



Developing a consistent approach to define and measure C&D waste across different Australian jurisdictions

Research Report No. 2

Authors

Tayyab Maqsood

Peter Wong

Malik Khalfan

Rebecca Yang

Salman Shooshtarian

Research Project 1.65 A National Economic Approach to Improved Management of Construction and Demolition Waste

Date: July 2019

Acknowledgements

Project Leader: Tayyab Maqsood, RMIT University

Researchers:

Peter Wong, RMIT University
 Malik Khalfan, RMIT University
 Rebecca Yang, RMIT University
 Salman Shooshtarian, RMIT University
 Tim Ryley, Griffith University

Core Members:

Carl Barrett, BGC
 Les Marchant Main Roads WA
 Louis Bettini, Main Roads WA
 Peter Fawcett, Aurecon
 Paul Morassut, NSW Roads and Maritime Services (RMS)
 Nadine Venturato, NSW Roads and Maritime Services (RMS)
 Dean Wood, WA Department of Finance
 Fiona Hogg, WA Department of Finance
 Sarah Mewett, WA Department of Communities
 Olivia Efthimiou, WA Department of Communities
 David Harrison, QLD Department of Housing and Public Works (QDHPW)
 Tim Norris, QLD Department of Housing and Public Works (QDHPW)

Project Steering Group

Name	Project Participant
Tayyab Maqsood (Project Leader)	RMIT University (Project Leader)
Will Hackney and	Aurecon (VIC)
Peter Fawcett	Aurecon (VIC)
Carl Barrett	BGC (WA)
Les Marchant	Main Roads WA (MRWA)
Louis Bettini	Main Roads WA (MRWA)
Sam Henwood	NSW Roads and Maritime Services (RMS)
Paul Morassut	NSW Roads and Maritime Services (RMS)
Nadine Venturato	NSW Roads and Maritime Services (RMS)
Dean Wood and	WA Department of Finance
Fiona Hogg	WA Department of Finance
David Harrison and	QLD Department of Housing and Public Works (QDHPW)
Tim Norris	QLD Department of Housing and Public Works (QDHPW)
Sarah Mewett	WA Department of Communities
Olivia Efthimiou	WA Department of Communities
Veronica Pannell	WA Department of Communities
Tim Ryley	Griffith University (QLD)
Peter Wong	RMIT University (VIC)
Rebecca Yang	RMIT University (VIC)
Malik Khalfan	RMIT University (VIC)
Salman Shooshtarian	RMIT University (VIC)
Francois Finette	Australian Road Research Board (ARRB) (WA)
Paul Davies	Infrastructure Sustainability Council of Australia (ISCA) (NSW)
Lara Harland	Engineers Australia (QLD)
Atanas Trpevski	Public Transport Authority of WA (PTA)
Jason Robertson	Master Builders WA

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
1 INTRODUCTION	5
2 DEFINITION AND TERMINOLOGIES	5
2.1 Definition of waste	5
2.2 Definition of clean fill	10
3 Waste Classification	11
4 When a waste ceases to become waste	13
5 Waste recycling residuals	16
6 Waste data management	16
7 RECOMMENDATIONS	18
7.1 State specific reforms	18
7.2 Nationwide reforms	19

LIST OF TABLES

Table 1. Definitions of general waste and C&D waste in different jurisdictions.	6
Table 2. Definition of clean fill	10
Table 3. When waste is not waste	14
Table 4. Waste data systems in different jurisdictions	17

EXECUTIVE SUMMARY

The construction industry in Australia has grown significantly in the past two decades in the wake of population growth, migration and expansion in the tertiary education industry. The growing population has necessitated extensive property development, better public transport and improved infrastructure. All these activities have resulted in a substantial growth in construction and demolition (C&D) waste. However, the amount of C&D waste generation and the way it is being dealt with differs across eight Australian jurisdictions. The main cause of different levels of C&D waste management in Australia is believed to be varied jurisdictional regulations governing C&D waste. These differences include using various definitions of waste and issues related to waste materials. Therefore, this section of report aims to present the inconsistencies identified in C&D waste related regulations, standards and strategies being implemented in eight states and territories. The key inconsistencies identified in the study states and territories are as follow:

- Terminologies and definitions used in C&D waste related regulations
- Definition of clean fill in different jurisdictions
- Waste classification for landfilling activities purposes
- Definition of ‘waste’ as opposed to ‘source’ during different phases of C&D waste management
- Waste data management systems including data collection, analysis and reporting

This report also presents 13 key recommendations drawing on the review of existing literature and summarised in Section 2.7, with 5 of these considered to be of relevance to all Australian jurisdictions. The key nationwide reforms that are applicable to all study jurisdictions and particularly relate to the federal government’s role in management of C&D waste include:

- 1) Align the classification used for reporting purposes and landfilling activities to remove inconsistencies;
- 2) Provide consistency in resource exemptions and separation between ‘source’ and ‘waste’, to remove confusion in the definition of general waste and C&D waste provided by National Waste Policy 2018 on exemption of re-use of materials from being waste;
- 3) Provide uniform reporting of waste data to better aggregate and report waste data. The first step is for the Commonwealth government to implement the 65 agreed improvements to the National Waste Report as established by Blue Environment's *Improving national waste data and reporting report*;
- 4) Establish a robust and consistent national waste data management system that is obliged to improve assessment of outcomes of projects, policies, laws and business transactions in different jurisdictions;
- 5) Provide consistent guidelines for waste auditing that are applicable throughout Australia.

In accordance with the second objective of this research, these recommendations can assist waste regulators with developing a consistent approach to define and measure C&D waste across different jurisdictions.

1 INTRODUCTION

The effective management of C&D waste largely hinges on the consistency in approaches to defining, measuring and treating this waste stream across Australia. It is widely known and documented that a harmonised approach can remove many barriers to reducing, re-using, recycling and recovering of waste across a country like Australia with different regulatory authorities. The assessment of whether certain material is waste is important to the application of the Acts and regulations imposed by these authorities. Therefore, a clear and consistent definition of 'waste' and 'resource' to be used across sectors and jurisdictions needs to be considered.

This report aims to first review the approaches taken in different jurisdictions to highlight the extent of consistencies/inconsistencies in the corresponding management systems. The review of regulations will help establish a clear understanding of circumstances in which a 'waste' should be considered as a 'resource'. For this purpose, the five main indicators in jurisdictional regulations are explored. These indicators show the characteristics of a waste relative to resource and include 'definition of waste', 'definition of clean fill', 'waste classification', 'when waste ceases to become a waste' and 'waste data management systems'. Indeed, when the inconsistencies in these indicators are identified and dealt with, Australia can plan for the development of a marketplace wherein different parties can effectively trade their waste across borders and industries. The subsidiary aim of this report is to propose a set of recommendations used to develop a consistent approach to define and measure C&D waste across different jurisdictions.

2 DEFINITION AND TERMINOLOGIES

2.1 Definition of waste

Although the National Waste Policy 2010 set an objective to develop a national definition of waste under Strategy 4 (national classification system for waste), to date there is no consistent definition for general waste or C&D waste specifically. Defining waste is not an easy task and there is no single domestic or international definition. This is because of the complicated nature of waste and because the nature (e.g. composition) of waste is changing. It is rapidly comprising increasingly diverse materials and products, as well as involving new processing and management technologies and regulations¹. Defining waste offers an understanding of its characteristics, which has become important with the customisation of modern waste management systems for various types of waste materials.

In Australia, the practice of waste definition is excessively associated with classification of hazardous materials and determination on landfill levy liability. Inconsistent definitions of waste can potentially result in levy avoidance or inability to achieve the best management practices. An inappropriate definition of hazardous waste can result in material avoiding appropriate treatment. Despite there being general similarities between definitions of C&D waste, each jurisdiction uses specific wording and practical applications. The definition of waste can decide when a material is a 'waste', a 'product' or a 'resource'. As such, this can have substantial regulatory, environmental and financial impacts for those who are involved in this industry (e.g. waste makers, recycling and disposal facility owners, and transporters)². As presented in Table 1, the definition of general waste is provided in the EPA-administrated legislation in different jurisdictions. The majority of definitions include some common elements, such as waste status (e.g. unwanted, discharged, abandoned or emitted), waste substance (e.g. gas, solid or liquid) and intended subsequent use (e.g. re-use, recycle or recover). The differences include source of waste (e.g. commercial, demolition) and potential harm to environment (alteration

¹ The Allen Consulting Group. 2009. National Waste Policy. Regulatory Impact Statement.

² Hyder. 2012. Waste Definitions and Classifications: Report on Issues, Opportunities and Information gaps. Hyder Consulting Pty Ltd.

of the environment). In the case of the ACT, three definitions are provided for general waste, varying in terms of wording, length, potential harm to environment and intended subsequent use; however, the descriptions do not differ in terms of scope. Lastly, it is noteworthy that, in all jurisdictional definitions, waste is always regarded as waste whether or not it is useful or intended for re-use, recycling, recovery or reprocessing. In this regard, the definition provided by the National Waste Policy 2018 excludes from being classified as waste any materials and products that are to be reused without processing.

Table 1. Definitions of general waste and C&D waste in different jurisdictions.

	EPA documents	Waste Policy and other documents
ACT	<p>Environment Protection Act 1997 General waste Any solid, liquid or gas, or any combination of them, that is a surplus product or unwanted by-product of an activity there product or by-product is of value or not.</p> <p>Waste Management and Resource Recovery Act 2016 General waste (a) any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment; (b) any discarded, rejected, unwanted, surplus or abandoned substance, whether or not intended for sale, recycling, reprocessing, recovery or purification by a separate operation from that which produced it; (c) any other substance declared by regulation to be waste.</p> <p>Environment Protection Regulation 2005 General waste a thing, whether valuable or not, that is— (a) discarded; or (b) rejected; or (c) unwanted; or (d) surplus; or (e) abandoned; or (f) intended for recycling, reprocessing, recovery, reuse, or purification.</p> <p>C&D waste No definition is provided for C&D waste</p>	<p>ACT Waste Management Strategy 2011-2015</p> <p>C&D waste generated by the building and construction industry</p>
	<p>Protection of the Environment Operations Act 1997 No 156 General waste (a) any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or (b) any discarded, rejected, unwanted, surplus or abandoned substance, or (c) any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or (d) any processed, recycled, re-used or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations, or (e) any substance prescribed by the regulations to be waste.</p> <p>Protection of the Environment Operations Act 1997 No 156 C&D waste unsegregated material (other than material containing asbestos waste) that results from:</p>	<p>Waste Levy Guidelines 2018 NSW Waste Avoidance and Resource Recovery Strategy 2014–21</p> <p>C&D waste is generated from construction or demolition works, and includes asphalt waste or excavated natural material.</p>
NSW		

	EPA documents	Waste Policy and other documents
	(a) the demolition, erection, construction, refurbishment or alteration of buildings other than chemical works, or mineral processing works, or container reconditioning works, or waste treatment facilities, or (b) the construction, replacement, repair or alteration of infrastructure development such as roads, tunnels, sewage, water, electricity, telecommunications and airports, and includes materials such as bricks, concrete, paper, plastics, glass and metal, and timber, including unsegregated timber, that may contain timber treated with chemicals such as copper chrome arsenate (CCA), high temperature creosote (HTC), pigmented emulsified creosote (PEC) and light organic solvent preservative (LOSP), but does not include excavated soil (for example, soil excavated to level off a site prior to construction or to enable foundations to be laid or infrastructure to be constructed).	
NT	<p>Waste Management and Pollution Control Act 2016</p> <p>General waste a solid, a liquid or a gas; or (b) a mixture of such substances, that is or are left over, surplus or an unwanted by-product from any activity (whether or not the substance is of value) and includes a prescribed substance or class of substances.</p> <p>C&D waste No definition is provided for C&D waste</p>	<p>Waste Management Strategy for the Northern Territory 2015–2022</p> <p>C&D waste Solid waste sourced from construction and demolition works, including building and demolition waste, asphalt waste and excavated natural material</p>
Qld	<p>Environmental Protection Act 1994</p> <p>General waste includes anything, other than an end of waste resource, that is— (a) left over, 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. (3) a thing can be waste whether or not it is of value.</p> <p>C&D waste No definition is provided for C&D waste</p>	<p>Queensland’s Waste Reduction and Recycling Strategy 2010–2020</p> <p>C&D waste is generated as a result of building, refurbishing, renovating or demolishing structures, buildings and infrastructure such as roads, bridges and docks, and includes material such as timber, clean soil, concrete, asphalt, plasterboard, steel, bricks, ceramic and clay tiles, and aluminium.</p>

	EPA documents	Waste Policy and other documents
SA	<p>Environment Protection Act 1993</p> <p>General waste any discarded, dumped, rejected, abandoned, unwanted or surplus matter, whether or not intended for sale or for purification or resource recovery by a separate operation from that which produced the matter; or (b) any matter declared by regulation to be waste for the purposes of this Act; or (c) any matter declared by an environment protection policy to be waste for the purposes of this Act, whether or not of value.</p> <p>C&D waste No definition is provided for C&D waste</p>	<p>Waste definitions 2009</p> <p>C&D waste The solid inert component of the waste stream arising from the construction, demolition or refurbishment of buildings or infrastructure but does not contain Municipal Solid Waste, Commercial and Industrial Waste (General), Listed Waste, Hazardous Waste or Radioactive Waste.</p> <p>South Australia’s Recycling Activity Survey 2016-17 Financial Year Report –Green Industries SA</p> <p>C&D waste includes waste from residential, civil and commercial Construction and Demolition activities, such as fill material (e.g. soil), asphalt, bricks and timber. C&D waste excludes construction waste from owner / occupier renovations, which are included in the municipal waste stream. Unless otherwise noted, C&D waste does not include waste from the commercial and industrial waste stream</p>
Tas	<p>Environmental Management and Pollution Control Act 1994 (EMPCA)</p> <p>General waste discarded, rejected, unwanted, surplus or abandoned matter, whether of any value or not; or (b) discarded, rejected, unwanted, surplus or abandoned matter, whether of any value or not, intended – (i) for recycling, reprocessing, recovery, reuse or purification by a separate operation from that which produced the matter; or (ii) for sale;</p> <p>C&D waste No definition is provided for C&D waste</p>	<p>C&D waste No definition is provided for C&D waste</p>
Vic	<p>Environment Protection Act 1970</p> <p>General waste any matter, whether solid, liquid, gaseous or radioactive, which is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration of the environment (b) any discarded, rejected, unwanted, surplus or abandoned matter; (c) any otherwise discarded, rejected, abandoned, unwanted or surplus matter intended for— (i) recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter; or (ii) sale; and (d) any matter prescribed to be waste.</p> <p>C&D waste No definition is provided for C&D waste</p>	<p>Statewide Waste and Resource Recovery Infrastructure Plan</p> <p>C&D waste materials generated and discarded from building, construction and demolition activities</p> <p>Victorian Recycling Industries Annual Survey 2010-11- Sustainability Victoria</p> <p>C&D waste waste from residential, civil and commercial construction and demolition activities, such as fill materials (e.g. soil), asphalt, bricks and timber. C&D waste excludes construction waste from owner / occupier renovations, which is included in the municipal waste stream. Unless otherwise noted, C&D waste does not include waste from the C&I sector</p>

	EPA documents	Waste Policy and other documents
WA	<p>Environmental Protection Act 1986</p> <p>General waste (a) whether liquid, solid, gaseous or radioactive and whether useful or useless, which is discharged to the environment; or (b) prescribed to be waste.</p> <p>Landfill Waste Classification and Waste Definitions 1996 (as amended 2018)</p> <p>C&D waste materials in the waste stream which arise from construction, refurbishment or demolition activities</p>	<p>Review of Waste Avoidance and Resource Recovery Act 2007</p> <p>C&D waste is the solid waste from residential, civil and commercial construction and demolition activities.</p>
National	<p>National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 2012</p> <p>General waste (a) discarded, rejected, unwanted, surplus or abandoned matter; or (b) otherwise discarded, rejected, unwanted, surplus or abandoned matter intended for: (i) recycling, reprocessing, recovery, reuse, or purification by a separate operation from that which produced the matter; or (ii) sale, whether of any value or not.</p> <p>Hazardous Waste (Regulation of Exports and Imports) Act 1989</p> <p>General waste a substance or object that: (a) is proposed to be disposed of; or (b) is disposed of; or (c) is required by a law of the Commonwealth, a State or a Territory to be disposed of.</p> <p>National Waste Policy- 2018</p> <p>General waste materials or products that are unwanted or have been discarded, rejected or abandoned. Includes materials or products that are recycled, converted to energy, or disposed. Materials and products that are reused (for their original or another purpose without reprocessing) are not waste because they remain in use.</p> <p>C&D waste waste produced by demolition and building activities, including road and rail construction and maintenance, and land excavation associated with construction activities</p>	

Unlike with general waste, the definition of C&D waste in the various jurisdictions is not straightforward. C&D waste is simply defined in the National Waste Policy³ as ‘*waste produced by demolition and building activities, including road and rail construction and maintenance, and land excavation associated with construction activities*’ (p. 17). Among the jurisdictions, only WA and NSW provide a specific definition for C&D waste in EPA administrated acts and regulations. Other jurisdictions refer to definitions that are loosely presented in other documents, such as state/territory waste strategy documents; in Tas there is no definition found for C&D waste published in any of the waste related documents. NSW has provided a comprehensive definition in which a broad range of construction and demolition activities and materials specifications are covered, as well as their potential environmental impact. WA definition provided a concise statement that only includes three types of construction activities.

There are fundamental inconsistencies even in the definitions enshrined in non-legislative documents. The main differences found include exclusion/inclusion of clean fill (e.g. soil and rock used for land rehabilitation), source of waste (e.g. building, refurbishing, renovating or demolishing) wording (e.g. construction (building) and demolition) and exclusion/inclusion of some materials (e.g. glass, plastic) and certain contaminations. It seems that two authorities, in SA (Green Industries SA) and Vic (Sustainability Victoria), manage their activities based on the same definition. Unlike the definition of general waste, NWP 2018 does not exempt re-use material from being waste. However, it makes sense that practitioners tend to refer to a broader definition.

³ National Waste Policy. 2018. Less Waste. More Resources. In: GOVERNMENT, A. (ed.).

2.2 Definition of clean fill

The other inconsistency found between jurisdictions is the definition provided for clean fill. Clean (waste) fill comprises uncontaminated (reprocessed) soil sand or rock produced during excavation and used to level off construction sites prior to construction. In Qld, this material is not considered as a waste. Therefore, its re-use would not be recognised as waste disposal and there is no liability for landfill levy. However, in other jurisdictions, this material is still regarded as waste. Some jurisdictions have not established a clear definition for clean fill (i.e. ACT, NT and Vic); moreover, among those that have, the definitions differ. There is a need to harmonise this definition in case other jurisdictions decide to exclude it from waste definition. Clean fill is termed as ‘waste fill’ in SA, ‘clean earth’ or ‘clean earthen material’ in Qld, and ‘virgin excavated natural material’ in NSW. The following table shows any available definitions for clean fill in the study jurisdictions.

Table 2. Definition of clean fill

	Legislation
NSW	<p>The Protection of the Environment Operations Act 1997 (POEO Act) ‘natural material (such as clay, gravel, sand, soil or rock fines): (a) that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities and (b) that does not contain any sulfidic ores or soils or any other waste and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice.’</p>
	<p>Environmental Protection Act 1994 clean earthen material means— (a) either of the following, if pulverised so that no piece has any dimension of more than 100mm— (i) bricks, pavers or ceramics; (ii) concrete that does not have any steel reinforcing rods embedded in it; or (b) clean earth.</p>
Qld	<p>Environmental Protection (Waste ERA Framework) Amendment Regulation 2018 clean earth means any natural substance found in the earth that is not contaminated with waste or a hazardous contaminant. Examples— clay, gravel, loam, rock, sand or soil</p>
SA	<p>Environment Protection (Fees and Levy) Regulations 1994 Waste consisting of clay, concrete, rock, sand, soil or other inert mineralogical matter in pieces not exceeding 100 millimetres in length and containing chemical substances in concentrations (calculated in a manner determined by the Authority) less than the concentrations for those substances set out in Schedule 6 but does not include waste consisting of or containing asbestos or bitumen</p>
Tas	<p>Environmental Management and Pollution Control Act 1994 means fill, including soil, rock, concrete, bituminised pavement and similar non-putrescible and non-water-soluble material, that is not contaminated by other waste and that does not contain contaminant levels exceeding limits set by the Director</p>

Legislation	
WA	<p>Landfill Waste Classification and Waste Definitions 1996 (as amended 2018)</p> <p>Material that will have no harmful effects on the environment and which consists of rocks or soil arising from the excavation of undisturbed material. Virgin excavated natural material (e.g. clay, gravel, sand, soil and rock), or such material that is mixed with: waste that has been excavated from areas that are not contaminated as a result of industrial, commercial, mining or agricultural activities, with manufactured chemicals, and does not contain sulfidic ores or soils (e.g. acid sulphate soils and peats), or materials not from a 'clean excavation' that have been validated to meet relevant ecological investigation levels.</p> <p>For material not from a clean excavation, it must be validated to have contaminants below relevant ecological investigation levels (as defined in the document Assessment Levels for Soil, Sediment and Water, Department of Environment, 2003)</p>

As evidenced above, the range of definition is wide and each of them refers to locally produced guidelines that determine the allowed level of contamination. Among the jurisdictions, WA and SA have published specific documents in which the definition of waste is stipulated in detail. In WA, the Landfill Waste Classification and Waste Definitions 1996 (as amended 2018) document clarifies the waste to be accepted at landfill under the Environmental Protection Act 1986. In SA, the Waste Guideline provides definitions for a range of terms commonly used within the waste industry, which are sourced from EPA regulations and publications.

There are several other issues with inconsistent language used in C&D waste management regulations that have been identified in previous studies. Inconsistent definitions and terminologies create regulatory and administrative burdens for those who operate across jurisdictional borders. They can be interpreted differently, as C&D waste can be defined or classified differently in different jurisdictions. Consequently, it is difficult to develop a domestic market to trade C&D waste materials between jurisdictions. It is also seen as a barrier to the national comparison of waste management practices. A standardised terminology is crucial for managing, monitoring and collecting data, and for national and international reporting. Use of inconsistent language can contribute to data gaps and data bias, making it difficult, if not impossible, to aggregate and report jurisdictional waste data².

On the other hand, a clear and uniform definition of C&D waste will promote investment in recycling facilities, the circular economy and development of the domestic market⁴. It may also assist in the uniform adoption of waste minimisation strategies between authorities. These strategies are largely developed according to the national waste policy⁵, which is limited in its effectiveness by the varying extents to which local authorities regulate waste management activities across Australia. Through a common language, a range of jurisdictions can take advantage of shared information⁶ that can be used to evaluate the performance of in place/in force legislation, strategies, policies and standards.

3 WASTE CLASSIFICATION

One of the differences in operation of landfill facilities is the method through which the incoming waste are classified, accepted or treated. Similar to waste definition, the way that waste is classified has a significant impact on many aspects of waste management. Classifications are used to determine waste treatment and disposal methods, and to grant permits and licences for landfill sites and recycling facilities. In the 1990s, some attempts were made to create uniform waste classification systems across Australia by developing a National Waste Classification system under the Australian Waste Database

⁴ Serpo, A. 2018. Harmonisation avoids 'perverse' outcomes. Interview with Waste Management Review. URL: <http://wastemanagementreview.com.au/harmonisation-avoids-perverse-outcomes/>.

⁵ Australian Government, National Waste Policy. 2018. Less Waste, More Resources.

⁶ SKM. 2012. Review of Australia's International Waste-related Reporting Obligations, p. 4.

(AWD) project that was commissioned by the Department of Environment and Energy (then known as Environment Australia)⁷. However, the project was not successful, and an effective waste system was not developed. The main issues with the AWD were reported to be wrong assumptions underpinning the project and resistance from key stakeholders. Later on, some consulting companies were tasked with conducting requirements studies to revitalise the AWD objectives^{8,9,10}. None of these studies have resulted in the formation of the AWD or a waste classification system at present.

Currently, the NWP 2018 and the Draft National Solid Waste Classification System both advocate a classification that is based on three main streams: C&D, Commercial and Industrial (C&I) and Municipal Solid Waste (MSW). Yet this classification has not been used in waste-related regulations in some jurisdictions, with other criteria (e.g. properties and level of risk they may impose) used to classify waste instead.

In the ACT, waste classification is risk-based and has two main categories (liquid and non-liquid waste). C&D falls under 'inert' waste, which is one of the four subcategories of non-liquid waste (i.e. inert, solid, industrial and hazardous). In NSW, authorities took a risk-based approach, developing six categories with different levels of risk and subsequently considering waste's physical and chemical properties. C&D waste falls within general solid waste (non-putrescible). EPA NSW has published a two-part guideline to classify different waste using multiple criteria for general waste and hazardous waste. In Qld, the new classification system (which comes into effect in February 2019) will take a risk-based approach and C&D waste is under non-regulated waste (lowest risk). Similarly, in NT, C&D waste is grouped as 'inert waste', which is one of the three main categories of waste classification (i.e. putrescible waste, inert waste, and listed waste). In the SA and Tas systems, there are five types of waste, wherein C&D waste has a separate category; the category of C&D in SA has two subcategories (i.e. inert and mixed). In Vic, waste classification is primarily based on source and properties and then risk level (municipal, industrial and prescribed waste); C&D waste is under industrial waste. In WA, the system is designed to serve landfill purposes and C&D falls within Class I (landfill inert). As noted above, currently there are different classification systems established in each of the jurisdictions; these different systems are carefully applied to cover various waste pathways including collection, transport, treatment, recovery, and disposal. Moreover, different authorities may have different classification systems in place. For instance, in Vic, the classification system being used by Sustainability Victoria (SV) is different from that which is recommended and operated by EPA Vic. SV follows NWP 2010 classification, which is different from the three categories proposed by EPA Vic⁹. EPA has published a guideline (Industrial Waste Resource Guidelines Waste Categorisation) in which the categorisation system in Vic is detailed.

C&D waste may also include hazardous materials such as asbestos that need to be separately managed and disposed of. However, the hazardous waste in relevant regulations is differently designated. For instance, the term for this type of waste is 'regulated waste' in Qld, 'listed waste' in SA and NT, 'controlled waste' in Tas and WA, and 'prescribed industrial waste' in Vic.

⁷ Moore, S and SY. Tu. 1995. Application of the Australian waste database to regional environmental management. International Conference on Advances in Strategic Technologies. volume 12, p. 15.

⁸ Net Balance. 2009. National Waste Data System Requirements Study. Department of the Environment, Water, Heritage and the Arts.

⁹ Hyder. 2012. Waste Definitions and Classifications: Report on Issues, Opportunities and Information gaps. Hyder Consulting Pty Ltd.

¹⁰ Hyder. 2011. Australian Waste Classifications. Roles in Decision Making.

Among the jurisdictions, NSW¹¹, NT¹², Qld¹³, SA¹⁴ and Vic¹⁵ have released guidelines on siting, design, operation and rehabilitation of landfills. The guidelines outline a suite of best practice management measures in the development and operation of landfills. These guidelines, through technical information, instruct landfill operators on how they can meet the environmental protection objectives of their jurisdictional regulatory framework.

4 WHEN A WASTE CEASES TO BECOME WASTE

In NWP 2018 the concept of ‘a waste is not always waste’ is promoted in the ‘Waste as a Resource- the Circular Economy’ section. This section explains that, by applying the principles of a circular economy, Australia can support better and repeated use of its resources; the focus is on maximising the economic value of resources. According to this new way of thinking, most of materials are resources that can be reused, recycled and reprocessed over and over. The ability to re-define the output of resource recovery facilities as not waste is instrumental to developing markets for those output products¹⁶.

However, at the jurisdictional level, the current regulations are bound to the notion of ‘once a waste, always a waste’. This is the case irrespective of the material’s later use or commercial value. Indeed, as seen above, the waste definitions in Australian jurisdictions do not separate disposable waste and products that are recycled or converted to energy. According to this notion, until the material is actually reused, it is regarded as a waste and whether certain material is waste must be assessed at a particular point in time¹⁷. For instance, contaminated soil that has been processed is still waste even once it has been (re)used; that it is now ‘clean’ material does not stop it being waste. As a result, it must be kept, treated, transported and disposed of only in conformity with a licence from the EPAs. The definition of waste and the circumstances under which the waste and recycling industry requires a licence and is liable to pay landfill levies are the main outcomes of the current conceptualisation of waste in Australia.

Indeed, the definition in use in jurisdictions carries an inconsistency; while a waste is identified as unwanted, regardless of its value, it can potentially be a resource for the same or other purposes. This is a crucial issue that needs to be immediately addressed in the legislative framework. In fact, the way regulations consider waste at different levels of the waste hierarchy provides a platform for dealing with waste and associated costs (e.g. a levy). Eventually, if properly defined and implemented, the separation between waste and resources will determine the quantity of waste sent to landfill. This, in turn, can reduce the quantity of new materials extracted and will largely mitigate the environmental risks created along the chain. An example of the consequences of not addressing this issue is evident in the case of Eclipse Resources Pty Ltd (‘Eclipse’) in WA, which became liable to pay approximately 21.6 million backdated levies in 2017¹⁸. The court ruled against Eclipse’s assumption about clean fills and recycled materials received and accepted for burial not being ‘waste’ but resources (for re-use purposes). The court determined that, technically, the definition of waste remains valid when it is unwanted by or excess to the needs of the source of that material¹⁹, regardless of its later use. Despite the court’s ruling, according to a piece of legislation²⁰ in WA, a licensee may by application claim an exemption from levy regulations for uncontaminated soil or other clean fill under some conditions

¹¹ EPA Environmental Guidelines: Solid waste landfills. 2016.

¹² EPA Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites In the Northern Territory. 2013 – NT.

¹³ Guideline ERA 60-Waste disposal-Landfill siting, design, operation and rehabilitation – Qld.

¹⁴ EPA Guidelines Environmental management of landfill facilities 2007 – SA.

¹⁵ EPA Guidelines Siting, design, operation and rehabilitation of landfills. 2015. Vic.

¹⁶ Hyder. 2011. Waste Definitions and Classifications. Report on Issues, Opportunities and Information Gaps.

¹⁷ WA Department of Water and Environmental Regulation. 2017. Factsheet - Assessing whether material is waste. <https://www.der.wa.gov.au/images/documents/your-environment/waste/Factsheet-Assessing-waste.pdf>

¹⁸ The Western Australian Jurist – Vol 8. 2017. When is waste a waste? pp. 201-224.

¹⁹ Eclipse Resources Pty Ltd v The Minister for Environment [No. 2] [2017] WASCA 90.

²⁰ Waste Avoidance and Resource Recovery Levy Regulations. 2008 – WA.

specified in the legislation. Such rulings are a serious deterrent for industries in terms of recycling material; instead it makes them resort to disposing of material at licenced landfill facilities to avoid liability for significant levies.

In Europe, turning waste into a resource by 2020 is one of the key objectives of the EU's Roadmap to a Resource Efficient Europe. Furthermore, when waste ceases to be waste largely depends on the definition of waste. The only definition of waste that does not consider waste to always be waste is provided by NWP 2018, which distinguishes waste from resource: *'Materials and products that are reused (for their original or another purpose without reprocessing) are not waste because they remain in use'*. Table 3 provides a summary of this issue in the jurisdictional legislative frameworks. In addition to the review of legislation, other waste related documents are reviewed as they are assumed to contribute to developing and upgrading (new) legislation that has a different perspective about when waste is a resource.

Table 3. When waste is not waste

Objectives and Strategies	
ACT	<p>Waste Management and Resource Recovery Act 2016 A waste is always waste regardless of its value</p> <p>ACT Waste Management Strategy 2011-2025 The Strategy recognises waste as a resource. Deriving value from waste resources requires innovations by government and industry in order to transform waste into valuable product.</p>
	<p>Protection of the Environment Operations Act 1997 No 156 Regulations may provide for the exemption of specified wastes from the calculation of contributions (including for example wastes that are recycled, re-used, recovered or processed) for landfill owners</p> <p>NSW Waste Avoidance and Resource Recovery Strategy 2014–21 A waste is always waste regardless of its value</p>
NSW	<p>Waste Management Strategy for The Northern Territory 2015–2022</p> <p>Waste Management and Pollution Control Act 2016 A waste is always waste regardless of its value</p>
	<p>Environmental Protection Act 1994 / Waste Reduction and Recycling Act 2011/ WRR Act 2011 Guideline: End of Waste A waste can be approved as a resource if the department considers that it meets specified quality criteria for its specific use</p> <p>Queensland's Waste Reduction and Recycling Strategy 2010–2020 A waste is always waste regardless of its value</p>
NT	<p>Environment Protection Regulations 2009 Under Part 2- Waste depot levy, landfilling 'waste fill' is exempted from depot levy.</p> <p>Environment Protection (Waste to Resources) Policy 2010 provides a mechanism by which a waste that meets specifications or standards published or approved in writing by the EPA will be considered a product (instead of a waste</p> <p>South Australia's Waste Strategy 2015-2020 A waste is always waste regardless of its value</p>
	<p>LGAT Waste and Resource Management Strategy 2017</p> <p>Environmental Management and Pollution Control (Waste Management) Regulations 2010 A waste is always waste regardless of its value</p>
Qld	<p>Environment Protection Act 1970 Version No. 172 A waste is always waste regardless of its value</p> <p>Environmental Protection Act 1986 A waste is always waste regardless of its value</p> <p>Waste Strategy 2030 Principle (5) Waste as Resource: WA will adopt and implement the waste the waste hierarchy, avoiding the generation of waste where possible, maximising the recovery of waste that is</p>
SA	
Tas	
Vic	
WA	

Objectives and Strategies

generated, and protecting the environment from the impacts of disposal. It recognises that some level of waste generation is unavoidable and so encourages a circular economy approach, where any waste that is generated is valued as a resource that can be reused or recycled for the benefit of the Western Australian economy

The results of the review of strategies and regulations shows that, aside from Qld, NSW and SA, other jurisdictions have largely not adopted the NPW 2018 notion (waste as a resource). In Qld, under the Waste Reduction and Recovery Act 2011 (Chapter 8), the End of Waste (EOW)²¹ framework is proposed to promote resource recovery opportunities and aims to shift the common perception from 'waste is always waste' to it being valued as a resource. Accordingly, in this state, waste ceases to be waste when, in accordance with the *end of waste code* or *end of waste approval*, it stops being waste and becomes a resource. This framework replaced the Beneficial Use Approval (BUA) framework to increase business opportunities for waste generators, waste processors and business receiving recovered material from within Qld. Furthermore, there is a discount for the residue waste levy fee; this encourages waste recycling throughout the state.

Although in other states the common perception is in favour of 'once waste is always waste', regulations are set in a way that exceptions are provided to encourage less waste disposal. In SA, disposal of 'waste fill' is exempted from the landfill levy program; the government also fixed the solid waste levy applicable to shedder floc (waste residue from metal recovery) disposal at \$62 (instead of standard rate of \$76 per tonne)²². This discount has made C&D waste recycling more cost-effective. In NSW, the definition of C&D waste excludes excavated soil that is to be used for levelling off the site prior to construction. In these states, regulations exempt certain waste (i.e. wastes that are recycled, re-used, recovered or processed) from the calculation of contribution. In Vic, waste generators are entitled to an annual rebate on the levy for waste that has been lawfully recycled, reprocessed or recovered. Likewise, NSW provides for rebates on recyclable materials that are lawfully removed from a licensed facility.

In WA, operators can apply for an exemption for recyclable materials²³. The Department receives occasional requests to 'approve' the use of these materials in certain circumstances. The former WA's Department of Environmental regulation developed a framework (end-of-waste: 2014-2016) to deal with the issues related to waste and resource. This framework consisted of several policies that would guide industry in relation to the decision-making process within this department in regards to waste and resource. However, this framework was suspended for review, as it did not provide legal certainty/defense for industry using waste-derived materials. The decision of Justice Beech in the Eclipse also weakened its position in the Department's decision-making process²⁴.

Currently, the prevalent approach in this state is more inclined towards considering waste from the point of view of the person who is the source/producer of the material and not the receiver of the material²⁴. Indeed, the fact that the receiver of the material considers it useful and economically does not mean that the material is not waste. Recently, an interesting factsheet was published by the WA's Department of Water and Environmental Regulation²⁵ (DWER) that provides further and promising information on how DWER proposes to assess whether material is waste when exercising its powers and performing its functions under the relevant legislation. The factors considered in this decision include 'the nature of the material', 'concept of unwanted', 'payment relating to the materials' and

²¹ Waste Reduction and Recycling Act. 2011.

²² Government of Australia. 2018. South Australia's Recycling Activity Survey 2016-2017 financial year report.

²³ Waste Reduction and Recycling (Waste Levy) and Other Legislation Amendment Bill 2018, Explanatory note, p. 9.

²⁴ WA Department of Water and Environmental Regulation. 2019. Waste not, want not: valuing waste as a resource: Issue paper.

²⁵ WA Department of Water and Environmental Regulation. 2017. Factsheet - Assessing whether material is waste. <https://www.der.wa.gov.au/images/documents/your-environment/waste/Factsheet-Assessing-waste.pdf>

‘sustainability transformed’. Under the ‘concept of unwanted’, it is noted that material wanted by its producer/source for use in some other project or for sale to another person is not considered to be waste. Payment is a factor that indicates whether a material being traded is a waste or not. According to this factor, if the producer of material pays a third party to receive it and dispose of it for them, this indicates that the producer does not want the material and it is waste. However, if material is sold by a producer to a third party, this will generally indicate that the material is a valuable commodity wanted by the producer for sale. The quality of transforming a waste into a product and the extent of the transformation or conversion is another consideration in this factsheet. It is stipulated that a mere intent to convert waste into a product or good is not sufficient.

The results of this review of relevant legislation shows that Australian jurisdictions need to collaborate with national organisations to reflect the concept of ‘waste is not always waste’ in their regulations. In this regard, waste strategy documents across Australia need to take a more active approach to promoting this concept within authorities, the waste and recycled industry, as well as the wider community.

5 WASTE RECYCLING RESIDUALS

Currently, under all jurisdictional regulations, the residuals of waste recycling facilities are considered as waste and thus the facility owners are liable to landfill levy. However, there are requests from the construction and waste recovery industries to change the fact that these residuals are still considered as waste in relevant regulations. Many believe that a levy on the disposal of recycling residuals reduces the competitiveness of materials sold into the international market. Furthermore, the disposal of residuals generally represents a significant cost for recycling facilities, which can obviously create commercial incentives to seek lower disposal cost options. It also justifies transport waste to interstate locations with a lower disposal rate.

6 WASTE DATA MANAGEMENT

Accurate C&D waste data collection and reporting underpin and inform the efforts and decisions aim to devise a consistent approach to defining and measuring C&D waste. Consistent and updated reporting can make it much easier to manage the C&D waste and resource market. According to ‘Strategy 14’ of National Waste Policy 2018 ‘Market Development and Research’, *‘all Australian governments and businesses generate and report information to support creating and maintaining markets for recycled materials, both domestically and internationally’*²⁶. Waste data is critical to well-targeted, evidence-based and planned waste projects and programs. Data on waste generation, landfill and resource recovery is also essential to the development and implementation of waste policies and programs. Up-to-date and consistent data is also required to understand the current state of waste and recycling. Historical data allows current performance to be plotted against prior performance and meaningful, achievable and realistic targets to be set. Historically, C&D waste data collection in Australia was found to be indicative rather than accurate and considered to be questionable in terms of transparency, comparability, accuracy, completeness, clarity and timeliness²⁷.

Waste data collection methods vary by jurisdiction and material type. In the NT and Tas, no waste data is collected and establishing a platform to collect the data remains a priority. In the ACT, there is no established method to collect data and improved data gathering capability has been recommended to facilitate effective management of waste²⁸ in the territory. Since 2017, with the commencement of a new Act²⁹, however, the ACT has made it a requirement for waste businesses to report their activities

²⁶ National Waste Policy. 2018. Less Waste. More Resources. In: GOVERNMENT, A. (ed.).

²⁷ Net Balance. 2009. National Waste Data System Requirements Study.

²⁸ ACT Government. 2018. Waste Feasibility Study Roadmap and Recommendations – Discussion Paper.

²⁹ Waste Management and Resource Recovery Act 2016 – ACT.

quarterly. In four other jurisdictions (NSW, Qld, SA and Vic), robust data systems serve to systematically collect and analyse waste data. The following table (Table 4) shows the waste data collection systems rolled out in these jurisdictions.

Table 4. Waste data systems in different jurisdictions

	Program	Function
NSW	Waste and Resource Reporting Portal (WARRP)	An online reporting tool designed to facilitate the submission of the Waste Contribution Monthly Report (WCMR). All licence holders of levy liable waste facilities) must submit the following reports to the NSW Environment Protection Authority (EPA): waste contribution monthly report, landfill facility information certificate (LFIC) and volumetric survey report. https://warrp.epa.nsw.gov.au/
Qld	The Queensland Waste Data System (QWDS)	A web-based system for operators to report on their waste data returns and the Annual Waste Survey. The system allows for the expanded capture of information about waste disposal and resource recovery. QWDS provides a streamline reporting system for private and local government waste managers—replacing spread sheets and third-party online survey sites previously used to collect data. In addition, QWDS provides all the functionality required to transition to the system—which allows for more robust online data collection and reporting. (https://www.Qld.gov.au/environment/pollution/management/waste/recovery/data-reports/qwds)
SA	Zero Waste Environment User System (ZEUS)	A web-based system developed by Green Industries SA to facilitate the monitoring, analysis and reporting of waste reduction targets in SA. ZEUS collects information on: recycling activity; waste (tonnes) to landfill by waste stream (MSW, C&I and C&D); litter; economic and environmental costs and benefit; infrastructure needs; and areas needing regulatory underpinning.
Vic	Waste Data Portal (WDP)	Waste Data Portal developed by Sustainability Victoria's to collect and store waste and recycling data from a number of sources and regularly produces state-wide waste, recycling and litter data reports. The portal aims to strengthen and standardise existing waste and resource recovery data in Victoria, introduce new data as necessary and improve collection and sharing of data in Victoria between state and local governments and industry. https://www.sustainability.Vic.gov.au/Government/Victorian-Waste-data-portal

The systems tabulated above have definitely had a positive impact towards achieving jurisdictional waste strategies. In 2016, EPA NSW provided a user guide³⁰ for their data management system (WARRP). This guide, through step-by-step navigational instructions, helps different stakeholders register and monitor data associated with waste management throughout the state. Particularly, landfill site owners and recycling facilities operators can use it for their obligatory waste data submissions. In Vic, one product of the WDP project is an interactive waste data map in which information is presented by year and material type for different regions of Victoria. The main data collection methods in Australia are annual survey (NSW, Vic and WA) and annual reporting (Qld and SA). The other discrepancy is the data collection mechanism that determines the obligatory or voluntary nature of data reporting. Local government waste data collection is voluntary in NSW, Vic and WA; it is obligatory in Qld and SA.

Despite the progress made in the field of waste data collection in some jurisdictions, the challenge of aggregation of individually collected waste continues to be the main concern at the national level. If properly merged, these systems will provide useful information that can lead to the development of a national approach in management of general waste as well as C&D waste. It would also assist Australia to measure its performance against other countries. As previously mentioned, there have been some unsuccessful efforts to form a national waste database under the Australian Waste Database (AWD) projects in the 1990s. This is a challenging task, as it requires standardisations in collecting, processing

³⁰NSW Waste and Resource Reporting Portal (WARRP) User Guide. 2016.

and reporting data methods in various jurisdictions. The other main issues were found to be costliness and difficulty of data collection activities, followed by inconsistent classification systems, data source incomprehensiveness and inability to separate waste streams, etc.³¹ However, in 2009, the Federal Department of Energy and Environment commenced the development of a national waste data system, which was later complemented with a 'method report' that describes what data would be collected and how it would be transformed. This work was furthered with a procedural document describing the whole process and a revised method was developed and agreed by all jurisdictions in 2015. The revised method included a Microsoft Excel tool that implements the agreed method. Despite these efforts, the national waste data system has not been launched, due to disapproval of the required budget; instead it was confined to the release of a biannual national waste data report.

7 RECOMMENDATIONS

7.1 State specific reforms

Following a review of the waste related legislative and non-legislative documents in eight jurisdictions of Australia, some reforms are suggested to address the inconsistencies between them regarding definition of waste and resource in the study waste management systems. While some of the reforms below are specifically recommended for one jurisdiction, there are some recommendations that apply to more than one jurisdiction.

These recommendations primarily emerge from the following sources:

- 1) Review of national jurisdictional legislations
- 2) Review of jurisdictional waste strategy documents and
- 3) Review of national and jurisdictional reports, consultation and review drafts, submissions to the Senate's Environmental Reference Committee

It is expected that these recommendations will be further informed by responses to a survey we have designed to capture various aspects of C&D waste management. Almost all of these recommendations can be incorporated in jurisdictional legislations and their benefits can be achieved when they are supported in primary legislation and subordinate regulations.

- 1) Amend waste definition to exclude clean fill and uncontaminated material to ensure continuous re-use and recycle of C&D waste in land rehabilitation projects in NSW;
- 2) Amend the licencing regime in relation to levies to exclude clean fill, uncontaminated materials and recycled C&D waste for reusing purposes, and exempt recycling facility operators who receive and accept waste for burial from paying levy fees in ACT, Qld, SA, Vic and WA;
- 3) Exclude activities that facilitate environmental rehabilitation and remediation from the requirement to obtain a licence in NT, NSW and Qld;
- 4) Introduce a uniform C&D waste definition in primary and secondary legislation in ACT, NT, Qld, SA, Tas and Vic;
- 5) Offer a discounted disposal levy rate for residual waste produced as a result of C&D waste recovery and recycling to make these practices more cost-effective for waste generators in ACT, NSW, Tas, Vic and WA;
- 6) Provide a clear process for determining licence requirements or exemptions based on environmental risk in NT;
- 7) Provide a legal definition for 'clean fill' and guidelines that determine the accepted level of contamination in ACT, NT and WA; and

³¹ Blue Environment. 2018. National Waste Report 2018, p.5.

- 8) Provide a legal definition for 'clean fill' and a guideline that determines the accepted level of contamination in ACT, NT and Vic.

7.2 Nationwide reforms

Similar to the reforms provided for each state, there are certain suggestions that can result in improved management of C&D waste nationally. These suggestions are based on previous reports, including submissions to the Senate's Standing Committee on Environment and Communications 2018 and a review of the regulatory framework in Australia. Due to their complex nature, these suggestions can only be implemented through coordinated decision-making processes supported by all states and territories. To achieve this, Environment Ministers at all levels of government should meet regularly to reach an agreement in principle.

- 1) Align the classification used for reporting purposes and landfilling activities to remove inconsistencies;
- 2) Provide consistency in resource exemptions and separation between 'source' and 'waste', to remove confusion in the definition of general waste and C&D waste provided by National Waste Policy 2018 on exemption of re-use of materials from being waste;
- 3) Provide uniform reporting of waste data to better aggregate and report waste data. The first step is for the Commonwealth government to implement the 65 agreed improvements to the National Waste Report as established by Blue Environment's *Improving national waste data and reporting report*;
- 4) Establish a robust and consistent national waste data management system that is obliged to improve assessment of outcomes of projects, policies, laws and business transactions in different jurisdictions; and
- 5) Provide consistent guidelines for waste auditing that are applicable throughout Australia.