



ACT
Government

Single Assessment Framework (SAF)

Business Case

Tier 1 (over \$50 million or High Risk)

Project Name:	ACT NoWaste FOGO Facility
Total Project Value (estimated) FY22- FY25:	\$ [REDACTED] (nominal, risk adjusted)
	\$ [REDACTED] (includes admin fees)
Capital Appropriation Requested FY22- FY25:	\$ [REDACTED] (nominal, risk adjusted) (including \$ [REDACTED] capital appropriation and \$ [REDACTED] capital provision)
Project Stage:	Planning
Risk Assessment (high/med/low):	Medium
Proposed Delivery Model:	DCMO
Requesting Directorate:	ACT NoWaste
Requesting Minister:	Chris Steel MLA
Business Case Advisors:	Arup

NOTE: This template should be completed using the accompanying SAF Business Case Guidance Notes.

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Sign Offs

Requesting Directorate:

Document in order to proceed

IFR

MPC:

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Document in order to proceed – CMTEDD Sign-offs complete

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1. Executive Summary

1.1 Statement of Need

The 2018 Waste Feasibility Study Roadmap and Recommendations, the 2019-20 Budget Papers for Transport Canberra and City Services, and the ACT Climate Change Strategy 2019-2025 have all identified the need for better rates of resource recovery and a move towards a circular economy. A major focus is the minimisation of waste to landfill and recovery of organic waste for beneficial reuse. The commitment under the ACT Climate Strategy is to introduce food and garden waste collection for all households (including multi-unit dwellings) from 2023.

To reach the emissions and waste reduction targets specified by the ACT Government, the current waste management infrastructure is limited in its effectiveness. The level of organic waste being produced is continuing to rise due to a wide array of factors including population growth, consumption levels and income, and increasing the volumes of waste being directed to landfill. With landfill no longer considered as the best solution for organic wastes, action is required to find alternative solutions for organic waste management.

An Investment Logic Mapping (ILM) Workshop was conducted in the lead up to the development of the business case. The workshop focused on four themes that need addressing, namely: (1) the impact of waste disposal practices on the community; (2) the negative impacts of poor disposal practices on the natural environment; (3) failing to acknowledge the value that can be recovered from waste streams; and (4) community dissatisfaction with current waste disposal practices.

The disposal of organic waste to landfill has detrimental effects on the environment and community, producing landfill gas and contaminated leachate. Methane is a key contributor to climate change and is difficult to fully capture or convert to energy once landfilled. Additionally, leachate is difficult to treat and has the potential to pollute waters.

As such, the community within the ACT, which is both educated and motivated to see action towards climate change and a circular economy, is seeking initiatives from the ACT Government towards better waste management. That, in combination with high levels of waste generation due to higher median incomes in the ACT, means there is significant opportunity to better utilise valuable resources that are currently going to landfill.

A range of options for diversion of food waste from landfill have been identified as possible responses to these issues. The proposed solution from this Business Case involves the development of an organic waste recovery facility to treat food and garden organic waste (**FOGO**) to produce a clean, high quality compost, which requires the procurement of an in-vessel composting system (**IVC**). There is an opportunity for the ACT to use this compost in various applications such as landscaping of urban developments, parks and gardens, retail nurseries and sale for home gardening and landscaping, maintenance of sporting fields, rehabilitation and landscaping of transport corridors and other construction sites. Opportunities also exist for using the compost in agriculture

and horticulture such as dairy pastures, orchards, broadacre cropping and viticulture, thus ensuring waste organics are dealt with in a truly circular way.

Currently, the ACT offers an opt-in household collection service and a free drop-off option for garden organics which are processing in open windrow at the Corkhill Brothers site at Mugga Lane. However, this existing operation cannot process food waste from a whole-of-ACT FOGO service through open windrow composting due to amenity risks. There are currently no facilities in the ACT which can process and recover FOGO material due to the putrescible nature and amenity risks posed by raw food waste. A separate services business case has been submitted to support the consolidation of ACT's current waste collection service contracts into a single collection contract from 2023, including replacing the current garden waste collection service with a FOGO collection service.

1.2 Project Solution

From the findings of the 2020 Directions Paper and Feasibility study, the proposed solution seeks to expand the existing opt-in garden organics collection to a mandatory food and garden organics service (FOGO) for households, helping to achieve goals set out in the ACT Climate Change and Waste Strategy. The most appropriate technology is in-vessel composting (IVC), that focusses on ACT household feedstock.

The proposed service is expected to recover 42,000 tonnes per annum of FOGO feedstock by 2023, made up of approximately 70% garden organics and 30% food organics. The facility will be sized for at least 50,000 tonnes per annum of processing capacity, and no major expansion works is expected on the facility within the first 15 years of the 20-year operations contract.

This solution is expected to address the problems included in the statement of need, identified in the ILM through delivering the following benefits:

- Community satisfaction with services provided
- Improving the natural environment
- Creating value from waste streams
- Reducing the impact of waste disposal on the community

1.3 Delivery Model

The Delivery Model assessment identified both a design-construct-operate-maintain (DCOM) and a User Charge PPP as preferred Delivery Models for the FOGO facility. Whilst both are suitable delivery models, at this stage of the project lifecycle it is not possible to understand in more granular detail the relative impact to risk quantification under each model, and therefore a quantitative analysis that compares the two options cannot be undertaken to select one of the two models.

As such, to demonstrate the difference in the total cost of a private sector delivery model vs. traditional government procurement, the analysis completed in the Business Case shows the outcomes under DCOM procurement compared to a traditional government procurement only.

It is expected that the final selection will be made in consultation with ACT Treasury after the Business Case assessment and approval process, and informed by further market feedback.

This Business Case has been prepared on the basis of the ACT developing a greenfield organic waste processing facility. Market sounding has ascertained that it is possible that a private sector operator could offer to build its own facility on different land to that identified by and owned by the ACT and/or retrofit an existing facility. In this case, a 'contract for services' contracting approach may be used in the form of a standard waste disposal agreement. As such further feedback from the market will be used to inform the final delivery model.

Any such option would be reliant on the private sector and is not within the direct control of the ACT. The results of informal market sounding, and the industry knowledge of both ACT NoWaste and its consultants revealed that there is no operational facility proximate to the ACT that is currently permitted to receive FOGO waste of the volume generated by the Territory.

The final approach may be informed by the first step in the procurement process, which is envisaged to have two stages:

1. Request for Proposal (RFP) from bidders which contains a detailed description of the ACT's needs, reflecting the project outlined in this Business Case; and
2. Request for Tender (RFT) from shortlisted bidders that takes into account any market feedback received during the RFP stage, to the extent permitted by procurement rules.

This process is reflected in the project programme at Appendix D, and based on consultations between NoWaste and MPC.

1.4 Funding Approval Sought

1.4.1. Type of funding sought

☐ Feasibility*
☐ Concept design
☐ Detailed design (note only where D+C has been justified)
☐ Full Business Case
☒ Delivery/Construction

*regardless of dollar value of the feasibility funding being sought, it is the estimated total value of the project which guides which Tier the project is considered under.

1.4.2. Cost Estimate

Benchmarking analysis has been used to estimate the capital and operating costs of the project. Benchmarks included:

- Recent tenders for a comparable project in NSW

- Publicly available information on domestic and international in-vessel composting facilities

The primary estimated costs are reflective of the feasibility stage of the project. Costs will be refined throughout the project lifecycle, particularly as contractor tenders are returned with fixed prices and other quotes for primary elements are received by the ACT Government. Estimated capital and operating costs excluding risk adjustments are shown in Table 1 and Table 2. Table 3 shows the operating cost for the first full year of operation.

Table 1: Capital Costs

Item	Value (\$ FY21, real)
Development capital costs	
EIS consultancy costs	
Statutory approval costs	
Procurement support costs	
Construction capital costs	
External utilities connection	
Recycling road extension	
Contractor profit margin	
Total capital costs	

Table 2: Operating Costs (20 years)

Operating Costs (across 20 years)	Value (\$ FY21, real)
Staff costs	
Education costs	
Fixed costs	
Variable O&M costs	
Landfill costs	
Contractor profit margin	
Total operational costs	

Table 3: Annual operating cost for first full year of operation

Item	Value (\$ FY21, real)
Staff costs	
Education costs	
Fixed costs	
Variable O&M costs	
Landfill costs	
Contractor profit margin	
Total operational costs	

1.4.3. Contingencies Included

Contingency has been estimated through undertaking a risk analysis, and applying monte carlo simulation. Where possible, risk mitigation measures have been identified and are outlined in the Risk Management Plan included in Appendix E. Delivery Model Contingency has been assessed only for risks that have been quantified as part of the risk assessment, and an exercise in allocating risks between ACT and private sector has been undertaken in line with the anticipated delivery model.

The following table shows contingency applied, as well as the risk allocation under both delivery models assessed.

Table 4: Delivery Model Contingency

Cost / Revenue Driver	Risk adjustment	Risk allocation to Government under DCOM	Risk allocation to Government under traditional government procurement
Capex	█ % uplift in overall capex	█ % of the initial capex risk is allocated to Government	100% of the capex risk is allocated to Government
Opex	█ % uplift in annual opex	█ % of the initial capex risk is allocated to Government	100% of the capex risk is allocated to Government

1.4.4. Cost to Government

The assessment has identified an opportunity to deliver at lower cost to government by employing the DCOM instead of traditional government procurement. The Public Sector Comparator (PSC) reflects the cost of government delivery and consists of the raw capital and recurrent costs, and project risks, including both those that could be transferred to private sector through a DCOM / PPP, and non-transferrable risk.

The risk-adjusted net present cost to government under the DCOM model amounts to \$ █.

Table 5 shows the breakdown of net present costs to government.

Table 5: Net present costs to government under DCOM model

DCOM	Value (\$, Discounted)
Risk-adjusted capital costs to government	█
Risk-adjusted recurrent costs to government	█
Net present cost to government	█

As shown in Table 6, the preliminary results of the analysis shows a \$ [REDACTED] saving for Government if the Project is procured as a DCOM.

Table 6: Risk adjusted cost of delivery, PSC vs. DCOM

	PSC	DCOM
Risk-adjusted NPC cost to Government	[REDACTED]	[REDACTED]

[OBJ]

Figure 1: Financial Analysis

1.4.5. Incremental Procurement/Transaction Costs

The illustrative private sector delivery model for this project, DCOM, requires an incremental amount of government effort during the procurement period vs. traditional government delivery. Given that the terms of the awarded contract will be relatively fixed for the entire operational period under DCOM, it is important that the Government fully understands the risks and potential costs, and associated contract structure. To do so, it is likely that legal, technical, and commercial advisors will be required during procurement. Costs anticipated for procurement and transaction effort have been incorporated in the analysis and are detailed in Section 4.2.1.

1.5 Treasury Budget Summary

The budget impact statement includes the FOGO facility costs to the ACT Government resulting from the project excluding the collection costs (which will be defined under a separate Business Case). It includes implications for ACT NoWaste including additional staff, equipment and any financial impacts on other Directorates that are not included in the financial model.

Under a DCOM, the government will fully fund the project. Payments to the contractor, which include a profit margin, will be made according to an agreed schedule, yet to be fully determined. Payments are expected to continue until 2044, the end of the operating period. The exact schedule for payments will need to be negotiated with the contractor but are likely to be monthly.

The following preliminary financial impact summary assumes DCOM delivery.

This Business Case seeks funding for the 2021-22 and 2022-23 financial years for the development costs for the FOGO Facility – including a portion of the design development capex required to progress the project from the feasibility phase to construction. This allows for activities such as planning approvals, Front End Engineering Design (FEED), procurement, legal advisory, financial advisory, and the development of an Environment Impact Statement. The establishment of a provision for the construction, operation and maintenance of a new FOGO composting facility and the other essential requirements to introduce the new waste collection service to households are proposed to be sought in an out-of-session decision from ERC during the 2021-22 financial year as

the procurement process progresses. This Business Case, other than the Financial Impact summary at table 7, reflects the full FOGO Facility costs and analysis.

Table 7: Preliminary Financial Impacts Summary (\$ nominal FY 2021)

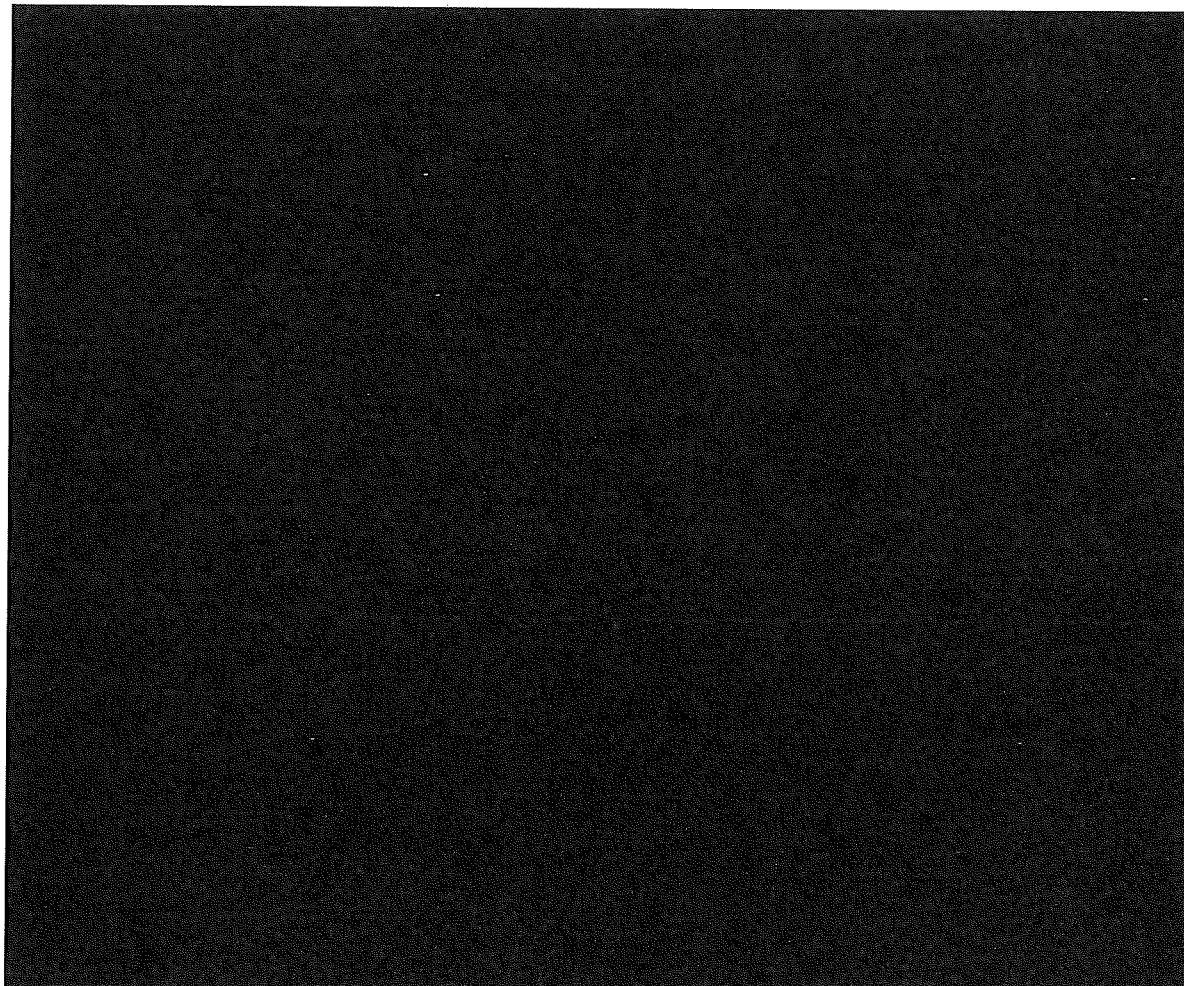


Table 8: Staffing Impacts Summary

Impact	2020-21	2021-22	2022-23	2023-24
Total Additional FTEs*	Nil	Nil	Nil	Nil

1.6 Next Steps

The proposed next steps for the project are broken down into seven key phases as shown in the table below. The next steps relating to the collections business case is also shown below in italics. It is key to note that the proposed timeline is very tight and requires the timely completion of key activities and careful and efficient management of various interfacing work streams, such as internal ACT Government approvals of the business case and budget. The timeline proposes the shortest possible timeline for delivery of the facility, with little to no float for resolving any issues around design and construction.

Table 9: Project Timeline

Stage	Timeframe
Business Case Finalisation	Q2 2021 – Q3 2021 (5 months)
Procurement Process	Q4 2021 – Q3 2022 (7 months)
Procurement Finalisation	Q2 2022 – Q3 2022 (2 months)
EIS and Concept Design	Q2 2021 – Q4 2022 (20 months)
Development Application	Q3 2022 - Q4 2022 (2 months)
Design (by selected bidder)	Q3 2022 – Q4 2022 (5 months)
Community Education	Q1 2023 – Q4 2023 (11 months)
Construction and Commissioning (by selected bidder)	Q1 2023 – Q4 2023 (11 months)
<i>Rollout of bins and caddies for FOGO collection</i>	<i>October 2023</i>
<i>Household collection service commences under new contract. FOGO collection commences</i>	<i>30 October 2023</i>

There has been no float allowed for in the development of the timeline to achieve operations by end of 2023. As such timely review of contracts for preferred bidder will be required with no allowance for extended legal negotiations that may occur.

Additionally, the EIS process relies upon the overlap of permitting and of development of detailed design. This itself may precipitate late design changes and late stage permit modification. As such, a 5-month period for design is possible, however, the capacity of the successful tenderer to deliver the design within this period should be a key criteria in the tender assessment process. Construction and commissioning will require early procurement of key plant and equipment.

The key next phase and deadlines to ensure budget approve are summarised in the table below.

Table 10: Project deadlines

Task	Deadline
Cabinet Review Process	1 July 2021

Approvals - Budget estimates, including allocation for FOGO procurement 1 September 2021

2. Project Outline

2.1 Description of the Project

2.1.1. Overview

The ACT government is committed to delivering real and lasting improvement in waste management and resource recovery for the ACT. This is in support of the Territory's wider commitments to pursuing prosperity, quality of life and emissions reduction by embracing circular and sustainable waste management.

This Business Case, led by the ACT NoWaste Branch, aims to implement a best practice household waste management processes for the ACT. The purpose of this project is to reduce the negative impacts of organic waste to the community and create value from the output. The objectives of the project are to:

- Meet the commitment under the ACT Climate Strategy 2019-2025 "to introduce food and garden waste collection for all households (including multi-unit dwellings) from 2023, and support with an education program from 2020"
- Move the ACT towards the 90% resource recovery target (by 2025) set in the Waste Strategy – it is estimated that FOGO will contribute to an approximately 4% contribution to this target
- Deliver new organics processing infrastructure within the ACT, converting FOGO material into useful compost products
- Support carbon neutrality of the waste sector
- Help redirect from landfill c.50% of available organic material in the domestic (currently 37% organic composition in red bin) and commercial waste stream, and
- Engage with the local community to drive behavioural change.

The introduction of the ACT Waste Management Strategy in 2011 has created a goal of improving resource recovery and a carbon neutral waste sector. It sets out a strategy of 'reduce and reuse' to achieve resource recovery rates of over 90% by 2025. Since the introduction of this strategy there are continued shortfalls in achieving these goals, accelerating the need to create a direction towards organic waste recovery.

The 2018 Waste Roadmap recommended the implementation of a composting facility within the ACT that is capable of processing both food and garden organics. This identified that there was a clear opportunity to significantly reduce the volume of food waste from households that ends up in landfill.

More recently a directions paper prepared in June 2020 considered a range of high-level options for processing technology and feedstock for treating household FOGO waste. The subsequent Feasibility Study of these options issued in November 2020 has further led to the development of this business case. This business case summarises the approach taken to select the preferred option, and details the economic, financial, and commercial assessment, as well as preferred procurement approach.

2.1.2. Scope of works

This proposed investment seeks process food and garden organics service (FOGO) for households, helping to achieve goals set out in the ACT Climate Change and Waste Strategy. Part of the proposed solution, detailed in this Business Case is an in-vessel composting (IVC) facility, that focusses on ACT household feedstock. This investment selection was recommended in the June 2020 Directions paper, backed further by Chris Steel MLA, Minister for Recycling and Waste Reduction in August 2020.

The proposed service is expected to recover 42,000 tpa of FOGO feedstock by 2023, made up of approximately 70% garden organics and 30% food organics. The facility will be sized for at least 50,000 tpa of processing capacity, and no major expansion works to the facility is expected within the first 15 years of operations.

ACT NoWaste has identified a viable project site with a footprint that enables growth over time to treat up to 70,000 tpa of FOGO feedstock. It is key to note that the anticipated delivery models, either PPP or DCOM, have the flexibility to consider supporting a service contract structure that could include a different location, depending on its ability to achieve best outcomes for the ACT Government.

2.1.3. Scope of services

This scope of services includes the delivery of a FOGO processing facility, more specifically, an IVC facility, delivered through either a DCOM or User Charge PPP. The proposed services include:

- Design and construction of a fit for purpose IVC facility.
- Long-term private sector operations and maintenance of the IVC facility.
- The production and sale of compost output from the processing facility for meaningful land rehabilitation.

This Business Case has been prepared on the basis of the Territory developing a greenfield organic waste processing facility..

2.1.4. Project Assumptions and Dependencies

Financial and economic modelling conducted to support this business case has assumed the following key parameters:

- Total capacity of 50,000 tpa
- A project term, of 21 years, comprising a one-year construction term and 20-year operating period
- The project would be developed on ACT NoWaste's identified site, with the site to be provided to the project developer for a peppercorn rent for the duration of the project term
- For the purpose of the value for money analysis, a DCOM delivery model, integrating the construction and operations into one contractual arrangement with a project developer
- Revenues from the sale of compost produced at the facility to be realised by the project developer, and a resultant reduction in the subsidy required from government, with the developer to bear all sales volume risk, and
- A guaranteed volume of feedstock at 42,000 tpa.

The key interdependency for this business case is the collection services required to provide the necessary feedstock for the FOGO facility. The business case for FOGO collection services is separate to this funding proposal. The collections business case aims to continue to be rolled out across Canberra, achieving full coverage from 2023/24.

2.2 Review 1 (IFCW): Status of Functional Brief/Output Specification

Sign off that the functional brief/output specifications are sufficiently progressed in order to go to market under the delivery model selected and within the procurement timeline outlined in the business case. Attach the Functional Brief at **Appendix A**.

Review 1 (IFCW) Officer Name: _____

Signature: _____

Date: _____

- *This is the first review point for IFCW and is an assessment of the status of the functional brief/output specification.*
- *Sign off should only occur if the IFCW officer is confident that the functional brief/output specifications are sufficiently progressed in order to go to market under the delivery model selected, and within the procurement timeline outlined in the business case.*
- *Risk workshops and quantification of project risks is mandatory for Tier 1 and 2 projects.*

Disclaimer: *This review does not represent an endorsement or agreement by the signing officer as to the contents of the section or a certification that the work was correctly performed.*

3. Needs Analysis

3.1 Problem

Three problems have been identified in response to the need to improve household waste management and resource recovery for the ACT through an Investment Logic Map (ILM) workshop. The workshop was undertaken to better understand the challenges facing the ACT Government in relation to its waste management for household FOGO waste. The ILM was conducted by technical consultants and ACT Government representatives. The following problems were defined:

- Problem 1: Growing volumes of untreated and avoidable organic materials is putting pressure on existing landfill facilities, bringing forward the need for a costly new site in the future
- Problem 2: Growing community concerns around unnecessary disposal of organic materials to landfill and the resulting emissions is a major reputational risk if the Government does not act now
- Problem 3: The inability to turn organic materials into a consumer product is resulting in a wastage of valuable resources and noticeable impacts on the environment and local amenity

It is key to note the impacts of the waste sector on climate change led the discussions and development of the ILM. This in conjunction with a general expectation that the ACT Government can improve its recovery of resources was also a focus for discussion, recognising the value of the organic material that is permanently lost when landfilled. The community expectations are ultimately interdependent with the loss of valuable resources to landfill and any effects of resultant of greenhouse gas emissions.

Discussed in Section 3.1.1, the problems are summarised in the ILM in Figure 2 below.

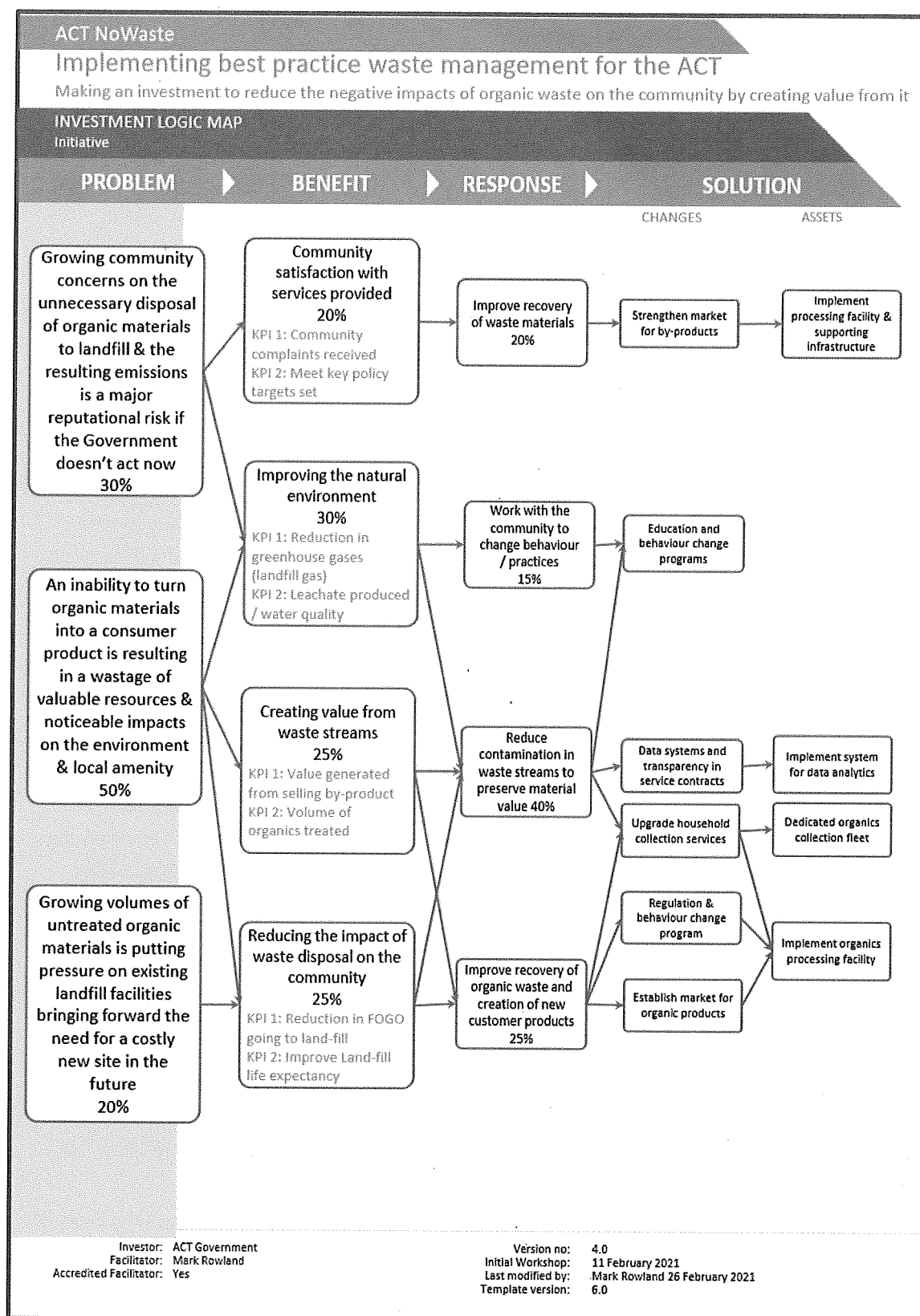


Figure 2: Investment Logic Map

3.1.1. Evidence of the Problem

Problem 1: Growing volumes of untreated and avoidable organic materials is putting pressure on existing landfill facilities, bringing forward the need for a costly new site in the future

Finite landfill capacity and its impacts

Reliance on land filling has a significant impact on landfill capacity, health, and environment. Landfilling is at the bottom of the waste hierarchy, and currently the only option in the ACT organic waste disposal, unless individual households opt-in to voluntary composting. The Mugga Lane landfill has been expanded to accommodate the growing waste in the state and based on the current rate of waste generation is predicted to reach its capacity limit by 2030.¹

Government intervention is required to address these issues, particularly as landfills create air (via methane gas) and water (via leachate) pollution. A key concern is groundwater pollution via leaching. Leachate is the liquid that seeps out of landfill sites made up of a high concentration of chemicals and heavy metals from the combination of industrial and agricultural waste. This has the potential to seep into the groundwater system which can then pollute local water sources and negatively impact water quality and supply. The cost for the government to rectify and manage this issue can be high.² Implementing the segregation of untreated organic waste can help avoid pressure on existing landfills and has potential to reduce harmful environmental impacts.

Problem 2: Growing community concerns around the unnecessary disposal of organic materials to landfill and the resulting emissions is a major reputational risk if the Government does not act now

Community Awareness / concerns

There is growing community interest in waste and resource management. Rising resource scarcity and tighter environmental standards have shifted consumer and business interest towards the circular economy. As a result, we are witnessing a wide-spread shift in consumer behaviour backed by a mounting desire to recapture our resources and re-use or recirculate them within supply chains. Many countries around the globe have taken measures to reduce their carbon emissions and drive investment into cleaner options, including introducing formal carbon pricing schemes.³ Such trends are gaining momentum and shifting community perception and awareness towards climate issues.

A FFW CRC Benchmarking (as yet unpublished) study found that the primary group of food wasters in the ACT were households on higher incomes (of over \$100,000 p.a.) Over 61% of the those interviewed as part of benchmarking study expressed a desire for reducing overall food waste by

¹ ACT Government, *Waste Feasibility Study Roadmap and Recommendation*, 2018 retrieved from https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.act-yoursay.files/2715/2566/4187/WFS_roadmap.pdf

² *Environment and Socio-Economic Impacts of Landfills*, 2012 retrieved from https://www.researchgate.net/publication/278738702_Environmental_and_socio-economic_impacts_of_landfills

³ Tax Foundation, *Carbon Taxes in Europe*, 2020 retrieved from <https://taxfoundation.org/carbon-taxes-in-europe-2020/>

doing the right thing and saving the planet. These responses and level of community engagement show the support, urgency and expectations for the government to execute actions centred on climate change.

ACT Government Climate Change Strategy and Waste Feasibility Study

Recognising community concerns, the ACT's *Climate Change Strategy 2019-25* includes actions to avoid and manage waste supported by a set of ambitious, yet achievable goals. The actions in Goal 6 (Waste Avoidance and Management) identified opportunities to reduce overall emissions from organic waste treatment.

The value of resources and embodied energy in waste is a missed economic opportunity, as indicated in the National Waste policy, Australia, ⁴ and its management attracts significant community interest. For example, community engagement and support for the development of the ACT Government Climate Change Strategy played a major role in shaping its actions and targets. A total of 226 suggestions were put forward by the community regarding waste matters with over 92% focused on diverting organic waste from landfill for beneficial re-use.⁵

Similarly, there were various suggestions related to managing landfill waste, providing incentives for households to reduce organic waste, implementing a ban on food wastages by commercial and industrial sectors, and lowering Australia's emissions profile.

A 2014 audit estimated that around 35% of household general waste is food and 10% is garden waste. Food organics represents the single largest proportion of waste in household garbage bins. Emissions from landfill in 2017-18 were 60.7 kt CO₂ -e, representing 2.2% of total emissions. From 2020, once electricity emissions are near zero, waste treatment is predicted to account for 4% of emissions.⁶

⁴ Australian Government, *National Waste Policy*, 2018 retrieved from <https://www.environment.gov.au/system/files/resources/d523f4e9-d958-466b-9fd1-3b7d6283f006/files/national-waste-policy-2018.pdf>

⁵ ACT Government, *ACT Climate Strategy Engagement Report*, July 2018

⁶ ACT Government, *ACT Climate Change Strategy 2019 – 25*, 2019

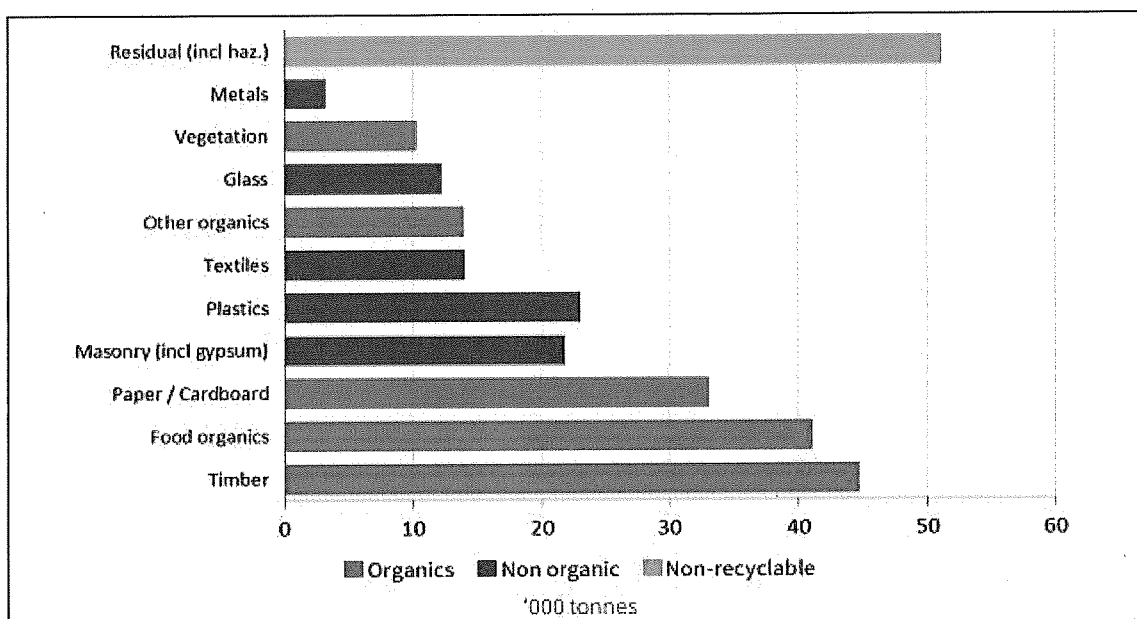


Figure 3: Waste streams going to landfill in 2014-15⁷

The ACT Waste Feasibility study identified the tonnage of various waste streams going to landfill in 2014 – 15, as shown in Figure 3. Over 40,000 tonnes of organic waste were sent to landfill. This identification of waste streams that can be diverted from landfills highlights the clear potential to increase the rate of recovery of organic waste in the ACT.

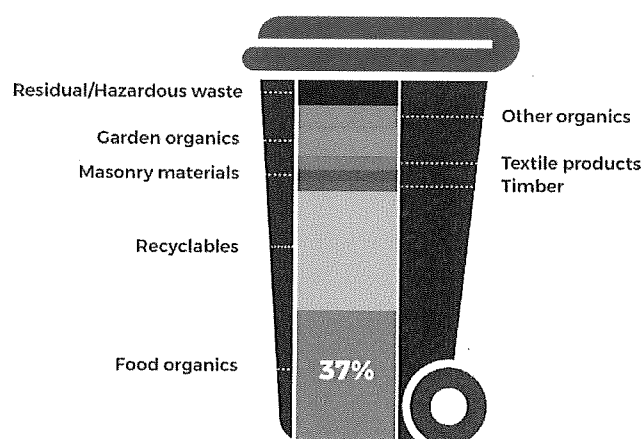
Problem 3: The inability to turn organic materials into a consumer product is resulting in wastage of valuable resources and noticeable impacts on the environment and local amenity

Waste of valuable resources

According to the National Food Waste Baseline report 2019, households are responsible for 34% of waste in the overall food supply chain and 74% of food waste in landfills are from households.⁸ Additionally, kerbside bin audits (Figure 4) found that almost 37% of a typical ACT household 'red bin' is full of food organics. Food and garden organics contain carbon, nutrients, minerals, and water that are recycled naturally as part of the ecosystem. Disposing this to landfill permanently loses the value from these resources.

⁷ ACT Government, *Waste Feasibility Study Roadmap and Recommendations*, 2018 retrieved from https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.act-yoursay.files/2715/2566/4187/WFS_roadmap.pdf

⁸ Arcadis, *National Food Waste Baseline*, 2019 retrieved from <https://www.environment.gov.au/system/files/pages/25e36a8c-3a9c-487c-a9cb-66ec15ba61d0/files/national-food-waste-baseline-executive-summary.pdf>

Figure 4: Typical red-bin content⁹

Waste disposed of at landfill can produce toxic chemicals that are harmful to soil, whereas composting has proven to be a safer method of waste management subject to feedstock quality. The by-products of composting contain compounds that can be transformed into biofertilizers and soil amendments. Composting also protects ground water from pollution such as leachate that results from landfilling.¹⁰ This can help reduce health and environmental impacts.

As such, the better management of organic waste is an opportunity to move from a linear economy to a circular value chain model. This lost value was assessed in a study conducted for the Environment Protection Authority (EPA),¹¹ which found the economic and environmental value of waste increases as the proportion of organic processing does. There is also an opportunity for increased employment opportunities, with the National Waste Policy, 2018 report¹² estimating the following figures.

Table 11: Estimated value of waste to the economy

Item	Value
Value of Waste management services	\$ 12.6 Billion per annum
Sales of recovered materials	\$ 2.9 Billion per annum
Waste related activities adds a total value to the economy	\$ 6.9 Billion per annum
For every 10,000 tonnes of waste recycled	9.2 jobs created

⁹ ACT Government, *Overview: A roadmap to improved resource recovery, Waste Feasibility Study*, 2018 retrieved from https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.act-yoursay.files/3015/2582/3028/WFS_overview.PDF

¹⁰ MDPI, *Waste management through composting: challenges and potentials*, 30 May 2020 retrieved from <https://www.mdpi.com/2071-1050/12/11/4456>

¹¹ Environment Protection Authority (EPA), *Organic waste economic values analysis*, 2002

¹² Australian Government, *National Waste Policy*, 2018 retrieved from <https://www.environment.gov.au/system/files/resources/d523f4e9-d958-466b-9fd1-3b7d6283f006/files/national-waste-policy-2018.pdf>

Environmental Impact

Poor waste management has a significant impact on the environment and its amenity for the community. Food organics are highly putrescible due to their high nutrient content and require appropriate management to minimise their impacts on the environment. Every tonne of food waste creates up to 4.5 tons of CO₂ emissions and waste is responsible for approximately 2% of Australia's emissions, consisting largely of methane gas from decay of organic material in landfill.

The *State and Territory Greenhouse Gas Inventories 2018* report provides estimates of total net emissions of greenhouse gas (GHG) in ACT since 1990 as shown in Figure 5 below.¹³ The total net emissions include emissions from the energy sector, industrial processes, agriculture, land-use change and forestry and waste. Overall emissions have increased by 21% of 1990 levels as shown in the figure below.

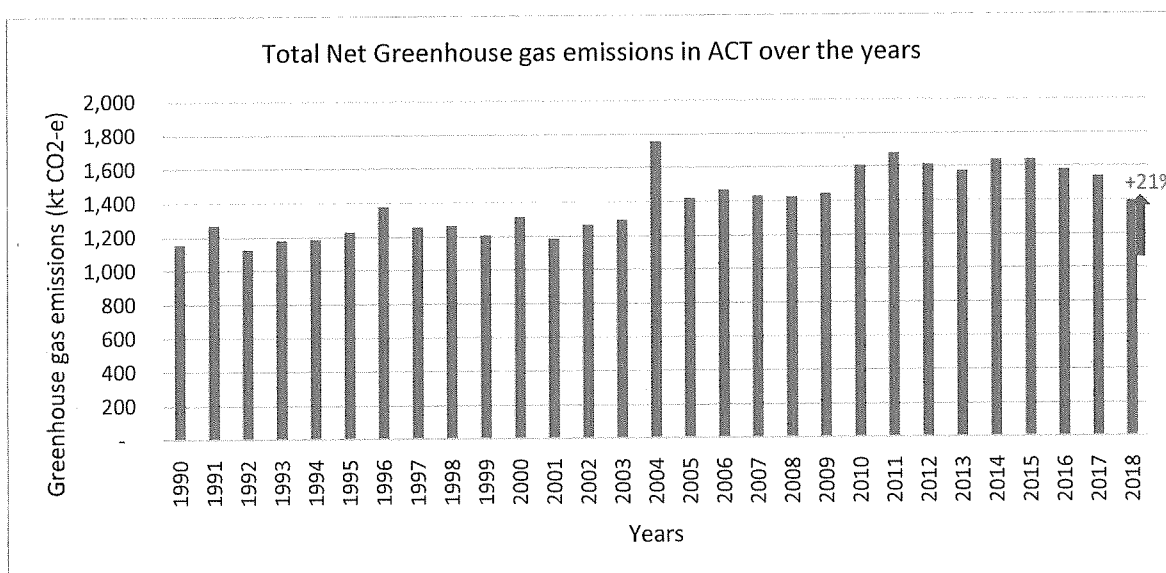


Figure 5: Total Net Greenhouse gas emissions in ACT over the years

The ACT has committed to reducing its overall emissions by (from 1990 levels):

- 40% by 2020
- 50 - 60% by 2025
- 65 – 75% by 2030
- 90 - 95% by 2040
- 100% (net zero emissions) by 2045

¹³ *State and territory greenhouse gas inventories emissions time series, 2018*

Emissions have increased to a level of +21% in 2018, making the 2020 target of -40% difficult to achieve. To meet the ambitious targets of 50 – 60% by 2025, further action is essential. This requires government to work closely with communities and businesses to find new ways to reduce emissions.

Timing Considerations

The ACT government has some of the most aggressive emission targets observed across Australia and globally, with the Territory targeting net zero emissions by 2045. Landfill life, community concerns, and government commitments creates a timing impetus to move the project forward particularly given this project aligns with the government's strategy of reducing its net emissions.

Additionally, the following targets and commitments are driving factors for investing in organic waste processing:

- The ACT Emission Reduction Strategy, as mentioned in Problem 2, to reduce approximately 60% of current greenhouse gas emissions by 2025
- The ACT Government commitment, under the ACT Climate Strategy 2019-2025 "to introduce a food and garden waste collection for all households (including multi-unit dwellings) from 2023, and support with an education program from 2020"
- The need to move the ACT towards the 90% resource recovery target (by 2025) set in the Waste Strategy
- Election commitments as per the ACT Labour policy reform, Item 9.2: "Roll out a household food waste collection service by 2023, starting with a pilot program in Belconnen"
- UN SDG Target 12.3, which calls for halving per capita global food waste at retail and consumer levels, and
- National Food Waste strategy to halve food waste by 2030

3.2 Benefits

3.2.1. Benefits to be delivered

The project presents the ACT with an opportunity to develop and implement innovative solutions to an evolving waste market in Australia and leverage learnings from overseas and across the country.

The ILM process identified four key benefits from best practice waste management in the ACT, these are outlined below.

Benefit 1: Community satisfaction with services provided

One of the issues identified by the ILM is the growing awareness of the community towards the need for more sustainable waste disposal practices. The community in the ACT is generally educated and transient, and is seeking better resource recovery solutions, similar to what they have experienced in other states. The proposed approach, being higher in the waste hierarchy, will recognise and respond to their concerns.

The community in ACT is highly concerned and mindful of their waste management and household practices as demonstrated by the state survey data by the *Fight Food Waste Cooperative Centre*¹⁴. According to the data, almost 80% of the ACT population is willing to reduce its contribution to food waste in the state and 73% believe it is possible to avoid overall food waste. Furthermore, the ACT has the highest proportion of the community, when compared to any other states, that use a compost bin (via composting groups and volunteers) as a method of waste disposal, suggesting that there is significant potential for relatively high levels of uptake of wider organic waste composting schemes.

Improving community satisfaction with waste disposal practices can help to create a sense of trust in the ACT Government, as it will demonstrate clear actions and initiatives in place to help meet the Territory's aggressive climate change targets.

Benefit 2: Improving the natural environment

As mentioned earlier in this document, organic waste decomposing in landfill produces methane, a highly potent greenhouse gas, as well as leachate. A study conducted by the *United States Environmental Protection Agency* found that diverting 75%-100% of food waste results in significantly lower levels of ammonia in leachate. This means the concentration of organic contaminants from leachate entering the groundwater from landfill is lower. This also has significant potential to reduce the overall leachate treatment costs for the ACT Government – a major operational cost and long term liability.

Food diversion will significantly reduce overall methane emissions.¹⁵ This has the potential to contribute to a cleaner environment and improve the value of environmental amenities, specifically air quality and human health effects.

A quantitative assessment of the reduction in methane through the use of composting compared to landfilling is included in the Cost Benefit Analysis (CBA), in Section 0.

Benefit 3: Creating value from waste streams

The circular economy is about preserving / maximising the value of resources. Waste can be used in numerous ways by developing circular solutions that lead to local productive reuse. The National Waste Policy action plan states, "For every 10,000 tonnes of waste that is recycled, 9.2 jobs are created, compared with only 2.8 jobs if the same amount goes to landfill. Further, if we increase Australia's resource recovery rate to 80%, an extra 15 million tonnes of material will be recovered every year."¹⁶

There are more than one hundred composting facilities in Australia, and the technology involved is practical, scalable, and robust. Organic waste can be used to turn waste into compost, soil

¹⁴ *Fight Food Waste Cooperative Research Centre* (as yet unpublished)

¹⁵ United States Environmental Protection Agency, *Impact of Food Waste Diversion on Landfill Emissions*, 2020 retrieved from https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CESER&dirEntryId=348317

¹⁶ Australian Government, *National Waste Policy Action Plan*, 2019

amendments or natural fertilisers, in turn creating revenue opportunities. These opportunities are higher in the waste hierarchy, as shown in the figure below.

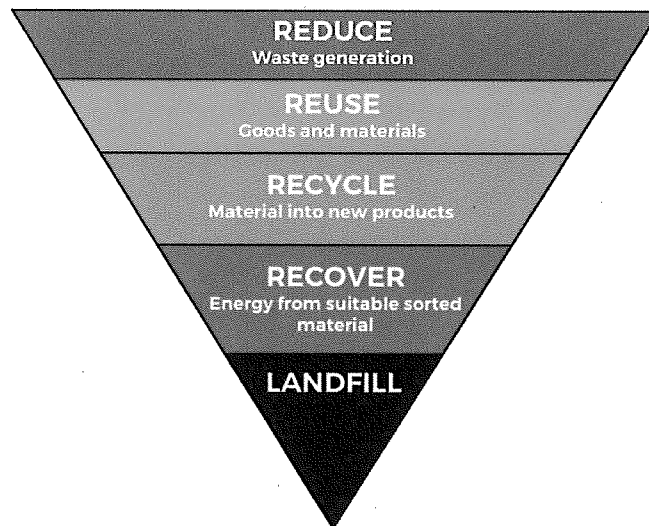


Figure 6: The Waste Hierarchy

Additionally, as outlined in the 2018 Roadmap to Improved Resource Recovery (Figure 7), diverting organics from landfill helps set the path to achieving the Territory's 90% resource recovery target.

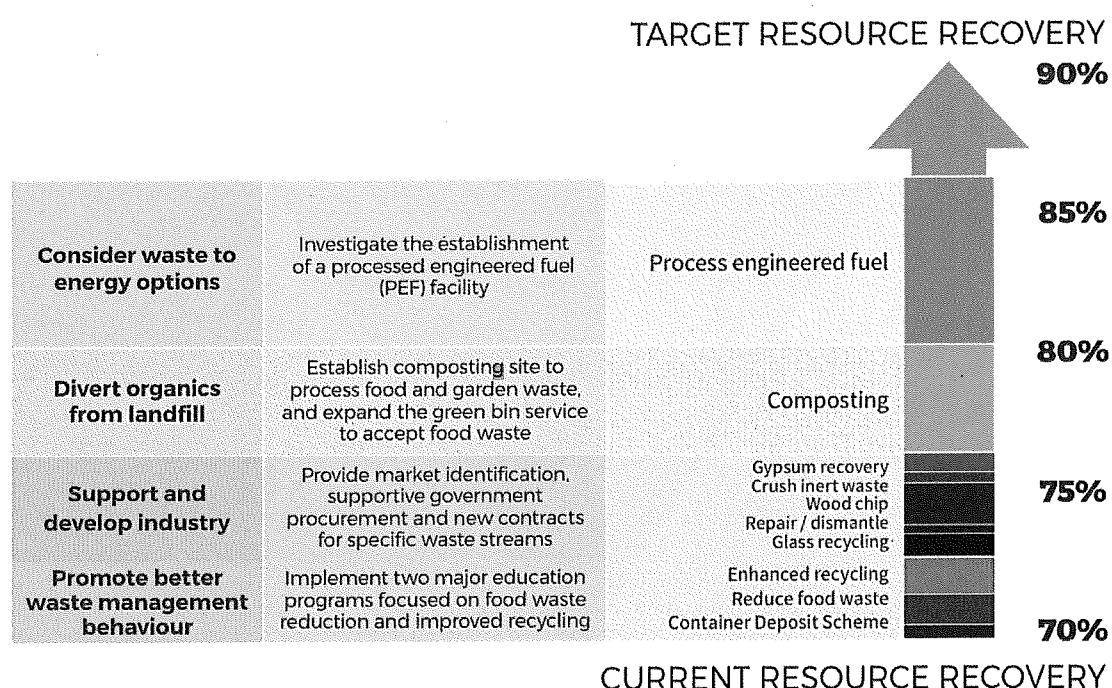


Figure 7: Snapshot of the roadmap initiatives towards 90% resource recovery

Benefit 4: Reducing the impact of waste disposal on the community

A research study has quantified the reduction of greenhouse gases from landfill waste streams in New South Wales, and found that 'removing organic food waste from the landfill stream could reduce GHG emissions compared with landfilling the food waste by about 0.805 tCO₂e/year' for each tonne of waste.¹⁷

In addition to the reduction of greenhouse gas emissions from landfill, it also supports the reduction of the impacts on the quality of surface and groundwater, foul odour and several carriers of diseases at landfill sites. Consequently, this results in reduced existing waste management costs, reduced human exposure to untreated waste, capacity development of local farmers by enhanced soil productivity, and significant job creation with the development and ongoing operation of a dedicated composting facility.

Benefit Realisation

The benefits realisation table below outlines the key benefits, responses and KPIs. This was defined as part of the ILM.

¹⁷ Hoda Karimipour, Vivian W. Y. Tam, Helen Burnie & Khoa N. Le *Quantifying the effects of general waste reduction on greenhouse-gas emissions at public facilities*, (2019) *Journal of the Air & Waste Management Association*, 69:10, 1247-1257, DOI: 10.1080/10962247.2019.1642967

Table 12: Benefits Realisation table

Benefits	Response	Solution	Key Performance Indicators (KPIs)
Community satisfaction with services provided	Improve recovery of waste materials	1. Strengthen market for by-products 2. Implement processing facility & supporting infrastructure	KPI 1: Community complaints / feedback KPI 2: Meet key policy targets set
Improving the natural environment	Work with the community to change behaviour / practices	1. Education and behaviour change programs	KPI 1: Reduction in greenhouse gases (landfill gas) KPI 2: Leachate produced / water quality
Creating value from waste streams	Improve recovery of organic waste and creation of new customer products	1. Regulation & behaviour change program 2. Establish market for organic products 3. Upgrade household collection services 4. Implement organics processing facility	KPI 1: Value generated from selling by-product KPI 2: Volume of organics treated
Reducing the impact of waste disposal on the community	Reduce contamination in waste streams to preserve material value	1. Dedicated organics processing facility 2. Data systems (including data analytics) and transparency in service contracts 3. Implement system for data analytics	KPI 1: Reduction in FOGO going to landfill KPI 2: Improve Landfill life expectancy

3.3 Alignment to Government policies

Diverting food waste from landfill is an important priority for the ACT government and is reflected in commitments around waste and resource recovery as well as the climate change policy. The ACT Government has identified diversion of food and garden organics from landfill as a key action to achieve resource recovery and emissions reduction targets, as reflected by the Parliamentary Agreement Policies. The Parliamentary Agreement Policies reinforces ACT Government's commitment to deliver an organic waste processing facility for households and business, and

improve household and business waste reduction, along with further education provided to the community.

The project is aligned with key drivers of change within the ACT Government. It also aligns with UN Sustainable Development Goal 12, which is Responsible Consumption and Production that includes a specific target to reduce food waste by 50% by 2030. Additionally, the proposed project would be consistent with global best practice, such as the EU Circular Economy Directive which supports source separation, particularly organics.

The project alignment with key policy, planning documents and political commitments is outlined below in Table 3.

Table 13: Project alignment with key planning policies

Policy	Alignment with project and ability to enhance current ACT Policy or deliver new ones
ACT Climate Change Strategy 2019-2025, The Environment, Planning and Sustainable Development Directorate	ACT Climate Change strategy 2019 – 2025, produced by The Environment, Planning and Sustainable Development Directorate which is a directorate of the Australian Capital Territory government, defines a goal: Goal 6. Waste Avoidance and Management to reduce emissions from waste treatment by three main actions: 1. Introduce food and garden waste collection for all households (including multi-unit dwellings) from 2023, and support with an education program from 2020. 2. Develop and consult on a scheme for requiring large organic waste producers such as hospitality and food retail businesses to have a separate organic waste collection mechanism. 3. Identify opportunities to reduce emissions from organic waste treatment including sewage such as through the use of anaerobic digestion and composting and investigate potential sites for organic waste processing. This business case and its implementation align well with the goals and actions of this strategy. It helps achieve these goals by the timeframes set out by the Strategy.
2018 Waste Feasibility Study Roadmap and Recommendations, Prepared by ACT NoWaste, ACT Government	The Roadmap recommends initiatives to move closer to 90% resource recovery through best practice waste management. The targets that align with this project are: Group 1 – Roadmap recommendations states Diverting organics from landfill with subgroups: • Implement a kerbside food and garden organics (FOGO) collection service aligned with the existing green bin roll-out program • Identify a site and establish an organics processing facility to process both food and garden organics

Policy	Alignment with project and ability to enhance current ACT Policy or deliver new ones		
ACT Waste Management Strategy 2011 – 2025, Environment and Sustainable Development, ACT Government	The goal of the ACT is to achieve full resource recovery and a carbon neutral waste sector. Outcome 2 and 4 states <i>Full Resource Recovery</i> and <i>Carbon Neutral Waste Sector</i> respectively with targets that align with this project and is listed below:	Outcome 2 Targets:	Outcome 4 Targets:
	The rate of resource recovery increases over 80% by 2015. – over 85% by 2020. – over 90% by 2025.	The ACT Waste Sector is carbon neutral by 2020. – energy generated from waste doubling by 2020. – waste resources are recovered for carbon sequestration by 2020.	
	Strategies	Strategies	
	2.2 Recover organic and residual waste resources. 2.3 Develop markets for organic and residual waste resources. 2.10 Disincentives to landfill including appropriate pricing and regulation.	4.2 Minimise organic waste to landfill 4.3 Expand bioenergy generation and investigate new energy from-waste technologies to generate energy. 4.4 Increase recycling to avoid greenhouse gas emissions. 4.5 Ensure energy efficient waste collection and transport solutions.	
Love Food Hate Waste, ACT Government Program	Love Food Hate Waste is a pilot program led by ACT NoWaste that aims to raise awareness about food waste and encourage residents to find ways to avoid and reduce it. This program is a part of ACT's response to help achieve goals expressed in the National Food Waste Strategy (to halve the food waste by 2030), ACT Waste Feasibility Study (minimise waste to landfill and reuse valuable resources) and ACT Climate Change Strategy 2019 (to achieve net zero emissions by 2045). The		

Policy	Alignment with project and ability to enhance current ACT Policy or deliver new ones
Australia's Climate Change Strategy, Department of Industry, Science, Energy and Resources The Federal Climate Change Strategy is a national strategy to act on climate change, and is informed by the Foreign Policy White Paper, Australia's Aid policy and the Sustainable Development Goals. Specifically, Strategy 4.3 - Supporting business and industry to innovate and adopt smarter practices and technologies emphasises the need for new industries, practices and technologies that are more sustainable, particularly in the management of resources. The introduction of an organic waste processing facility endorses the adaptation of smarter waste practices along with a sustainable approach towards waste management, particularly when compared to landfilling.	program encourages the community to live a more sustainable lifestyle by offering a range of tools such as food waste audits, meal plans and shopping list templates, portion planners, setting optimum fridge temperature, food storage tips and further such practical resources to reduce food waste at the source i.e. households. As 26,000 tonnes of household food waste goes to landfill every year, the campaign aims to educate and raise awareness to reduce household organic waste that goes to landfill. The program will cease 30 June 2021. The National Food Waste Strategy is a framework for action towards the reduction of food waste. The main aim of this strategy is to halve Australia's food waste by 2030. It includes the following priority areas that align with organic waste processing, including: Priority 2 – Business Improvements Outcome – Improvement and adoption of technologies, processes, and actions to avoid and reduce food waste. This focuses on: Identifying areas for improvement

Policy	Alignment with project and ability to enhance current ACT Policy or deliver new ones
National Waste Policy, Department of Agriculture, Water and Environment The 2018 National Waste Policy was prepared collaboratively by the Australian Government, state and territory governments and the Australian Local Government Association. It provides a framework for collective action by businesses, governments, communities and individuals until 2030. The principles and strategies that align with this project are: Principle 2: Improve Resource Recovery <i>Improve material collection systems and processes for recycling.</i> A FOGO processing facility is a form of improved recycling, generating compost and aligning with this principle.	• Supporting technology adoption • Encouraging collaboration Priority 3 – Market Development Outcome - Development of markets to support the repurposing of food waste. This focuses on: • Identifying food waste composition and nutritional value to develop new markets • Encourage innovation • Connecting food waste sources to users Improving existing processes is a crucial part of avoiding food waste and supporting innovative technology to create value from waste (waste recovery) is a way to support the priorities of this strategy. Technology adoption such as composting facilities encourage collaboration by linking kerbside separation, local composting facilities, development of new markets to support waste recovery (compost from waste). These all align and contribute to the priority areas in the National Food Waste Strategy.

Policy	
Alignment with project and ability to enhance current ACT Policy or deliver new ones	
Principle 4: Better Manage Material Flows to Benefit Human Health, The Environment and The Economy. • <i>Strategy12 – Reduce Organic Waste: Reduce organic waste, including garden and food waste, by avoiding their generation and supporting diversion away from landfill into soils and other uses, supported by appropriate infrastructure</i> By treating waste as a valuable resource through the diversion of organics from landfill and its resultant recycled organics this reduces environmental impacts of landfill. This contributes to improving Human Health, the Environment, and the Economy.	
Parliamentary Agreement Policies 2020 <i>Agreement between Labor party and Greens, represents the parties' shared commitment to serve people of ACT</i>	
Policy Issue 1 - The Government will seek advice on the best way to facilitate the outcomes contained in the Government's Waste Strategy to locate waste processing facilities in Hume.	References to Hume in the ACT Waste management Strategy 2011-2025 focus on developing the Hume Resource Recovery Estate (HRRE), and co-locating resource recovery facilities within HRRE. Previous attempts to attract private sector waste processing businesses to HRRE are documented in the HRRE Master Plan 2012 but have not been successful. As a result, land remains undeveloped in HRRE as of 2020. This vacant land has been identified as the confirmed location for Material Recovery Facility (MRF) upgrades and the preferred location for the FOGO processing facility, which is consistent with the intended use of HRRE to co-locate resource recovery operations.
Policy Issue 2 - Planning review process to improve and simplify the ACT's planning system	Land use planning is raised as a key issue for waste infrastructure in the Solid Waste Implementation Plan (SWIP). However, the objectives of the Planning Review as stated in the Parliamentary Agreement appear to focus on the quality, affordability, sustainability and community consultation and involvement for residential development. This will not necessarily

Policy	Alignment with project and ability to enhance current ACT Policy or deliver new ones
	address the land use conflict issues between essential industrial land uses including waste infrastructure and sensitive land uses such as residential development.
Legislative, Executive and Administrative reform - Create circular economy legislation to, amongst other things, phase out single use plastics	Phase out of single-use plastics acknowledged in the SWIP, but no major flow-on infrastructure impacts as this is a low-tonnage stream. The policy measure is expected to reduce contamination in both comingled recycling and FOGO collections, and may contribute to ongoing community awareness and positive behaviour change on waste issues.
Greens policy platform - Improve household and business waste reduction and recycling education (\$2M over 4 years)	The importance of education for behaviour change is emphasised in the SWIP, particularly in relation to FOGO introduction. No specific budget is proposed in the SWIP.
Greens policy platform - Deliver an organic waste processing facility for households and businesses	FOGO processing using in-vessel composting at a preferred site in HRRE is a key infrastructure commitment which is included in the SWIP.
Greens policy platform - Set targets in ACT Government procurement for zero waste consumption and minimum amounts of recycled content	The SWIP advocates government procurement of recycled content as an important lever for supporting investment in resource recovery infrastructure that is not directly controlled by the ACT Government, particularly C&D recycling.

3.4 Options Analysis

3.4.1. Strategic Solutions Analysis

The ACT Government has investigated a wide number of options in improving waste management in preparation of this business case. Strategic directions were set out in the 2018 Waste Feasibility Study – Roadmap and Recommendations to divert organics from landfill. These options were:

- Strategic Option 1: Establishing a comprehensive Foods Waste reduction and recovery program
- Strategic Option 2: Ongoing participation and support to the national food waste initiatives
- Strategic Option 3: Implementation of kerbside FOGO collection service which is aligned with the existing GO bin rollout program
- Strategic Option 4: Establishing a composting facility within the ACT that is capable of processing both food and garden organics

Strategic Option 1: Establishing a comprehensive Foods Waste reduction and recovery program

This strategic option is for a food waste reduction and recovery program that is underpinned by the waste hierarchy's primary principle of avoiding and reducing waste generation.

This initial food waste reduction and recovery program could be modelled closely on the highly successful Love Food Hate Waste program from the UK. Love Food Hate Waste helps households and businesses avoid food waste, save time and money, and reduce their environmental impact by planning better, shopping smarter and storing food effectively. The program features tips on buying, cooking and storing food to avoid or reduce food waste.

Results from the UK indicate reductions in food waste of 15% to 20%. The financial savings, over various jurisdictions, range from \$16 to \$250 due to reduction of food waste for every dollar invested in the program.

Similar programs have been successfully implemented by NSW and Victoria. In NSW, the Love Food Hate Waste program is managed by the Environment Protection Agency and runs in partnership with retailers, food manufacturers, local government authorities and community or charity groups.

To be successful, these types of programmes as demonstrated in NSW and as the proposed approach for the ACT, require a collaborative approach across governments and related agencies, not-for-profit-organisations, local industry, and small to medium businesses to drive and champion the initiative and ultimately implement. This enables the benefits for the various food rescue charities to be realised and which in turn supports reduction of food waste.

Additionally, supporting the primary principle of waste avoidance and reduction would include any future work looking to reduce retail and food packaging.

A Love Food Hate Waste Program has already been introduced in the ACT, which includes inspiring ideas, recipes, facts and resources for the community. The program will cease in 30 June 2021.

Strategic Option 2: Ongoing participation and support to the national food waste initiatives

Managing food waste is at the forefront of the Australian Government's agenda. Strategic dialogue is occurring at all state, territory, and local levels on promoting food waste outcomes, standards, and reducing greenhouse gas emissions. The ACT Government aims to continue to be an active member of the Working Group for the National Food Waste Strategy, contributing to the commitment to cutting the amount of food in Australia by half by 2030. This was agreed by ministers at the November 2016 Meeting of the Environment Ministers (MEM).

Strategic Option 3: Implementation of kerbside FOGO collection service which is aligned with the existing GO bin rollout program

Having an additional kerbside FOGO collection service provides an opportunity to significantly reduce the tonnes of food waste from households currently disposed of to landfill. This has significant benefits, something that was highlighted by a number of submissions from a 2017 market sounding.

The introduction of a FOGO collection service would require significant community engagement together with a comprehensive education program to ensure community buy-in for 'at source' sorting of food organics. This would also include longitudinal education campaigns, which need to be launched well ahead of full roll out as well as staged and maintained over a period of time.

FOGO services have been implemented in 38 local councils in Victoria and 26 in NSW. Other jurisdictions that have successfully implemented FOGO services include Albury, Parkes-Forbes-Bathurst, Lismore, Ballina, Grafton, Orange, Wodonga, Indigo Shire, Wangaratta, Benalla, Strathbogie Shire and Moira Shire.

At this stage, collections are being considered through a parallel business case.

Strategic Option 4: Establishing a composting facility within the ACT that is capable of processing both food and garden organics

In vessel composting is proven, simple, scalable, practical and quick to both develop and operate. There is considerable expertise in the market for offering composting facilities which can be procured through a range of commercial contracts. The ACT Government can contract to supply a minimum volume of waste, collected through the FOGO service, for processing.

This would require the need to develop a compost market which can be supported by the ACT Government contracting to purchase back a minimum quantity of compost that can be used in ACT parks and gardens or sold to the public.

3.4.2. Recommended Strategic Solution

Recommended Strategic Solution: Establishing a composting facility within the ACT that is capable of processing both food and garden organics

The recommended strategic solution focuses on household organics, as this represents the largest proportion of organic waste. Focusing on household organics was deemed to have the greatest impact to the problems and help achieve goals set out in the ACT Waste Management Strategy, the 2018 Roadmap and the ACT Climate Change Strategy.

At present, the ACT Government has control only over the management and collection of household waste. Whereas, commercial and industrial waste is handled by private entities. A wider review of commercial and household waste is being prepared by the government. By implementing a separation of food and organic waste process and composting, household waste alone can significantly increase resource recovery and reduce the need for landfills including the burden they pose on communities.

3.4.3. Project Solutions Analysis

To establish a composting facility that is capable of processing both food and garden organics, a project solutions analysis has been undertaken that is outcomes focused. This creates a clear link between the solution and the risks and benefits for the ACT, rather than adopting a technology-focused assessment. This meant that value for money into consideration is considered at an early stage.

The assessment of high-level scenarios was based on the following understanding of ACT's risk appetite and key objectives to enable FOGO implementation:

- Achieving policy objectives and targets for resource recovery.
- Supporting and aligning to Climate Policy and greenhouse gas (GHG) reduction targets.
- Futureproofing to provide resilience against market shocks and flexibility to take advantage of future opportunities.
- Maintaining public trust in the resource recovery system as a whole, and in the ACT government role in guiding and procuring this.
- Access and equity in ACT waste services.
- Generating viable, marketable products.

The ACT's attitudes to risk, investment and waste operations are understood to capture the following. This was used as a framework for our project solutions assessment.

- ACT values the provision of resource recovery as an essential public service and supports this through mechanisms such as low-cost leasing of land and direct payments to private resource recovery operators to offer free material drop-off in the ACT.
- ACT is willing to show leadership in investment for social and environmental outcomes, for example under emissions abatement commitments.

- ACT does not operate waste facilities and all operations for basic recycling at drop-off centres (RDOCs), waste transfer stations and the Material Recovery Facility (MRF) are carried out by contracted entities. Technical maturity and commercial maturity of technologies in the Australian context influence the risk to facility operators and cost implications for ACT.
- The territory governance structure gives ACT direct control over provision of some public services (waste, transport, health, education), and regulatory control over private operations in the waste and resource recovery sector. The ACT intends to maximise the opportunities presented by this governance structure.
- ACT land ownership creates potential opportunities to align strategic planning, efficient development approvals and risk-reduction through contract negotiations in relation to waste facilities. Where appropriate, the ACT intends to maximise the benefits of government land ownership for siting of waste facilities and efficient, cost-effective infrastructure delivery.
- ACT has a responsibility to provide value for money in its services and contracts.
- The ACT can control costs by reducing uncertainty and risk to the processing operation wherever possible.

The detailed benchmarking and analysis of Australian and International Case Studies of FOGO Waste Treatment Facilities was completed as part of the Feasibility Study. Key issues examined included technology, rollout, contamination and compost outlets. This was used to help define options, typical size of projects, level of contamination expected and the potential for the creation of a compost market

The following sites were investigated as part of the validation exercise.

- Tweed Shire Council, NSW
- Bega Valley Shire Council, NSW
- Snowy-Monaro Regional Council, NSW
- Bunbury-Harvey Regional Council WA
- City of Sydney food waste collection trial for MUDs
- Corkhill Bros ACT
- Sacyr Compost Facility, Victoria
- UK experience with organics

Example results of the benchmarking is summarised in Table 14 below, with details of all case studies used included in Appendix F.

Table 14: Benchmarking study

Case Study	Population	FOGO Program	Tonnes of FOGO	Processing Technology	Contamination	Compost outlets and experience
Bunbury-Harvey Regional Council WA	~46,000 people across 7 local government areas	- First 2 Councils: 2013 - Complete rollout: 2019	18,000 in 2019. Facility is experiencing some operational pressures as it approaches its 20,000tpa licence limit.	Open windrow processing with a mobile aerated floor system, and periodic turning of the piles to achieve uniform composting.	- Average contamination rate is 2.4% - Councils are obliged to pay a penalty if > 5% contamination - Manual decontamination	<10mm fraction is the sold as organic compost "360 Organics" recently launched, sold into the following markets: - Horticulture, market gardens and orchards. Avocado farmers and orchards in the South-West region are important customers. - Viticulture, particularly vineyards pursuing organic certification - Sale to the public through transfer stations and landscaping suppliers - Transport Canberra - Roads verge rehabilitation
Tweed Shire Council, NSW	~60,000 people in single unit dwelling Multi-unit dwellings can opt-in	1 July 2017	12,258 tonnes in 2018/19	Predominantly open windrow composting In-vessel composting facility commissioned in 2019, to increase the quantities of commercial liquid waste and food waste	4% contamination rate in 2018	No visibility on the compost output

Table 15 outlines the project solutions considered. Technologies and outcome-led options have been listed, focusing on household organics, however, some options have been included are flexible for the future integration of commercial waste.

Table 15: Project Solutions Analysis

Scenario	Status	Rationale
In-vessel composting Household FOGO only Approx. 45,000 tpa	Preferred	Meets ACT key objectives while controlling risks through: - Mature technology - Projects delivered in Australia - mature delivery and operational experience - Good environmental and amenity performance - Amenity performance and capability supports reasonable proximity to sensitive receptors, potential to reduce transport costs and emissions - Evidence of strong market demand for quality compost
Dry anaerobic digestion Household FOGO only	Not preferred	Significantly higher capital and operational costs. Clean energy produced by anaerobic digestion (AD) must attract a premium to justify the more intensive processing. Alignment to decarbonisation directions for both gas and transport has been explored. While potential applications exist, reliance on other stakeholders and current valuation of renewable energy in various forms does not clearly support investment in AD.
Open windrow of aerated static pile Household FOGO only	Not preferred	Lower cost but higher amenity risks, particularly when food waste is present. Requires larger buffer zone to sensitive receptors, less ability to control odour.

CABINET-IN-CONFIDENCE (after first entry)

Scenario	Status	Rationale
		Does not align strongly to the direction of regulatory standards and organics processing approaches for metropolitan centres.
Insect processing	Not preferred	Insect farming is an established technology but is high cost, labour intensive, and unsuitable for processing the woody garden waste fraction of FOGO waste. Goterra is an ACT-based business which processes food waste into protein meal using black soldier fly larvae. Goterra currently accept food waste from Palerang council. This is a significantly smaller quantity of waste than the expected FOGO recovery from across ACT. Insect processing is not identified as the preferred technology for the feasibility study and business case due to lack of proven reference projects. However, the tender process will be sufficiently flexible to allow Companies to submit competitive bids if they feel their technology can meet ACT NoWaste requirements.
Co-located dry AD and IVC	Not preferred	Co-location of dry AD to recover energy from FOGO organics and FOGO IVC infrastructure repurposed for digestate stabilisation is possible future configuration which could potentially be pursued in response to significant increases in the value of renewable biogas.
Co-located wet AD and IVC infrastructure.	Not preferred for 2023 tender.	Wet AD is not a suitable technology for processing FOGO feedstock. It requires feedstocks such as commercial food waste, liquid waste and sewage sludge which are not controlled or easily attracted by ACT. This technology does not address the core objective of diverting FOGO organics from landfill. Additionally, wet AD technology for feedstock such as commercial food waste is unlikely to be developed in ACT until a premium value for renewable energy from biogas is established. Wet AD produces a solid digestate which requires outlets for recovery. Incorporation into an IVC process is one potential pathway for this material.

CABINET-IN-CONFIDENCE (after first entry)

Scenario	Status	Rationale
Co-processing clean green waste or woody waste streams with household FOGO	Not preferred	Commercially inefficient. Green waste and woody waste such as forestry residues can be successfully recovered through less costly methods such as open windrow composting, due to lower environmental and amenity risks. Would undermine existing, successful processing operations for clean green waste. Approx. 45,000 tpa household FOGO is adequate for a typical and efficient IVC operation.
Attraction of commercial food waste streams for co-processing with household FOGO (either AD or IVC)	Not preferred Can be accommodated in future	Expected household FOGO tonnage is adequate for an efficient and cost-effective processing operation. Arup recommend that the facility be sized to accept approximately 45,000 tpa of ACT kerbside organic from 2023, to minimise uncertainty and risk in the initial tender. Provision for expansion can be supported in the land tenure and tender specifications. ACT cannot direct commercially collected waste volumes. These would have to be attracted on a commercial gate fee basis. A range of other organics processing outlets already exist for some commercial food waste streams and preserving diversity and competition in this space is desirable. Reliance on these tonnages within baseline throughput would increase uncertainty and commercial risk regarding the scale of processing. Food waste streams from sources such as hospitals, schools, offices and food businesses pose different contamination risks and operational challenges. Reliance on these streams would very significantly increase the work required in stakeholder education and engagement to control contamination. This may not be achievable within the timelines required for household FOGO commencement. This approach strikes a more appropriate balance between securing suitable processing infrastructure for household FOGO and investigating opportunities to improve organics diversion in other sectors.
Design of AD or IVC to accept organic feedstocks from other LGAs	Not preferred	The ACT does not require additional feedstock to achieve a viable and efficient scale of processing for FOGO organics.

Scenario	Status	Rationale
		Reliance on additional organic waste streams would only be appropriate where a local processing operation is not available and transport of waste to ACT is more cost-effective than developing local processing capacity. Consolidation of waste to the ACT has transport implications, and associated costs and emissions which would need to be considered. If ACT were to take a role as a regional processing hub, clear responsibilities and performance standards would need to be established with regard to contamination. This would add complexity to the project but could be considered where regional leadership from the ACT provides wider resource recovery benefits, while increasing the scale and decreasing the unit cost of organics processing.
Design of AD or IVC to accept agricultural feedstocks	Not preferred	The ACT does not require additional feedstock to achieve a viable and efficient scale of processing for FOGO organics. In agricultural contexts, organic waste materials are typically recovered through reapplication to agricultural land. They are not a focus for meeting landfill diversion and emissions reduction objectives. Some agricultural feedstocks are not well-suited for co-processing with FOGO material, and reliance on these streams increases the complexity and risk of the FOGO processing project, without clearly contributing to ACT core objectives. Co-processing of FOGO organics and agricultural organics has significant transport implications, and associated costs and emissions. Local solutions for challenging agricultural wastes, for example wet anaerobic digestion of liquid waste from intensive livestock, abattoirs and food processing operations is more likely to be appropriate for challenging agricultural wastes. The ACT may have a role in facilitating these types of projects but does not have a clear role to procure or directly support them.

3.4.4. Base Case

The Base Case assumes that the ACT Government does not introduce compulsory household FOGO collection and processing facility. In this case the ACT would continue only using an opt-in service for green waste, and food waste in the general rubbish bin. Additional options include the provision of information and/or minor funding to support community gardens and home composting for enthusiastic members of the community.

Additionally, the ACT Government are trialling FOGO for 5,000 households to:

- a.) deliver a service that replicates and tests a recommended industry collection model;
- b.) successfully engage the community on the future FOGO collection service;
- c.) gather data and lessons learned to inform the city-wide rollout;
- d.) process the collected materials into a beneficial reuse product; and
- e.) successfully lead into the city-wide rollout of household FOGO collections.

Investigations are underway to determine whether this could be achieved at the existing garden organics collection site at Mugga Lane. This however cannot be scaled up to a large scale. This maintains the status quo and would not any of the objectives or policy guidance for the ACT Government, however, would also not impose any additional costs.

3.4.5. Recommended Project Solution

Preferred Project Solution

- In-vessel composting
- Household FOGO only

In-vessel composting focusing only on ACT household FOGO feedstock is the preferred option for the 2023 procurement process. In-vessel composting focusing on ACT household food and garden organics delivers on ACT objectives for resource recovery and emissions reduction, while managing environmental and commercial risks through the use of mature, controlled processing technology with a track record of project development in Australia. The ACT does not require additional feedstock to achieve a viable and efficient scale of processing for FOGO organics.

It is expected that around 42,000tpa of FOGO feedstock could be recovered from 2023, made up of approximately 70% garden organics and 30% food organics. It is recommended that the facility be sized with at least 50,000tpa of processing capacity available from 2023, and no major expansion works expected to the facility within the first 15 years of operations. If disposed to landfill, this

material would generate methane emissions equivalent to around 73,000 tonnes of CO_{2-e}¹⁸, which can only partially be captured by landfill gas collection.

This preferred option was identified in the Direction paper in June 2020 and confirmed in August 2020. The tonnages have been refined through more detailed data analysis in this feasibility study, but this does not affect the validity of high-level conclusions reached at the Directions paper stage.

In-vessel composting focusing on ACT household food and garden organics delivers on ACT objectives for resource recovery and emissions reduction, while managing environmental and commercial risks through the use of mature, controlled processing technology with a track record of project development in Australia. The ACT does not require additional feedstock to achieve a viable and efficient scale of processing for FOGO organics.

The Directions paper identified in-vessel composting as the preferred organics processing technology for the ACT, based on the objectives, constraints and risk appetite for the Territory. The value of renewable energy in various forms was investigated but found to be below the level which would be needed to justify more complex and costly dry anaerobic digestion options for FOGO material, while the lower level of control over odour and amenity in open-windrow composting was undesirable given the metropolitan context of the ACT and the Territory's desire to offer ACT-owned land as a potential site during the procurement process.

Table 16: Components of IVC project cost

Components	Capex/opex	Comments
Development costs • Design • EIS process requirements • Permitting and licencing, including both waste and environmental licencing conditions.	Factored into capex	Permitting risk borne by ACT for ACT-owned site although sometimes undertaken by developer and part of tendered scope of work.
Utilities • Electricity – supply only • Water – supply only	Connections: Capex Consumption: Opex	Water storage and recycling onsite. Non-potable water supplies considered.
Civil Infrastructure • Buildings – receival hall, processing sheds, site offices • Roads • Pavements • Weighbridges • Offices • Amenities	Capex Maintenance: Opex	

¹⁸ <https://www.industry.gov.au/sites/default/files/2020-10/national-greenhouse-accounts-factors-2020.pdf>

	Components	Capex/opex	Comments
	• Lighting • Leachate tanks • Water Tanks • Fire Services • Biofilters / Air scrubbing		
Fixed plant and equipment	• Shredders • Conveyors • Screens • Grinders • Composting tunnels • Fully enclosed maturation process area including air delivery systems • Process control systems / SCADA • Fans	Capex Maintenance: Opex	Fixed components sized for maximum expected throughput.
Mobile plant and equipment	• Loaders • Material handlers • Turning equipment if used • Shredding and screening equipment	Initial equipment: capex Maintenance and operational adjustments: opex	Mobile plant and equipment more flexible to operational changes over time
Labour	• Plant operation • Maintenance • Site management • Admin • Cleaning • Laboratory Technician • Sales	Opex	Staff loading may be able to be reduced if another facility or operation is sharing resources. i.e., Management / Sales / Laboratory
Land		Factored into capex or lease cost as Opex	ACT owned land offered no leasing or acquisition costs assumed for costing purposes.



Figure 8: Example of a composting tunnel, external view. Image supplied by technology composting provider Christiaens



Figure 9: Example of a composting tunnel, internal view. Image supplied by technology composting provider Christiaens

3.5 Review 2 (Treasury): Needs Analysis

Treasury directorate to sign off that a case for the project is present in the business case.

Review 2 (Treasury) Officer Name: _____

Signature: _____

Date: _____

- *This is the first review point for Treasury and is assessment of the need's analysis.*
- *Sign off should only occur if the Treasury officer is confident that the needs analysis is robust, is based on evidence and an Investment Logic Workshop (ILW) has been undertaken (if applicable).*
- *Note that Tier 1 business cases anticipate review and signoff by the Under Treasurer.*

Disclaimer: *This review does not represent an endorsement or agreement by the signing officer as to the contents of the section or a certification that the work was correctly performed.*

4. Cost & Contingency

This section outlines the methodology and approach used to estimate capital costs, operating costs, project and delivery model contingency. The following chapter outlines:

- Benchmarking analysis that has been used to form the basis of estimated costs for the FOGO facility
- Detailed assumptions for capital and operating costs
- Approach undertaken to estimate project and delivery model contingency
- Overall Budget and funding strategy

4.1 Benchmarking Analysis

The capital and operating costs for the FOGO Facility have been estimated using a benchmarking analysis of the following:

- Recent tenders for a comparable waste project in NSW
- Publicly available information on domestic and international IVC facilities

The capital costs for this project are estimated to be \$█ per tonne. This comprises development, construction, major maintenance, contingency costs as well as operator profit margin.

Operating costs amount to \$█ per tonne, which consists of staffing, education, maintenance costs and operator profit margin. The public information market benchmarks used exclude staffing and insurance costs, therefore for the purpose of this benchmarking analysis we have excluded staffing and insurance from the project benchmarks. Operating costs excluding staffing and insurance for the facility is \$█ per tonne, as show in Figure 11.

Capital costs are sensitive to build quality and the technology solution applied. The build quality presented in this business case is assumed to be best practice tunnel design and processing (highest amenity and limited impact). Based on our analysis and wider project experience, there are limited facilities in Australia with similar technology to compare as the market is simply less mature than overseas. This means that some benchmarks found are not as relevant to this project. In order to reflect the best-in-class technology, high quality solution and the context that an Australian company will be providing the integration works (which means high labour costs when compared to other countries), a higher cost estimation benchmark has been used. Figure 10 and Figure 11 shows CAPEX and OPEX rates on a per tonne basis for the FOGO capacity in comparison to the other benchmarks.

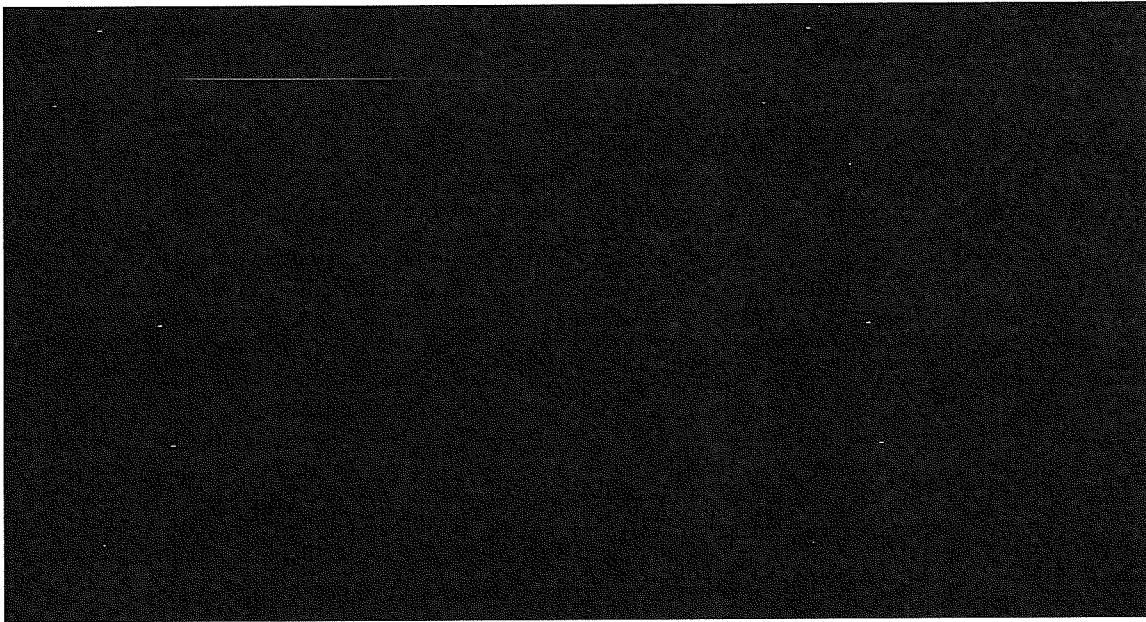


Figure 10: CAPEX Benchmarking Analysis

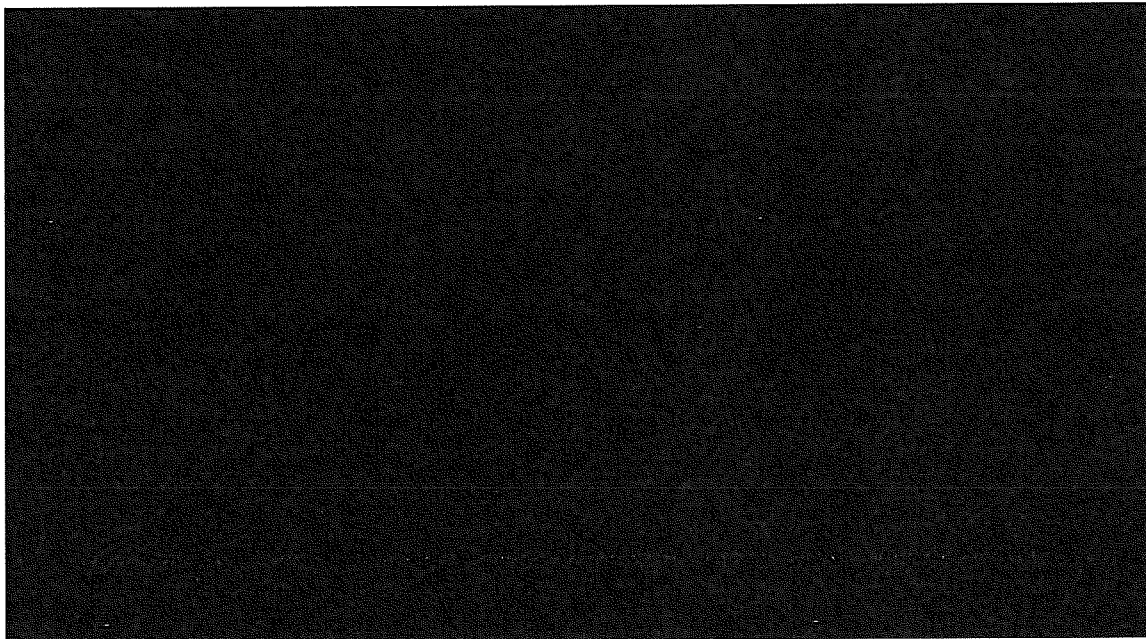


Figure 11: OPEX Benchmarking Analysis

As shown in Figure 10 and Figure 11, Company A, B and C refers to the three tenders received for a project in NSW to deliver a composting facility. Each tenderer used In Vessel Composting technology with forced airflow and covered maturation with odour treatment. Therefore, from a high level, the tenders are comparable to some extent. However, the costs between companies vary due to the following reasons:

- Quality of process – Each tender had slightly different processing parameters, particularly the tunnel residence time. A shorter tunnel residence time means a high volume of

throughput in a smaller tunnel. This means lower overall construction costs, but the quality of the end product may not be as high.

- Parameters – Tenderers proposed slightly different methods of tunnel construction, flow rates of air and water, thus leading to variation in costing.
- Material quality – Different costs of processing equipment were proposed based on build quality and supplier.
- Contamination removal – Different configurations for contamination removal equipment (pre processing)
- General variance in company costing structures.

Company A's design solution was considered to align best with the design for this Project and therefore this Project was benchmarked against Company A's tender costs. Company B and C's cost structure was considered to be incomplete and unreliable, especially for OPEX, and therefore were not considered as reliable data points for consideration.

In addition to the tender information, a range of publicly available information were sourced to assess the range of capital and operating cost ranges on a per tonne basis. Key reports that were used include:

- *Wrap, Realising the value of organic waste (2008)*
- *Arcadis, Assessment of the options to improve the management of bio-waste in the European Union (2009)*
- *ACT Government, Economic Modelling of Options for Waste Infrastructure in the ACT (2010)*
Sustainability Victoria, Biological Recovery of Organics (2017)

It is important to note that the parameters sought from publicly available information lacks sufficient transparency on the exact technology, build quality, and the majority of data points are from outside of Australia, and therefore cannot be accurately relied upon for appropriate comparison. The cost parameters of overseas facilities will be significantly lower than has been estimated for this project, as labour in Australia has approximately a premium of 30% to 40% in comparison to international benchmarks.

Due to the high build quality and best in class technology proposed for this project, there is insufficient relevant benchmarks that can be used and therefore a higher benchmark in comparison to the tenders and public information has been sought. Detailed assumptions underlying the capital and operating costs are discussed in Section 4.2.

4.2 Preliminary Cost Estimate

4.2.1. Capital Costs

The estimated capital costs (excluding risk adjustment) for the project are summarised in Table 17.

Table 17: Summary capital costs

Item	Value (\$ FY21, real)
Development capital costs	
EIS consultancy costs	
Statutory approval costs	
Procurement support costs	
Construction capital costs	
External utilities connection	
Recycling road extension	
Contractor profit margin	
Total capital costs	

The capital costs for the project consist of several elements that will be required for delivery. The table below sets out each of these parameters alongside a broad description as to how they were devised.

The capital costs outlined are preliminary and are reflective of the current stage of development of the project, feasibility stage. Through further project development, costs will be refined. This will primarily be achieved by receiving contractor tender returns with fixed pricing for the project and by receiving quotations for other primary elements such as the utilities connections.

Table 18: Detailed assumptions for capital costs

Parameter	Value (\$, FY21 real)	Description
Development Capex	10% of project capex (variable)	Development capex required to progress the project from the feasibility phase to construction. This allows for activities such as planning approvals, Front End Engineering Design (FEED), procurement, legal advisory, financial advisory etc. This allowance is based on Arup experience of process plant-based projects. Development capex is small in comparison to the overall spend of the project.
EIS Consultancy Costs	\$500,000	This is a provisional sum provided by ACT NoWaste for external consultancy services to be undertaken during the EIS process.
Statutory Approval Costs	\$50,000	This is a provisional sum provided by ACT NoWaste for costs to be incurred the statutory approval process.

Parameter	Value (\$, FY21 real)	Description
Procurement Support Costs	\$150,000	This is a provisional sum provided by ACT NoWaste for costs to be incurred during the procurement process.
Construction Capex	683 \$/T design capacity	Construction capex is the cost allowance for the construction of the process facility itself. This does not include ancillary items such as utilities connections. It is based on a 50,000 tpa facility. Costs have been informed by benchmarking of previous projects and available tenders, which identified that construction capex was highly sensitive to the proposed technical solution. The primary expense drivers were found to be the type of process technology used and indoor maturation. Arup has reviewed a commercial in confidence tender quotation for a facility materially similar in outline design to the one proposed here with a design capacity of 25,000 tonnes. The construction capex for that project was at the top end of the benchmark range due to the quality of process technology used. The construction capex was benchmarked on a \$/T design capacity basis to get this figure. The quotation was received in Q1 2020 from an Australian contractor utilising European technology. This was deemed to be the most appropriate benchmark to be used at feasibility stage given ACT are seeking require best in class technical solutions. Costing will need to be reviewed post FEED stage to ensure that the technology proposed continues to align with this benchmarking strategy. As discussed in the risk assessment, cost risks will be managed by entering into a fixed price contract with a suitable contractor. Primary capex risks include ground condition (contamination etc.) and final selected technology. These are further discussed and captured in the risk register and included in contingency allowances and will require mitigation. Estimated capex excludes contractor margin which has been added separately within the business plan

Parameter	Value (\$, FY21 real)	Description
External Utilities Connections	\$975,189	The utilities costs are relatively unknown as investigation has not yet been undertaken. This will be undertaken at the FEED stage. An allowance of \$1m has been made for the electricity, water, drainage and telecoms connections assuming that the connection points are unconstrained, no grid reinforcement works are required, and the connection point is within 1km of the site. Capex risk associated with utilities is discussed in the risk register.
Recycling Road Extension	\$396,878	This is a provisional sum provided by ACT NoWaste for road upgrades to service this facility and the MRF.
Major Maintenance Capex	\$3,315,642 in year 10	Over the expected lifetime of the project (20 years), mechanical plant and equipment will require replacement. Typically, this happens between years 8 and 13 depending on the equipment, condition and manufacturers recommendations. This allowance has been made for 100% replacement of mechanical equipment.
Contract profit margin	6%	Profit margin applied to the base costs that is sought by the contractor. The contract profit margin is based on industry standard and project experience.

4.2.2. Operational Costs

The estimated operational costs (excluding risk adjustment) across 20-year operational period for the project is summarised in Table 19 and Table 20 .

Table 19: Total operational costs across 20 years

Item	Value (\$ FY21, real)
Staff costs	
Education costs	
Fixed costs	
Variable O&M costs	
Landfill costs	
Contractor profit margin	
Total operational costs	

Table 20: Annual cost for first full year of operation

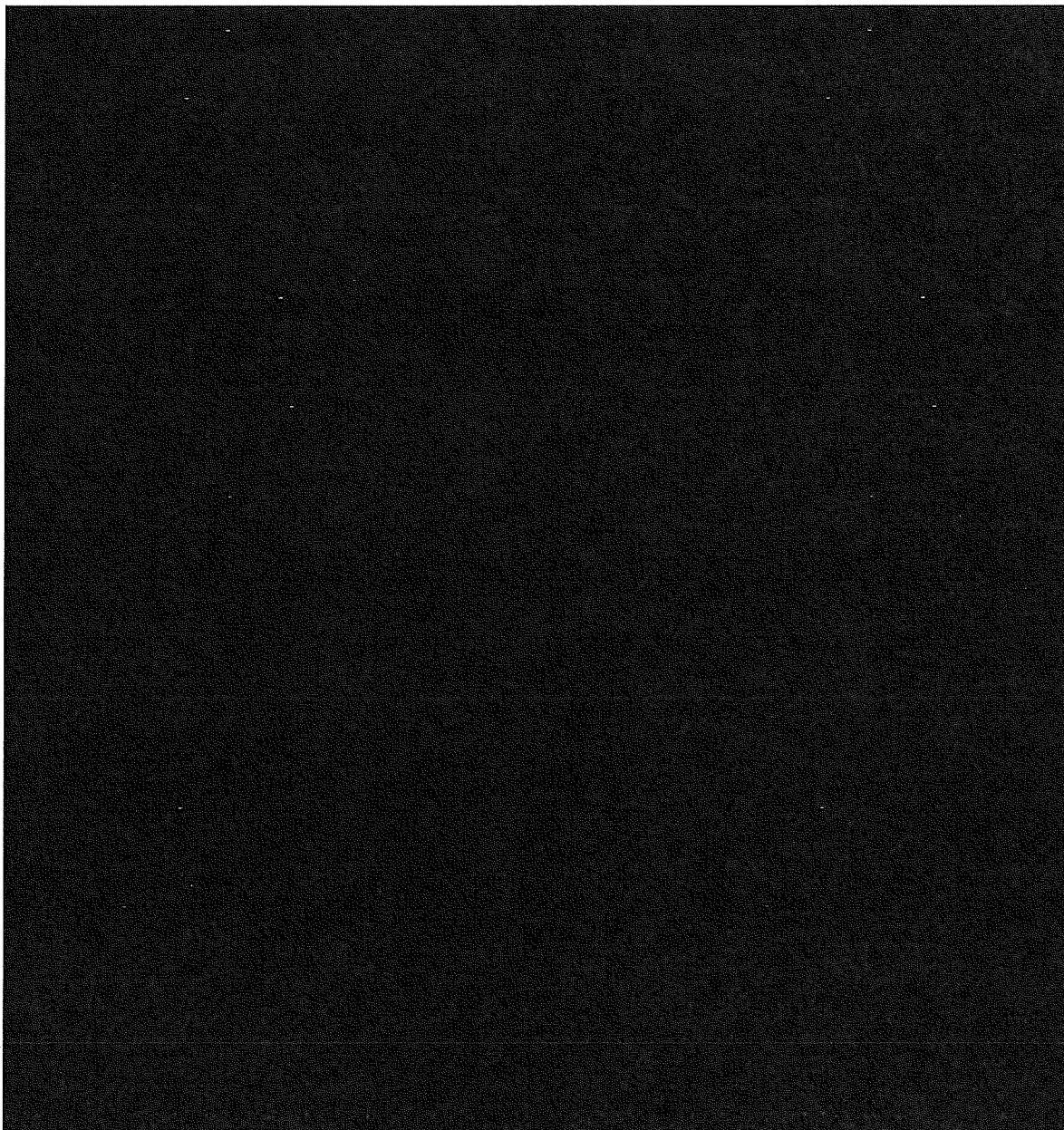
Item	Value (\$ FY21, real)
Staff costs	
Education costs	
Fixed costs	
Variable O&M costs	
Landfill costs	
Contractor profit margin	
Total operational costs	

Project operational costs are the costs incurred in the day-to-day operations and maintenance of the facility. The table below sets out each of these parameters alongside a broad description as to how they were devised.

The costs are preliminary and would be firmed up through the tender process within the contracting methodology with a fixed price scoping approach to O&M services. Note that lifecycle maintenance has been included in the capex section of this report.

Table 21: Detailed assumptions for operational costs

Parameter	Value	Description
Average cost per Full Time Equivalent (FTE)	\$118,876 (10 FTE's)	10 FTE's estimated for operation from a bottom up build approach and will comprise Site Manager, Plant Operators, Supervisor, Admin, Cleaners and Maintenance Staff
Education budget	1 FTE @ \$93,033 / FTE	One FTE has been included for the purposes of education. This role would be to work in educating the general public on the operation of FOGO to try to reduce the overall levels of contamination within the waste (i.e., incorrect disposal). An education officer at waste facilities to work with waste generators and suppliers.
Fixed Maintenance Allowance (years 1 - 5)	\$103,370 per annum non-FTE budget	Maintenance allowance in years 1 to 5 and 6 – end has been benchmarked using the same recent tender benchmark as explained in the capital cost section of this report.
Fixed Maintenance Allowance (years 6- end)	\$206,740 per annum non-FTE budget	This line item is for the periodic replacement of wear equipment such as conveyor rollers, motor elements, pump/fan elements, screens, shredder blades and other components. The increase post year 6 is to account for expected increased wear and tear due to age.



4.3 Contingency

Contingency has been considered as any risks that cannot be mitigated by the measures outlined in the Risk Management Plan included in Appendix E. Delivery Model Contingency has been assessed only for risks that have been quantified as part of the risk assessment.

Risks that either remain high after mitigation or occur during design or construction have been quantified. Quantification has been undertaken using the following approach:

1. Qualitative analysis of risks prior and post mitigation

2. Quantitative assessment of risks that either remain high after mitigation or occur during design or construction
3. Estimate proportion (%) of risk that is transferred to the Contractor
4. Estimate the probability of the risk event occurring
5. Estimate the range of impact on the cost or revenue driver
6. Monte Carlo Analysis

Monte Carlo Simulation

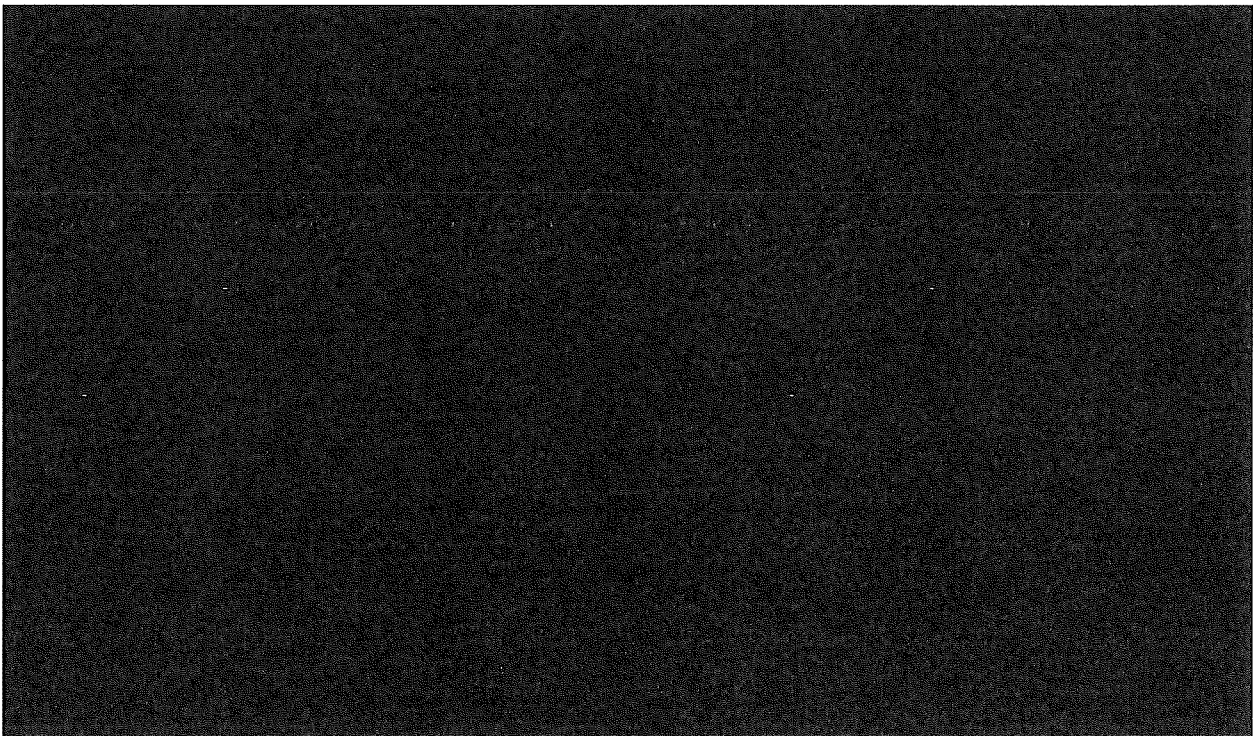
As aforementioned, a probabilistic risk assessment using Monte Carlo simulation has been carried out on key contingent project risks.

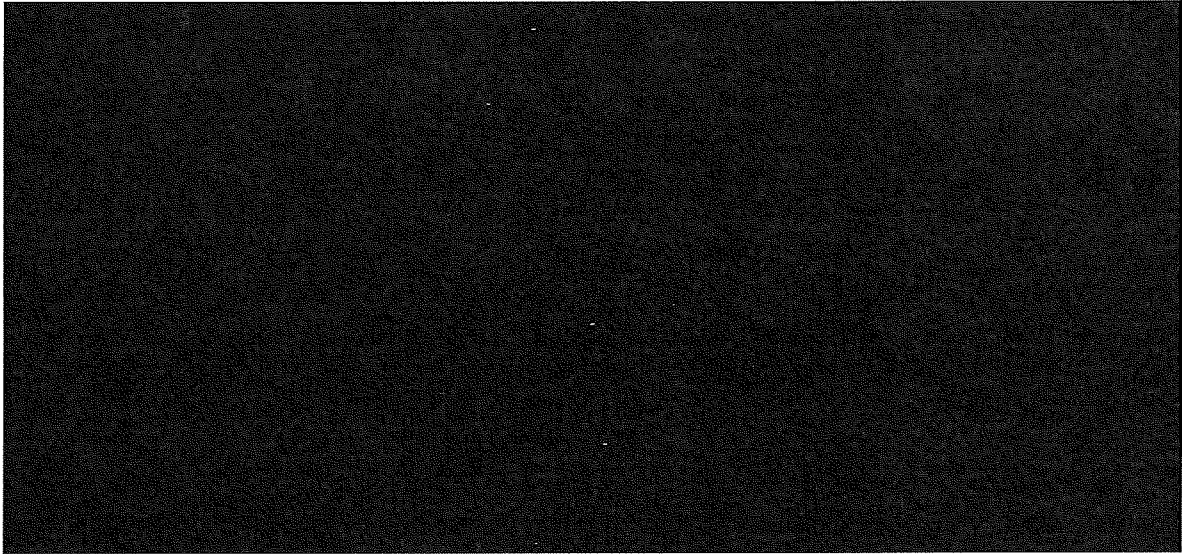
Contingent risks are generated from the outputs of the risk register (Appendix C) which involves a qualitative and quantitative assessment of each risk. This assessment provides a likelihood and severity rating for each risk based on assumptions and credible scenarios which is then used to develop the inputs into the Monte Carlo simulation.

The development of the risk register was conducted by key stakeholders and project group members to ensure that all risks are captured, likelihood and impact are calculated, and potential mitigation strategies considered.

A total of 35 risks were considered in the risk register, 15 have been quantified through the Monte Carlo simulation. The quantified risks assessed through the Monte Carlo assessment are summarised in the table below. Additionally, whether the cost or revenue drivers are impacted by the risk has also been identified.

Table 22: Risk quantified through Monte Carlo simulation





P90 risk allowances are generated by undertaking a Monte Carlo simulation of 10,000 iterations and assigning a PERT distribution to all risks. A PERT distribution is a continuous probability distribution which is defined by the minimum, most likely and maximum values. It is widely used for risk analyses due to the intuitive nature of the input parameters. The PERT differs from a triangular distribution in such that it has a smoother shape and places a greater emphasis on the most likely value.

Below is a summary of the high-level outputs from the risk analysis with the complete analysis presented in in Appendix H.

Table 23: P90 contingency risk adjustments

The table content is completely redacted with a large black rectangle. The table is identified as 'Table 23: P90 contingency risk adjustments'.

4.4 Budget / Funding Strategy

This section sets out the budget impacts of the preferred option. A budget impact statement analyses the budget impact of the proposed project (savings and costs) and implications for the Directorate including additional staff, equipment or any financial impacts on other Directorates that are not included in the financial model.

Under a DCOM, the government will finance the project in full. Payments to the contractor, which include a profit margin, will be made according to an agreed schedule. Separate schedules will be in place for the construction and operational phases of the project but included in the same contract.

Capital payments are assumed to commence on 1 September 2021 prior to construction to enable the contractor to complete design and planning works. Capital payments will continue until the end of the construction period.

Similarly, payments to the contractor will be made during the operating period according to an agreed schedule. These payments will continue until 2044, the end of the operating period. The exact schedule for payments will need to be negotiated with the contractor.

An additional ACT NoWaste staff member will be required during the procurement period to manage contracting and minimise government risk. Government lawyers and/or external lawyers will also be required. Cost associated with other technical advisors required for the development of the project are included in the project capital costs. Once operational, staffing impacts will be minimal and only required to ensure contractor performance and compliance as well as to facilitate payment.

The following preliminary financial impact summary is for a DCOM delivery.

Table 24: Preliminary Financial Impacts Summary (\$ nominal FY 2021)

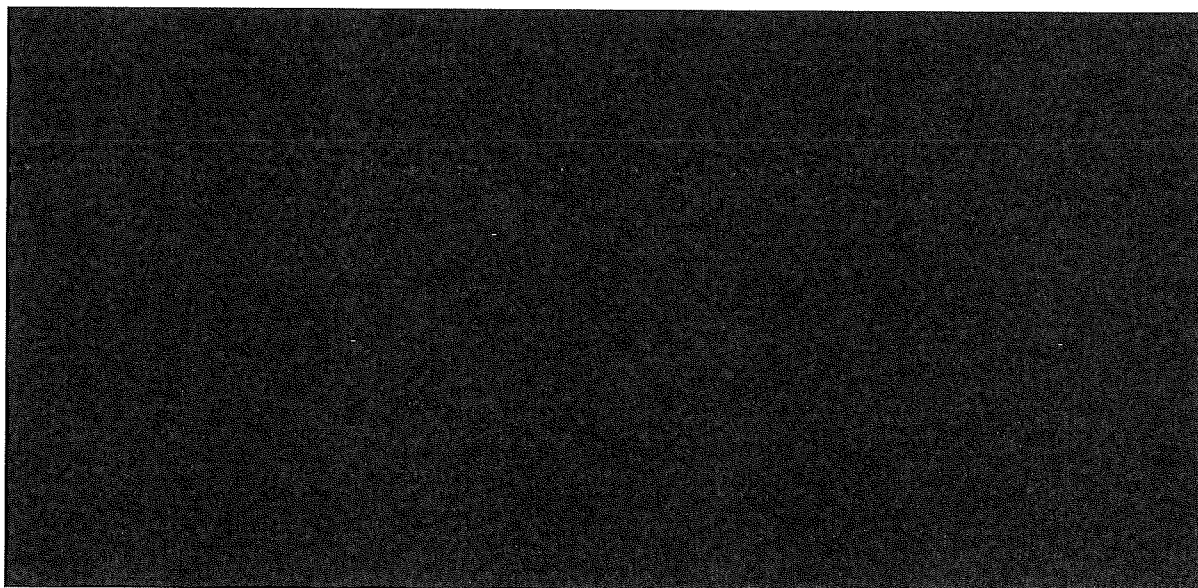


Table 25: Staffing Impacts Summary

Impact	2020-21	2021-22	2022-23	2023-24
FTE	Nil	Nil	Nil	Nil

5. Economic Analysis

The project realises a number of benefits, including economic, social and environmental benefits. To capture these an analysis' have been undertaken.

- Cost Benefit Analysis
- Social Analysis
- Environmental Analysis
- Wider Economic Benefits

The following table summarises the key project benefits, with only the economic benefits assessed quantitatively.

Table 26: Project Benefits

Category	Benefits
Economic Benefits (CBA)	• Reduced Greenhouse Emissions • Delayed landfill investment • Reduction in leachate treatment costs
Social Benefits	• Employment • Health and wellbeing
Environmental Benefits	• Methane emissions reduced • Improved water quality • Enhanced soil quality
Wider Economic Benefits	• Improved agriculture productivity • Contribution to the circular economy

5.1 Cost Benefit Analysis

A Cost Benefit Analysis (CBA) captures the quantifiable economic, and social and environmental benefits of the project in measurable cash flows. The CBA assesses the economic costs and benefits, comparing the options against the base case so that the incremental costs and benefits can be identified.

The following table summarises the costs and benefits were included as part of the CBA for both the base and project Case.

Table 27: CBA Costs and Benefits

Element	Category	Base Case	Project Case
Costs	Construction Costs	No capital costs.	• Design • Construction
	Operating and Maintenance Costs	No change in operating costs. Assumes that the diversion of FOGO from landfill will not change operating, maintenance or staffing costs.	• Staffing • Education costs • Fixed O&M Costs (Maintenance Allowance, Lease Costs, Insurance, Admin etc) • Variable O&M costs • Landfill costs
Benefits		No Benefits	• Reduced Greenhouse Gas Emissions (GHG) • Delayed landfill investment • Reduction in leachate

The CBA has been developed to be compliant with ACT Treasury Guidelines and integrates the National Greenhouse Accounts Factors on Greenhouse Gas Emissions. Table 28 summarises the key parameters that underpin this analysis.

Table 28: CBA Key Parameters

Element	Category
Discount year	FY 2021
Discount rate	■
Price base year	FY 2021
Operations start date	1 December 2023
Evaluation Period	30 years

5.1.1. Methodology

Reduced Greenhouse Gas Emissions (GHGs)

The project's ability to reduce GHGs, particularly methane was assessed using the National Greenhouse Accounts Factors for landfill and the biological treatment of solid waste. GHGs were measured as the incremental benefit of the FOGO facility above or below the base case, landfilling the waste. It was assumed for the economic analysis that feedstock would comprise approximately 70% garden organics and 30% food organics.

The social cost of carbon (SCCC) has been assumed as \$20/tonne, taken from the ACT Government Climate Change Strategy 2019-2025, and seen as an appropriate value given the project represents a Government initiative to reduce emissions. The social cost of carbon has been adjusted over the operating period of the FOGO facility to consider the expected increase in the willingness to pay for carbon initiatives in the future, and the need to maintain zero net emissions. Using taking the mid-point of \$65 / tonne reported in Reputex modelling of the carbon offset price in 2040 (assumed to \$30-100/tonne), a YOY growth rate of 6.4% to the cost of carbon has been applied.¹⁹ As there is some uncertainty in this, sensitivities have been included in the economic analysis of the future price of carbon,. Both \$30 and \$100 per tonne have been tested.

The base case calculates the methane (MH₄) emissions using the conversion factors summarised in Table 29 below. It also assumes that 75% of methane is captured. This capture rate is assumed to be appropriate as insufficient information is available on the landfill. Additionally, it is difficult to estimate the capture rate over the whole of life of a landfill facility, and therefore a 75% capture rate is considered the most reasonable measure based on technical advice.

¹⁹Reputex Energy, 2020, CO2 offset price of \$30-\$100/t in 2040 for Australia to reach and maintain net-zero emissions. Retrieved: <https://www.reputex.com/research-insights/co2-offset-price-of-100-t-for-australia-to-reach-and-maintain-net-zero-emissions/>

Table 29: Greenhouse gas conversion factors for landfill

Item	Value	Source
Landfill – Food waste conversion factor	2.1	National Greenhouse Accounts Factors, Department of Industry, Science, Energy and Resources - Table 45
Landfill – Garden and Green waste conversion factor	1.6	National Greenhouse Accounts Factors, Department of Industry, Science, Energy and Resources - Table 45
Capture rate	75%	Australian Clean Energy Regulator - NGER Technical guidelines for the estimation of emissions by facilities in Australia

The project case uses the composting equations provided in the National Greenhouse Accounts Factors to calculate the methane and Nitrous Oxide emissions. These are summarised in the table below. There is assumed to be no recovery of methane, as this is only relevant for an Anerobic Digester Facility.

Table 30: Greenhouse gas conversion factors for composting

Item	Value	Source
Methane Emissions Factor (per tonne)	0.021	National Greenhouse Accounts Factors, Department of Industry, Science, Energy and Resources
Carbon Equivalent Factor (Methane)	28	National Greenhouse Accounts Factors, Department of Industry, Science, Energy and Resources - Table 30
Nitrous Oxide Emissions factor	0.025	National Greenhouse Accounts Factors, Department of Industry, Science, Energy and Resources
Methane Carbon Equivalent Factor (Nitrous Oxide)	265	National Greenhouse Accounts Factors, Department of Industry, Science, Energy and Resources - Table 30

Delayed landfill investment

This benefit monetises the variation in costs resultant from extending the Mugga Lane landfill life. This is a result of the diversion of FOGO waste to the new facility, in turn deferring expansion / new

landfill development. Based on the proposed FOGO facility capacity, it has the potential to defer the need for a new landfill by five years by 2050.

This value of delayed investment is captured through discounting the landfill remediation and capital costs when incurred in 2050 or 2055. The cost of landfill closure has been taken from the 2009 Department of the Environment, Water, Heritage and the Arts paper on landfill costs, originally sourced from the WMAA National Landfill Division in 2006. Cell development has been used as a proxy of cell treatment during closure and rehabilitation, which has been added to capping and aftercare, bringing the total cost of closure to \$11 / tonne (2006). The total volume of feedstock has been used as proxy of total tonnes remaining in the Mugga Lane Landfill. It is key to note that this is not the total capacity of the landfill, as this is not provided, however, is used as a proxy to understand the potential economic value of delay.

Table 31: Estimated costs for large best practice landfill in Australia (Source: Waste Management Association of Australia (WMAA) National Landfill Division in PC 2006 and WCS unpublished)

Type of cost	Cost per tonne of waste (WMAA) - \$2006
Cell development	\$6.5
Capping and rehabilitation	\$2.5
Aftercare	\$2
Total Cost	\$11
Volume treated	
Volume	40,000 tonnes

Reduction of leachate

Leachate is a liquid that passes through solid waste, that has been contaminated by a range of compounds or toxins, including organic waste, which creates significant externality costs.²⁰ By re-directing compost from landfill, this environmental impact can be mitigated and cost reduced. The external cost of leachate has been taken from the 2006 Australian Productivity Commission Report, accounting for the risk that leachate will damage human health and the environment. This external cost has been taken as [REDACTED] (2006) and escalated to 2021 values for the economic analysis.

5.1.2. Results

Table 32 summarises the results from the Cost Benefit Analysis. The economic analysis shows that the project is anticipated to create economic value for the Territory, with a BCR of **0.57** with a 7%

²⁰ Australian Productivity Commission (2006), Waste Generation and Resource Efficiency

discount rate. This indicates that the project does have some economic benefits, however, they do not outweigh the costs of the project. Although this is the case, it is key to note that the project has a number of non-quantifiable benefits that should be considered as well as the outcomes of the CBA.

Table 32: CBA results (\$ discounted, FY 2021)

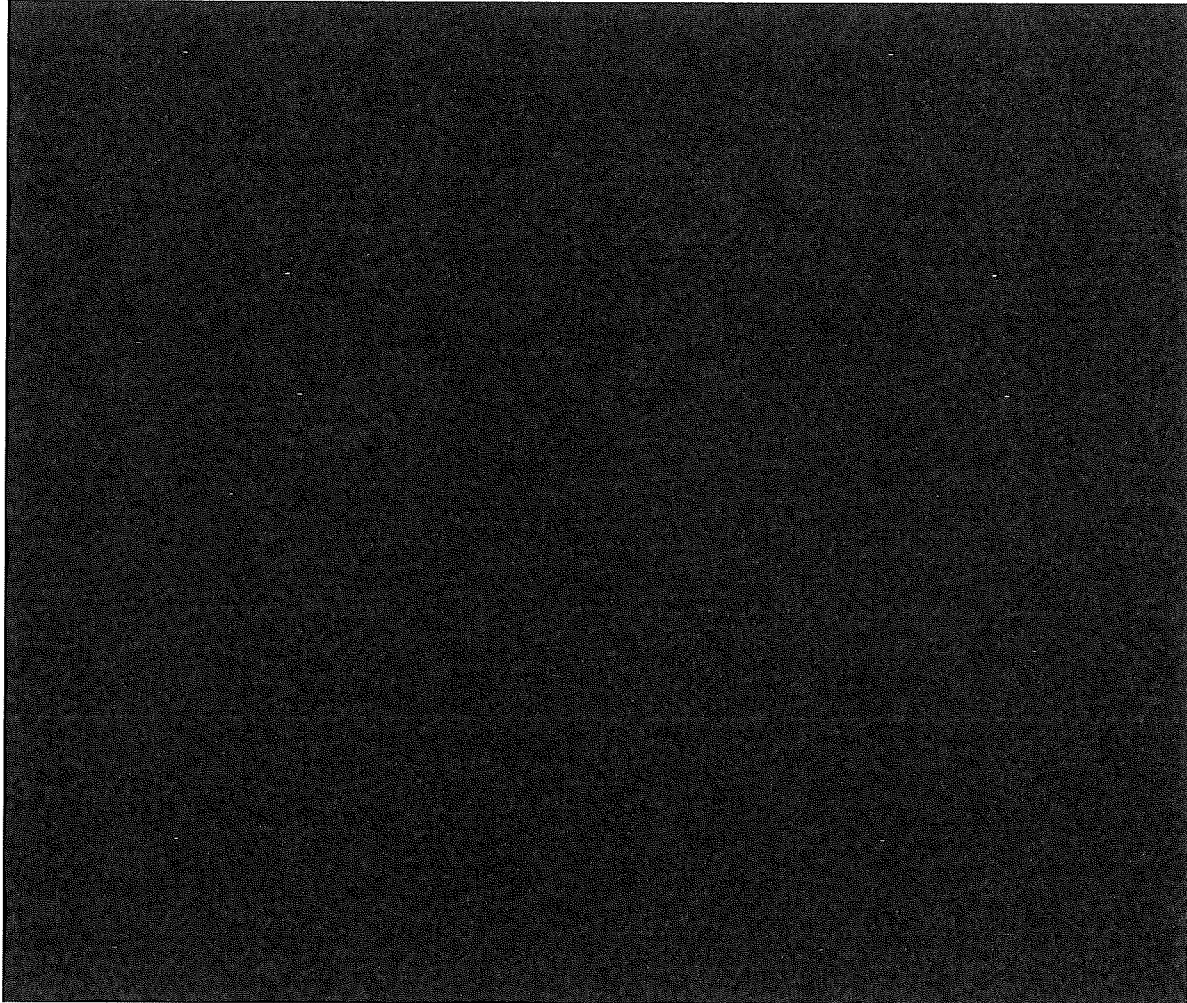
Element	FOGO Facility
Costs	
Capital Costs	
Operating Costs	
Total Costs	
Benefits	
GHG Benefit	
Land Fill Closure Cost Delay Savings	
Leachate Saving	
Total Benefits	
Summary	
Net Present Value (NPV)	(35,898,292)
Benefit-cost Ratio (BCR)	0.57
Internal Rate of Return (IRR)	N/A

5.1.3. Sensitivity Analysis

Due to the early stage of project development, a detailed sensitivity analysis has been completed to understand the impact that uncertainties around the Project and its parameters may have on its economic impact.

Table 33 summarises the sensitivity analysis undertaken for the preferred option with respect to the Central Case. The Central Case is the results for the preferred option, with no sensitivities applied, using a discount rate of 7%.

Table 33: Sensitivity Analysis (\$ Discounted, FY 2020)



5.1.4. Social Analysis

Studies regarding the social aspects of a circular economy, in this case employing a waste recovery strategy, have identified several social benefits. Employment being the primary impact on the community, followed by quality, wellbeing and willingness to pay for food composting.²¹

Employment

Investment in the FOGO facility will create employment opportunities during construction and operations. Based on a 2009 NSW Treasury Paper, for every \$1m spent in Construction Trade services, there are 7.2 jobs created.²² For a \$40m level of investment, this could be a total of ~30 construction jobs.

²¹ MDPI, *Addressing the Social Aspects of a Circular Economy: A Systematic Literature Review*, 24 September 2020

²² NSW Treasury, *Employment support estimates – methodological framework*, 2009

Additionally, as the government invests in greener policies, supports circular-based economies, and creates better waste management systems, additional jobs are expected to be created during the operating phase. Based on analysis of the proposed facility and its operations an additional 10 Full Time Equivalent (FTE) jobs, as well as 1 FTE for the education rollout, are expected to be realised.

These employment opportunities, higher in the waste hierarchy, create opportunities for higher skilled work in ACT in the waste sector. This transition will be reliant on upskilling of workers through providing necessary skills and training.

Health and wellbeing

Diverting organic waste from landfill has the potential to improve the quality and wellbeing of the public through the improvement of air quality – by subsequent reduction of air pollution and GHG production – as well as the reduction of leachate production.

Depending on local circumstances, leachate can find its way into the water table, which can result in considerable damage to community health. As such, by investing in diverting waste away from landfill, there is a significant reduction in risk to these water supplies.

Willingness to pay for food composting

According to a paper by the Australian National University that looked at Brisbane households, on average Brisbane households' willingness to pay (WTP) is an additional \$32 to \$35 (\$2011) per year for a general waste bin where food waste is split from general waste.²³ Brisbane households were seen to be a close comparison to the ACT, particularly as they have relatively similar average weekly earnings.

Based on advice from ACT NoWaste, at this stage additional Council Rates to pay for the FOGO facility should not be considered within the analysis. As such it has been assumed that all households receiving the new FOGO bins capture this WTP benefit.

This incorporates the community's willingness to pay for decreased landfill costs, sale of recyclables, environmental externalities and reduced resource. As it is unclear the proportion of benefits attributed to benefits already calculated in the CBA, , this WTP benefit has been expressed as a quantitative benefit.

Households participating in the scheme are broken down by Single Unit Dwellings (SUD) and Multi-Unit Dwellings (MUD). The number of households has been based on the ACT NoWaste 2020 dwelling count forecast using EPSDD new dwelling occupancy projections 2018-2047. The WTP benefit would be realised on a per household basis, regardless of the number of occupants.

The number of households participating in the scheme is outlined in the table below.

²³ Robert Gillespie & Jeff Bennett, 2011. "Willingness to pay for recycling food waste in the Brisbane Region," Environmental Economics Research Hub Research Reports 1096, Environmental Economics Research Hub, Crawford School of Public Policy, The Australian National University.

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Table 13: Number of households expected to be onboarded

Year	2023	2024
MUD FOGO-onboarded Dwellings	1,785	4,278
MUD FOGO incremental onboarded Dwellings	1,339	2,493
SUD FOGO-onboarded dwellings	106,665	143,156
SUD FOGO incremental onboarded dwellings	79,999	36,491

5.1.5. Environmental Analysis

The implementation of this project positively impacts the environment through creating an activated waste sector. Benefits include:

Improved water quality

The primary method of waste disposal in ACT is landfill which has negative environmental impacts through leachate discharges, greenhouse gas emissions, loss of visual amenity, foul odours and harbouring of disease-carrying pests. The other alternative that is often used is incineration which can produce toxic emissions if not controlled properly. Preventing organic wastes going into landfill has the potential to reduce the potency of leachate infiltrating into the groundwater and impacting water quality.

5.2 Wider Economic Benefits

Wider economic benefits are the improvements in economic welfare that are not typically captured in a CBA. These benefits are generally difficult to quantify and have been presented qualitatively.

The FOGO processing facility along with the resultant recycled organics, should have a wide range of wider economic benefits that bring added value to the Territory, public and industry. These benefits are outlined in the sections below.

Improved agriculture productivity

The benefits of organic compost for soils for agriculture crops and landscape maintenance far outweighs the use of synthetic fertilisers. Organic fertilisers have a greater capacity to hold and store nutrients, increasing soil fertility and as such soil organic carbon. Additionally, compost can aid in restoration of soils contaminated by hazardous waste and is also a cost-effective solution over water and air pollution remediation technologies.²⁴

²⁴ EPA, *Reducing the Impact of Wasted Food by Feeding the Soil and Composting*, 2020 retrieved from <https://www.epa.gov/sustainable-management-food/reducing-impact-wasted-food-feeding-soil-and-composting>

Australian soils are generally low in organic carbon, a key indicator of soil fertility. Using compost improves soil fertility and promotes healthy plant growth through its macro and micronutrients (often absent in synthetic fertilizers), reduced nitrogen leaching properties and its ability to release nutrients slowly over time.

Additionally, a study in Adelaide ²⁵ found typical yield in various agricultural industries improved by 12% by using high-quality compost made by recycled organics. This is due to savings from water efficiency. Organic compost products support water efficiency as it helps soil retain moisture increasing its water holding capacity. It is also estimated that “the combined gross crop productivity benefit for use of compost within the viticulture, horticulture, cut flower and nursery industries is about \$102/tonne of organic product applied”.

As such, this can result in lower maintenance of landscapes and agricultural crops as well as a reduced reliance on synthetic fertilizers.

Contribution to the circular economy

Using high-quality compost derived from recycled organics is sustainable, replacing soil nutrients and improving structure when the quality is poor. Compost can be used to replace topsoils, reducing the need to source virgin material from environmentally sensitive areas. It can return organic carbon to the soil where it can be stored as opposed to being emitted in the form of methane.

An economic analysis report assigned by the Australian Organics Recycling Association found “7.5 million metric tons of organics recycled puts more than \$2 billion into the country’s economy”.²⁶ The sources of recycled organics includes municipal and council wastes, commercial and industrial and construction and demolition waste. Additionally, a report prepared by KPMG about circular opportunities in the food industry and their potential GDP and employment impacts further supports the value and employment opportunity that a FOGO facility could help to unlock.²⁷

²⁵ EPA, Consultancy report: Organic waste economic values analysis, 2002
http://report.epa.sa.gov.au/files/8451_organic_waste.pdf

²⁶ BioCycle, *how much do organics recycling businesses contribute to Australia’s economy*, 2020 retrieved from
<https://www.biocycle.net/much-organics-recycling-businesses-contribute-australias-economy/>

²⁷ KPMG, *Potential Economic Pay-off of a circular economy*, 2020 retrieved from
<https://assets.kpmg/content/dam/kpmg/au/pdf/2020/potential-economic-pay-off-circular-economy-australia-2020.pdf>

Opportunity	Description	Real GDP (2047-48, present value \$million)	Employment (2047-48, FTE)
Food			
Nutrient recovery and recycling	Converting nutrients in organic waste into fertiliser	1,597	233
Biogas from organic waste	Converting organic waste to renewable energy	8,834	823
Water use efficiency	Improving the efficiency of water use	29,899	4,510
Food waste	Reducing waste in the consumption of food	37,141	-2,936

Figure 12: Circular opportunities in the food industry

Currently landfilling is used in the ACT is a linear approach in waste management. FOGO processing, managed effectively can be a part of the circular economy for food that helps rebuild soil health, recovers valuable resources, and provides feedstock for energy plants.

6. Delivery Model Analysis

6.1 Outline of Key Risks

This chapter explores the viable delivery model options available for implementation of the project. Key to the analysis was developing an understanding of project risks, how they could be managed / mitigated, and the level of risk transfer that may be achieved under the procurement models under consideration. The process undertaken with respect to analysis of risk management is summarised in Figure 13 below. This process included holding risk workshops and undertaking qualitative and quantitative assessments to assess the risks involved in pursuing the project.

These risks have been used to quantify delivery model contingency outlined in Section . This is the value of retained risks and the impact to cost. For this project, these contingencies have been applied in both a DCOM delivery model and traditional Government Procurement, with total quantified risk, not just retained risk, applied to the Government Procurement alternative. Additionally, this risk assessment, and resultant cost implications have been used in the assessment of delivery models, integrated into the Value for Money Assessment (Financial Analysis) outlined in Section 0 below.

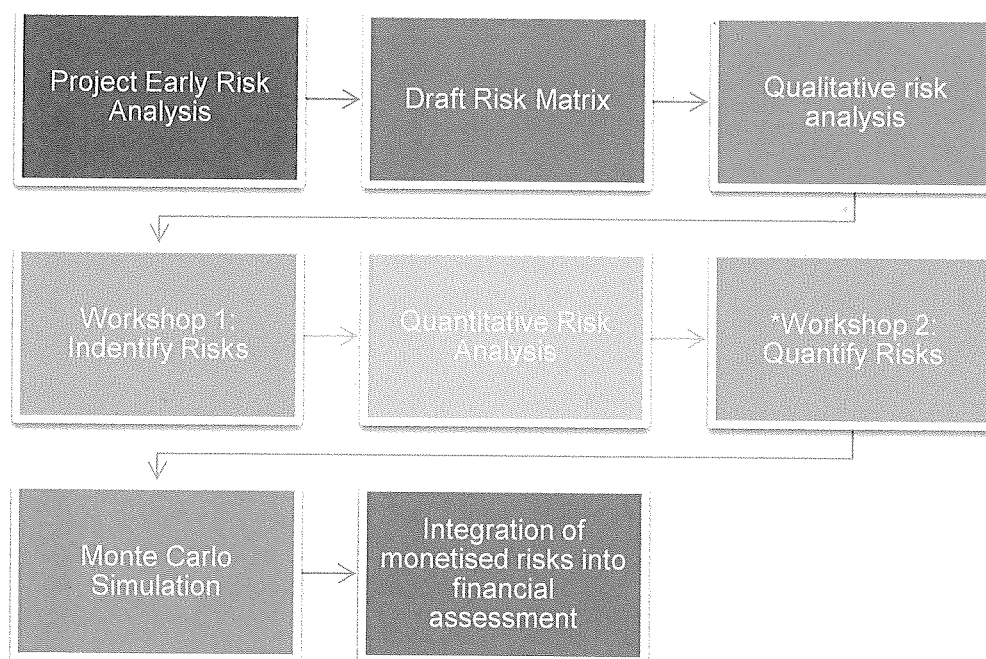


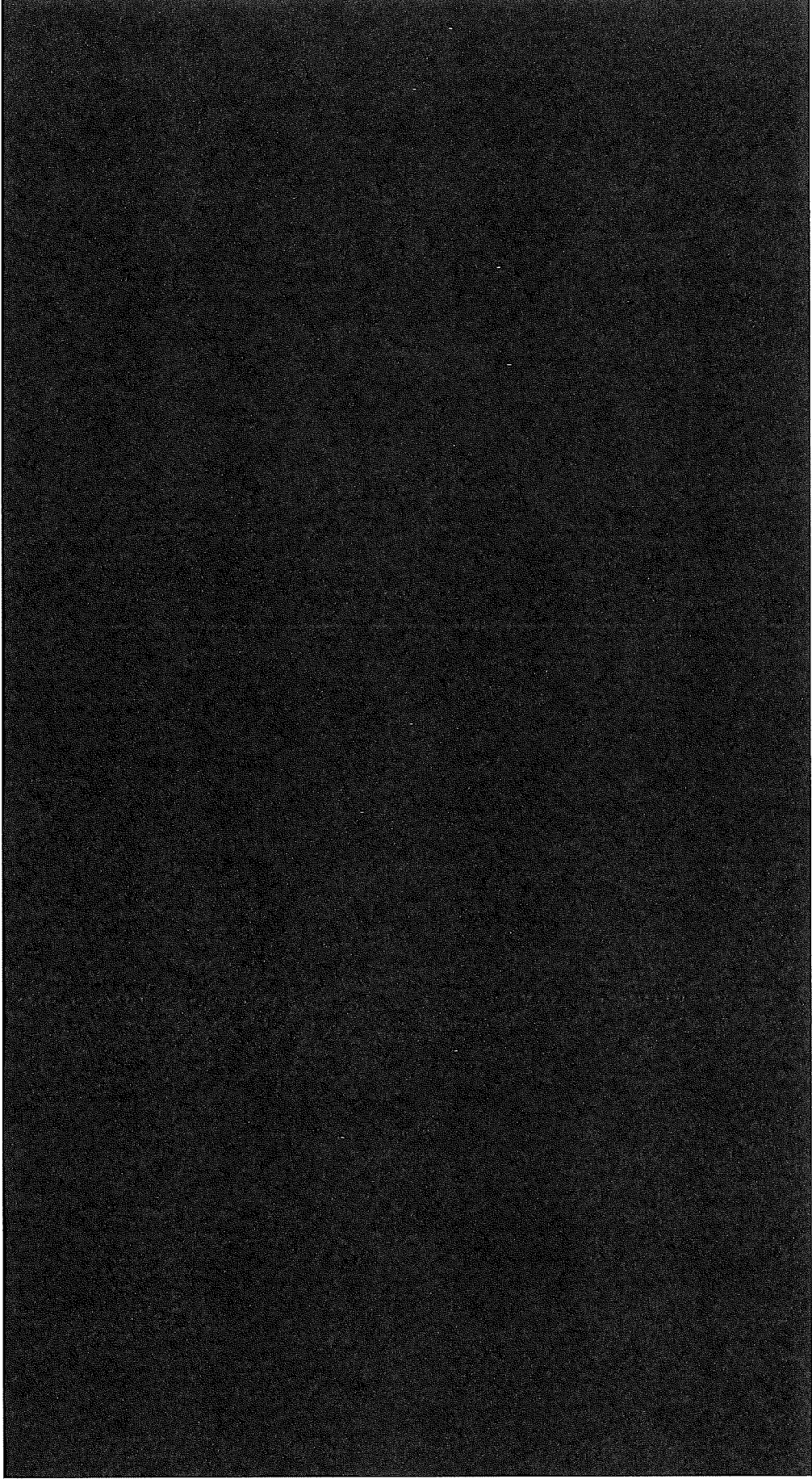
Figure 13: Risk management process

**outcomes validated over email with ACT NoWaste*

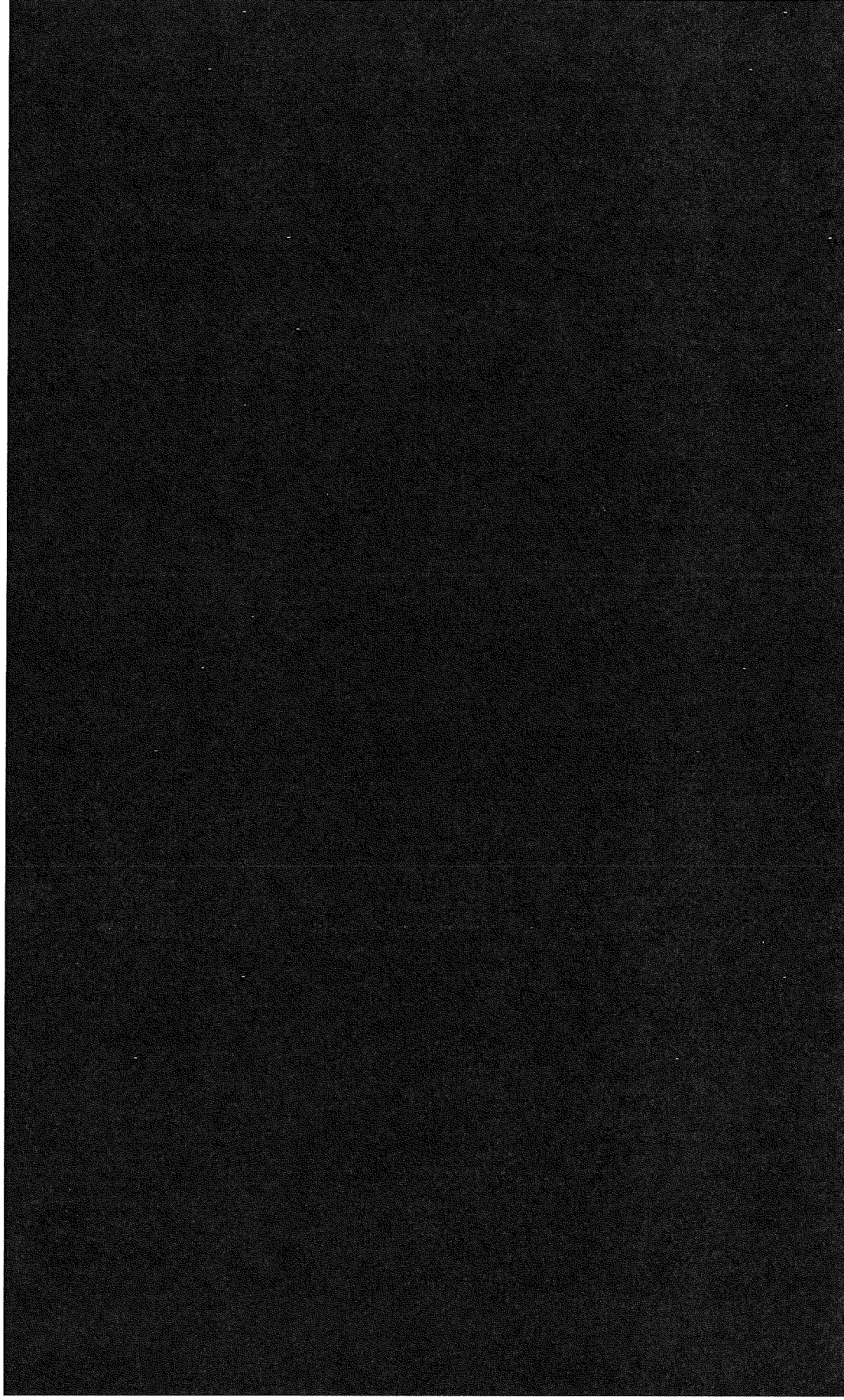
The following risks summarised in Table 34 have been identified as relevant to the project are detailed further in a Risk Register in Appendix C. Further to this a detailed assessment of the causes,

impacts and potential mitigations of the risks considered in the Risk Management Plan in Appendix E.

Table 34: Project Risk Summary



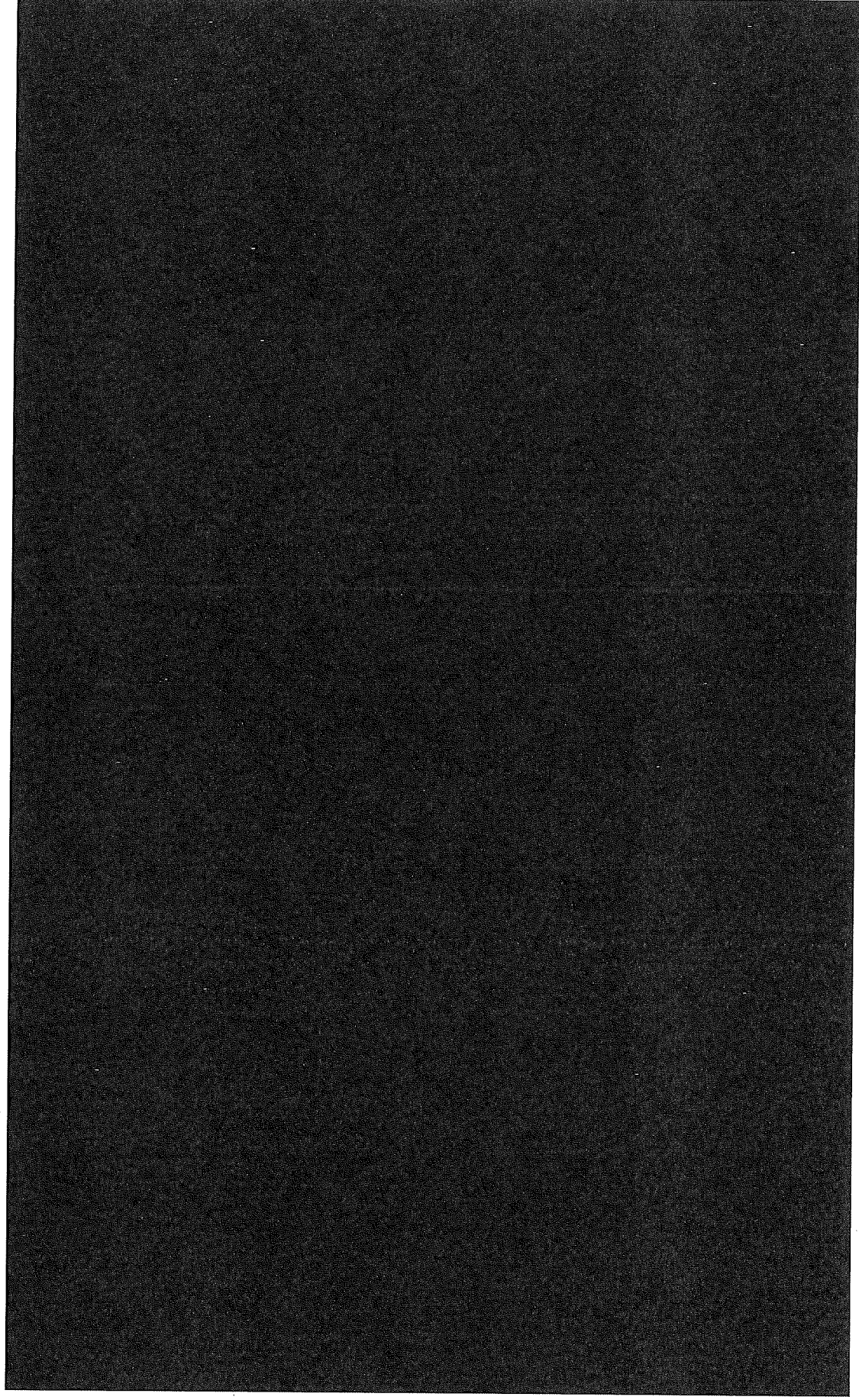
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Single Assessment Framework – Business Case Template (All Tiers)

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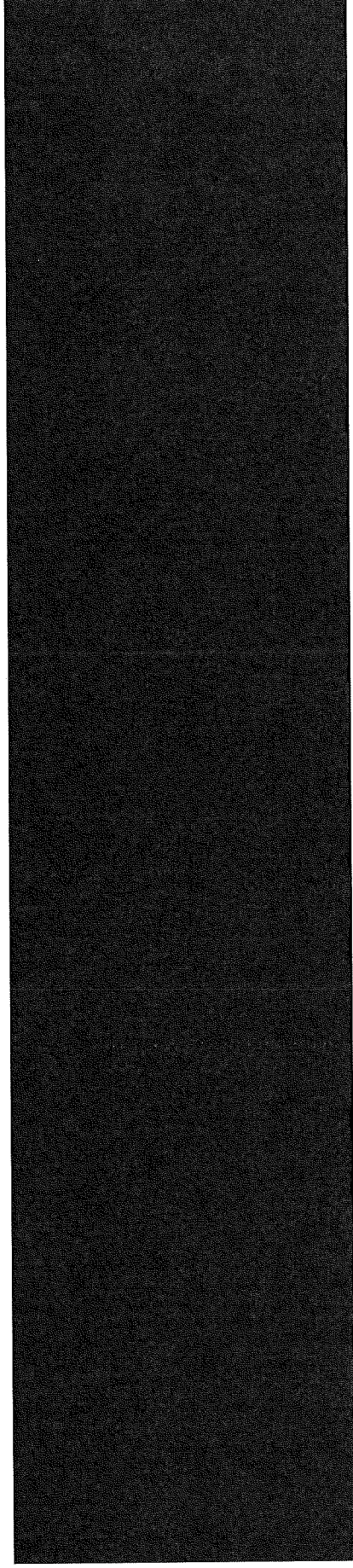
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Single Assessment Framework – Business Case Template (All Tiers)

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6.1.1. Commentary on risk

The risk workshop considered potential future risks based on the current known information. There are a variety of mitigating measures that will be implemented prior to project contractual close to mitigate certain project risks as far as is practical. Identified mitigation / management measures are presented in the Risk Register. Much of the risk will be mitigated through further design development prior to financial close such as Front-End Engineering Design (FEED) activities, ground investigation and utilities connection studies. In addition, project risk will be mitigated through the contracting philosophy. As far as reasonably practicable, risk mitigation will be undertaken prior to contractual close, before significant capex is incurred. As is typical for any capital works project, some risks will have to continue to be managed through construction, and for such mitigation measures, associated project development cost has been included in the financial modelling.

Much of the risk under the shortlisted delivery models analysed later in this chapter are anticipated to be transferred to the chosen private sector developer / contractor. The mitigation measures set out in the risk register assume that the contractor would be willing to accept a level of risk that is in line with general market practice and therefore considered reasonable. Such risks are assumed to be priced into developer / contractor costs in the analysis in Section 7 of this document. The risk appetite of contractors may change over time as they undertake due diligence and investigations and therefore final risk positions are expected to be commercially agreed within the contracts during the project's procurement stage.



6.2 Commercial Principles

To select the most appropriate delivery model, the relative importance of a range of commercial principles has been considered. For the FOGO facility, the commercial principles underpinning the proposal that are important to consider include the following criteria:

- Time to deliver
- Flexibility
- Level of Integration / Bundled Services
- Level of risk transfer
- Innovation and incentive
- Output specification
- Cost and level of complexity for Government
- Price certainty

These commercial principles have been used in a Multi-Criteria Analysis that was the basis of selecting the preferred delivery model, as outlined later in this chapter. A description of each of these principles based on the *ACT Government Capital Framework, Draft Delivery Model Analysis Guidelines* is summarised in Table 35 below.

Table 35: Definition of key commercial principles

Commercial Principle	Description
Time to deliver	The extent of time required to prepare and procure the project, and commence operations.
Flexibility	Operational flexibility: the extent to which the delivery model enables the Government to retain flexibility in terms of the project's operational profile. Future scope changes: the extent to which the delivery model assists the Government in managing and implementing changes to the functional requirements of the project over time (both during the design and construction stage and subsequently).
Level of integration / Bundled services	The level of integration between construction, ongoing maintenance, and facilities management.
Level of risk transfer	The extent to which the delivery model facilitates a transfer of project risks from the Government to the private sector contractor.
Innovation and incentive	The existence of opportunities and incentives within the delivery model to drive innovation.
Output specification	The Project Team clearly understands the output requirements from the project and can readily measure outputs. The easier this is to define, the more suitable to complex, integrated models.
Cost and level of complexity for Government	Level of cost and complexity of the procurement process, both for the public sector and for bidders. Additionally, the costs to establish and maintain relationships between the parties and level of ongoing Government involvement.
Price certainty	The importance of price certainty to the project, associated with the project risk profile and need for flexibility.

The relative importance of each criteria and level of consideration when selecting the most appropriate delivery model is outlined in the table below. Note that this relative importance is quantified later in this chapter.

Table 36: Commercial Principles

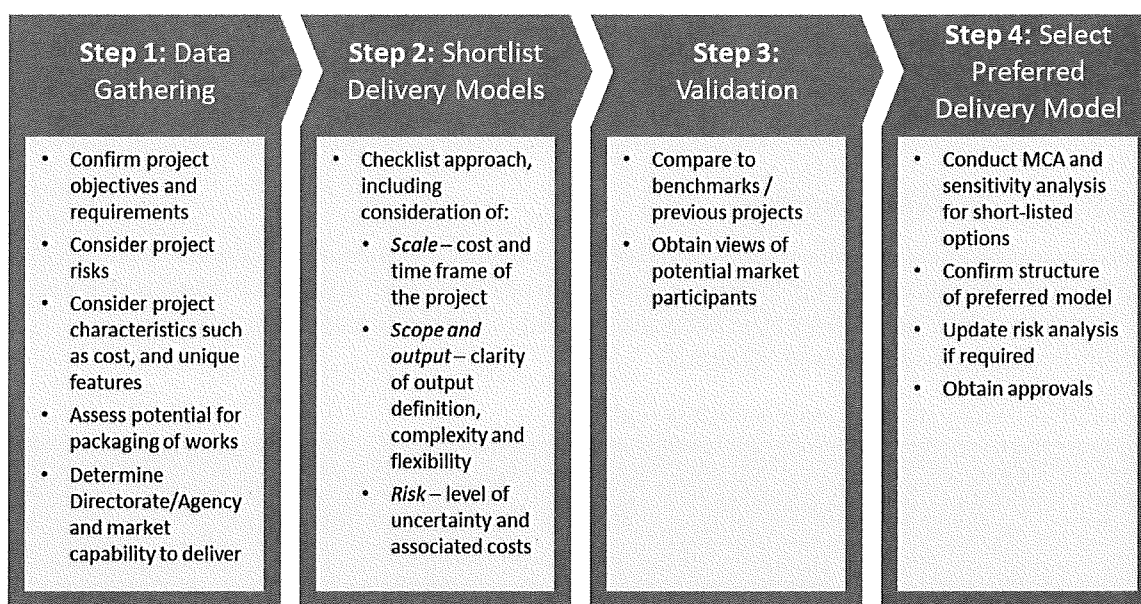
Criteria	Description
Time to deliver	Time to deliver the FOGO facility is relatively important due to Election Commitments and ACT's broader timelines to deliver the project by 2023, as well as the need to make progress against government's carbon reduction targets. Factors such as the technology and its potential obsolescence are not a driver or concern for this project.
Flexibility	Flexibility in the project and its delivery, in terms of ability to accommodate to variability and uncertainty is not the primary concern form this project. The facility's size, quantity of waste and the required output is expected to be understood prior to going to market.
Level of Integration / Bundled Services	Level of integration and the ability bundle services is important for this project. This will help to ensure that the facility is designed and built to accommodate optimised operational procedures and can generate a compost output of the quality required. This is consistent with feedback during informal market sounding, where private sector parties emphasised the importance of integrating asset creation and operating activities, and limited interest in post development operating contracts. Additionally, as the operator is intended to be responsible for creating the market for compost produced, there is incentive for the developer to construct a facility that is fit and useful over the asset life.
Level of risk transfer	[REDACTED] [REDACTED] [REDACTED]
Innovation and Incentive	The delivery model should encourage the private sector to be innovative, creating the opportunity for a better solution for organic waste processing. If allowed by their technologies or market relationships, bidders should be encouraged to demonstrate the ability to generate additional by-products that could be used to generate additional revenue streams and further develop the circular economy.

Criteria	Description
Output Specification	The Output Specification would be limited to stipulating compliance with relevant environmental standards and the required waste feedstock level being pre-defined. This lends to a model which would not require detailed designs to be provided to bidders, particularly as there are options for bidders to deliver this project using various technology solutions or uses for produced compost.
Procurement cost and level of complexity for Government	This project requires balancing the need to leverage private sector know-how, capacity, and innovation potential, with minimising unnecessarily complex contractual arrangements. [REDACTED] This commercial principle is considered to have a medium level of importance given the project is small in scale and therefore less complex.
Price certainty	Price certainty is important for this project and is sought for most government projects. Given constraints in the ACT's current and future budgets, price certainty is of high importance for this project.

6.3 Delivery Model Assessment

The Delivery Model Assessment has been undertaken using both the *ACT Government Capital Framework*, and *Delivery Model Analysis Guidelines*. This approach includes shortlisting delivery models, and subsequent detailed delivery model analysis using the Commercial Principles discussed in Section 6.2, based on the framework below set out in the guidelines.

Table 37: Delivery Model Selection Framework



6.3.1. Data Gathering

Significant work has been completed prior to the Business Case phase on Delivery Model Assessment and high-level market sounding. This has been highlighted throughout the business case document, summarised in the table below.

Table 38: Data Gathering

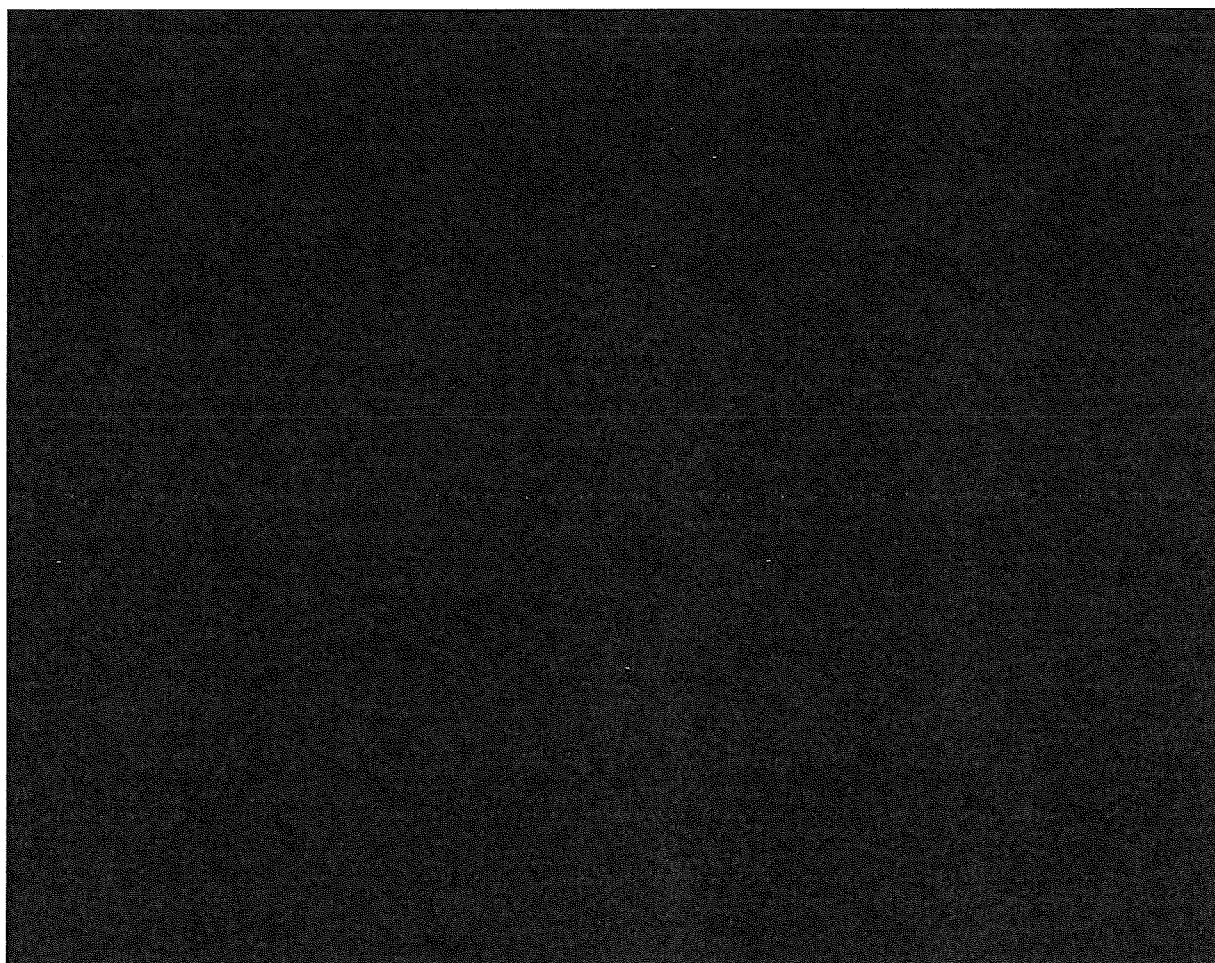
Data area	Key observations
Project objectives	See Section 2.1.1 for project objectives.
Project requirements	- Introduction of food and garden organic waste treatment for waste that is currently sent to landfill - Redirection of 50% of domestic organics from landfill - Treatment of over 42,000 tpa of feedstock by 2023 - Ability to engage and create a compost market for the sale of the output of the facility. Potential for additional revenue generating by-products
Project risks	Key project risks have been outlined within Section 6.1, with further detail provided in the Risk Management Plan included in Appendix E. [REDACTED] [REDACTED] [REDACTED]

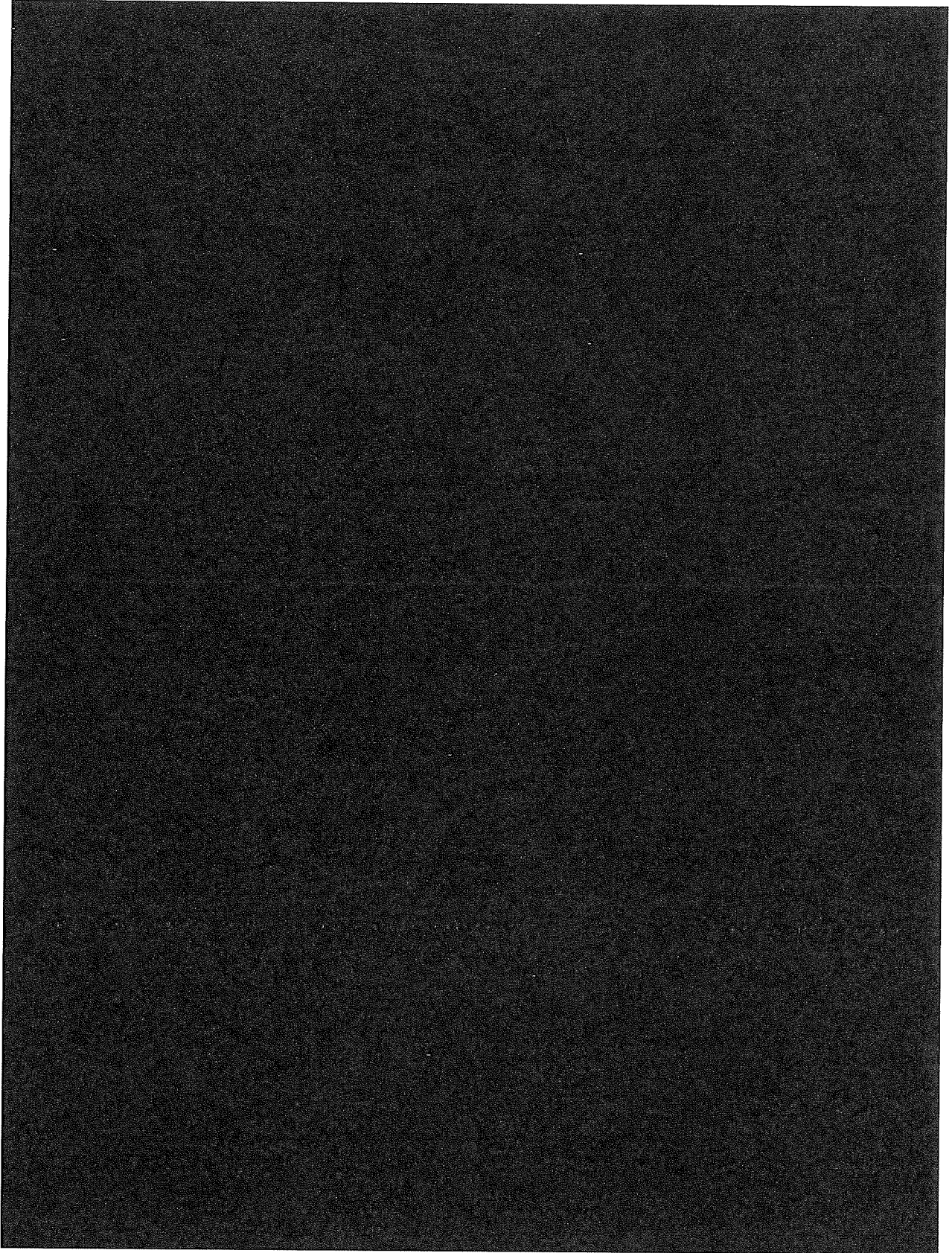
Data area	Key observations
	[REDACTED]
	[REDACTED]
	[REDACTED]
	[REDACTED]
	[REDACTED]
	[REDACTED]
Market Sounding	Soft Market Sounding was completed as part of the Feasibility Study with various established and reputable players in the FOGO market. Please see the section below for a summary of the findings of the market sounding.

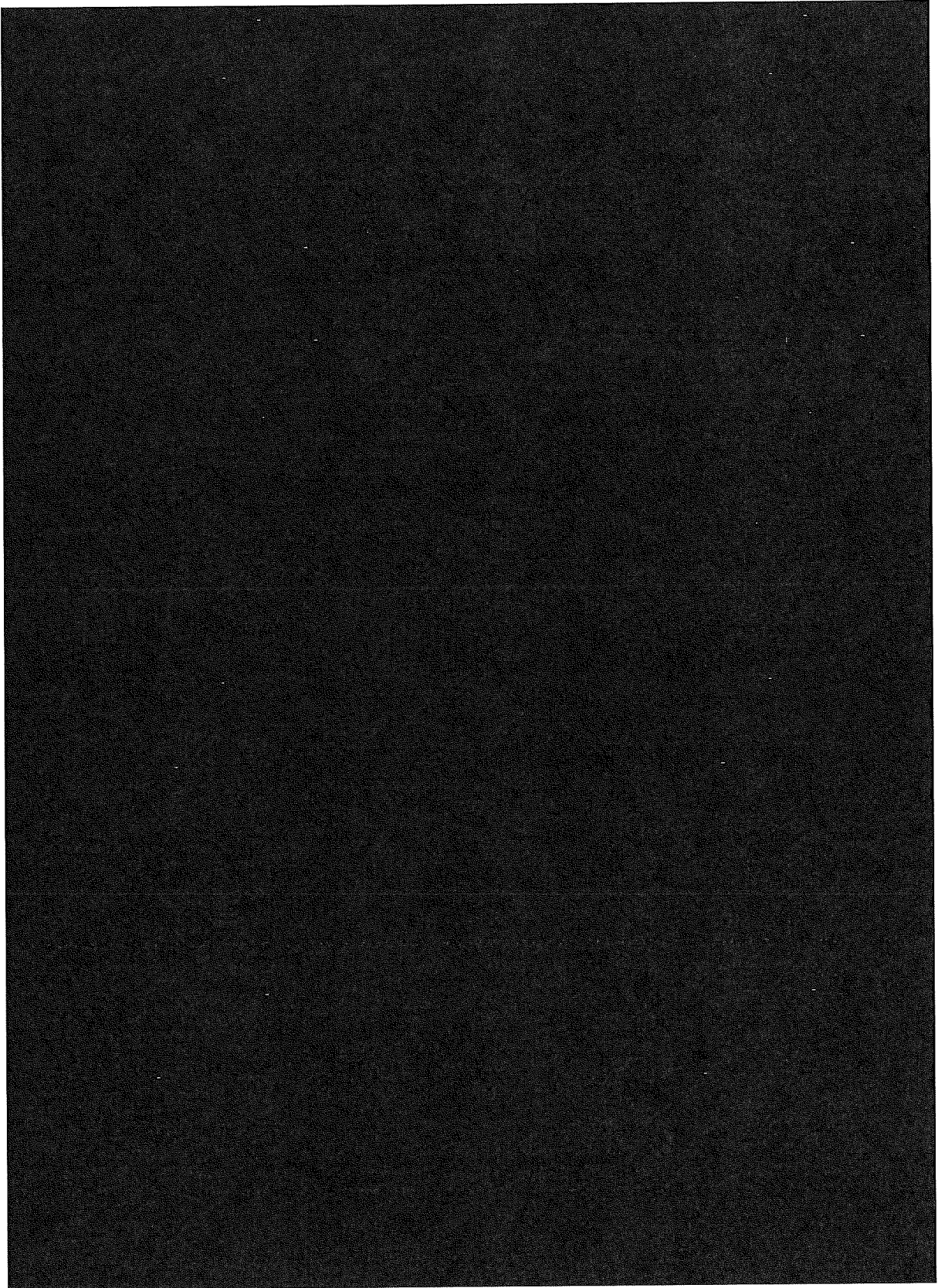
6.3.2. Market Sounding

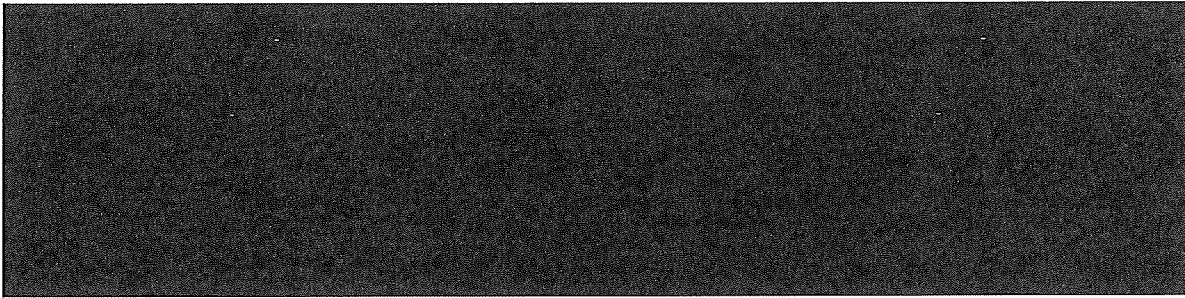
Arup conducted a soft market sounding with various established and reputable players in the FOGO market. This included technology providers and facility operators with experience across a range of contractual models. Key findings have been anonymised to protect commercial-in-confidence information and are summarised in Table 39.

Table 39: Summary of soft market sounding findings









6.3.3. Delivery Model Short-List

The long list of delivery models considered for delivery of the FOGO Facility are detailed in the table below. These have been based on the *ACT Government Capital Framework, Draft Delivery Model Analysis Guidelines*, and grouped into the following four categories.

- Group 1: User Charge PPP, Availability PPP, DCOM
- Group 2: MC, Alliance, ECI, Delivery Partner
- Group 3: D&C, DCM
- Group 4: PMA, D then C, CM

Table 40: Delivery Model groupings

Delivery model type	Specific Models
1. User Charge PPP, Availability PPP, DCOM	• Design Construct Maintain Operate • Availability PPP • User Charge PPP
2. MC, Alliance, ECI, Delivery Partner	• Managing Contractor • Alliance • Early Contract Involvement • Delivery Partner
3. D&C, DCM	• Design & Construct • Design, Construct, Maintain (Long term)
4. PMA, D then C, CM	• Design then Construction • Document & Construction • Design, Construct, Maintain (Short term) • Project Management Agreement • Construction Management

These four groups have been used to shortlist Delivery Models, based on a range of key criteria. The short-listing process aimed to assess the appropriateness of each model in relation to the project in terms of scale, scope, risk and whole-of-life service opportunities.

The approach used is summarised in Table 41 below.

Table 41: Delivery Model Shortlist Checklist

Issue	Project Details	Group 1	Group 2	Group 3	Group 4
Scale					
Is the project value over \$100 million?	No	✓	✓	✓	✗
Is the project value under \$50 million?	Yes	✗	✗	✓	✓
Are there substantial lifecycle costs?	Yes	✓	✗	✗	✗
Is the useful life of the project asset over 10 years?	Yes	✓	✗	✗	✗
Scope and outputs					
Are the project scope and outputs capable of clear definition?	Yes	✓	✗	✓	✗
Are design and construction complex, or does the project involve innovative technology?	No	✗	✓	✓ ✗	✗
Is the scope likely to change in a way that the Project Team cannot anticipate?	No	✗	✓	✗	✓
Are there any opportunities for bundling of non-core services and maintenance within the project?	Yes	✓	✗	✗	✗
Risk					
Is it possible to identify and quantify the main project risks?	Yes	✓	✗	✓	✓
Are there unquantifiable risks and uncertainties that could have a material impact on the project cost and objectives?	No	✗	✓	✗	✗
Is the cost of allocating the main project risks to the private sector likely to be prohibitive?	No	✗	✓	✗	✓
Score					
Ranking		1	4	2	3
✓ If the answer to the question is 'yes', these delivery models may be appropriate					
✗ If the answer to the question is 'no', these delivery models may not be appropriate					
Criteria suits the project					
Criteria does not suit the project					

The short-listing assessment suggests that Group 1, made up of DCOM and PPP is the most appropriate for the FOGO facility. Although scoring less, Group 3 is also suitable for the FOGO facility, with Delivery Models within carried through to the shortlist. Although PPPs are typically used for major economic infrastructure projects such as toll roads, it is also used for smaller projects with a component of user charges, such as waste treatment plants, with capital values of under \$50 million.

For this project, an availability PPP is less appropriate because revenues are anticipated (if under PPP delivery) through user charges; the Territory would be the key user and would likely need to commit to a minimum amount of organic waste to be processed by the facility, with gate fees to be payable on the basis of the higher of actual throughput or minimum agreed tonnage.

Delivery Model Shortlist

- Design Construct Maintain Operate
- User Charge PPP
- Design & Construct
- Design, Construct, Maintain (Long term)
- Design then Construction
- Document & Construction
- Design, Construct, Maintain (Short term)
- Project Management Agreement
- Construction Management

6.3.4. Validation

To validate the delivery model selection, market sounding and benchmarking to other projects was completed as part of the Feasibility Study. The market sounding is summarised above in Section 6.3.2 above.

6.3.5. Detailed Delivery Model Assessment

The process of selecting the preferred delivery model applied a Multi-Criteria Analysis (MCA) on short-listed options. The MCA consisted of four key steps which are outlined in Figure 14.

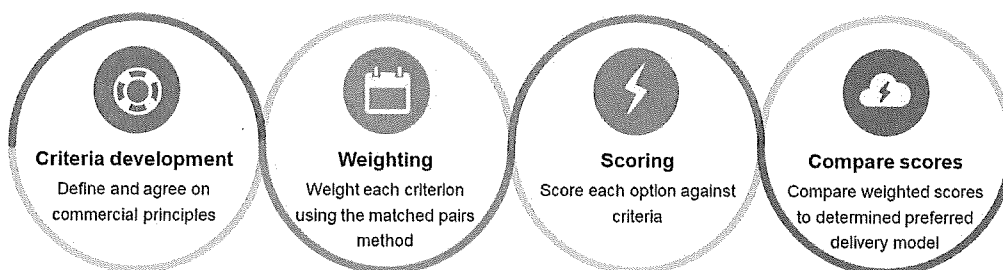


Figure 14: Multi-Criteria Assessment Framework

Criteria

The assessment criteria used for the MCA are a continuation of the Commercial Principles outlined in Section 6.2. These have been confirmed in a Procurement Workshop on the 15th of April 2020.

Weighting

Assessment criteria were weighted depending on their relative importance to each other. A three-point scale comprising High, Medium, and Low was used to weight the criteria. This was translated into a weighted total score using a 3:2:1 ratio.

The weighting was confirmed in an MCA workshop with ACT NoWaste and ACT Treasury. The results are summarised in Table 42 below.

Table 42: Commercial Principles Weighting

Criteria	Weighting (rounded)
Time to deliver	16%
Level of Integration / Bundled Services	16%
Level of risk transfer	16%
Flexibility	11%
Price certainty	16%
Procurement cost and level of complexity for Government	11%
Innovation and Incentive	11%
Output Specification	5%

Scoring

Each short-listed delivery model was scored in relation to the criteria using the scale shown in Table 43. Scoring was based on Table 5 in the *ACT Government Capital Framework, Draft Delivery Model Analysis Guidelines* as a starting point. These scores were then refined with input from ACT NoWaste and ACT Treasury team members to account for the nuances of this project.

Table 43: MCA scoring scale

Score	Description
1	The model does not meet the assessment criterion
2	The model marginally meets the assessment criterion
3	The model meets the assessment criterion
4	The model exceeds the assessment criterion
5	The model is superior to the assessment criterion

The results of the scoring process for each of the options, in relation to each of the Commercial Principles (Criterion) in the sections below. A brief justification for the scoring has also been provided.

Time to deliver

Delivery Model	Score: Time to Deliver	Justification
Design then Construct	4	Flexible to meet time requirements with advantage of rapid procurement
Design & Construct	4	Flexible to meet time requirements with advantage of rapid procurement
Design Construct Maintain (Short Term)	3	Can meet delivery time requirement; procurement process may take slightly longer than traditional D&C methods
Design Construct Maintain (Long Term)	3	Can meet delivery time requirement; procurement process may take slightly longer than traditional D&C methods
Design Construct Maintain Operate	3	Can take longer to document than a traditional procurement method which can delay commencement.
User Charge PPP	2	Longer procurement period expected for PPP, as greater time is needed for Government to prepare tender and contractual documents, longer tender evaluation period due to greater levels of due diligence, and fundraising activity and more stakeholders involved (particularly due to financing element), which combined can delay commencement.

Flexibility

Delivery Model	Score: Flexibility	Justification
Design then Construct	4	Contract can be easily amended to address variation arising from uncertainty at initial stages
Design & Construct	3	Ability to accommodate uncertainty and variation ultimately dependent on contract terms and nature of project
Design Construct Maintain (Short Term)	2	Limited ability to innovate or upgrade until initial operating term has concluded. Design may be influenced by initial operational model and expensive or

CABINET-IN-CONFIDENCE (after first entry)

Delivery Model	Score: Flexibility	Justification
		cumbersome to change to realise improvement.
Design Construct Maintain (Long Term)	2	Project generally needs to be scoped from the outset resulting in limited ability to innovate or upgrade over the life of the plant
Design Construct Maintain Operate	2	Project generally needs to be scoped from the outset resulting in limited ability to innovate or upgrade over the life of the plant
User Charge PPP	1	Given the use of private sector financing, and the need to have more rigid longer term arrangements in place to ensure private sector lender and investor appetite, government generally has limited ability to vary once project commenced

Level of Service / Integration

Delivery Model	Score: Level of Service / Integration	Justification
Design then Construct	1	Focused only on construction stage; no integration of outcomes beyond construction
Design & Construct	1	Focused only on construction stage; no integration of outcomes beyond construction
Design Construct Maintain (Short Term)	3	Addresses maintenance beyond construction phase but not ongoing operational considerations
Design Construct Maintain (Long Term)	3	Addresses maintenance beyond construction phase but not ongoing operational considerations
Design Construct Maintain Operate	5	Full integration of the life cycle of the project
User Charge PPP	5	Full integration of the life cycle of the project

Level of Risk Transfer

Delivery Model	Score: Level of Risk Transfer	Justification
Design then Construct	2	Little or no involvement by operator in the D&C phase, resulting in risk of suboptimal operations / functionality, or expensive refit after initial O&M term.
Design & Construct	2	
Design Construct Maintain (Short Term)	4	
Design Construct Maintain (Long Term)	4	Compost market risk remains with ACT to resolve. Considerable interface risk between construction and operations. ACT can share in any compost/output upsides
Design Construct Maintain Operate	5	Integrating the D&C and operational phases of the project encourages private sector to ensure design is focused on maximising operational functionality. Contractor assumes significant risk.
User Charge PPP	5	The most complete level of integration between D&C and operating phases, with the incorporation of private financing. As a result, encourages private sector to focus on optimising whole of life costs. Contract typically assumes the majority of risk under this model.

Innovation and Incentive

Delivery Model	Score: Innovation and Incentive	Justification
Design then Construct	2	Output is fixed at the outset with minimal opportunity or incentive for the contractor to drive innovation.
Design & Construct	3	Innovation is possible during the design phase.
Design Construct Maintain (Short Term)	3	Innovation is possible during the design phase.
Design Construct Maintain (Long Term)	4	Design and build will be incentivised for long term costs savings for maintenance.
Design Construct Maintain Operate	4	Incentivises for whole-of-life cost savings for maintenance and operations

CABINET-IN-CONFIDENCE (after first entry)

User Charge PPP	5	Incentivises for whole-of-life cost savings for maintenance and operations
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Output Specification

Delivery Model	Score: Output Specification	Justification
Design then Construct	1	ACT would need to provide a detailed functional specification. The ACT lacks technical expertise in this area.
Design Construct Maintain (Short Term)	4	
Design Construct Maintain (Long Term)	4	The ACT would need to have input into the ongoing operations of the facility in its design, so would need to have more control over the design and construction process.
Design Construct Maintain Operate	5	ACT can specify project requirements in function and service quality standards (i.e., processing of organic waste to produce a valuable compost in a safe and environmentally sensitive manner) rather than in terms of prescriptive design inputs.
User Charge PPP	5	ACT can specify project requirements in function and service quality standards (i.e., processing of organic waste to produce a valuable compost in a safe and environmentally sensitive manner) rather than in terms of prescriptive design inputs.

Cost and level of complexity for Government

Delivery Model	Score: Cost and Level of Complexity for Government	Justification
Document & Construct	5	Relatively straightforward contract structures and documentation. Procurement process is well understood by ACT and efficient to implement. ACT is responsible for ongoing operations (either itself or through separate contractual arrangement with an operator). Complexity in managing the multiple interfaces.
Design & Construct	5	

Delivery Model	Score: Cost and Level of Complexity for Government	Justification
Design Construct Maintain (Short Term)	3	Some complexity arising from incorporating short term O&M to D&C arrangements. Additional time and/or cost may be incurred in procurement due to the need to identify and vet bidders with ability to deliver during both the D&C and O&M phases.
Design Construct Maintain (Long Term)	2	Separate arrangements would need to be made for operations (either self-operated or outsourced), increasing effort and cost associated with documentation. Additional time and/or cost may be incurred in procurement due to the need to identify and shortlist bidders with ability to deliver during both the D&C and O&M phases.
Design Construct Maintain Operate	2	Complex contractual arrangement, which has limited precedent in ACT context. Procurement process will be more complex due to the need to identify and shortlist bidders with ability to deliver during both the D&C and O&M phases.
User Charge PPP	1	Complex contractual arrangement. Procurement process will be more complex due to the need to identify and shortlist bidders with ability to deliver during both the D&C and O&M phases. Further time and cost incurred in understanding and evaluating bidders' proposed financing arrangements.

Price Certainty

Delivery Model	Score: Cost and Level of Complexity for Government	Justification
Document & Construct	2	Provides only short-term construction price certainty in accordance with agreed terms, but

Delivery Model	Score: Cost and Level of Complexity for Government	Justification
		no certainty for variation or long-term costs.
Design & Construct	3	Provides only short-term construction price certainty in accordance with agreed terms, but no certainty for variation or long-term costs.
Design Construct Maintain (Short Term)	3	Provides only short-term construction and maintenance price certainty in accordance with agreed terms, but no certainty for variation or long-term costs.
Design Construct Maintain (Long Term)	4	Provides short-term construction and maintenance price certainty in accordance with agreed terms, but no certainty for variation or long-term operational costs.
Design Construct Maintain Operate	4	Fee agreed for all short-term and long-term costs relating to the facility, with only variability arising in respect of risks retained by ACT in the risk allocation and contract.
User Charge PPP	5	Fee generally covers most costs relating to the facility. Long term contractual certainty over costs throughout the project's lifecycle, and minimised upfront outlay for ACT. Risks retained by ACT in the risk allocation and PPP contract can result in variability if mitigants are not properly identified.

6.4 Outcomes of MCA

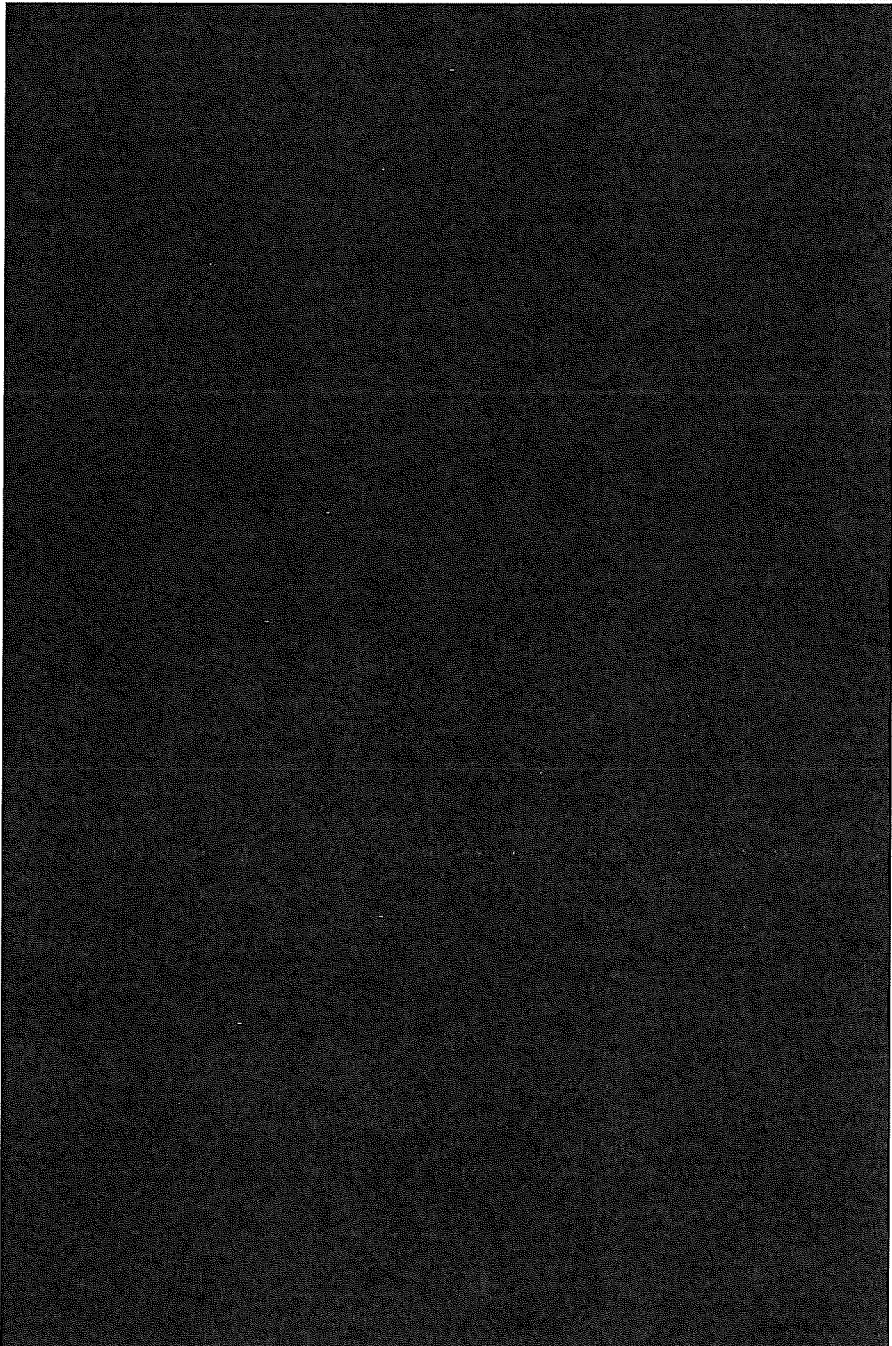
The results the MCA identified a **DCOM** and a **User Charge PPP** as preferred delivery models.

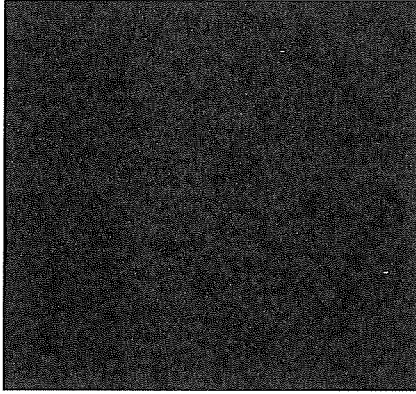
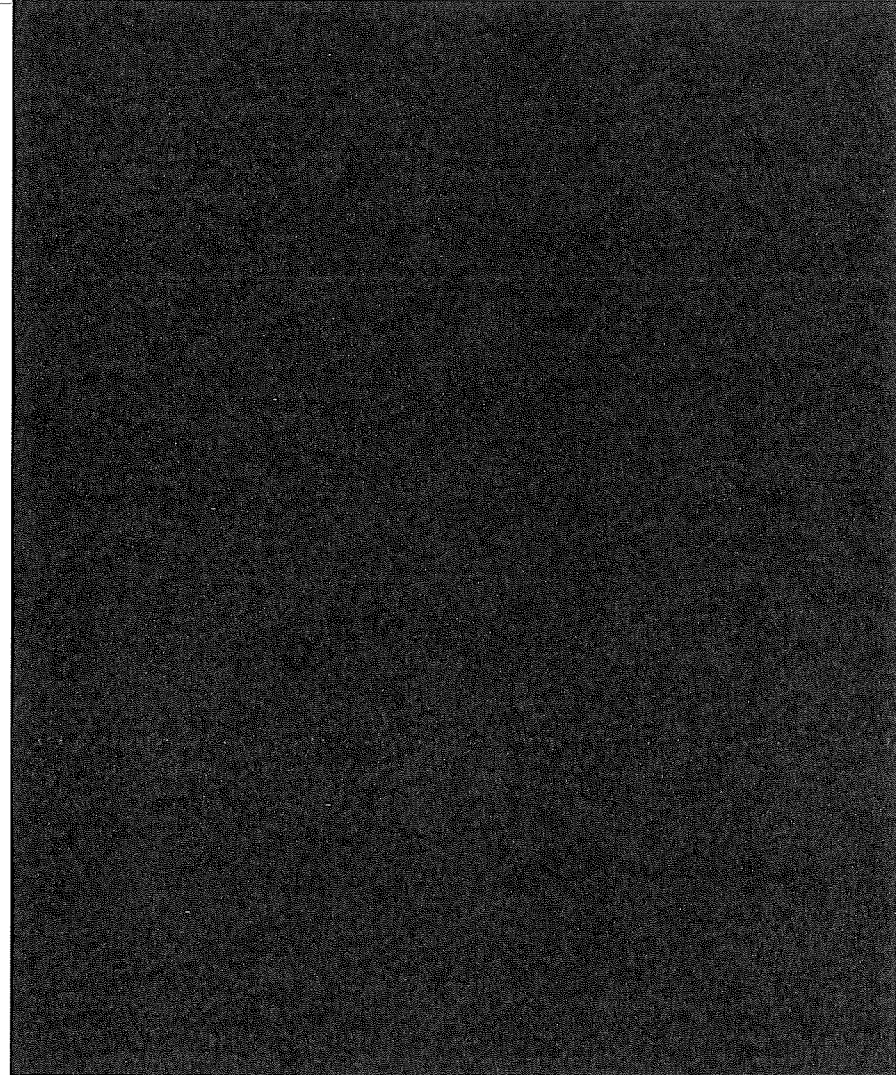
Table 44: Summary of MCA Analysis

MCA Criteria	MCA Weighting	Document & Construct	Design & Construct	Design Construct Maintain (Short Term)	Design Construct Maintain (Long Term)	Design Construct Maintain Operate	User Charge PPP
Time to deliver	16%	4.0	4.0	3.0	3.0	2.5	2.0
Flexibility	11%	4.0	3.0	2.0	2.0	2.0	1.0
Level of Integration / Bundled Services	16%	1.0	1.0	3.0	3.0	5.0	5.0
Level of risk transfer	16%	2.0	2.0	4.0	4.0	4.5	5.0
Innovation and Incentive	11%	2.0	3.0	3.0	3.5	4.0	5.0
Output Specification	5%	1.0	1.0	4.0	4.0	5.0	5.0
Procurement Cost and level of complexity for Government	11%	5.0	5.0	3.0	2.0	2.0	1.0
Price Certainty	16%	2.0	2.5	3.0	3.5	4.0	5.0
TOTAL	Total / 5	2.63	2.71	3.11	3.13	3.63	3.68

6.5 Recommended Delivery Model

From the outcomes of the MCA process, a **DCOM** and a **User Charge PPP** are the preferred Delivery Models for the FOGO facility. A qualitative assessment of both models has been undertaken, taking into consideration the benefits of each model, the outcomes of the soft market sounding and preliminary consultation with stakeholders. This included stakeholders within ACT NoWaste, ACT Treasury and Major Projects Canberra, and Arup/Sphere's knowledge of the organics and waste infrastructure market.

Delivery Model	Benefits	Disadvantages
DCOM		

Delivery Model	Benefits	Disadvantages
		
User Charge PPP		

From this, both models are suitable for this project. Given the similarity in the MCA analysis outcomes between both models, we have included an analysis of both in the Business Case, with an

understanding that a final selection will be made in consultation with ACT Treasury and other relevant government agencies.

Informal market sounding has ascertained that it is possible that a private sector operator could offer to build its own facility on different land to that identified by and owned by the ACT and/or retrofit an existing facility. In this case a 'contract for services' contracting approach would be used to be used (in the form of a standard waste disposal agreement). As such further feedback from the market may be required to inform the selection of the final delivery model – this will be undertaken during the procurement phase through a two stage RFP and RFT process.

Service and quality standards for the operations of the facility will need to be agreed as part of the procurement process.

6.6 Review 3 (IFCW): Delivery Model Selection

IFCW directorate to sign off that the delivery model selected is appropriate for the project risk profile and value.

Review 3 (IFCW) Officer Name: _____

Signature: _____

Date: _____

- *This is the second review point for IFCW and is an assessment of the delivery model analysis.*
- *Sign off should only occur if the IFCW office is confident that the delivery model selected is the most suitable to the project requirements and level of risk.*

Disclaimer: *This review does not represent an endorsement or agreement by the signing officer as to the contents of the section or a certification that the work was correctly performed.*

7. Financial Analysis

This section outlines the financial analysis undertaken on delivering the project through a DCOM model, as well as via traditional procurement.

While PPP and DCOM have both been identified as suitable delivery models, at this stage of analysis it is not possible to comment in more granular detail on the relative impact to risk quantification under each model, and therefore a quantitative analysis that compares the two options is likely to be misleading. To demonstrate the potential cost of a private sector delivery model vs. traditional government procurement, the analysis in this chapter focuses on how the outcomes under DCOM procurement contrast with those under traditional government procurement only.

The following chapter outlines:

- General model assumptions
- Proposed risk allocation under DCOM
- DCOM payments to contractor and project revenues received from the sale of compost, in present value terms
- Net present costs to government if delivered through a traditional procurement method (the Public Sector Comparator, or PSC), and
- Cost to Government.

The aim of the financial analysis is to (1) determine the relative cost to ACT of different delivery models and (2) for each model determine the impact on government budgets by analysing the net cashflow of the project.

7.1 Delivery Model Structure

It is expected that the most likely structure of a DCOM would involve Government paying a Contractor to construct and operate the site, and the



This model is outlined in the diagram below.

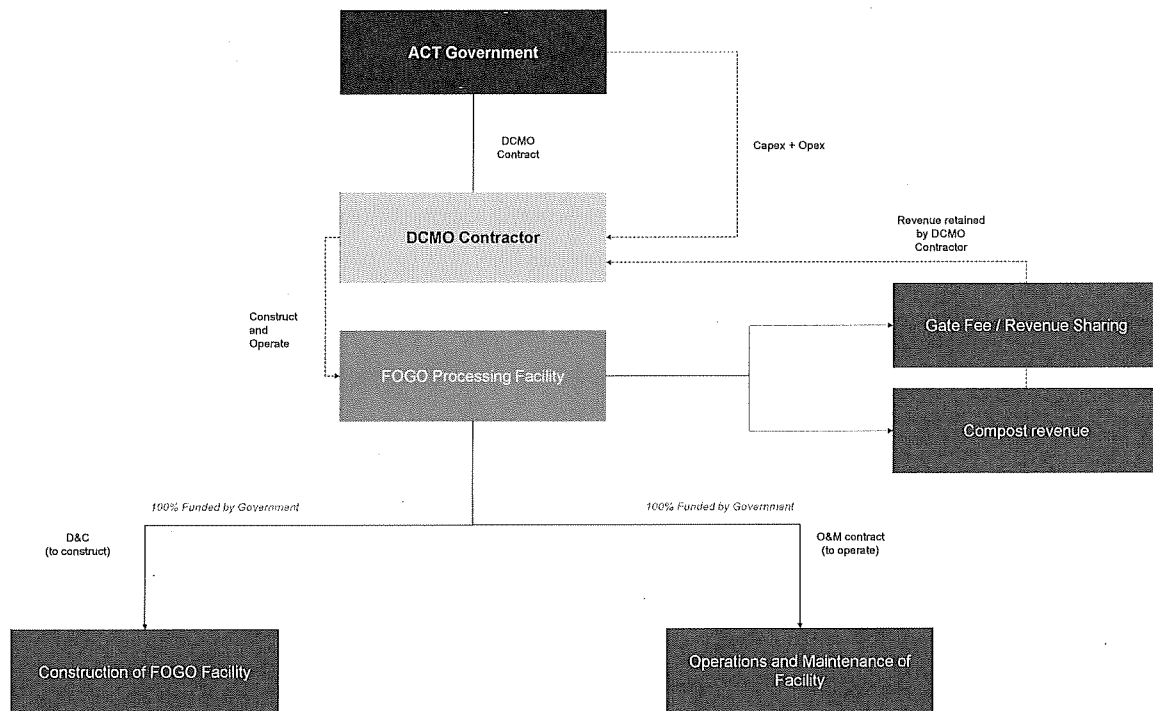


Figure 15: DCOM Proposed Structure

For the purposes of financial model, the model assumes that the DCOM contractor would be paid by the Government for upfront capital costs, inclusive of a [REDACTED] profit margin on construction activity. It would also be paid a revenue item (possibly structured as either a gate fee or availability payment) set at a level that would allow the contractor to generate an assumed contractor profit margin of [REDACTED] on operating expenses.

7.2 General Assumptions

The DCOM model assumes that capital costs, operating costs and major maintenance will be funded by the Government. In addition, the following assumptions have been applied:

- The DCOM contractor would be paid by the Government for capital costs, operating costs (net of any revenue derived from the sale of compost product(s)), and an assumed contractor profit margin of [REDACTED]. The assumed private sector profit margin in the financial analysis is based on Arup's observations of similar and recent projects in the Australian market.
- Under the DCOM, risks are allocated between government and the selected contractor. The analysis assumes this contract type will see the transfer of significant risks to the private sector in line with typical standard practice and this is articulated in the risk management plan in Appendix E.
- The Government would only fund capital and operating expenditures that align with the agreed allocation of risks and responsibilities. If a risk that is allocated to the contractor results in increased costs, the contractor would absorb any additional costs, either by

seeking to reduce costs in other areas (without impacting service quality or breaching contractual obligations) or by accepting a lower profit margin.

Discount rate

Two separate discount rates have been applied in this business case:

- Financial discount rate – In accordance with the *National PPP Guidelines Volume 5 Discount Rate Methodology*, separate discount rates have been determined for (a) the DCOM model, and (b) traditional government procurement. The traditional government procurement model uses the 10-year ACT Government bond rate (the Territory's risk free rate, with duration aligned as close as possible to the average life of the project), whilst the DCOM model uses a discount rate equivalent to the risk free rate plus the portion of the systematic risk premium transferred to the private sector.
- Economic discount rate – This discount rate is applied in the cost benefit analysis and is often referred to as the 'social discount rate'. This rate seeks to adjust for social time preference, defined as the value that society attaches to the present rather than future consumption. In the ACT, this rate is set at 3.5%. This discount rate is applied to real cashflows.

In the financial analysis, analysis of the DCOM model and traditional procurement sees the application of different discount rates to project cashflows to determine the project's net present value. Under the traditional government procurement model, the risk-free rate, the 10-year ACT Government bond rate (currently 1.97%), is used as the discount rate given that predominately all the systematic risks are borne by the public sector. Under the DCOM model, where systematic risks are shared between the public and private sectors, the systematic risk premium transferred to private sector needs to be determined to calculate the discount rate.

To enable the identification of the proportion of systematic risk borne by the parties under a DCOM model, and allocate the systematic risk premium, a two-stage process was undertaken:

- Assessment of the relative importance of each of the systematic risks which included demand, inflation, asset residual value and downturn in broader market; and
- Assessment of how the risk would be allocated between the parties.

In line with the *National PPP Guidelines*, Table 45 shows the weightings and allocation of risk applied to each systematic risk in order to determine the premium transferred to the private sector. In relation to the weighting scale, a '1' represents low importance based on impact upon project cash flow and '5' being of high importance. For the allocation of risk, '0' means the risk is with public sector, '1' is with private sector and '0.5' means it is shared between the two parties.

Table 46: Systematic risk premium allocation table

Systematic Risk type	Weighting (Scale 1-5)- Based on relative importance	Estimated Portion of Systematic Risk Premium %	Allocation of risk based on Step 1 analysis (Scale 0 - 1)	Systematic Risk Premium Transferred to Private Sector
Demand	■	■	■	■
Inflation	■	■	■	■
Asset residual value	■	■	■	■
Downturn in broader market	■	■	■	■
Total	■	■		■

With consideration of the risk analysis undertaken in Section 6, the weighting and allocation of risk is based on the following reasoning:

- ■

■
- ■

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The estimated portion of systemic risk premium in Table 47 is calculated by multiplying the portion of weighting in the Weighting column by the total systematic risk premium. The total systematic