Advanced Environmental Dynamics

Specialist Consultants

GREENSPOT WETHERILL PARK

GREENHOUSE GAS ASSESSMENT

Report # 959516.1

Prepared for:

Bettergrow Pty Ltd

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Executive Summary

Advanced Environmental Dynamics Pty Ltd was commissioned by Bettergrow Pty Ltd to undertake a greenhouse gas assessment of the Greenspot Wetherill Park (GWP) resource recycling and recovery centre to be located at 24 Davis Road, Wetherill Park, NSW.

This greenhouse gas assessment has been undertaken in a consideration of and in accordance with

- *The National Greenhouse and Energy Reporting (Measurement) Technical Guidelines (NGER Technical Guidelines)*
- *Guidelines for Energy Savings Action Plans (DEUS,2005)*

Project Background

Up to 200,000 tonnes of various materials will be processed through GWP annually including:

- *60,000 tonnes of hydro-excavation and directional drilling muds/fluids for storage, separation and consolidation within the Drill mud and Hydro-excavation Fluids Processing Area (DHFPA);*
- *40,000 tonnes of various bulk landscaping products;*
- *70,000 tonnes of garden organics (GO) or combined food organics and garden organics (FOGO) to be processed and consolidated within the Organics Receival and Processing Building (ORPB) ; and*
- *30,000 tonnes of other source separated commercial and industrial organics (C&IO) to be processed and consolidated within the Food Depackaging Building (FDB)*

Greenhouse Gas Assessment

The focus of the greenhouse gas assessment was on Scope 1 and Scope 2 emissions and in particular the on-site consumption of diesel fuel (Scope 1) and electricity (Scope 2).

An annual Scope 1 plus Scope 2 emissions total of 3,673.6 tonnes of $CO_{2\text{-}e}$ was estimated to be associated with GWP. This is equivalent to c. 0.031% of the national waste sector emissions for the year ending June 2016 and 0.0007% of the national total for the same period.

As GWP will not consume more than 10 GWh of electricity, the project will not be required to develop an Energy Savings Action Plan (DEUS, 2005). However, it is noted that c. 59% of the electricity usage is associated with the operation of the Organics Receival and Processing Building's eight carbon filter units which manage odour from the facility. For the purposes of this assessment, it has been assumed that all 8 units operate 24 hours a day, seven days per

week. Reducing electricity demand whilst maintaining environmental values at nearby receptor locations, may be achievable in practice.

Table of Contents

Tables

Figures

Abbreviations

AED	Advanced Environmental Dynamics Pty Ltd
AWS	All weather station
BoM	Bureau of Meteorology
c.	Circa (approximately)
CER	Clean Energy Regulator
CH_4	Methane
CO_2	Carbon dioxide
DEE	Department of the Environment and Energy
DEUS	Department of Energy Utilities and Sustainability
DHFPA	Drill mud and Hydro-excavation fluids processing area
ESAP	Energy Savings Action Plans
EPA	Environmental Protection Authority
FO	Food organics
FDB	Food depackaging building
FOGO	Combined food organics and garden organics
GHG	Greenhouse gas
GO	Garden organics
GWP	Greenspot Wetherill Park
LZE	LZ Environmental
misc	Miscellaneous
N_2O	Nitrous oxide
NGA	National Greenhouse Accounts
NGER	National Greenhouse and Energy Reporting
NSW	New South Wales
ORPB	Organics receival and processing building
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

Units

CO_{2-e}	Carbon dioxide equivalent
Gwh	Gigawatt hour
kwh	Kilowatt hour
Mt	Mega tonnes
t	tonnes

1. Introduction

Advanced Environmental Dynamics Pty Ltd was commissioned by Bettergrow Pty Ltd (Bettergrow) to undertake a greenhouse gas (GHG) assessment of the Greenspot Wetherill Park resource recycling and recovery centre located at 24 Davis Road Wetherill Park, New South Wales (NSW).

This report contains a summary of the GHG assessment methodology and findings.

1.1 Project Description

AED understands that Bettergrow is seeking approval to develop a resource recovery and recycling centre at 24 Davis Road, Wetherill Park NSW (Lot 18, DP249417) referred to herein as Greenspot Wetherill Park (GWP, Figure 1).

Figure 1: Site Location (GWP)

Source: Google Earth

Up to 200,000 tonnes of various materials will be processed through the facility annually including:

- 60,000 tonnes of hydro-excavation and directional drilling muds/fluids for storage, separation and consolidation within the Drill mud and Hydro-excavation Fluids Processing Area (DHFPA, Figure 2);

- 40,000 tonnes of various bulk landscaping products;
- 70,000 tonnes of garden organics (GO) or combined food organics and garden organics (FOGO) to be processed and consolidated within the Organics Receival and Processing Building (ORPB, Figure 3) ; and
- 30,000 tonnes of other source separated commercial and industrial organics (C&IO) to be processed and consolidated within the Food Depackaging Building (FDB, Figure 3)

Figure 2: Drill Mud and Hydro Excavation Area (southern portion of site)

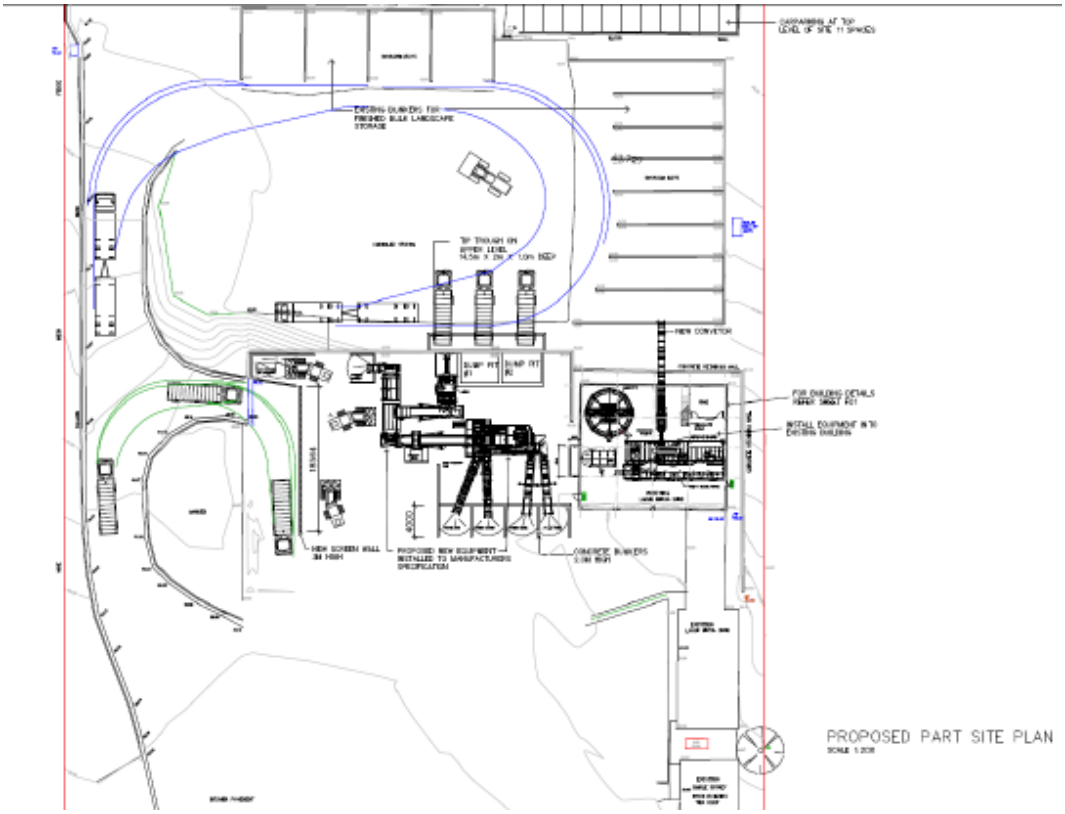
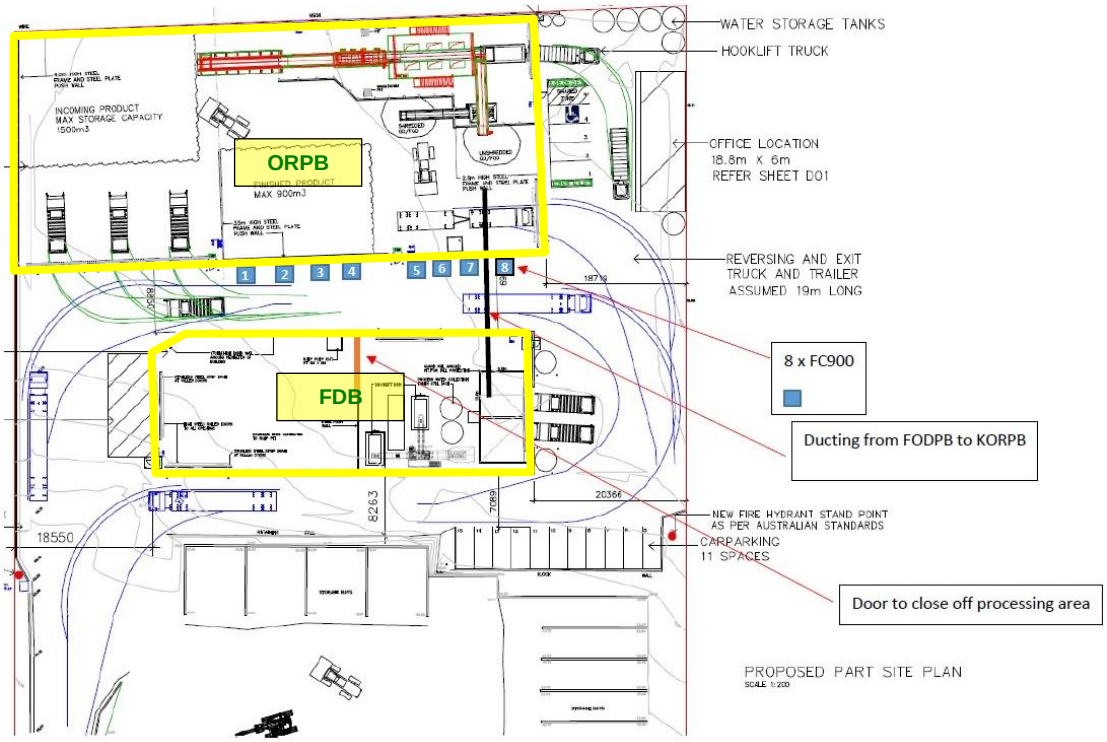


Figure 3: Organics Receival & Processing Building and Food Depackaging Building (northern portion of site)



2. Greenhouse Gas Assessment

2.1 Legislative Framework

2.1.1 National Greenhouse and Energy Reporting Act 2007 and Supporting Legislation

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) and its associated regulations established the framework for a national greenhouse gas and energy reporting system in Australia.

The *National Greenhouse and Energy Reporting (NGER) Scheme 2007* was established by the NGER Act as a national framework for reporting and distributing information pertaining to greenhouse gas emissions, energy production, energy consumption as well as other information under NGER legislation. The objectives of the NGER Scheme are to (DEE, 2017):

- Inform policy making and the Australian public;
- Meet Australia's international reporting obligations; and
- Provide a single national reporting framework for energy and emissions reporting.

The *National Greenhouse and Energy Reporting (Measurement) Determination 2008* provides methods and criteria for calculating greenhouse gas emissions and energy data under the NGER Act and is updated annually.

The National Greenhouse and Energy Reporting (Measurement) Technical Guidelines (NGER Technical Guidelines) have been developed in order to assist stakeholders understand and apply the NGER (Measurement) Determination 2008.

2.1.2 Energy Efficiency Opportunities

The Department of Energy Utilities and Sustainability (DEUS, 2005) requires that NSW sites designated by the Minister as using over 10 GWh in electricity per annum prepare Energy Savings Action Plans (ESAPs).

As GWP will not use over 10 GWh in electricity per annum (Table 3), the site will not be required to prepare ESAPs.

2.2 Greenhouse Gas Emissions Inventory Methodology

The GHG emissions inventory for the GWP is based on the accounting and reporting principles detailed within the *Greenhouse Gas Protocol: A Corporate Accounting and*

Reporting Standard Revised Edition (WBCSD & WRI). The protocol was first established in 1998 to develop internationally accepted accounting and reporting standards for GHG emissions from companies.

The Greenhouse Gas Protocol defines direct and indirect emissions through the concept of emission Scopes.

- **Scope 1:** Direct GHG emissions. Direct GHG emissions occur from sources that are owned or controlled by a company. For example emissions from combustion in owned or controlled boilers, furnaces or vehicles.
- **Scope 2:** Electricity indirect GHG emissions. This accounts for GHG emissions from the generation of purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated but the emissions are allocated to the organisation that owns or controls the plant or equipment where the electricity is consumed.
- **Scope 3:** Other Indirect GHG emissions. This is an optional reporting category that allows for the treatment of all other indirect GHG emissions resulting from a company's activities, which occur from sources not owned or controlled by the company. Examples include extraction and production of purchased materials; transportation of product by contractors; use of sold products and services; and employee business travel and commuting.

2.2.1 Calculation Approach

The GHG emission inventory for GWP is based on the methodology detailed in the Greenhouse Gas Protocol (WBCSD & WRI) and the relevant emission factors in the National Greenhouse Accounts (NGA) Factors (DEE, 2016a).

There are several GHGs including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). However, to simplify inventory accounting, a single unit of measurement, the carbon dioxide equivalent ($CO_{2\text{-}e}$) is used. This unit of measure accounts for the various global warming potentials of non-CO_2 gases as specified by DEE (2016a).

2.2.2 Emission Factors

The National Greenhouse Accounts Factors (DEE, 2016a) provides emission factors for a variety of activities. Those for Scope 1 emissions associated with GWP are summarised in Table 1 with factors for Scope 2 emissions included in Table 2.

Table 1: Scope 1 Emission Factors: Consumption of Liquid Fuel for Transport (DEE, 2016a)

Category	Fuel Type	Energy Factor (GJ/Kl)	EF (kg CO2-e/GJ)		
			CO2	CH4	N2O
General transport	Diesel oil	38.6	69.9	0.10	0.5
Post-2004 vehicles	Diesel oil	38.6	69.9	0.01	0.5
Heavy Vehicles - Euro iv	Diesel oil	38.6	69.9	0.06	0.5
Heavy Vehicles - Euro iii	Diesel oil	38.6	69.9	0.10	0.5
Heavy vehicles - Euro i	Diesel oil	38.6	69.9	0.20	0.5

Table 2: Scope 2 Emission Factors: Consumption of Electricity (DEE, 2016a)

Category	State	Units
Electricity Use	NSW	Kg $CO_{2\text{-}e}$/kwh

2.2.3 Materiality

Materiality is a concept used in accounting and auditing to minimise time spent verifying amounts and figures that do not impact a company's accounts or inventory in a material way. The exact materiality threshold that is used in GHG emissions accounting and auditing is subjective and dependant on the context of the site and the details of the inventory.

All emissions that originate within the boundary are included in the inventory unless they are excluded on materiality grounds. Information is considered to be material if, by its inclusion or exclusion it can be seen to influence any decisions or outcomes. On the other hand, emissions are assumed to be immaterial if they are likely to account for less than (say) five per cent of the overall emissions profile.

The following emissions are not included in the inventory for this project on the basis of materiality:

- The inventory does not consider emissions associated with the organic waste material intake streams. These are very small surface areas therefore the GHG emissions from such sources are considered to be immaterial.
- Consumption of unleaded petroleum (ULP).

2.3 Greenhouse Gas Emission Sources

Presented in Table 3 is a summary of the relevant project-specific information that has been used in this greenhouse gas assessment. Specifically, an estimated 300,872 litres of diesel and 3,397 megawatt hours of electricity will be consumed on-site per annum. A breakdown of fuel and electricity use as a function of process/area is provided in the table.

Table 3: Total Diesel and Electricity Usage per Annum

Process/Area	Diesel (Litres)	Electricity (kwh)
Organics Receival and Processing	118,560	1,210,040
Food Depackaging	24,440	248,040
Bulk Landscape Supplies	36,400	0
Hydro Excavation and Drill Mud Processing	107,952	546,000
Workshop and ammenities	13,520	9,360
Office, weighbridge, security, road lighting Misc	0	219,000
Site Total (per annum)	**300,872**	**3,397,240**

2.4 Greenhouse Gas Emissions

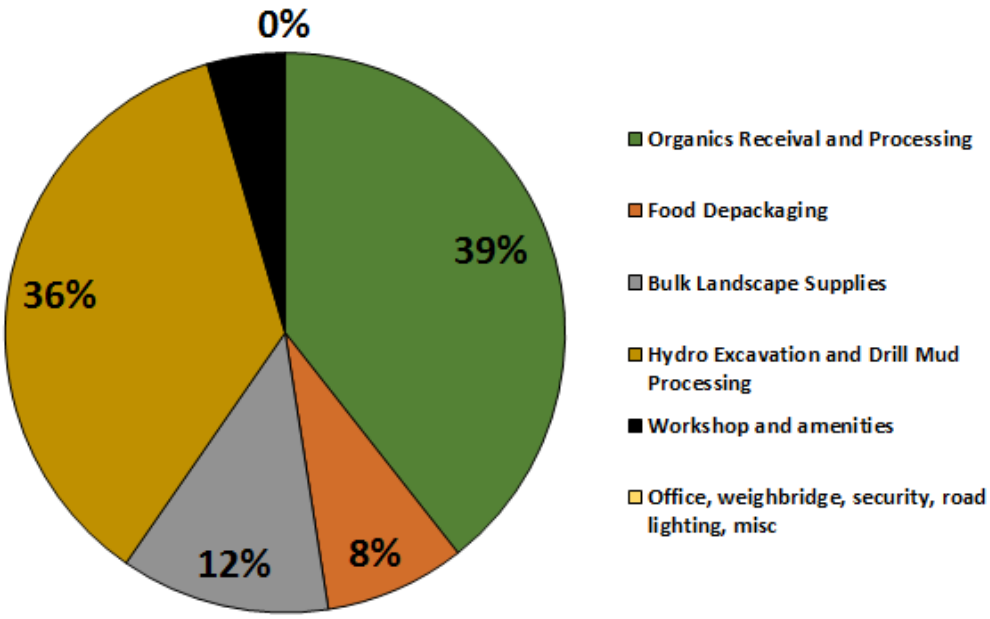
2.4.1 Scope 1 Emissions

Based on the use of the worst-case Scope 1 emission factors for the consumption of diesel fuel (Table 1) and an annual total of 300,872 litres of diesel fuel consumed on site, Scope 1 emissions are estimated to be 819.9 tonnes of $CO_{2\text{-}e}$ per annum (Table 4). A breakdown of emissions by process/area is depicted in Figure 4.

Table 4: Scope 1 Emissions: Diesel Consumption

Process/Area	Diesel (litres)	CO_2	CH_4	N_2O	Total
		t CO2-e	t CO2-e	t CO2-e	t CO2-e
Organics Receival and Processing	118,560	319.9	0.9	2.3	**232.1**
Food Depackaging	24,440	65.9	0.2	0.5	**66.6**
Bulk Landscape Supplies	36,400	98.2	0.3	0.7	**99.2**
Hydro Excavation and Drill Mud Processing	107,952	291.3	0.8	2.1	**294.2**
Workshop and amenities	13,520	36.5	0.1	0.3	**36.8**
Office, weighbridge, security, road lighting, misc.	0	0.0	0.0	0.0	**0.0**
Site Total (per annum)	**300,872**	**811.8**	**2.3**	**5.8**	**819.9**

Figure 4: Breakdown of Scope 1 Emissions: Diesel Consumption



2.4.2 Scope 2 Emissions

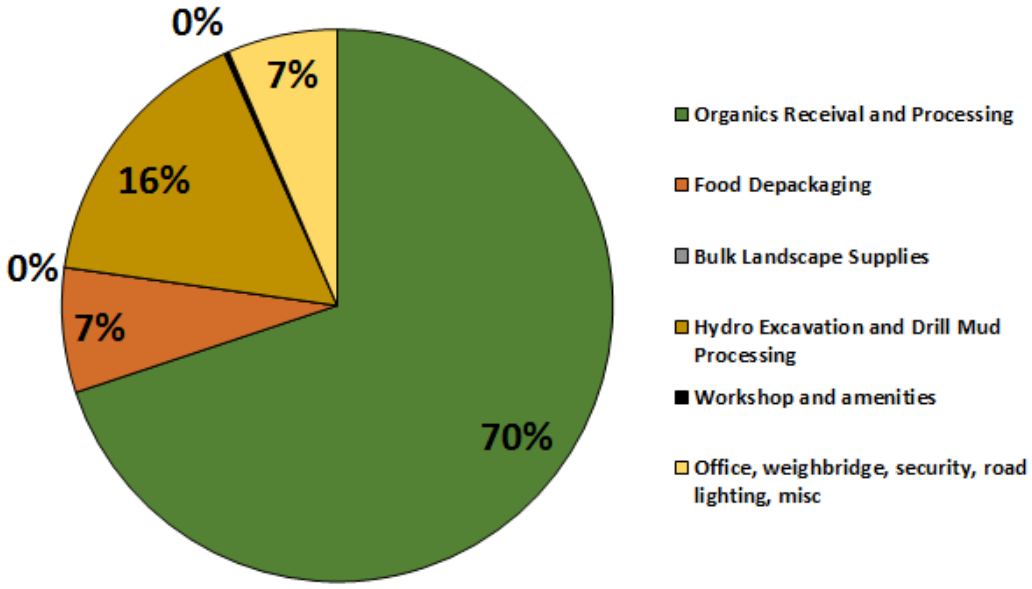
Based on Scope 2 emission factors for the consumption of electricity in NSW (Table 2), Scope 2 emissions are estimated at 2,853.7 tonnes of $CO_{2\text{-}e}$ per annum (Table 5). A breakdown of emissions by process/area is depicted in Figure 5.

Note that c. 59% of the GWP electricity usage is associated with the operation of the Organics Receival and Processing Building's eight carbon filter units that manage odour from the facility. For the purposes of this assessment, it has been assumed that all 8 units operate 24 hours a day, seven days per week. Reducing electricity demand whilst maintaining environmental values at nearby receptor locations, may be achievable in practice.

Table 5: Scope 2 Emissions: Electricity Usage

Process/Area	Electricity Usage (kwh)	Scope 2 Emissions (t CO2-e)
Organics Receival and Processing	2,374,840	1,994.9
Food Depackaging	248,040	208.4
Bulk Landscape Supplies	0	0
Hydro Excavation and Drill Mud Processing	546,000	458.6
Workshop and amenities	9,360	7.9
Office, weighbridge, security, road lighting, misc.	219,000	184.0
Site Total (per annum)	**3,397,240**	**2,853.7**

Figure 5: Breakdown of Scope 2 Emissions: Electricity Usage



2.4.3 Total Greenhouse Gas Emissions

Based on total Scope 1 emissions per annum of 819.9 tonnes of $CO_{2\text{-}e}$ and total Scope 2 emissions of 2,853.7 tonnes of $CO_{2\text{-}e}$, the total Scope 1 plus Scope 2 emissions of greenhouse gases per annum is estimated to be 3,673.6 tonnes of $CO_{2\text{-}e}$.

2.4.4 Comparison with National Total

Australia's annual total emissions for the year to June 2016 were estimated to be 536.5 megatonnes (Mt) of $CO_{2\text{-}e}$ (DEE, 2016c). A breakdown of Australia's emissions by sector is provided in Table 6.

A comparison of the project emissions with those of the waste sector suggests that the project will contribute an additional 0.031% to this sector and an additional 0.0007% to the annual national total (excluding land use, land use change and forestry).

Table 6: National Greenhouse Gas Inventory, Year to June 2016, (DEE, 2016c)

Sector	Emissions (Mt CO_{2-e})
Energy - Electricity	189.0
Energy - Stationary excluding electricity	98.2
Energy - Transport	93.4
Energy - Fugitive	40.7
Industrial processes and product use	34.1
Agriculture	67.3
Waste	12.0
Total excluding land use, land use change and forestry	**534.7**
land use, land use change and forestry	1.7
Total including land use, land use change and forestry	**536.4**

3. Mitigation and Management Strategies

Potential mitigation and management strategies that could assist in reducing greenhouse gas emissions through improved energy efficiencies include (but may not be limited to):

- Use of building materials for walls, floors, roofs, that provide insulation and aid in reduced energy costs;
- Integration of energy efficient glazing and shading where possible;
- Fully enclosed buildings to maintain internal climate;
- Maximisation of natural ventilation and use of inverter air conditioning systems;
- Use of natural lighting;
- Potential use of photovoltaic cells and battery storage to generate power onsite;
- Use of light sensors to minimise lighting related electricity usage;
- Use of high efficiency lighting;
- Use of variable frequency drive motor controls on stationary equipment to minimise electricity consumption;
- Waste transfer vehicles to leave site with full loads to reduce the number of traffic movements and diesel consumption;
- All vehicles/plant and machinery will be turned off when not in use and regularly serviced to ensure efficient operation; and
- Truck routes and loading capacity will be designed and optimised to reduce the distance and effort required by the vehicles.

4. Conclusion

AED has conducted a greenhouse gas assessment of the Greenspot Wetherill Park located at 24 Davis Road, Wetherill Park, NSW.

The assessment has been undertaken in a consideration of and in accordance with

- *The National Greenhouse and Energy Reporting (Measurement) Technical Guidelines (NGER Technical Guidelines)*
- *Guidelines for Energy Savings Action Plans (DEUS,2005)*

The focus of the assessment was on Scope 1 and Scope 2 emissions and in particular the on-site consumption of diesel fuel (Scope 1) and electricity (Scope 2).

An annual Scope 1 plus Scope 2 emissions total of 3,673.6 tonnes of $CO_{2\text{-}e}$ was estimated to be associated with GWP. This is equivalent to c. 0.031% of the national waste sectors emissions for the year ending June 2016 and 0.0007% of the national total for the same period.

As GWP will not consume more than 10 GWh of electricity, the project will not be required to develop an Energy Savings Action Plan (DEUS, 2005). However, it is noted that c. 59% of the electricity usage is associated with the operation of the Organics Receival and Processing Building's eight carbon filter units which manage odour from the facility. For the purposes of this assessment, it has been assumed that all 8 units operate 24 hours a day, seven days per week. Reducing electricity demand whilst maintaining environmental values at nearby receptor locations may be achievable in practice. Other opportunities to reduced greenhouse gas emissions were noted in Section 3.

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6. References

- Australian Government (2016a): *National Greenhouse Energy Reporting Act 2007*. Including amendments up to Act No. 11, 2016. Register 5 July 2016.
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