Attachment 1 to Item 4.5.2.

Hawkesbury Landfill Management Strategy (Beyond 2026)

Date of meeting: 12 March 2024
Location: Council Chambers
Time: 6:30 p.m.

SMEC

Member of the Surbana Jurong Group

SMEC INTERNAL REF. 30019111

Final Report

Hawkesbury Landfill Management Strategy (Beyond 2026)

Prepared for: Hawkesbury City Council
09 November 2023

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Executive Summary

The Waste Management Facility on the Driftway is pivotal to the waste management and resource recovery in the Hawkesbury. Previously planned for landfill closure in 2026. This report, a synthesis of SMEC's analyses on Planning, Collection, Resource Recovery, and Landfill Options, along with a Multi-Criteria Analysis, advises the Council on post-2026 landfill, waste management and resource recovery options for the Waste Management Facility.

The report brings together the information gathered through the analysis conducted by SMEC and presented in the Tech Memos investigating

- Land-Use Planning (approvals and controls),
- Garbage Collections,
- Resource Recovery; and
- Landfill Options

This information is brought together with the results of a Multi-Criteria Analysis with the results presented in a decision tree and advice given on the interactions of different decisions.

Based on the site's existing conditions and approvals in addition to the disposal options in the Greater Sydney metropolitan area, SMEC recommends expanding the landfill to the north part of Lot 192 where the existing landfill sits. This could provide between 145,000 to 700,000 m^3 of additional airspace, extending the use of this site potentially for several additional years if not more than a decade.

This expansion should be partnered with the development of various resource recovery activities which are recommended in this document with varying levels of priority (Dirty MRF, Repair-Reuse shop, Scrap Metal Recovery, Micro factories, etc.).

If Hawkesbury City Council (HCC) is not able to proceed with the expansion of the landfill to the north, they should construct a transfer station for the transport of kerbside and self-haul waste to alternative waste facilities.

HCC is currently partnering with Western Sydney University and Sydney Water, investigating the potential for a local FOGO processing facility at Sydney Water's Richmond location through the Circular Economy Hub. Assuming this partnership for the processing of FOGO goes ahead, the focus for HCC should be on promoting other resource recovery activities to improve the council recovery of other waste streams that could also add value to the nearby LGAs which will encourage them to bring additional tonnages to this site and improve the financials of each resource recovery initiative eventually built.

In the longer term Council should also seek to expand the landfill west onto Lot 32.

Expanding the landfill in combination with resource recovery will provide the site with decades more life with a local centre for waste management and resource recovery centre providing benefits to the local community and economy, a local centre for disaster waste management and increase opportunities to partner with neighbouring local governments.

These options will preclude the sale of the Driftway properties under the current regulatory conditions as they will serve as a buffer between waste management activities and the local community. The potential sale of these properties was considered but was not supported due to the loss of amenities to the community and increased costs of transport if the site were to close and allow the sale.

1. Introduction

This report provides a summary of previous deliverables and provides final recommendations to Hawkesbury City Council (HCC) for its Landfill Management Strategy (Beyond 2026). The report is informed by an investigation into the impacts and options regarding site planning, landfill expansion options, collections management and resource recovery. In addition, SMEC has conducted a multi-criteria analysis (MCA) to examine some of the major options available to HCC and the impact on overall operations to seek options that are:

- Affordable
- Sustainable
- Efficient

SMEC recommendations address future strategic issues as well as further investigations to inform future decisions through the lens of the HCC Community Strategic Plan 2022-2042 and 2032 Waste and Resource Recovery Strategy.

2. Tech Memos

For this project, SMEC produced four tech memos. While not exhaustive, these tech memos detailed investigations into the possible actions and impacts on the management of the site. The tech memos covered the following topics:

- Planning Considerations
- Resource Recovery Options
- Collection Services
- Landfill Options.

It should be noted that the introduction of a food organics, garden organics (FOGO) service was not directly investigated as this is being investigated separately from these works.

The key outcomes identified in the tech memos are summarised below.

2.1 Tech Memo 01 – Planning

The Waste Management Facility (WMF) is located within the Hawkesbury Local Government Area (LGA) north of The Driftway and on land formally identified as Lot 194 DP823986 and Lot 192 DP729625 (the Site). The Site is bounded by Blacktown Road to its northeast and the Royal Australian Air Force (RAAF) Richmond airbase is located approximately 3km north of the Site. The Western Sydney University's Hawkesbury campus is located west of the Site on land identified as Lot 181 DP39768.

The Site is zoned SP1 Waste Management Facility in accordance with Hawkesbury Local Environmental Plan 2012 (HLEP 2012). It is understood that HCC owns seven Lots south of the Driftway, which are subject to a Planning Proposal in September 2020 to reclassify the use from 'community' land to 'operational' land and provide a 250m buffer between the Facility and the surrounding dwellings. It is noted that these lots are located within the Penrith LGA and are zoned RU4 Primary Production Small Lots in accordance with Penrith Local Environment Plan 2010 (PLEP 2010). As the Site is located within proximity to the RAAF Richmond airbase, a review of height controls was undertaken noting that the HELP 2012 does not specify building height for this area.

A request for information was submitted in June 2023 to the RAAF base including flight paths and no response was received and this should be managed as a risk going forward with any future Development Approval (DA).

The Planning Tech Memo investigated the following three (3) options:

2.1.1 Option 1: Landfill and/or Facilities Expansion

This option included expansion both within the current landfill footprint (to the north of actual cells 1 & 2) and expansion to the West on Lot 32 DP1270808. It identified the following actions/requirements that need to be addressed in order to allow for the expansion of the landfill:

- Northern Expansion
  - Confirm flooding impacts
- Western Expansion
  - Further assessment detailing the impacts of any proposed development to biodiversity on and surrounding Lot 32 DP1270808.
  - Confirm flooding impacts
  - EIS required to expand onto Lot 32 DP1270808
  - Designated Development approval required
  - Considered Regionally Significant Development
    - Under this assessment would need to confirm possible height restrictions due to the vicinity of RAAF Richmond
  - Amended Environmental Protection Licence (EPL).
- Other Development on Site
  - Confirm flooding impacts

In addition, it was identified that there may be limitations on the height of the landfill due to constraints stemming from the nearby RAAF Richmond base. SMEC did make enquiries with the Australian Defence Force (ADF) to confirm whether there were any restrictions but did not receive a response.

It was identified that there may be a potential for a Native Title Claim on LOT 32. HCC has sought advice on this separately and has advised that should it wish to purchase this lot it will likely trigger native title obligations. HCC also received advice that indicated that the purchase of the current landfill site would not trigger any native title claims.

This option would preclude the sale of the Driftway properties.

2.1.2 Option 2: Additional uses of the facility

It was determined that there were no significant barriers to additional uses of the facility but that assessments for contamination, consideration of the risk of gas accumulation, geotechnical assessment and confirmation that future works do not compromise environmental controls would be required.

This option would preclude the sale of the Driftway properties.

2.1.3 Option 3: Facility Closure

This option was considered with the understanding of what would be required in order to sell the HCC owned Driftway properties. As per clause 7.28(3) of the PLEP 2010, development of the HCC owned sites would not be possible if the Site continues to operate as a waste management facility. Closure of the facility would need to be in accordance with the closure and rehabilitation plan outlined in the Hawkesbury City Waste Management Facility Landfill Environmental Management Plan and include the cessation of all waste management activities including the operation of any community recycling facilities.

If this were to be followed, then the Driftway proprieties could be sold once all conditions of the closure and rehabilitation plan are met.

It would however require Council to seek an alternate location for the WMF operations and a transfer station for the consolidation and transport of waste collection services.

2.2 Tech Memo 02 – Resource Recovery

This summary provides an overview of key drivers, options, and risks related to the waste management project in HCC.

2.2.1 Key Drivers

The waste management project in HCC is influenced by several local and regional targets:

- **National Waste Policy Action Plan 2019:** This federal government plan guides Australia's waste management efforts to 2030, emphasizing waste reduction and sustainability.
- **NSW Waste and Sustainable Materials Strategy 2041:** The state government's strategy aims to transition NSW to a circular economy by reducing waste, emissions, and environmental harm.
- **Western Sydney Regional Waste and Sustainable Material Strategy:** This regional strategy focuses on avoiding and reducing waste, resource recovery, protecting the region from waste pollution, and fostering strategic collaboration.
- **Hawkesbury City Council Community Strategic Plan 2022-2042:** Local Strategy to focus on the community values and focusing on maintaining the values of the community.
- **HCC 2032 Waste and Resource Recovery Strategy:** The local strategy outlining the strategic plan for reducing waste.

Population and Housing Growth: HCC is experiencing growth in population and housing, with projected increases over the next few years. This growth has implications for waste management services.

2.2.2 Targets and Opportunities for Recovery

A key strategic driver of the Federal Government's *National Waste Policy Action Plan* 2019[1] is the target of 80% diversion of waste from landfill by 2030. This is an ambitious goal that will be difficult to meet without the use of Energy from Waste initiatives.

Beyond being a strategic goal, increasing recovery and reducing overall residual waste will also have the impact of increasing overall landfill lifespan. Reducing residual waste being disposed in The Driftway landfill gives HCC flexibility to consider other options such as partnering with other councils in the area to provide a regional disposal location and spread the capital costs of the landfill over more customers or a greater period of time.

To achieve diversion targets, HCC will need to target individual waste streams. HCC already divert many materials within the self-hauled waste disposed at the WMF and imposes charges for material going to landfill in order to discourage disposal. Some further gains could be achieved in this area however the greatest opportunity for increased recovery is through the current kerbside collection.

These waste streams could be captured in three ways:

1. Separated Kerbside Service
    - This entails services like Green Organics (GO) or Food Organics Garden Organics (FOGO). A comprehensive FOGO program could divert 60-70% of current general waste by weight from the current general waste stream.
2. Recovery from Kerbside Collection Service (Dirty MRF)
    - This would target the material that remains in the general waste collection bin, recovering items that residents continue to put in this service when other options for recovery are not available. This would be achieved through the construction of a Dirty MRF or similar facility.
3. Additional On-site Recovery Services
    - Other waste/recycling streams could benefit from local facilities at the Site to encourage a circular economy that promotes local reprocessing, reuse and repair of items such as clothing, e-waste, tools, furniture and other bulky items that can be saved from entering the recovery and/or landfill stream.

Table 1 shows the top 13 items that HCC could target in their current landfill stream and their potential recovery rates. Realising these recovery rates will be required to achieve the 80% target recovery rate, however additional recovery will still be required.

[1] National Waste Policy Action Plan, accessed 12 May 2023, https://www.dcceew.gov.au/environment/protection/waste/publications/national-waste-policy-action-plan

Table 1: List of top 13 target material categories

Waste stream	Operation	Current source-separated feedstock (tpa)	Available to recover from landfill (tpa)	% Recovery if all available material is recovered
Co-mingled recycling	Collected by JJR, improve through improved service operation	4,836	2,285	11%
Cardboard (including above)	Received at WMF and another 1000tpa left in kerbside bin	293	1,074	2%
Green Organics WMF incl untreated timber	Self-hauled green waste, mulched at WMF	761	261	2%
Kerbside FOGO is available in general waste (including untreated timber)	Collected GO and future FOGO are to be processed at the Circular economy hub	5,272	7,886	21%
Clothing/Textiles	Repair, reuse or EfW	6	978	2%
Soft plastics (kerbside)	Send to a larger facility	0	403	1%
Solar panels	Regional facility could be feasible (landfill ban?)	TBC	TBC	0%
Mattresses (cost per mattress)	Dismantle/shredding	54 (~1,500 mattresses)[1]	TBC	0%
Reuse bins (items returned to tip shop)	Free to put into reuse shed	19	2267	4%
E-waste including other E-waste appliances	Placed in cages for collection (no repair or reuse)	Not Available	331	1%
C&D (bricks, concrete, wood, tyres, plasterboard etc)	Open air (dump on the ground)	100	522	1%
Treated, contaminated timber	Collected by a facility nearby that accepts treated timber	157	351	1%
Scrap metal	Placed on the ground, no further sorting of metals	1,578	261	3%
Total		13,076	16,619	46%

[1]Assuming that one mattress weighs an average of 35kg.

The Treemap shown in Figure 1 is derived from the data in Table 1 and shows the potential relative impact of each recovery stream/method in removing waste from landfill. While not directly investigated in this report FOGO recovery through kerbside collection has the potential to have the greatest impact. Following that increasing on-site recovery through additional services, education and other incentives would provide some additional benefit in increasing recovery through a Dirty MRF.

All of these options can be considered in isolation, but it should be noted that the greatest total improvement will be achieved as more separation options are implemented. The strongest link here is with the removal of FOGO from the waste stream which will improve the quality of the general waste (MSW) and will enable a Dirty MRF to become more viable due to reduced costs and increased recovery of items such as cardboard that would otherwise be overly contaminated by FO.

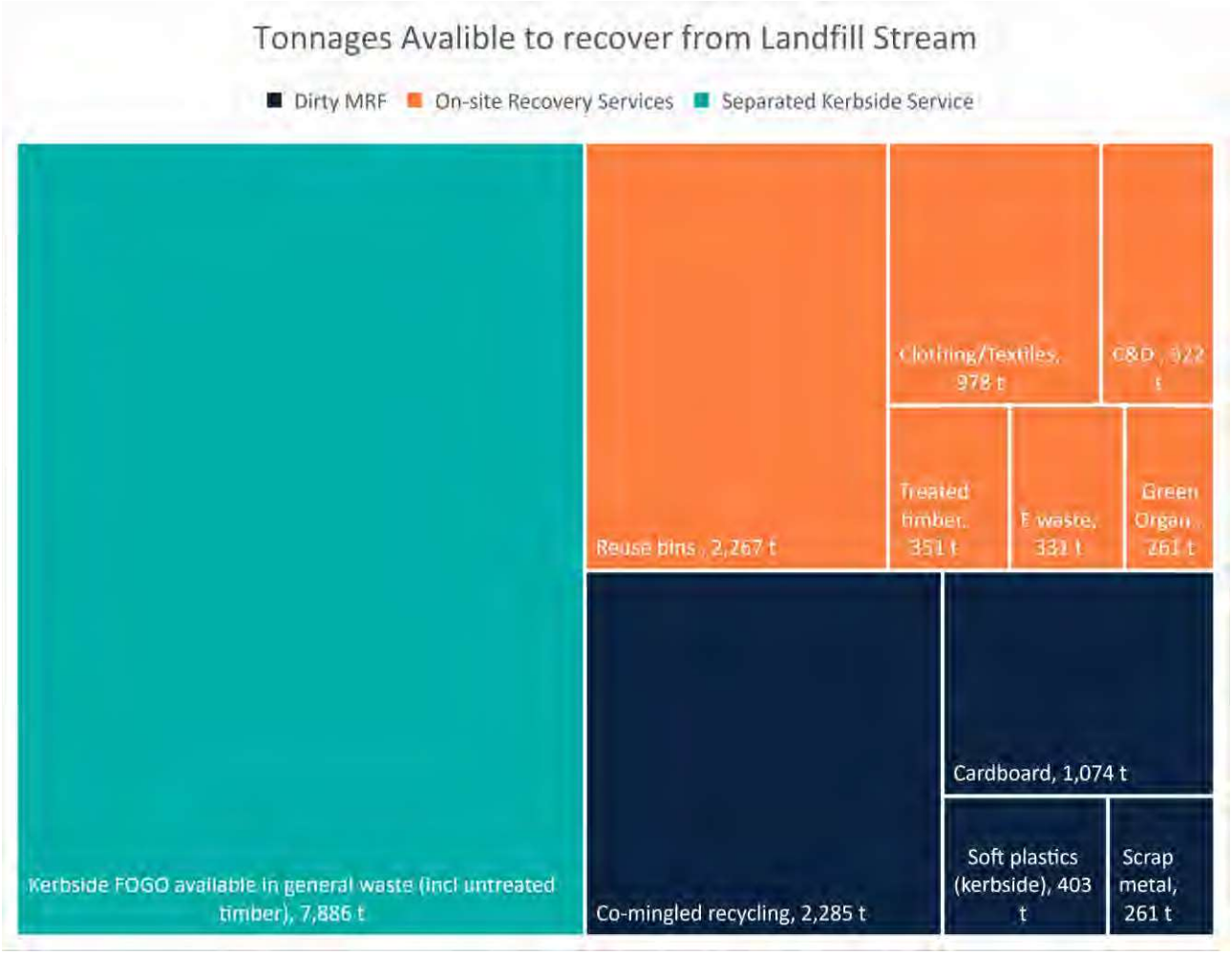

Figure 1: Treemap showing relative recovery.

2.2.2.1 Potential auxiliary facilities for waste management:

In discussion with HCC and in investigating potential recovery options, the below auxiliary facilities were identified:

- **Dirty MRF**: A dirty MRF provides further extraction of recyclable materials from the landfill stream prior to the waste entering the Waste transfer station/landfill. Recyclables include plastics, scrap metal and steel/aluminium. The successful diversion could avoid the landfill levy and other charges. The facility requires significant space and processing at the site, around 2000 – 3000 m^2 of land area. This facility can benefit from the implementation of FOGO collection services within HCC and nearby LGAs, by delivering their "organic's depleted" MSW to this facility at a convenient gate fee.
- **Repair and reuse centre:** A new building of resources drop-off centre for common household wastes that cannot be collected via council kerbside waste and recycling collection services. Hence to facilitate community initiatives, and social enterprises for reuse and repair and to encourage a circular economy. The facility may require 200 – 500 m^2 of land size.
- **Further Scrap metal sorting:** This option could be included in the repair and reuse centre for better scrap metal sorting and increasing its recycling opportunity, but also can be considered for improvement metal sorting by type of material to be applied to the bulk metals being currently delivered to the site by residents.
- **Micro-Factory:** This small-scale manufacturing facility can be tailor-made for HCC and targets problematic waste streams, such as textiles, plastics, glass and E-waste, considering taking waste from surrounding councils to create a circular economy for specific waste. The facility size may vary between 300 and 2500 m^2 depending on the targeted waste streams.
- **Start-Up Space:** This could be used by HCC to provide initial support to waste and recovery start-ups to test the market and process allowing them to target problem wastes or find local recycling solutions. Once established

businesses should be encouraged to move to separate facilities. The area for this could range in size and should be incorporated as additional space in other facilities such as Reuse Centre, Micro-Factorie, Transfer Station or MRF. This option could significantly benefit from the Star-Up hub created by Western Sydney University which has implemented similar recycling activities in NSW.

The following two items may provide benefits but require further investigation:

- **Solar farm 1MW:** A Solar farm could be a sustainable solution to repurpose a closed landfill for renewable energy generation. Comparatively, solar farms on closed landfills tend to be smaller than other utility-scale solar projects, but they can still produce significant amounts of renewable energy. Excess electricity generated by the solar farm can be fed back into the grid and sold to the utility company. The footprint for a 1 MW solar farm is around 2 – 3.5 ha of land size. Size and approach are pending where the landfill expansion will occur.

The suitability of these facilities varies, with some being more favourable for specific waste streams or goals. Costs are preliminary and indicative, with detailed costing, size, scope, and infrastructure considerations needed for further assessment.

2.2.3 Recommendations

The Resource Recovery Tech Memo made the following recommendations:

- Further Assessment: Conduct detailed assessments, including cost-benefit analyses, feasibility studies, and infrastructure requirements, for each auxiliary facility.
- Auxiliary facilities for waste management:
  - Facilities classified as highly suitable (repair and reuse centre with scrap mental sorting and micro facility) should proceed unless there is a major issue/concern raised in the final analysis.
  - A dirty MRF is considered suitable and worth consideration but will require further investigation. The Dirty MRF option was identified as potentially working well in conjunction with either the landfill or transfer station and so was considered as part of the MCA in part due to the additional community benefits.
  - A solar farm was considered possibly suitable, but it would require further investigation considering size, demand and cost to install and maintain. As this is a fast-developing area it will require further investigation closer to potential time of installation.
  - Other items that were considered possibly suitable included:
    - C&D reprocessing open air
    - Onsite Cardboard and paper reprocessing
    - Landfill gas capture
    - L-bin or push-pit
- Collaboration: Explore opportunities for collaboration with surrounding councils, especially for facilities like the Waste Transfer Station and Dirty MRF.
- Circular Economy: Emphasise initiatives that promote a circular economy, such as repair and reuse centres and micro facilities.
- Resource Recovery: Prioritise resource recovery streams identified in the top 13 priority list to meet diversion rate targets.
- Energy from Waste: Consider the feasibility of an EfW facility to achieve higher diversion rates, especially if 80% is the target.
- Continuous Monitoring: Regularly monitor progress towards targets and adjust strategies accordingly.

In summary, HCC faces the challenge of managing waste in line with local and regional targets while accommodating population and housing growth. To meet these challenges, a combination of resource recovery streams, auxiliary facilities, and strategic planning is necessary.

2.3 Tech Memo 03 – Collection Services

This Tech Memo investigated the current operations and costs associated with the collection of the MSW kerbside collection service (Red Bin). It found that overall, the service was efficiently run providing a service at a competitive rate the current fleet is capable of absorbing additional services for a further 2000 households. Growth greater than that would require an increase in the collection fleet.

- It was found that the current collection services fleet would not be able to cope with the closure of the Site without a transfer station due to the significant distance to the nearest waste disposal location. This is due to the significant increase in travel time to an alternative disposal location leading to a large increase in fleet requirements and costs, noting that the additional travel time potentially not being compliant with National Heavy Vehicle Legislation (NHVL).
- Given this assessment, it is recommended that a bulk haulage transfer station be constructed at the current site if a decision is made to close the current landfill.
- Achieving higher resource recovery rates, (e.g., by rolling out a FOGO collection service) could reduce the volume of red-lid bin waste and therefore enable collection vehicles to collect more bins per load. There are more service collections and combinations that could be considered (such as providing a larger 360 L bin for co-mingled recycling and undertaking a rear lift collection) to improve resource separation at the source.
- Future collection options assessed included in-house collections and outsourced collections. Transport options to an alternative disposal location such as direct travel or bulk haulage were assessed. The advantages and disadvantages of the options were discussed in the tech memo.

2.4 Tech Memo 04 - Landfill

During the investigation of the landfill options, it was identified there are opportunities to extend the landfill life beyond 2026. This conclusion was reached based on the following information:

1. Previously filled landfill cells, especially Cells 1 and 2, have remaining airspace when compared to the current LEMP 2021 proposed capping height. Even though the current landfill cells have been filled beyond their expected closure date (2022 when cell 6 was expected to start operations), the difference between the existing levels and the final cap design presents close to 90,000 m^3 of additional air space.
2. Previous Development Applications for an extended landfill, covering areas considerably larger than the currently approved landfill footprint have been approved in the past. i.e., Stage 1 for landfill operation in the original DA 253/87.
3. It may be possible for further landfilling to be undertaken in this current landfill area by following updated waste management guidelines,
4. Since the development of the previous LEMP in 2001, many putrescible landfills in the Sydney area have closed, leaving only one currently operating in the metropolitan region (Cleanaway's Lucas Height Landfill) that receives MSW (putrescible waste). This landfill scarcity, combined with a negative regulatory position towards alternative waste disposal technologies (Energy from Waste, MSW composting into MWOO), encourages the maximum use of existing landfill assets in the greater Sydney area.
5. Disposal costs for MSW will continue to increase within diminishing air space in the region. Extending the life of the existing landfill makes financial sense and secures HCC a disposal solution for the short to medium term.

Following its assessment, SMEC developed two possible options with conservative and aggressive approaches for each option.

2.4.1 Option 1: Landfill North Expansion

This area has been previously used to dispose of material excavated from currently operating cells, but also for the landfilling of waste in areas not precisely defined. This area is elevated above flood levels and appears suitable for any proposed future landfill expansion.

Figure 2: Proposed North Landfill expansion.

To complete this work the following items were identified and impact the Northern Expansion:

- Permit Requirements
  - Current landfill permits consider the construction and operation of landfill cells for the existing cells (1 to 5) and future Cell 6 The most recent Environmental Protection Licence (EPL) indicates that landfilling in cells 1-4 must cease by June 30th, 2021. Any future expansion will require new authorisation to build and operate new cells. Considering that the north area has been "intervened" in the past, and the fact that DA 253/87 has approved the use of the north area for landfill purposes (formerly known as Stage 1), the aspects that require a DA revision are:
    - Re-assessment of the north area to overcome proposed LEMP 2021 in order to revert to original DA 253/87 so landfill operations in the north section can be performed.
    - Re-opening of closed cells 1, 2 and part of 4 to improve air space usage and reach maximum defined height for existing and future cell operations.
    - Define a new capping strategy and height as the new broader landfill area will encompass a bigger volume and footprint, as well as potentially additional height.
- Waste Exhumation
  - When the first LEMP was presented in 2001, there was the expectancy that the northern area would be used exclusively for the stockpiling of excavated material from cell construction activities (presented in Fig.2). However, there is clear evidence that waste has been landfilled in this area, including asbestos contaminated soil. Two approaches can be followed for removing waste from this area:
    i. The floor could be raised (to avoid cutting into the floor) to achieve a suitable sub-base for a landfill cell. This option would reduce available airspace for landfill purposes and may require significant fill material to achieve the required levels.
    ii. Grading the floor by cutting into the floor and performing a *waste exhumation*. In NSW, this activity requires approval from the NSW EPA.

- Stormwater and Leachate Management
  - The landfill expansion will need to redefine the location of the stormwater management infrastructure considering that the existing water storage pond is located north of Cell 1, where the expansion of landfill cells will be developed.
  - Leachate management infrastructure will need to be re-assessed as the current and proposed leachate infrastructure is remote from the proposed expansion area.

2.4.2 Option 2: Landfill West Expansion

In addition to the above expanding the landfill to the West will require HCC to gain access to the land on their current Western boundary. Lot 32 currently is zoned as SP1 Education Agriculture under the Hawkesbury Local Environmental Plan 2012. Waste management facilities and waste disposal facilities are not considered ancillary use for the current zoning, which means that a Planning Proposal for rezoning (to SP1 Waste Management Facility, or similar) would be required.

Should rezoning be obtained, an Environmental Impact Study and a Development Application will have to be submitted.

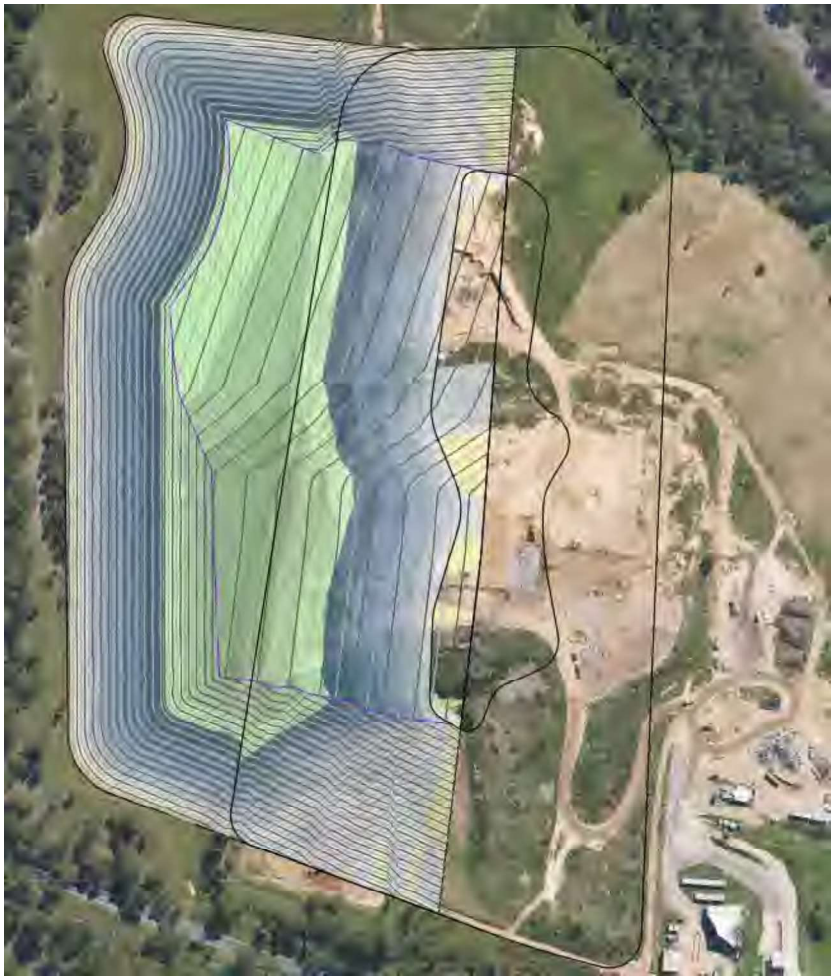

Figure 3: Potential Landfill West Expansion

2.4.3 Landfill Recommendation

The recommendations made from the Landfill Tech Memo were that HCC should further investigate options to expand the landfill both to the north and west of the current landfill. This would provide HCC with increased utility and additional airspace dependent on the approach taken as listed below:

- Possible Additional Airspace for Northern Expansion

  - 145,000 m^3 to 700,000 m^3
- Possible Additional Airspace for Western Expansion
  - 550,000 m^3 to 800,000 m^3

Since the original Tech Memo was produced SMECs current recommendation is to expand the landfill to the North with further investigations to be carried out into expanding to the West.

3. Multi-Criteria Analysis

3.1 MCA Criteria

The Criteria were broken into two areas of Focus:

1. Council Criteria – The factors mainly concerned with the operations of HCC.
2. Community Criteria – The factors mainly concerned with the impact of changes on the community services, harms and benefits.

3.1.1 HCC Criteria

3.1.1.1 Risk

This criterion addressed the risks associated with the options including implementation and technological maturity. The scoring of the criteria was informed by the draft HCC Enterprise Risk Framework and reproduced in part below.

This assessment did not address WHS risks, nor environmental impact as this is addressed elsewhere or will be further investigated as part of the implementation of a selected option. This assessment does consider the financial, reputational, compliance, operations and service delivery risks.

3.1.1.2 Financial Impacts

This criterion addresses the costs of the option. This includes avoided costs such as reducing waste levy payments from increased diversion of waste from landfill. The comparison between the options was weighted between the costs and qualitative assessment including:

- Long-term financial risk
- Limitations
- Funding opportunities
- Long-term value to HCC.

3.1.2 Community Criteria

These criteria were based on HCC's Community Strategic Plan 2022-2042. Under this plan the community vision is

> We see the Hawkesbury as a vibrant and collaborative community living in harmony with our history and environment, whilst valuing our diversity, striving for innovation, a strong economy and retaining our lifestyle and identity.

3.1.2.1 Benefits and Strategic Alignment

This section examined how well each option contributed to the benefits sought by HCC to benefit the community and its contribution to achieving the HCC strategic targets. Key additional documents that were measured against are:

- HCC Waste Strategy

- HCC Net Zero Strategy
- WSROC Waste Strategy
- HCC Social Infrastructure Strategy
- HCC Property Strategy

The score for each option considered how the proposed option aligns with the above strategies.

3.1.2.2 Service and Social Benefit

These criteria examine the impact of the option on the level of service may provide to the community and the overall social benefit. Broadly speaking, this is an assessment of "what the community" gets out of the service and options that better provide for community needs scored higher.

Specific items that this section considered are:

- Community accessibility to waste services (appropriate service levels)
- Access to support during disasters waste recovery etc
- What are the community benefits such as jobs, ability to repair etc?
- Ability to manage waste and support the community in times of disaster and disaster recovery.

3.1.2.3 Environmental Considerations

These criteria were selected to enable examination of how well an option contributes to a circular economy, increases resource recovery, environmental protection and reduced greenhouse gases (GHG). For environmental considerations, these criteria were considered holistically with both negative and positive impacts. The scoring of factors that provide ongoing benefits were considered more beneficial than factors that provide "one-off" or short-term benefits.

3.1.2.4 Economic Impact

This criterion considered the overall economic impact on the community with regard to the flow of money and jobs within the community. Options scored higher if they provided more jobs to the local community, including surrounding council areas. This economic impact includes reduced waste levy payments which is a direct economic drain on the community.

Also considered within this criterion is the ability of HCC to support local industry or businesses through the provision of land to support recycling or circular economy activities etc.

3.2 Options

A total of four options were considered for the MCA. It should be noted that these options were not mutually exclusive, and most could be done in conjunction with the other options. The exception to this was Option 1 which was the closure of the Site and ceasing all waste activities at this location. It was put forward as the baseline scenario of what may occur if no changes to the current strategy are made.

3.2.1 Option 1: No Change (Landfill Closes in 2026 – No Transfer Station Constructed)

No changes are carried out on the HCC landfill, and it will close as predicted in 2026. HCC is then required to transport waste to the nearest disposal location. It is assumed that collections will continue with HCC staff and will transport waste to the nearest disposal location without the use of a transfer station. The additional transport distance to the disposal location will restrict the fleet to one collection per day and will cause a doubling of costs associated with staff and fleet.

3.2.2 Option 2: Landfill Expansion

Expansion of the existing landfill to increase airspace.

The area to the North has been previously used to dispose of material excavated from current operating cells and some asbestos has been disposed of in the area. The area is elevated above flood levels and appears suitable for future landfill expansion.

The area to the West is currently designated for educational purposes but may be suitable as a landfill location greatly increasing the available landfill area.

3.2.3 Option 3: Increase Resource Recovery – Dirty MRF

This option examined the possible impact of an increased resource recovery in the form of a Dirty MRF. The option was considered in combination with both the on-site landfill and a transfer station.

Overall, a conservative estimate of 10% of material could be diverted from landfill. This estimate is based primarily on the ferrous metal component of the waste which is the easiest to recover and on-sell. In 2023-24 FY the NSW waste Levy is $163.20/t. Redirecting waste from landfill through a dirty MRF would save approximately $359k in levy payments per year. In the case where the current landfill closes, and waste will need to be transported to an alternative disposal location, there would be a further transportation saving of $242k per year (based on estimated transport costs of $110/t).

It should also be noted a Dirty MRF would be more efficient in the recovery of recyclables if organic materials are removed from the waste stream, which will also improve the quality of the recycled material. Although this organic removal would reduce the volume being received at the Dirty MRF, this available capacity could be used to capture additional tonnages from nearby councils; this would additionally improve the financial aspects of this recovery option.

3.2.4 Option 4: Construct a Transfer Station

In the event that the local landfill is closed, HCC will be required to build a transfer station to haul waste material efficiently to the nearest waste disposal facility. The capacity requirements for the transfer station could vary depending on the removal of FOGO from the general waste stream and if HCC chooses to open up the facility for use by the surrounding Council Areas. Doing so could act as a source of revenue for HCC.

3.3 MCA Recommendations

The MCA results indicate that Option 3: Increase Resource Recovery – Dirty MRF, provides the best-ranked option. It offers substantial benefits such as reduced landfill levy payments, increased material recovery, and reduced GHG emissions. However, it carries moderate risks and requires further investigation. It is also less viable when paired only with a transfer station rather than a landfill located on-site.

Option 2: Landfill Expansion ranks second in overall score, providing control over waste strategy and potential economic benefits when paired with Option 3. Overall, it was also the most financially viable and would be the easiest and quickest to implement.

Based on the MCA findings, the following recommendations are provided:

- Option 3 (Dirty MRF): Further investigate and develop a detailed plan for the implementation of the Dirty MRF, considering its substantial benefits.
- Option 2 (Landfill Expansion): Consider the expansion of the existing landfill in conjunction with Option 3 to maximize waste management control and potential economic benefits.
- Option 4 (Transfer Station): Explore the construction of a transfer station in coordination with other waste management options, providing flexibility and additional benefits.
- Option 1 (No Change): Avoid pursuing this option due to increased operational costs and limited benefits.

4. Decision Tree

HCC has several decisions to make to develop its WMF strategy. The following section seeks to present these decisions as a series of decisions, consequences and outcomes, while also outlining the interactions and opportunities in further detail.

The final decisions are guided by:

- HCC Community Outcome 2: Protected Environment and Valued History Long-Term Objectives:
  - 2.3 Encourage and enable our community to embrace the waste management principles of reduce, reuse and recycle,
  - 2.4 Encourage tan enable our community to make more sustainable choices.
- 2032 Waste and Resource Recovery Strategy Themes

Figure 4: HCC 2032 Waste and Resource Recovery Strategy: Key Themes

Throughout the process of developing these decision trees, it was clear that HCC cannot reach its strategic goals without considering a combination of the options investigated in this report. Through a combination of the three primary options investigated, there is an opportunity to develop an integrated solution delivering greater benefit to the Council overall.

4.1 Business as Usual

Throughout the project, SMEC considered a Business as Usual (BAU) option including during the MCA. It was found that this option was not viable. Continuing on the current path would see the Landfill close with no clear alternative in place. This would force the Council to shut the community disposal facilities at site as there would not be a viable way to transport self-haul waste to an alternate location.

The collection fleet would need to be doubled and there would be significantly higher costs associated with transporting material via collection truck to any alternate disposal location. This would also expose the council and council workers to increased risk with more hours on the road and produce more GHG.

This option then reduces community facilities, increases costs above other alternatives, increases GHG production and increases the risk of a road accident.

4.2 Increased Resource Recovery

Increased resource recovery was identified as a high-value outcome in the tech memos and through the MCA which specifically considered a Dirty MRF. In addition to the Dirty MRF, there are also options for separated kerbside collection and additional services to collect and potentially reprocess material. These options are detailed further below including the considerations and decisions that need to be made.

4.2.1 Dirty MRF

The implementation of a Dirty MRF or similar Resource Recovery activities was assessed as the most desirable option in the MCA. It provided additional benefits when paired with a local landfill. This was due to the strong support of Community outcomes and the achievement of the Council, State and National Waste targets and strategies.

This report only carried out some initial analysis of the options and there are more detailed investigations required to confirm that this is a viable option that should be supported as well as the exact form that this should take.

The greatest benefits identified were:

- Potential to increase the landfill life by 10% or more.
- Economic Returns to the Community
- Support of strategic goals and targets
- Potential to support expanded facilities to cater for the wider area including other councils.
- Potential to capture new tonnages from nearby councils, improving the site's revenue.
- The ability to better manage waste during times of disaster.

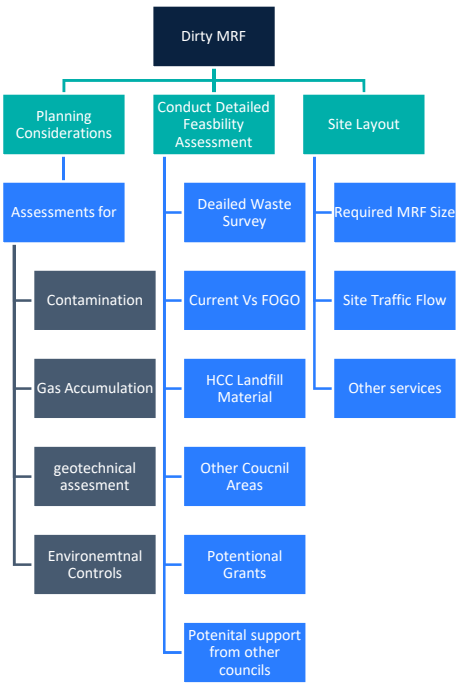

Figure 5: Dirty MRF Considerations

In competing this planning, consideration should be given to the future uses of the site including the possible eventual need to place a Transfer Station on the site following closure of the landfill or to complement other services such as FOGO or Waste to Energy within the larger region.

As outlined in Figure 5: Dirty MRF Considerations, several investigations and decisions are required in order to implement this service. The critical Investigation in support of the feasibility of this option is a detailed Waste Survey which examines the makeup of the kerbside bins and how it changes throughout the year. The analysis of these results should also inform the likely future trends in waste to ensure that any changes do not adversely impact any purchased or constructed facility. Examples of this would include the introduction of a FOGO service and changes in packaging standards.

The implementation of the Dirty MRF on the site would also preclude the sale of the Driftway properties under the current site conditions.

4.2.2 Other Resource Recovery Options

Outside of the HCC kerbside collection service, there is also significant room to increase on-site recovery through other Resource Recovery Options. Some of these options were investigated in the Resource Recovery Tech Memo.

Planning requirements for these options would be similar to those for the Dirty MRF mainly consisting of assessments of contamination., gas accumulation and potential impacts on neighbouring properties. These options however are generally smaller in scale than a Dirty MRF and so as individual opportunities present cost-effective methods for increasing recovery.

Similar to Dirty MRF a key component of developing options is identifying target materials which while less essential, would benefit from a more detailed analysis of the waste stream. Overall though these options are generally lower risk and can start smaller mainly using the infrastructure already onsite or using minimal temporary facilities and grow if there is actual demand.

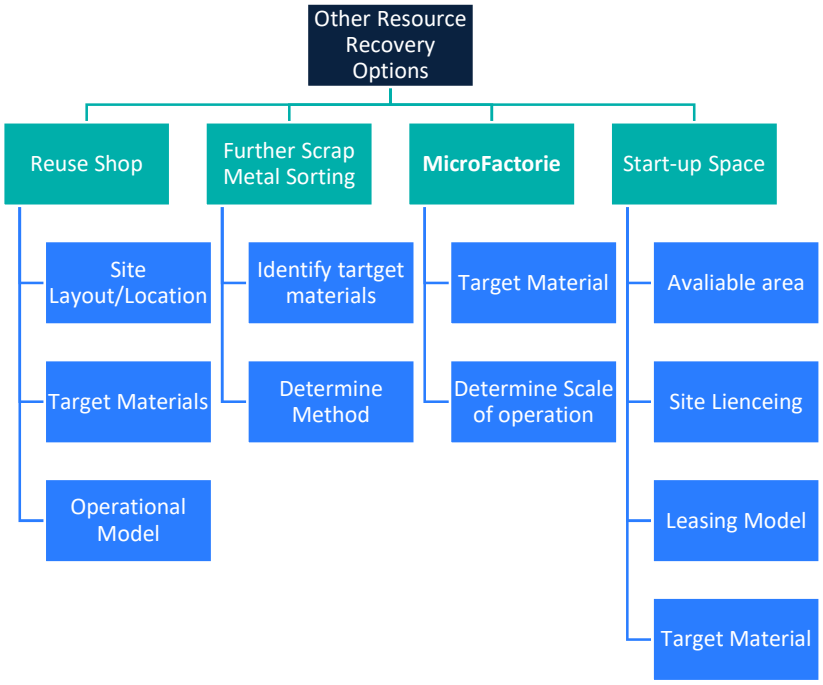

Figure 6: Other Resource Recovery Considerations

4.2.3 Interactions with Other Decision Trees

The primary way resource recovery options interact with the other options is through the reduction of waste to landfill. In the case of expanding the landfill, this will lead to airspace savings, lengthen the total landfill life and potentially increase in overall density of the material. For the Alternative waste disposal locations increased resource

recovery will lead to transport savings, both in reduced overall volume and weight but also potentially through increased compaction. The increased compaction results as removing more material will result in a more uniform material which usually leads to greater compaction. This is shown at a high level in Figure 7: Resource Recovery Decision Tree

There are also potential benefits to be realised through the introduction of a FOGO service. Not only would this significantly reduce the costs of landfill or transport, but it will also change the makeup of material going to a Dirty MRF and present new opportunities. For example, there may be an opportunity to recover smaller fraction sizes or target different materials. This may also make it viable to have refuse-derived fuel (RDF) as an output subject to EfW facilities' location and requirements.

It should also be noted that the introduction of a Dirty MRF could present the Council with an opportunity to partner with surrounding local governments. This would increase recovery across the region and may provide HCC with an alternative revenue stream to offset the costs of running a facility.

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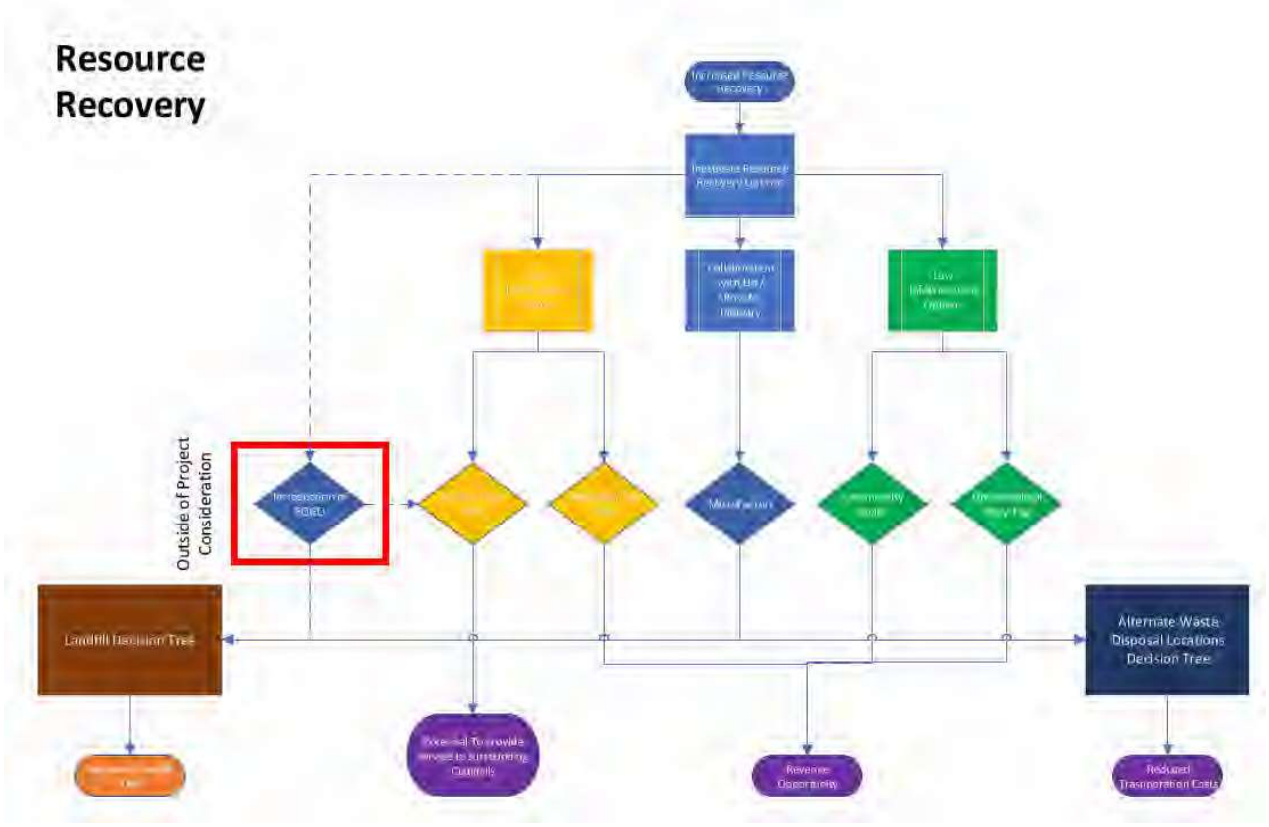

Figure 7: Resource Recovery Decision Tree[2]

[2] Larger version of the decision tree can be seen in Appendix A

4.2.4 Key Decisions

While this report identified that a Dirty MRF and other recycling facilities will be required to meet HCC strategic goals how this is to be implemented and their overall feasibility need to be further investigated.

1. Dirty MRF
    a. Decide to undertake a detailed feasibility assessment for a Dirty MRF
    b. Subject to recommendations in feasibility assessment, decide whether to develop a Dirty MRF
        i. Target Materials
        ii. Partnerships or Customer Relationships with other Councils
        iii. Facility Capacity
        iv. Location within the site
2. Other Resource Recovery Options
    a. Decide on whether to introduce a Re-use Shop.
    b. Decide methods to increase the sorting/separation of metals.
    c. Decide on whether micro-factory options are suitable for HCC.
    d. Decide on whether to allocate a start-up “space”.

4.3 Landfill Expansion

This was identified as the second most desirable option under the MCA. It is more time-sensitive than the more desirable option of establishing a Dirty MRF and it should be noted that the best use of the Dirty MRF also relies on the use of a local landfill.

4.3.1 Interactions with other Decision Trees

The landfill options interact with the Resource recovery options and the alternate waste disposal location options in two different ways.

For Resource Recovery, the interaction is to drive down the volume of waste going to landfill and change in material makeup of material going to landfill. This is expected to have two outcomes:

1. Increased landfill life due to reduced volumes
2. More uniform material leading to operational efficiencies.

The flow-on effects of this could be the spreading of capital costs over a longer time frame and increased capacity could allow HCC to partner with other LGAs in order to provide a more local disposal option. This could also act as a source of revenue for HCC.

In the case of the alternate waste disposal locations, as shown in Figure 8: Landfill Decision Tree the interaction here is to provide a solution if the expansion of the landfill cannot occur. As such it is the backup alternative to landfill options.

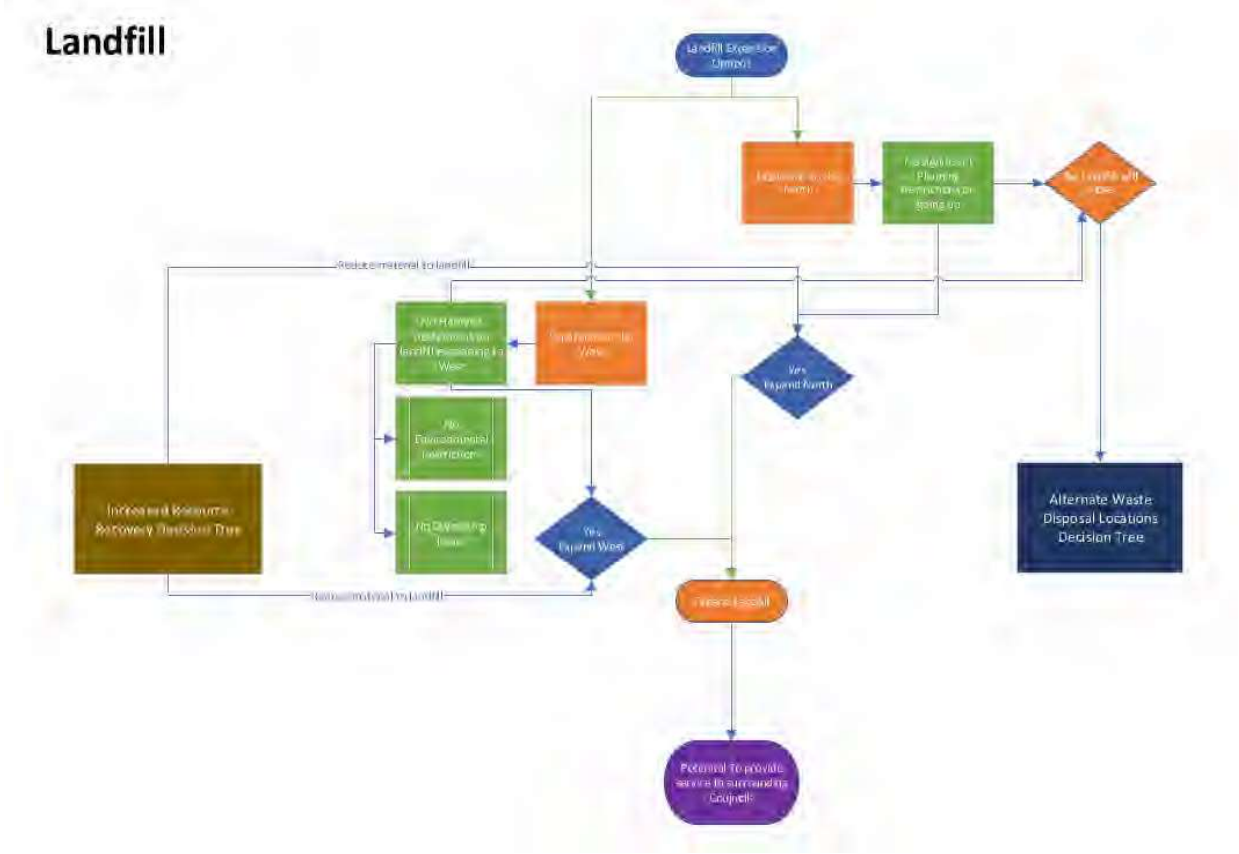

Figure 8: Landfill Decision Tree[3]

[3] Larger version of the decision tree can be seen in Appendix A

4.3.2 Key Decisions

1. Decide to expand the landfill to the North.
    a. Stop landfill capping works.
    b. Decide on the future extent of landfill footprint.
2. Expand the Landfill to the West
    a. Decide on the future extent of landfill footprint.
    b. Decide on preferred land ownership arrangements.

4.4 Build Transfer Station

This could result if planning approvals for the landfill expansion are not given or following EIS other prohibitive environmental constraints are found. Constructing a transfer station was identified as preferable to a direct haul of waste in the MCA. However, this should be confirmed once decisions on location, total haul length and site layout are considered to confirm this as the preferable option.

This is the preferred option when considering alternative disposal locations due to comparative costs and increased risks of using collection trucks to self-haul to a location. This may be more efficiently completed by a contractor however initial investigations suggest that the current council-run service is highly competitive with rates that would be charged by contracted collection services.

The transfer station option does provide additional benefits in the form of community amenity as it will keep the self-haul options available for use, provides an opportunity to work with or partner with other surrounding councils and may support future recovery options such as FOGO and WtE.

The primary obstacle to this option and its major drawback is the significant capital required for its construction.

4.4.1 Interactions with other Decision Trees

This option is a more complex decision tree as it also includes considerations around contracting out collection services as well as any bulked-up haulage service. During this project, SMEC looked into the efficiencies of the council-run collection service and found that it was cost-competitive with what the Council would get from a contractor. The service also had sufficient capacity to grow with the City in the short term. On reviewing the capability of transporting waste directly to an alternative waste facility with collection trucks, SMEC's investigation suggested this was not viable and that the better option was the construction of a transfer station.

The primary interaction with other Decision trees is with the landfill decision tree as it is only on closing the landfill that the building of a transfer station becomes a viable consideration. Without this option, there is little current need for a transfer station.

As mentioned in earlier sections interactions with the Resource Recovery Options would be to reduce the volume of material that would need to be transported leading to savings in transportation, waste disposal and waste levy costs.

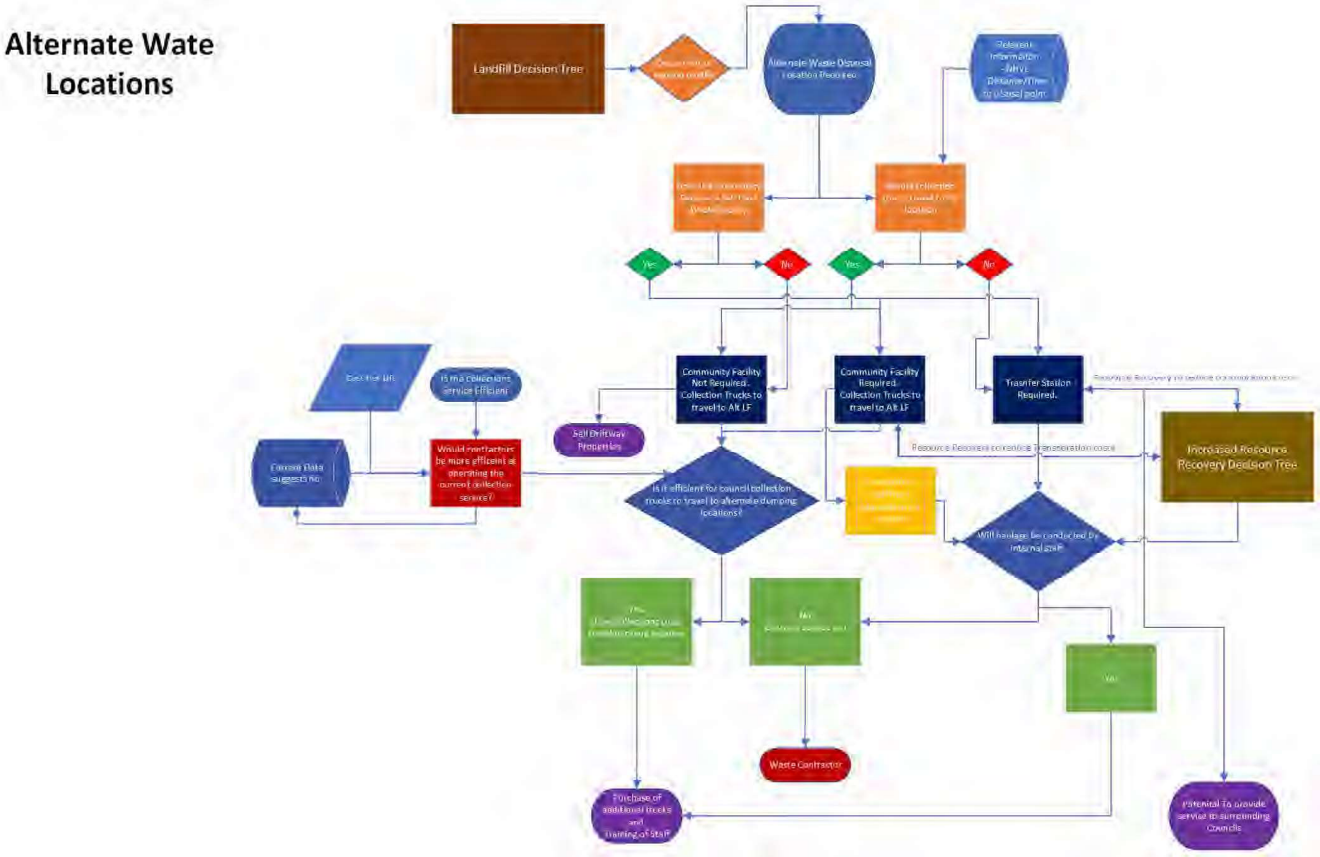

Figure 9: Alternate Waste Disposal Locations[4]

[4] Larger version of the decision tree can be seen in Appendix A

4.4.2 Key Decisions

1. Subject to a decision regarding landfill expansion, decide when and where to build a transfer station.

4.5 Key Assumptions

Key Assumptions that will impact the decisions taken by HCC:

- Shared use arrangements (establish a regional resource recovery hub/transfer station etc) with adjacent councils.
- The potential of implementing a solar farm
- The sale of the Driftway properties.
- FOGO
- Energy from Waste
- Significant Changes in Waste Regulations or Waste Levy

4.5.1 Partnerships with surrounding councils

Several of the options considered present HCC with opportunities to build partnerships with the surrounding councils and provide more local waste services and increased recovery. Providing a regional facility with access to residents from other council areas could provide additional revenue options (disposal fees, increased material sales) and potentially reduce overall costs (i.e., shared ownership arrangements)

This should be considered as part of any feasibility studies for resource recovery options including the dirty MRF and any development of a transfer station. For the landfill expansion options, it is unlikely that early engagement will be required with other councils, however, the expanded airspace available presents an option for accepting their waste to provide a revenue stream to HCC.

4.5.2 Solar Farm

In general, solar farms on closed landfills tend to be smaller than other utility-scale solar projects, but they can still produce significant amounts of renewable energy and provide an innovative way to reuse previously unusable land. Depending on where the expansion of the current landfill is developed, and how much space is available, a solar farm may be a suitable alternative.

Technology and demand continue to improve for these types of projects and there have been significant improvements in the practicality of solar farms in recent years. Given this, solar farms should be considered within the closure plans for the landfill and may be suitable as part of the progressive closure of the site. Given this, it is the overall recommendation that this be considered in the detailed design of future landfill capping projects.

4.5.3 Sale of Driftway properties

It was confirmed that under the current site approvals, the Driftway properties may only be sold once all waste facility activities have ceased and the site rehabilitation and closure plan implemented. This was seen as the least desirable option within the MCA despite the potential revenue from the sale of the properties.

Given this outcome, this report recommends that other options for the development and use of the site be followed. There may be scope to review the requirements to hold these properties in the future and it should be further investigated at the closure of the current landfill site, considerations should be given in the design of all future landfills and other facilities to maintain buffer distances which appear to have been the reasoning for the requirement to hold these properties.

4.5.4 Food Organics Garden Organics

FOGO is a key decision that HCC should consider as it has great potential to reduce their overall waste volumes and it can greatly impact other relevant decisions investigated within this project. Specifically, the decision on the Dirty MRF

will be affected both by its overall viability and the immediate purpose. Taking FOGO out of the waste stream will present new opportunities for the Dirty MRF and will change the size and equipment requirements. This could make it a more cost-effective option.

Similarly, the need for a Transfer Station in the event of landfill closure is largely due to the volume and weight of waste. If FOGO were introduced and the volumes and weights of the residual waste bins fell significantly, direct haul by the collection trucks may become viable. If the FOGO collection service is contracted out and Council trucks are otherwise underutilised, it may even be the preferred option or a suitable transition option.

4.5.5 Energy from Waste

Similar to FOGO a possible EfW opportunity may present HCC with opportunities that significantly change the preferred decisions. If a suitable EfW facility was constructed within a reasonable transport distance of HCC it would likely impact the preferred end destination of waste, reducing the overall need for landfill but may increase the need for a transfer station. In addition, it may be practical to optimise a Dirty MRF to produce Refuse Derived Fuel (RDF) for an EfW plant.

If in combination with other resource recovery options, EfW may reduce the need for a landfill to the point it may not be worth pursuing the western landfill expansion.

4.5.6 Changes in Regulations

An unknown consideration in making decisions is the potential for future changes to legislation and regulations, including significant changes in the Waste Levy. NSW has made decisions before that have had significant impacts on facilities and the options available for processing. A similar issue occurred in 2018 when the NSW EPA revoked the resource recovery exemption for the output from Mechanical Biological Treatment (MBT) facilities in 2018. Specifically, this left Veolia and SUEZ (site now owned by Cleanaway) with partially stranded assets.

While it is not likely that NSW EPA will make a similar decision that would affect the options available to HCC it remains an example where significant regulation changes had a large impact on industry.

The changes that are more likely to be made that will impact HCC's decision would be a large increase in the waste levy and/or landfill bans preventing certain materials from going to landfill. An example of this is when the Victorian EPA banned E-waste from landfill, defining E-waste as waste in the form of electrical or electronic equipment, devices or things (or materials or parts of such equipment, devices or things), the operation of which is dependent on, or designed for the generation, transfer or measurement of, an electric current or electromagnetic field.

Decisions like this would need to be considered in what to target with regard to resource recovery to reduce waste levy impacts and remove any banned material from the waste stream. These decisions will need to be taken in the context of regulations that are put in place.

4.6 Key Decisions

The key decisions for all options are summarised in Table 2: Key Decisions with further information providing:

- Decision No. – Number to allow for cross-referencing in the table.
- The time frame in which the decision should be made.
- The importance of the decision
  - High – Critical with wide-ranging impacts
  - Medium – Of moderate importance impacting some other decisions.
  - Low – Significant but not impacting other decisions to a great degree.
- Reliant Decisions – Decisions that would impact how this is considered.
- Dependent Decision – Decisions that will be impacted by this decision.
- Policy Links – How this relates to HCC policy.

Table 2: Key Decisions

Decision No.	Timeframe	Decision	Importance	Reliant Decisions	Dependent Decisions
1	12 to 24 Months	Decide to undertake a detailed feasibility assessment for a Dirty MRF	High	9	
2	12 to 24 Months	MRF Target Materials	Medium	1	3, 4, 5
3	18 to 30 Months	MRF Partnerships	Medium	1, 2	4
4	18 to 30 Months	MRF Capacity	Low	1, 2, 3	Nil
5	18 to 30 Months	MRF Location	Low	1, 2, 3	Nil
6	6 to 12 Months	Decide to build a RE-use Shop	Low	7	7
7	6 to 12 Months	Decide to increase metal recycling	Low	6	6
8	18 to 30 Months	Decide to build a Micro Factory	Low	6, 1	Nil
9	18 to 30 Months	Decide to allocate start-up space	Low	6, 1	Nil
10	0 to 3 Months (Immediate)	Decide to stop landfill capping works	High	Nil	1, 15
11	3 to 6 Months	Decide the future extent of the landfill footprint on the current site.	High	10	1, 15
12	12 to 24 Months	Decide the future extent of the landfill footprint to the west	High	11	1, 15
13	18 to 30 Months	Decide on preferred land ownership arrangements	Medium	12	Nil
14	12 to 24 Months	Landfill partnerships	Medium	11, 12	11, 12
15	Immediately on the Decision not to expand the landfill Or >30 Months	Decide to build a transfer station		11, 1	1
16	After 15	Transfer station partnerships		15	15
17	After 15	Transfer station size		1, 16	Nil
18	After 15	Transfer station location		1, 16	Nil

4.6.1 Recommended Decision Path

The final recommendation of this report is to:

1. Cease all landfill capping works immediately.
2. Initiate steps for expansion within the current landfill footprint.
3. Investigate options for expansion of the landfill footprint west.
4. To extend the landfill life; investigate options for increased resource recovery including Dirty MRF, RE-use Shop, Increased Metal recovery/separation, Start-up space, and Micro-Factory. In doing this consider the need for a possible transfer station in the future.
5. Speak to surrounding LGAs to discuss options to partner in service delivery.
6. If the landfill expansion is not to go ahead or in the case of supporting FOGO or EfW options, carry out the design of a transfer station.

SEMC Recommendations for the overall timeline of these decisions including specifics around investigation are outlined in Table 3: SMEC Recommendations according to the broad timeline below:

- Immediate decisions and actions
- 6 to 12 months
- 12 to 24 months
- More than 24 Months

Table 3: SMEC Recommendations

Timeframe		
Immediate Action	i.	Cease current landfill capping activities.
	ii.	Start the planning process to amend site conditions to allow expansion of the landfill to the north.
	iii.	Conduct a feasibility assessment to determine the height of the landfill.
	iv.	Investigate options for separated metal recycling
6 to 12 months	i.	Conduct detailed design of north expansion.
	ii.	Submit new design for planning approvals.
	iii.	Conduct a detailed analysis of the waste profile and how it changes through the year (this should be made an ongoing programme of waste audits).
	iv.	Begin separated metal recycling.
	v.	Reach out to other Councils to discuss potential partnerships or service offerings for waste processing and/or disposal.
	vi.	Conduct a detailed feasibility assessment for western landfill expansion.
	vii.	Complete initial master planning of the site to determine space available for recycling options.
	viii.	If approval is not given or Landfill Expansion options cannot proceed start the process to sight, build and operate a transfer station
12 to 24 months	ix.	Conduct Feasibility assessment for Dirty MRF
	x.	Conduct Feasibility assessment for expanded on-site recovery options.

Timeframe		
	xi.	Establish a Reuse Shop
	xii.	Further Scrap Metal Recycling
	xiii.	Micro-Factory
	xiv.	Start-up Space
	xv.	Begin the process of acquiring Lot 32
	xvi.	Begin planning and environmental investigation and reports to develop landfill on Lot 32.
More than 24 Months	xvii.	Dependent on Feasibility Assessment conduct detailed planning for Dirty MRF
	xviii.	Investigate options for Solar Panels on Landfill
	xix.	Investigate Changes to allow the sale or change of use of Driftway Properties
	xx.	Depending on the requirements and availability of FOGO/WtE investigate options for Transfer Station.