Options for the Future Management of Waste

A Submission to Flinders Council

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MRA Consulting Group

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Disclaimer

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Glossary

Terminology	Definition
AD	Anaerobic Digestion
BAU	Business-as-usual
CAPEX	Capital Expenditure
CDS	Container Deposit Scheme
FO	Food Organics
FOGO	Foord Organics and Garden Organics
LLF	Launceston Landfill
MCA	Multi-Criteria Analysis
MGB	Mobile Garbage Bin
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
OPEX	Operating Expenditure
PEF	Processed Engineered Fuel
WLF	Whitemark Landfill
WtE	Waste-to-energy

Executive Summary

Flinders Island currently puts 1,766 tonnes of waste per year into landfill, with residual waste making up 61% of the waste stream. This waste management options assessment finds that the improved landfill management (modern landfilling) is the cheapest option at $312/tonne. Other alternatives, which involve off-island transport or more advanced treatment methods, are significantly more expensive, mainly due to the high freight costs and low waste volume.

Improving the current recycling system costs $231/tonne and would divert 622 tonnes of recyclable material every year, thus extending the landfill life and reducing long-term capital expenditures (CAPEX). The Multi-Criteria Analysis (MCA) confirms that the improved landfill management and recycling are the strongest options across various economic, operational and environmental criteria, alongside improving landfill management and MSW dehydration.

- Landfill capacity is not an immediate constraint for waste management. Layouts of current and future cells provide an estimated 66 years of operation and the potential for over 100 years by improving the recycling system to divert 622 tonnes away from Whitemark.
- The recommended options pathway is to continue using existing the landfill, improve cell design and landfill management where budget permits, and implement expanded recycling drop-off points for cardboard, metals and CDS materials.

1 Introduction

This report assesses various future management options for Flinders Island. It examines the current waste profile of the island, recycling potential, alternative waste management technologies, cost-benefits of each option, and the long-term landfill capacity. It aims to identify practical, cost-effective and sustainable options that suits the island's context, such as its low waste volumes, high freight costs and limited access to specialist infrastructure.

The analysis investigates a range of options such as kerbside collection, expanded recycling, processed engineered fuel (PEF), waste-to-energy (WtE), small-scale incineration, anaerobic digestion (AD), composting and off-island disposal. Each option is assessed based on its cost (as a predominant driver), operational complexity, regulatory requirements, environmental impact and implementation feasibility.

This analysis is done through cost modelling of each option, an MCA, and a review of the current and potential landfill capacity. This allows for a consistent framework in comparing all identified options and selecting those that warrant further consideration by Council on its feasibility on Flinders Island.

2 Preliminary Assessment

2.1 Business as Usual

The current Whitemark landfill receives 1,766t/year in waste, with the remaining waste being stockpiled.

The cost per tonne of disposal has been provided by Council as $161.35/t. This is the direct cost of the following landfill elements:

- Plant and equipment
- Wages
- Consumables and sundry

It does not include:

- Return on Capital Employed (ROCE)
- Landfill profit margin
- Corporate overheads
- Landfill remediation
- Post-closure monitoring

MRA has provided for an additional (estimated) $48.31/t in the business case comparisons to include:

1. Post-closure remediation and capping
2. Post-closure monitoring

MRA recommends that Council undertake a Full Cost of Landfill study to determine the exact cost requirement for these post-closure costs and a more accurate accounting of the current operating costs, including the costs of capital and corporate overheads. Given that these are not included in current landfill accounting, MRA has not included them in the modelling. That is, all costs are comparisons to the operating cost of Whitemark plus remediation and post-closure monitoring (only).

Consequently, MRA used a benchmark BAU cost of "current landfilling" of $210/t ($161.35/t + $48.31/t).

2.2 Recycling Streams

Based on existing waste data and assessment of the landfill waste stream, MRA has segregated the waste into recyclable or landfill (disposal). These are set out in Table 1.

Table 1 Available waste streams

Characterisation	All sites/streams	Tonnes
Residual	61%	1,078
Organics	3.7%	66
FO	3.1%	54
GO	0.7%	12
Recyclables	35.2%	622
Paper and Cardboard	21.0%	371
Glass CDS	1.0%	18
Plastic containers CDS	3.3%	58
Metal CDS	1.8%	32
Mixed Metal	8.2%	144
Total	100%	1,766

MRA notes that the characterisation data is extrapolated from the Landfill and Transfer Station Audits carried out by Jones Waste in 2025. The audit report did not consolidate the waste stream assessment into an Island Waste Characterisation. MRA has applied a weighted average analysis to bring all the data sets together into a single Characterisation of all material being delivered to landfill. Raw data analysis is provided in Excel Waste Options Cost Estimates MRA 2026. (Appendices B-D)

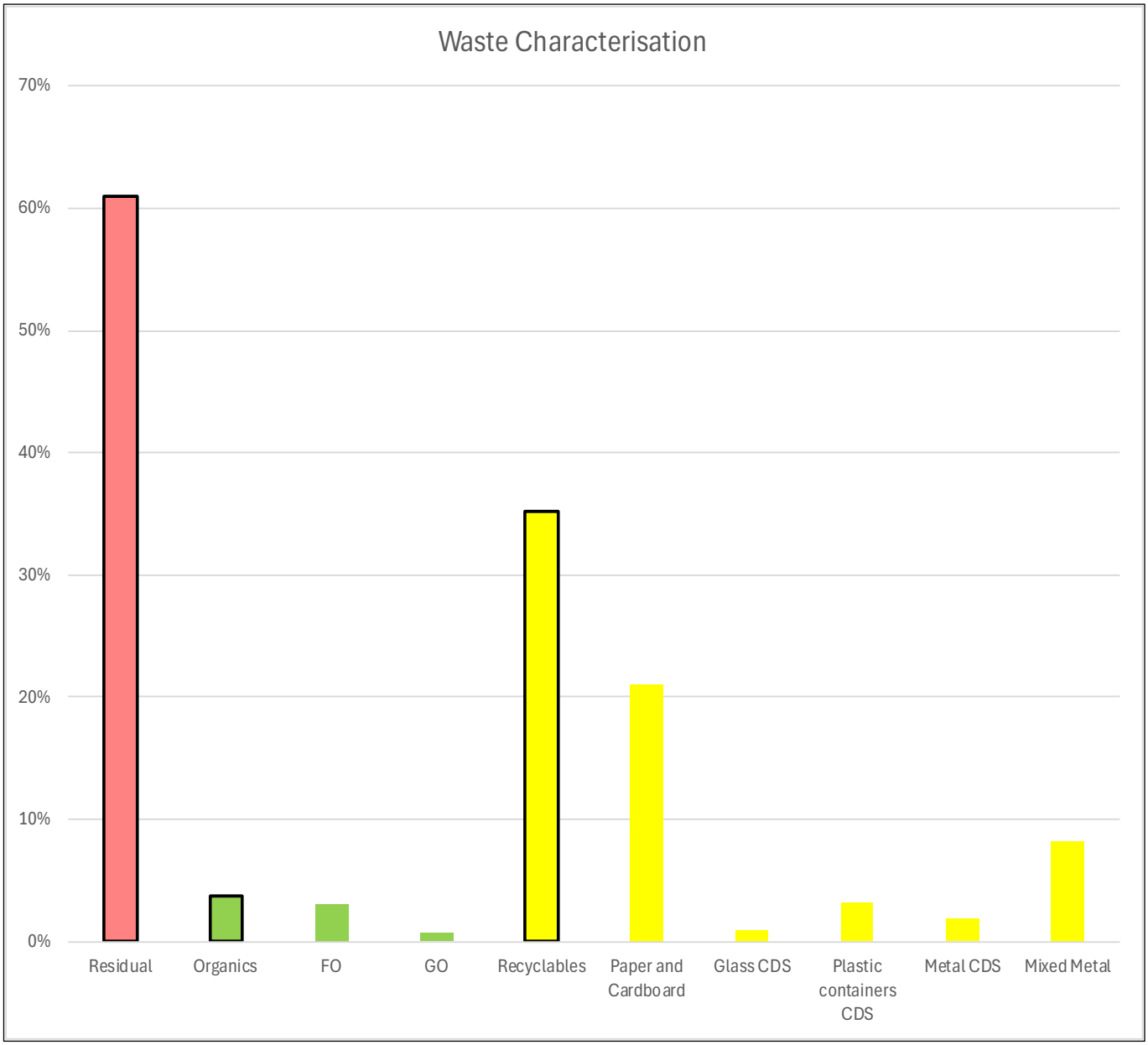

Figure 1 Available Tonnes by type and individual waste stream

Note that the columns outlined in black (residual, organics and recyclables) are the totals, with the corresponding colours showing the subsequent breakdowns of each waste classification.

2.2.1 Recycling Cost Base

The cost of recycling each waste stream depends in large part on whether the finished product remains on Flinders Island or must be shipped to Launceston or even the mainland/overseas.

The cost of freight off-island are high and that mitigates against many recycling options.

The relevant costs of recycling are set out in Table 2.

Table 2 Cost of recycling off island for cardboard, metal and CDS

Cost	Value	Comments
CAPEX		
CAPEX for new skips bins	$16,000	8 new drop-off bins across 2 sites.
CAPEX for baler	$50,000	New baler plus install.
Total recycling CAPEX	$66,000	
Interest on CAPEX	$7/t	8 tonnes recovered.
OPEX		
Baling	$30/t	Including labour.
Transporting on island	$20/t	
Shipping off island	$212/t	
Total OPEX	$262/t	Assume $0 revenue for cardboard or CDS. Savings in landfill costs accrue to Council.
Total cost of Recycling	$269/t	

Table 2 indicates that recycling can only be achieved at a small price premium to local landfilling. However, diverting 622 tonnes of these materials would significantly extend the landfill life.

3 Alternative Waste Management Options

MRA has examined a range of options to reduce landfill demand and to provide alternative solutions for disposal. These were combined with recycling opportunities to create 11 different waste management scenarios. These are described in Table 3.

Table 3 Description of Options for Cost Analysis

#	Option	Description
Residual Waste		
1	Current landfill: BAU	• Base cost plus unfunded post-closure remediation estimate • Residents transport waste to landfill and Transfer Stations • Assumes current landfill costs continue
2	Improved landfill management	• Continue to use space in current landfill with a 5m vertical height addition • Redesign cell layout for efficiency and optimal use of void • Add weighbridge and user pays • Assume costs are same as BAU
3	Launceston landfill (LLF)	• All waste is baled and transported to Launceston for landfilling • Bale, transport, ship, transport and landfill gate fee
4	WtE on island	• Based on IQ Energy G500 quote for small gasifier • Produces Ash, Syngas and Heat. Assume no offtake sales • Assumes Ash is disposed on island in existing landfill
5	Incinerator on island: no energy PEF (recyclables) + LLF ash	• All waste is sent to incineration on island • Small tonnes so assume high gate fee • Equivalent cost to baling and shipping to Maryvale in Victoria • Therefore, comparable to Off Island Incineration option
6	PEF Rec + LLF	• Dry material is converted to PEF • Assumes only Recyclables are capable of being accepted as PEF • All PEF is transported to incinerator on mainland
7	MSW dehydration + LLF	• Dehydration via composting of residual waste • Bespoke shed built for dehydration • Assume 40% reduction in weight

		• Similar to Remondis at Port Macquarie
Organics Processing		
8	AD FO on island + LLF	• Food Only waste is put to AD on the Island • Small amount of food only therefore low economies of scale
9	Compost FOGO + LLF	• Households separate FOGO via Drop Off • FOGO is separately composted via MAF • MAF located at current landfill
Collection Services		
10	Kerbside collection	• MGB bins provided for each household to collect residual waste only • Drop-off of recyclables remains the same • Council collection truck transports to landfill • Landfilling remains per BAU
11	Improved recycling	• Introduction of 2 new drop-off points for cardboard and metal • CDS for containers • Transport to landfill site for consolidation • Materials to be baled at landfill • Landfilling remains per BAU • CDS transported to Launceston at same cost as baled cardboard

4 Cost Breakdown

The following section breaks down all relevant data and assumptions used for the cost analysis later in this report. All values were either sourced from relevant credible sites or were assumptions based on prior MRA work.

The costs encapsulate capital and operational expenditures, as well as disposal to either Launceston or Whitemark landfills.

4.1 Current Landfill: BAU

An internal operating cost was provided by Council as $161.35/tonne to operate the current landfill, including:

- Plant and equipment;
- Wages; and
- Consumables and sundry.

This cost did not include any post-closure rehabilitation costs such as remediation, capping and monitoring. A $48.31/tonne additional cost was added to the original provided fee, with the following breakdown:

- MRA estimate post-closure remediation and capping costs range between $1-20 million across all landfills. Due to the small size and input waste, $1 million was taken as an estimate as the cost across 20 years, coming out to $28.31/tonne/year.
- MRA also estimate post-closure monitoring costs range between $10-200k per year. MRA estimate a $20/tonne/year cost to cover this fee, equalling $35,320/year, more than enough to oversee a small landfill like Whitemark.

These two costs total to give the $48.31/tonne post-closure fee and, alongside the provided $161.35/tonne operating fee, produce the $210/tonne BAU cost that MRA use in the cost benefit analysis.

4.2 Improved Landfill Management

A full breakdown of all new systems needed to upgrade the current landfill can be found in Appendix E. This includes:

- Landfill cell construction;
- Surface water management;
- Landfill gas capture system;
- Leachate systems;
- Professional fees and services; and
- Contingency costs.

The total CAPEX cost for new cells and construction comes to just over $2 million. At an assumed 6.5% interest rate, this comes to $74/tonne. The depreciation of the $2 million over 40 years totals $29/tonne.

These two costs that cover the improvement of the landfill is added to the BAU case to get a total cost of $312/tonne.

4.3 Launceston Landfill

To transport waste from Flinders Island to Launceston landfill, it must be baled, shipped off island, transported to Launceston landfill from the port and a gate fee must be paid.

- MRA estimate the cost of baling to be $30/tonne.
- Assuming a cost of $220 per truck hour with a 2 hour round trip distance and a 20 tonne payload on the vehicle, MRA estimate a transport cost of $22/tonne.
- The Bass Freight website lists the General Freight cost (per m^3) from Launceston to Lady Barron/Cape Barren Island to be $212/tonne.
- The Launceston council website also lists a $205/tonne gate fee for mixed general waste.

This gives a total cost of $469/tonne to transport residual waste from Flinders Island to Launceston.

4.4 WtE on island

IQ Energy provided MRA with cost estimates for the development of WtE system dealing with around 2,000 tonnes of waste. They provided the following estimates:

- CAPEX of $3.2 million. At an interest rate of 6.5%, this gives a $118/tonne interest on CAPEX.
- OPEX of $250/tonne.

This totals to a cost of $368/tonne to develop and operate a WtE system on island.

4.5 Incinerator on island

MRA estimate a total gate fee of $700/tonne, assuming it is run by a private operator.

4.6 PEF Recycling

MRA estimate the cost of development, operation and disposal for a PEF recycling system to be $722/tonne. This cost was found using previous values from transporting waste to Launceston as well as the initial CAPEX cost and gate fee from a cement kiln as opposed to Launceston landfill. The breakdown is as follows:

- $100/tonne to create the PEF;
- $30/tonne to bale, as before;
- $212/tonne to ship to Launceston, as before;
- $80/tonne to transport to the mainland; and
- $300/tonne for the cement kiln gate fee.

The remaining 1,144 tonnes of residual waste can be sent to either WLF or LLF for their respective disposal fees of $390/tonne and $558/tonne.

4.7 MSW Dehydration

MRA estimate a dehydration shed to cost around $1,000,000, including all cementing, internal machinery etc. At an interest rate of 6.5%, this would come to $37/tonne in CAPEX cost.

With an assumed OPEX cost of $120/tonne, the total cost to dehydrate is $157/tonne.

The output of the MSW dehydration is 60% of the original tonnes (around 1,060 tonnes). This is sent to either WLF or LLF at a rate of $210/tonne and $469/tonne respectively, giving a total cost of $283/tonne or $438/tonne.

4.8 AD FO on island

MRA estimate an initial CAPEX cost of $100,000 with the collection cost of a new FOGO bin coming to $1,777/tonne.

To find this, MRA assumed an MGB lift rate to be $5/bin including all capital and operational costs such as purchasing bins and a collection truck which would operate weekly.

The interest on CAPEX cost comes to $99/tonne and with an assumed $150 operating cost of the AD, the total cost of composting on island is $2,026/tonne for the 66 tonnes of organic waste (54 of which being food waste).

The remaining 1,700 tonnes or residual waste can either be sent to WLF or LLF for total costs of $278/tonne or $527/tonne, respectively.

4.9 Compost FOGO

MRA estimate the CAPEX cost including a MAF and windrow turner to be $0, assuming existing equipment. The same implementation of the FOGO bin across households would cost $1,777/tonne.

Assuming an OPEX cost of $150/tonne, operating a composting system costs $1,927/tonne.

This rate applies to the 66 tonnes of audited organics, with the remaining 1,700 tonnes of residual waste going to either WLF or LLF at a cost of $210/tonne or $469/tonne, respectively.

This comes to a total cost of $274/tonne or $473/tonne, respectively, to manage all available tonnes using a FOGO composting model.

4.10 Kerbside Collection

The cost of implementing a new bin collection service assuming a $5/bin lift rate cost would be $117,000 when multiplied by the assumed 450 households on island and 52 weeks for a weekly collection. This includes the costs of capital within the $5 cost.

As a per tonne cost, this comes to $66/tonne to operate the collection service.

This cost serves as an additional cost to the transport either disposal location, giving final costs of $276/tonne for WLF and $535/tonne for LLF.

4.11 Improved Recycling

MRA estimate a total recycling CAPEX of $66,000, broken down into a $50,000 fee for a baler (including install) and $16,000 for new skips bins (8 new drop-off bins across the 2 designated recycling sites). At an interest rate of 6.5%, this comes to $7/tonne for the 8 recovered tonnes.

The OPEX cost is broken into an assumed $30/tonne for baling including labour; $20/tonne to transport off island and, if it were to be shipped off island, a shipping fee of $212/tonne, coming to a total cost of $262/tonne.

Both the gate fee and rebate fees at LLF were assumed to be $0 in the OPEX costs as they would approximately cancel each other out. If anything, due to the low gate fee costs for cardboard and metal, the rebate cost could outweigh the gate fee so this cost estimate could be lowered, with landfill costs accruing to Council.

The total cost of recycling and shipping these tonnes off-island is $269/tonne.

The remaining tonnes can be sent to either WLF or LLF for their respective disposal costs of $231/tonne and $398/tonne.

5 Cost Benefit Analysis

All identified technology options were compared on their cost benefit based on the breakdown in the previous section. Options were divided into residuals going to WLF and LLF to further look into the effect that the end location of residuals has on the cost.

Options are briefly discussed on their feasibility due to its cost benefit and amount of tonnes managed.

5.1 All Technology Options with Whitemark Landfill Disposal

In this scenario, Council diverts all residual waste to WLF, assuming it is still feasible to do so. Improving recycling appears to be the best additional option and would successfully divert 622 tonnes of waste away from landfill.

The organic processing options appear to be a viable option due to their low costs, however, it costs a large amount to deal with little tonnes, both dealing with only 66 tonnes of organics at around a $2,000/tonne cost. The cost hardly increases due to the small percentage of total tonnes that would be dealt with.

The kerbside collection option adds a streamlined collection system for residual waste but all ends up going to landfill, so this adds an unnecessary cost.

All other options appear too expensive when compared to the improved recycling and landfill management options.

Table 4 Cost per tonne and Cost over 20 years for Options with WLF disposal

#	Option	Assumptions/Cost Breakdowns	Total over 20 years	Cost per tonne
Residual Waste				
1	Current landfill: BAU	Base cost plus unfunded post-closure remediation estimate	$7,405,282	$210
2	Improved landfill management	Assume costs are same as BAU	$11,032,430	$312
3	Launceston landfill (LLF)	Bale, ship, truck then landfill in Launceston	$16,565,080	$469
4	WtE on island	$400/t gate fee with private operator	$12,990,000	$368
5	Incinerator on island: no energy	Assumed $700/t gate fee with private operator for small tonnes	$24,724,000	$700
6	PEF Rec + WLF	PEF (recycling only)	$8,988,421	$390
		Residual to landfill	$4,802,839	

		Total	$13,791,261	
7	MSW dehydration + WLF	Dehydration (100%)	$5,538,400	$283
		Remaining residual to WLF (60%)	$4,450,320	
		Total	$9,988,720	
Organics Processing				
8	AD FO on island + WLF	Build local AD for food waste and grass	$2,667,527	$278
		Residual to WLF	$7,140,662	
		Total	$9,808,189	
9	Compost FOGO + WLF	FOGO	$2,537,527	$274
		Residual to WLF	$7,140,662	
		Total	$9,678,189	
Collection Services				
10	Kerbside collection + WLF	Add new collection service	$2,340,000	$276
		Residual to WLF	$7,405,282	
		Total	$9,745,282	
11	Improved recycling + WLF	Recovered recyclables	$3,347,526	$231
		Residuals to WLF	$4,795,122	
		Total	$8,142,648	

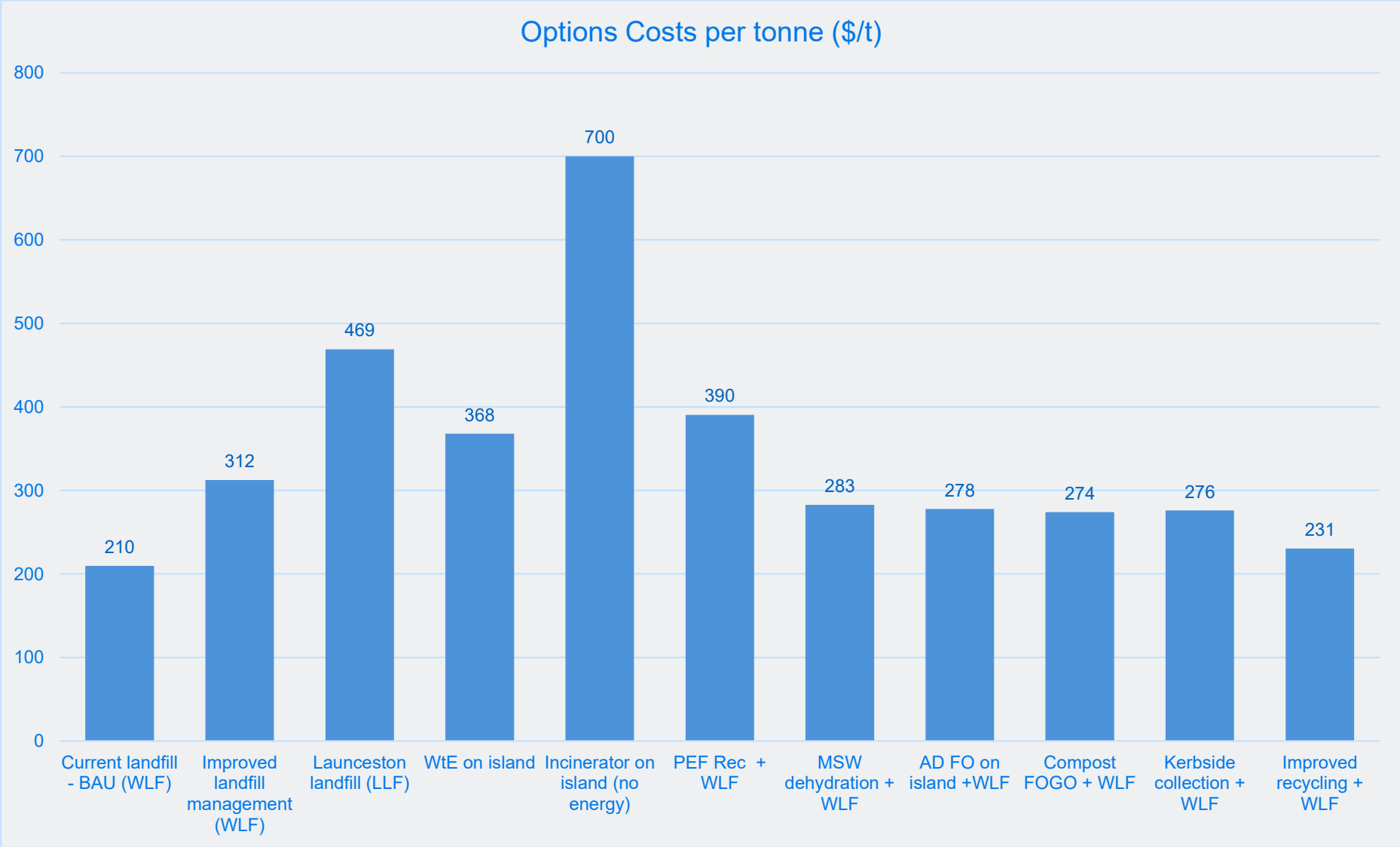

Figure 2 Bar chart of Cost per Tonne for Options with WLF disposal

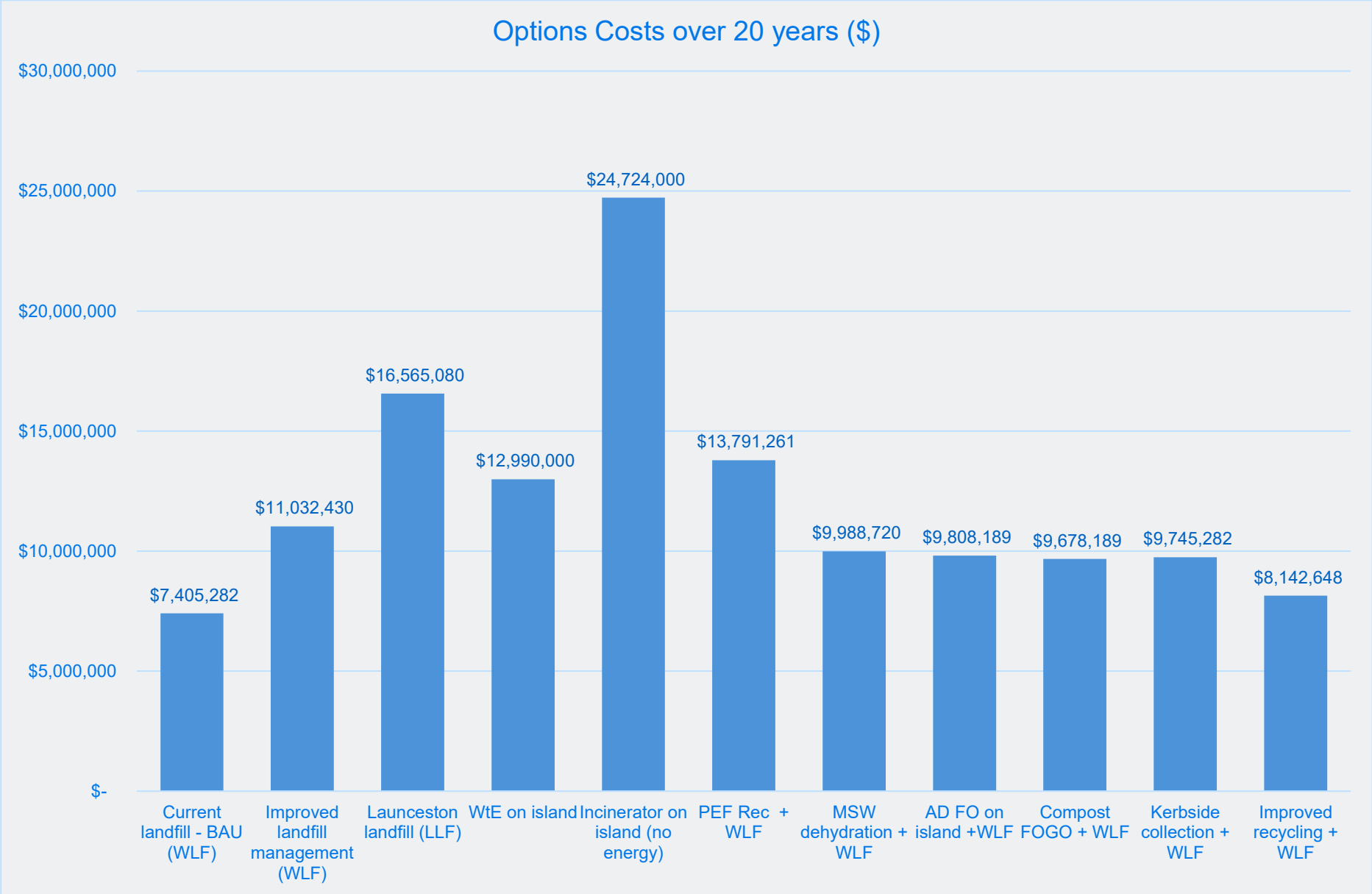

Figure 3 Bar chart of Cost over 20 years for Options with WLF disposal

5.2 All Technology Options to Launceston Landfill Disposal

Options 1-5 have been removed from Table 5 as they are all undergone on island and have no dependence on LLF, so will have the same costs as those found in Table 4.

Clearly, the change from WLF to LLF has increased costs dramatically. Improved recycling still appears to be the strongest option. Using LFF, if WLF is still operational, seems completely impractical due to inflated costs.

Table 5 Cost per tonne and Cost over 20 years for Options with LLF disposal

#	Option	Assumptions/Cost Breakdowns	Total over 20 years	Cost per tonne
Residual Waste				
6	PEF Rec + LLF	PEF (recycling only)	$8,988,421	$558
		Residual to landfill	$10,726,341	
		Total	$19,714,762	
7	MSW dehydration + LLF	Dehydration (100%)	$5,538,400	$438
		Remaining residual to WLF (60%)	$9,939,048	
		Total	$15,477,448	
Organics Processing				
8	AD FO on island + LLF	Build local AD for food waste and grass	$2,667,527	$527
		Residual to WLF	$15,947,478	
		Total	$18,615,005	
9	Compost FOGO + LLF	FOGO	$2,537,527	$523
		Residual to WLF	$15,947,478	
		Total	$18,485,005	
Collection Services				
10		Add new collection service	$2,340,000	$535

	Kerbside collection + LLF	Residual to WLF	$16,565,080	
		Total	$18,905,080	
11	Improved recycling + LLF	Recovered recyclables	$3,347,526	$398
		Residuals to WLF	$10,726,341	
		Total	$14,073,867	

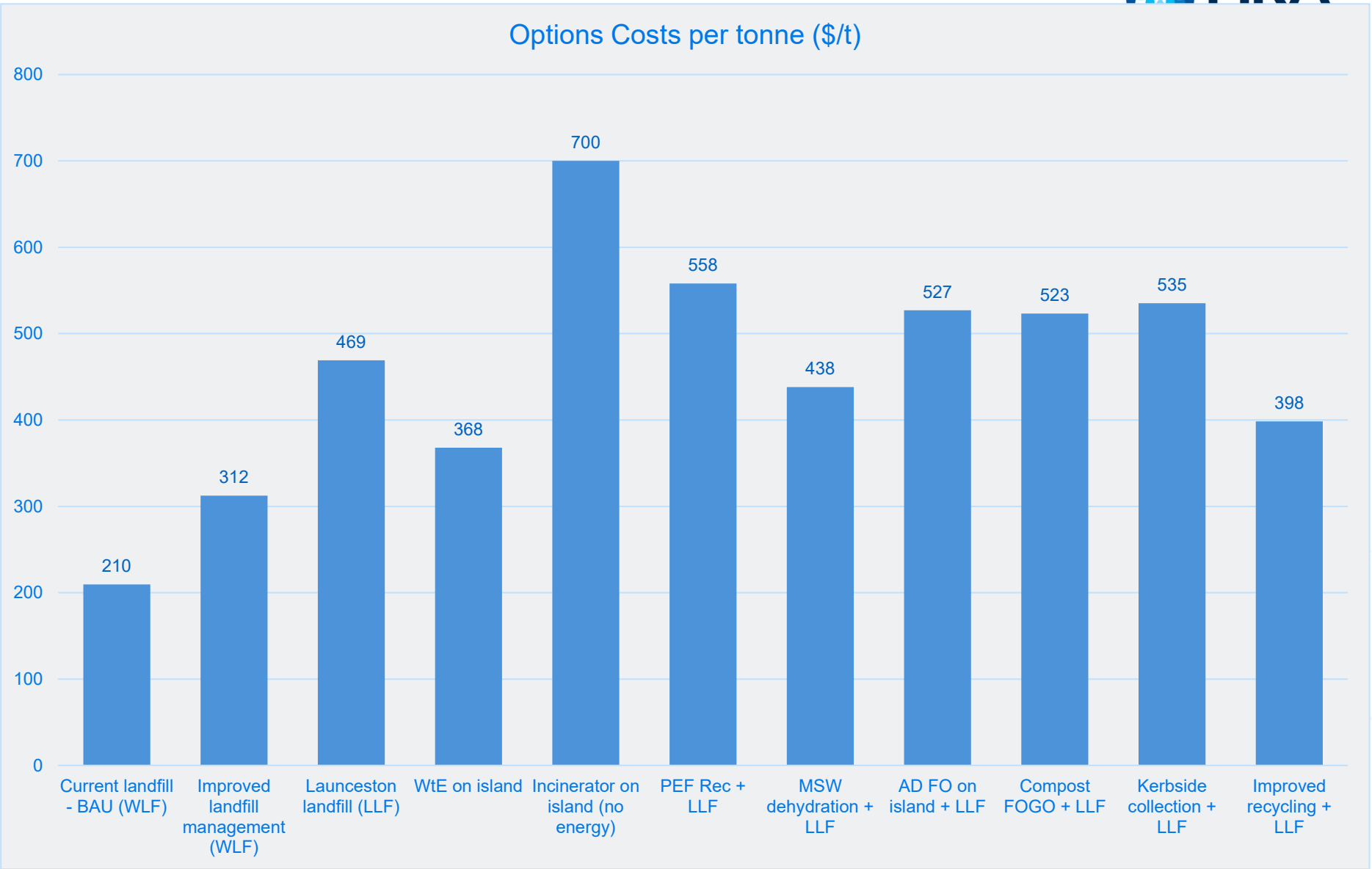

Figure 4 Bar chart of Cost per Tonne for Options with LLF disposal

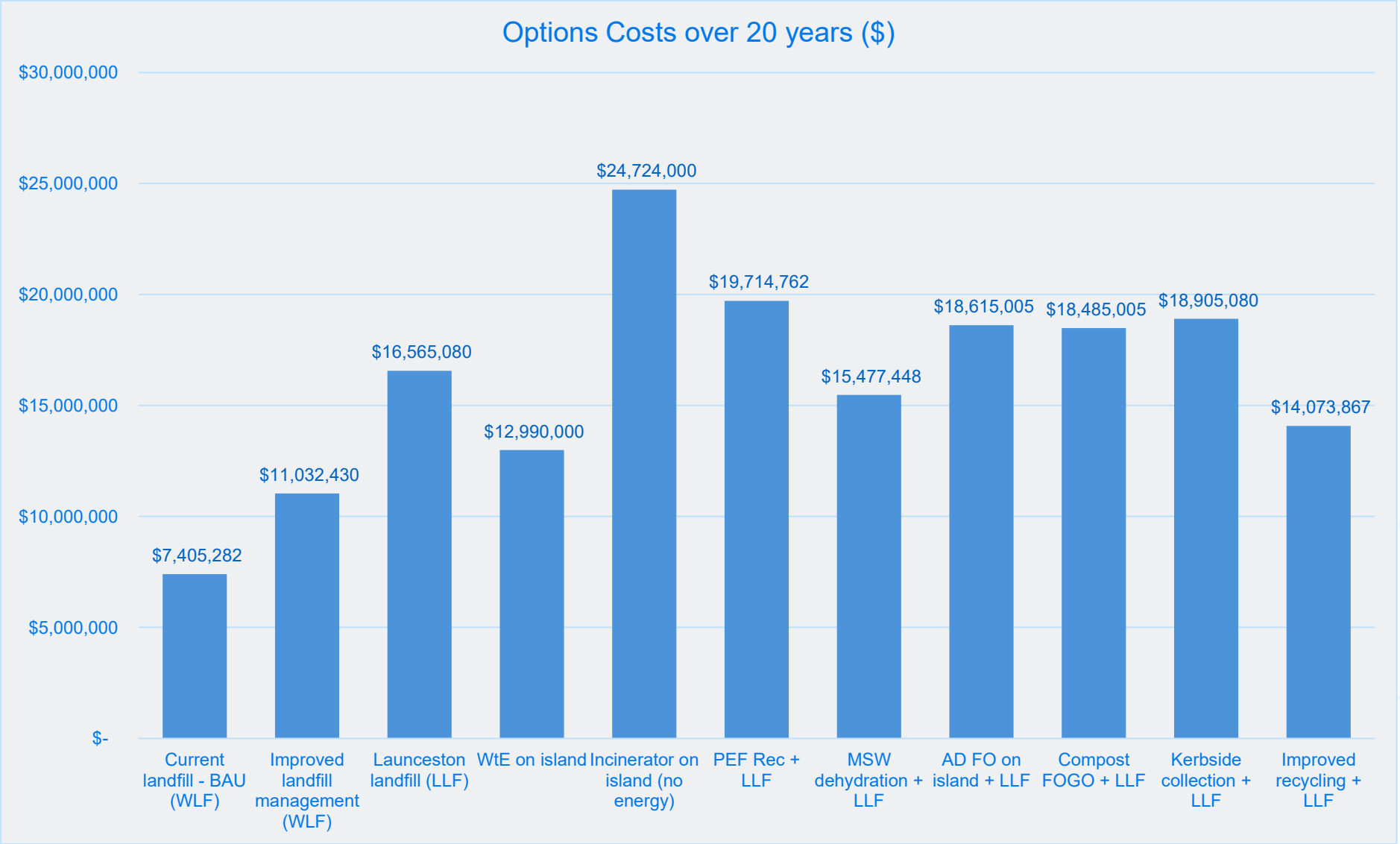

Figure 5 Bar chart of Cost over 20 years for Options with LLF disposal

5.3 Summary

It is clear from this analysis that transporting waste from Flinders Island to the mainland is extremely expensive.

- All options involving disposal at LLF are more expensive than BAU and using Whitemark for the residual disposal.
- Whitemark is clearly the cheapest form of disposal of residuals.
- Composting and AD on island are very expensive per tonne because of the low tonnes and involve the introduction of a new organics bin. However, the main cost is capital and operating cost of the processes.
- Additional recycling of cardboard and metal is only slightly more expensive than landfilling at Whitemark but has the benefit of reducing landfill consumption by 35% (622t out of 1766t/yr)

Clearly, BAU (local landfilling) remains the cheapest option. When augmented by additional recycling this can reduce demand on future landfill space.

The key conclusion is that continuing to landfill at Whitemark whilst meeting modern landfill management standards is the preferred forward option. That implies that Council's costs will need to rise to the $312/tonne and properly constructed landfill cells will be required.

6 Multi-Criteria Analysis

This MCA looks beyond cost benefits and investigates other drivers behind recommendations for Council, such as environmental and social benefits. This will determine which options, whether primary or as a diversion scheme would suit Flinders Island as a feasible waste management option.

The MCA is a structured way to directly compare options which differ in scale, technological maturity, operational requirements and costs.

The full breakdown can be found in Appendix F. The summary of scores can be found in Table 6.

6.1 Weighting Breakdown

6.1.1 Financial

MRA selected a weighting of 60% as costs are the main driver behind choices. If options are too expensive, they are infeasible for implementation in a smaller community and often overcompensates with the low tonnes being produced.

This section is broken down into the following individual criteria:

- Total cost (25%)
- Cost per tonne (25%)
- Commercial viability (5%)
- Financial risk (5%)

6.1.2 Operational

MRA selected a weighting of 30% as it would be impractical to implement an option that could not be run by Flinders Island's labour force, or had too many risks regarding meeting regulations, maintaining and operating machinery and required education.

This section is broken down into the following individual criteria:

- Technical complexity (8%)
- Labour requirements (5%)
- Regulatory planning (6%)
- Education (6%)
- Implementation time (5%)

6.1.3 Environmental

MRA selected a weighting of 10% as environmental considerations have a low influence on option choice but it still important to consider as to minimise any ecological damage various options may cause.

This section is broken down into the following individual criteria:

- Greenhouse gas emissions (3%)
- Operational liability (4%)
- Impact mitigation (3%)

Table 6 Multi-Criteria Analysis Scores for Options, ordered by ranking

Ranking	Option	Total Raw Score	Total Weighted Score
0	Current landfill: BAU (WLF)	32	2.84
1	Improved recycling	32	2.77
2	Improved landfill management (WLF)	30	2.33
3	MSW dehydration	23	2.13
=4	Kerbside collection	27	1.93
=4	Launceston landfill (LLF)	26	1.93
6	Compost FOGO	25	1.86
7	AD FO	20	1.56
8	PEF Recycling	17	1.17
9	WtE	15	1.12
10	Incinerator	13	1.04

6.2 Ranking Analysis

The MCA supports improved recycling, followed by improved landfill management at WLF as the best options, especially if they are combined.

MSW dehydration has the cheapest cost per tonne ($157/tonne) to implement and operate, but does not include disposal to landfill costs to remaining tonnes. This reduces total tonnes to 60% capacity which could act as a future option to reduce waste output.

Kerbside collection and Launceston landfill have been deemed as the benchmark for infeasibility, with unnecessary additional costs where alternative options are available.

All other options past this threshold have significant financial, operational and environmental limitations that outweigh their benefits.

BAU (WLF) has been included as the baseline for comparison purposes only.

7 Landfill Assessment

7.1 Void Space

Council has advised MRA on the layout of Whitemark landfill, discussing the current situation and their plan for future cells. The current layout can be seen in Figure 6.

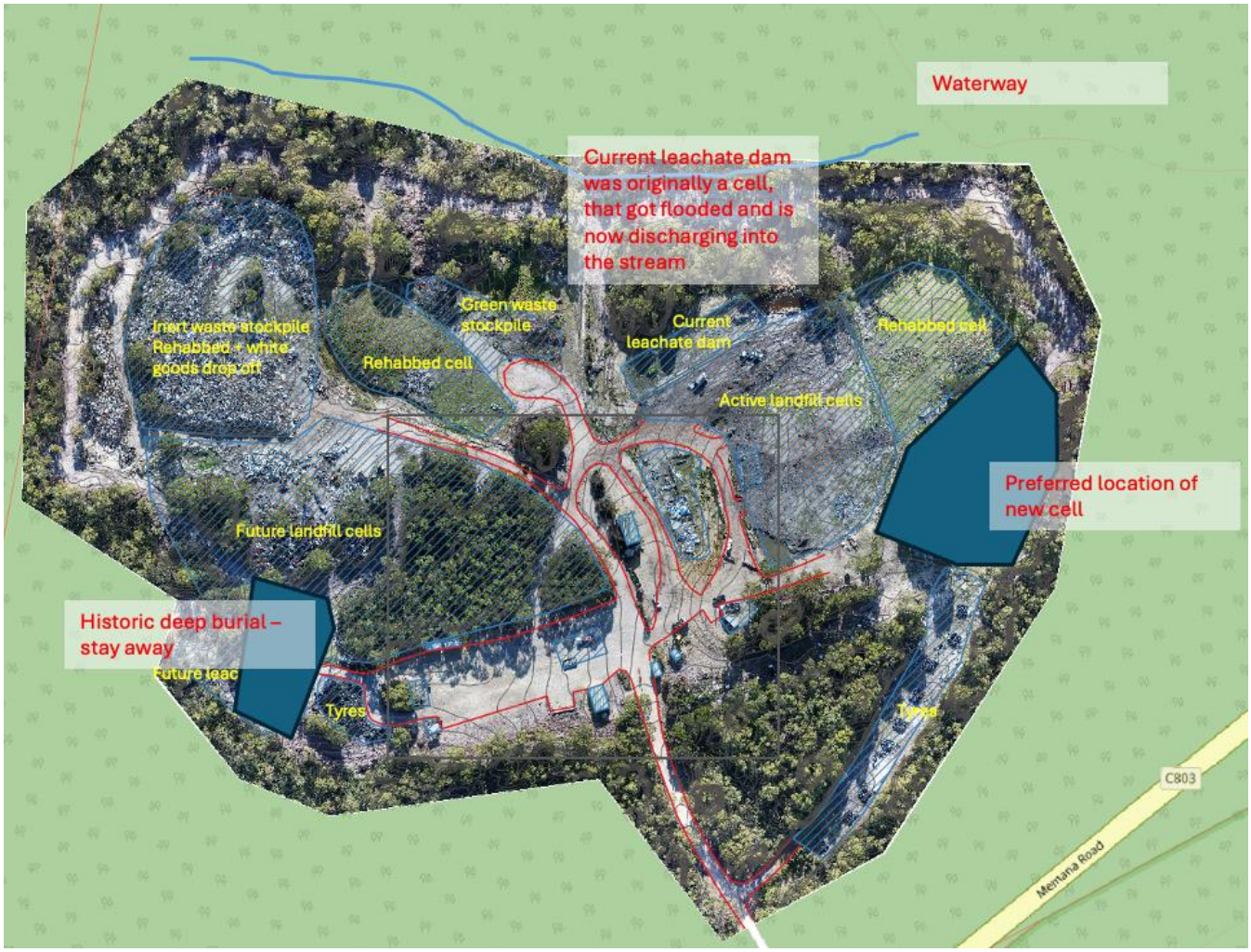

Figure 6 Current Whitemark Layout

The locations for future disposal that were identified by Council were the following:

- The preferred location of new cell on the far east side of the landfill
- The future landfill cells, avoiding the deep burial site of asbestos etc.
- The inert waste stockpile, which already has washing machines etc., but can be temporarily relocated
- A possible fourth cell alongside the green waste stockpile

This fourth cell was ignored in the analysis for now as its feasibility has not been fully confirmed, especially due to the effects of the leachate dam and nearby waterway. The simplified layout of the selected cells can be found in Figure 7.

Figure 7 Map of Future Cells

This map has changed labels for simplicity. The following key can be used to compare the cells to those labelled in Figure 7. Future Cell 1 is the "preferred location of new cell"; Future Cell 2 is the "future landfill cells"; and Future Cell 3 is the "inert waste stockpile". Note, only the cells that Council have identified as being plausible for future disposal have been highlighted.

MRA has reviewed the current void space to calculate the potential remaining lifespan of Whitemark landfill, based on the:

1. Known annual filling rates of 1,766t/yr; and
2. Identified options for new landfill cells.

MRA encourage these future cells to be managed correctly, including being dug approximately 2.5m deep, base lined and, once filled to 5m above ground level, capped at a 30° angle with a biogas recovery system. The full outline this structure is found in Figure 8.

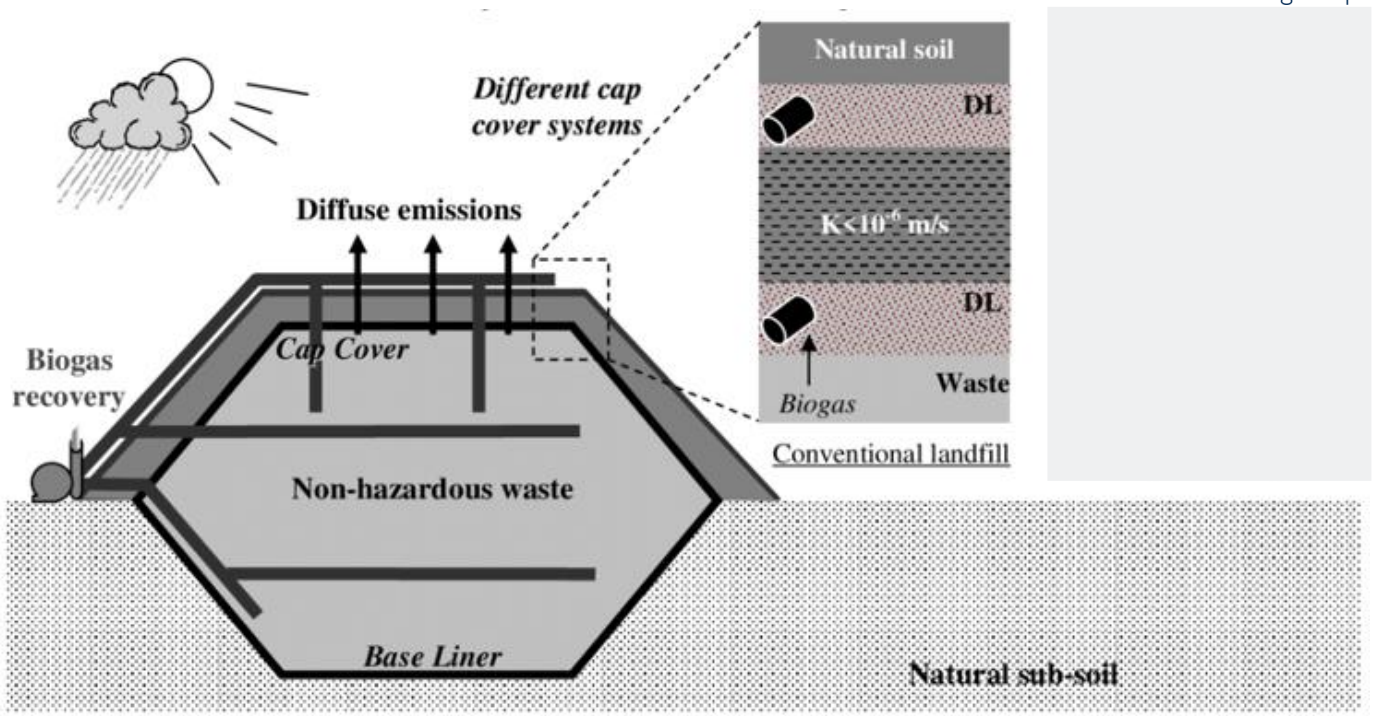

Figure 8 Sample design for cell

Source: Staub, Matthias & Gourc, Jean-Pierre & Simonin, Raphaël. (2018). Influence of landfill cap cover characteristics on the mitigation of GHG emissions. MRA notes this is merely a generic design that may change dependent on factors specific to Whitemark landfill. It serves as an outline for the shape needed to maximise volume within a cell to improve lifespan.

7.2 Landfill Lifespan

MRA has calculated the land area and void volumes of the potential future landfill cells.

The analysis assumes:

1. Landfill compaction rates of 0.75t/m^3 can be achieved;
2. Landfill consumption continues at 1,766t/yr (though this will reduce with improved recycling);
3. Additional 5m vertical height permitted permitted under landfill approvals; and
4. Additional 2.5m vertical depth can be added presuming landscape and terrain permits.

The calculated volumes were treated as truncated cones with elliptical bases for simplification. The full breakdown of the volumes can be found in Appendix G. The final calculated volumes and lifespans of each individual cell can be found in Table 7.

Identified Future Cells	Area (m^2)	Volume (m^3)	Tonnes	Lifespan (years)
Future Cell 1	5,141	33,284	24,963	14.1
Future Cell 2	13,426	80,043	60,032	34.0
Future Cell 3	6,585	42,896	32,172	18.2
Total	**25,152**	**156,223**	**117,167**	**66.3**

Table 7 Lifespan of future cells

There is at least 66 more years of landfill life available at Whitemark landfill if the identified cells were correctly managed, with possible room for smaller cells elsewhere.

If the recycling option were also to be implemented (i.e. the diversion of 622 tonnes away from Whitemark landfill), the total lifespan should increase to over 102 years.

Assuming that the tonnage density can be met and the landfill terrain permits for the digging of these cells, MRA suggests the continued use of the landfill in the discussed manner in order to maximise its output and cost benefit of keeping residual waste on island.

8 Conclusions

The previous analysis confirms that two options appear to be clearly viable for Flinders Island when assessed on cost, practicality and sustainability metrics. Most advanced technologies are unsuitable due to low waste volume (1,766t/yr), high CAPEX and OPEX, limited market access, and high regulatory and technical risk.

Local landfilling through improved landfill management is the most cost-effective option ($312/t) compared to off-island disposal ($469/t). The landfill has an estimated 66 years of capacity under current cell arrangements and can reach over 100 years with additional recycling options off-site. This improved recycling option ($231/t) diverts 622 tonnes of recyclable materials a year, which would extend landfill life and reduce operational difficulty.

The recommended pathway is to:

- Continue using the existing landfill as main disposal method;
- Improve landfill operations to maximise remaining capacity;
- Expand recycling infrastructure and drop-off points;
- Target diversion of cardboard, metals and CDS materials; and
- Plan for long-term landfill management and post-closure obligations

This approach allows for a low-risk and cost-effective waste management pathway that aligns with the island's scale and community needs. Council now has a clear path forward to manage waste in a reliable and affordable way that meets long-term needs.

Appendix A: Waste Characterisation

	19.05.2025		20.05.2025	
	Litres	%	Litres	%
Garbage bags of rubbish	885	15.41%	285	5.77%
Paper - recyclable	35	0.61%	18	0.37%
Paper - non recyclable	175	3.05%	65	1.32%
Cardboard	551	9.60%	861	17.46%
Food / Kitchen	125	2.18%	193	3.90%
Vegetation / Garden	0	0.00%	30	0.61%
Stumps / logs (10cm diametre +)	0	0.00%	0	0.00%
Wood - varnished / painted	0	0.00%	58	1.17%
Wood - chipboard / MDF	220	3.83%	50	1.01%
Wood - board / pole, untreated	0	0.00%	540	10.95%
Wood - board / pole, treated	300	5.23%	0	0.00%
Furniture	550	9.58%	340	6.90%
Carpet & Underlay	0	0.00%	60	1.22%
Textiles - clothing / cloth	45	0.78%	82	1.65%
Textiles - composite (shoes / bags etc)	68	1.18%	33	0.67%
Matressess - spring	0	0.00%	0	0.00%
Rubber / Foam	44	0.77%	42	0.84%
Glass - containers recyclable	83	1.45%	25	0.50%
Glass - plate / other	15	0.26%	20	0.41%
Plastic - containers recyclable	233	4.06%	88	1.77%
Plastic - plastic bag and film	544	9.48%	514	10.43%
Plastic - Polystyrene foam	205	3.57%	86	1.74%
Plastic - other	446	7.78%	693	14.05%
Metals - recyclable containers	98	1.71%	122	2.46%
Metals - ferrous steel	652	11.36%	597	12.11%
Metals - non ferrous	0	0.00%	28	0.57%
Concrete / Cement	108	1.87%	100	2.03%
Bricks	78	1.35%	0	0.00%
Tiles	150	2.61%	0	0.00%
Plasterboard	0	0.00%	0	0.00%
Rock / Dirt / Soil	0	0.00%	5	0.09%
Asphalt	0	0.00%	0	0.00%
Computers /office equipment	0	0.00%	0	0.00%
Toner cartidge	0	0.00%	0	0.00%
Electrical large eg: whitegoods	0	0.00%	0	0.00%
Electrical medium eg: tv	0	0.00%	0	0.00%
Electrical small eg blender	115	2.00%	0	0.00%
Insulation	0	0.00%	0	0.00%
Paint (containing liquid)	0	0.00%	0	0.00%
Oil	0	0.00%	0	0.00%
Hazardous / special (describe)	1	0.02%	0	0.00%
Bric-a-brac (describe)	0	0.00%	0	0.00%
Other items	15	0.26%	0	0.00%
	5,740		**4,930**	

Whitemark Landfill				Lady Baron TS	Killcrankie TS	Sum Volume	% characterisation LF +TS Mix
	19-May-25	20-May-25	Sum Volume	Volume	Volume	Volume	Percentage
Garbage bags	885	285	1170			1170	5%
Paper	35	18	53	68	92	213	1%
P+C non rec	175	65	240			240	1%
Cardboard	551	861	1412	1105	1910	4427	20%
FO	125	193	318	192	170	680	3%
GO		30	30	42	72	144	1%
							0%
Wood painted		58	58			58	0%
Wood chipboard	220	50	270			270	1%
Wood untreated		540	540			540	2%
Wood board	300		300			300	1%
Furniture	550	340	890			890	4%
Carpet	45	60	105			105	0%
Textiles clothing	68	82	150			150	1%
			0				0%
Rubber	44	42	86			86	0%
Glass containers CDS	83	25	108	87	25	220	1%
Glass plate	15	20	35			35	0%
Plastic containers CDS	233	88	321	381	20	722	3%
Plastic bags	544	514	1058			1058	5%
Polystyrene	205	86	291			291	1%
Plastic other	446	693	1139			1139	5%
Metal cotainers CDS	98	122	220	142	42	404	2%
Metal steel	652	597	1249	295	222	1766	8%
Metal non-ferrous		28	28		10	38	0%
Concrete	108	100	208			208	1%
Bricks	78	5	83			83	0%
Tiles	150		150			150	1%
							0%
							0%
							0%
							0%
							0%
							0%
							0%
Electrical	115		115			115	1%
							0%
							0%
							0%
							0%
							0%
Other	15		15			15	0%
Residual				3335	3249	6584	30%
Total	5740	4902	10642	5647	5812	22101	
Check box					2563		
					22101		

Appendix B: Assumptions

Demographics			
Households	450		
Household density (#/hh)	2.2		
Population	1000		
Waste Generation			
Oct 22 - Sep 23			
Fate	**Tonnes**		
Landfilled	1766	The subject of this study.	
Stockpiled	146	Assumed on-site use. Not in analysis	
Recovered	4	Used for drop-off estimations only	
Waste Characterisation (2025 Audit)			
Composition of landfill tonnes (1,766 t)	Percent Charcterisation	Tonnes	
Recyclables	35%	622	
paper and cardboard	21%	371	
glass CDS	1%	18	
Plastic containers CDS	3%	58	
Metal CDS	2%	32	
Mixed Metals	8%	144	
Organics	4%	66	
FO (Food Organics)	3%	54	
Other organics (Assumed Garden Organics GO)	1%	12	
Residual	61%	1078	
Total	**100%**	**1766**	
Capital			
MGB cost per bin	$60		
Collection truck	$350,000		
Improved landfill (new cells + construction)	$2,015,082	Refer Capex Sheet for costings	
Operating Costs to Launceston LF (LLF)			
Baling	$30	per tonne	
Shipping off island	$212	$ General Freight (per m3) Launceston to Lady Barron /Cape Barren Island	Rates - Bass Strait Freight
Transport to Launceston (truck)	$22	Assuming a cost of $220 per truck hour and a 2 hour round trip distance divided by 20t payload on the vehicle	
Gate fee at Launceston Landfill	$205	per tonne	
Total cost to Launceston landfill	$469	per tonne	
Post Closure costs			
Remediation and capping	$28	$50,000	$1m in 20 years
Monitoring	$20	$35,320	Per year to closure

Dehydration Residual			
Shed	$1,000,000		
Capex cost $/t (@6.5% interest)	$37		
Opex	$120		
Total Dehydration costs	$157		
WtE on Island			Based on IQEnergy
Capex	$3,200,000		
Interest on capex	$118		
Opex	$250		
Total Cost of on island WtE	$368		
AD FO on island			
AD CAPEX	$100,000	Assume existing equipment	
Collection costs separate bin	$1,777	Assumes dedicated FOGO collection	
Interest on CAPEX $/t	$99		
Opex $/t	$150		
Total Cost of composting $/t	**$2,026**		
Compost on island			
Capex incl MAF and windrow turner	$0	Assume existing equipment	
Collection costs separate bin	$1,777	Assumes dedicated FOGO collection	
Opex $/t	$150		
Total Cost of composting $/t	**$1,927**		
Additional drop off recycling and CDS on island			
Capex for new skip bins	$16,000	8 new drop off bins across 2 sites	
Capex for baler	$50,000	New baler plus install	
Total recycling capex	$66,000		
Interest on capex $/t	$7	8 tonnes recovered	
Opex			
Baling $/t	$30	Including labour.	
Transport on island $/t	$20		
Shipping off island $/t	$212		
Total Opex $/t	$262	Assume $0 revenue for cardboard or CDS. Savings in landfill costs accrue to Council	
Total Cost of Recycling $/t	**$269**		
Miscellaneous Costs			
MGB lift rate on island	$5.00	per bin	
Drop off bins	$2,000	per bin	
Baling cardboard	$30	per tonne	
Cardboard sale price	$0	per tonne	
Metal gate fee	$0	sold at $0/t - metal recycler paying for transport	
Other			
Item	**Value**	**Unit**	
Shipping container limit	10	tonne	
Freight frequency	1	trip per week	Schedule - Bass Strait Freight
* Waste Management Strategy 2024-2028			

	Waste Management Options		
1	Current landfill - BAU (WLF)	$161	per tonne
	Unfunded post closure liabilities	$48	
	Total BAU costs	$210	
2	Improved landfill management (WLF)		
	Finance cost (@6.5% interest) $/t	$74	
	Depreciation over 40 years $/t	$29	
	Total cost including BAU Opex $/t	$312	
3	Launceston landfill (LLF)	$469	per tonne
4	WtE on island	$0	IQ Energy ($3.2 million/2,000 tonnes)
5	Incinerator on island (no energy)	$700	
6	PEF Rec + WLF	$722	per tonne (PEF creation; baling; transport to Launceston; transport to mainland; cement kiln gate fee)
7	MSW dehydration + WLF	$190	Build dehydration pad, dry MSW, export to Launceston landfill
8	AD FO on island +WLF	$2,026	per tonne
9	Compost FOGO + WLF	$1,927	per tonne
10	Kerbside collection + WLF	$5.00	Simple red bin collections (not enough tonnes for recyclables or FOGO collection)
11	Improved recycling + WLF	622	Tonnes assumed via new drop off facilities and CDS
	0		

Appendix C: Options Analysis for WLF Disposal

	Options	Assumptions	Assumptions about collection	Applicable tonnes/y	OPEX		Total over 20 years	Cost per tonne
					Cost	Total Cost	Original	Original
1	Current landfill - BAU (WLF)	Base cost plus unfunded post closure remediation estimate	As current	1766	$210	$ 370,264	$ 7,405,282	$ 209.66
2	Improved landfill management (WLF)	Assume costs are same as BAU	As current	1766	$312	$ 551,622	$ 11,032,430	$ 312
3	Launceston landfill (LLF)	Bale, ship, truck then landfill in Launceston	As current	1766	$ 469	$ 828,254	$ 16,565,080	$ 469
4	WtE on island	$400/t gate fee with private operator	As current	1766	$ 368	$ 649,500	$ 12,990,000	$ 368
5	Incinerator on island (no energy)	Assumed $700/t gate fee with private operator for small tonnes	As current	1766	$ 700	$ 1,236,200	$ 24,724,000	$ 700
6	PEF Rec + WLF	PEF (dry recycling only)	As current	622	$ 722	$ 449,421	$ 8,988,421	$ 390
		Residual to landfill	As current	1144	$ 210	$ 240,142	$ 4,802,839	
		Total		1766			$ 13,791,261	
7	MSW dehydration + WLF	Dehydration 100%	As current	1766	$ 157	$ 276,920	$ 5,538,400	$ 283
		Remaining residual to LF 60%		1060	$ 210	$ 222,516	$ 4,450,320	
		Total		1766			$ 9,988,720	
8	AD FO on island +WLF	Build a local AD for the food waste and grass.	As current	66	$ 2,026	$ 133,376	$ 2,667,527	$ 278
		Residual to LLF		1700	$ 210	$ 357,033	$ 7,140,662	
		Total		1766			$ 9,808,189	
9	Compost FOGO + WLF	FOGO	As current	66	$ 1,927	$ 126,876	$ 2,537,527	$ 274
		Residual to LLF		1700	$ 210	$ 357,033	$ 7,140,662	
		Total		1766			$ 9,678,189	
10	Kerbside collection + WLF	Add a new collection service while retaining current landfill operations.	Introduction of new red bin collection service	1766	$ 117,000		$ 2,340,000	$ 276
		Residual to current LF		1766	$ 210	$ 370,264	$ 7,405,282	
		Total					$ 9,745,282	
11	Improved recycling + WLF	Recovered recyclables		622	$ 269	$ 167,376	$ 3,347,526	$ 230.54
		Residuals		1144	$ 210	$ 239,756	$ 4,795,122	
		Total		1766			$ 8,142,648	

Appendix D: Options Analysis for LLF Disposal

	Options	Assumptions	Assumptions about collection	Applicable tonnes/y	OPEX		Total over 20 years	Cost per tonne
					Cost	Total Cost	Original	Original
1	Current landfill - BAU (WLF)	Base cost plus unfunded post closure remediation estimate	As current	1766	$210	$ 370,264	$ 7,405,282	$ 209.66
2	Improved landfill management (WLF)	Assume costs are same as BAU	As current	1766	$312	$ 551,622	$ 11,032,430	$ 312
3	Launceston landfill (LLF)	Bale, ship, truck then landfill in Launceston	As current	1766	$ 469	$ 828,254	$ 16,565,080	$ 469
4	WtE on island	$400/t gate fee with private operator	As current	1766	$ 368	$ 649,500	$ 12,990,000	$ 368
5	Incinerator on island (no energy)	Assumed $700/t gate fee with private operator for small tonnes	As current	1766	$ 700	$ 1,236,200	$ 24,724,000	$ 700
6	PEF Rec + LLF	PEF (dry recycling only)	As current	622	$ 722	$ 449,421	$ 8,988,421	$ 558
		Residual to landfill	As current	1144	$ 469	$ 536,317	$ 10,726,341	
		Total		1766			$ 19,714,762	
7	MSW dehydration + LLF	Dehydration 100%	As current	1766	$ 157	$ 276,920	$ 5,538,400	$ 438
		Remaining residual to LF 60%		1060	$ 469	$ 496,952	$ 9,939,048	
		Total		1766			$ 15,477,448	
8	AD FO on island + LLF	Build a local AD for the food waste and grass.	As current	66	$ 2,026	$ 133,376	$ 2,667,527	$ 527
		Residual to LLF		1700	$ 469	$ 797,374	$ 15,947,478	
		Total		1766			$ 18,615,005	
9	Compost FOGO + LLF	FOGO	As current	66	$ 1,927	$ 126,876	$ 2,537,527	$ 523
		Residual to LLF		1700	$ 469	$ 797,374	$ 15,947,478	
		Total		1766			$ 18,485,005	
10	Kerbside collection + LLF	Add a new collection service while retaining current landfill operations.	Introduction of new red bin collection service	1766	$ 117,000		$ 2,340,000	$ 535
		Residual to current LF		1766	$ 469	$ 828,254	$ 16,565,080	
		Total					$ 18,905,080	
11	Improved recycling + LLF	Recovered recyclables		622	$ 269	$ 167,376	$ 3,347,526	$ 398.47
		Residuals		1144	$ 469	$ 536,317	$ 10,726,341	
		Total		1766			$ 14,073,867	

Appendix E: CAPEX and Post Closure Costs

Category	Parameter	Parameter	Volume/area	$ Unit Cost	Sub total	Sub total 2026 value
CAPITAL COSTS						
Landfill cell construction	Earthworks	Earthworks				
	- Site clearance and rationalising surface	- Site clearance and rationalising surface	4,900	$ 10.00	49,000	
	- Excavation and place	- Excavation and place	12,500	$ 20.00	250,000	
	Basal liner system	Basal liner system				
	- 1000mm thick compacted clay layer	- 1000mm thick compacted clay layer	3,600	$ 10.00	36,000	
	- 300mm gravel leachate collection layer	- 300mm gravel leachate collection layer	500	$ 120.00	60,000	
	- Separation geotextile	- Separation geotextile	3,000	$ 5.00	15,000	
	- 225mm HDPE primary perforated colelction pipe	- 225mm HDPE primary perforated collection pipe	100	$ 170.00	17,000	
	- 160mm HDPE secondary perforated collection pipe	- 160mm HDPE secondary perforated collection pipe	100	$ 110.00	11,000	
	Construction audit	Construction audit	-	$ -	-	
	Auditor verification	Auditor verification	-	$ -	-	
	Construction GITA and CQA	Construction GITA and CQA	-	$ -	-	
	Clay	Clay	-	$ -	-	
	Add more items if applicable	*Add more items if applicable*	-	$ -	-	
Surface water management	Excavate perimeter ditch	Excavate perimeter ditch	280	$ 10.00	2,800	
	Excavate collection pond	Excavate collection pond	500	$ 10.00	5,000	
	Add more items if applicable	*Add more items if applicable*	-	$ -	-	
Landfill gas capture system	Landfill gas well	Landfill gas well	8.0	$ 17,000.00	136,000	
	Other gas collection system infrastructure e.g. gas main lines and flow lines	Other gas collection system infrastructure e.g. gas main lines and flow lines	1	$ 100,000.00	100,000	
	Fully enclosed landfill gas flare	Fully enclosed landfill gas flare	1	$ 200,000.00	200,000	
Leachate system	Leachate pond design	Leachate pond design				
	Leachate pond construction	Leachate pond construction				
	- 63mm HDPE leachate rising main pipe	- 63mm HDPE leachate rising main pipe	100	$ 200.00	20,000	
	- 225mm HDPE inclined riser	- 225mm HDPE inclined riser	40	$ 200.00	8,000	
	- Pump, required non return valves and associated pipework	- Pump, required non return valves and associated pipework	1	$ 20,000.00	20,000	
	- Air compressor and receiver and connection to power source	- Air compressor and receiver and connection to power source	1	$ 60,000.00	60,000	
	- Flow meter	- Flow meter	1	$ 8,000.00	8,000	
	- Local control panels, incl. hydrostatic pressure monitor	- Local control panels, incl. hydrostatic pressure monitor	1	$ 20,000.00	20,000	
	- Hydrostatic field testing of main pipework	- Hydrostatic field testing of main pipework	1	$ 10,000.00	10,000	
	- Pressure testing of airlines	- Pressure testing of airlines	1	$ 1,000.00	1,000	
	- Excavate leachate pond	- Excavate leachate pond	1,000	$ 20.00	20,000	
	- 200mm compacted in-situ soils for pond	- 200mm compacted in-situ soils for pond	500	$ 15.00	7,500	
	- 700mm compacted clay layer	- 700mm compacted clay layer	500	$ 15.00	7,500	
	- 2mm textured HDPE geomembrane	- 2mm textured HDPE geomembrane	500	$ 20.00	10,000	
	- Excavate and backfill anchor trench	- Excavate and backfill anchor trench	50	$ 30.00	1,500	
Professional fees & services		**Subtotal**			**1,075,300**	
Contingency					**537,650**	
			1%		16,130	
			10%		161,295	
	Total CAPEX				**1,790,375**	**2,015,082**
					2022	2026

AFTERCARE		Cost	
Landfill gas capture system	Repair and maintenance for 20 years post closure	80,000	
	Monitoring and reporting ditto	60,000	
	Calibrations and flare maintenance ditto	30,000	
Post-closure rehabilitation	Landfill capping	-	
	- 300mm thick engineered seal bearing surface regulating layer	60,000	
	- 600mm thick compacted clay layer	40,000	
	- 1000mm thick subsoil layer	30,000	
	- 200mm thick top soil layer	30,000	
	- Drainage geocomposite	40,000	
	Revegetation	30,000	
	Leachate extraction	20,000	
	Leachate system maintenance	-	
	Gas extraction		
	- Gas management system	25,000	
	- Gas extraction wells	5,000	
	- Gas monitoring bores	1,500	
	Professional fees & services	1,753	
	Contingency	45,325	
	Aftercare total	**498,578**	**$ 544,810**
		2022	2026

Appendix F: Multi-Criteria Analysis

				Scoring					
Main Criteria	Individual Criteria	Description	Weighting	3	2	1	Option	Raw Score	Weighted Score
Financial (60%)	Total cost	Total of capital, operational and disposal costs as a gate fee across the 20-year project lifecycle.	0.25	Less	More	Most	Current landfill - BAU	3	0.75
							Improve landfill management	2	0.5
							Launceston landfill LLF	1	0.25
							WtE on island	1	0.25
							Incinerator on island - no energy	1	0.25
							PEF Rec + LLF	1	0.25
							MSW dehydration + LLF	2	0.5
							AD FO on island + LLF	2	0.5
							Compost FOGO + LLF	2	0.5
							Kerbside collection + LLF	2	0.5
							Improved recycling + LLF	3	0.75
	Cost per tonne	Total expenditure per tonne of waste generated across the 20-year project lifecycle.	0.25	Less	More	Most	Current landfill - BAU	3	0.75
							Improve landfill management	2	0.5
							Launceston landfill LLF	2	0.5
							WtE on island	1	0.25
							Incinerator on island - no energy	1	0.25
							PEF Rec + LLF	1	0.25
							MSW dehydration + LLF	3	0.75
							AD FO on island + LLF	1	0.25
							Compost FOGO + LLF	1	0.25
							Kerbside collection + LLF	1	0.25
							Improved recycling + LLF	3	0.75
	Commercial viability	Commercial attractiveness, revenue potential, cost recovery and long-term sustainability.	0.05	High	Medium	Low	Current landfill - BAU	3	0.15
							Improve landfill management	3	0.15
							Launceston landfill LLF	2	0.1
							WtE on island	2	0.1
							Incinerator on island - no energy	1	0.05
							PEF Rec + LLF	1	0.05
							MSW dehydration + LLF	2	0.1
							AD FO on island + LLF	2	0.1
							Compost FOGO + LLF	2	0.1
							Kerbside collection + LLF	2	0.1
							Improved recycling + LLF	2	0.1
	Financial risk	Level of financial exposure and sensitivity to cost overruns or revenue uncertainty.	0.05	Low	Medium	High	Current landfill - BAU	3	0.15
							Improve landfill management	2	0.1
							Launceston landfill LLF	3	0.15
							WtE on island	1	0.05
							Incinerator on island - no energy	1	0.05
							PEF Rec + LLF	1	0.05
							MSW dehydration + LLF	2	0.1
							AD FO on island + LLF	2	0.1
							Compost FOGO + LLF	2	0.1
							Kerbside collection + LLF	2	0.1
							Improved recycling + LLF	2	0.1

Operational (30%)	Technical complexity	Complexity of operating and maintaining machinery, including reliability and interface risks.	0.08	Minimal	Moderate	Significant	Current landfill - BAU	3	0.24
							Improve landfill management	3	0.24
							Launceston landfill LLF	3	0.24
							WtE on island	1	0.08
							Incinerator on island - no energy	1	0.08
							PEF Rec + LLF	1	0.08
							MSW dehydration + LLF	2	0.16
							AD FO on island + LLF	1	0.08
							Compost FOGO + LLF	2	0.16
							Kerbside collection + LLF	2	0.16
							Improved recycling + LLF	2	0.16
	Labour requirements	Level and quality of staffing required to maintaining the operation of the option.	0.05	Minimal	Moderate	Significant	Current landfill - BAU	3	0.15
							Improve landfill management	3	0.15
							Launceston landfill LLF	3	0.15
							WtE on island	1	0.05
							Incinerator on island - no energy	1	0.05
							PEF Rec + LLF	1	0.05
							MSW dehydration + LLF	2	0.1
							AD FO on island + LLF	1	0.05
							Compost FOGO + LLF	2	0.1
							Kerbside collection + LLF	2	0.1
							Improved recycling + LLF	2	0.1
	Regulatory planning	Complexity of the time and effort required to obtain all necessary approvals.	0.06	Minimal	Moderate	Significant	Current landfill - BAU	3	0.18
							Improve landfill management	2	0.12
							Launceston landfill LLF	2	0.12
							WtE on island	1	0.06
							Incinerator on island - no energy	1	0.06
							PEF Rec + LLF	1	0.06
							MSW dehydration + LLF	1	0.06
							AD FO on island + LLF	1	0.06
							Compost FOGO + LLF	2	0.12
							Kerbside collection + LLF	2	0.12
							Improved recycling + LLF	3	0.18
	Education	Difficulty of gaining community understanding and acceptance of new options.	0.06	Minimal	Moderate	Significant	Current landfill - BAU	2	0.12
							Improve landfill management	3	0.18
							Launceston landfill LLF	2	0.12
							WtE on island	1	0.06
							Incinerator on island - no energy	1	0.06
							PEF Rec + LLF	1	0.06
							MSW dehydration + LLF	1	0.06
							AD FO on island + LLF	2	0.12
							Compost FOGO + LLF	3	0.18
							Kerbside collection + LLF	3	0.18
							Improved recycling + LLF	3	0.18
	Implementation time	Time required to progress the option from concept to operational readiness.	0.05	< 3 years	3 - 10 years	> 10 years	Current landfill - BAU	3	0.15
							Improve landfill management	3	0.15
							Launceston landfill LLF	2	0.1
							WtE on island	1	0.05
							Incinerator on island - no energy	1	0.05
							PEF Rec + LLF	1	0.05
							MSW dehydration + LLF	2	0.1
							AD FO on island + LLF	2	0.1
							Compost FOGO + LLF	3	0.15
							Kerbside collection + LLF	3	0.15
							Improved recycling + LLF	3	0.15

Environmental (10%)	Greenhouse gas emissions	Relative emissions profile across all lifecycle stages.	0.03	Minimal	Moderate	Significant	Current landfill - BAU	2	0.06
							Improve landfill management	2	0.06
							Launceston landfill LLF	2	0.06
							WtE on island	2	0.06
							Incinerator on island - no energy	1	0.03
							PEF Rec + LLF	2	0.06
							MSW dehydration + LLF	2	0.06
							AD FO on island + LLF	2	0.06
							Compost FOGO + LLF	2	0.06
							Kerbside collection + LLF	2	0.06
							Improved recycling + LLF	3	0.09
	Operational liability	Amount of ongoing environmental exposure (e.g. odour, leachate, groundwater)	0.04	Minimal	Moderate	Significant	Current landfill - BAU	2	0.08
							Improve landfill management	3	0.12
							Launceston landfill LLF	2	0.08
							WtE on island	2	0.08
							Incinerator on island - no energy	2	0.08
							PEF Rec + LLF	3	0.12
							MSW dehydration + LLF	2	0.08
							AD FO on island + LLF	2	0.08
							Compost FOGO + LLF	2	0.08
							Kerbside collection + LLF	3	0.12
							Improved recycling + LLF	3	0.12
	Impact mitigation	Scale of caused environmental impacts and feasibility of mitigation.	0.03	Easily mitigated	Somewhat mitigatable	Difficult to mitigate	Current landfill - BAU	2	0.06
							Improve landfill management	2	0.06
							Launceston landfill LLF	2	0.06
							WtE on island	1	0.03
							Incinerator on island - no energy	1	0.03
							PEF Rec + LLF	3	0.09
							MSW dehydration + LLF	2	0.06
							AD FO on island + LLF	2	0.06
							Compost FOGO + LLF	2	0.06
							Kerbside collection + LLF	3	0.09
							Improved recycling + LLF	3	0.09

Appendix G: Volume Calculations

Cell	Major axis (m)	Minor axis (m)	Volume above ground level (m^3)	Volume below ground level (m^3)	Total volume (m^3)
1	104	58	21,894	11,390	33,284
2	195	80	58,187	29,856	80,043
3	100	77	28,274	14,622	42,896

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