



Bromelton Compost Manufacturing Facility Greenhouse Gas Assessment

SOILCO Pty Ltd
22 May 2025

→ **The Power of Commitment**



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Abbreviations and acronyms

Abbreviation/acronym	Definition
BCDF	Business Case Development Framework
BCMF	Bromelton Compost Manufacturing Facility
EIS	Environmental Impact Statement
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FTE	Full-Time Equivalent
IPCC	Intergovernmental Panel on Climate Change
IS	Infrastructure Sustainability
ISC	Infrastructure Sustainability Council
kL	Kilolitre
km	Kilometre
ktCO ₂ -e	Kilotonnes of carbon dioxide (gas) equivalent
kV	Kilovolt
kWh	Kilowatt hour
NDC	Nationally Determined Contribution
NGER	National Greenhouse and Energy Reporting
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
SSP	Shared Socioeconomic Pathway
tCO ₂ -e	Tonnes of carbon dioxide (gas) equivalent
tkm	Tonne-kilometre
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

The Bromelton Compost Manufacturing Facility (the Bromelton CMF Project) is a proposed organics facility located along Mitchell Road in Bromelton, in South East Queensland. The Bromelton CMF Project will involve the construction and operation of a facility for the receipt, processing, composting, and storage of the following materials: garden, food, wood wastes, manures and soil for the sale and distribution of finished compost, mulch and soil products. SOILCO Pty Ltd (referred to as SOILCO) will design, construct and operate the Bromelton CMF Project.

SOILCO are seeking the following approvals for the Project:

- A State Development Area (SDA) Material Change of Use approval for works within the Bromelton SDA under the *State Development and Public Works Organisation Act 1971*.
- An Environmental Authority (EA) Approval for Environmentally Relevant Activities (ERAs):
 - ERA 53(a) Organic material processing: Processing more than 200 t of organic material in a year by composting.
 - ERA 54 Mechanical waste processing: 2 (c) – operating a facility for receiving and mechanically reprocessing more than 10,000 t a year of general waste.
 - ERA 33(1): Crushing, milling, grinding or screening more than 5,000 t of material in a year.

The Bromelton CMF Project aligns with objectives in the Queensland Government Queensland Organics Strategy 2022–2032 by reducing the amount of organic waste going to landfill and it will offer economic and social benefits through employment and local business opportunities in Southeast Queensland.

SOILCO commenced composting operations in 1985 in Australia and has a strong distribution network in agricultural and urban markets in Australia. SOILCO are a manufacturer of quality assured compost, mulch and soil blends and specialise in the design, construction and operation of innovative organics recycling facilities in Australia. SOILCO's mission is to transform organic resources into the world's best products to regenerate and enhance the health and productivity of soil and to maximise our contribution to clean energy and sustainable communities.

SOILCO successfully operates a state-of-the-art network of licensed organics processing facilities across Eastern Australia. SOILCO's infrastructure experience spans different technology solutions, including:

- Open Windrow (OW)
- In-Vessel Composting (IVC) tunnels
- Aerated Static Piles/ Covered Aerated Static Piles (ASP/CASP)

For the Bromelton CMF Project, SOILCO will utilise ASP and OW technologies. A summary of the key components of the Project is outlined in Table 1-1.

Table 1-1 Summary of key Bromelton CMF Project components

Project Component	Details
Lot on Plan	Lot 4 on Plan RP85497 and Mitchell Road (Local government managed road)
Summary of proposed works	Construct and operate a Compost Manufacturing Facility (CMF) at 260 Mitchell Road, Bromelton for the sale and distribution of finished compost, mulch & soil products The site will be split into 3 different processing areas: Receival, decontamination and composting utilising Forced Aeration Pad system.
Construction disturbance area within Lot 4 RP85497	21 hectares
Operational footprint within Lot 4 RP85497	18.5 hectares

Project Component	Details
Proposed output of the compost facility and type of material to be received and processed	Receipt, processing, composting, and storage of up to 250,000 tpa of the following materials: Garden, Food and Wood wastes and manure. Receipt, processing, storage and blending of up to 150,000 tpa of sand and soil products for manufacturing (Virgin Excavated Natural Materials or VENM).
Technology used	Two composting technologies will be utilised to handle different feedstocks: – 100,000 tpa of garden organics (GO) composted by Passive Open Windrow (OW) method. – 150,000 tpa of Food Organics and Garden Organics (FOGO) is to be processed on a Forced Aeration Pad system . Wood wastes and manure will make up a small portion of the composting feedstocks and will be blended with the GO and FOGO based on onsite capacity. VENM will be received and stored as required based on demand of finished products. Due to the seasonal nature of feedstock generation, up to 11% of the total annual waste may be received in any one month. This would typically occur around spring and autumn.
Key infrastructure and structures	– Access from Mitchell Road – Weigh bridges – Internal road network – Maintenance and storage shed – Final screening and manufacturing area – Water tanks – Aeration Pad system – Office, carparking and amenities – FOGO receival area – 3 x leachate ponds – 1 x freshwater dam – Open windrows pad – FOGO maturation pad – Hardstand areas – Retaining wall – Upgrade of Mitchell Road
Hours of Operation	Monday – Friday: 6am to 6pm Saturday: 6am to 4pm Sunday and public holidays: 9am - 4pm
Operational Staff	22 employees
Access arrangements	Mitchell Road will connect the Bromelton CMF Project to the road network. Mitchell Road will be upgraded to accommodate the traffic from the Bromelton CMF Project.
Timeframe	Construction and Commissioning Early 2026

1.1 Construction

The majority of the construction works will involve grading/excavation of the existing site, construction of semi-open composting facilities, establishment of hardstand areas and installation of plant to be used in general operation of the site.

Construction of the facility will involve:

- Bulk earthworks (Cut and fill in order to level terrain for the facility)
- Establishment of open-air compost manufacturing areas
- Establishment of the Aerated Static Pile areas
- Construction of weighbridges
- Concrete pads for loading bays
- Construction of leachate ponds.

Construction activities with potential to lead to dust generation are outlined in Table 1-2.

Table 1-2 *Dust generating construction activities*

Construction phase	Expected activities
Site establishment	– Delivery of site amenities and surveying and pegging of site.
Earthworks	– Establishment of access road to work area. – Grading, excavation and general movement of earth materials.
Roadworks and intersection works	– Removal of trees/ stripping of topsoil – Box out to required levels – Subgrade and base course – Asphaltting – Line Marking – Signage installation – Defect inspection and cleaning
Civil works	– Demolition and earthworks – Civil works. – Ponds and other civil structures
Mechanical installation	Installation of the following items: – Shredder – Drum screen – Platforms – Storage tanks/platforms – Blowers – Leachate system – Water system – Picking station – Control system & instrument mech – Odour control system – Interconnecting pipework.
Electrical installation	Installation of the following items: – Blowers – Pumps – Screens – Motor control centre works – Interconnecting cabling – Electrical installation complete.

1.2 Operation

1.2.1 Site layout

The proposed composting facility is shown in Figure 1-1 and Figure 1-2 . The following sections of the facility are relevant to the operations:

- Site office and Weighbridge
- FOGO receival building
- Aerated Static Pad
- Fogo maturation area
- Open Windrows GO
- Final Screening and Manufacturing (Manure)
- Leachate Ponds (GO, FOGO and Manufacturing).



Figure 1-1 **Layout of Bromelton Compost Manufacturing Facility**

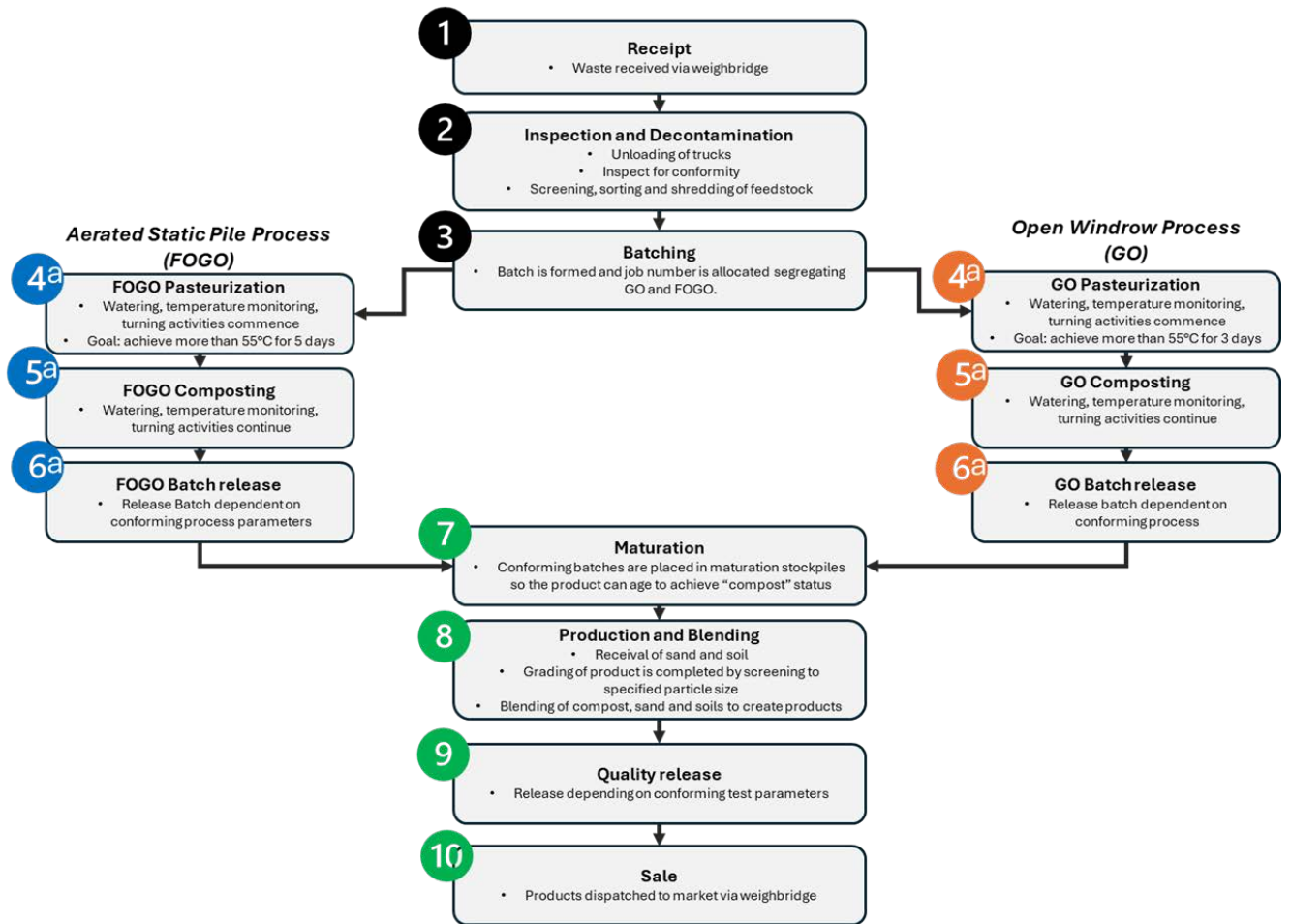


Figure 1-2 Operational process flowchart

1.2.2 Composting Process

The facility will operate in accordance with the process flow outlined in Figure 1-1 and Figure 1-2. The process flow can be divided into two branches and includes the following steps:

- Material will enter site, be weighed on a weigh bridge and inspected for conformity to process requirements.
- FOGO will be delivered to the decontamination line, which will then be screened, sorted, decontaminated and shredded depending on the size of material (>60 mm in diameter material will be shredded).
 - Shredded and decontaminated FOGO will then be placed into windrows on Aerated Static Piles pads for 21 days.
 - Aerated Static Piles pads will aerate FOGO with 18,000 m³/hour of air.
 - Windrows will be turned completely one time during the three-week period.
 - Once 21 days have passed, FOGO will be transferred to the manufacturing, maturation & storage area, and will be aged for a further eight weeks.
 - Virgin Excavated Natural Material (VENM) will also be stored in this area and will be blended into completed compost as required.
- Garden Organics (GO) will be sorted and then directly deposited onto open windrows for composting and maturation, which will sit for 8 weeks.
 - Windrows will be turned two times completely during the eight-week period.
 - Maturation windrows will undergo water humidification periodically.
 - VENM and manure will also be mixed into finished GO compost as required.
 - Manure will be stored in the final screening and manufacturing area.
- Once material has been composted sufficiently, it will be directly transported off site or stored in “bunker” areas until it is ready to be transported off site.

A summary of the proposed composting process is outlined in Table 1-3.

Table 1-3 *Proposed composting process*

Step	Summary	Timing
1. Receipt	– Unloading in the Receiving Building, which is undercover and partially enclosed.	30 mins
2. Decontamination	– Screening, sorting and shredding of feedstock. – Size reduction of feedstock in preparation for batching and composting.	1 – 2 days
3. Batching	– Placement on primary and/or secondary composting pad - designated areas for unloaded materials. – Batch/stockpile is formed according to input material and composting procedure. – Job number allocated according to feedstock type (i.e. GO, FOGO). – Additional inputs such as sand, soil or manure are added (if required).	1 – 2 days
4. Pasteurisation	– Controlled microbiological transformation of organic materials under aerobic and thermophilic conditions for a designated number of days, turns and specified temperature (above 55°C). – Watering, temperature monitoring, turning activities commence. – Objective is to achieve greater than 55°C for 3 days for a minimum of 3 turns.	Material to remain on the aerated static pile between 18 – 21 days (depending on conditions and seasonal variation).
5. Composting	– Aerobic conditions continue to be maintained as per pasteurisation for a designated number of days, turns and specified temperature (below 55°C), conformance to resource recovery orders assessed prior to removal. – Watering, temperature monitoring and turning activities continue. – A minimum of two additional 2-turns to complete batch.	

Step	Summary	Timing
6. Batch release	– Removal from composting pads and stockpiling for maturation. – Release dependent on conforming process parameters including pH, EC, moisture temperature profile and turn profile. – Batch can be pulled out and stockpiled with other conforming batches. – Ungraded, conforming product may be used as a component in other products.	1 – 2 days
7. Maturation	– Conforming batches are placed in single maturation stockpile. – Aging of product in stockpile provides additional time to achieve compost status. – Although the compost temperature is close to ambient during the curing phase, chemical reactions continue to occur that make the remaining organic matter more stable and suitable for use with plants. Drying of material from above 40% moisture during pasteurisation and composting to approximately 25% prior to screening and quality release is also achieved.	4 -6 weeks
8. Production	– Blending with other inputs to create products for sale and distribution. – Grading of product is done by screening to specified particle size. – A new batch number is used for this process.	1 week
9. Quality release	– Screening and stockpiling of finished goods for testing to relevant standards then distribution following conformance. – Release dependant on conforming test parameters including particle size, physical contamination, pH, EC bulk density and Solvita® assessment for maturity.	1 week
10. Sale	– Released product is stockpiled according to batch number. – Products are designed to be fit for purpose.	4 weeks

Figure 1-3 provides a summary of the greenhouse gas emissions that are likely to be generated in each step of the composting process.

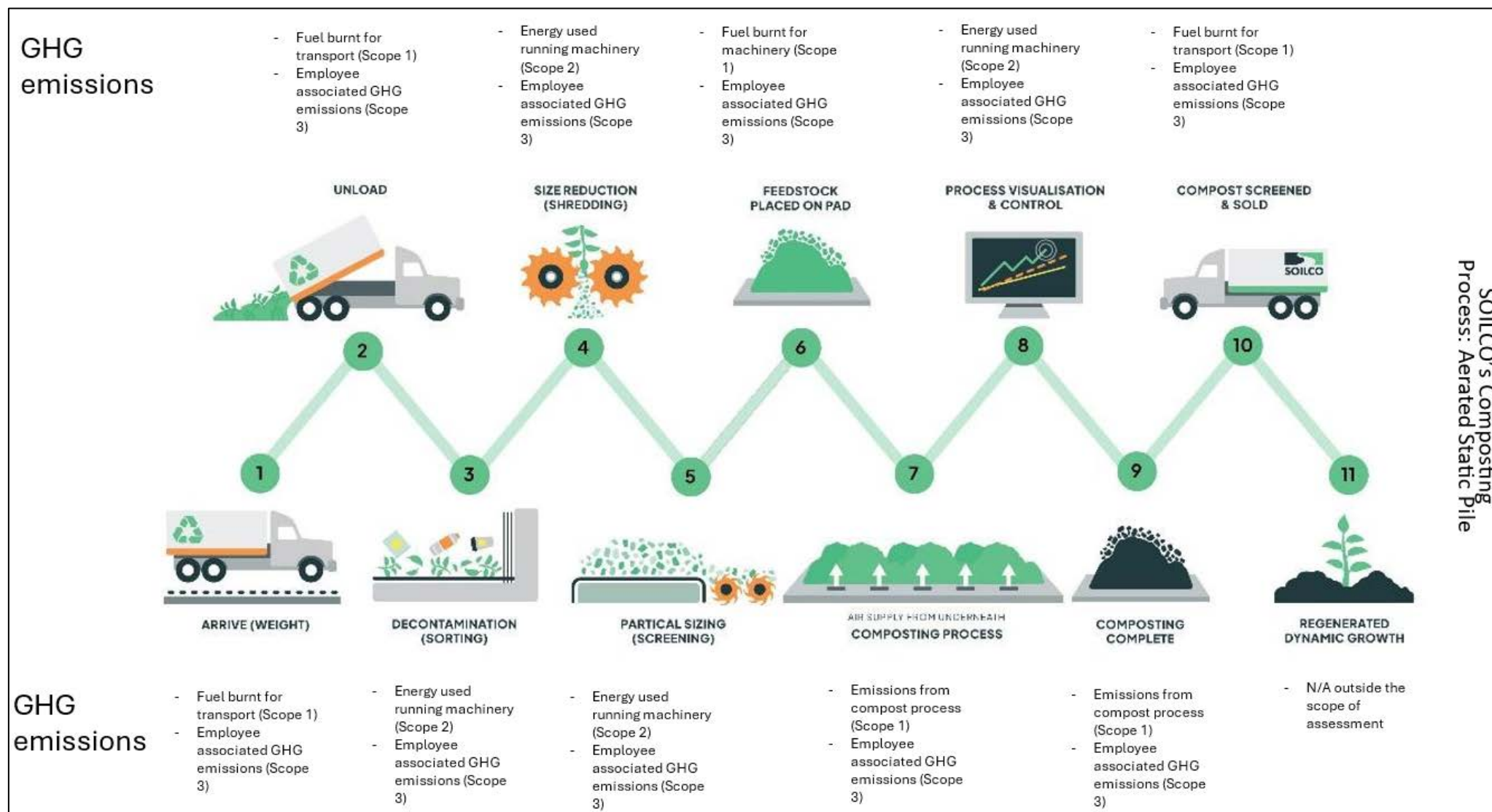


Figure 1-3 Summary of Greenhouse gas emissions during operation

1.3 Purpose of this report

This greenhouse gas assessment report has been prepared to support the assessment of the Project impacts and forms part of the supporting documentation for EA Approval for ERA 53(a), ERA 54(2)(c) and ERA 33(1). It also has been developed in response to the information request from the Office of the Coordinator General for the Material Change of Use (MCU) Development Application (Reference: OUT24/5995) 6 January 2025 (Reference D24/202645).

This document complies with the Queensland Government Guideline – Greenhouse gas emissions.

This report has been written to help understand the potential greenhouse gas impacts and to nominate mitigation and management principles to avoid, reduce, substitute or offset these emissions. This assessment comprises Scope 1, 2 and 3 emissions associated with construction, operation and decommissioning of the Project. Information in this report draws on best available estimates at the time of analysis and will be revised as new data becomes available. The assessment it is not a formal lifecycle assessment.

1.3.1 Scope

The scope of this assessment includes the calculation of greenhouse gas emissions for the Project. In addition, mitigations and management principles have been nominated to avoid, reduce, substitute or offset these emissions. This assessment comprises Scope 1, 2 and 3 emissions associated with the Project works, during both construction and operation as well as decommissioning of the Project as described in Section 1.

1.3.2 Limitations

This report has been prepared by GHD for SOILCO Pty Ltd and may only be used and relied on by SOILCO Pty Ltd for the purpose agreed between GHD and SOILCO Pty Ltd as set out in this report.

GHD otherwise disclaims responsibility to any person other than SOILCO Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on information reviewed at the date of preparation of the report. Subsequent to report finalisation based on the information provided at time of finalisation, GHD is not obliged to update this report as it is not within the current scope of work.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Legislative context

2.1 International framework

Several international organisational bodies have policy for governments to use as guidance on greenhouse gas mitigation and management. These are listed in the sections below with an explanation and description of relevance to this assessment.

2.1.1 Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard

The Greenhouse Gas Protocol (WRI & WBCSD, 2004) provides the internationally accepted framework for accounting and reporting standards from organisations to report greenhouse gas emissions. The main principles as presented for project accounting are:

- **Relevance:** The greenhouse gas emissions assessment is to present information that users need for making decisions.
- **Completeness:** Appropriate emission sources within the assessment boundary must be accounted for so that users will find the assessment comprehensive and meaningful.
- **Consistency:** Accounting approaches, assessment boundary and calculation methodology must be consistent, so that greenhouse gas emissions can be compared over time.
- **Transparency:** Information and appropriate assumptions are to be documented clearly in the assessment so that users can attest to its credibility; and that all parameters, values (and units) are accessible and presented within the assessment.
- **Accuracy:** Data presented should be credible to effect precise emissions quantification, so as to permit users to make decisions.
- **Conservativeness:** Using conservative assumptions and values where uncertainty (e.g. source data, or bill of quantities information) is high. Applying this principle will lead to a more likely overestimate of greenhouse gas emissions and underestimate of greenhouse gas removals (WRI & WBCSD, 2005).

The Greenhouse Gas Protocol further defines greenhouse gas emissions through the concept of emission scopes that are:

- 'Scope 1' means direct emissions of greenhouse gases from sources within the boundary of the facility and as a result of the facility's activities (including emissions from land/vegetation clearing).
- 'Scope 2' means emissions of greenhouse gases from the production of electricity, heat, or steam that the facility will consume, but that are physically produced by another facility.
- 'Scope 3' means indirect emissions of greenhouse gases generated in the wider community other than Scope 2 emissions, occurring as a consequence of the activities of a facility project but arise from sources not owned or controlled by that facility's business (WRI & WBCSD, 2004).

Scope 3 emissions, also referred to as value chain emissions, typically constitute the predominant portion of a project's total greenhouse gas emissions assessment (Figure 2-1). These emissions originate from sources that are not owned or directly controlled by the reporting entity but are nonetheless associated with its operations. This category encompasses emissions from the procurement of goods and services, upstream and downstream transportation and distribution, waste generated in operations, and the end-use of sold products. Accurately quantifying and managing Scope 3 emissions is imperative for organisations striving to minimise their overall carbon footprint and achieve comprehensive sustainability objectives.

The Greenhouse Gas Protocol's Scope 3 Standard offers a robust framework for the systematic measurement and reporting of these emissions. It enables organisations to pinpoint the most significant emission sources within their value chain and formulate targeted mitigation strategies. Addressing Scope 3 emissions not only enhances an organisation's environmental performance but also bolsters its reputation, aligns with stakeholder expectations, and provides a competitive edge in the marketplace.

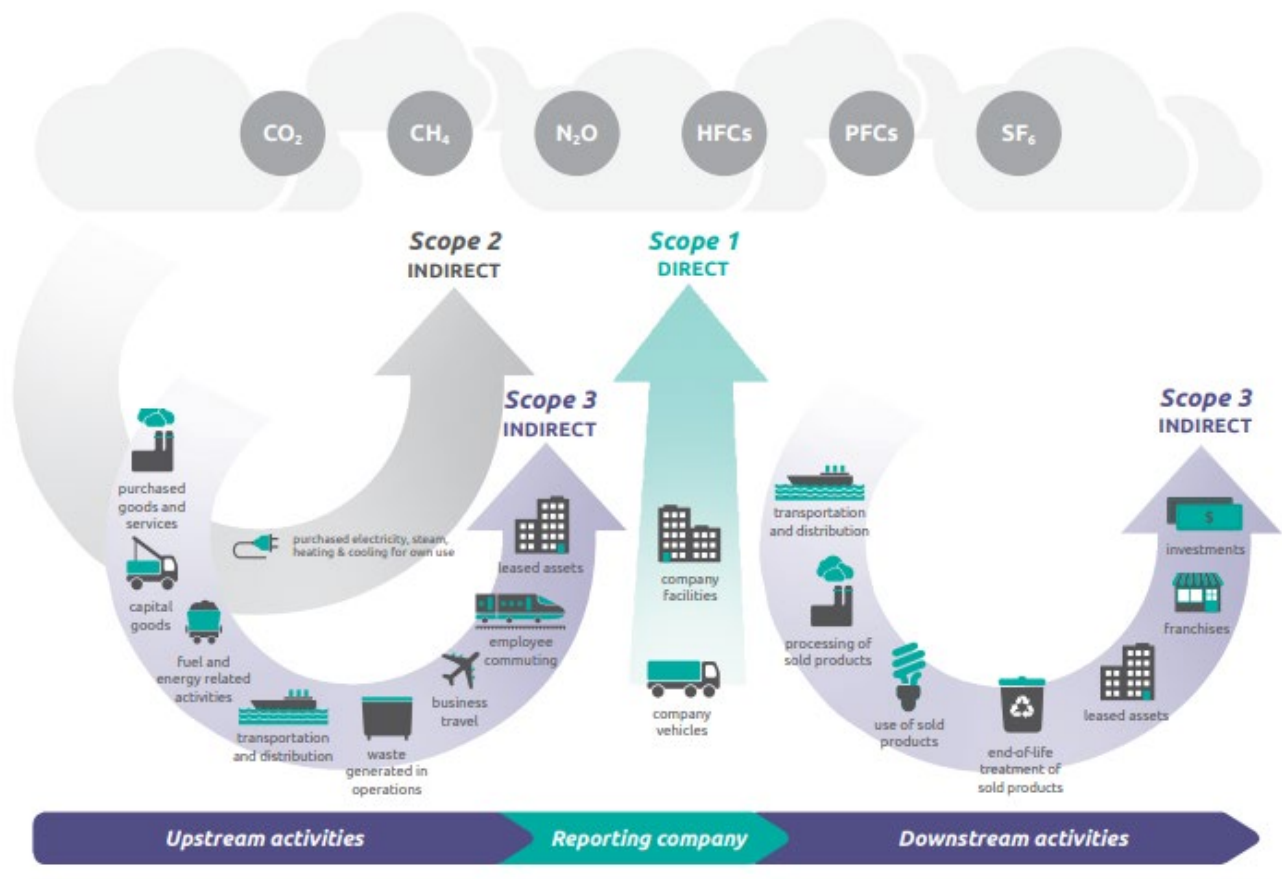


Figure 2-1 Overview of Greenhouse Gas Protocol scopes and emissions across the value chain (Source: WRI and WBCSD, 2004)

2.1.2 Paris Agreement under the United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) establishes the overall framework for intergovernmental organisations to address climate change issues. Under the UNFCCC, governments:

- Commit to reducing greenhouse gas emissions through national policies and international agreements, such as the Paris Agreement
- Receive support for climate adaptation and mitigation efforts, including financial aid, technology transfer, and capacity-building initiatives
- Report and monitor their progress in addressing climate change, ensuring transparency and accountability through regular submissions of national communications and greenhouse gas inventories.

The Paris Agreement is a landmark international treaty adopted in 2015 during the 21st Conference of the Parties (COP21) to the UNFCCC. Its chief objective is to constrain the rise in global temperatures to well below 2°C above pre-industrial levels, with a concerted effort to limit the increase to 1.5°C. The agreement mandates comprehensive and ambitious climate actions from nearly all nations, fostering both mitigation and adaptation strategies, with a particular emphasis on supporting developing countries. Additionally, it establishes a robust framework for transparency, requiring regular monitoring, reporting, and enhancement of national climate commitments over time.

As Australia is party to the Paris Agreement, efforts must be made to halt the increase of global average temperatures, and the Australian Government has made a commitment to a 28 percent reduction of greenhouse gas emissions below 2005 levels by 2030. These targets should influence the selection of greenhouse gas emission mitigation within the Project.

2.1.3 Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) is a body of scientific experts established in 1988 by the World Meteorological Organisation and the United Nations Environment Programme to provide independent climate change advice. The IPCC produces detailed reports on various aspects of climate change and its impacts, using the latest climate science to develop practical response strategies. Despite the adoption of the UNFCCC in 1992, the IPCC remains the primary source of scientific and technical data on climate change and greenhouse gas emissions.

The IPCC Sixth Assessment Report (AR6) is based on more recent literature since the publication of the AR5 in 2014. It summarises the state of understanding of climate change risk and impacts, mitigation and adaptation.

Following the progression of the AR6 development and worldwide commitments, the Australian Government has committed to net-zero emissions by 2050 (Nationally Determined Contributions (NDCs)). This includes:

- Reduce greenhouse gas emissions:
 - 2015 NDC: committed to reduce emissions by 26 to 28 percent below 2005 levels by 2030
 - 2020 NDC update: affirmed the 2030 target
 - 2021 NDC update: committed to net-zero 2050.
- Track progress towards those commitments
- Report each year on Australia's greenhouse gas emissions.

These targets should influence the selection of greenhouse gas emission mitigation within the Project.

However, for the purposes of applying the global warming potential of specific greenhouse gases, these remain sourced from AR5, which Australia's legislative instrument – the *National Greenhouse and Energy Reporting Regulation 2008* as amended, also adopted.

2.2 Australian framework

2.2.1 *National Greenhouse and Energy Reporting Act 2007*

The Australian Government enacted the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) in July 2008. The NGER Act establishes a national framework for Australian corporations to report Scope 1 and Scope 2 greenhouse gas emissions, and energy consumption and production.

The NGER Act together with its subordinate legislative instruments identified below, underpins the National Greenhouse and Energy Reporting (NGER) Scheme:

- The *National Greenhouse and Energy Reporting Regulations 2008* (and its amendments) which provide the necessary details that allow compliance with, and administration of, the NGER Act
- The *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (and its amendments) which provides methods and criteria for calculating greenhouse gas emissions and energy data under the NGER Act
- The *National Greenhouse and Energy Reporting (Audit) Determination 2009* which sets out the requirements for preparing, conducting and reporting on greenhouse and energy audits.

A summary of what is covered by the legislation is presented in Table 2-1.

Table 2-1 **Greenhouse gas legislation summary**

NGER Act and Regulations	Details reporting greenhouse gas emissions, energy production, and energy consumption by corporations in Australia. It aims to provide robust data to inform government policy and international reporting obligations. It also details specific information companies must report and the methods for calculating emissions and energy data. This ensures consistency and accuracy in the data collected.
<i>National Greenhouse and Energy Reporting</i>	Provides methods, criteria and emission factors for calculating greenhouse gas emissions and energy data under the NGER Act and Regulations.

(Measurement) Determination 2008	
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These frameworks have been relied upon to produce the greenhouse gas assessment applicable to the Project.

2.3 Queensland framework

Within the *Clean Economy Jobs Act 2024* the Queensland government has made a commitment to reach net-zero by 2050. To achieve this, all sectors will need to contribute to meeting a net-zero emissions target, recognising the level of emissions they release to the atmosphere and their varying opportunities and capacities to avoid and mitigate their emissions.

A range of policy and legislative provisions will be required to facilitate a transition to a low-carbon economy:

- Guideline – Greenhouse Gas Emissions
- Air – EIS Information Guideline
- Queensland's 2035 Clean Economy Pathway.

The Guideline – Greenhouse Gas Emissions clarifies the Queensland Government's minimum expectations for emissions management under the *Environmental Protection Act 1994* (EP Act) and how such requirements to manage emissions will be mandated through environmental authorisations. These guidelines also state that for national reporting purposes, Scope 3 emissions are to be accounted for.

This assessment is also underpinned by the EP Act and the *Environmental Protection Regulations 2019* of Queensland. The EP Act aims to protect the environment while allowing for sustainable development. It establishes an environmental management program, policies for specific environmental aspects, and a licensing system for regulated activities. The *Environmental Protection Regulations 2019* and other policies provide detailed processes and guidelines to achieve the EP Act's objectives. This framework ensures that development is balanced with environmental protection.

3. Methodology

3.1 Overview

This greenhouse gas assessment has been prepared to estimate the greenhouse gas emissions for the Project and develop management opportunities to monitor and reduce greenhouse gas emissions.

The tasks shown in Figure 3-1 have been completed as part of this greenhouse gas assessment. The greenhouse gases being assessed include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride (SF₆), where relevant.

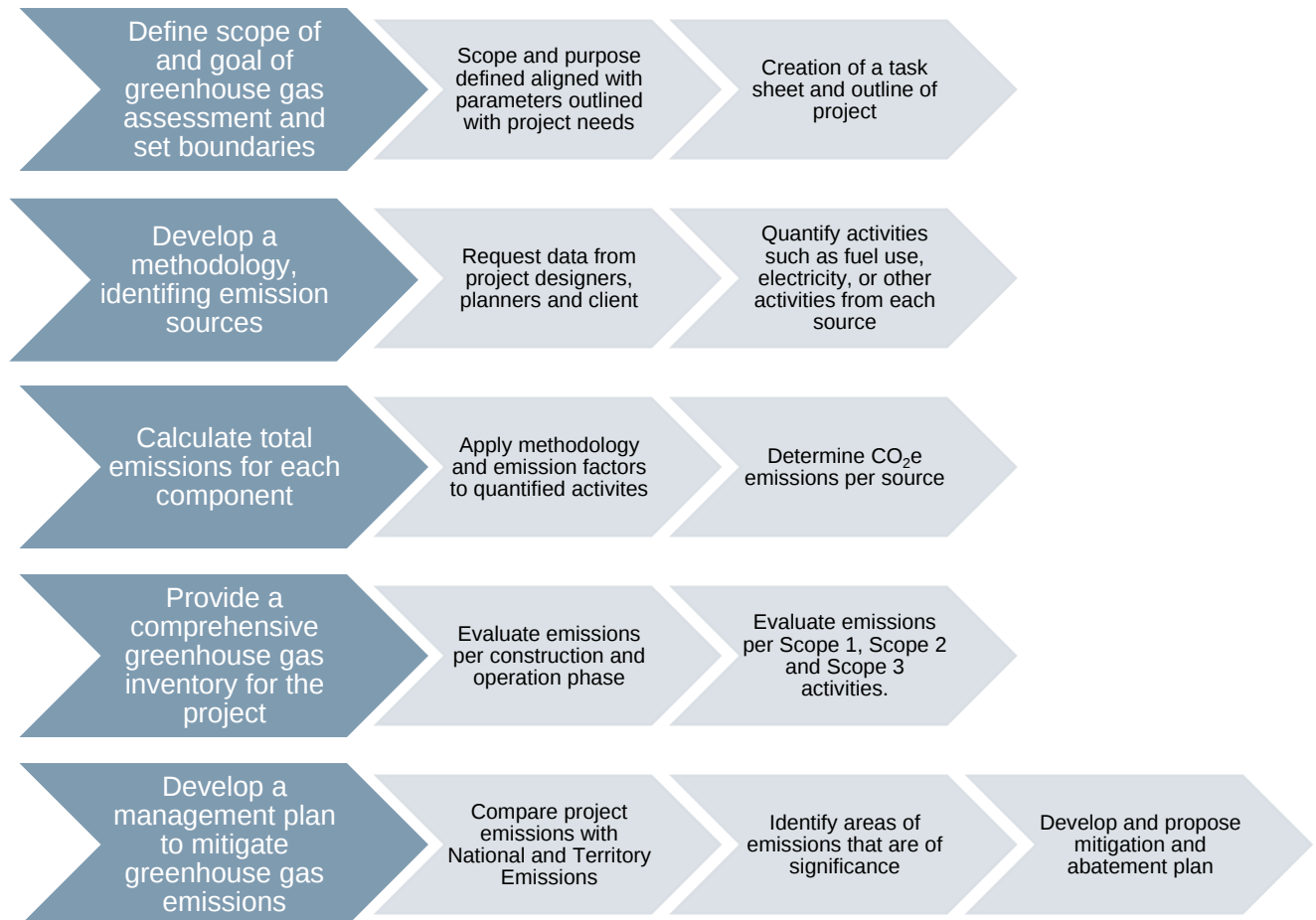


Figure 3-1 Greenhouse gas assessment and management plan approach

The data considered in the greenhouse gas assessment was sourced from Project documents available at the time of writing.

The Greenhouse Gas Protocol further defines greenhouse gas emissions through the concept of emission scopes. This is detailed in 2.1.1.

The Scope 1 and 2 emission factors used for this assessment were sourced primarily from the *National Greenhouse and Energy Reporting Act (Measurement) Determination 2008* as amended. Other factor sources that were deemed relevant at the time of writing include:

- National Greenhouse Accounts Factors (2024)
- ISC IS materials calculator version 2 – LCI (2017)
- EPiC Database (2019)
- Transport Authorities Greenhouse Group report: Vegetation class & maximum biomass (Maxbio) class
- EPD SHOTCRETE_ MossIA
- Australian Reinforcing Company Reinforcing Bar & Mesh (2016) (EPD858): Reinforcing bar
- Australian Reinforcing Company Reinforcing Bar & Mesh (2016) (EPD858): Reinforcing mesh
- EPD Australasia Ltd (2023): PVC pressure pipes
- MM Carbon Portal (ISCA version 2.0).

Section 3 of this report provides detailed information on the inclusions, exclusions, and assumptions made within our calculations.

The following methods were used to calculate Scope 3 emissions from purchased services and capital goods (WRI & WBCSD, 2013):

- **Average-data method**, which involves estimating emissions for goods and services by collecting data on the mass (e.g. kilograms or pounds), or other relevant units of goods or services purchased and multiplying by the relevant secondary (e.g. industry average) emission factors (e.g., average emissions per unit of good or service).
- **Spend-based method**, which involves estimating emissions for goods and services by collecting data on the economic value of goods and services purchased and multiplying it by relevant secondary (e.g. industry average) emission factors (e.g. average emissions per monetary value of goods).

3.1.1 Greenhouse gases and global warming potential

The greenhouse gases considered in this assessment and the corresponding global warming potential for each gas are listed in Table 3-1. Global warming potential is a metric used to quantify and communicate the relative contributions of different substances to climate change over a given time horizon.

Global warming potential accounts for the radiative efficiencies of various gases and their lifetimes in the atmosphere, allowing for the impacts of individual gases on global climate change to be compared relative to those for the reference gas carbon dioxide. In this assessment, the global warming potentials from the NGER Regulations 2008, updated from 14 October 2024, were used. These are reflective of radiative forcing over a 100-year time horizon.

Table 3-1 *Select greenhouse gases and their 100-year global warming potential*

Carbon dioxide (CO ₂)	1
Methane (CH ₄)	28
Nitrous oxide (N ₂ O)	265

4. Emissions calculation

4.1 Emissions sources

The following sources of emissions have been considered in this assessment.

4.1.1 Construction

- Fuel consumption from on-site equipment and plant
- Emissions associated with land clearing resulting in cleared vegetation and lost carbon sink
- Fuel associated with electricity generation
- Material inputs and transport
- Waste processing
- Potable water use and sewage
- Staff travel to and from site (local land travel)
- Staff facilities and offices

4.1.2 Operation and maintenance

- Fuel consumption from on-site equipment and plant
- Emissions from Compost decomposition
- Product transportation
- Processing of other waste
- Potable water use and sewage
- Staff travel to and from site (local land travel)
- Electricity use
- Ongoing maintenance activities

4.1.3 Decommissioning

There are additional emission sources that would be associated with the Project, such as emissions based on expenditure on supporting services such as insurances, accounting services, etc. The emissions from these sources have been estimated based on a percentage of construction emissions and where budgetary information has been made available at time of writing.

4.2 Exclusions

The following items were excluded from the assessment as their contribution is anticipated to be minor, not relevant or have insufficient information available to calculate, including:

- Combustion of fuels used in minor quantities such as LPG, gasoline, solvents, oils, and greases.
- Minor quantities of acetylene welding gases
- Embodied carbon of:
 - Office Amenities- structure (demountable)
 - Office Amenities- fitout (fairly basic)
 - Maintenance & Storage Shed
 - FOGO Pre Treatment Building
 - Extra over quantities within the BoQ for earthworks
 - Erosion and sediment control devices

- Capital equipment
 - heavy equipment and machinery (whether purchased or for hire)
 - furniture, fridges, computers, TVs, building fittings, demountables
- Refrigerant Use in Air Conditioners (e.g. control room)
- Software and Systems Licensing - SCADA
- Staff PPE / Clothing
- Staff business-related travel
- PI/PL insurance - required for operations
- Potable water and sewage
- Food and catering
- Revegetation carbon sequestration
- Downstream emissions avoided by use of the facilities product as opposed to traditional manufactured fertilisers or products
- Other minor GHG impacts that do not have available information to estimate

4.3 Assumptions

Consistent with financial and quantity estimation for projects, the calculations for greenhouse gas emissions are only as accurate as the information available. The estimations provided should not be relied upon more than the data from which it was calculated. Assumptions for the Project assessment are described in Table 4-1. These assumptions are listed in detail against the relevant emission in the greenhouse gas Inventory in Appendix A.

More broadly for the assessment the below assumptions create a basis for the assessment:

- Wherever possible, project design information was used to calculate greenhouse gas emissions, where there is limited availability of information, the assumptions below have been detailed to confirm consistency and data source.
- As the Project progresses through the reference design, detailed design, construction and operational phases, this assessment should be updated (for currency) with more relevant information as it becomes available.
- The assessment was based on emission factors available at the time of the assessment and future changes in emission factors or global warming potential were not considered.
- Scope 3 estimates are based on industry averages rather than supplier-specific information. The activity data is limited in the early stages of the Project, therefore, the numbers used are based on the best information currently available; these could be expected to change, and any updates to these numbers would fall under a separate scope of work.

Detailed assumptions relating to the greenhouse gas emissions assessment of the Project are presented in Table 4-1.

Table 4-1 Overall assumptions for the Project

Category	Parameter	Assumptions
Whole of project	Fuel	- Assume 10,000 KL diesel - Construction fuel use for plant and machinery including generators - Assume 30% used during decommissioning
	Vegetation removal – diesel for clearing and lost carbon sink	– 3.38 ha 'Eucalypt Tall Open Forest (Class B) - Carbon lost from removing vegetation was calculated using the factors obtained from the Transport Authorities Greenhouse Group Report specific to the facility's locality (using Biomass Class 4, which is the class that covers most of the vegetation removed).
	Transport of materials	– Assume transport 50 km of materials – construction and operation distance assumptions

Category	Parameter	Assumptions
	Electricity	– No grid electricity used during construction/decommissioning – 12kwh/ton of feedstock – operational electricity usage
	Staff, local ground travel	– Assume transport 50 km of staff to and from work.
	Waste production (recycling and landfill)	– Assume transport 50 km of waste – construction and operation distance assumptions
	Feedstock (organic waste component)	– 250,000 ton annually
Earthworks	Gravel hardstands for storage areas and, windrows	– Assuming gravel base - @ 600mm depth
Roads and car parks	Pavement Surface	– Assuming asphalt pavement (200mm)
	Pavement Base	– Assuming subbase of rock (Fine crushed rock - 510mm)
	Pavement Select Fill	– Assuming thickness of 150mm
Concrete slabs and misc hardstands	Hardstand around building	– Assuming gravel @ 200mm depth
	Fogo shed slab	– Assuming concrete N32 @100mm thick slab
	Aerated Static Piles pad 100-150mm reinforced concrete base slab with attached thickenings	– Assuming concrete N32 @150mm thick slab
	Aerated Static Piles pad 300mm reinforced concrete slab with spigots	– Assuming concrete N32 @300mm thick slab
	Steel	– 50% of steel is recycled at decommissioning phase
Ponds	HDPE liner	– Assuming 1.5mm thick (Town Planning Report Figure 4.10 - see below)
Services	Tanks	– Assuming a 107 kl reinforced concrete tank - 100mm thick
	FS - Pump	– Assuming it to be a typical vertical turbine fire pump
	Pipe	– Assuming a 100mm pipe size - 4.5 kg/m - Assume up to a 100 m
	SST - Pump	– Submersible sewage ejector pump
MISC	Chainwire perimeter fencing	– Assuming 6.5 kg weight/meter
	Allowance for storage push walls and concrete blocks	– Assuming 112m3 of N32 block wall is 0.5m x 1.5m x 150m
	Tank hardstand with perimeter bunding	– Assuming concrete N32 @100mm thick slab
	Solar	– Assuming thickness of a solar panel to be about 3.5 mm

5. Emissions inventory

Results of this greenhouse gas assessment are presented in the following sections.

5.1 Project total

Table 5-1 summarises the total emissions associated with the Project works for the construction of Bromelton Compost Manufacturing Facility, operational, and decommissioning phases.

Table 5-1 Greenhouse gas emissions summary for the Project

Project phase	Duration	Emissions (t CO ₂ e)				
		Scope 1	Scope 2	Scope 3	Total	Total per year
Construction phase for Bromelton Compost Manufacturing Facility	14 months	28,453	0	14,172	42,625	36,536
Operational phase (30 years)	Annual	11,500	2,130	1,204	445,021	14,834
Decommissioning	14 months	8,129	0	4,277	12,406	10,634
Greenhouse gas indicators						
Total life of project		381,582	63,900	54,570	500,052	N/A

5.1.1 Construction phase emissions estimation

Emissions associated with the construction of the Project are presented below in Table 5-2. The total greenhouse gas emissions during construction are estimated at 42,200 tCO₂e over one year. Emissions from diesel consumption are the largest source of emissions during the construction phase, accounting for half.

Table 5-2 *Summary of construction phase emissions*

Activity	Activity data	Unit	Emissions (t CO ₂ e)			
			Scope 1	Scope 2	Scope 3	Total
Diesel consumption of genset	10,000	kL	27,097	0	0	27,097
Diesel consumption of genset	10,000	kL	0	0	6,678	6,678
Land clearing	3	ha	1,355	0	0	1,355
Materials - concrete N32	11,162	t	0	0	4,309	4,309
Materials - Asphalt	7,314	t	0		1,463	1,463
Materials - Gravel	45,966	t	0	0	261	261
Materials - Rock	16,256	t	0	0	177	177
Materials - steel (Reo Mesh)	11	t	0	0	31	31
Materials - steel (Reo Bar)	5	t	0	0	15	15
Materials - PVC	1	t	0	0	5	5
Materials - Glass	50	t	0	0	50	50
Materials - Cast Iron	20	t	0	0	32	32
Materials - Geomembrane	2	t	0	0	14	14
Materials - Lime	26	t	0	0	21	21
Materials transport	4,040,668	tkm	0	0	292	292
Waste transport	202,033	tkm	0	0	15	15
Worker transport	5	kL	0	0	3	3
Waste (C&D)	4,041	t	0	0	808	808
Total emissions - construction			28,453	0	14,172	42,625

5.1.2 Operations and maintenance phase annual emissions estimation

Table 5-3 provides an estimation of emissions occurring as a result of operations annually. The largest contributors to operational emissions are from the composting, accounting for 70% percent.

Table 5-3 Summary of operational phase annual emissions

Activity	Quantity	Units	Greenhouse gas emissions (t CO ₂ e)			
			Scope 1	Scope 2	Scope 3	Total
Electricity from grid (QLD)	3,000,000	kWh	0	2,130	0	2,130
Electricity from grid (QLD)	3,000,000	kWh	0	0	300	300
Worker transport	1	kL	0	0	1	1
Composting	250,000	t	11,500	0	0	11,500
Materials transport	12,500,000	tkm	0	0	903	903
Total			11,500	2,130	1,204	14,834

5.1.3 Decommissioning emissions estimation

Table 5-4 provides an estimation of emissions occurring as a result of decommissioning the Project. The largest contributors to decommissioning emissions are from diesel consumption, accounting for 60 percent.

Due to no input data the decommissioning phase emission estimations were based off the construction phase estimations where relevant. Waste process was amended to include the assumed increased waste from landfill of certain items with embodied carbon.

Table 5-4 Summary of decommissioning phase emissions

Activity	Activity data	Unit	Emissions (t CO ₂ e)			
			Scope 1	Scope 2	Scope 3	Total
Diesel consumption of genset	3,000	kL	8,129	0	0	8,129
Diesel consumption of genset	3,000	kL	0	0	2,003	2,003
Waste (C&D)	17,985	t	0	0	2,255	2,255
Waste transport	899,252	tkm	0	0	41	41
Recycling benefit from construction - steel	8	t	0	0	-23	-23
Recycling transport	790	tkm	0	0	<1	<1
Total			8,129	0	4,277	12,406

5.1.4 CMF emissions intensity comparison

Emissions intensity is the weight of carbon per unit of feedstock (gCO₂eq/ton) that a facility processes. In broader waste management discussion, the NSW EPA fact sheet “Emissions impacts of composting food waste” (NSW EPA, 2024) says that “*The collection, transport, and processing of food waste into compost reduces emissions by 96% compared to landfilling it.*” Noting the facility has inherently lower GHG impacts than conventional landfill practices, this section will further discuss the emissions intensity of other compost facilities.

The study “Greenhouse Gas and Air Pollutant Emissions from Composting” (Nordahl. Et al, 2023) details that there are many types of GHG’s emitted during the composting process. This is dependent on feedstock, compost handling techniques, timing and other external factors. For the purposes of this assessment the methodology used will be from the *National Greenhouse and Energy Reporting (Measurement) Determination 2008, 5.22 Method 1—emissions of methane and nitrous oxide from biological treatment of solid waste* which states that per ton of feed stock processed 46 kgCO₂eq/ton is released into the atmosphere.

The NSW EPA released a facts sheet “Emissions impacts of composting food waste” (NSW EPA, 2024). This document details several CMF types and has a measure of the carbon produced per ton of feedstock which is presented in Figure 5-1.

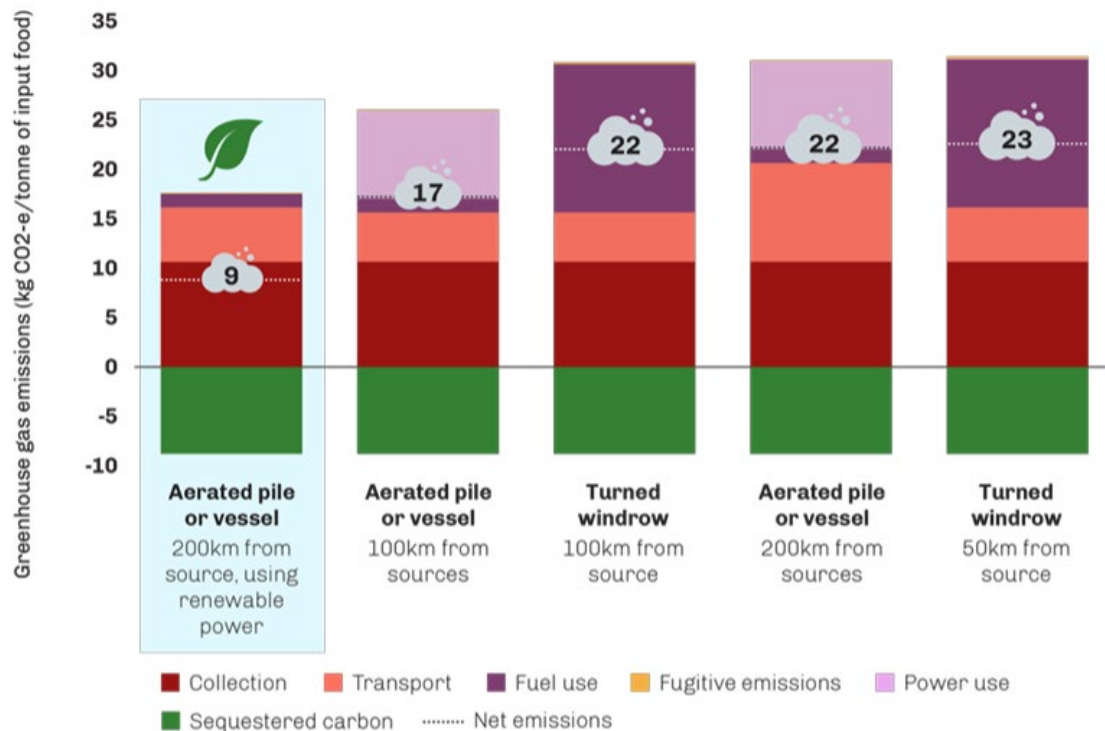


Figure 5-1 Emissions and offsets for off-site aerobic composting scenarios (source: NSW EPA, 2023)

The “Carbon Footprint of a University Compost Facility: Case Study of Cornell Farm Services” (M. Schwarz and J. Bonhotal, 2018) found that their facility generated 15.4 kgCO₂eq/ton.

In both of the above examples (Figure 5-1 and (M. Schwarz and J. Bonhotal, 2018)) there is carbon sequestering calculations that are included to bring the total carbon intensity down. Furthermore, the NSW EPA examples don’t include the 46 kgCO₂eq/ton recommended by the NGER 2008. The “Carbon Footprint of a University Compost Facility: Case Study of Cornell Farm Services” (M. Schwarz and J. Bonhotal, 2018) was carried out in North America. The area of the study experiences lower temperatures than Australia. Pattey, Trzcinski, and Desjardins (2005) found a positive correlation between rising temperatures and CH₄ emissions. An unsubstantiated opinion of the writer is that the lower temperatures in this climate could be key to the higher nominated baseline of 46 kgCO₂eq/ton recommended by the NGER.

6. Mitigation and management

To reduce greenhouse gas emissions, the Project will implement a combination of the following mitigations where feasible.

6.1 Scope 1 emission reduction measures

- Fuel:
 - Avoid stationary fuel use through solar and battery arrangements
 - Where feasible, mobile and stationary equipment compliant with a more recent emission standard than USEPA Tier 2 will be sourced
 - Implement regular maintenance schedules to ensure optimal performance and fuel efficiency of all machinery
 - Haul distances will be minimised in Project design as far as practicable to reduce diesel consumption
 - Extraction practices will be reviewed to minimise double handling of materials and ensure that haulage is undertaken using the most efficient routes
 - Electricity bills and fuel usage will be tracked
 - Mobilise vehicles and equipment from nearby locations to minimise greenhouse gas emissions during transport
 - Plan logistics to reduce travel distances and optimise routes.
 - Utilising maximum sized vehicles to minimise movements.
- Operational practices:
 - Optimise operational schedules to reduce idle times and unnecessary fuel consumption
 - Educate operators on efficient driving and equipment handling techniques to minimise fuel use
 - Regular maintenance of equipment to ensure optimal performance and minimise emissions
 - Diesel equipment idling will be minimised wherever feasible
 - GHG emissions and energy use developed targets will be monitored and reported on a scheduled basis.
- Alternative fuels:
 - Use biofuels or other low-carbon alternatives where feasible
 - Alternative fuels (e.g. low sulphur) will be considered where economically and practically feasible
 - Explore the use of electric or hybrid vehicles for on-site transportation.
- Vegetation management:
 - Minimise the clearance of vegetated areas to preserve carbon sinks and reduce emissions from land-use changes
 - Reuse of removed vegetation will be encouraged
 - Onsite revegetation
 - Offset carbon emissions. SOILCO are planting an area on the site as compensation for the area cleared. There is an opportunity to calculate the carbon sink of this area if allowable under relevant standards and guidance.

6.2 Scope 2 emission reduction measures

- Renewable energy:
 - Source electricity from renewable energy providers where possible.
 - Install on-site renewable energy systems, such as solar panels, to power facilities
- Energy efficiency:

- Implement energy-efficient lighting, heating, and cooling systems in all buildings
- Use energy management systems to monitor and optimise electricity use
- Electricity bills and fuel usage will be tracked.
- Demand management:
 - Schedule high-energy activities such as fans on the APS system during off-peak hours to reduce strain on the grid and associated emissions
 - Implement load-shifting strategies to balance energy use throughout the day.

6.3 Scope 3 emission reduction measures

- Supply chain:
 - Obtain more granular source data (e.g. not based on expenditure) in order for Scope 3 emissions to be more accurately modelled. For example, shift the accounting approach from spend-based method to average data method
 - Low carbon alternatives for aggregate, cement and steel will be sourced where viable and from local sources where possible
 - Awareness raising: Engage with suppliers to ensure that they understand the impacts of their carbon footprint, and that their businesses are aligned with the Queensland Government's emissions reduction targets
 - Undertake a supply chain analysis – to assess whether suppliers are compliant with their sustainability and emissions management policies and strategies to drive Scope 3 emissions transparency and due diligence checks
 - Consider sustainable procurement, i.e. to engage suppliers who are Climate Active certified, or are able to supply products that have accompanying Environmental Product Declaration
 - For Scope 3 emissions associated with the combustion of fuels (i.e. Scope 1 emissions), should the reduction measures presented in the Scope 1 emissions reduction section above be implemented, then there will be consequential reductions in the associated Scope 3 emissions component.

7. Risk assessment

A risk assessment for greenhouse gas related impacts was undertaken using a high-level risk assessment framework that differentiates risks qualitatively by listing impacts as either Low, Medium or High.

Risk to the environmental values of Queensland from the Project's greenhouse gas emissions are detailed below from the Climate change in Queensland fact sheet (QLD Government, 2019). The identified risks were categorised under seven main climate variables:

- Higher temperatures
- Hotter and more frequent hot days
- Harsher fire weather
- Fewer frosts
- Reduced rainfall in the south-east
- More intense downpours.

These climate variables risk impacting the below environmental aspects:

- Climate
- Air quality
- Water quality
- Land
- Flora and fauna.

Greenhouse gas emissions from this assessment would contribute to these risks.

For this greenhouse gas assessment, the magnitude of each Project emission source (when compared to Queensland totals) and scaled against the overall Project impact was assessed to understand where the Project has the highest emission reduction opportunities. The highest risk emission sources hold the greatest opportunity for reduction.

Risks associated with the emissions for the Projects three phases are listed in Table 7-1. Risks associated with the emissions for the Projects three phases are listed in Table 7-1. Only those sources with greater than 10 percent of the Project totals have been included. The emission sources should be broadened when accuracy of estimations increase in future phases of the Project.

Table 7-1 identifies Project activities that have the highest potential to generate greenhouse gas emissions. Identified risks require mitigation and management practices to qualify residual risk. This is detailed in Table 7-2.

Table 7-1 Emissions source in order of magnitude

Phase	Emission source	Magnitude (% of phase total)	Magnitude (% of Queensland total)	Overall initial risk
Construction	Scope 1 - Fuel usage during construction	64%	0.0219%	High – Transport of materials and plant and equipment usage is a larger part of the construction emissions. This is based on diesel fuel usage.
Construction	Scope 3 – Concrete + other materials. Embodied carbon	10%	0.0035%	Medium – embodied carbon is determined by the measurement of carbon input to each ton of material.
Operation	Scope 1 - Composting emissions	78%	0.0093%	High – Composting
Operation	Scope 2 - Energy usage during operation	14%	0.0017%	Medium – Energy used to operate facility is sourced from traditional fossil fuel sources, increasing the greenhouse gas intensity.

Phase	Emission source	Magnitude (% of phase total)	Magnitude (% of Queensland total)	Overall initial risk
Decommissioning	Scope 1 - Fuel usage during decommissioning	66%	0.0066%	Low – Decommissioning and methodology is unclear; plant may be upgraded to continue life cycle.
Decommissioning	Scope 3 – Infrastructure waste	18%	0.0018%	Low – Decommissioning and methodology is unclear; plant may be upgraded to continue life cycle.

Table 7-2 Emissions source mitigation and residual risk

Phase	Emission source	Overall initial risk	Mitigation	Management principles	Overall residual risk
Construction	Scope 1 - Fuel usage during construction	High – Transport of materials and plant and equipment usage is a larger part of the construction emissions. This is based on diesel fuel usage.	- Avoid stationary fuel use through solar and battery arrangements - Haul distances will be minimised in Project design as far as practicable to reduce diesel consumption - Use biofuels or other low-carbon alternatives where feasible - Alternative fuels (e.g. low sulphur) will be considered where economically and practically feasible - Explore the use of electric or hybrid vehicles for on-site transportation.	- Where feasible, mobile and stationary equipment compliant with a more recent emission standard than USEPA Tier 2 will be sourced - Implement regular maintenance schedules to ensure optimal performance and fuel efficiency of all machinery - Extraction practices will be reviewed to minimise double handling of materials and ensure that haulage is undertaken using the most efficient routes - Mobilise vehicles and equipment from nearby locations to minimise greenhouse gas emissions during transport - Plan logistics to reduce travel distances and optimise routes.	Medium
Construction	Scope 3 – Concrete + other materials. Embodied carbon	Medium – embodied carbon is determined by the measurement of carbon input to each ton of material.	- Minimise the clearance of vegetated areas to preserve carbon sinks and reduce emissions from land-use changes - Reuse of removed vegetation will be encouraged	- Low carbon alternatives for aggregate, cement and steel will be sourced where viable and from local sources where possible - Awareness raising: Engage with suppliers to ensure that they understand the impacts of their carbon footprint, and that their businesses	Low

Phase	Emission source	Overall initial risk	Mitigation	Management principles	Overall residual risk
				are aligned with the Queensland Government's emissions reduction targets - Undertake a supply chain analysis – to assess whether suppliers are compliant with their sustainability and emissions management policies and strategies to drive Scope 3 emissions transparency and due diligence checks	
Operation	Scope 2 - Energy usage during operation	Medium – Energy used to operate facility is sourced from traditional fossil fuel sources, increasing the greenhouse gas intensity.	– Source electricity from renewable energy providers – Install on-site renewable energy systems, such as solar panels, to power facilities	– Implement energy-efficient lighting, heating, and cooling systems in all buildings – Use energy management systems to monitor and optimise electricity use – Electricity bills and fuel usage will be tracked.	Low
Operation	Scope 1 - Composting emissions	Medium – Composting	– Restrict number of pile turns to requirements of the relevant standards and guidelines	– Manage pile temperatures and decomposition rates – Calculate the avoided carbon from industrial fertilisers being offset by the use of the facilities compost product.	Medium
Decommissioning	Scope 1 - Fuel usage during decommissioning	Low– Decommissioning and methodology is unclear; plant may be upgraded to continue life cycle.	– As above fuel mitigations	– As above fuel management practices	Low
Decommissioning	Scope 3 – Infrastructure waste	Low – Decommissioning and methodology is unclear; plant may	– Develop decommissioning plan for the project to enhance usability and circularity of components	– Highlight materials and component that can reused after operation phase, those articles that	Low

Phase	Emission source	Overall initial risk	Mitigation	Management principles	Overall residual risk
		be upgraded to continue life cycle.		could be sold on or recycled/upcycled.	

The above qualitative assessment of risk is detailed only to the level of describing high, medium and low. Further information, quantitative data and specifics about the Project design, and operation is required to confirm actual risk levels. For the purposes of approvals, these mitigation strategies outlay the structure for measurement and reduction of the Project greenhouse gas emissions. Table 7-2 above will be utilised to populate a greenhouse gas Abatement Plan in Appendix B which will nominate time periods for quantification, implementation and review of these mitigation strategies and management principles.

8. Summary and conclusions

8.1 Total project emissions estimate

The Project will generate an estimated total 42,625 tCO₂e emissions for construction plus 14,834 tCO₂e per year of operation. The highest estimated annual Scope 1 emissions will be less than 50,000 tCO₂e generated during the first year of construction due to fuel usage, vegetation and land use change occurs.

Based on this estimate, the Project is considered a high emitter and as such would be required to meet the obligations under the Queensland Greenhouse Gas Emissions Guidelines. If the Project reports under NGER, these estimates should be updated annually to reflect the actual emissions during both the construction and operational phases.

As described in Section 7, there are several higher risk emission sources which require mitigation as part of best practice environmental management. These are summarised in Table 8-1.

Table 8-1 Project greenhouse gas emissions contribution to state and national emissions

Phase	Project greenhouse gas emissions source	Project %	Queensland %	Residual risk of emission source after mitigations
Construction	Scope 1 - Fuel usage during construction	64%	0.0219%	Medium
Construction	Scope 3 – Concrete + other materials. Embodied carbon	10%	0.0035%	Low
Operation	Scope 2 - Energy usage during operation	14%	0.0017%	Low
Operation	Scope 1 - Composting emissions	78%	0.0093%	Medium
Decommissioning	Scope 1 - Fuel usage during decommissioning	66%	0.0066%	Low
Decommissioning	Scope 3 – Infrastructure waste	18%	0.0018%	Low

8.2 EP regulation compliance

The risk assessment within this report focused on higher-risk emission sources. The higher risk emission sources had a qualitative risk category assigned to understand the risk exposure. Mitigation and management practices have been applied to the identified risks to reduce greenhouse gas emissions from the Project.

All risks have been reduced to a maximum level of medium. The mitigations are part of the Project and have been considered within the scope and budget of the development. The residual risk of the GHG emissions from the Project detailed within this report meets the requirements and intent of reduction of environmental impact.

8.3 Contribution to meeting Queensland's environmental targets

The annual greenhouse gas emissions in Queensland were reported to be 124.1 MtCO₂e in 2022. The Australian and state governments have committed to decarbonisation targets of net-zero by 2050. The Project's emissions

relative to state and national reported numbers is 16,454 t CO₂e per year of operation which is 0.0133 percent. Section 6 details how the project has reduced the risk of its emissions, which is summarised in Table 8-1.

Reduction of the total Project emissions should be further investigated and confirmed as details of design, logistics, lower carbon fuels and using solar rather than diesel generators are finalised. To meet the Queensland target of net-zero by 2050, the Project must implement the below mitigations, or similar:

- Use of solar and batteries for operational energy, target of net-zero by 2050
- Calculate the avoided carbon from industrial fertilisers being offset by the use of the facilities compost product.
- Calculate the carbon sequestration of revegetated areas on site.
- Offset of Scope 3 emissions to reach target of net-zero by 2050.

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Appendix A

Greenhouse Gas Inventory



Bromelton Compost Manufacturing Facility

GHG emissions inventory

Emission source	Activity Data		Emissions (t CO ₂ -e)			Total Emissions	Emissions Percentage
	Value	Units	Scope 1	Scope 2	Scope 3	(t CO ₂ -e)	(t/t %)
Construction and Product inputs							
Diesel consumption of genset	10,000	kL	27,097	0	0	27,097	64%
Diesel consumption of genset	10,000	kL	0	0	6,678	6,678	16%
Land clearing	3	ha	1,355	0	0	1,355	3%
Materials - concrete N32	11,162	t	0	0	4,309	4,309	10%
Materials - Asphalt	7,314	t	0	0	1,463	1,463	3%
Materials - Gravel	45,966	t	0	0	261	261	1%
Materials - Rock	16,256	t	0	0	177	177	0%
Materials - steel (Reo Mesh)	11	t	0	0	31	31	0%
Materials - steel (Reo Bar)	5	t	0	0	15	15	0%
Materials - PVC	1	t	0	0	5	5	0%
Materials - Glass	50	t	0	0	50	50	0%
Materials - Cast Iron	20	t	0	0	32	32	0%
Materials - Geomembrane	2	t	0	0	14	14	0%
Materials - Lime	26	t	0	0	21	21	0%
Materials transport	4,040,668	tkm	0	0	292	292	1%
Waste transport	202,033	tkm	0	0	15	15	0%
Worker transport	5	kL	0	0	3	3	0%
Waste (C&D)	4,041	t	0	0	808	808	2%
Total emissions - construction			28,453	0	14,172	42,625	36,536
Annual rate							
Operation and Maintenance - annual							
Electricity from grid (QLD)	3,000,000	kWh	0	2,130	0	2,130	14%
Electricity from grid (QLD)	3,000,000	kWh	0	0	300	300	2%
Worker transport	1	kL	0	0	1	1	0%
Composting	250,000	t	11,500	0	0	11,500	78%
Materials transport	12,500,000	tkm	0	0	903	903	6%
Total emissions - operation			11,500	2,130	1,204	14,834	445,021
Total design life							
End of life / decommissioning							
Diesel consumption of genset	3,000	kL	8,129	0	0	8,129	66%
Diesel consumption of genset	3,000	kL	0	0	2,003	2,003	16%
Waste (C&D)	11,277	t	0	0	2,255	2,255	18%
Waste transport	563,862	tkm	0	0	41	41	0%
Recycling benefit from construction - steel	8	t	0	0	-23	-23	0%
Recycling transport	395	tkm	0	0	0	0	0%
Total emissions - decommissioning			8,129	0	4,277	12,406	10,634
Assume the same							
Total emissions			381,582	63,900	54,570	500,052	

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Appendix B

Abatement Plan

Project Abatement Plan

The below Greenhouse Gas Abatement Plan has been developed in accordance with Appendix A of the [Queensland Greenhouse Gas Guidelines](#).

Project details

The Bromelton Compost Manufacturing Facility (the Bromelton CMF Project) is a proposed organics facility located along Mitchell Road in Bromelton, in South East Queensland. The Bromelton CMF Project will involve the construction and operation of a facility for the receipt, processing, composting, and storage of the following materials: garden, food, wood wastes, manures and soil for the sale and distribution of finished compost, mulch and soil products. SOILCO Pty Ltd (referred to as SOILCO) will design, construct and operate the Bromelton CMF Project.

SOILCO successfully operates a state-of-the-art network of licensed organics processing facilities across Eastern Australia. SOILCO's infrastructure experience spans different technology solutions, including:

- Open Windrow (OW)
- In-Vessel Composting (IVC) tunnels
- Aerated Static Piles/ Covered Aerated Static Piles (ASP/CASP)

For the Bromelton CMF Project, SOILCO will utilise ASP and OW technologies. A summary of the key components of the Project is outlined in Table 1-1.

Table B.1 Summaries key Bromelton CMF Project components

Project Component	Details
Lot on Plan	Lot 4 on Plan RP85497 and Mitchell Road (Local government managed road)
Summary of proposed works	Construct and operate a Compost Manufacturing Facility (CMF) at 260 Mitchell Road, Bromelton for the sale and distribution of finished compost, mulch & soil products The site will be split into 3 different processing areas: Receival, decontamination and composting utilising Forced Aeration Pad system.
Construction disturbance area within Lot 4 RP85497	21 hectares
Operational footprint within Lot 4 RP85497	18.5 hectares
Proposed output of the compost facility and type of material to be received and processed	Receipt, processing, composting, and storage of up to 250,000 tpa of the following materials: Garden, Food and Wood wastes and manure. Receipt, processing, storage and blending of up to 150,000 tpa of sand and soil products for manufacturing (Virgin Excavated Natural Materials or VENM).
Technology used	Two composting technologies will be utilised to handle different feedstocks: – 100,000 tpa of garden organics (GO) composted by Passive Open Windrow (OW) method. – 150,000 tpa of Food Organics and Garden Organics (FOGO) is to be processed on a Forced Aeration Pad system . Wood wastes and manure will make up a small portion of the composting feedstocks and will be blended with the GO and FOGO based on onsite capacity. VENM will be received and stored as required based on demand of finished products.

Project Component	Details
	Due to the seasonal nature of feedstock generation, up to 11% of the total annual waste may be received in any one month. This would typically occur around spring and autumn.
Key infrastructure and structures	– Access from Mitchell Road – Weigh bridges – Internal road network – Maintenance and storage shed – Final screening and manufacturing area – Water tanks – Aeration Pad system – Office, carparking and amenities – FOGO receival area – 3 x leachate ponds – 1 x freshwater dam – Open windrows pad – FOGO maturation pad – Hardstand areas – Retaining wall – Upgrade of Mitchell Road
Hours of Operation	Monday – Friday 6am to 6pm Saturday – 6am to 4pm Sunday and public holidays 9am - 4pm
Operational Staff	22 employees
Access arrangements	Mitchell Road will connect the Bromelton CMF Project to the road network. Mitchell Road will be upgraded to accommodate the traffic from the Bromelton CMF Project.
Timeframe	Construction and Commissioning Late 2025 – 30th January 2026

Emissions projections and commencing abatement measures

Table B.2 Project Greenhouse gas total emissions

Project phase	Duration	Emissions (t CO ₂ e)				
		Scope 1	Scope 2	Scope 3	Total	Total per year
Construction phase for Bromelton Compost Manufacturing Facility	14 months	34,336	0	14,898	49,234	42,200
Operational phase (30 years)	Annual	11,500	3,550	1,404	16,454	-
Decommissioning	14 months	8,129	0	5,651	13,780	11,812
Greenhouse gas indicators						
Total life of project		387,465	106,500	62,670	556,635	Project life

Materials used during the construction phase will be mitigated by reduction in material or reduction/substitution of the material – design optimisation and review of material quantities of each phase of design will be required throughout the project to ensure impacts are mitigated.

Fuel consumption should be mitigated by replacing diesel generators with solar and batteries, and conversion of vehicle fleet to electric where possible.

Measures to be implemented should include:

- Select vehicles and heavy equipment with higher fuel conversion efficiency and lower greenhouse gas emissions.
- Mobilise vehicles and equipment from nearby locations to minimise greenhouse gas emissions associated with transport where possible.
- Minimise clearance of vegetated areas to reduce environmental impact.

Greenhouse gas emissions reference point

Reference points for greenhouse gas emissions reduction include:

- Construction:
 - A industry default baseline of 100,000 tCO₂-e per year applies to facilities covered by the Safeguard Mechanism (it is unlikely this facility will be covered by the Safeguard Mechanism).
 - This facility is only estimated at ~40 tCO₂-e per year, so this will be used as the project specific baseline.
- Operation and decommissioning:
 - The projected emissions summarised in Table B.1 above will be considered as reference points for the operation and decommissioning phases of the Project.

The reference points above have been selected based on initial Project information without taking into consideration management and abatement planning. These numbers will form a baseline and assessed throughout the life of the Project. The emissions associated with the Project will be reviewed annually.

Emission reduction targets

Interim Scope 1 and Scope 2 greenhouse gas emission reduction targets

- 2030 Target:
 - Reduce emissions by at least 30 percent below 2005 levels
- 2035 Target:
 - Achieve a 75 percent reduction in emissions by 2035

Long-term overall Scope 1 and Scope 2 greenhouse gas emission reduction targets

- 2050 Target:
 - Reach net-zero emissions by 2050

When annualising Scope 1 emissions, the construction phase of this Project is not captured by the Commonwealth Safeguard Mechanism for covered emissions. Emissions associated with the operations of the compost manufacturing facility are minimal – and do not negatively impact the Queensland Government's targets for emissions reduction. On the contrary, this Project will assist with meeting the Queensland Government's targets as presented above.

Greenhouse gas emission reduction program

Scope 1 emission reduction measures

- Fuel:
 - Avoid stationary fuel use through solar and battery arrangements
 - Select heavy equipment and vehicles with higher fuel conversion efficiency and lower greenhouse gas emissions
 - Implement regular maintenance schedules to ensure optimal performance and fuel efficiency of all machinery.
- Operational practices:
 - Optimise operational schedules to reduce idle times and unnecessary fuel consumption
 - Educate operators on efficient driving and equipment handling techniques to minimize fuel use
 - Regular maintenance of equipment to ensure optimal performance and minimize emissions.
- Alternative fuels:
 - Use biofuels or other low-carbon alternatives where feasible
 - Explore the use of electric or hybrid vehicles for on-site transportation.

- Vegetation management:
 - Reuse of removed vegetation will be encouraged
 - Offset carbon emissions.

Scope 2 emission reduction measures

- Renewable energy:
 - Source electricity from renewable energy providers
 - Install on-site renewable energy systems, such as solar panels, to power facilities.
- Energy efficiency:
 - Implement energy-efficient lighting, heating, and cooling systems in all buildings
 - Use energy management systems to monitor and optimize electricity use.
- Demand management:
 - Schedule high-energy activities during off-peak hours to reduce strain on the grid and associated emissions
 - Implement load-shifting strategies to balance energy use throughout the day.

Scope 3 emission reduction measures

- Supply chain:
 - Obtain more granular source data (e.g. not based on expenditure) in order for Scope 3 emissions to be more accurately modelled. For example shift the accounting approach from spend-based method to average data method.
 - Awareness raising: Engage with suppliers to ensure that they understand the impacts of their carbon footprint, and that their businesses are aligned with the Queensland Government's emissions reduction targets.
 - Undertake a supply chain analysis – to assess whether suppliers are compliant with their sustainability and emissions management policies and strategies to drive Scope 3 emissions transparency and due diligence checks.
 - Consider sustainable procurement, i.e. to engage suppliers who are Climate Active certified, or are able to supply products that have accompanying Environmental Product Declaration.
 - For Scope 3 emissions associated with the combustion of fuels (i.e. Scope 1 emissions), should the reduction measures presented in the Scope 1 emissions reduction section above be implemented, then there will be consequential reductions in the associated Scope 3 emissions component.

Regularly report on progress and adjust strategies as needed to meet reduction targets.

Advancing technologies and opportunities

Further assessment is required in future phases to understand where future impacts can be avoided, reduced, substituted or offset. At this point in time, additional abatement measures are considered limited. The Project will continue to look for opportunities to mitigate carbon emissions throughout the Project.

Monitoring and auditing

Monitoring of the Project is broken into the three phases.

The **construction phase** of the Project will be monitored to ensure that the estimated greenhouse gas emissions targeted will be met.

Individual companies involved in the Project must meet their NGER reporting requirements. The Project must request for all third parties (e.g. contractors) to provide a summary of their Scope 1 and 2 emissions annually, for the purposes of the Project's own assessment on whether they will need to report for contractors' emissions under the NGERS legislation.

The **operation phase** of this Project will be monitored to report on both greenhouse gas emissions from its facilities as well as energy produced and exported in line with the requirements of the *National Greenhouse and Energy Reporting Act 2007* throughout the construction phase of the Project. The Project must have an annual review of the total Scopes 1 and 2 emissions at the minimum to ascertain reporting obligations under the NGERS. Further under the greenhouse gas Protocol, year-on-year comparisons are considered good practice (WRI and WBCSD, 2004).

greenhouse gas Inventory: Maintain a comprehensive greenhouse gas inventory to track emissions against the established reference points during operation and decommissioning phases.

The **decommissioning phase** of the Project will be monitored to ensure that the Project does not negate the emissions avoidance implemented during the operation phase. Any related activities to be undertaken during decommission phase must be minimised in as far as possible, based on any engineering and technological advances current in the future. During **all phases** auditing of greenhouse gas emissions and the relevant monitoring should be undertaken annually to allow for transparency of data accuracy.

Reporting

Contractors and involved companies will be required to undertake NGERS reporting where their greenhouse gas emissions exceed the 25,000 tCO₂-e threshold or is covered by the safeguard mechanism with emissions exceeding the 100,000 tCO₂-e threshold (during a financial year period). A baseline emission intensity will be generated for all phases of the Project's activities.

Regular reporting: report progress at regular intervals to stakeholders and regulatory bodies, ensuring transparency and accountability.

The Project is required to develop a reporting plan outlining which its obligations to report for contractors under the NGERS.



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