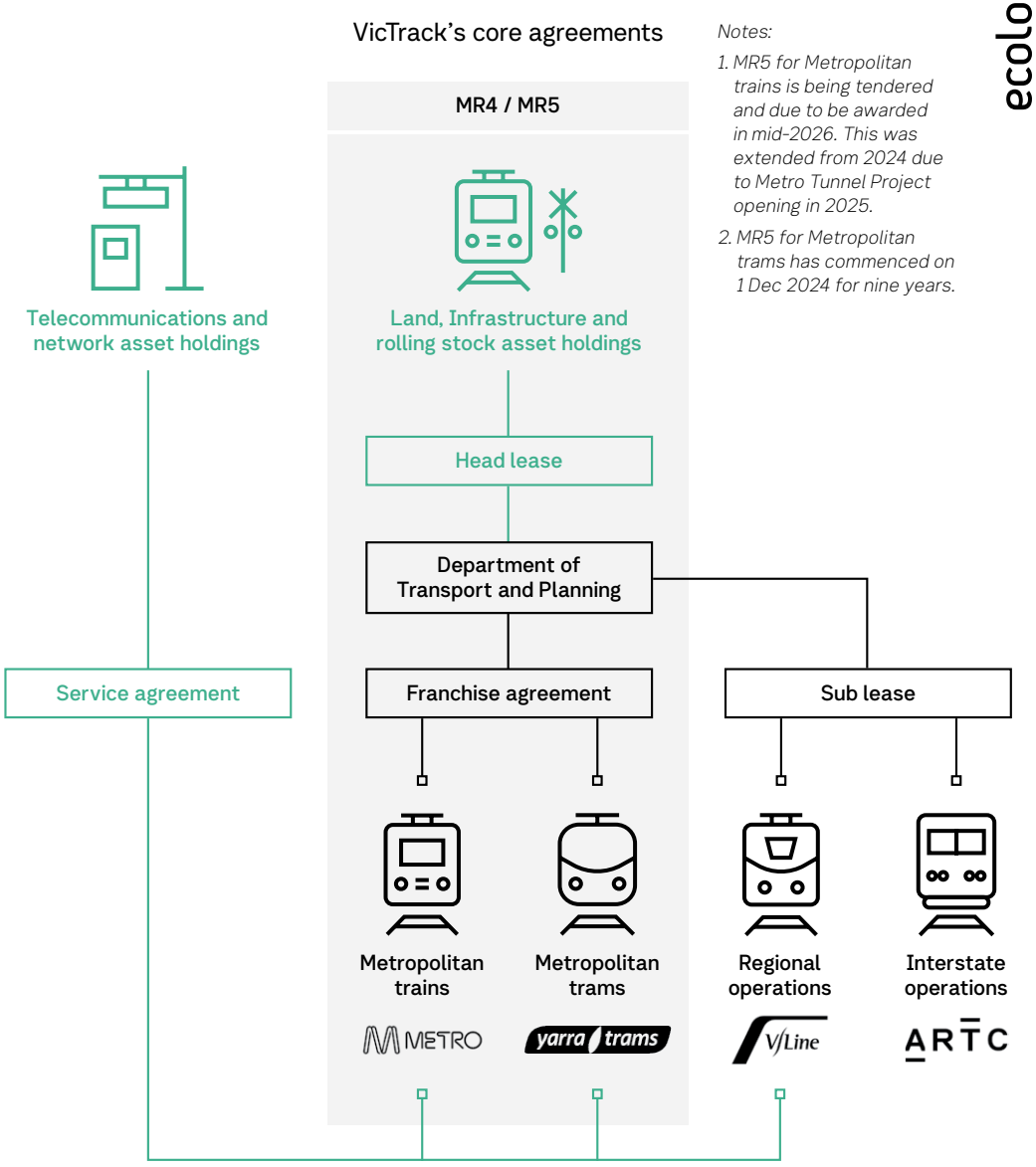


Figure 1 – VicTrack's core agreements

Project relevant standard baselines and exemptions:

- For MTPO and LXRP, standards baselines and exemptions are documented on the respective project space (note: relevant permissions are required to access LXRP Engineering Hub and RPV Standard hub)
- Relevant documentation for each project is to be referred to as part of product/material selection to confirm approvals.

Safety and environmental management:

- Materials and products must meet the standards and specifications prescribed by the relevant authority/ operator and be approved for use
- All activities involving recycled materials (i.e. sourcing, transporting, processing and placing) must meet the relevant statutory and regulatory requirements

  The environmental management requirements of DTP and relevant RTO must be met, as identified in *Table 2*
- Compliance with EPA requirements.

Table 2 – Environment requirements

Infrastructure Manager	Environmental requirement
VicTrack	VT-PO 167: Environmental Sustainability Policy PR-GL 003: Environmental Management Plan PR-GL 004: VicTrack Soil Reuse Guideline Environmental Sustainability Strategy 2021-25
DTP	Section 176: Environmental Management (Minor) Section 177: Environmental Management (Major)
MTM	A7640: Metro Environment and Sustainability Policy A2020: Safety and Environmental Requirements for Contractors and Third Parties
V/Line	NIMG-2741: Third Party Safety and Environmental Management Handbook SAPO-2: Health, Safety and Environment SAMG-39: Construction Environmental Management Plan (CEMP) SAMG-49: Contractor Safety and Environmental Management Handbook SAMG-7: V/Line's Significant Environmental Aspects and Impacts SAPR-67: Environmental Management of Industrial and Priority Industrial Wastes SAPR-68: Environmental Management of Earthworks and Soil Disturbance SAPR-9: Safety, Security, Health and Environment Risk Management Process
ARTC	Environmental Policy Inland Rail Environment and Sustainability Policy Inland Rail Sustainable Procurement Policy RSK-PR-001: Risk Management Environment Protection Licence (NSW-2023) Environment Protection Authority (SA-2019) Southern Sydney Freight Line Environmental Documentation
Yarra Trams	SMS 1.1.2: Sustainability and Environment Policy

Whole-of-Life (WoL) carbon emissions:

- Traditional quarried materials often have a large embedded carbon cost from production, to construction and to final recycling/disposal
- Use of recycled materials to replace or supplement traditional quarried materials may reduce WoL carbon emissions, but consideration should be given to all transportation/ processing/recycling requirements (e.g. collection, cleaning, processing and delivery)
- Materials and products sourced locally to a project site can provide benefits to WoL carbon emissions through a reduction in transport carbon emissions
- End of life material recyclability should be considered in the context of WoL assessments.

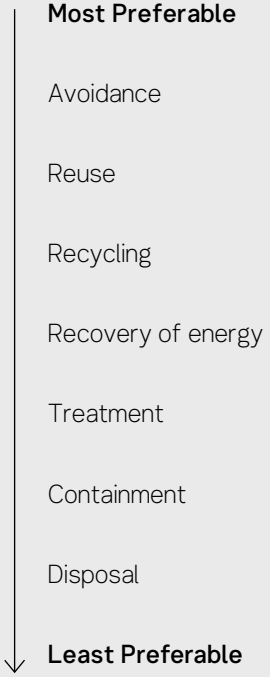
Sourcing/Supply:

- Selection and use of recycled materials must consider the source/ supply availability of such materials
- Reuse of on-site materials and the adoption of recycled products can benefit future projects from cost and environmental saving by reducing transportation requirements and increasing flexibility during construction (e.g. composite sleepers may be cut to suit on-site, resulting in increased opportunity for bulk product purchase for manipulation as required by each specific project, which can reduce typically long lead times)
- Sourcing restrictions may be due to project location (high cost of material transport) and/or market availability;
  - Existing markets (e.g. crushed concrete, reclaimed asphalt) are readily available and commonly used to supplement/complement traditional quarried materials in road pavement construction
  - Emerging markets (e.g. reclaimed ballast, recycled plastics) are less developed. This is due to a lack of data leading to uncertainty around their impact on the environment, health and safety, asset performance and their reuse as part of a circular economy; and/or a lack of consistent and reliable material supply. Refer to *Section 8* for more information on these areas
- RTO approved products for track structures and components are commonly supplied from overseas, such as China, Germany, Austria and UK. This reference guide focuses on what is accepted in current standards and approved products records at the time of publishing. Further assessment should be made on WoL considerations and opportunities to introduce locally supplied products that utilise Victorian waste streams.

Waste management hierarchy:

- Ideally, production of waste from rail infrastructure projects should be avoided; however, this is often not practical. In cases where avoiding waste material generation is not feasible, it is important to minimise waste production, and reuse or recycle valuable construction resources wherever possible
  - This document provides support for addressing the 'reuse' and 'recycle' steps of the Waste Management Hierarchy *Figure 2*.

Figure 2 – Waste Hierarchy Infrastructure Victoria, 2019



3.1 Recycled Material Sources and Usage

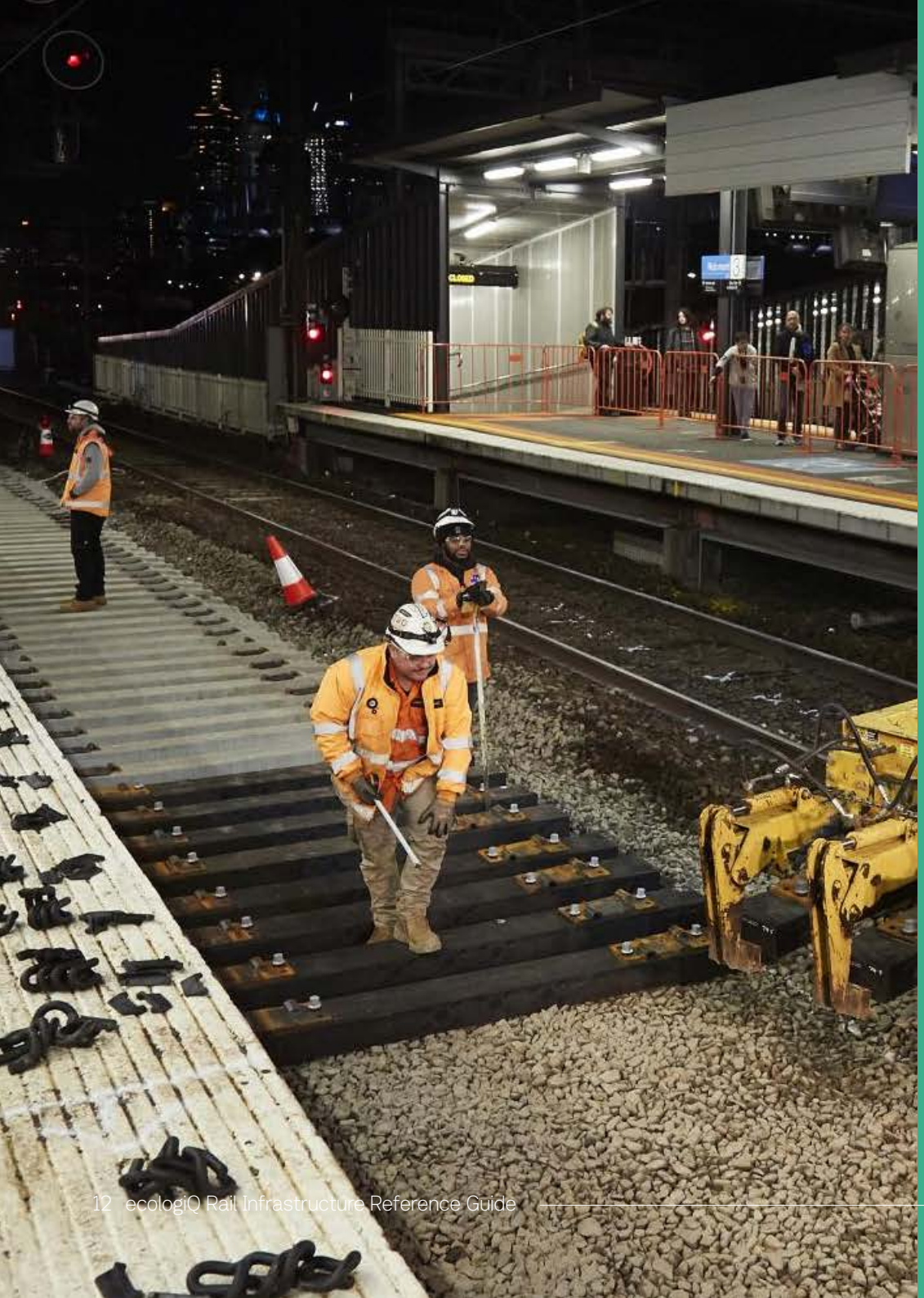
Table 3 provides a summary of the current and emerging recycled material sources and their current areas of use. Refer to the road guide for further detail of road-related material applications.

Table 3 – Recycled material sources and general applications for use

Recycled Material	Sources	Processing	General Applications
Crushed Concrete (CC) 	▪ Demolition works ▪ Returned loads ▪ Other infrastructure construction activities	▪ Removal of contaminants, followed by crushing and screening	▪ Maintenance access (unbound granular) pavements as crushed rock replacement
Recycled Crushed Glass (RCG) 	▪ Container glass cullet ▪ End of life and damaged solar panels	▪ Removal of contaminants, followed by crushing to required gradation (e.g. glass fines)	▪ Recycled Crushed Glass (RCG) approved for use as bedding and embedment material for drainage piping and Combined Service Route (CSR) ▪ EPA fact sheet: Use of glass fines
Reclaimed Asphalt Pavement (RAP) 	▪ Removal of asphalt from existing road pavement	▪ Crushing and screening	▪ Driver and maintenance walkways ▪ Access roads ▪ Approaches to Road-Rail Vehicle (RRV) pads ▪ Facilities/depots walkways and pavements
Supplementary Cementitious Materials (SCMs) 	▪ Waste by-products including Fly Ash (FA), Ground granulated blast-furnace slag (GGBFS), Amorphous Silica	▪ Treated to comply with AS/NZS 3582.1, AS/NZS 3582.2 and AS/NZS 3582.3, respectively	▪ Used to replace a proportion of the cement in Portland cement ▪ Additive to concrete rail sleeper mixes, subject to type approval procedure
Crumb Rubber (CR) 	▪ End-of-life tyres	▪ Ambient mechanical grinding, or ▪ Cryogenic mechanical processing (less common)	▪ Pavements (e.g. permeable paving, spray sealing, some asphalt mixes) ▪ Level Crossing panels and RRV access pads ▪ Rail sealing ▪ Miscellaneous roadside applications (e.g. landscaping, retaining walls, playgrounds) ▪ Traffic calming devices (e.g. bollards, wheel stops, speed humps)

Recycled Material	Sources	Processing	General Applications
Steel Furnace Slag (aggregate) 	▪ By-product of steelmaking – either basic oxygen steel (BOS) slag, or electric arc furnace (EAF) slag	▪ Slag can be produced from either the refining of pig-iron in an oxygen converter or, by melting scrap steel	▪ Drainage blanket ▪ Capping layer
Steel 	▪ Reclaimed (scrap) steel	▪ Melted in an EAF and cast into sections for rolling into products	▪ Structural steel ▪ Reinforcing bars ▪ Steel mesh ▪ Steel rod ▪ Wire
Ballast 	▪ Reused from existing/modified track formation	▪ Remove fines to the extent practical and dispose offsite. If any fines/soil within ballast material, sample to determine if suitable for reuse (including leachability testing)	▪ 1st order reuse: as ballast in track (temporary and permanent condition currently in trial) ▪ Placed as drainage blanket in track formation ▪ Maintenance access unbound granular pavements
Plastic 	▪ Commercial, industrial and municipal waste	▪ Sorted into plastic types/categories ▪ Shredded and granulated ▪ Cleaned/washed ▪ Dried, decontaminated and pelletised ▪ Reprocessed/reformed into recycled products	▪ Composite rail sleepers ▪ Drainage pipes/pits ▪ Service conduits/pits ▪ Geosynthetics ▪ Fencing ▪ Level Crossing Panels ▪ Road-Rail Vehicle (RRV) access pads ▪ Viaduct screening, noise walls, decking ▪ Void filler in concrete, steel fiber replacement in concrete ▪ Miscellaneous (signage/sealants etc).

** Emerging materials refers to those in development, which may or may not have been approved for use. For additional information, refer to Section 8 on Emerging materials.*



4. Specified Material Applications

This section provides an overview of reuse and recycled material applications currently allowable within RTO standards and specifications.

A list of tables is provided on the following page to help navigate the material applications and the associated document, links to documents are provided in *Appendix A1-A5*.

Table 4 provides a quick reference table that outline the areas of opportunity for component reuse and adoption of recycled materials. In some instances, recycled materials may only be used as supplementary materials, or in specific areas of use.

Table 4 – Material applications reference table

Topic	Sub-section	Reference
Reuse applications	Heavy rail (MTM, V/Line, ARTC)	*Table 7*
	Light rail (Yarra Trams)	*Table 9*
Recycled material applications	Track	*Table 8a*
	Sleepers and components	*Table 8b*
	Track formation	*Table 8c*
	Geocomposites, textiles, geogrids and ballast mats	*Table 8d*
	Subsurface drainage	*Table 8e*
	Combined Services Route (CSR)	*Table 8f*
	Utility protection	*Table 8g*
	Fencing	*Table 8h*
	Level crossings	*Table 8i*
	Miscellaneous ▪ Tactile ground surface indicators (TGSIs) & raised pavement markers (RPMs) ▪ Platform gap fillers ▪ Signage ▪ Sealants ▪ Walkway gratings ▪ End of track protection	*Table 8j*
	Other infrastructure ▪ Structures ▪ Pavements – formation ▪ SUP, footpaths, edgings etc. ▪ Pavement (asphalt and spray seals)	*Table 8k*
	Light rail (Yarra Trams)	*Table 10*
Tourist and Heritage Rail		*Section 7.2*

4.1 Definitions and abbreviations

For the purpose of the following tables, reuse and recycled material are defined as:

- **Reuse:** The non-destructive collection of goods for use within the rail network in its primary or secondary forms, such as:
  - Serviceable asset: An asset with remaining useful life that may be economically redeployed on the public transport network or transferred to an approved third party
  - Site-won materials: Re-processed and placed within the network
- **Recycled material:** Waste materials that are processed to meet the performance requirements of standards to form new products or materials suitable for use
- **Abbreviations:** CC = Crushed Concrete, CR = Crumb Rubber, RCG = Recycled Crushed Glass, SCMs = Supplementary Cementitious Materials
- **Slag:** Shortened version of slag aggregate (separate to GGBFS as an SCM, refer *Table 3*)
- For descriptions of various material categories, as referenced in these guidelines, refer to *Appendix B Table B.1 - Material Descriptions*.

4.2 Allowable limits

Allowable limits for recycled materials within their respective application are not commonly expressed within the current RTO standards and specifications. Product material composition is subject to the relevant Australian standards (as directed by the RTO standards or procedures) and approvals.

In cases where Australian standards do not identify requirements (e.g. with emerging materials), the assessment and testing of a recycled/reused product may be managed through wider industry accepted references, however, would be subject to relevant approvals.

If the material composition of a product has been adjusted (i.e. to increase the percentage of recycled content), then it will be subject to re-approval prior to acceptance and use on the network.

Where applicable, indicative allowable limits of recycled materials are noted. Recycled content should be confirmed with the product supplier or manufacturer, as limits may vary due to supply and performance requirements.

4.2.1 Recycled content in steel

Steel is typically manufactured from iron ore, and/or using scrap (recycled) steel. The two primary methods are integrated Blast Furnace (BF)/Basic Oxygen Steelmaking (BOS) and Electric Arc Furnace (EAF). EAF primarily uses scrap steel.

It is to be noted that both types of steelmaking are complementary processes, with neither one considered superior to the other, as scrap steel EAF steelmaking cannot be produced without scrap steel created via the integrated steel manufacturing process.

Typically, 15–20% of scrap/post-consumer steel is recycled through the BF process, whereas the EAF process uses scrap/post-consumer steel with a much higher content (e.g. >85% recycled steel to manufacture reinforcing steel). Waste reduction can be achieved through early involvement with projects, minimising material use and the need for on-site cutting or modifications.

4.3 Limitations

- The standards and specifications identified may not preclude the use of recycled materials, however adoption of any recycled materials/products would be subject to approvals
- All reuse applications are subject to compliance with relevant RTO standards & specifications and typically include requirements for condition assessment and approval
- Products documented on the RTO Type Approved registers have been used to validate allowable areas of recycled materials in *Tables 8a-k*. This validation is only relevant at the time of writing this guide
- The uses identified in the tables relate to applications within the rail corridor only (refer to the Ancillary guide for other non-service and safety critical opportunities)
- NATA accredited independent testing and verification is required for all products and materials being used within the rail corridor. Quality assurance shall be ensured by the product supplier and evidence submitted to RTO's as standards require
- Products shall be manufactured under a third-party certified Quality Assurance System.

4.4 Serviceable assets reuse procedures

VicTrack and DTP Transport Services have responsibilities for the disposal of rail infrastructure assets and the Operations and Control Management Systems (OCMS) is under their control. As such, both VicTrack and DTP have developed a procedure and strategy respectively to optimise the reuse of serviceable assets within the rail network.

Thereby, limiting the disposal of assets with remaining useful life and supporting compliance with relevant policies and agreements. To maximise the effectiveness of these procedures, it requires early identification of surplus materials (from source projects) and alignment with all stakeholders, including projects, RTOs and approving and regulating bodies.

VicTrack and DTP Transport Services procedures are outlined below to support their implementation.

4.4.1 VicTrack surplus materials hierarchy for disposal

The VicTrack Disposal of Rail Based Assets Procedure (VT-SP-143), should be used for assets owned and controlled by VicTrack.

The surplus materials hierarchy for disposal outlined in *Table 5* compliments VT-SP-143 by providing guidance on the key steps and expected timeframes to implement the disposal of assets procedure.

This hierarchy applies to any track materials which are removed as part of projects and cannot be reused on-site. The hierarchy's intent is to:

- Give all sectors within the rail industry an opportunity for reuse, as well as clarity on the priority and order in which these materials are made available
- Provide clarity on the process to be followed and define timelines to ensure reasonable progression of process
- Minimise the amount of waste produced by projects
- Provide clarity on asset ownership and expectations on all parties
- Support the accurate maintenance of the VicTrack's asset register and balance sheet.

Table 5 – VicTrack Surplus Material Hierarchy for Disposal

Step 1:	**Identification**	At the project's commencement, project team to identify what materials will be left over at its completion. A table with estimated quantities of each material is to be provided by the project to VicTrack (Asset Engineering Manager)	At earliest possible stage
Step 2:	**Materials offered to applicable RTO**	Surplus materials offered to applicable Rail Operator (from the asset the material comes from). Given four weeks to respond before offer is progressed	4 weeks to respond
Step 3:	**Materials offered to other RTOs**	Surplus materials offered to other applicable Rail Operators. Given four weeks to respond before offer is progressed	4 weeks to respond
Step 4:	**Materials offered to VicTrack Freight**	Surplus materials offered to VicTrack Freight via VicTrack's Asset Engineering Manager. Given four weeks to respond before offer is progressed	4 weeks to respond
Step 5:	**Materials offered to Tourist and Heritage Sector**	Surplus materials offered to sector via VicTrack's Tourist and Heritage Registrar. Given four weeks to respond before project progresses	4 weeks to respond
Step 6:	**Scrapping unwanted rail/track jewellery**	VicTrack (Asset Engineering Manager) is to be advised if surplus materials remain after Step 2–5. VicTrack then advises the project what they can do with the materials	Possible outcomes: ▪ Old unusable rail and track jewellery – VicTrack scrap merchant to liaise with project to collect materials. VicTrack, scrap merchant and project to collaborate to coordinate removal/logistics etc. **Projects must not directly scrap materials** ▪ Old concrete/timber sleepers – disposed of by project in accordance with regulations. Not to be publicly offered. Undamaged hardwood timber sleepers can often be re-homed to landscaping businesses or Parks Victoria ▪ Old unwanted ballast/soil – disposed of by project in accordance with regulations
Step 7:	**Disposal of unwanted materials**	Materials are VicTrack-owned assets and process must be closely followed	

Notes:
1. Evidence required to demonstrate hierarchy has been followed appropriately.
2. Projects may need to facilitate site visits with relevant parties to establish suitability of materials for reuse.
3. Parties get one opportunity to make a claim for specific materials.

4.4.2 Transport Services – Rail Asset Disposal Strategy

In June 2020, DTP Transport Services endorsed the use of a Rail Asset Disposal Strategy, which aims to provide direction to Transport Services staff, stakeholders and RTOs regarding the disposal of rail infrastructure and OCMS assets that are owned by the State. The process was formerly managed using a combination of the VicTrack's procedure and RTO practice notes.The strategy provides guidance in relation to the existing franchise agreements and rail infrastructure lease in six key stages outlined in *Table 6*.

For further details on approach refer to the original strategy, agreements and relevant RTO procedures.

Table 6 – Transport Services - Rail Asset Disposal Strategy

1	**Determine asset ownership**	Required to determine relevant disposal procedure and identify relevant commercial arrangements
2	**Determine if approval of asset disposal is required (by Transport Services)**	Business as Usual (BAU) Asset Disposal
		Non-BAU Asset Disposal
		Protected Categories of Assets: ▪ **Primary Assets** – An asset that is essential to the operation of all or any part of a franchise business ▪ **Serviceable Assets** – Asset with remaining useful life that may be economically redeployed on the public transport network or transferred to an approved third party ▪ **Salvageable Asset** – A life expired asset that may generate a financial benefit for the state when disposed.
3	**Asset disposal notification form**	Form aims to facilitate the maintenance of Transport Services databases and record systems, and to inform Transport Services of what asset(s) are being disposed of associated reason
4	**Asset disposal approval plan**	Purpose of the plan is to facilitate both the technical and financial approval for the disposal of the asset
5	**Management of change**	Update of Transport Services asset register, databases and record systems to reflect the changes to the assets
6	**Asset disposal methodology – listed in order of precedence**	▪ Appendix 1 – Protected Asset Categories ▪ Appendix 2 – Infrastructure and OCMS, Asset Disposal Process ▪ Infrastructure Victoria – Waste Management Hierarchy.
	Other disposal considerations	▪ Short-term stockpiling of serviceable assets, where reserved for reuse (approval required) ▪ Hazardous materials: Operators are responsible as waste producer under EPA Victoria's regulations.

Note: Strategy may vary slightly depending on asset type (i.e. infrastructure, OCMS and rolling stock spares)

4.5 Applications for Reuse

Refer to *Table 7* for material type/product that existing RTO standards and specifications allow for reuse in its primary form. Potential secondary reuse applications are encouraged to be investigated in conjunction with RTOs approvals processes. The tables also note other reuse activities that do occur but aren't currently documented in existing standards and specifications. Application of these are based on relevant compliance and approvals being obtained.

Reuse should consistently keep products, components, and materials at their highest utility and value. This can commonly be achieved through reuse in their original (primary) intended application (i.e. avoid 'downcycling'). This should be considered in a WoL context and infrastructure design life requirements.

Refer to *Table 9* for reuse in light rail (tram) track infrastructure applications.

Table 7 - Reusable material types/products within existing standards and specifications

Material application	Material type /product	Standards and specifications allowing for reuse in primary form			Supplementary notes
		MTM	V/Line	ARTC	
Track	Rails	☑ A1520	☑ NIST-2650	☑ Section 1 (CoP)	▪ Partially worn rail may be considered for reuse ▪ Caution required for close inspection of elements each time they are removed from the track and prior to re-use ▪ Consideration is also required for appropriate material handling and storage ▪ Subject to approval by MTM: – Reuse of rail as guard rails (A3902) – Serviceable 53 kg/m or 60 kg/m rail may be used within stabling sidings – Reuse of rails for replacement of rail defects[1] – Released rail used for mainline use as closure rails for welding (provided it has been ultrasonically tested and is clear of defects)
	Turnouts and special trackwork (incl. bearers)	☑ A14203	☑ NIST-2651 NIST-2660	☑ Section 3 (CoP) ETC-03-01	▪ V/Line permits the reuse of existing turnouts where serviceable life remains (or refurbished) and the reuse of rail to manufacture turnouts providing the rail profile meets requirements of the design specification ▪ ARTC permits the relocation of existing turnouts, where serviceable life remains ▪ MTM requires all materials to be new, unless otherwise specified or approved
Sleepers and components	Timber	☑ A1520	☑ NIST-2651	☑ Section 2 (CoP)	▪ Reuse of sleepers and components typically relates to cyclic or routine maintenance activities, not new construction activities ▪ Condition assessment is required to confirm serviceability of sleepers and components ▪ Although not documented in standard, MTM may permit the reuse of timber sleepers within sections of track adjacent to works where timber exists. The timber must be inspected by MTM and accepted as acceptable within the area ▪ Subject to acceptance by MTM, serviceable sleepers which are not suitable for mainline services may be used within stabling sidings ▪ Steel sleepers are not approved on the MTM network, with the exception of steel hollow bearers for cable management (refer to Approved Products Register)
	Concrete	☑ A1520 A1504	☑ NIST-2651	☑ Section 2 (CoP)	
	Steel	☒	☑ NIST-2651	☑ Section 2 (CoP)	
	Anchors, dogspikes, sleeper plates and resilient rail fastening assemblies	☑ A1503	☑ NIST-2651	☑ Section 2 (CoP)	

Material application	Material type /product	Standards and specifications allowing for reuse in primary form			Supplementary notes
		MTM	V/Line	ARTC	
Track formation	Ballast[2]	☑ A1341	☑ NIST-2654	☑ ETG-04-01	▪ Opportunity for reuse of ballast subject to approved placement locations and appropriate proof of performance, durability and residual life ▪ Reclaim and reuse of ballast is under utilised within main line operations and has typically only been adopted in low-risk environments in Victoria, other jurisdictions and countries are much more advanced in their reuse of ballast[2] ▪ Ballast reuse accepted during certain maintenance activities (e.g. resleepering) subject to removing fouled ballast and appropriate material handling and storage ▪ ARTC and V/Line provide ballast reuse requirements for maintenance and construction activities Refer to *Section 8* Emerging Materials for further details
	Fill material[3]	☑ A1537 A1392	☑ NIST-2659 SAPR-68	☑ ETC-08-02 ETC-08-03 ETC-08-04	▪ Subject to compliance with VicTrack's Soil Reuse Guideline (PR-GL 004) and relevant endorsement ▪ Subject to compliance with relevant EPA guidance ▪ Redundant material from a previous track formation may be re-used as general fill material providing the material meets the relevant performance requirements ▪ Fill materials classed as 'unsuitable' could be used provided that appropriate treatment is undertaken and the materials are re-classified as suitable
Combined Services Route (CSR)	Conduits and equipment	☑ A1547 A1347	☑ NIST-012.2	None identified	▪ Existing VicTrack infrastructure may be permitted as approved, where it is suitable for the intended use and conforms to specifications. Reference to be made to relevant VicTrack standards, including TS-SP 013 and TS-ST 043 ▪ No existing cabling or equipment shall be re-used unless approved by the Infrastructure Manager as per V/Line standards ▪ Existing in service asbestos type pits, trunking and associated enclosures shall not be utilised for new works as per MTM standards

Notes:

1. *MTM conditions for reuse of rails for replacement of rail defects are outlined below and shall be in accordance with the MTMI Welded Track Management Manual, including:*
   a) The serviceable rail must be ultrasonically tested to ensure no rail defects exist in the rail
   b) Where serviceable rail is proposed to be used, the details of use shall be included within the "Permit to Disturb Track Form" for acceptance by MTM
   c) The serviceable rail may only be of the same or greater profile to the section being replaced
2. *MTM have approved ballast reuse in low risk sites like sidings or for completing "top up" shoulder ballasting during maintenance. A waiver may be required for approval and is subject to any site-specific controls that may be required. Example sites include: Kananook sidings and as a partial fill material in the approach embankments for the Bell to Moreland viaduct structure.*
3. *Appendix A of VicTrack's Soil Reuse Guideline (PR-GL 004) describes the process for soil reuse on VicTrack assets and the relevant stages where VicTrack require consultation.*

4.6 Allowable areas of application for recycled materials

Refer to tables below for material type/product with the potential for recycled material applications.

The tables also note other recycling activities that do occur but aren't currently documented in existing standards and specifications. Application of these are based on relevant compliance and approvals being obtained.

Table 8a – Allowable areas of application for recycled materials – Track

Material application	Material type/ product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Track	Rails	Yes	☑	☒	☒	☒	☒	☒	☒	☒	A3902	NIST-2650 NIST-2703 NIST-2704	Section 1 (CoP)
	Turnouts and special trackwork (incl. bearers)[2]	Yes	☑	☒	☒	☒	☒	☑	☑	☒	A1423[1]	NIST-2651 NIST-2660	Section 3 (CoP) ETC-03-01 ETG-02-01
	Rail seal	Yes	☒	☒	☒	☑	☒	☒	☒	☒	None identified	None identified	None identified

Notes:

1. *Type approved recycled composite bearers may be used as a replacement for timber bearers if they meet the requirements of AS 1085.22 Railway track materials: Alternative material sleepers, subject to approval by the Head of Engineering – Track and Structures. (refer to A1423 Cl. 5.5.4).*
2. *Refer to Section 8.3.1 for details on composite bearers.*

Table 8b – Allowable areas of application for recycled materials – Sleepers & Components

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Sleepers and components	Timber[1]	Yes	☒	☒	☒	☒	☒	☒	☒	☒	None identified	NIST-2651	Section 2 (CoP) ETA-02-01 ETG-02-01
	Concrete[1,2]	Yes	☒	☒	☒	☒	☒	☑	☒	☒	A1504	NIST-2651	Section 2 (CoP) ETD-02-05
	Steel[1]	Yes	☑	☒	☒	☒	☒	☒	☒	☒	None identified	NIST-2651	Section 2 (CoP) ETC-02-03
	Composite	Yes	☒	☒	☒	☒	☒	☒	☑[3]	☒	Refer to *Section 8.3.1* for further details and to the respective RTO's Type Approval registers for currently approved products		
	Anchors, dogspikes, sleeper plates and resilient rail fastening assemblies	Yes	☑	☒	☒	☒	☒	☒	☒	☒	A1423 A1503	NIST-2651 (Cl 8.3)	Section 2 (CoP)

Notes:
1. *Serviceability requirements for sleepers shall be followed for respective RTO standards and specifications.*
2. *Concrete sleepers may contain approximately 25% fly ash in concrete mix. Limits vary with product/concrete supply. Recycled steel is not used in pre-stressing of concrete sleepers.*
3. *Composite sleepers may contain 80-85% post-consumer recycled plastics. Confirm actual recycled content with product manufacturer.*

Table 8c – Allowable areas of application for recycled materials – Track formation

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Track formation	Ballast	N/A	Refer to reuse *Table 7*								A1341	NIST-2654	Section 4 (CoP) ETA-04-01 ETG-04-01
	Drainage blanket (excl. geo-synthetic)[1]	N/A	☒	☒	☒	☒	☑	☒	☒	☑	A1537 A1538	NIST-2659	ETC-08-02 ETC-08-03
	Capping layer[2]	N/A	☒	☒	☒	☒	☑	☒	☒	☒	A1537 A1392	NIST-2659	ETC-08-02 ETC-08-03
	Structural fill[3]	N/A	☒	☒	☒	☒	☒	☒	☒	☑[4]	A1537 A1392	NIST-2659	ETC-08-02 ETC-08-03 ETC-08-04
	General fill[3]	N/A	☒	☒	☒	☒	☒	☒	☒	☑[4]	A1537 A1392	NIST-2659	ETC-08-02 ETC-08-03 ETC-08-04

Notes:

1. *RTO standards and specifications do not specifically identify ballast use as drainage blanket, however, may be useable if blended with appropriate materials to comply with specification requirements.*
2. *Capping layer material can be a blended product. The combined material shall satisfy the requirements of relevant specifications. Application of recycled materials as capping, such as crushed concrete, glass fines, recycled brick and recycled plastic is an emerging market, refer to Section 8.*
3. *Site won material is typically reused within the rail corridor following assessment of contamination, blending and material compliance testing and approvals. Refer to reuse Table 7.*
4. *Refer to Table 7 for relevant requirements for the reuse of ballast as partial fill.*

Table 8d – Allowable areas of application for recycled materials – Geocomposites, textiles, geogrids and ballast mats

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Geo-composites, textiles, geogrids and ballast mats	Geosynthetics	Yes	☒	☒	☒	☒	☒	☒	☑	☒	A1537 A1538 A1392	NIST-2659 NIST-2616	ETC-08-02 ETC-08-03 ETC-08-04 Section 9 (CoP)

Notes:
1. *All track geocomposites (including ballast mats) used in track formation require Type Approval. Type Approvals may not be required outside of track formation.*
2. *Drainage geocomposites do not typically require Type Approval.*
3 *Geotextiles can be manufactured with 100% post-consumer recycled plastics. Confirm actual recycled content with product manufacturer.*

Table 8e – Allowable areas of application for recycled materials – Subsurface Drainage

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Subsurface drainage	Drainage pipes and headwalls	Yes	☒	☒	☑	☒	☒	☑[3]	☑[2]	☒	A1537 A1538	NIST-2659 NIST-2616	None identified
	Granular fill materials (pipe bedding)[1]	No	☒	☒	☑	☒	☒	☒	☒	☒	A1501 A1538	NIST-2659	None identified
	Pits, lids, grates and ballast cages	Yes	☑	☒	☑	☒	☒	☑[3]	☑[2]	☒	A1537 A1538	NIST-2659 NIST-2616	None identified

Notes:

1. *Recycled glass sand for use as pipe bedding:*
   a) Material certification required prior to use.
   b) MTM approved Specification: A1501 - MTM Recycled Glass Specification.
   c) V/Line approved Specification: NIST-2659.1 - Specification of Recycled Glass Sand (2021).
   d) ARTC adoption to be further investigated following recent adoption from other RTOs.
2. *Plastic drainage pits and pipes can contain high percentages of post-consumer recycled plastics (up to 100% depending on product and application). Confirm actual recycled content with product manufacturer and appropriate application with respect to pipe strength classification.*
3. *Concrete drainage pits and pipes can utilise up to 45% usage of SCMs. Confirm actual recycled content with product manufacturer.*

Table 8f – Allowable areas of application for recycled materials – Combined Services Route

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Combined Services Route (CSR)	Ground level troughing[1]	Yes	☑	☒	☒	☒	☒	☒	☑	☒	A1547 A1347	NIST-012.2	None identified
	Conduits (below ground)[2]	No	☑	☒	☒	☒	☒	☒	☑	☒	A1547 A1347	NIST-012.2	ETG-17-01
	Granular fill materials (pipe bedding)[3]	No	☒	☒	☑	☒	☒	☒	☒	☒	A1501 A1547 (Cl. 6.15)	None identified	None identified
	Pits and lids[2,4]	Yes	☑	☒	☒	☒	☒	☑	☑	☒	A1547 A1347	NIST-012.2	ETG-17-01
	Other (clips, hollow sleepers, cable trays, protection tamps)[5]	Yes	☑	☒	☒	☒	☒	☒	☑	☒	A1547 A1347	NIST-012.2	None identified

Notes:

1. *Ground Level Troughing (GLTs) are typically plastic systems used for temporary utility diversions.*
2. *Underground utility services and pipelines within railway boundaries require approval and are to comply with AS4799 - Installation of underground utility services and pipelines within railway boundaries.*
3. *Recycled Glass Sand for use as pipe bedding:*
   a) Material certification required prior to use.
   b) MTM approved Specification: A1501 - MTM Recycled Glass Specification.
   c) V/Line approved Specification: NIST-2659.1 - Specification of Recycled Glass Sand (2021)
   d) ARTC adoption to be further investigated following recent adoption from other RTOs.
4. *Pits may be proprietary products or concrete cast in situ.*
5. *A variety of CSR ancillary items have Type Approval for use within the railway corridor. Refer to the relevant Type Approval register for products.*
6. *Reference to be made to relevant VicTrack standards, including TS-SP 013 and TS-ST 043.*

Table 8g – Allowable areas of application for recycled materials – Utility protection

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Utility protection		No	☑	☒	☒	☒	☒	☑	☒	☒	A1538 A1547 A1347	NIST-012.2	ETG-17-01

Notes:
1. *Applications include: Reinforced concrete protection slabs, concrete pipe encasement and sleeving of utilities.*
2. *Other pipe materials not specifically addressed in relevant standards and specifications are subject to the approval of the RTOs.*

Table 8h – Allowable areas of application for recycled materials – Fencing

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Fencing	Line side fencing and gates[1,2]	No[7]	☑	☒	☒	☒	☒	☒	☑	☒	A1524	NIST-2662	N/A to Victoria
	Train gates[3]	Yes	☑	☒	☒	☒	☒	☑	☑	☒	A1520	NIST-004.13	None identified
	Handrails[4]	Yes	☑	☒	☒	☒	☒	☒	☑	☒	A1546 A1537	NIST-2662 NIST-002.1	Section 9 (CoP)
	Temporary safety fencing[5]	Yes	☑	☒	☒	☒	☒	☒	☑	☒	A3902	None identified	None identified
	Foundations[6]	No	☑	☒	☑	☒	☒	☑	☒	☒	A1524	NIST-2662 NIST-004.13	N/A to Victoria

Notes:
1. *Applications include: All line side fencing such as, boundary, sidings, facilities/security.*
2. *RTO Standards and Standard Drawings are to be referred to for typical fencing types.*
3. *MTM Type Approved product has grandfather rights for the Automatic Stabling Train Gates (ASTG).*
4. *Applications include: Driver walkways, maintenance walkways, delineation and station/platform handrails.*
5. *Application to works adjacent/inside the rail track.*
6. *Applications include: concrete foundations and star pickets.*
7. *Fencing requires type approval on Yarra Trams network.*

Table 8i – Allowable areas of application for recycled materials – Level Crossings

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Level crossings	Pedestrian maze gates and crossings[1,2]	Yes	☑	☒	☒	☑	☒	☑	☒	☒	A1541 Reference also to be made to relevant VicTrack Standard Drawings	NIST-2687	ESC-03-01 ETS-12-01
	Boom barriers[3]	Yes	☑	☒	☑	☒	☒	☑	☑	☒	Refer to PTV Standard Drawings STD_ G0011 to 021	NIST-2687 Refer to PTV Standard Drawings STD_ G0011 to 021	ESC-03-01
	Crossing panels and Road-Rail Vehicle (RRV) access pads[4]	Yes	☑	☒	☒	☑	☒	☑	☑	☒	A3900 A3901 A3902 Refer to PTV Standard Drawing STD_R0022	NIST-2687 Refer to PTV Standard Drawing STD_R0022	ETS-12-00

Notes:
1. *Elements include: Gates, fencing, foundations, pathway and signage.*
2. *Consideration for Type Approved removable panels for track crossings.*
3. *Elements considered include: Boom arms, mast poles, foundations, signage and associated fencing.*
4. *Consideration for Type Approved removable panels.*

Table 8j – Allowable areas of application for recycled materials – Miscellaneous

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Miscellaneous	Tactile Ground Surface Indicators (TGSIs) and Raised Pavement Markers (RPMs)[1,2]	Yes	☒	☒	☒	☑	☒	☒	☑	☒	A1541 A1530	NIST-2687 NIST-002.1	ETS-12-00 ESC-03-01 ETS-12-01
	Platform gap fillers[3]	Yes	☒	☒	☒	☒	☒	☒	☑	☒	A1530	None identified	None identified
	Signage[4]	Yes	☑	☒	☒	☒	☒	☒	☑	☒	A1541 A1530	NIPR-2661 NIST-2687 NIST-002.1	ETA-11-01
	Sealants[5]	Yes	☒	☒	☒	☒	☒	☒	☑	☒	None identified	None identified	None identified
	Walkway gratings[6]	Yes	☑	☒	☒	☒	☒	☒	☑	☒	A1546	NIST-2616	Section 9 (CoP)
	End of track protection (including: buffer stop, arrester bed)	Yes[7]	☑	☒	☒	☒	☒	☒	☒	☑	A1539	NIST-004.13	ETH-00-01

Notes:
1. *TGSIs shall be in a contrasting colour with a minimum Luminance Contrast complying with the Disability Standards for Accessible Public Transport.*
2. *RPMs as per AS1428 Design for Access and Mobility.*
3. *All materials must be non-conductive to protect against rail to earth potentials between trains and the platform structure.*
4. *Applications include: permanent and temporary signage, including monument boards, level crossing signage and any other signage that is rail safety or service critical.*
5. *Applications include: ballast bonding and track joint sealant.*
6. *Applications include: Walkways on structures and grating replacement walkways for poor condition footpaths.*
7. *Type Approval would not be expected for arrester bed materials, however would be required for buffer stops.*

Table 8k – Allowable areas of application for recycled materials – Other infrastructure

Material application	Material type/product	Requirement for Type Approval	Allowable recycled material applications								Standards and specifications		
			Steel	CC	RCG	CR	Slag	SCMs	Plastic	Ballast	MTM	V/Line	ARTC
Structures	Cladding and barriers	Yes	☑	☒	☒	☒	☒	☒	☑	☒	A1546	NIST-2616	Section 9 (CoP)
	Concrete[1]	Refer to road guide											
Pavements – formation	Refer to road guide										**Car Parks:** A1549_ **Footpaths in Stabling Facilities:** A1520 **Access Tracks and Formation:** A1537 A1392	NIST-2687	None identified
SUP, footpaths, edgings etc.	Refer to road guide											NIST-004.13	None identified
Pavement (Asphalt and Spray Seals)	Refer to road guide										**Car Parks:** A1549	None identified	None identified

Notes:
1. *Special requirements associated with Super-T structures, which do not permit the use of fly ash in structural concrete due to pre-stressing requirements should be considered.*

5. Yarra Trams

Yarra Trams operate the Melbourne light rail network. Due to the nature of the light rail network, material applications include aspects of road, rail and ancillary infrastructure. Across shared tram and road networks, infrastructure to support the tram network must also be designed for vehicles and other road users.

As such, this section identifies opportunities for reuse and relevant reference guide sections (along with relevant Yarra Trams standards) to aid in optimising use of recycled materials and in proprietary products.

This section only applies to tram infrastructure on the tram network. For tram stop platform applications, refer to the ancillary and road guides.

Table 9 – Reusable material types/products within existing standards and specifications

Material application	Material Type/Product	Standard allowing for reuse in primary form	Supplementary notes
Tram track	Rail anchors	STD_T9008	▪ Serviceable rail anchors can be reused approximately 3 times ▪ New rail anchors can be reused approximately 6–10 times
	Concrete/bluestone block edging	STD_T9060	▪ Existing block edging is reused where possible

5.1 Standards

The primary standards relevant to the tram network track infrastructure include:

- Yarra Trams standards:
  - CE-019-ST-0006 – Infrastructure - Tram Track Design
  - CE-019-ST-0033 - Infrastructure – Tram Track Construction
  - CE-019-ST-0039 – Infrastructure – Tram Stop Platform Design
- Standard Drawings:
  - Accessed via the Drawing Management System (DMS)
  - Refer to tables in subsequent sections for relevant drawing numbers

The standard drawings noted in the following sections should be reviewed in combination with the Yarra Tram standards (as housed on the Yarra Trams standards website).

5.2 Reuse

Refer to *Table 9* for material types/products that can be reused in line with existing standards and specifications. Investigation in conjunction with relevant stakeholders into other potential secondary reuse applications is encouraged.

While a standard may not specifically identify reuse as part of the material application it may not preclude this activity and should therefore be investigated as an opportunity as part of works.

5.3 Opportunities for recycled materials

Refer to *Table 10* for guidance on material types/products that can potentially be recycled for use in tram track structures.

5.4 Standard Waiver

Under some conditions, compliance with all engineering and asset-related Standards at all times may not always be practicable, and a better outcome could be achieved through an alternative approach. In such circumstances, approval of a waiver or deviation to the compliance requirements in a Standard may be approved. Refer to CE-019-PR-0003 which describes the Standard Waiver process. This process does not replace the need for Engineering Change or Type Approval processes but provides the supporting approval to deviate from a specific standard, specification, TMP or NTS requirement.

Note: An approved waiver does not mean an entire design is approved, only that the aspects of the design relating to the waiver are considered compliant to Yarra Trams requirements. The Chief Engineer at Yarra Trams approves all waivers.

5.5 Type Approval

Type Approval is the assessment and approval of an item for a defined application in the Yarra Trams network.

All new products or modifications that are safety, performance, or environment critical (i.e. an equipment, product or asset that has a Safety, Operations, or Environment criticality rating of 4 or 5 when assessed in accordance with the CE-021-ST-0028 – AMS06 Asset Criticality Standard) have been identified as requiring Type Approval.

For Rolling Stock and associated equipment, the preferred approval standard is AS7501 Railway Rolling Stock – Rolling Stock Compliance Certification.

Refer to *Section 6* to understand more on Type Approvals.

Table 10 – Allowable areas of application for recycled materials – Tram track

Application	Material type/product	Reference	Yarra Trams standard drawings	Notes
Track	Rails, tie bars	*Table 8a*	STD_T9010, STD_T9011, STD_T9012, STD_T9060, STD_T9002, STD_9003, STD_T9001	▪ Other elements include tie-bars (recycled steel opportunity)
Sleepers/bearers and components	Steel beams, concrete/ composite sleepers, clips, fastenings and fixings	*Table 8b*	STD_T9010, STD_T9011, STD_T9012, STD_T9060, STD_T9005	▪ Other tram elements include foot insulator rubber rail pad and anchor blocks (recycled rubber opportunity) ▪ Composite sleepers being trialled (recycled plastic opportunity)
	Bearer supports	N/A	STD_T9010	▪ Concrete packing blocks & plastic wedges (SCMs and recycled plastic opportunity)
Track structure Type 1/2/3 (track slab)	Asphalt, pavements, primer, structural concrete, steel reinforcement, compacted rock	Refer to road guide	STD_T9010, STD_T9060	▪ Concrete track slab/foundation (50mpa strength tramway special), SCMs opportunity ▪ Steel reinforcement includes bars or fabric ▪ Fill materials in some application can be recycled concrete material complying with relevant VicRoads Standard
Track structure Type 7A&B (transitions)	Ballast, crushed rock, cement-treated crushed rock, crushed concrete	*Table 8c*	STD_T9011, STD_T9012, STD_T9060	▪ Track structure transitions (ballasted to track slab) ▪ Refer to 'Track structure – Type 1/2/3' for road pavement
Edging, separation kerbing and surface treatment	Concrete/bluestone, Surface Treatments	Refer to road guide	STD_T9060, STD_0310	▪ Recycled glass fines as a replacement to natural sand incorporated into Separation Kerbing ▪ Recycled glass used for Coloured Surface Treatments ▪ SCMs in concrete opportunity
Drainage filter fabric/geotextile	Geosynthetics	*Table 8d*	STD_T9010, STD_T9060, STD_9011, STD_T9012, STD_T9020	▪ Standard drawings specify proprietary products
Subsurface drainage	Drainage pipes, bedding material, pits/lids/grates	*Table 8e*	STD_T9010, STD_T9060, STD_T9012, STD_T9020	▪ Recycled glass sand not currently adopted by Yarra Trams standards as replacement for natural sand (opportunity) ▪ For drainage bedding using crushed rock refer road guide
CSR	Conduits, cable protection cover, protective conduit marker, bedding material	*Table 8f*	STD_T9010, STD_9020, STD_T9060	▪ Recycled glass sand not currently adopted by Yarra Trams standards as replacement for natural sand (opportunity) ▪ Recycled plastic in conduits and protective products (opportunity)

Note: Standard drawings accessed via the PTV DMS

6. Type Approvals

Standards, specifications and products used within the rail industry are governed by relevant Rail Transport Operators (RTOs).

Each RTO has procedures to manage the approval of new products, equipment or systems, and to allow for departures from existing standards and specifications.

Understanding the Type Approval and Engineering Change processes can help to introduce new products with increased recycled content into the rail industry.

There are three key processes that are consistent across RTOs:

- **Type Approval:** Relates to 'qualifying' new/custom built Rolling Stock and Infrastructure operational items, including assets, equipments or devices.
- **Engineering Change:** Applied to authorise the introduction/ modification of an asset/asset system into the rail network.
- **Waiver or Derogation:** Refers to a departure from an endorsed standard/procedure applicable to maintain, upgrade, renew, build and commission Rolling Stock and Infrastructure Operational Assets.

6.1 General Procedure for Type Approval

This section highlights the overarching RTO process for obtaining Type Approval for a new product/material. There are six stages to obtaining a product or equipment type approval, as shown in *Figure 3*.

6.1.1 General advice for obtaining approvals for new products/equipment

- Commence early due to the time-intensive nature of the process
- Check if the product or equipment is already approved by another RTO, this may be taken as a positive assessment of the system or equipment or evidence that the product or equipment meets performance requirements
- Identify if similar or equivalent products have been trialled and approved
- If provisional type approval is granted, it is likely that a trial period is required. A trial plan should be developed in collaboration with the RTO, that outlines anticipated timeframes, inspection and testing, performance measurement, reporting requirements and the exit strategy should the trial be unsuccessful.

Note: Existing approved products and components are typically specified in preference to non-stock componentry.

Figure 3 – General Procedure for Type Approval from RTOs

	1 →	2 →	3 →	4 →	5 →	6
	Request for Type Approval (or new equipment system approval)	**Initial assessment to determine Type Approval category and subsequent process**	**Type Approval process**	**Management of engineering change**	**Engineering review and decision**	**Update documentation**
METRO	Request for Type Approval: A1705 Integrated Risk Management Procedure: A2023 Infrastructure Service Critical Assets Assessment Procedure: A9606	Chief Engineer and Head of Engineering to determine Type Approval process	Type Approval Procedure: A1215 Provisional Type Approval (with Trial) Full Type Approval Engineering Product Approval	Engineering Change Procedure: A1224	If successful, Type Approval Certificate (TAC) Issued Type Approval Recommendation Memorandum (TARM)	A9402 – Type Approval Product Register (refer to latest version)
V/Line	NIFO-1310.1 – Type Approval Checklist	Asset Management Engineering Manager NIFO-1310.3 – Type Approval Preliminary Evaluation FULL or MINOR	Provisional Type Approval with Trial Full Type Approval Including Enterprise Wide Risk Management (ERWM)	SAPR-13 Rail Safety Management of Change	If successful, Type Approval Certificate Issued (NIFO-1310.2)	Type Approval Register Updated (V/Line Extranet)
ARTC	EGP-21-01 – New Equipment & System Approvals EGP2101F-01 – Type Approval Request Form New Equipment Preliminary Assessment Supplier Product Information Pack (PIP) in accordance with AS7702	Endorsed by Manager Asset Planning & Investment Interstate or Programme Technical Manager Inland Rail SIGNIFICANT or MINOR	EGP-21-01 New Equipment & System Approvals SIGNIFICANT (with or without Trial) MINOR	Recommendation for Approval General Manager Technical Standards Consultation with Stakeholders as appropriate	General Manager Technical Standards Regulator Notification (notification period) as required Implement or Reject	Advice to Operational safety & Environment Review Committee (OSERC) Update Type Approval Register
yarra trams	Request for Type Approval Form – (CE-019-FO-0018) Submit form with relevant information identified on form	Engineering Manager review Acceptance and Classification of Engineering Change Management process	CE-019-PR-0020 – Type Approval Procedure Provisional (with Trial) or Full	CE-021-GL-0004 – Engineering Change Process Guideline CE-019-PR-0016 – Engineering Change Management Procedure	Type Certification (provisional or full)	If successful, update Approved Product List

6.2 RTOs Approval Standards and Procedures Documents

Associated approval standards/procedures documents for each RTO are outlined in *Table 11*.

The Type Approval registers are maintained and updated by the respective RTOs. These do not currently identify if the type approved products contain recycled materials. Practitioners should validate recycled material with suppliers and the relevant RTO.

Table 11 – RTOs approvals standards and procedure documents

Operator	Type Approval	Engineering Change	Waiver/Derogation	Registers
MTM	A1215: Type Approval Procedure	A1224: Engineering Change Procedure	A1212: Engineering Waiver Procedure	A9402: Type Approval Product Register (refer to latest version)
V/Line[1]	NIPR-1310: Type Approval – V/Line Asset Management (Procedure)	NIPR-2000: Creation and Revision of OCE Documents that form ONRSR Accreditation and Derogations SAPR-13: Rail Safety Management of Change		Type Approved product list
		NIWI-2952: Recording Infrastructure Asset Configuration Changes	NIFO-2000.2: Proposal for Derogation to Technical Standards (Form)	
ARTC	EGP-21-01: New Equipment & System Approvals	EGP-02-01: Engineering Waiver Management EGP0201F-01: Engineering Waiver Approval Form RSK-PR-001: Risk Management Procedure		EGP2101R-01: New Equipment & Systems Approval Register EGP0201R-01: Waiver Approval Register
Yarra Trams[2]	CE-021-PR-0021: Type Approval Procedure	CE-019-PR-0016: Engineering Change Management Procedure	CE-019-PR-0003: Waiver (Deviation) Procedure CE-019-FO-0021: Waiver (Deviation) Request	Approved Product List (Not published)

Notes:
1. Links to V/Line's standards and type approved product list require access to the V/Line Extranet.
2. Yarra Trams Engineering Management System documents are not currently available publicly.

6.3 Who is involved in Type Approval?

The primary roles of persons involved in the Type Approval process are identified and described in the RTOs' standards. The following section provides an overview of the key roles and responsibilities.

Further roles are included within the relevant RTO standards identified in *Table 11*.

Applicant/Requestor:

The proprietor or an appointed representative responsible for the design and production of the item or system. The Applicant/Requestor is responsible for completing the type approval application and provision of any product information to demonstrate product performance or to support the assessment process[1].

Endorser/Approver:

This is likely to be a combination of representatives from the RTOs' asset engineering management or standards team as appropriate. Typically, an Engineering Manager or Subject Matter Expert (SME) will be assigned to the product application and will support the process through to acceptance or rejection.

Chief Engineer, Head of Engineering or Manager Standards sign-off is required for Type Approval Certifications for safety or service critical applications.

The applicant or requestor may also have two additional key persons or organisations involved in the process.

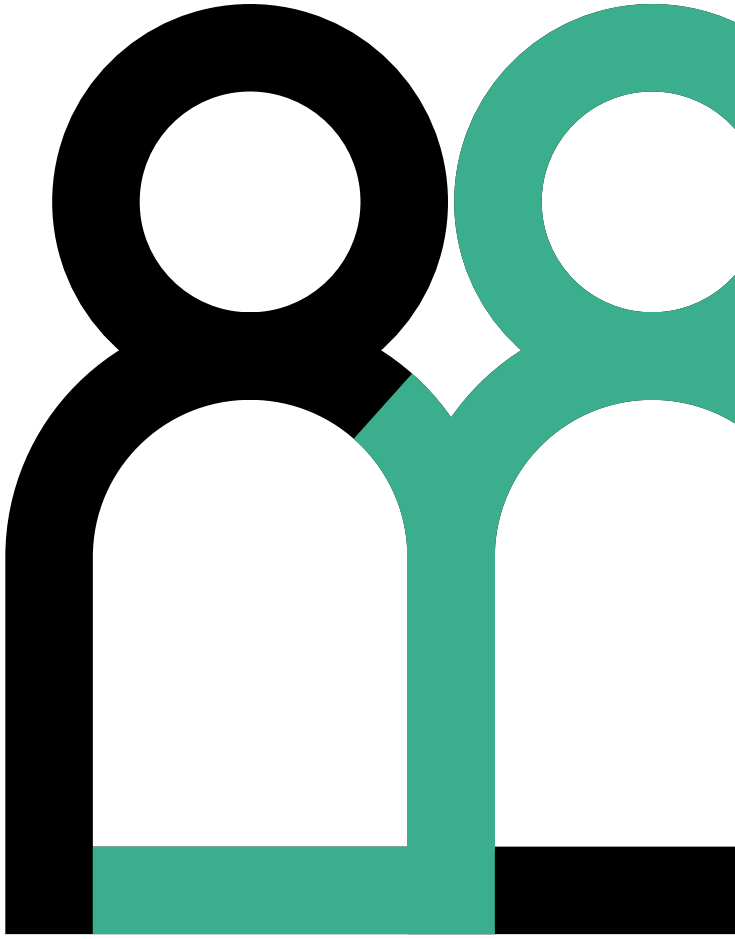
Project Sponsor (e.g. LXRP/MTPO):

Endorsement of products or materials containing recycled material by a 'Project Sponsor' can greatly support the type approval process.

Independent Testing:

New products are likely to require third-party testing to demonstrate that the product or equipment meets the relevant standards and specifications. This may include:

- Collaboration with Research institutions (such as the Australian Centre for Railway Innovation (ACRI) or Monash Institute of Railway Technology)
- Utilising NATA accredited product and material testing laboratories
- Ongoing testing and monitoring as part of project installation and operation.



1. Requests for Yarra Trams Type Approval shall be submitted by Yarra Trams personnel with an appropriate Engineering Delegation Authority (EDA).

6.4 Type Approval Categories

Type Approval Categories associated with new products or equipment are explained in the relevant RTO standards/procedures as outlined in *Table 11*.

Proprietors proposing products as alternatives to existing type approved products are likely to fall under the categories listed below in *Table 12*.

6.5 Anticipated timeframes

Understanding the anticipated timeframes required for product or material type approval will impact the likelihood of implementing a new product, piece of equipment or type of material on the relevant rail network.

There are currently no set timeframes, however a number of factors will affect how long it takes to obtain Type Approval.

Table 12 – Type Approval Categories

MTM	V/Line	ARTC	Yarra Trams
Engineering Product Approval	Minor Type Approval Process (MTAP)	Minor Approval	–
Provisional Type Approval (trial)	Provisional Type Approval (PTA)	Trial Type Approval	Provisional Type Approval (acceptable for trial)
Full Type Approval	Type Approval (TA) – Full	Significant Approval	Full Type Approval Path

Note: Grandfather Rights path is only applicable to existing items on the respective network and are not currently considered relevant for new and emerging products or materials containing recycled content.

6.6 Factors affecting Type Approval

- **Application and associated risk:** Level of risk to the asset will vary depending on application and the intended location where the product is to be used.
- **Previous approval:** Has the product been approved previously by RTOs (e.g. expired approval or modifying composition of an accepted product)?
- **Approved by another operator:** If the product is already approved with another RTO, this may support the application by demonstrating performance in a similar or like-for-like condition.
- **Approved outside Victoria:** National or international application will support the demonstration of performance to other standards. Applicants should consider the comparable standards, climates and conditions.
- **Standards and specifications:** Do standards and specifications exist that set out performance requirements for the specific product or equipment application?
- **Performance testing regime:** Identifying a testing plan will help demonstrate proof of performance. I.e. can testing be undertaken offline in a laboratory or is in-situ testing required?
- **Requirement for trial period:** Duration will vary depending on application and location of the product as described in *Section 6*. Availability (for possession) and accessibility (for testing and inspection) of a trial site should also be considered.

6.7 Product trials

New equipment or products that are provisionally approved with conditions and subject to a trial period should expect additional time for full type approval.

- Trial periods are dependent on the product and should be discussed with the Approving Engineer.
- Typical trial durations of 12–18 months can be expected for materials, products or equipment used in safety or service-critical applications.
- A Trial Implementation Plan should set out the program expectations for this period, including anticipated timeframes, inspection and testing, performance measurement, reporting and the exit strategy should the trial be unsuccessful.

7. Tourist and Heritage Railway

A number of heritage railways and tramways have been established throughout Victoria along closed lines to preserve rail history and to operate as tourist attractions.

As part of the Victorian rail industry, materials and products that are removed as part of works on primary rail networks typically cascade down, where suitable, to support the operation of the tourist and heritage railways and minimise waste within the industry.

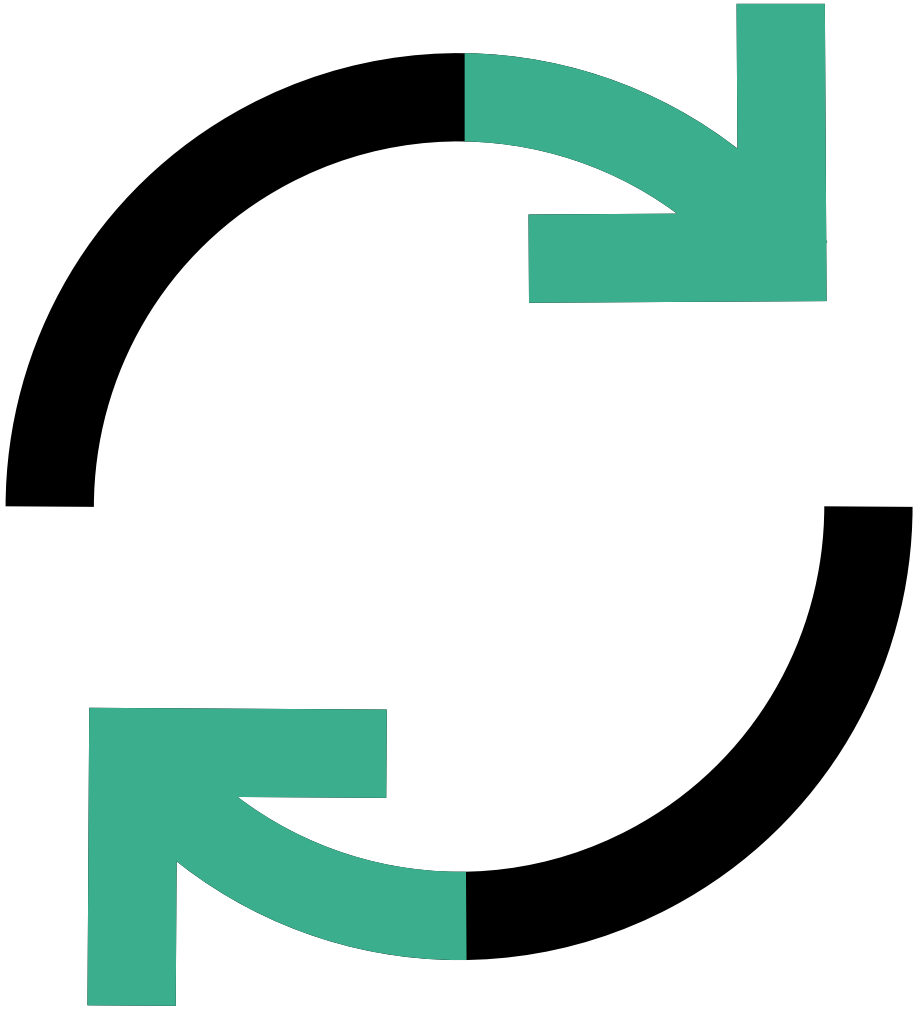
The tourist and heritage railway, excluding Puffing Billy, is controlled by VicTrack, who leases assets to tourist and heritage railway operators.

7.1 Office of the National Rail Safety Regulator

The Office of the National Rail Safety Regulator (ONRSR) has developed a number of Safety Management System (SMS) modules to assist smaller less-complex operators (including tourist and heritage) when developing or reviewing their SMSs.

These modules allow operators to customise and combine modules to develop a safety management system that is specific and appropriate to the scope and nature of their operations and their accreditation.

The individual tourist and heritage railways can modify the template requirements to suit their operations and use this as an opportunity to increase the use of reused or recycled materials and components in upgrade works.



7.2 Reuse and recycling opportunities

Opportunities to maximise the reuse of serviceable products and the use of recycled materials from the primary railway networks, includes but is not limited to:

- **Rails** – predominately use 30kg–40kg/m rail but upgrade based on availability
- **Sleepers** – concrete, timber, steel and composites
- **Sleeper components** – fastenings, dog spikes, sleeper plates and anchors
- **Ballast** – as available and pending affordability of transport.

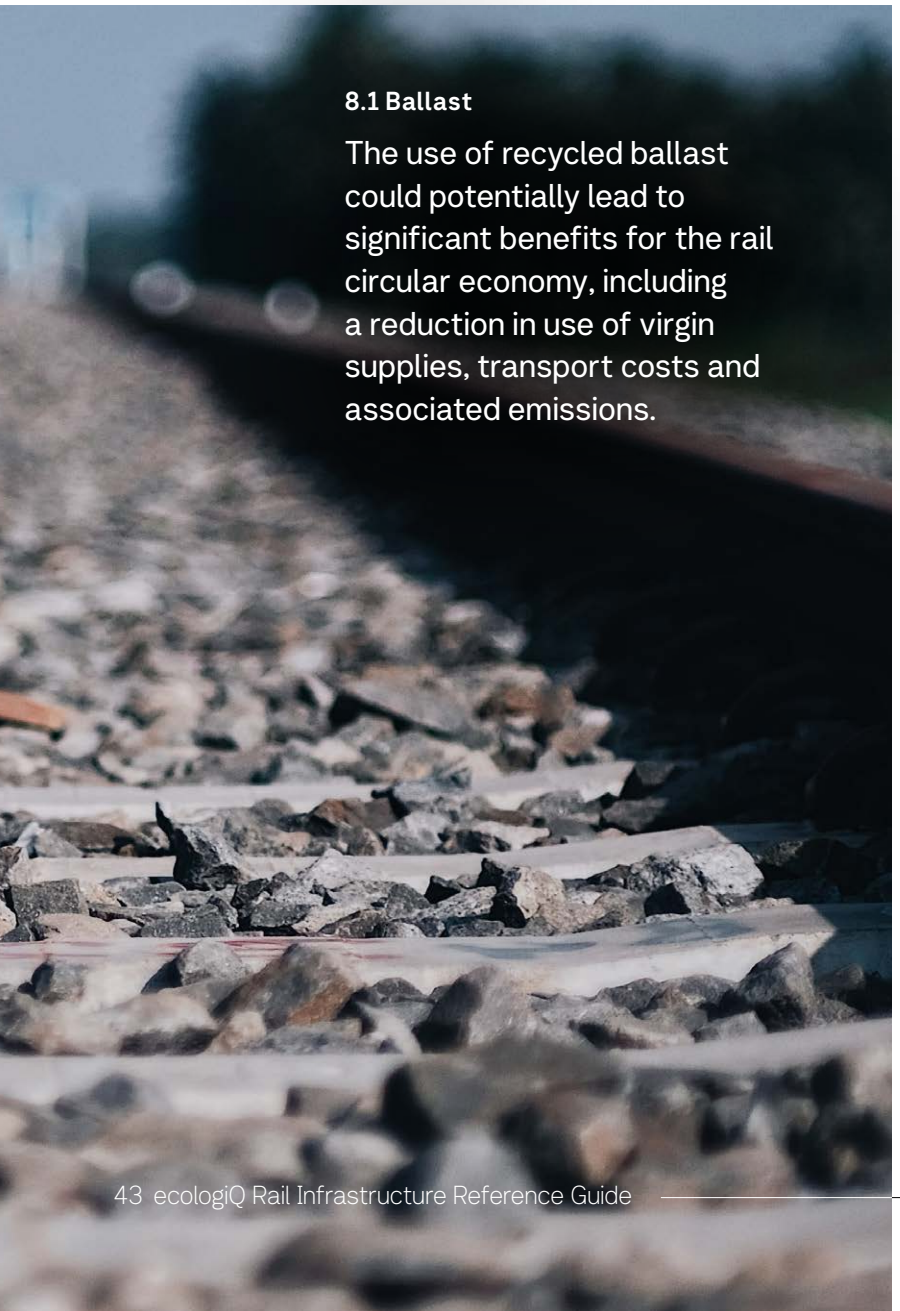
These opportunities should be considered in line with the VicTrack and DTP Transport Services Asset Disposal procedure and strategy respectively, as outlined in *Section 4.4*.

8. Emerging Materials

The potential for reuse and inclusion of recycled materials is actively being pursued in the rail industry.

Research, development and trials are being undertaken to better understand their possible uses in rail construction and to determine future opportunities and additional materials for use.

This section highlights some examples of emerging materials that have the potential for uptake and could be considered for rail infrastructure projects in Victoria, including on a trial basis. Refer to the road guide for emerging materials applicable to the road industry.



8.1 Ballast

The use of recycled ballast could potentially lead to significant benefits for the rail circular economy, including a reduction in use of virgin supplies, transport costs and associated emissions.

Ballast reuse is especially applicable for the temporary track arrangements required for construction works. Ballast reclaimed from existing track conditions, due to operational and maintenance use, is known to contain various contaminants including heavy metals, hydrocarbons and potentially asbestos.

These contaminants may restrict the reuse of ballast due to the need for appropriate treatments to remove the contaminants. Under Victoria's waste management regulations ballast is required to be classified in accordance with EPA IWRG621 (i.e. to remain on-site or to be disposed of at an appropriately licensed facility).

However, following appropriate screening and cleaning the resultant material has been proven to meet the performance requirements of virgin ballast.

Following an appropriate cleaning and/or screening process, and subject to approval of the relevant RTO, the following may present opportunities for ballast reuse:

- 60 and 50mm ballast for running rail
- 19mm ballast screening (outside running rail)

Lesser grade material has potential (if it adheres to relevant standards and requirements) for use in:

- Structural backfill
- Use in concrete as rock/aggregate replacement
- Clean rock for upgrade of maintenance access tracks
- Drainage materials e.g. lining of open cut drains (considering minimum rock size)
- General fill.

As noted in *Table 7*, the appropriate handling and storage of ballast is crucial to enabling its reuse to reduce the likelihood of fouling.

Potential agreements within the rail industry for sharing cleaned ballast between RTOs may also provide benefits, including increased uptake of ballast reuse, reduced ballast to landfill and reduced transportation costs.

8.1.1 Recent trials in Victoria

Under the current MTM Spoil Management contract, the ballast removed from the rail corridor during renewal/maintenance activities is being transported to a local recycling facility, where the ballast was tested post-cleaning. Upon testing, majority of the material was found to have met the requirements of relevant Australian Standards and MTM's Ballast specifications.

Further trials are being undertaken by MTM with industry to validate the quality assurance process for recycled ballast and to subsequently develop reuse requirements for the MTM ballast supply specification.

Railway & Tramway Heritage Victoria has been working with VicTrack, in partnership with LXRP and V/Line, to recycle fit-for-purpose materials from the main line to the tourist and heritage sector. In 2023, ballast removed from the LXRP's Union Road–Mont Albert Road project was transported to Yarra Valley Railway's Tarrawarra Yard. After on-site screening and cleaning by specialists, 85% were re-stacked as clean ballast for reuse .

8.1.2 Applications outside Victoria

Ballast reuse processes are well established in NSW, QLD, Germany, Austria and the UK, and follow a similar process for reuse:

- Assessment of ballast contamination and residual life
- Receive or haul ballast
- Remove contaminants by cleaning or screening
- Process to meet material specification (removal of fines and fouling)
- Transport and lay ballast
- Monitor stability and displacement.

Table 13 identifies standards from other jurisdictions in Australia for the reuse of ballast. Applications are provided as examples and should be assessed and applied in accordance with the relevant Victorian standards.

Table 13 – Standards outside Victoria that allow for the use of recycled ballast

Standard	Region	Owner	Application
TS 03609/ T HR TR 00192 ST (Version 2)	NSW	NSW Government, Transport Asset Standards Authority	Section 10.2 sets out the permitted uses for recycled ballast
TS 01049:1.0/CRN CS 240	NSW	Transport for NSW, Country Regional Network (CRN)	Section 8 sets out repair standards for ballast cleaning and use of recycled ballast
Recycled Fill Materials for Transport Infrastructure Environmental Instruction 21.6	South Australia	Department of Planning, Transport and Infrastructure (DPTI)	Section 8.3.2 sets out ballast reuse standards, including sampling and testing

8.2 Recycled materials in track formation

The current RTO's standards and specifications do not preclude the use of recycled content within track formation layers, providing compliance with the relevant Australian standards. However, the inclusion of these materials is not currently widely supported/ demonstrated throughout Victoria.

Research is currently being undertaken to explore for opportunities for blending recycled materials such as recycled glass, plastic and crushed concrete into the capping layer.

8.2.1 Applications outside Victoria

Slag aggregate use in capping and free drainage filter material is typically allowed in current standards across the states however, prescriptive standards for other recycled material is limited with the exception of Queensland.

Table 14 and *Table 15* identify Queensland Rail (QR) and Department of Transport and Main Roads (TMR) standards for the use of recycled materials in the capping layer and free drainage material, respectively. Applications are provided as examples and should be assessed and applied in accordance with the relevant Victorian standards.

Table 14 – Queensland standards that allow for the use of recycled materials in capping layer

State	RTO/ authority	Material specification reference	Allowable limits				References
			CC	RAP	RB	RCG	
QLD	QR	Subtype 2.3	≤100%	≤20%	≤20%	≤20%	QR-CTS-Part 6
	TMR	Subtype 2.4	≤100%	≤20%	≤45%	≤20%	MRTS05 – Section 7.2

Note: Course component material properties as required by MRTS05 (Type 2.3 and 2.4). Option for natural or recycled material blends. Testing criteria is adjusted for recycled material blends. Additional considerations include max. pH, UCS and presence of foreign material.

Table 15 – Queensland standards that allow for the use of recycled materials in free draining material

State	RTO/ authority	Material specification reference	Allowable limits				References
			CC	RAP	RB	RCG	
QLD	QR TMR	Subtype 2.3	≤100%	≤20%	≤20%	≤20%	QR-CTS-Part 6 MRTS04 – 18.2.3 MRTS05 – Section 7.2

Note:
High level requirements QR-CTS-Part 6. MRTS05 applies for rail pavements using unbound granular materials. Queensland Rail standards are not publicly available.

8.3 Plastics

8.3.1 Composite Rail Sleepers and Bearers

RTO's are trialling composite railway sleepers on their networks, primarily as an alternative to maintenance intensive timber sleepers.

These trials have been designed to determine the viability of the composite sleepers for use on the wider network. Trial applications in Victoria include:

- **December 2017:** Timber replacement sleepers VIC Heritage Railway
- **July 2019:** Low profile concrete sleeper replacement at Richmond Station (MTM)
- **August 2019:** Concrete replacement at Wyndham Vale Stabling Yard – connection road (V/Line).

Subsequent to the trials, composite sleepers have been approved for low-speed applications as per the condition of Type Approvals by MTM and V/Line. Recent application include:

- **2021 to 2022:** installation of >1000 nos. of sleeper at various stabling yards and sidings (V/Line).
- **2023:** Approval granted for using composite sleepers on the ballasted track section on Off Site Tram Track Extension Works as part of the Maidstone Tram Maintenance Facility for the Next Generation Trams (Yarra Trams).

Other trial applications in Australia:

- **2018:** Timber replacements, interspersed with standard timber sleepers (Queensland Rail).

Composite sleepers for mainline trackwork are not included in current RTO standards and specifications, however they have been trialled via the type approval process, which has been supplemented by relevant laboratory testing of comparable standards.

Performance review of the subsequent trial shall determine opportunities for composite sleepers across Victoria.

In March 2020, RISSB released an update to *AS 1085.22 Railway track materials: Alternative material sleepers*, which provides requirements for the specification, manufacture and testing of alternative material sleepers for the use in railway track.

For V/Line assets, the requirements for composite sleepers and bearers have to primarily comply with NIST-2651 (updated in 2023 to incorporate composite material).

In the interim, recently published Australian standards AS1085.22 takes precedence, in conjunction with ISO 12856-1:2022 *Railway applications — Polymeric composite sleepers, bearers and transoms*.

As identified in Section 3, composite rail sleepers can provide increased flexibility during construction as they may be cut to suit on-site, resulting in increased opportunity for bulk product purchase for manipulation as required by each specific project, which can reduce typically long lead times.

8.3.2 Plastics in Other Applications

Recycled plastic products are also being developed for other applications including:

- Geosynthetics
- Drainage pipes/pits
- Service conduits/pits
- Electrical conduit and cable covers
- Fencing
- Level crossing elements (e.g. crossing panels, boom barriers etc)
- Platform/viaduct screening
- Noise attenuation panels & decking
- Plastic in concrete (void formers, synthetic fibres in place of steel etc)
- Miscellaneous (TGSIs, RPMs, signage, sealants etc).

Type approved products are already available in market.

Refer to the road and ancillary guides for other applications.

9. Disclaimer

This guide is not intended to make any legal representations and does not commit the Victorian State Government to any future course of action. Readers should not rely on these guidelines when making construction, business or investment decisions.

The Victorian State Government and its departments and agencies accept no responsibility for any use of this guide, including for any loss or detriment resulting from reliance on or application of this guide.

10. Change log

Version	Summary of updates
May 2025	General updates in accordance with industry changes since last publication (October 2022).

Appendix A – Reference Documents

A.1 VicTrack

Environmental Sustainability Strategy 2021-25
PR-GL 003 – Environmental Management Plan
PR-GL 004 – VicTrack Soil Reuse Guideline
TS-SP 013
TS-ST 043
VT-PO 167– Environmental Sustainability Policy
VT-SP-143 – VicTrack Disposal of Assets Procedure

A.2 DTP

Department of Transport (2020) Transport Services Strategy – Rail Asset Disposal Strategy
PTV-NTS-006 Network Technical Standard –Track & Structure – Railway
PTV-NTS-007 Network Technical Standard – Track & Structure – Tramway
Section 176 – Environmental Management (Minor)
Section 177 – Environmental Management (Major)

A.3 MTM

A1212 – Engineering Waiver Procedure
A1215 – Type Approval Procedure
A1224 – Engineering Change procedure
A1341 – Technical Specification for Ballast Supply
A1347 – High Voltage Cable Routes
A1392 – Earthworks and Formation Specification
A1423 – Turnouts and Special Trackwork Specification
A1501 – Recycled Glass Sand Specification
A1503 – Resilient Rail Fastenings Assemblies
A1504 – Concrete Sleeper

A1520 – Train Stabling and Driver Facilities
A1524 – Line Side Fencing
A1530 – Metropolitan Railway Stations
A1537 – Earthworks and formation standard
A1538 – Track Drainage Standard
A1539 – End of Track Protection
A1541 – Criteria for Infrastructure at Railway Level Crossings – Pedestrian Crossings
A1546 – Bridge Standard
A1547 – Standard for Construction of Cable Route and Signalling Civil Works
A1549 – Car Parks
A1705 – Request for Type Approval
A2020 – Safety and Environmental Requirements for Contractors and Third Parties
A2023 – Integrated Risk Management Procedure
A3900 – Track System Standard
A3901 – Track Geometry Standard
A3902 – Track Structure Standard
A7640 – Metro Environment and Sustainability Policy
A9402 – Type Approval Product Register (refer to latest version)
A9606 – Infrastructure Service Critical Assets Assessment Procedure

A.4 V/Line

NIFO-1310.1 – Type Approval Checklist
NIFO-1310.2 – Type Approval Certificate
NIFO-1310.3 – Type Approval Preliminary Investigation
NIFO-2000.2 – Proposal for Derogation to Technical Standards (Form)
NIMG-2600 – Asset Management Definitions and Terminology
NIMG-2741 – Third Party Safety and Environmental Management Handbook
NIPR-1310 – Type Approval – V/Line Asset Management (Procedure)
NIPR-2000 – Technical Standards: Development, Change and Derogations
NIPR-2661 – Procedure – Provision of Trackside Signage
NIST-002.1 – Railway Station Design Standard and Guidelines
NIST-004.13 – Train Stabling Facilities
NIST-012.2 – Specification for Signalling Supply, Construction and Installation
NIST-2616 – Railway Structures Design Requirements
NIST-2650 – Rail use, laying and adjustment
NIST-2651 – Sleepers and Fastenings
NIST-2654 – Ballast Standard
NIST-2659 – Earthworks and Drainage
NIST-2659.1 - Specification of Recycled Glass Sand
NIST-2660 – Turnouts and Crossings
NIST-2662 – Right of Way
NIST-2687 – Level Crossings
NIST-2703 – Inspection and Assessment: Rail and Rail Joints (External)
NIST-2704 – Inspection and Assessment: Rail (Internal)
NIWI-2952 – Recording Infrastructure Asset Configuration Changes
SAMG-39 – Construction Environmental Management Plan (CEMP)
SAMG-49 – Contractor Safety and Environmental Management Handbook
SAMG-7 – V/Line's Significant Environmental Aspects and Impacts
SAPO-2 – Health, Safety and Environment
SAPR-13 – Rail Safety Management of Change
SAPR-67 – Environmental Management of Hazardous or Prescribed Waste
SAPR-68 – Environmental Management of Earthworks and Soil Disturbance
SAPR-9 – Safety, Security, Health & Environment Risk Management Process

A.4 ARTC

EGP-02-01 – Engineering Waiver Management
EGP0201F-01 – Engineering Waiver Approval Form
EGP0201R-01 – Waiver Approval Register
EGP-21-01 – New Equipment & System Approvals
EGP2101F-01 – Type Approval Request Form
EGP2101R-01 – New Equipment & Systems Approval Register
Environment Protection Authority (SA-2019)
Environment Protection Licence (NSW-2023)
Environmental Policy
ESC-03-01 – Level Crossing Equipment (Signalling)
ETA-02-01 – Timber Sleeper and Turnout Specification
ETA-04-01 – Ballast Specification
ETA-11-01 – Permanent Trackside Signage
ETC-02-03 – Steel sleepers – Usage and Installation Standard
ETC-03-01 – Turnout Replacement
ETC-08-02 – Railway Earthworks
ETC-08-03 – Earthworks Materials Specification
ETC-08-04 – Earthworks Construction Specification
ETD-02-05 – Concrete Sleepers – Design
ETG-02-01 – Sleepers, Bearers and Fastenings
ETG-04-01 – Ballast
ETG-17-01 – Installation of Utility Services and Pipelines within Railway Boundaries
ETH-00-01 – Buffer Stops and Restraining Devices for Dead End Tracks
ETS-12-00 – Level Crossings
ETS-12-01 – Pedestrian Level Crossings
Inland Rail Environment and Sustainability Policy
Inland Rail Sustainable Procurement Policy
RSK-PR-001 – Risk Management Procedure
Section 1: Rail (CoP)
Section 2: Sleepers and Fasteners (CoP)
Section 3: Points and Crossings (CoP)
Section 4: Ballast (CoP)
Section 9: Structures (CoP)
Southern Sydney Freight Line Environmental Documentation
Update Type Approval Register

A.5 Yarra Trams

CE-019-FO-0018 – Type Approval Form
CE-019-FO-0021 – Waiver (Deviation) Request
CE-019-PR-0003 – Waiver (Deviation) Procedure
CE-019-PR-0016 – Engineering Change Management Procedure
CE-019-PR-0020 – Type Approval Procedure
CE-019-ST-0033 – Infrastructure – Tram Track Construction
CE-021-GL-0004 – Engineering Change Process Guideline
CE-021-ST-0012 – Infrastructure – Tram Stop Platform Design
CE-021-ST-0028 – AMS06 Asset Criticality Standard
CE-021-ST-0035 – Infrastructure – Tram Track Design
SMS 1.1.2: Sustainability and Environment Policy

VicTrack standard drawings are available on the PTV Document Management System.

STD_G0011 to 021 – Boom barriers and associated drawings
STD_R0022 – Track and pavement details for level crossing road surface
STD_T0310 – Typical cross sections at grade tracks
STD_T9001 – Rail / wheel profiles – 96lb/yd, 42kg/m & 43kg/m
STD_T9002 – Rail / wheel profiles – 60kg/m, 41kg/m, Ri57/R10 & Ri57A/R10

STD_T9003 – Standard tie bar

STD_T9005 – Standard check plate block & assembly – 41kg rail

STD_T9008 – Destressing procedure for 41kg tram rail gauge-lock clip arrangement

STD_T9010 – Typical track structures

STD_T9011 – Ballast construction (track design)

STD_T9012 – Ballast construction w/centre poles (track design)

STD_T9020 – Track drainage trench grate arrangement

STD_T9060 – Track structures transition

A.7 VIDA

LXRP Engineering Hub

LXRP sustainabilty policy

RPV Standard Hub

Rail Projects Victoria sustainability policy

A.8 Other Reference

AS 1085.22 – Railway track materials: Alternative material sleepers

EPA fact sheet: Use of glass fines

EPA IWRG621 – Soil Hazard Categorisation and Management / EPA Guidance

Extractive Resources Strategy (Department of Jobs, Precincts and Regions)

NSW – TS 01049:1.0 / CRN CS 240 – Ballast

NSW – TS 03609 / T HR TR 00192 ST (Version 2) – Ballast

QR-CTS-Part 6 – Earthworks

Queensland Transport and Main Roads Specifications MRTS04 – General Earthworks

Queensland Transport and Main Roads Specifications MRTS05 – Unbound Pavements

Recycling and Resource Recovery Infrastructure Evidence Base Report (Infrastructure Victoria)

Recycling Victoria Strategic Plan (Department of Energy Environment and Climate Action)

SA – Recycled Fill Materials for Transport Infrastructure Environmental Instruction 21.6

Social Procurement Framework (Buying for Victoria)

Victorian Recycling Infrastructure Plan (Recycling Victoria)

Appendix B – Material Descriptions

Table B.1 — Material Descriptions

Material	Description
Ballast	Ballast is the crushed rock above the capping layer which supports the sleepers and forms part of the track.
Capping (also sub-ballast)	Capping or sub-ballast is the upper layer of the formation consisting of graded crushed rock or similar compacted material that provides a sealing layer to the formation.
General fill	The lower layer of the formation below the capping layer and structural fill.
Geopolymer-binder	Binder containing greater than 80% Fly Ash, Ground Granulated Blast Furnace Slag (GGBFS) or Amorphous Silica complying with the requirements of AS 3582.1, AS 3582.2 and AS 3582.3 respectively, metakaolin and up to 20% alkaline components.
Geosynthetics	The range of polymeric products comprising eight main categories: geotextiles, geogrids, geonets, geomembranes, geosynthetic clay liners, geofoam, geocells and geocomposites.
Granular filter material	Granular material with the grading selected so that it will allow water to pass through it, while retaining solid matter.
Structural fill	The mid layer of the formation between the capping and general fill or subgrade layer comprising of appropriately specified and compacted material.
Supplementary cementitious material	Fly Ash, Ground Granulated Blast Furnace Slag, or Amorphous Silica complying with the requirements of AS 3582.1, AS 3582.2 and AS 3582.3 respectively.

For other definitions refer to: V/Line - NIMG-2600 – Asset Management Infrastructure Definitions and Terminology

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Purposely Greener Infrastructure

Contact us

For more information on the program and
to find out how we can support your team:
ecologiQ@roadprojects.vic.gov.au

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