Local Government and Landfill Futures

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ABSTRACT

Historically in Australia, disposal to landfill has been the dominant means for managing waste, however today there are a large range of measures in use that can be classified as disposal, recovery, reuse or avoidance measures. This project takes a purposefully broad perspective on managing waste and resources, in line with international best practice. That is, the system boundary includes the whole production and consumption value chain, rather than just post-consumption waste. The aim of this research was to undertake a detailed analysis of the role of landfills in Australia in relation to other waste mitigation approaches. The research uses issues identification, a situation analysis, a review of existing literature, policy mapping and participatory stakeholder engagement methods. Strategic analysis of these outcomes will yield a suite of potential policy options, which will be peer reviewed in a policy forum. This research seeks to provide support for improved decision making at the many levels of government who each have jurisdictions over waste. The project will also deliver potential policy options related to decision making processes themselves. Intervention points can occur at all stages of the production and consumption chain. Further, this project takes a futures perspective (i.e. by asking *how do we want to manage resources in, say 30 years?*), while acknowledging the inertia of the past and challenges associated with the current context (such as sunk costs associated with existing landfill infrastructure). Finally, the project considers the current and future roles and responsibilities of all stakeholders. Local government is a key stakeholder and policy actor in the area of waste management, and this paper focuses on the implications for local government of a more holistic approach to assessing waste management options.

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ABOUT THE AUTHORS: The Institute for Sustainable Futures (ISF **www.isf.uts.edu.au**) was established by the University of Technology, Sydney in 1996 to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protects and enhances the environment, human well-being and social equity. We seek to adopt an inter-disciplinary approach to our work and engage our partner organisations in a collaborative process that emphasises strategic decision-making. The research team for this project is comprised of Stuart White, Dana Cordell, Anna Gero, Damien Giurco, Jade Herriman, Leah Mason, Dustin Moore and Sally Asker.

CRC CARE: The Co-operative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) is a collaborative research and development body providing cutting edge technologies and knowledge in assessing, preventing and remediating contamination of soil, water and air. Established in 2005, CRC CRE represents a partnership between experts in science, industry and government, offering outcome-based solutions based on the best research and evidence available.

THIS PAPER

This paper is based on initial findings of the CRC CARE funded Landfill Futures project undertaken by the Institute for Sustainable Futures (ISF). This paper forms the speaking notes for a presentation to the ACELG researcher's forum held at UTS 15th December 2011. This paper is a 'working paper' which will be informed by subsequent stages of work; the ideas in the paper, and the research presented may be further developed over the remainder of the project. For this reason we direct readers to final project reports and peer reviewed article which are planned for publication in early 2012.

Introduction

The aim of this research is to undertake a detailed analysis of the role of landfills in Australia in relation to other waste mitigation approaches. The research uses issues identification, a situation analysis, a review of existing literature, policy mapping and participatory stakeholder engagement methods. Strategic analysis of these outcomes will yield a suite of potential policy options, which will be assisted by a peer reviewed policy forum.

This project takes a purposefully broad perspective on managing waste and resources, in line with international best practice. That is, the system boundary includes the whole production and consumption value chain, rather than just post-consumption waste. In this project, waste is defined as all waste that does or would otherwise be sent to landfills. This focuses on municipal solid waste (MSW), commercial and industrial (C&I) and construction and demolition (C&D) waste. In all jurisdictions in Australia, hazardous waste has specific disposal and treatment requirements and is governed by specific regulation, separate to that of general municipal waste, commercial and industrial and construction and demolition waste (EHPC, 2009). For this project hazardous waste is considered to the extent that it is an identified waste stream, and historically may have been disposed of at landfill. However hazardous waste and its specific disposal, treatment or mitigation requirements is not a focus of this research or report. Mining, agricultural and other rural wastes that are typically managed onsite or via other means than landfilling are excluded from the scope of this project. Liquid waste is also excluded, unless explicitly stated otherwise.

Historically in Australia, disposal to landfill has been the dominant means for managing waste, however today there are a large range of measures in use that can be classified as disposal, recovery, reuse or avoidance measures. Intervention points can occur at all stages of the production and consumption chain. Further, this project takes a futures perspective (i.e. by asking *how do we want to manage resources in, say 30 years?*), while acknowledging the inertia of the past and challenges associated with the current context (such as sunk costs associated with existing landfill infrastructure). Finally, the project considers the current and future roles and responsibilities of all stakeholders.

This research seeks to provide support for improved decision making at the many levels of government who each have jurisdictions over waste. The project will also deliver potential policy options related to decision making processes themselves.

Background – waste in Australia

Waste management in Australia is a complex and dynamic landscape, featuring a large and various group of stakeholders who are required to navigate a range of policies, regulations and legislative instruments from the national to the local level. Much has been written on the broader issues of waste management, for example, The National Waste Report 2010 (EPHC, 2010a), Hyder (2009), WCS (2008), Beyond Recycling (ISF, 2004).

Historically, landfill has been the preferred means of disposing of waste in Australia (WMAA, 2008; EPHC, 2010a). This has largely been justified on the basis that it has a low financial cost, has fewer impacts on urban amenity than incineration, and that there is no scarcity of land in Australia.

Currently landfills play a significant role in the management of waste within Australia – during 2006-07 around 48 per cent of Australia's waste was disposed to landfill (EPHC, 2010a). Australia currently disposes of an estimated 20 million tonnes of waste to around 655 landfills (EPHC, 2010a; see WMAA 2010 for state-by-state estimates; see also Cordell et al., 2011 for further discussion).

Perhaps most importantly, there is also broad recognition of the difficulties of managing increased waste generation using existing landfill systems. The historical, and in some cases, contemporary view that "there is no lack of land to fill" is increasingly challenged by more recent developments in the social and physical landscape. These developments include:

- Increasing population coupled with increasing consumption per head of population leads to rapidly filling landfills. This view is supported by waste strategy commentary and interviews, for example one interview respondent stated: *"[I am] not convinced that the volume of waste going to landfill is going to decline, due to greater population growth."*
- Increasing proximity of settlements to landfills coupled with an increasing understanding of the social, economic and environmental impacts of landfill as a waste management technology led to a difficulty in creating new landfills near large population centres. This too is supported by waste strategy commentary and interviews, for example: *"Hallam Road is established since 1997 – change over time has been huge. Tens of thousands of new neighbours within 1km radius. No protection of buffers – not in Planning or Environmental Protection Acts."*

Individual state and territory jurisdictions are the primary administrators of waste and resource recovery. It is their role to establish and manage policies and legislation, with local government having the primary responsibility for delivering services to the residential community, and in some cases commercial enterprises as well (WME, 2011). Both local government organisations and private companies own and run waste infrastructure and provide waste collection and transport services.

Research objectives

There is an extensive body of literature on the direct (or 'tangible') costs and particular technological challenges of minimising local landfill impacts on the environment – specifically through containment of contamination and then remediation. The Commonwealth Government's current *National Waste Policy* (EPHC, 2009) aims to avoid the generation of waste, reduce the amount of waste (including hazardous waste) for disposal, manage waste as a resource, ensure that waste treatment, disposal, recovery and re-use are undertaken in a safe, scientific and environmentally sound manner, and contribute to the reduction in greenhouse gas emissions, energy conservation and production, water efficiency and the productivity of the land.

However, along with other researchers (e.g. RPM et al*,* 2001), we believe that the full sustainability costs and challenges of waste management and mitigation (from disposal through to avoidance and resource recovery options) would benefit from further analysis and research. There is also an absence of a high-level integrated framework or tool to support decision-making on sustainable waste mitigation strategies.

As part of this research project, the current sustainability challenges have been reviewed, as well as the emerging trends in sustainability frameworks for waste management, the technologies and systems for resource recovery and disposal, waste policies at state and federal level, stakeholder views on the future of waste and sustainable initiatives for managing waste as a resource.

The project also sets up an argument for why an 'integrated resource planning' framework approach is useful for waste management and mitigation in Australia. Such a framework would allow for improved decision-making and policy development, by enabling a robust economic comparison of policy options for waste mitigation, taking into account sustainability aspects.

Methodology

As outlined in Figure 1 the research has been conducted over a series of stages, and is currently in a process of revising initial findings based on outcomes of a stakeholder workshop.

The initial stages of work resulted in a series of internal working papers:

- Interview report
- Costing working paper
- Policy working paper
- IRP working paper
- Workshop report

The workshop will be followed by final synthesis, overarching review and feedback, and final reports and peer reviewed papers.

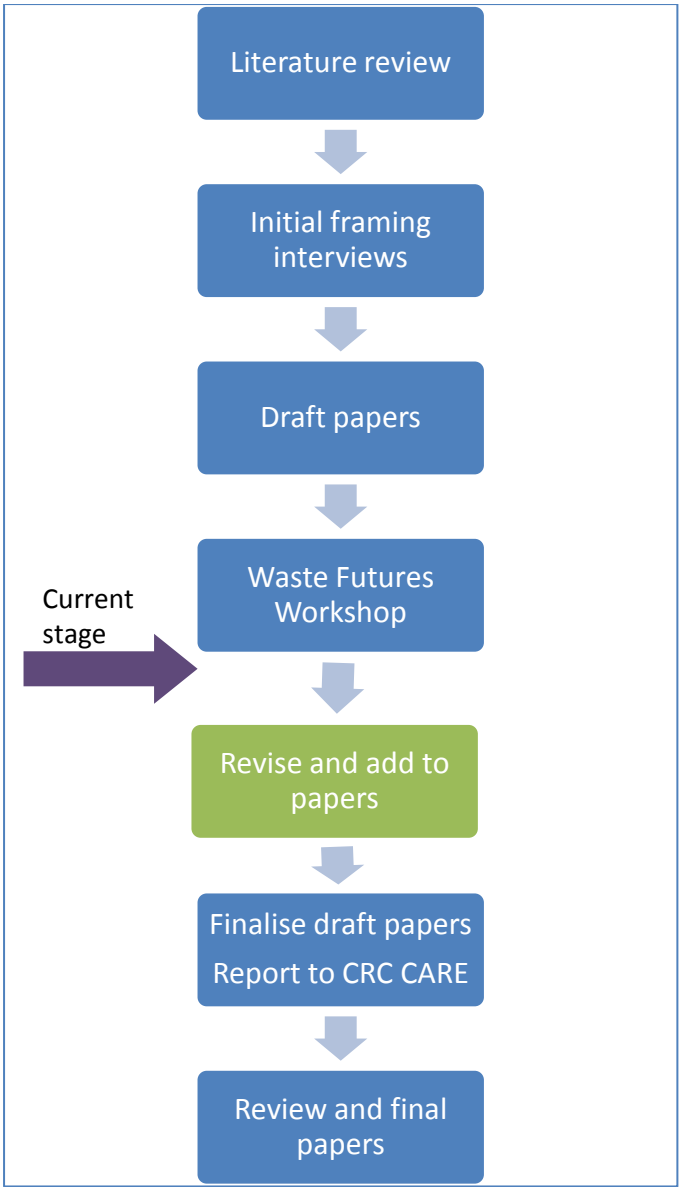

Figure 1 – project stages

Workshop objectives, design and findings

The following section outlines in some detail the design and objectives of the stakeholder workshop, as the most recently completed project stage.

The project team designed the workshop 'conversation' such that it incorporated both 'blue sky' and pragmatic thinking whilst incorporating futures research. Futures research presents exciting opportunities for understanding and addressing environmental, social, political and technological challenges: these techniques allow us to anticipate trends, identify desirable futures and respond appropriately. Importantly however, the value of futures approaches in addressing complex challenges such as waste lies solely in the ability to turn the outcomes of these processes into decision and action.

The team's conversation design included 3 key conversation prompt presentations and 3 group activities to assist in steering the discussion along a logical and coherent path to one focused on the future vision of waste management in Australia. The importance of active participation to allow for robust discussion was acknowledged and taken into account in the design of workshop activities.

Participants targeted came from a range of sectors relating to various aspects of waste management. Furthermore, participant's geographic focus varied, with some having a national focus, while others were more state-based or regional focused. A breakdown of participants is provided below.

- Industry: 11 participants (focus on alternate waste technology (AWT), landfill, consulting, biohazards and general consulting)
- Government: 4 participants (focus on waste reform, policy and planning)
- Research: 1 participant
- It is worth noting that most participants hold additional positions, across peak waste groups, affiliations or government advisory in addition to their main place of work.

The geographic focus of participants included:

- National focus: 6
- New South Wales: 7
- Queensland: 2
- Victoria: 1

Speakers for the day to act as prompts for plenary conversation were selected based on internal team discussions and discussion with the Project Reference Group (PRG) as well as input from key people in the waste industry in Australia and New Zealand. The aim was to include conversation prompt speakers from a range of strategic backgrounds in line with the research interests, and with varying experience across the waste sector, both thematically and geographically. It was also the intention that the speakers raise conversation that is directly relevant to the research underway - being able to widen and contribute to its breadth.

As well as broad futures focused speakers and activities, the afternoon sessions were focused more closely on some key themes of relevance to earlier research within the project, which participants were briefed on through background reading material. Guiding questions for discussion included:

Futures Roundtable topic A: • Could **Integrated Resource Planning (IRP)** be a useful tool in the waste sector? • And if so, what would be needed to make it work?
Futures Roundtable topic B: • How do we design and obtain **appropriate costing and pricing** to reach desired change for the future?
Futures Roundtable topic C: • How do the **relationships between different levels of government** affect decision-making with respect to waste?
Futures Roundtable topic D: • How do we **engage stakeholders and the broader community in waste decision making**?

Highlighting some initial findings

This section highlights a small number of the key initial findings from each stage of the work to date. It is not intended to present the key conclusions of the research – which is still in synthesis mode – but a few of the 'threads' of themes which have been considered at various stages of the research.

- *Some positive recent changes*

The workshop revealed that, in the face of a rapidly changing policy and technical environment, leaders in this field are able to identify a range of recent **'high points'** in the field – from the introduction of waste levies in Queensland to changes in how organics and food waste is being treated nationally. Many of these recent changes affect local government as waste service providers.

- *Waste avoidance and its role in policy*

Almost all state and territory waste strategies are framed within the waste hierarchy with avoidance at the top, mirroring the National Waste Policy and aligning to COAG's 1992 National Strategy for Ecologically Sustainable Development. The ACT is limiting its aspirations to 'reducing' waste (DECCEW, 2010). Despite this, there is very little commentary on the role of reduced consumption in achieving this policy objective.

Several interview respondents noted this as an issue, for example: *"[I] would like to see more attention to sustainable production and consumption. [Taking a] harder look at EU, OECD, the way these issues are tackled. Look at the different scales – get a handle on what our footprint is like. And developing policies in that space*."

- *Involving the community*

All state and territory strategies are also in agreement that not enough is being done to educate members of the public about waste management. This is also supported by findings from the stakeholder interviews. Several respondents noted that there has been some progress towards public awareness of their overall responsibility and accountability relating to waste management and mitigation – *"[There is a] greater level of awareness from the community who are making greater demands to have more environmentally friendly services."* However many respondents also note the significant need to go further and the difficulties of doing so: *"In a confused communications environment where you are bombarded with different messages all the time and they are changing – there is difficulty in getting a core message through which is meaningful."*

- *Various costs of waste disposal and waste recovery*

All state and territory waste strategies also recognise that waste disposal and waste recovery have financial, environmental and social costs. Victoria's Zero Waste Strategy was backed by a benefit-cost analysis (see Allen Consulting Group, 2003), however other states do not appear to be attempting to gain a robust understanding of the full costs associated with waste management and mitigation. While interview respondents were limited in their responses to a question on the social costs of landfill, more comprehensive responses were given on financial and environmental costs, with the former being given the most attention by the majority of respondents (see Gero et al., 2011).

Most state and territory waste strategies and interview respondents point to the relatively low cost of landfill as another impediment to the development of alternative waste management and mitigation options. As noted by an industry representative: "*The [landfill] levy will keep going up at least for the next 3–4 years but it will still be too cheap. This will go to about $110/tonne but still [it will be] too cheap. It needs to be about $180/tonne to incentivise alternatives*." The implication of this is that the cost of landfill will continue to be adjusted to facilitate the development of alternatives, however as noted by an interview respondent, levies do not always

achieve the desired results: *"The levy is in place but it is not achieving what it sets out to do. Therefore it could be argued it's just a revenue raiser as its not encouraging an alternative to landfill – there is no foreseeable plan to come up with an alternative."* As highlighted in the companion report on sustainability costs (Cordell et al., 2011), this may be in part due to the failure to factor intangible costs into pricing.

Waste industry and government stakeholders who participated in the workshop are interested in costing and pricing, as well as funding waste options. People spoke about aspiring to a future for waste and waste management that has strong national leadership and adequate **funding.** There were a range of views about the degree of hypothecation of waste levies – that is, how waste revenue from levies tied to waste disposal at landfills are collected and used – whether for general spending, or specifically in waste avoidance/ reduction activities.

- *Interest in exploring whether IRP can be applied effectively to waste*

Integrated Resources Planning has an established and successful record of use, originally in the US energy sector in the 1970s and in more recent years in also in the Australian water and energy sectors. Its strength is in evaluating new supply options and demand management options on a consistent basis. Integrated resources planning follows a cycle of planning, analysis, developing and selecting options based on least cost and sustainability criteria, then implementing a portfolio of waste minimisation (demand reduction) and management (e.g. increasing landfill supply) options to achieve supply-demand balance and then monitoring and evaluation as part of an adaptive management philosophy. Integrated resources planning can also be linked to deliberative processes for agreeing on goals and generating and selecting options, to assist with reconciling trade-offs and planning under uncertainty.

Workshop participants responded positively to the general idea of applying an integrated resources planning framework to waste mitigation and resource management. They were interested in the potential IRP to 'bring avoidance/changes in consumption etc. options to the table for the first time', and the opportunity to consider options over a long period of time – both supply and demand options on one page. Group members agreed on the potential of IRP as a future tool for the waste sector. However there was concern over where the opportunities are to engage with stakeholders and how to sell 'costless' or cost negative initiatives to treasury. Participants commented that 'IRP appears to act as a springboard up into avoidance and reuse issues, where the traditional waste hierarchy doesn't work for dealing with 'supply and demand''.

- *Possible information gaps*

Our review of existing waste policy at federal and state government suggests a strong challenge for addressing fragmentation in the waste system can be seen in the observed differences in **knowledge, expertise, and infrastructure constraints** for innovation in waste management across states and territories. The discussions of the relative merits of landfill, waste-to-energy technologies and composting technologies for alternative waste management are taking place in a rapidly changing technical environment, often with **limited independent guidance**. This is particularly clear with respect to local government, who must continue managing a steadily growing waste burden while responding to community expectations about public health standards and key environmental issues.

Stakeholders who participated in the workshop are also concerned about the inconsistencies in waste data, standards and definitions across Australia's jurisdictions. For example, they are in agreement that **data availability** is a key concern for Australia – data at all levels of government is

either poor, not publically available or not being used for decision making. There may be fears by some levels of government about comparative data being used to rank performance across jurisdictions.

Conclusions

As mentioned above, this research is still in progress. However, to date, this research observes that Australian cities and towns face significant challenges to mitigate and manage growing waste production from an increasing, ever-consuming populace. To tackle these challenges, the waste industry – together with stakeholders across the production consumption chain – must adopt new supply and demand strategies to reduce waste generation, improve waste management, and protect our environment – all in a transparent and cost-effective manner.

This research also challenges the effectiveness of the objectives and targets, set by state and territory governments, without detailed implementation plans informed by consideration of the real costs in involved in the day-to-day management of waste. It observes that the economic and financial constraints on local government are not always well represented in the objectives and target setting of state government policy.

The research has identified and continues to explore the need for **decision making frameworks** that can adequately assess different waste mitigation and management options against agreed objectives, in specific contexts. As the costs and impacts for all forms of waste disposal and mitigation become better understood, the costs and objectives of waste policy will need to be better integrated.

The industry also needs to better understand community expectations regarding levels of service, manage the risks entailed in more sophisticated waste management/mitigation systems, minimise greenhouse gas emissions, and develop the expertise required to achieve sustainability across the waste, energy and land-use planning nexus.

Good-quality, robust and relevant information is needed to help the sector make decisions concerning these emerging challenges. Effective waste management and mitigation planning in Australia requires the collation and analysis of strategic data and a long term view to inform an adaptive decision making process, as well as acknowledge the constraints of the past. Importantly, waste reduction and waste management infrastructure must be considered together, as sister-strategies to meeting the goal of managing material flows in sustainable settlements.

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GLOSSARY OF SOME KEY TERMS[1]

Actual costs	costs directly incurred by the waste management or mitigation project
Avoidance / waste avoidance	waste avoidance (also known as waste minimisation) is aimed at reducing the production of waste through education and improved production process rather than aiming to increase technology to improve treatment of waste – it is focused on maximising the efficiency of resource use
Avoided costs	the cost of the business as usual waste management alternative that is avoided by the proposed waste management initiative
Composting	the biological decomposition of organic materials such as leaves, grass clippings, brush, and food waste into a soil amendment – composting is a form of recycling
Construction and demolition waste	materials in the waste stream which arise from construction, refurbishment or demolition activities
Disposal	removal and containment of waste for public health and amenity benefits; despite a move towards the recovery of resources from waste, disposal is still the most common final destination for many types of waste, including municipal waste; two main categories of disposal are burial (landfilling) or burning (incineration); the line between disposal and resource recovery is sometimes blurred by the fact that both landfills and incinerators can be established or modified to enable at least the recovery of energy (and potentially the recovery of materials)
Instrument / policy instrument	economic, communicative, structural or regulatory interventions made to work towards a stated goal or desired outcome
Intangible costs	costs that are not readily calculated or quantified relating to a waste management or mitigation measure
Integrated Resource Planning	a strategy that addresses the entire production life-cycle (beyond post-consumption), includes all key stakeholders, all sustainability costs and benefits, material flows, and other key sustainability aspects of waste and resource management
Landfill	a site used for disposal of solid material (i.e. is spadeable) by burial in the ground that is licensed as a landfill under the relevant environment regulation of the jurisdiction
Measure	waste management/mitigation measures include specific resource recovery, avoidance, AWT technologies and initiatives suitable to meet strategic objectives
Municipal solid waste	is made up of: • household domestic waste that is set aside for kerbside collection or delivered by the householder directly to the waste facility; • other types of domestic waste (e.g. domestic clean-up, furniture and residential garden waste); • local council generated waste (e.g. waste from street sweeping, litter bins and parks); or, • commercial waste generated from food preparation premises, supermarkets etc. (DEC WA, 2009)
Option	option is a combination of a particular measure and instrument (as defined above)

[1] Please note that these are general definitions which are broadly consistent across various sectors and jurisdictions, but that in relation to classifications and definitions of types of waste, language varies considerable across the states and territories of Australia. See Martin (2011) for details. Interpretation of these terms also varies considerably amongst people working in the sector, as will be discussed further in Gero et al (2011).

Post-generation waste / post-consumption waste	any product which has served its intended use by a business or a consumer, which has been disposed
Post-manufacture waste	waste that is created by a manufacturing process
Production and consumption system	the physical, social and economic system/s which produce goods and services for human use and purchase; the associated social and economic factors which affect the demand, use and disposal of these goods (and services)
Putrescible	component of the waste stream likely to become putrid; liable to decay – food and garden waste from various sources
Recycling	using waste as material to manufacture a new product – recycling involves altering the physical form of an object or material and making a new object from the altered material
Reuse	recovering value from a discarded item without reprocessing or remanufacture; that is, using an object or material again, either for its original purpose or for a similar purpose, without significantly altering the physical form of the object or material – reuse includes selling/buying, donating, or exchanging used items
Tangible costs	a quantifiable cost related to waste management and mitigation measures
The project	refers to the CRC CARE funded project 'Landfill Futures' of which this paper draws on
Treatment	physical, chemical or biological processing of a waste for disposal or reuse
Waste	may mean one or more of the following: • any substance that is discarded, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment; • any discarded, rejected, unwanted, surplus or abandoned substance; • objects or materials for which no use or reuse is intended; • any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, reprocessing, recovery, or purification by a separate operation from that which produced the substance; and/or, • any substance described in Environmental regulations as waste In this project, waste is defined as all waste that does or would otherwise be sent to landfills. This focuses on MSW, C&I and C&D waste. Hazardous waste is included to the extent that it relates to landfill as a disposal option. Mining, agricultural and other rural wastes that are typically managed onsite or via other means than landfilling are excluded from the scope of this project. Liquid waste is also excluded, unless explicitly stated otherwise.
Waste hierarchy	an ordered list of approaches to deal with municipal solid waste (MSW), which ranks the options according to their environmental acceptability, with waste reduction the most preferred, and landfill disposal the least preferred
Waste management and mitigation	for the purpose of this report, 'waste management and mitigation' refers to the suite of all measures or options to better treat, recycle, minimise or avoid waste