Goondiwindi Food Waste Hub

Project Business Case

Clean Growth Choices

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Document Development History

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The Clean Growth Choices Consortium is delivering the Communities in Transition (CiT) pilot project with the support of the Queensland Government.

Extensive resources including case studies are available at: https://www.cleangrowthchoices.org/

Cover Photo Credit: Goondiwindi and District Community Garden:
https://www.facebook.com/goondiwindianddistrictcommunitygarden/photos/a.156806741196272/501100680100208/?type=3&theater

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1 Executive Summary

The Goondiwindi Community has identified an opportunity to reduce waste to landfill, and reduce costs to food businesses while establishing a food waste recycling project which will add value to the Community Garden by providing compost materials and the potential to supply produce to the town's food businesses.

This business case proposes a number of actions to develop additional value from resources by identifying and facilitating circular economy principles in the region. A number of steps are proposed to work with food businesses to utilise food waste for use in the Community Garden, which can then provide products to the food businesses. The project will seek to assist individual businesses in achieving resilience by potentially reducing both waste and input costs. The project will establish networked industries of the future with new science and technology.

The project will deliver value under the *Queensland Waste Management and Resource Recovery Strategy*, particularly *Strategic priority 2: Transitioning to a circular economy for waste*. Value can be gained from material otherwise destined for landfill when there are increased options for reuse, recycling and recovery of resources, energy and fuels from waste.

This business case proposes a project which will contribute to achieving the *Queensland Government WMRR Strategy* targets of 90% of all waste diverted from landfill by 2050.

Our Future State: This business case advances projects that address a number of key government objectives including:

- Creating jobs in a strong economy by creating and maintaining jobs for regional employees in drought-affected communities
- Keeping Queenslanders healthy by reducing financial pressures on regional families and reducing suicides.

1.1 Communities in Transition (CiT): Clean Growth Choices

The CiT Pilot Program delivers on the *Queensland Climate Transition Strategy*'s goal to build leadership capacity within communities to develop place-based climate transition roadmaps. These roadmaps, and this business case, identify opportunities for economic and social development and climate resilience in regional Queensland. These opportunities range across a number of sectors including agriculture, waste, water supply, tourism, energy, manufacturing, transport and human services. The multidisciplinary nature of the business case means that other Queensland Government priorities are being addressed indirectly, thus offering an opportunity to leverage efforts across government.

The CiT Pilot Program contributes to reducing emissions by identifying economic opportunities that support the transition to a low carbon economy, under the *Queensland Climate Transition Strategy.* Importantly this business case identifies not only low emissions opportunities, but offers economic diversification to build resilience in regional economies.

The *Goondiwindi Living Roadmap* outlines how a group of Goondiwindi residents came together to develop this business case including the options canvassed by the groups.

2 Introduction/Background

This business case establishes at a pre-feasibility analysis of projects to secure long-term agricultural productivity in Goondiwindi. It recognises that soil health and water productivity will be the key to the ongoing prosperity of Goondiwindi's agriculture sector. The project has been identified in the Sustainable World Class Agriculture Pathway in the Goondiwindi Clean Growth Choices program. It has emerged from the working group's desire to empirically demonstrate the benefits of regenerative agriculture in improving water productivity and yield through a focus on soil health. The project lays the foundation for a long-term move to more resilient and productive farming practices in the area.

The business case proposes a model to provide for the recirculation of food and agricultural residues and wastes into a range of value-added materials to provide farm and community benefit

The project is developed at two levels:

1. Testing soil improvements and correlating the results with productivity and profitability data
2. A town-based program providing a smaller system taking food service waste and providing compost to the Community Garden.

3 Overview

3.1 Vision

The vision is to develop a regenerative agriculture program with a new model for green and agricultural waste management that provides long-term improvement in soil organic matter and agricultural productivity.

3.2 Organisational Objective

This project has been identified by the Goondiwindi Clean Growth Choices working group.

4 The Business Case

4.1 Purpose of the Business Case

The purpose of the business case is to provide a pre-feasibility level assessment of a number of options to return nutrients to soil to achieve soil quality and water holding capacity improvements, leading to greater long-term productivity.

The business case proposes three project options to achieve the above outcome.

It is a preliminary business case that will provide the working group with:

1. A sound basis for a decision to proceed to a business case
2. The next steps and estimated costs to develop the business case.

Sustainable Development Goals

The project aims to achieve sustainable economic development in Goondiwindi and in particular, works towards achieving the following of the United Nations Sustainable Development Goals (SDGs):

Number	Goal	Explanation
SDG 8	Decent Work and Economic Growth	Roughly half the world's population still lives on the equivalent of about US$2 a day with global unemployment rates of 5.7%, and having a job doesn't guarantee the ability to escape from poverty in many places. This slow and uneven progress requires us to rethink and retool our economic and social policies aimed at eradicating poverty.

SDG 9	Industries, Innovation and Infrastructure	Investments in infrastructure – transport, irrigation, energy and information and communication technology – are crucial to achieving sustainable development and empowering communities in many countries. It has long been recognized that growth in productivity and incomes, and improvements in health and education outcomes require investment in infrastructure.
SDG 12	Sustainable Consumption and production patterns	Ensure sustainable consumption and production patterns. Sustainable consumption and production is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all.
SDG 13	Climate Action	Climate change is now affecting every country on every continent. It is disrupting national economies and affecting lives, costing people, communities and countries dearly today and even more tomorrow. Weather patterns are changing, sea levels are rising, weather events are becoming more extreme and greenhouse gas emissions are now at their highest levels in history. Without action, the world's average surface temperature is likely to surpass 3 degrees centigrade this century. The poorest and most vulnerable people are being affected the most.
SDG 17	Partnerships for the Goals	A successful sustainable development agenda requires partnerships between governments, the private sector and civil society. These inclusive partnerships built upon principles and values, a shared vision, and shared goals that place people and the planet at the centre, are needed at the global, regional, national and local level.

4.2 Business Case Sponsor

The business case is sponsored by the Department of Environment and Science (DES).

5 Situational Assessment and Problem Statement

This section outlines the benefit to the region for proceeding with the one or more of the proposed options and contains:

- A description of the current situation, challenges and opportunities
- An assessment of how the opportunities are currently being met or not met
- An analysis of the gap between the current situation and the stated objective(s).

Food waste costs the Australian economy about $20 billion a year[1]. The National Food Waste Strategy provides a framework to halve Australia's food waste by 2030. The strategy contributes toward global action on reducing food waste and aligns with the UN Sustainable Development Goal 12: Ensure sustainable consumption and production patterns.

The Goondiwindi region is subject to significant change. Steven Crimp, a climate applications scientist with the Climate Change Institute (CCI) at the Australian National University has found in the region[2]:

- Warming occurred between 1950 and 2018 with average temperatures now approximately 1.1°C warmer than in 1950
- Between 1950 and 1985, a maximum temperature of 29°C occurred on average for 14% year. Between 1986 and 2018 this temperature occurred around 35% year
- The number of frost events (defined as below zero degrees) has more than tripled, with an average nine events now occurring most years
- The average length of dry spells has increased, as has the average time between rainfall events.

The current situation with food waste:
Five million tonnes of food is wasted by Australian households and the commercial and industrial sectors each year[3]:

- 76% went to landfill
- 18% recycled
- 1% going to energy from waste facilities.

According the Qld Government's biomass mapping data, Goondiwindi produces 580 tonnes of food waste[4] per year, or over 10 tonnes per week. Sources include food service businesses and retailers, households, schools and workplaces. Currently household and business food waste is collected in general waste bins and disposed of in landfill. Food waste in landfills generates greenhouse gas methane and produces liquid leachate, odour and vermin. There is no methane capture at the Goondiwindi landfill site.

Opportunities and challenges

There are a number of opportunities to repurpose food waste and keep it circulating within the community for as long as possible; extracting value from it rather than disposing of it to landfill, and each will result in a number of valuable outputs:

Opportunities	Outputs
a) Establishing a green and food waste kerbside collection with the collected material to be composted or treated	Green waste at a regional scale that can be centrally treated, composted or digested into organic products for distribution to farms or households (potential for energy, syngas, heat etc.)
b) Facilitate community composting programs to divert organic waste from landfill	Local scale composting suitable to use in individual gardens

1. _____

[1] Department of the Environment and Energy, 2017, National Food Waste Strategy Halving Australia's Food Waste By 2030
[2] Somes, T., 2019, Data shows Goondiwindi climate is changing: GRDC Update
[3] Blue Environment, 2018, Australian National Waste Report 2018
[4] Qld State Development, Infrastructure, Development and Planning, 2018, https://www.statedevelopment.qld.gov.au/industry/priority-industries/biofutures/queensland-biomass-mapping-and-data.html

c) Facilitating a food services waste composting program	Larger volume of organic fertilizers and gas for energy generation

These three opportunities are outlined in more detail below:

a) Kerbside Collection

In July 2018 one local government in Queensland introduced a food organics and garden organics kerbside organic bin collection service as had 33 in NSW, 28 in SA and 19 in VIC.[5] A well promoted and carefully designed system can capture around 70% of food waste[6].

Challenges:

- Requires effective community education to overcome concerns including:
  - Unpleasantness i.e. odour, mess and attracting vermin
  - Hassle of remembering
  - Lack of choice in how they dispose of their food waste
- May require kitchen bins and compostable bags to be provided
- More complex processing technology is often required by regulators, e.g. in-vessel or covered aerated composting to reduce environmental impacts and odour risks.

Ipswich Council has established a Green Waste Service which also takes kitchen vegetable waste and some paper that cannot be placed in traditional recycling bins (e.g. tissues) and are composted - https://www.ipswich.qld.gov.au/residents/waste/green_waste_service

Refer also to the Cooma Council kerbside collection case study in Appendix 3.

b) Facilitate Community Composting

There are a number of programs that Goondiwindi Regional Council could adopt to facilitate community composting.

Community Composting Hubs: Assist people who are unable to compost their food waste at home. Hubs are typically established by councils in partnership with community gardens where the composted material is used to grow food. Councils often provide:

- Free kitchen caddies
- Web page with links to networks of hubs
- Compost and worm farm workshops

See the Blue Mountains Compost Hub Case Study at Appendix 3.
WasteShare Network: 24,833 people in the network are currently composting their food waste (April 2019).. This program is all about connecting with neighbours who are interested in accepting scraps to feed their worm farms, chickens or compost stations. How it works:

- A map everyone can see
- When you become a host (sign up), you add your address and a marker is added to the map
- People from around can send a message when they're ready to bring their kitchen scraps.

1. _____

[5] Blue Environment, 2018, Australian National Waste Report 2018
[6] Blue Environment, 2018, Australian National Waste Report 2018

https://sharewaste.com/

Compost Revolution Network: Over 35,000 households are participating in 52 council areas. The network collectively diverts over 40 tonnes of organic waste per week from landfill. Most councils report cutting labour time and costs by 85% compared to the traditional rebate-based system. How it works:

- Council signs up and chooses which products and the percentage off RRP they would like to offer residents to incentivise uptake
- Compost Revolution set up a custom council-branded website and marketed it to residents
- Residents complete an online 10 minute tutorial and quiz to learn about composting
- Residents order and pay for their gear via an integrated e-commerce platform
- Council approves every order. Compost Revolution do home delivery, support and invoicing
- Compost Revolution keep resident engaged with composting and gardening tips. https://compostrevolution.com.au/councils/

c) Food Services Waste Composting Program

This option involves collecting food waste from food services businesses that are located in close proximity and treat it in a composting or dehydrating device. These have been used in a number of locations such as Degreaves St, Melbourne, Brisbane Airport, the Myer Centre in Brisbane and others. There are other opportunities in that by containing the materials, they reduce vermin and odours and provide organic materials that may be useful for composting and small scale agriculture.

In Goondiwindi, such a system could be established in the town centre with materials treated for re-use initially at the Community Garden, with the potential to overflow to farms or residents once testing confirms the quality and benefits of the materials. There are a couple of options for collection and treatment that would need to be considered:

- Collection: Whether a central processor is placed close to businesses so businesses can place material directly into the machine, and processed material can then be transported to the Community Garden; or whether a bin is located in town, with materials moved regularly to a processor at the Community Garden
- Treatment: There are a number of options available to treat the materials. The project centres around the use of technology to process the material rather than conventional composting to assist in reducing the time between disposal and re-use.

One option might be to use a small-scale dehydrator, rapid composter or anaerobic digester at the community gardens to capture biogas for electricity generation and to convert the by-product sludge to biofertilizer.

See the Brisbane Airport Corporation Case Study and the University of Sunshine Coast Case Study at Appendix 3.

This project wraps up the desire to increase soil organic matter and carbon content, and in turn increase in the water holding capacity of the soil.

Opportunities

Increasing soil nutrient and carbon levels at the Goondiwindi Community Garden

Compost can sequester carbon in the soil. Over 20 years, compost has the highest soil carbon sequestration potential (1.10 to 1.80 t CO_{2e}/ha/yr) compared to:

- Agronomy 0.29 to 0.88 t CO_{2e}/ha/yr
- Nutrient management 0.26 to 0.55 t CO_{2e}/ha/yr
- Tillage/residue management 0.15 to 0.70 t CO_{2e}/ha/yr
- Water management 1.14 t CO_{2e}/ha/yr
- Manure/biosolids use 1.54 to 2.79 t CO_{2e}/ha/yr [7].

Develop a market for compost/biofertilizer

Compost or biofertilizers are a valuable agricultural input which is often driven more by customer demand than material supply. Markets in Goondiwindi could include:

- Residents and businesses in town
- Businesses such as landscapers and nurseries
- Councils e.g. parks
- Intensive agriculture e.g. vegetable or fruit producers
- Extensive agriculture e.g. pasture, broad acre cropping or forestry
- Rehabilitation e.g. erosion stabilisation, revegetation.

Challenges:

- Identifying a target market for end products
- Offering appropriate products at the right price
- Communicating the benefits of products
- Ensuring product quantity including obtaining sufficient feedstock
- Ensuring product quality
- Balancing cost of producing with sales.

6 Assumptions and Constraints

The business case provides a pre-feasibility level assessment of the project. It has been prepared by the Clean Growth Choices team under the direction of the Clean Growth Choices working group. The working group largely consists of volunteers who are providing guidance and input. Costings and pricing estimates are considered to be at a prefeasibility level of accuracy.

7 Identification and Analysis of Options

This is a high level analysis of the possible alternatives that could be employed to bridge the gap between the current situation and what is proposed, as outlined in Section 4.

1. _____

[7] NSW Environment, Climate Change and Water, 2011, The benefits of using compost for mitigating climate change

7.1 Identification of Options

Three options are provided for assessment. They are not mutually exclusive options and any number could be pursued. Option 1 can be adopted independent of the other options, though it is recommended that Option 1 is adopted to accompany either or both of Options 2 and 3, in order to prove the efficacy of those projects.

7.1.1 Option 1: Food Waste Recycling Strategy

This option involves the processing and beneficial reuse of food waste. This project would divert food waste from town-based food businesses from landfill to a small processing unit located close to the businesses. The process would include:

- Education program to encourage business engagement and commitment to collect food waste
- Waste is delivered each day to the unit where it is added to the processor
- The unit processes the materials
- Processed materials are collected and taken to the Community Garden
- Materials are then available or distributed to Community Garden users or others.

Considerations for this option include:

Collection:

Consideration	Comment
Education program to encourage business engagement and commitment	Should there be a point here?
Suitable site	Within walking distance of most businesses
Consider low tech options that may be useful to businesses collecting their food waste	Low tech food waste processing e.g. CLO'ey, by Closed Loop, One Bucket by Bokashi & Eco Bucket by Eco-organics, Hungry Bins, Jora Compost Tumbler

Processing and product:

Consideration	Comment
Space including: • Access • Availability of power and water • Ventilation (odour) • Foot traffic • Noise	Two sites have been suggested by the Working Group and require further analysis: • Laneway where Urban Quarter was located – may be suitable, subject to owners' consent • Land adjacent to the Co-Op Supermarket as many food businesses regularly visit there to purchase supplies Note, an enclosed system is less likely to cause odour issues and vermin and is more visually appealing May also need space for storing things such as saw dust and the compost
Supervision requirements	E.g. loading and unloading, cleaning Commitment to collect materials from the unit at the appropriate times Level of automation and control sought
Volume of food waste feedstock	To be determined, and will govern the capacity of the

available	technology selected
Output volume	Including the Community Garden's ability to manage the potential volume of materials
Demand and intended use of the end product	Need to consider the level of level of decomposition desired (maturity and stability) so product suits end use. Products that continue to breakdown can produce substances harmful to plants
Operating costs including temperature they are required to operate in	e.g. OSCA (operating temperature 60°)
Purchase/lease and operating costs of the unit	What models are available for the machines?
Serviceability and response time of the machine if there is a fault	In the event of a breakdown,how quickly could it be repaired in Goondiwindi?

Types of technology:

This option involves seeking a suitable technology through a competitive process whereby town businesses in conjunction with the Council invite expressions of interest:

Type	How it works	Product [8]	Examples
Dehydrators	These unit rapidly reduce the volume of food waste by up to 80-90%	Generates a sterile biomass product	Enrich260, Gaia Food Waste Dehydrator, Hungry Giant Food Waste Dehydrator
Aerobic in-vessel composters and worm farms	Control and accelerate the composting in the presence of oxygen	Compost that varies in decomposition Compost in the initial active phase are either just degraded food waste or partly composted and pasteurised (often applied very small rates or pre-mixed and used as a mulch) In the curing phase they are either still immature and not yet stable (e.g. usually mixed with soils before application or mature compost that can be applied directly to soil (ready to use)	e.g. Rocket, OSCA and HotRot units that produce an immature compost that requires a resting period outside of unit with appropriate oxygen and water (usually 3-8 weeks) Larger units incorporate the resting period within the vessel
In vessel closed loop systems	Food waste is rapidly reduced and transformed into compost within short timeframes. Uses	A composted pasteurised product	e.g. Closed Loop units produces a partly composted pasteurised product and thus is limited in its application

1. _____

[8] Jodi Clarke, Caroline Chane & Ellie Watts, 2016, Exploring In-Vessel Food Waste Processing Units for use in Urban and Regional Settings Advantages, Disadvantages; Environmental and Community Impacts

	controlled temperatures, agitation, airflow and microbes		
Anaerobic digesters	Processes food waste using microbes in absence of oxygen to generate gas and sludge that can be dried and sold as a biofertilizer	Biogas Liquid fertiliser Sludge (can be drier and used as a biofertilizer)	

Appendix 3 has details of some technologies and some case studies.

7.1.2 Option 2: Testing Soil Quality

This option involves the testing of soils to verify improvements to soil, organic matter, soil carbon, water holding capacity and other relevant measures following application of materials applied following Option 1. It is not dependent on the other options though should accompany Option 1.

The objective of the testing should be to gather evidence to demonstrate the effectiveness of soil conditioning with treated food waste with the following groups of participants:

1. The Community Garden prior to commencing the program and continuing through the program
2. Farms that may wish to receive excess compost from the Community Gardens
3. A control group.

7.2 Comparison of Options

This a brief summary of the benefits, disbenefits, costs, risks for each of the options. It is important to note that these options are not mutually exclusive, in that more than one could be selected and developed independently.

Criteria	Option 1: Food Waste	Option 2: Testing
Food Waste Benefits: • Council • Goondiwindi Community	• Supply of organic materials to the Community Garden • Reduced waste to landfill • Reduced waste disposal costs to food services businesses	• **Potential for conclusive results**
Disbenefits: • Stakeholder A • Stakeholder B	• Possibly additional time taken for food service businesses to dispose of food waste	• Should there be a point here?
Costs: • Direct • Indirect • Recurrent	• CAPEX (who pays) • OPEX (who pays) • Staff time for businesses delivering materials to the site, and Community Garden collecting materials from the site regularly	• **Testing costs** • **Program management costs**
Risks: • **Initial** • **Minimisation/ mitigation costs** • **Resulting risk**	• **Amenity risks (smells, foot traffic accessing the site)** • **Commercial risk – sustained supply of materials for the system – businesses continued willingness to participate and Community Garden to take the waste**	• **Low Risk** • **Some financial risk – cost of testing and analysis** • **Potential for inconclusive results as there are many independent variables**

7.3 Recommended Option

The Working Group consider that the project should be progressed to a comprehensive business case.

8 Risks and Benefits

8.1 Matters to be considered

Scientific and Economic Rigor: What needs to be tested and measured to ensure that the results can be demonstrated. There are two levels of testing for the project:

1. Testing associated with the recirculation of food waste:
    - Ensure no contaminants are moved to farms (testing material produced)
    - Measure benefits to the soil – soil carbon, nitrogen, water holding capacity (baseline)
    - Changes in productivity that can be attributed to the project (yield, quality, water productivity)

- Economic benefits from higher increase in yield and/or quality.

Waste regulations relating to the movement of agricultural waste – what requirements and costs does it introduce and will it pose a risk to the viability?

The business model proposed has the potential to provide benefits to the community

The location of the site needs to be suited to the project:

- Suitable size to accommodate plant and for storage and collection of materials
- Access for businesses to deliver materials and maneuvering space for vehicles
- Access to grid power, water and possibly a sewer
- Planning approvals or a reasonable prospect of gaining approvals
- A suitable distance from sensitive land uses to protect amenity.

8.2 Risks

Technology Risk:

- Identifying the right technology to convert the food waste into the right material given space and time constraint.
- No providers willing to bid for the project.

Supply Risk (ensuring sufficient supply of suitable materials for the life of the plant):

- Green waste quality and consistency of supply are issues
- The types of wastes identified so far are insufficient or unsuitable for available technologies
- Biosecurity – need to ensure acceptable management of any biosecurity risks

Off-take Risk:

- Contamination – farms not prepared to use compost from an uncontrolled source

Regulation Risk:

- Failure to gain necessary planning and environmental approvals
- Cost of complying with regulations
- A number of considerations relating to Environmentally Relevant Activities:
  - ERA 53: Organic material processing (on farm AD and AD plants associated with WWT and meat processing excluded). ERA may be triggered if the facility processes more than 200 tonnes per year (4 tonnes per week), material is imported for AD (which is what this proposal includes). There may be an exclusion for this depending on the types of materials to be processed and the method of processing
  - Regulated wastes includes animal processing residues such as abattoir waste and some food processing wastes (as per number 29 of the Schedule, including these materials and transport of them would need to be done by a licensed operator (ie. exclusion would not apply).

DES is developing End of Waste frameworks which may see some materials reclassified as resources https://environment.des.qld.gov.au/waste/end-of-waste-framework.html

8.3 Potential Benefits

Below is a list of benefits that may result from the project. They have been classified into direct and indirect.

No	Benefit	Direct or Indirect	Details
1	Knowledge	Direct	Improved knowledge of use of organic materials on farm
2	Soil water	Indirect	Increase in the capacity of soils to hold water, improving resilience and productivity
3	Soil carbon	Direct	Increasing soil health leading to greater productivity
4	Carbon farming	Indirect	Additional revenue potentially available from sale of Australian Carbon Credit Units (ACCUs) for carbon accrued in the soil or diverting food waste to landfill
5	New business opportunities	Indirect	The potential to earn additional income from carbon credits through increasing soil health
6	Reducing waste to landfill	Direct	Diversion of food waste to a higher value use
7	Employment	Direct	The projects could secure existing employment or offer additional jobs
8	Local investment	Direct	Investing funds in the local area
9	Cost savings	Direct	Avoidance of waste to landfill from businesses will save the businesses $75 per tonne from 1 July 2019
10	Reputation	Indirect	The project is a good fit with Goondiwindi's clean green agriculture image
11	Organic household waste	Indirect	The projects could potentially expand to include organic household waste generated in Goondiwindi

8.4 Other Opportunities

There is the potential for the project to be a catalyst for the Goondiwindi food precinct to be an Innovation Precinct:

- Dept Industry (Aust): https://www.industry.gov.au/strategies-for-the-future/promoting-innovation-precincts
- CSIRO: https://www.csiro.au/en/Do-business/Collaborative-research/Active-opportunities/Precinct-partnerships

A number of models could be structured around this program as an innovation precinct:

- Circular economy model where food service residues are provided to the community gardens which in turn supply products such as locally grown produce to food service businesses
- Building additional value to these could include a model such as Wandering Cooks, where commercial kitchen capacity is added, or underutilized capacity is made available for small production runs by food start-ups
- These would link strongly to the USQ, GRC Ag Tech Project where there may be local technology development opportunities.

Aggregation of Australian Carbon Credit Units (ACCUs)

As a central point for the collection and recirculation of materials, there may be potential for the farms to accrue ACCUs for increasing soil carbon.

Wider waste and recycling hub

Can a central point for managing farm waste also double as a farm materials recycling point – diesel, tyres ag plastics?

9 Implementation Strategy

9.1 Project Title

Goondiwindi Food Waste Hub

9.2 Target Outcomes

The target outcomes will be an agreed investment grade business cases for the options identified in the business case.

9.3 Outputs

Testing: A scope of works for a scientific and economic investigation of the costs and benefits of regenerative agricultural practices.

Food-service site: An investment grade business case providing detailed information to assess the feasibility of a project.

9.4 Work Plan

The work plan will consist of a range of key work packages. It will be necessary to break these packages up into a project plan prior to commencing.

Work Package	Details	Responsibility
Supply of materials	Identify Food Waste businesses that may be keen to participate in the project	Project manager with Council
Site availability	Further analysis of sites to determine suitable site and any significant planning risks	Project manager with Council
Stakeholder commitments	Gather additional detail from farms about waste and potential term sheets	Project manager with Council
Refine model	Discuss the opportunity with a range of potential suppliers to determine level of interest and refine the market offer	Council
Seek investment	Develop a process to invite expressions of interest and select a suitable proponent or technology	Council and project manager
Installation	Install the equipment and commence operations	Council and Steering Committee
Soil testing	Expand testing to farms participating in the recirculation of material	Commence testing

9.5 Budget

The potential cost of aspects of the work are listed below noting that some aspects could be driven internally by Council creating some cost savings (indicated with costs in brackets and incorporated into the total range:

Work Package	Details Discipline	Est Cost.
Project facilitation	Part-time resource to facilitate the project as Council's representative – or in-house at Council	($40,000)
Testing program for soils	Testing soils at the Community Garden before the program and for a period of time to be agreed after the project commences	$10,000
Establish the operating conditions	Seek Council agreement on potential sites and likely planning conditions, facilitate grid connections and access to water and trade waste (or suitable water recycling)	($20,000)
Business engagement	Engage food services businesses to test willingness, location and model	($10,000)
Technical and scientific advice	Review identified materials and suggest technologies and assemble relevant information to potential bidders	$20,000
Legal advice, agreements etc	Optional – could be conducted in-house by Council	$10,000
Approvals	Cost of preparing reports to gain necessary regulatory and financial approvals needed to gain an Investment decision	$5,000
Total		$45,000 - $135,000

9.6 Other Resources

Potential for facilitation and funding of the program through a number of programs and initiatives including:

- Land Restoration Fund for testing the benefits of applying organic matter to farms to increase soil carbon levels – https://www.qld.gov.au/environment/climate/climate-change/land-restoration-fund/pilot-projects/about
- Resource Recovery Funding for development of the next phase of the business case, leading to investment decision that may be eligible for funding under *Stream 3: Resource Recovery: Investment Pipeline Fund* - https://www.statedevelopment.qld.gov.au/industry-development/resource-recovery-industry-development-program.html
- Rural Research and Development for Profit: A proposal could seek funding assistance - http://www.agriculture.gov.au/ag-farm-food/innovation/rural-research-development-for-profit
- Fight Food Waste Cooperative Research Centre (CRC): SME Solutions Centre provides matched funding to assist SMEs to research agricultural and food waste solutions - https://fightfoodwastecrc.com.au/wp-content/uploads/2019/06/Fight-Food-Waste-SME-Solutions-Centre-Overview-.pdf.

10 Project Management Framework

10.1 Governance

A key question for this project is “Who Owns the Project?”

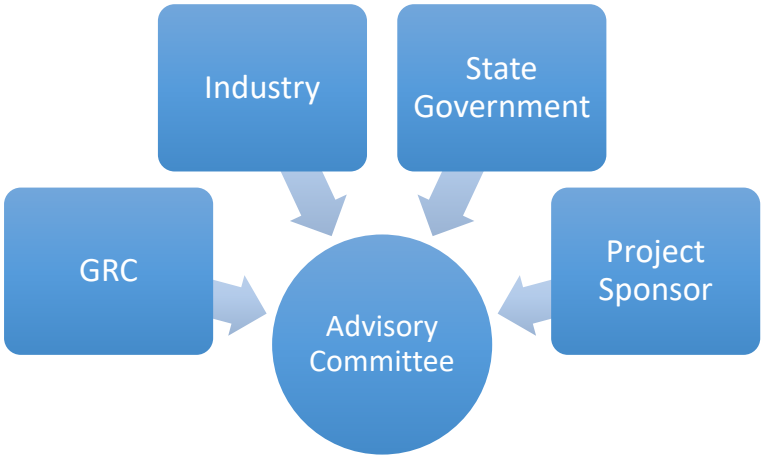
The governance system is proposed to deliver the business case as follows, with the exact representation to be determined at the commencement of the project:

- Steering Committee: Responsible for the delivery of the project, meeting its objectives on time and within budget. The Steering Committee members will also consult strategically with external stakeholders to ensure the project has the support of a wider network
- Working Group: Responsible for advising the Project Manager on technical and operational aspects of the project and will meet to advise the Project Manager
- Project Manager: Reporting to the Advisory Committee. The Project Manager should sit within the GRC structure and have access to relevant expertise, including through regular meetings of the Working Group.

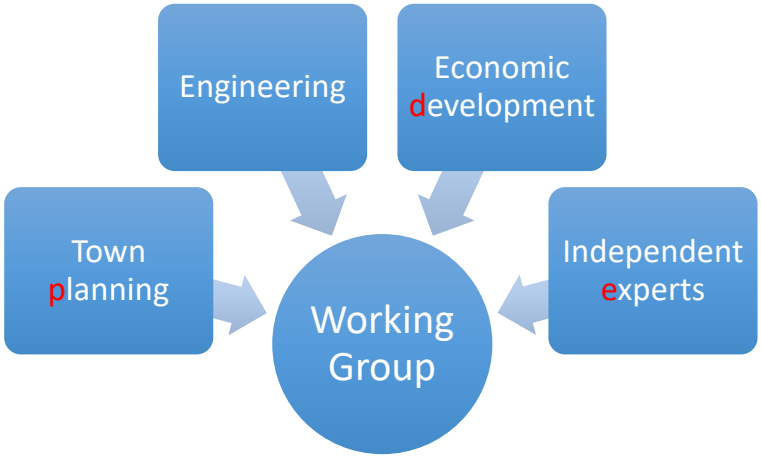
The Project Manager will be responsible for the delivery of the project.

The Advisory Committee should be established with representatives from the Goondiwindi Regional Council, TSBE and industry representatives. The Project Sponsor should be represented, particularly if funding is provided.

Suggested Project Advisory Committee Structure:



Suggested Project Working Group Structure:



The business case should be progressed by suitably qualified project manager.

10.2 Project and Quality Management

A detailed project plan will need to be prepared for the project incorporating a number of factors including:

1. Organisational Impact: How the work undertaken during the project will impact on the organisation and how these impacts will be addressed
2. Outcome Realisation: How outputs will be managed once they are delivered, and who will be accountable. This may change as the project evolves
3. Quality Management: Define suitable standards, requirements and best practices for the project to deliver against, and the internal quality requirements
4. Post-project Review: How the group will capture the lessons learnt throughout the project and what review will be done to assess whether the initiative delivered the intended benefits.

The Project Manager will need to ensure that the final project developed is robust and based on sound science. Methodologies for calculating carbon abatement should be recognised and calculations should be accredited, or conducted by an accredited person. Financial analysis should be sufficiently robust to allow decision making, so initial consultation should occur with potential funders and financiers about the level of detail required.

Appendix A: Benefit Analysis

This analysis assesses how each key stakeholder group (or individual stakeholders) may be impacted by the project and how they may impact on the project.

Option 1: Testing

Stakeholder	Positive Impact	Negative Impact	Overall
Goondiwindi farmers	• Increased knowledge of impacts and confidence in using compost	• Potential risk of unknown materials	Positive
Community Garden	• Understanding of value of organics in soil	• Potential risk of unknown materials	Positive

Option 2: Food Waste

Stakeholder	Positive Impact	Negative Impact	Overall
Food businesses	• Potential cost saving for waste disposal • Opportunity to gain local produce • Further networking with other businesses	• Time to take materials to a central point • Space for receptacle	Positive
Farmers	• Potential for increased soil quality and water holding capacity – greater ability to withstand • Potential to earn additional income through generating ACCUs • Potential reduction in mineral fertiliser inputs • Potential long-	• Potential costs • Adapting farm system • Potential for initial decrease in productivity as farm system adjusts	Positive

	term productivity increase		
Council	• Reduced waste to landfill • Potential income from the lease of a site that may currently be vacant • Facilitated a long-term economic benefit for a key industry sector • Reduced greenhouse emissions from a key sector	• Potential amenity impacts from the site and transport of wastes	Positive
Community	• Long-term sustainability of farming sector	• Potential amenity impacts from the site and transport of wastes	Positive

Appendix B: Risk Analysis

As a pre-feasibility level business case, this is an initial consideration of risks, and strategies that can be put in place, or investigations into further work that can mitigate these risks.

Option 1: Testing

Major Risk and what does it do to the project?	Mitigation Strategy
Unable to engage any farmers in a testing program	**Effective communications to inform the farmers of the benefits of soil testing to assist the farmers to make an informed choice**
Testing is not able to demonstrate that project results in a positive impact on soils	**No Mitigation**

Option 2 Food Waste Strategy

Major Risk and what does it do to the project?	Mitigation Strategy
Not enough food service businesses are interested to achieve critical mass	**Provide clear communications of the benefits** and obligations **of the project so food businesses can make a clear decision**
Amenity impacts from the system or operation	**Failure to maintain the system and regularly collect materials from disposal points will have amenity impacts for participating businesses and other businesses and will quickly erode any positive perceptions of the program**
Food service businesses express interest initially then withdraw once operating affecting viability	**Need effective communications with food businesses so they understand the project and can commit to the project long-term**

Biogas: Risks, Opportunities and Challenges:

Biogas from the breakdown of food waste by bacteria can also occur in anaerobic (oxygen free) tanks. The biogas can be used to produce electricity and heat or can be converted to biomethane to be used as a transport fuel or fed into gas grid mains. While Australia's largest landfills use 20-30% of the potential methane in waste for electricity generation, anaerobic digesters convert between 60-80%. [9]The sludge after anaerobic digestion can be used as a biofertilizer. Compared to many other bioenergy technologies this technology can accommodate a wide range of source materials including those with high moisture content and impurities. It can also be operated at a small scale and in any location. [10]

Challenges: [11]

- Lacking concise process control and optimization
- Harmful compounds can be easily produced, causing the system to become unstable or reduce the amount of methane gas produced, e.g. easily digestible food waste converts to volatile fatty acids that cause a pH drop, high protein and lipids can cause high levels of levels of ammonia, hydrogen sulphide etc or cause digester foaming
- Capital intensive (main revenues from collection fee and sale of electricity
- Co-digestion with animal manure or sewage sludge is a common to provide alkalinity and micronutrients needed for soils.

1.

[9] The Conversation, 2017, Capturing the true wealth of Australia's waste

[10] Appels, L., Lauwers, J., Degrve, J., Helsen, L., Lievens, B., Willems, K., Van Impe, J., Dewil, R., 2011. Anaerobic digestion in global bio-energy production: Potential and research challenges. Renew. Sustain. Energy Rev. 15, 4295–4301.

[11] Fuqing Xua , Yangyang Lia, , Xumeng Gea, , Liangcheng Yang , Yebo Lia, 2018, Anaerobic digestion of food waste – Challenges and opportunities, Bioresource Technology 247 (2018) 1047–1058

Appendix C: Background Information – check the hyperlinks in this appendix

Resource Availability

- The National Renewables Map has a bioenergy layer with a general level of feedstock available showing Goondiwindi high in animal, cotton and some other materials - https://nationalmap.gov.au/renewables/
- The Queensland Government has mapped the availability of biomass residues and integrated it with the Commonwealth Government AREMI Mapping - https://www.statedevelopment.qld.gov.au/industry-development/queensland-biomass-mapping-and-data.html

Government Policy

Queensland Government:

- Waste Management and Resource Recovery Strategy https://www.qld.gov.au/environment/pollution/management/waste/recovery/strategy
- Biofutures Roadmap https://statedevelopment.qld.gov.au/resources/plan/biofutures/biofutures-10yr-roadmap-actionplan.pdf
- The Queensland Government released the Energy from Waste Policy Discussion Paper for public consultation in July 2019. https://www.qld.gov.au/environment/pollution/management/waste/recovery/energy-waste

Australian Government

Carbon Credits:

The projects may be eligible to create carbon credits. The food-based project may be eligibile for the creation of ACCUs through the Source-separated organic waste method - http://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-industry/landfill-and-alternative-waste-treatment-methods/source-separated-organic-waste

Case Studies.

Case study – Kerbside Collection: Fortnightly kerbside food and garden organics (FOGO) collection service across 3,100 households in the Cooma township:

- Collected 463 tonnes of food and garden waste
- Processed at the Cooma Landfill and sold under a variation of the town's name: 'Coompost'
- Produced approximately 1,500 tonnes of nutrient-rich compost (placed into rows approximately 100 metres long and this material is combined with manure, other organic materials and water which then undertakes a 10 to 12 week processing (cooking) period where the rows of material reach temperatures in excess on 60^{o}C to ensure that all pathogens, seeds etc. are eliminated)
- Contamination rate of less than 3%

Benefits

- Extended the life of the Cooma landfill by an estimated 3-5 years
- Provides two jobs
- Agriculture sector is using it to improve soil quality and increase production
- Part of a three-year scientific trial to help improve soil fertility and carbon levels to assist with combating noxious weeds, such as African Lovegrass (resulted in a 50% reduction in African Lovegrass, improvements in soil quality and preferred pasture species)
- Also used by council, residents and community organisations.

https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/wastegrants/18p0747_snowymonaro-cooma-fogo-case-study.pdf

https://www.epa.nsw.gov.au/news/news/2018/combating-noxious-african-lovegrass-with-compost

Case Study: Blue Mountains Compost Hub

The Council's 2016 waste audit found that over 26% of waste collected from household garbage bins was food waste.

After registering, participants can pin their location on a map as a Compost Champion or a Compost Contributor. Contributors drop off their food scraps to a Compost Champion nearby. The council provides compost bins to Compost Champions and kitchen caddies to the Compost Contributors. The trial found that in nine weeks, 28 contributing households were able to divert 1,000kgs of food scraps from landfill - https://www.bmcc.nsw.gov.au/media-centre/compost-hub-ready-for-champions-and-contributors

Similar business models

Company	Website	Details
Agri Cycle	http://www.agri-cycle.uk.com/	Recycler of ag plastics
Degraves Street Melbourne	https://www.melbourne.vic.gov.au/business/waste-recycling/Pages/degraves-street-recycling-facility.aspx	Melbourne central waste recycling hub
Farm Plastics Recycling	https://www.abc.net.au/landline/farm-waste:-the-growing-problem-of-plastic-farm/11264632	Landline 29 Jun 2019 about Farm Plastics
Biomix	https://www.biomix.com.au/about-biomix	Victorian compost company

Laneway projects:

Technology	Website	Details
Closed Loop Recycling	https://closedloop.com.au/organics/	In use at Spicers Balfour Retreat, Newfarm QLD
Enrich 360	http://enrich360.com.au/enrich360-equipment/	In use at Brisbane Airport Domestic Terminal Lease Model Need details of power consumption and liquid waste. No additives required.
Biobin	http://www.biobin.net/index.php?id=2	Brisbane Convention and Exhibition Centre and the Currumbin RSL have a Bio-Bin
Ecoguardians Soil Food	https://www.ecoguardians.com.au/soilfood/soilfood	No additives required Condensate water produced considered grey water

Case Study: Brisbane Airport Corporation:

In April 2019 the Brisbane Airport Corporation started using the dehydrator, enrich360 to process food waste from its Skygate retail precinct. Nine retailers currently collect their food waste before it is placed in the dehydrator. The process is fully automated (dehydration, sterilisation and volume reduction) and takes around 8-10 hours to complete a cycle. The product from this system is able to be used as a directly applied fertiliser, a pelletised fertiliser or as a compost enhancer. In its first three months the unit has processed more than three tonnes of food waste into 500kg of fertilizer. https://www.bne.com.au/sites/default/files/docs/BAC-Annual-Report_2019.pdf

Case Study: OSCA – 1, University of the Sunshine Coast

- Continuous feed system that takes two weeks from start to finish, and six weeks of rest before the compost can be applied to soils
- Odour is managed by a bio-filter and unit located in open space so is not an issue
- Maintenance every six months and the filters changed every 18 months
- Six to eight hours are needed to operate the unit including shredding biodegradable material such as cups and cutlery, cleaning the machine, feeding it and collecting the product
- Waste put in a 240L bin and a lifter used to empty it into the Oscar once or twice a day (200L/day)
- The machine turns once an hour for two minutes (energy cost of an ordinary lightbulb)
- Capacity to process 1,000kg per week.

Jodi Clarke, Caroline Chane & Ellie Watts, 2016, Exploring In-Vessel Food Waste Processing Units for use in Urban and Regional Settings Advantages, Disadvantages; Environmental and Community Impacts

Other Research

Sustainability Victoria has conducted research into farmers' perceptions of organic products - https://www.sustainability.vic.gov.au/-/media/SV/Publications/About-us/What-we-do/Strategy-and-planning/Victorian-Organics-Resource-Recovery-Strategy/RRE015-Social-research-Perceptions-of-recycled-organic-products.pdf?la=en

GRDC is doing work on soils nearby. Could GW gain funding to become a trial site to provide evidence/data on the efficiency, environmental and economic gains (e.g. soil carbon) of using green waste to add carbon to the soil.