Review and identify jurisdictional regulations/specifications/guidelines/ standards, affecting the development and operation of end-markets for C&D waste streams

Research Report 1

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EXECUTIVE SUMMARY

This report presents the results of an analysis of the C&D waste regulatory frameworks in Australian states and territories concerning end-market development and operation. Market creation and stimulation are sustainable solutions to the growing issue of C&D waste. It is often argued that the regulatory context has a significant impact on the effective operation of the recycled product end-market. This study analysed 102 federal, state and territories government policies, standards, guidelines, legislation and specifications to determine the extent to which the Australian regulatory frameworks are in favour or against C&D waste market development. The following are the highlights from this regulation analysis:

1. Most of the primary state and territory legislation does not define C&D waste and considers waste as always a waste regardless of its value or future usage;
2. Specifications of application of C&D recycled products vary between states and territories, which has a negative impact on interstate market development and stimulation;
3. In most waste strategy documents, the significance of waste market development is highlighted; some waste strategy documents suggest recommendations to improve it; and
4. Among the states and territories, New South Wales and Tasmania have the most extensive and smallest regulatory framework relevant to C&D waste management and market development thereof, respectively.

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1 INTRODUCTION

With rapid urbanisation around the world, construction activities continue to grow to an unprecedented extent. As a result, the current rate of the construction industry has reached 35% of the total waste sent to landfill worldwide (Solís-Guzmán et al., 2009, Zheng et al., 2017). For instance, in the UK, 49 Mt of C&D waste was generated in 2014, more than half of this amount was landfilled (Menegaki and Damigos, 2018). In China, the annual C&D waste generation is 2.36 BT (Zheng et al., 2017) and in the US, this figure was 516 Mt in 2017 (US EPA, 2019). In Australia, construction and demolition activities have substantially grown over the recent decades leading to the generation of a large amount of waste (Shooshtarian et al., 2019a). The C&D waste stream; therefore, accounts for 43% of the total waste generated, reaching 20.4 Mt annually (Shooshtarian et al., 2019b). The average annual growth of C&D waste generation is currently at 2%, and about 6.7 Mt of this waste stream is landfilled (Shooshtarian et al., 2020a). The development of a market for salvaged and recycled waste materials (including C&D waste) has been advised as a sustainable solution to reduce waste disposal (Sustainability Victoria, 2016). Hence, multiple pieces of literature, industry reports, policies, strategies, and guidelines have emphasised the necessity of a marketplace in the management of C&D waste (Shooshtarian et al., 2020b, Shooshtarian et al., 2019c, Caldera et al., 2020, National Waste Policy, 2018).

Within the Australian context, the circular economy of waste has five principles, the third of which is to 'increase the use of recycled material and build demand and markets for recycled products, that is, market development (Perey et al., 2018, Florin et al., 2015). In the Australian National Waste Policy (2018), Strategy 14 places emphasis on market development and research (p. 16). Estimations, based on the current solid waste generation rates in Australia, project that Australian recycling capacity must increase by 400% by 2040 to address the issue of solid waste in future (Environment and Communications References Committee, 2018). Several internal and external factors strongly influence the development of a domestic market for waste and recyclables. Among others, the supportive regulatory framework is found to have a significant effect.

Waste regulatory frameworks must be set to be in favour of local market development and the implementation of an effective circular economy. The issues that must be addressed in this regard are inconsistency in state and territory waste regulations throughout Australia, clarification on the waste definition including when waste becomes a resource and is not liable for landfill levy, weak or inconsistent regulations that encourage illegal dumping and stockpiling activities and inconsistent reporting obligations. Hence, this study (Project 1.75) aimed to review and identify jurisdictional regulations/specifications/guidelines/standards affecting the development and operation of end-markets for C&D waste streams. This report presents the results of an analysis of waste regulatory frameworks in eight Australian states and territories.

2 METHODOLOGY

The methodology used in this project involves using secondary data from publicly available sources. The regulation of waste primarily takes place at the state and territory government level. In each state and territory, a legislation portal makes jurisdictional legislation (acts and subordinate regulations) freely available. The following table shows the web addresses of these portals within federal, state and territory governments.

Table 1. Legislation portal web links in different states and territories

State and territory	**Portal weblink**
Federal Government	https://www.legislation.gov.au/
Australian Capital Territory	https://www.legislation.act.gov.au/
New South Wales	https://www.legislation.nsw.gov.au/#/
Northern Territory	https://legislation.nt.gov.au/
Queensland	https://www.legislation.qld.gov.au/
South Australia	https://www.legislation.sa.gov.au/index.aspx
Tasmania	https://www.legislation.tas.gov.au/
Victoria	https://www.legislation.vic.gov.au/
Western Australia	https://www.legislation.wa.gov.au/

The review of regulatory frameworks involved analysis of (1) national and states and territories primary legislation (i.e. acts and regulations), (2) guidelines, policies and strategies, and (3) standards, codes and specifications. The review also specifies the relevant government organisations that have a pivotal role in the creation and stimulation of end markets for C&D waste recyclables.

3 REVIEW OF REGULATIONS, SPECIFICATIONS, GUIDELINES AND STANDARDS

In this section of the report regulations, guidelines and policies that affect the development and operation of C&D waste end-markets are reviewed. The review involves the analysis of national and jurisdictional (eight Australian states and territories) documents that are publicly available. Furthermore, public organisations that are responsible or contribute to developing such end markets in each state and territory are identified.

3.1 Australia

i. Overview

As the C&D waste regulation and policy development mostly takes place in states and territories, the federal government has set limited legislation and guidelines for end-market development for waste-derived products. The Product Stewardship Act 2011 provides a distinct definition of waste, which is allocated to a product after it has been disposed of. In the Act, when a product is a waste, it is still under the product life definition. The Act sets criteria for developing stewardship programs in Australia. Among other publications, the National Waste Policy 2018 has the most significant impact on end-markets for recycled materials. The Policy was prepared by the Australian Government, state and territory governments, and the Australian Local Government Association. The Policy guides ongoing collaboration between all Australian governments, business and industries. Through various strategies highlighted in this Policy, it advocates end-markets for recycled materials via a common approach, sustainable procurement by governments, and market development and research. In 2019, the Policy's Action Plan was released to set the targets and actions to implement the Policy's strategies. The key actions that affect end-market creation and stimulation through governments' purchasing power to increase recycling include stimulating demand for recycled materials relative to virgin materials, encouraging innovation and investment in recycling to meet demand from new markets, supporting domestic jobs and industries by retaining the value of recycled materials and encouraging economy-wide behaviour change.

At the national level, efforts to stimulate end-markets for recycled products are typically led by the Federal Department of Agriculture, Water and the Environment. The Department has published a sustainable procurement guideline, which is based on the Commonwealth Resource Management Framework, 2018 National Waste Policy and Sustainable Development Goals. The Guideline maps out the pathway to the government sustainable procurement approach, including consideration of the purchase of goods and infrastructure that can be re-used, repaired and recycled, and contain recycled content. The Department also published a guide to analysing the supply chain of C&D waste resources to help develop effective end-markets for materials derived from the C&D waste stream. The Guide provides several case studies across Australia in which the sustainable outcomes of using recycled products in construction projects are highlighted.

ii. Regulatory framework

Table 2. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Product Stewardship Act 2011	• Presents criteria for product stewardship programs • Provides regulatory context for waste minimisation and increased recycling and re-using activities, some statements include: a) managing waste from products as a resource b) ensuring that products and waste from products are re-used, recycled, recovered, treated and disposed of in a safe, scientific and environmentally sound way • Includes the point at which a product is a waste in the product life definition	• No realised or perceived negative impacts

	• Provides a distinct definition of waste, whereby a product is designated as such after it is disposed of	
National Waste Policy 2018 - Australian Government	• Sets 14 strategies to improve waste management. The most relevant strategies are: a) Strategy 5 (Common approach): Implement a common approach towards waste policy and regulation, particularly concerning national opportunities to support the development of markets for recycling b) Strategy 8 (Sustainable procurement by governments): All Australian governments consider environmental issues in their approach to goods and infrastructure procurement and promote demand for recycled materials and products containing recycled content c) Strategy 14 (Market development and research): All Australian governments and businesses generate and report information to support creating and maintaining markets for recycled materials	• No realised or perceived negative impacts
National Waste Policy (Action Plan) 2019	• Presents targets and actions to implement the 2018 National Waste Policy. The relevant targets are: a) Target 4: Significantly increase the use of recycled content by governments and industry b) Target 7: Make comprehensive, economy-wide and timely data publicly available to support better consumer, investment and policy decisions • Proposes actions to stimulate end-markets such as: a) Stimulating demand for recycled materials relative to virgin materials b) Encouraging innovation and investment in recycling to meet demand from new markets c) Supporting domestic jobs and industries by retaining the value of recycled materials d) Encouraging economy-wide behaviour change	• No realised or perceived negative impacts
Sustainable Procurement Guideline- Department of Agriculture, Water and the Environment	• Applies the government procurement strategies 11to the Commonwealth Resource Management Framework, 2018 National Waste Policy and Sustainable Development Goals • Suggests consideration of purchasing goods and infrastructure that can be re-used, repaired and recycled, and contain recycled content	• No realised or perceived negative impacts
Guide to Pavement Technology Part 4E: Recycled Materials. - Austroads	• Presents the latest information and specifications of recycled materials to be used in construction projects • Suggests a framework for determining the suitability of recycled materials in roadworks • Determines physical and chemical requirements and relevant testing methods	• No realised or perceived negative impacts

Construction and Demolition Waste Guide – Recycling and Re-use Across the Supply Chain - Department of Agriculture, Water and the Environment	• Presents information about the supply chain of C&D waste resources • Provides case studies in which recycled C&D waste resources are used	• No realised or perceived negative impacts
Environmental Sustainability Policy - Department of Services Australia	• Provides suggestions for C&D waste management to the Department offices; these include: a) Comply with the above legislation, regulations and policies b) Apply the environmental standards for waste management as outlined in the Policy c) Re-use and/or recycle—where cost-effective and practical d) Establish re-use and recycling disposal infrastructure for large office relocations to optimise resource recovery e) Maintain accurate and complete records for reporting purposes on the types of disposal infrastructure at each site, the types and units of items being disposed of and the method of disposal	• No realised or perceived negative impacts

iii. Relevant organisations

The major organisations with the most significant contributions to market creation and stimulations at the national level are the Department of Agriculture, Water and the Environment and Austroads.

3.2 Australian Capital Territory

i. Overview

In this section, the regulatory framework that governs/guides market creation and stimulation activities are analysed. The primary pieces of legislation are the Waste Management and Resource Recovery Act 2016 (WMRR act) and the Environment Protection Act 1997. The leading ACT organisations that are responsible for the creation and stimulation of the C&D waste market are the Environmental Protection Authority and Transport Canberra and the City Services Directorate. Included in the review are strategies, standards, legislation and specifications. The primary pieces of legislation do no account for the end of life options and waste is always considered as waste regardless of its value. However, in the Development Control Code[1], a set of mandatory requirements are specified, which state that development projects with more than 20m^3 of waste generation must recycle and re-use C&D waste materials. The ACT has no specifications for the application of C&D waste recycled products in infrastructure projects.

ii. Primary legislation

The two primary pieces of legislation are the Waste Management and Resource Recovery Act 2016 (WMRR act) and the Environment Protection Act 1997. Their subordinate regulations do not provide significant support for C&D waste market creation and stimulation. The major issues are related to having no clear definition of C&D waste, which might create confusion among waste businesses and operators, leading them not to account for waste end-of-life options. Table 4 provides a summary of regulatory statements in favour of and against market development enshrined in ACT legislation.

Table 3. Summary of regulatory statements in favour/against recycled C&D market development

Acts and Regulations	In favour of market development	Against market development
Environment Protection Act 1997 (Environmental Protection Authority)	One of the Act's objects is to promote waste minimisation and the re-use and recycling of materials	• No clear definition for C&D waste • Waste is always a waste regardless of its value
Waste Management and Resource Recovery Act 2016 (Transport Canberra and City Services Directorate)	This Act implies support for market development through the following objects: a) Manage waste through maximising the recovery and re-use of resources b) Support innovation and investment in waste management c) Promote responsibility for waste reduction	• No clear definition for C&D waste • Waste is always a waste regardless of its value • Proximity principle applied to waste materials
Environment Protection Regulation 2005 (Environmental Protection Authority)	Not evident	• Waste is always a waste regardless of its value • Clean fill is not excluded from waste category

[1] Development control code for best practice waste management in the ACT 2019. Transport Canberra and City Services Directorate. https://www.cityservices.act.gov.au/__data/assets/pdf_file/0008/1315754/Development-Control-Code-for-Waste-Management-2019.pdf

Waste Management and Resource Recovery Regulation 2017 Transport Canberra and City Services Directorate	Not evident	• No definition for C&D waste, no list of recyclable C&D waste

iii. Guidelines, policies and strategies

In this section, policies and strategies are analysed (Table 5). In 1996, the ACT is was the first jurisdiction in the world to employ a 'No Waste' strategy. Since its implementation, this strategy set the waste policy for four governments (1996- 2004). The cornerstone of this strategy was based on the notion that waste material is a resource, not a waste. Following this strategy, three other policies and strategies were developed that have guided waste management planning and activity in the territory. The ACT's Waste Strategy (2015-2025) is a pioneering document that provides practical strategies that are relevant to efforts to create and stimulate the market for the C&D waste stream. The Waste-to-Energy Policy[2] recommends sustainable procurement to create a market for recycled products. The big change in the policy is that the ATC government puts a pause on the new plans for energy recovery from waste activities throughout the territory as of 2020. This policy limits the market availability for combustible C&D waste materials such as timber. The 2015 Sustainable Procurement Policy is among the first policies published in the Australian states and territories focusing on the cradle to cradle approach, which will have multiple sustainable (environment and economic) outcomes. Among the specified outcomes, end-of-life options and job creation through market development are the most relevant considerations. However, this policy does not provide any specific information on the use of recycled C&D waste products by the territory government. Table 5 provides a summary of the strategies and factors that can trigger market development.

Table 4. Summary of statements in favour/against recycled C&D waste market development

Guideline/strategy	In favour of market development	Against market development
ACT Waste Management Strategy 2011-2025 - Environment, Planning and Sustainable Development Directorate)	• Advises the following strategies: a) Develop markets for recyclable materials and strengthen the regional connection b) Disincentivise landfill including appropriate pricing and regulation c) Government sustainable procurement d) Encourage on-site re-use for C&D waste	• No realised incentive for C&D waste market development
ACT Waste-to-Energy Policy 2020-25 - ACT Government	• Government seeks to create markets for recycled products through government procurement • It rules out energy from recovery activities throughout the territory	• No realised incentive for C&D waste market development
Sustainable Procurement Policy 2015 - ACT Government	The policy supports the cradle to cradle approach and suggests several sustainable impacts to consider when procuring goods and services: a) Reusability and/or recyclability b) Product efficiency and longevity: options for re-use, repair, upgrade or modification to increase product life c) Recycled content of goods	• No specific mention of C&D waste recycled products

[2] ACT Waste-to-Energy Policy 2020-25- ACT Government. https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.act-yoursay.files/3815/8509/9072/TCCS_ACT_Waste_to_Energy_Policy.pdf

	The policy indicates the outcome of sustainable procurement as follows: a) Job creation (e.g. green technologies, use of local suppliers, creating markets for recycled products, back to work schemes) b) end-of-life options (e.g. recyclability, resource recovery)	

iv. Standards, codes and specifications

Among all the government-issued documents, the Development Control Code[1] is the most relevant source of information about the C&D waste stream. This document lists the obligatory requirements for re-using and using recycled products in development projects. These requirements are provided in Table 6. The ACT has not published any specifications with regards to the use of recycled products in construction and infrastructure projects.

Table 5. The statements specified in standards/codes/specifications in favour/against market development

Standard/code/specification	In favour of market development	Against market development
Development Control Code for Best Practice Waste Management in the ACT 2019 - Transport Canberra and City Services Directorate	• The general waste definition excludes recyclable materials • C&D waste definition is provided • Best practice waste management for C&D waste provided through *Part 6. Mandatory requirements- demolition, excavation and construction* with the following conditions for development activities that generate more than 20m^3 of waste: a) Minimum 90% of all demolition and excavated waste generated on development must be re-used or recycled or both b) Minimum7 5% of all construction waste generated on development must be re-used or recycled	• No realised incentive for C&D waste market development

v. Relevant Organisations

The three major organisations that make the most significant contributions to market creation and stimulations are the ACT Environmental Protection Authority (EPA), the Environment, Planning and Sustainable Development Directorate, and Transport Canberra and City Services Directorate.

3.3 New South Wales

i. Overview

The NSW Environment Protection Authority (EPA) and Transport for NSW (TfN) are the main organisations that contribute to creating and stimulating C&D waste material end-markets. The EPA provides leadership to ensure NSW has a fair, modern and well-regulated waste industry. This organisation provides several C&D waste resource-specific exemption documents that outline how the consumers of recycled materials are exempted from waste levies across the state. The state's sustainable procurement policy prioritises the use of recycled materials in government projects. The policy advocates procuring goods and services that are eco-labelled (e.g. environmental declarations), compliant with environmental-based standards, and registered in recognition programs and systems (e.g. sustainable choice, sustainability advantage and recycled content).

ii. Primary legislation

The definition of waste in the Protection of the Environment Operations Act 1997 is extended to the end of waste stage of materials irrespective of it is being processed, recycled, reused or recovered. The Protection of the Environment Operations (Waste) Regulation 2014 is considered to be the most significant piece of legislation that provides exemptions for waste and its derivatives for reclaiming and depositing on the land or for use as a fuel. The implication of this regulation is further extended through several order and exemption documents published by NSW EPA.

Table 6. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Protection of the Environment Operations Act 1997 - EPA	• Includes C&D waste in the litter definition • Defines waste owner • Prescribes the local council responsibility in developing and administrating a waste reduction and environmental sustainability scheme • Promotes the reduction in the use of materials and the re-use, recovery or recycling of materials	• Waste is always waste regardless of its intended fate and status • Resource recovery excludes waste energy recovery
Waste Avoidance and Resource Recovery Act 2001 - EPA	• Adopts waste hierarchy • The objectives of the Act that relate to C&D waste end-markets are: a) To encourage the most efficient use of resources b) To ensure that industry shares with the community the responsibility for reducing and dealing with waste c) To ensure the efficient funding of waste and resource management planning, programs and service delivery d) To achieve integrated waste and resource management planning, programs and service delivery on a statewide basis • Considers environmental policies such as an extended producer responsibility scheme and product stewardship • Describes the EPA priorities	• Waste is always waste regardless of its intended fate and status • No specific statement related to C&D waste end-markets
Protection of the Environment	• Prescribes the NSW EPA responsibilities and objectives; some of its objectives are:	• No specific statement related to C&D waste end-markets

Administration Act 1991 - EPA	a) Encouraging the re-use and recycling of materials and encouraging material recovery b) Setting mandatory targets for environmental improvement c) Environmental goals, having been established, should be pursued most cost-effectively by establishing incentive structures including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their solutions and responses to environmental problems	
Protection of the Environment Operations (Waste) Regulation 2014 - EPA	• Provides exemptions for waste and its derivatives for reclaiming and depositing on the land or for use as a fuel	• No specific statement related to C&D waste end-markets

iii. Guidelines, policies and strategies

The state sustainable procurement guideline is the most comprehensive document in Australia. It maps out the state's foundations and strategy for sustainable procurement of goods and services. According to this document, prioritised for procurement are those materials that are eco-labelled (i.e. environmental declarations) and/or are registered in national and state recognition programs and systems (e.g. sustainable choice, sustainability advantage and recycled content). In practice, NSW's sustainable procurement follows the purchase strategy, understanding need and the market, developing a plan and preparing a specification, assessing responses and supplier selection, and reviewing and identifying improvement. Transport for NSW (TfN) has released a technical guide for using and re-using various waste streams including C&D waste materials in road construction activities. Besides providing the best waste management practice, the Guide shows the pathway to obtain EPA approval/exemption to serve such purposes. Lastly, the state policy statement on energy recovery encourages this waste management method by providing levy exemptions for uncontaminated wood and residual waste from mixed C&D waste processing facilities.

Table 7. Summary of statements in favour/against recycled C&D waste market development

Guideline/strategy/policy	In favour of market development	Against market development
Waste Levy Guidelines 2018 - NSW EPA	• Defines C&D waste stream • Outlines the waste materials and relevant exemption requirements to be used on roads, other construction works and landfill facilities as bedding layers	• No realised or perceived negative impacts
NSW Waste Avoidance and Resource Recovery Strategy 2014–21 - NSW EPA	• Describes the state's funding strategy (Waste Less, Recycle More) for developing new markets for recycled materials • Advocates waste management strategies such as product stewardship, industrial symbiosis and sustainable procurement	• No realised or perceived negative impacts

	• Outlines the responsibility of public departments and organisations to manage waste	
Sustainable Procurement Guide 2017 - NSW Government	• Maps out the state's foundations (e.g. the quadruple bottom line, whole-of-life costs, life cycle assessment, circular economy, and community and social impact) and strategy for sustainable procurement of goods • Outlines the state's procurement reliance on eco-labelling (e.g. environmental declarations), standards, and recognition programs and systems (e.g. sustainable choice, sustainability advantage and recycled content) when comparing services and goods	• No specific statement related to C&D waste materials
Environmental Guidelines Solid waste landfills 2016 - NSW EPA	• Specifies some of the C&D waste materials (e.g. crushed building waste and glass) that can be used for daily cover and final capping in landfill sites	• No realised or perceived negative impacts
Management of Wastes on Roads and Maritime Services Land 2014 - Transport for NSW	• Sets out the Transport for NSW (TfN) approval and waste management procedures for utilising TfN land sites for road construction activities • Explains the procedure to obtain an exemption for certain C&D waste materials	• No realised or perceived negative impacts
Technical Guide Management of Road Construction and Maintenance Wastes 2016 -Transport for NSW	• Provides information on the statutory and TfN policy requirements for the management of wastes associated with road construction and maintenance works	• No realised or perceived negative impacts
Waste Classification Guidelines Part 1: Classifying Waste- NSW EPA	• Provides a clear definition of C&D waste, uses "unsegregated" as an inclusion criterion • Excludes excavated soil from the C&D waste definition	• Not clear whether a segregated C&D waste is a source of waste
NSW Energy from Waste Policy Statement 2015 - NSW EPA	• The policy statement objectives are: a) Promote the source separation of waste where technically and economically achievable b) Drive the use of best practice material recovery processes c) Ensure only the residual from bonafide resource recovery operations are eligible for use as a feedstock for an energy recovery facility • Lists eligible waste fuels, which includes uncontaminated wood waste	• Treated timber is excluded from the eligible waste fuels list

	• Describes the landfill levy exemptions that apply to waste fuels and outlines the requirements of using residual waste from mixed C&D waste processing facility	
Resource Recovery Orders and Exemptions- NSW EPA	• Provides a brief guideline on EPA resource recovery orders and exemptions objectives and requirements	• No realised or perceived negative impacts

iv. Standards, codes and specifications

NSW's extended producer responsibility policy lists some C&D waste materials that fall under current product stewardship programs. These programs aim to share the responsibility of the end of waste stage with their suppliers/manufacturers. In 2014, the NSW EPA published several Resource Recovery Orders/Exemptions under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014. The orders impose the requirements that must be met by suppliers of C&D waste resources to which the corresponding exemptions apply. These documents are effective enablers towards stimulating end-markets for C&D waste resources across the state. Additionally, the Institute of the Public Works Engineering Australia has specified the use of recycled C&D waste materials in infrastructure projects. The specification is considered at the national level.

Table 8. The statements specified in standards/codes/specification in favour/against market development

Standard/code/specification	In favour of market development	Against market development
NSW Extended Producer Responsibility Priority Statement 2010 - Environment, Energy and Science	• From the C&D waste stream, only treated timber, PVC and packaging were listed in the scope of the document	• No specific statement related to the C&D waste stream
Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage 2010 - Institute of the Public Works Engineering Australia (NSW)	• Provides a specification for the supply of recycled materials, primarily crushed concrete, brick and reclaimed asphalt blends for the following uses: a) Road base for roads with light to medium traffic b) Bedding material for paving blocks to be used in pedestrian areas, car parks, shopping centres etc. c) Select fill for use on subgrades to enhance strength or for raising site levels, particularly in roadways and beneath buildings	• No realised or perceived negative impacts

	d) Drainage medium for drainage lines and drainage structures	
NSW EPA: Recovered aggregate Recovered railway ballast Recovered glass sand Reclaimed asphalt pavement Cement fibreboard Excavated natural material Excavated public road material Plasterboard	• Provides chemical, other material requirements and testing procedures for exemption purposes • Describes applications	• No realised or perceived negative impacts

v. Relevant organisations

The EPA and TfN are the main government agencies that contribute to creating C&D waste material end-markets in NSW. The EPA provides leadership to ensure NSW has a fair, modern and well-regulated waste industry. TfN's Environmental Policy provides the framework for ongoing improvements in TfN's environmental performance. A relevant objective in this framework is to promote the efficient use, re-use and recycling of resources, and the minimisation of waste. TfN published a technical guide to manage waste and re-use resources in the relevant construction activities. NSW EPA published several Resource Recovery Orders/Exemptions for several C&D waste resources that contribute to developing and stimulating relevant end-markets.

3.4 Northern Territory

i. Overview

The Northern Territory (NT) waste regulatory framework builds on the Waste Management and Pollution Control Act 1998. The leading government agencies that provide support for market creation and stimulation are the Department of Environment and Natural Resources, the Department of Infrastructure, Planning and Logistics (DIPL), and the Northern Territory Environment Protection Authority (EPA). The Department prepares the main pieces of legislation. The Northern Territory does not have a sustainable procurement policy with a focus on government commitment to procure goods with recycled content; however, in its Procurement Governance Policy 2019, the sustainable outcomes are emphasised. Furthermore, the application of C&D waste recycled is encouraged in two standard specifications developed by DIPL.

ii. Primary legislation

There are four pieces of primary legislation in NT that form the waste regulatory framework. These acts and regulations are administrated by the Department of Environment and Natural Resources. Aside from the exemption for using waste materials in land reclamation activities with environmental protection approval as specified in the 1998 Act, the primary legislation provides little support towards C&D waste market creation and stimulation through general sustainability principles. Overall, the government agencies consider waste to always be waste irrespective of its value. Table 10 provides a summary of the regulatory statements that are in support of or against C&D waste market development.

Table 9. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Waste Management and Pollution Control Act 1998 - the Department of Environment and Natural Resources	• The Act exempts construction activities from environmental protection approval when waste rock, rubble and other inert materials are used for land reclamation purposes	• No clear definition for C&D waste • Waste is always a waste regardless of its value
Environment Protection Act 2019 - the Department of Environment and Natural Resources	• The Act promotes a waste hierarchy that prefers waste recycling and re-using over the disposal	• No clear definition or information about C&D waste • No encouragement for sustainable government procurement
Waste Management and Pollution Control (Administration) Regulations 1998 - the Department of Environment and Natural Resources	• No evident support	• No clear definition or information about C&D waste • No encouragement for sustainable government procurement
Environment Protection Regulations 2020 - the Department of Environment and Natural Resources	• No evident support	• No clear definition or information about C&D waste • No encouragement for sustainable government procurement

iii. Guidelines, policies and strategies

Except for the waste strategy document, the relevant government departments and agencies have not published any guidelines or policies about C&D waste market development. The waste strategy, as summarised in Table 11, encourages three actions that will boost market development in the Northern Territory. However, this strategy does not indicate any specific actions for the C&D waste market.

Table 10. Summary of statements in favour/against recycled C&D waste market development

Guideline/strategy	In favour of market development	Against market development
Waste Management Strategy for The Northern Territory 2015-2022 - Northern Territory Environment Protection Authority	Under the management actions, it advises facilitating opportunities to connect waste recovery and re-use markets with key waste producers. Other measures recommended are: a) Collaborate with the Waste and Recycling Industry of the NT (WRINT) to identify emerging trends and issues requiring multi-faceted solutions; b) work with industry and government agencies to demonstrate the economic incentives available through improved waste management and resource recovery	• No specific action/strategy for C&D waste market creation and stimulation • Does not support sustainable government procurement

iv. Standards, codes and specifications

The NT Department of Infrastructure, Planning and Logistics has provided standard specifications for re-using recycled products in government projects. These two standards encourage using C&D waste materials in construction projects. In environmental management standard specification, the three conditions in which recycled products are preferred are: 1) when they perform better in terms of cost; 2) when they perform better in terms of technical performance, or 3) when they are the environmental equivalent of their fresh materials alternatives. In the roadworks standard specification, only the application of crushed glass is advised.

Table 11. The statements specified in standards/codes/specifications in favour/against market development

Standard/code/specification	In favour of market development	Against market development
Standard specification for Environmental management V.2 - Department of Infrastructure, Planning and Logistics	• Implement measures to reduce, re-use and recycle waste products/materials including soil, road pavement materials and concrete • Demonstrate the priority use of materials and products that maximise the use of recycled content wherever these are cost- and performance-competitive and are at least the environmental equivalent of the non-recycled alternative	• Only general recommendations are provided

Standard Specification for Roadworks - Department of Infrastructure, Planning and Logistics	• Source the material from some sources including window (or flat) glass and plain ceramic. The application should comply with specifications enshrined in another document[3] • Addition of crush and screen reclaimed asphalt pavement no more than 15% (by mass) in base layers or 10% in the wearing course	• Other potential recycled materials are not specified

v. Relevant organisations

The Department of Environment and Natural Resources (DENR), Northern Territory and Environment Protection Authority (EPA), and the Department of Infrastructure, Planning and Logistics (DIPL) are the government agencies that take care of issues related to C&D waste market development in the Northern Territory. The DENR administrates the main pieces of legislation and the DIPL provides specifications for using recycled materials in construction projects. NT EPA is the agency that developed the territory‘s waste strategy.

[3] ARRB Group Ltd. 2019. Specifications for Recycled Crushed Glass as an Engineering Material.

3.5 Queensland

i. Overview

Queensland is the first state in Australia that has separated waste from a recoverable resource in its regulatory framework. The legislative framework effectively facilitates waste management and resource recovery stakeholder's engagement through several consultation opportunities throughout the development of legislative documents. The main public organisations that contribute to C&D waste materials end-markets development are the Department of Environment and Science (DES), the Department of State Development, Tourism, and Innovation (DSDTI) and the Department of Transport and Main Roads. The state has specified the end of waste (EoW) framework in the Waste Reduction and Recycling Act that promotes resource recovery opportunities and aims to transform the perception of waste from being seen as waste to being valued as a resource. A waste producer may supply waste as a resource under an EOW code provided they have registered with the DSE and can comply with the requirements of the code. DTMR developed two specifications for using recycled glass aggregates and reclaimed asphalt pavement material.

ii. Primary legislation

The Waste Reduction and Recycling Act 2011 (current as of 1 July 2019), detailed in 16 chapters, is the most updated waste Act in Australia that covers various waste management strategies and enablers. The strategies include the polluter pays principle, the user pays principle and product stewardship. Included in enablers are discounted landfill levy rates for residue waste generated by recycling activities and a disposal ban. These enablers will stimulate the market for C&D waste-derived products. The Act also allows for pubic and industry submissions for developing an EoW code; this will aid in meeting stakeholders'expectations and further stimulate a market for C&D waste. It obligates the local governments to prepare a specific waste reduction and recycling plan that is following the Act, its contextual conditions, and waste management and resource recovery principles and consultation with the public. Developing such a plan has its pros and cons, including, for the former, being more effective as it is based on the local government waste management status quo and, for the latter, inconsistencies that may arise from various requirements across the state. A further drawback may be that the proximity principle, as enshrined in the Act, might limit market development as it confines recycling facilities feedstock to the available waste across the state only.

Table 12. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Environmental Protection Act 1994 - Qld Department of Environment and Science	Defines waste in a detailed approach as follows: • As anything, other than an end of waste (EOW) resource, that is a) leftover or an unwanted by-product, from an industrial, commercial, domestic or other activity; or b) surplus to the industrial, commercial, domestic or other activity generating the waste • Waste can be a gas, liquid, solid or energy, or a combination of any of them • A thing can be waste whether or not it is of value • Excludes C&D waste from the definition of landfill/disposing of waste	• No realised or perceived negative impacts

Waste Reduction and Recycling Act 2011 - Qld Department of Environment and Science	• Defines C&D waste and adopts a waste hierarchy model • Introduces a few different waste management strategies: i.e. the polluter pays principle, user-pays principle and product stewardship • Considers disposal ban waste • Recommends discounted landfill levy rates for residue waste in recycling activities • Considers a non-levy zone across the state • If waste used as feedstock for a recycling activity was generated outside the non-levy zone, all of the residue waste generated by the recycling activity is taken to be generated outside the non-levy zone • Requires local governments to consider the following when adopting a waste reduction and recycling plan: a) Population profile b) Residential, industrial and commercial development c) Amounts and types of waste generated d) Services, markets and facilities relevant to dealing with different types and amounts of waste e) The waste and resource management hierarchy f) The waste and resource management principles g) Achieving the state's waste management strategy objectives h) Consulting with the public about the plan and amendments • Details the requirements for waste management and resource recovery data reporting • Prescribes the end of waste (EoW) when it becomes a resource • Requires state government agencies to prepare and publish a Waste Management Plan and to report annually against the progress of the Plan to the Department of Environment and Science."	• The obligation of local government for recycling activities might induce inconsistencies in efforts to implement a uniform management system across the state • Proximity principles may limit market development
Environmental Protection Regulation 2008 - Qld Department of Environment and Science	• C&D waste is categorised as general waste	• No specific statement about the C&D waste stream • No statement directly related to recycled materials market development
Waste Reduction and Recycling Regulation 2011	• Defines C&D waste	• No specific statement about the C&D waste stream • Market development enablers are not included

iii. Guidelines, policies and strategies

The Queensland Waste Avoidance and Resource Productivity strategy that is developed by the DES categorises some C&D waste materials with high volume and current resource value as the state priority waste. Furthermore, this document proposes several state's priorities with regards to end-market creation and stimulation. These priorities are classified under four major objectives: Driving

cultural change; avoidance and minimisation; re-use, recovery and recycling; and management, treatment and disposal. The DES also provides an EOW guideline, as per the WRR Act requirements, that prescribes the process for people who are using or intending to re-use waste as a resource. A waste producer may supply a waste as a resource under an EOW code provided they have registered with the DES and can comply with the requirements (i.e. specified criteria and quality characteristics) of the code. If waste material is approved as a resource under the EOW framework, it is no longer considered waste. The Qld Government Procurement Policy 2019[4] aims to manage demand and reduce waste, and manage the consumption of valuable resources. However, the use of recycled materials is not recommended.

Table 13. Summary of statements in favour/against recycled C&D waste market development

Guideline/strategy	In favour of market development	Against market development
Waste–Everyone's responsibility Queensland Waste Avoidance and Resource Productivity Strategy (2014–2024) - Qld Department of Environment and Science	• Classifies high volume C&D wastes with a current resource value (i.e. concrete, treated timber and plasterboard) as the state's priority waste • Proposes four main objectives for the state's waste management: Driving cultural change; avoidance and minimisation; re-use, recovery and recycling; and management, treatment and disposal. The following priorities under these objectives are related to C&D waste end-markets: a) Awareness and communication b) Roles and responsibilities c) Education and training d) Industrial ecology and infrastructure planning for driving change e) R&D f) Improved data to highlight business opportunities g) Regional collaboration and partnerships h) Product stewardship i) Market development and appropriate incentives j) Appropriate regulation and enforcement a) Full cost accounting of all disposal	• No realised or perceived negative impacts
Waste Management and Resource Recovery Strategy - Qld Department of Environment and Science	• Includes several strategies to develop a market for recyclable materials: a) Landfill disposal bans on selected waste streams b) Explore product stewardship schemes c) Develop a policy for energy from waste d) Assess the opportunities of the circular economy model for Queensland e) Collect and amalgamate data to understand f) Material flows across the economy and address knowledge gaps g) Continuously improve and reform waste-related legislative frameworks	• No realised or perceived negative impacts

[4] Queensland Procurement Policy 2019. Department of Housing and Public Works. https://www.hpw.qld.gov.au/__data/assets/pdf_file/0020/3377/qldprocurementpolicy.pdf

	h) Support the commercialisation of successful recycling and re-manufacturing technologies	
End of Waste (EOW) Guideline - Qld Department of Environment and Science	• Prescribes the process for people who are using or intending to re-use waste as a resource such as how to become a registered resource producer • In preparing an application to use the benefits of the EOW framework, the applicant has to consider if a new market for the given waste is likely to be developed	• A resource should be comparable to any virgin material for which it would substitute
Resource Recovery Industries 10 Year Roadmap and Action Plan 2019- Department of State Development, Tourism and Innovation	• The action plan specifies core waste types in Queensland including built environment waste • Amount the four main strategies, Strategy 2 focuses on market and supply chain development. The relevant actions are below: a) Deliver a comprehensive analysis of the resource recovery market sector b) Develop industry attraction programs focused on technologies and industries that will utilise recycled output to develop secondary markets c) Investigate and report on export opportunities for value-added recycled products for the development of secondary markets d) Coordinate supply chain development services and activities across the state, including customised activities to meet local and regional needs, where appropriate e) Consult with regional teams to understand issues that relate to waste management and resource recovery specific to their region f) Deliver business development and capability programs to enable SMEs and small regional councils to participate fully in market opportunities g) Analyse aggregated data from the RRIDP to inform ongoing market development initiatives h) Promote exemplar resource recovery precincts in Queensland to demonstrate investment readiness i) Review resource recovery initiatives on large government-led projects to develop best practice guidelines j) Investigate opportunities for recycled products or materials to be included in government procurement policies	• No realised or perceived negative impacts
Waste Reduction and Recycling Plan 2018-2024	• Build on the learnings from waste plans of those former agencies and entities comprising DES • Establish key roles and networks • Map major departmental waste streams	• No focus on market development for C&D waste

Qld Department of Environment and Science	• Empower all staff to engagement in appropriate waste management behaviours	

iv. Standards, codes and specifications

The Queensland Department of Environment and Science (DES) has released several EOW codes for various waste materials. Currently, there are three specific C&D waste streams, i.e. liquid washout, returned concrete and solid washout. At the time of writing this report, DES is preparing an EOW code for recycled aggregate that is an enabler for C&D waste end-markets development. The Queensland Department of Transport and Main Roads is responsible for developing specifications for using recycled materials in infrastructure projects. At the moment, the Department has issued two specifications for two C&D waste materials: recycled glass aggregates and reclaimed asphalt.

Table 14. The statements specified in standards/codes/specifications in favour/against market development

Standard/code/specification	In favour of market development	Against market development
End of Waste Code Liquid Concrete Washout (ENEW07602719) - Qld Department of Environment and Science	• States when the liquid concrete washout becomes a resource and any relevant requirements and/or conditions for its use	• No realised or perceived negative impacts
End of Waste Code Returned Concrete (ENEW07278517) - Qld Department of Environment and Science	• States when the returned concrete becomes a resource and any relevant requirements and/or conditions for its use	• No realised or perceived negative impacts
End of Waste Code Solid Concrete Washout (ENEW07602819) - Qld Department of Environment and Science	• States when the solid concrete washout becomes a resource and any relevant requirements and/or conditions for its use	• No realised or perceived negative impacts
Transport and Main Roads Specifications MRTS36 Recycled Glass Aggregate - Qld Department of Transport and Main Roads	• Sets out the requirements for recycled glass aggregate used in asphalt and unbound granular road pavements, not other applications	• No realised or perceived negative impacts
Transport and Main Roads Specifications MRTS102 Reclaimed Asphalt Pavement Material - Qld Department of Transport and Main Roads	• Sets out the requirements for reclaimed asphalt pavement (RAP) material that is used in asphalt	• No realised or perceived negative impacts

v. Relevant organisations

The main public organisations that contribute to the C&D development of waste material end-markets are the Department of Environment and Science (DES), the Department of State Development, Tourism and Innovation (DSDTI), and the Department of Transport and Main Roads (DTMR). The DES administrates the legislation across the state and provides the EOW codes and guidelines and waste

strategies. At the time of writing this report, the DSDTI is developing the Resource Recovery Industries 10 Year Roadmap and Action Plan. The DTMR developed two specifications for using recycled glass aggregates and reclaimed asphalt pavement material.

3.6 South Australia

i. Overview

South Australia is a leading state in the operation of an effective C&D waste management system. The state recycling target is set at 90% in 2020[5]. Green Industries SA, the SA Department for Infrastructure and Transport, and the SA Environmental Protection Authority (EPA) are the government agencies that deal with the C&D waste issues and market development. The primary Act in this state has excluded recovered resources that are being dealt with following the declaration of that resource. The declaration regarding any material is specified in a government Gazette. SA is among the first of the states and territories to put a sustainable procurement policy in place for government procurement practices. Green Industries SA offers market development research grants to stimulate an increase in the quality and market demand for recyclable materials and recycled content products. In 2013, the SA EPA released a standard for using waste materials as waste-derived fill (WDF); the standard describes the processes and approval requirements of the application of the C&D waste stream in development activities. Overall, the regulatory framework in this state is in favour of a circular economy and market development.

ii. Primary legislation

The primary piece of legislation is the Environment Protection Act, which has a specific focus on circular economy and market development. The Act allows for an exemption of meeting waste management requirements for specific materials as approved recovered resource. The Act objectives promote resource recovery through programs that encourage the industry, public authorities and the community to engage in resource recovery. The subordinate regulation (Environment Protection Regulations 2009) defines some C&D waste materials (e.g. rock, concrete, clay and soil) as clean fill, which is excluded from the levy fee.

Table 15. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Environment Protection Act 1993 - SA Environment Protection Authority	• Waste management hierarchy is adopted • Some materials can be approved as recovered resources and exempt from meeting requirements that apply to waste material • The Act objectives include: a. Encourage and assist action by industry, public authorities and the community aimed at pollution prevention, clean production and technologies and resource recovery; b. Promote the circulation of materials through the waste management process and	• Waste is always waste regardless of its value and fate—however, approved recovered resource is excluded from this definition • C&D waste is not defined

[5] Green Industries SA. 2015. South Australia's Waste Strategy 2015-2020.

	support a substantial market for the recovered resource by: i. programs to encourage and assist the industry, public authorities and the community to engage in resource recovery ii. regulating resource recovery	
Environment Protection Regulations 2009 - SA Environment Protection Authority	• Clean fill is excluded from the waste category and the levy is no payable on clean fill • Clean fill includes some C&D waste materials such as clay, concrete, rock, sand and soil • Defines waste fill (clean fill) and specifies its chemical and physical properties	• Brick waste is not considered a clean fill • C&D waste is not defined
Green Industries SA Act 2004	• Tasks Green Industries SA to develop the waste strategy and identify targets for resource recovery • Lists the functions of Green Industry SA concerning resource recovery including market development • Builds on circular economy principles, the waste management hierarchy, ecologically sustainable development and other best-practice methods	• C&D waste is not defined

iii. Guidelines, policies and strategies

Several guidelines and strategies facilitate resource recovery and market development in the state. As already noted, clean waste is exempted from the landfill levy. Green Industries SA provides market development with a research grant and infrastructure investment loan scheme to stimulate market demand for recyclable materials and streamline greater local re-manufacturing/reprocessing and adoption of new technologies to reduce contamination level and improve recycled product quality. The EPA policy (Table 17) requires the Authority not to recommend the Minister to ban landfilling for certain waste materials unless there are existing markets for them. The Green Industries SA Waste Strategy 2015-2020 fully supports the development of the market for recycled materials; the agency is in the process of updating the state waste strategy. Another state policy is the government procurement policy, which stimulates market development through applying demand management strategies such as encouraging the use of second-hand materials. The SA Department for Infrastructure and Transport has published several guidelines for using clean waste including soil in infrastructure and transport projects; however, the permissible percentage of their usage is kept at a minimum (e.g. 20% by mass for concrete). The state resource recovery infrastructure plan highlights the role of the

market as a soft infrastructure in the use of resource recovery in the construction of new infrastructure and provides several actions and strategies to create recycled products markets in the state.

Table 16. Summary of statements in favour/against recycled C&D waste market development

Guideline/strategy	In favour of market development	Against market development
Environment Protection (Waste to Resources) Policy 2010 - SA Environment Protection Authority	• The policy required the Authority not to recommend the Minister to declare disposal of a waste unless: a) There are existing or developing markets to enable resource recovery b) There are reasonable and practicable existing and new processes, technologies or systems that enable resource recovery	• No realised incentive for C&D waste market development
Waste Levy Regulations Guidelines 2016 - SA Environment Protection Authority	• Levy fee is not appliable to clean fill	• No realised or perceived negative impacts
South Australia Waste Strategy 2015-2020 - Green Industries SA	• Some objectives of this strategy include: a) A stable market for investors through a clear policy framework providing a reliable platform for investment decisions b) A resource-efficient economy where the best or full value is secured from products and materials produced, consumed and recovered across the state c) A stable and efficient market for investors; essentially, a clearly articulated policy framework that gives a solid platform for investment decisions • The strategy recommends the following market-based tools: a) Policy for setting landfill levies, advance disposal and recycling fees, and deposit-refund and subsidy schemes b) Incentives, grants and loans to promote change and efficiency, enhance environmental performance and innovation, and reward desired behaviours c) Producer responsibility measures including future recycling, costs in purchase prices, influencing buying decisions and supporting the effective recovery of valuable resources • Some suggestions specific to the C&D waste stream include: a) Encourage the use of secondary materials such as concrete aggregate b) Encourage salvaging and re-use of building materials	• No realised or perceived negative impacts

	c) Promote the procurement of re-manufactured material and products	
Sustainable Procurement Guideline 2012 - SA Government	• Fosters a viable Australian and New Zealand market for sustainable products and services by supporting businesses and industry groups that demonstrate innovation in sustainability • Stimulates markets through applying demand management strategies such as: a) Re-using, refurbishing or reconditioning the product to extend its life b) Acquiring second-hand or used items	• No clear instruction for using recycled C&D waste materials
Business Plan 2018-19 - Green Industries SA	• Suggests a market development research grant that stimulates an increase in the quality and market demand for recyclable materials and recycled content products. It also focuses on creating market opportunities for new, sustainable products made from recycled materials; expanded market-related activities for existing recycled-content products; improved quality and supply of waste feedstock used in manufacturing recycled-content products; and improved market confidence in recycled materials and recycled-content products • Outlines an infrastructure investment loan scheme to provide greater local re-manufacturing/ reprocessing and the adoption of new technology to improve quality and reduce contamination level for recyclable materials for local use and re-entry into export markets • Provides SA government plan for trade representation across the region in Indonesia, Malaysia and Singapore in the waste industry for SA resource recovery companies	• No realised or perceived negative impacts
Recycled Fill Materials for Transport Infrastructure Environmental Instruction 21.6-2015 - SA Department for Infrastructure and Transport	• Developed to manage oils, asphalt planings, road base, concrete, ballast and timber sleeper generated and re-used on transport infrastructure maintenance and construction projects • Recycled aggregates permitted for pavement construction consist of inert products such as crushed concrete, brick, tile and other ceramics	• The permitted application of concrete waste has to be less than 20% by mass
Guide for the Re-use or Disposal of Surplus Soil 2017 - SA Department for Infrastructure and Transport	• Provides a guide to DPTI staff on the appropriate re-use or disposal of surplus soil and other C&D waste materials, i.e. concrete • Specifies approval conditions for reusing soil as waste fill	• No realised or perceived negative impacts
South Australia's Waste and Resource Recovery Infrastructure Plan	• Highlights the need for recycled products market analysis and development as well as data collection and management, and online web platforms to support new and expanded infrastructure projects • Suggests the following actions:	• No realised or perceived negative impacts

- Green Industries SA	a) Expanding existing recycling facilities to process growing volumes of C&D waste (e.g. concrete crushing), as well as recovering more waste going to landfill such as waste soil b) Consideration should be given to establishing a 'soil bank' and to developing consistent and better-coordinated systems and practices to enable cost-effective re-use of low-risk waste soils (e.g. clean fill and intermediate-level waste soil) for development, redevelopment and infrastructure projects c) Suitable transfer routes to waste and resource recovery facilities and ports to export markets d) Investment in equipment and facilities for waste compaction and bulk hauling to reduce the cost of transporting waste to end-markets e) Development of markets is needed for new and expanded volumes of recovered recyclables f) Create local demand for these materials through government procurement policies and Circular Economy processes g) Establishing accredited testing for product standards and performance will provide purchasers with confidence in the quality of the remanufactured products	

iv. Standards, codes and specifications

The SA EPA has defined approval conditions of using C&D waste materials as a waste-derived fill (WDF). The SA Department for Infrastructure and Transport provides specifications for using C&D waste recycled materials in the Department's projects. The Specification: Part R15 Supply of Pavement Materials specifies the requirements for the supply and delivery of recycled pavement materials to be used in construction projects. It also suggests that, where fresh materials have been specified in contract-specific requirements, the contractor may submit a proposal to use recycled materials.

Table 17. The statements specified in standards/codes/specifications in favour/against market development

Standard/code/specification	In favour of market development	Against market development
The standard for the production and use of Waste Derived Fill 2013 - SA Environment Protection Authority	• Describes the processes and approval requirements of using three waste sources for potential use as a waste-derived fill (WDF). These sources are the soil for direct re-use, recycled C&D waste and a homogenous mineral-based industrial residue. • WDF approval is subject to the existence of an immediate market and appropriate materials flow and stockpile management	• No realised or perceived negative impacts

Specification: Part R15 Supply of Pavement Materials - SA Department for Infrastructure and Transport	• Specifies the requirements for the supply and delivery of materials including recycled pavement materials to be used in the construction of roadworks, bridgeworks, railways and other applications associated with construction • Indicates that, where fresh materials have been specified in contract-specific requirements, the contractor may submit a proposal to use recycled materials	• No realised or perceived negative impacts

v. Relevant organisations

Green Industries SA, the SA Department for Infrastructure and Transport and the SA Environment Protection Authority are the government agencies that contribute to market development for waste materials in South Australia. Green Industries is statutorily commissioned to develop a waste strategy for the state[6]. The agency responsibility includes public and industry awareness of and participation in resource recovery and green industry, to identify targets for resource recovery development and to identify any obstacles or potential obstacles to the implementation of the targets or any significant risks associated with the implementation of targets, and to establish criteria and methods for assessing the adequacy of the strategy and its implementation. Furthermore, the Green Industries SA Act 2004 defined the agency's functions including market development, identifying and improving business efficiencies and opportunities, and raising public and industry awareness of waste management, resource recovery and innovation, and the best practice methods thereof. It is also tasked to promote research and development about resource recovery and waste management and to establish a collaborative partnership with government and non-government organisations such as the research sector to promote waste management and resource recovery. The SA Department for Infrastructure and Transport has published several guidelines and specifications for using C&D waste in the Department's projects.

[6] Green Industries SA Act 2004. https://www.legislation.sa.gov.au/LZ/C/A/ GREEN%20INDUSTRIES%20SA %20ACT%202004/ CURRENT/2004.1.AUTH.PDF

3.7 Tasmania

i. Overview

Tasmania is a state that currently has the fewest waste regulations and policies concerning market development in Australia. The Tasmania Environment Protection Authority (EPA) and the Department of Primary Industries, Parks, Water and Environment are the government agencies that are responsible for waste management in Tasmania. One Act and one regulation (Table 19) are the main legislative documents that affect C&D waste market development. However, little support is provided through these two pieces of legislation. Currently, there is no standard, strategy (outdated), policy or guidelines that affect C&D waste creation and stimulation. In this state, waste is always considered waste regardless of its value.

ii. Primary legislation

The only two relevant pieces of legislation in Tasmania, as tabulated below, provide little support for market development. In the Act, re-using and recycling is encouraged; the subordinate regulation as part of the application for environmental approval states that alternative options for reusing and recycling is mandated. The main focus of the primary legislation is on controlled waste materials such as poisons, fish waste and sewage. A significant barrier to C&D waste market development is the lack of a statewide landfill levy to incentivise recycling and re-using activities.

Table 18. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Environmental Management and Pollution Control Act 1994 - Tasmania Environment Protection Authority	• Waste re-using and recycling is among the objectives of this Act	• Waste is always waste regardless of its value and its future fate
Environmental Management and Pollution Control (Waste Management) Regulations 2020 - Tasmania Environment Protection Authority	• Environmental approval should include any alternative options for re-use, reprocessing or recycling of the waste	• Waste is always waste regardless of its value and its future fate

iii. Relevant organisations

The Tasmania Environment Protection Authority and the Department of Primary Industries, Parks, Water and Environment are the government agencies that are responsible for waste management in this state.

3.8 Victoria

i. Overview

Victoria is a leading state in market development for C&D waste materials. Sustainability Victoria recently introduced the Buy Recycled directory, in which state recycled products suppliers are identified and featured. Despite the lack of a current waste strategy in Victoria, the state agencies have published various guidelines and strategies that inform waste management and resource recovery activities and decisions across the state. The Department of Environment, Land, Water and Planning (DELWP), Waste and Resource Recovery Groups, the Environmental Protection Authority (EPA), Sustainability Victoria and VicRoads are the leading government agencies that have a role to play in developing C&D waste end-markets in Victoria.

ii. Primary legislation

The Environment Protection Act 1970 relies on several sets of principles to effectively manage waste and improve market conditions for recycled products. These include wastes hierarchy, shared responsibility, product stewardship, and the improved valuation, pricing and incentive mechanisms principle. The Act also provides the regulatory context to establish the regional Waste and Resource Recovery Groups (WRRGs) with several objectives and functions. MWRRGs are Victorian State Government statutory authorities with a legislative responsibility to develop their Regional Waste Resource Recovery Plans (RWRRIPs) to specify how to satisfy the waste and resource recovery needs of their region over ten years; currently, there are seven WRRGs across Victoria. The Act indicates the requirements for landfill levy rebates when waste received at a landfill is demonstrated to be recycled, reprocessed and recovered. The Sustainability Victoria Act 2005 sets out SV objectives and functions to promote sustainability in the use of resources with some focus on recycled products market development and stimulation.

Table 19. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Environment Protection Act 1970 - Administrated by EPA	• Adopts wastes hierarchy, shared responsibility, product stewardship, and improved valuation, pricing and incentive mechanisms principles: a) Pricing and incentive mechanisms principles should establish incentive structures, including market mechanisms, which enable persons best placed to maximise benefits or minimise costs to develop solutions and responses to environmental problems • Outlines the objectives and functions of Waste and Resource Recovery Groups including: a) Undertake waste and resource recovery infrastructure planning b) Facilitate efficient procurement of waste and resource recovery infrastructure and services for its waste and resource recovery region c) Integrate regional and local knowledge into statewide waste and resource recovery market development strategies	• Considers resources to be recovered as waste

	d) Educate businesses and communities to reduce waste going to landfill by using waste and resource recovery infrastructure and services efficiently e) Ensure its plans and programs are informed by local government, business and community and inform statewide plans and programs • Sets out the industry waste reduction agreement specifications including the obligation to provide an economic assessment of the market for the wastes that can be recovered • Specifies Victoria's waste management policy development criteria • Specifies how the landfill levy rebate may be claimed when waste received at a landfill is recycled, reprocessed and recovered. This rebate is only claimable in annual landfill levy statements.	
Environment Protection Act 2017 - Administrated by EPA	• Presents (new) the Vic EPA's objectives, responsibilities and a new governance structure	• No responsibility regarding market development is allocated to Vic EPA as the main government agency with environmental protection focus
Environment Protection (Resource Efficiency) Act 2002	• One of its objectives is to improve the operation of the provisions of the Environment Protection Act 1970 in dealing with waste management and resource recovery • Presents the functions of Sustainability Victoria	• No statement on waste end-markets development and stimulation
Sustainability Victoria Act 2005	• Presents Sustainability Victoria's functions including those directly related to waste end-markets development: a) Foster a stewardship ethos concerning the use of resources b) Promote throughout Victoria waste avoidance, waste reduction and recovery, re-use, recycling of resources and best practices in waste management c) Encourage and promote the development and use of environmentally sustainable practices, markets, technologies and industries, including resource efficiency, energy efficiency, renewable energy and water d) Facilitate the uptake of fledgling technologies, industries, markets and practices in environmental sustainability, including demonstration projects	• No realised or perceived negative impacts

	e) Facilitate the development of voluntary environmental sustainability initiatives f) Develop and implement strategies to foster sustainable markets for recovered resources and recycled materials g) Develop tools to measure, monitor and report on Government waste, water and energy targets	

iii. Guidelines, policies and strategies

In the absence of a current waste strategy (the previous version was outdated in 2010) SV, EPA and DEWLP published several guidelines and strategies that have a particular focus on recycled materials end-markets development. In 2018, SV released the Statewide Waste and Resource Recovery Infrastructure Plan, which is an essential guideline for end-markets creation and stimulation over the next 30 years in Victoria. The Plan contains several goals, strategic directions and recommendations for enabling recycled products utilisation. The strategic directions provide the pathway to further resource recovery across Victoria. This agency also published the Victorian Market Development Strategy for Recovered Resources, which outlines how the state government and other stakeholders should contribute to creating and stimulation of end-markets. The EPA released a supporting guideline, Management and Storage of Combustible Recyclable and Waste Materials.

Table 20. Summary of statements in favour/against recycled C&D waste market development

Guideline/strategy	In favour of market development	Against market development
Statewide Waste and Resource Recovery Infrastructure Plan 2018 - Sustainability Victoria	• Presents the results of economic and transport assessments with some recommendations as to reducing transport costs and increasing the resource recovery economic benefits • Identifies the main stakeholders and their role in the waste and resource recovery system including community, business, industry and government, manufacturers, waste and resource recovery industry, local governments, SV, EPA, DEWLP, and WRRGs, the Victorian Planning Authority and the federal government • Presents the Plan's strategic directions and goals (in 30 years) include the following: a) Goal 1: Landfills will only be for receiving and treating waste streams from which all materials that can be viably recovered have been extracted b) Goal 2: Materials are made available to the resource recovery market through aggregation and consolidation of volumes to create viability in recovering valuable resources from waste c) Strategic Direction 1: Prioritise viable recovery	• No realised or perceived negative impacts

	d) Strategic Direction 2: Reduce landfill reliance e) Strategic Direction 3: Aggregate materials f) Strategic Direction 4: Utilise land g) Strategic Direction 4: Evidence-based decision making • Identifies opportunities identified in regional implementation plans such as facilitating joint procurements for waste and resource recovery infrastructure	
Victorian Market Development Strategy for Recovered Resources 2016 - Sustainability Victoria	• Supports industry to develop and test new products made from recovered materials and promote their uptake and to strengthen markets for existing products • The Strategy's strategic directions include: a) Improve the quality of recovered resources to support manufacturing b) Improve consolidation and aggregation of recovered materials to contribute to growth in manufacturing c) Improve the performance of products incorporating recovered resources d) Increase the use of products incorporating recovered resources e) Cross government coordination within an integrated, statewide waste management framework f) Adopt appropriate, evidence-based approaches to government intervention g) Capitalise on policy and market signals supporting resource recovery • Proposes prioritisation methodology for market development of recovered resources	• No realised or perceived negative impacts
Recycling Victoria: A New Economy 2020 - DELWP	• Specifies Victoria's circular economy goals as follows: a) Goal 1 - Design to last, repair and recycle b) Goal 2 - Use products to create more value c) Goal 3 - Recycle more resources d) Goal 4 - Reduce harm from waste and pollution	• No realised or perceived negative impacts
A Circular Economy for Victoria - DELWP	• Contains the following sections relevant to recovered materials end-markets: a) Improving materials productivity b) Getting more value from recovered materials c) Building a resilient waste and resource recovery system	• No realised or perceived negative impacts
Guideline: Energy from Waste 2017 - Vic EPA	• Outlines how the Environment Protection Act 1970 and associated statutory policies and regulations are applied to the assessment of proposals that recover energy from waste	• No realised or perceived negative impacts

	• Reviews the assessment criteria for energy from waste activities	
Victorian Waste Education Strategy 2016 - Sustainability Victoria	• Some focus areas with relevance to recycled products end-markets in this strategy include: a) Increase the Victorian community and business perception of waste management as an essential service b) Increase community awareness of waste and support and encourage waste avoidance c) Improve resource recovery and reduce contamination d) Strengthen Victoria's waste and resource recovery education capabilities	• No realised or perceived negative impacts

iv. Standards, codes and specifications

VicRoads is a public agency that specifies the physical and chemical properties of several waste-derived materials in applications in infrastructure projects.

Table 21. The statements specified in standards/codes/specifications in favour/against market development

Standard/code/specification	In favour of market development	Against market development
Registration of Crushed Rock Mixes: Code of Practice - VicRoads	• Specifies the requirements for using crushed rock mixes in project infrastructures	• No realised or perceived negative impacts
Selection and Design of Pavements and Surfacings: Code of Practice RC.500.22 - VicRoads	• Specifies the requirements for using waste materials in building pavements	• No realised or perceived negative impacts
Section 812-Production of Crushed Rock for Pavement Base and Subbase - VicRoads	• Specifies the requirements for using crushed rock in pavement subbase and light-duty base	• No realised or perceived negative impacts
Section 820-Crushed Concrete for Pavement Subbase and Light Duty Base - VicRoads	• Specifies the requirements for using crushed concrete in pavement subbase and light-duty base	• No realised or perceived negative impacts
Section 821- Cementitious Treated Crushed Concrete for Pavement Subbase - VicRoads	• Specifies the requirements for using crushed concrete in the pavement sub base	• No realised or perceived negative impacts
Section 407-Hot Mix Asphalt - VicRoads	• Specifies the requirements for using waste materials in project infrastructures	• No realised or perceived negative impacts

v. Organisations

The Department of Environment, Land, Water and Planning (DELWP), Waste and Resource Recovery Groups (WRRGs), the Environmental Protection Authority (EPA), Sustainability Victoria and VicRoads are the main government agencies that have a role to play in developing C&D waste end-markets in Victoria. The first four entities provide the Victorian Government with policy advice, environmental regulation, programs to implement policies and reporting on the state's environment. The objective of Sustainability Victoria, as enshrined in the Sustainability Victoria Act 2005, is to facilitate and promote environmental sustainability in the use of resources. The agency has provided several guidelines and strategies to increase resource recovery activities across Victoria. VicRoads develops and administrates specifications of recycled materials to be used in the state's infrastructure projects.

3.9 Western Australia

i. Overview

Western Australia is vast and located a considerable distance from waste end-markets, which can impact investment in waste and recycling infrastructure and overall recycling rates. However, the state is one of the Australian states and territories with a heavily regulated waste management regulatory framework. The organisations with the most impact on C&D waste market development in Western Australia are the Department of Water and Environmental Regulation (DWER), the Waste Authority, the WA Environment Protection Authority and WA MainRoads. The state regulatory framework considers waste as a resource and provides an exemption for the application of waste in construction and maintenance work in licenced landfills. The framework also provides regulatory supports for the application of a range of waste management strategies such as polluters pay, product stewardship, extended producer responsibility and end-users liability for material whole life cycle costs.

ii. Primary legislation

The Environmental Protection Act 1986 is an overarching piece of legislation that prevails over other state legislation. This Act distinguishes waste used for reclaiming purposes from waste. It specifies two waste strategies—the polluter pays principle and end-users responsibility—that aid market development for recycled products. The Act instructs allocation of the state fund to re-using and recycling activities and favours market incentives. The second important Act, the Waste Avoidance and Resource Recovery Act 2007, administrated by DWER, specifies product stewardship and extended producer responsibility to encourage recycling activities.

Table 22. Summary of regulatory statements in favour/against recycled C&D market development

Act and Regulations	In favour of market development	Against market development
Environmental Protection Act 1986 - DWER	• It does not consider all waste materials as a waste • Enforces the polluter pays principle: Those who generate pollution and waste should bear the cost of containment, avoidance or abatement • The users of goods and services should pay prices based on the full life cycle costs of providing goods and services • Indicates that environmental goals should be pursued most cost-effectively, by establishing incentive structures including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to respond to environmental problems • Indicates that amounts of money collected from waste penalties and landfill levy may be applied to fund programmes relating to the management, reduction, re-use, recycling, monitoring or measurement of waste that are approved by the Minister	• No realised or perceived negative impacts
Environmental Protection (Landfill) Levy Act 1998 - DWER	• No realised positive impacts	• No realised or perceived negative impacts

Waste Avoidance and Resource Recovery Act 2007 - DWER	• Adopts the waste management hierarchy • Promotes the most efficient use of resources, including resource recovery and waste avoidance • Specifies product stewardship plans and extended producer responsibility schemes • Establishes Waste Authority functions such as promoting market development for recovered resources and recycled materials	• No realised or perceived negative impacts No specific information about C&D waste stream
Waste Avoidance and Resource Recovery Regulations 2008 - DWER	• Describes the exemption conditions for C&D waste as follows: a) For the waste used for construction and maintenance work carried out on the licensed landfill b) Uncontaminated soil or other clean fill received at a licensed landfill for land reclaiming purposes on landfill site c) Waste that is not disposed of to landfill but is collected and stored at a licensed landfill for recycling	• No realised or perceived negative impacts
Environmental Protection Regulations 1987 - DWER	• Similar to the overarching Act	• No realised or perceived negative impacts
Landfill Waste Classification and Waste Definitions 1996	• Defines waste classes, C&D waste stream and clean fill	• No realised or perceived negative impacts

iii. Guidelines, policies and strategies

The Waste Authority has released the state waste strategy document in which several actions and strategies are recommended to develop recycled C&D waste materials. The agency also published several other guidelines and statement positions that cover the recycled products market development.

Table 23. Summary of statements in favour/against recycled C&D waste market development

Guideline/strategy	In favour of market development	Against market development
Waste Avoidance and Resource Recovery Strategy 2030 - Waste Authority	• Recommends the following strategies: a) Implement sustainable government procurement practices that encourage greater use of recycled products and support local market development b) Prioritise local market solutions for recyclable materials c) Identify and implement options for collaboration between industry and the State Government to support market development and recovery with an emphasis on focus material (e.g. C&D waste)	• No realised or perceived negative impacts

	d) Provide funding to promote the use of priority recycled products and support the establishment of local markets with an emphasis on focus materials e) Support community, government and industry initiatives that promote resource recovery f) Develop a legislative framework to encourage the use of waste-derived materials, including product specifications, to build confidence in recycled products, increase their demand and develop relevant markets while protecting the environment	
Waste Data Strategy 2019 - Waste Authority	• Undertake annual data collection activities to monitor waste and recycling performance • Collaborate with other jurisdictions and agencies to develop standards for collecting more detailed data about waste flows in the circular economy • Develop policies and legislation in consultation with stakeholders to increase the accuracy of waste data	• No realised or perceived negative impacts
Waste Authority Position Statement Construction and Demolition (C&D) Waste Position Statement 2016 - Waste Authority	• Communicates the benefits of C&D waste recycling • Supports further research to identify suitable applications for C&D derived products	• No realised or perceived negative impacts
Source Separation of Waste Position Statement 2014 - Waste Authority	• Communicates the benefits of C&D waste recycling • Encourages source separation for C&D waste materials	• No realised or perceived negative impacts

iv. Standards, codes and specifications

Three agencies provide specifications for using recycled products in construction projects. In 2020, the Waste Authority published a state-wide specification for recycled road base and drainage rock. Main Roads also have a specification for recycled C&D waste materials for application in pavement projects. Furthermore, the Institute of Public Works Engineering Australia (IPWEA), in partnership with the Western Australia Local Government Association (WALGA), set requirements for supplying C&D waste materials in road works.

Table 24. The statements specified in standards/codes/specifications in favour/against market development

Standard/code/specification	In favour of market development	Against market development

Roads to Re-use: Product Specification - recycled road base and recycled drainage rock- 2020 - Waste Authority	• Sets out product specification for recycled road base and recycled drainage rock • Ensures that material meeting this specification will no longer be considered a waste for the waste levy	• No realised or perceived negative impacts
IPWEA/WALGA Specification for the supply of recycled road base 2016	• Specifies recycled C&D waste materials properties to be used in road base	• No realised or perceived negative impacts
Main Roads Western Australia, Specification 501: Pavements 2020	• Specifies supply of recycled C&D waste materials properties to be used in pavement layers	• No realised or perceived negative impacts

v. Relevant organisations

The state organisations involved in C&D waste market development in Western Australia are the Department of Water and Environmental Regulation (DWER), the Waste Authority, the WA Environment Protection Authority and WA Main Roads. In WA, Acts and regulations are administrated by DWER. The Waste Authority is responsible for developing and updating the state waste strategy document in which several actions and strategies are recommended to develop recycled C&D waste materials. The agency also provides statement positions about various aspects of waste management in WA. The Waste Authority, Main Roads and IPWEA/WALGA have separately published specifications for using C&D waste-derived products in infrastructure projects.

4 CONCLUDING REMARKS

The review demonstrates differences and similarities in the Australian states and territories regulatory frameworks concerning the development and stimulation of end markets for C&D waste recyclables. This study analysed 102 federal, state and territories government policies, standards, guidelines, legislation and specifications to determine the extent to which the Australian regulatory frameworks are in favour or against C&D waste market development. The following are the highlights from this regulation analysis:

1. Most of the primary state and territory legislation does not define C&D waste and considers waste as always a waste regardless of its value or future usage;
2. Specifications of application of C&D recycled products vary between states and territories, which has a negative impact on interstate market development and stimulation;
3. In most waste strategy documents, the significance of waste market development is highlighted; some waste strategy documents suggest recommendations to improve it; and
4. Among the states and territories, New South Wales and Tasmania have the most extensive and smallest regulatory framework relevant to C&D waste management and market development thereof, respectively.

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