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Greenhouse Gas Assessment

In accordance with the Director-General's Requirements
Section 75F of the Environmental Planning and Assessment Act 1979

For No Fuss Liquid Waste Pty Ltd, Lot 333, 10-12 Smith Street Emu Plains.

August 2010

Project No: 3439.001

REPORT ISSUE AUTHORISATION

PROJECT: Greenhouse Gas Assessment in accordance with the Director-General's Requirements Section 75F of the Environmental Planning and Assessment Act 1979 for No Fuss Liquid Waste Pty Ltd, Lot 333, 10-12 Smith Street Emu Plains.

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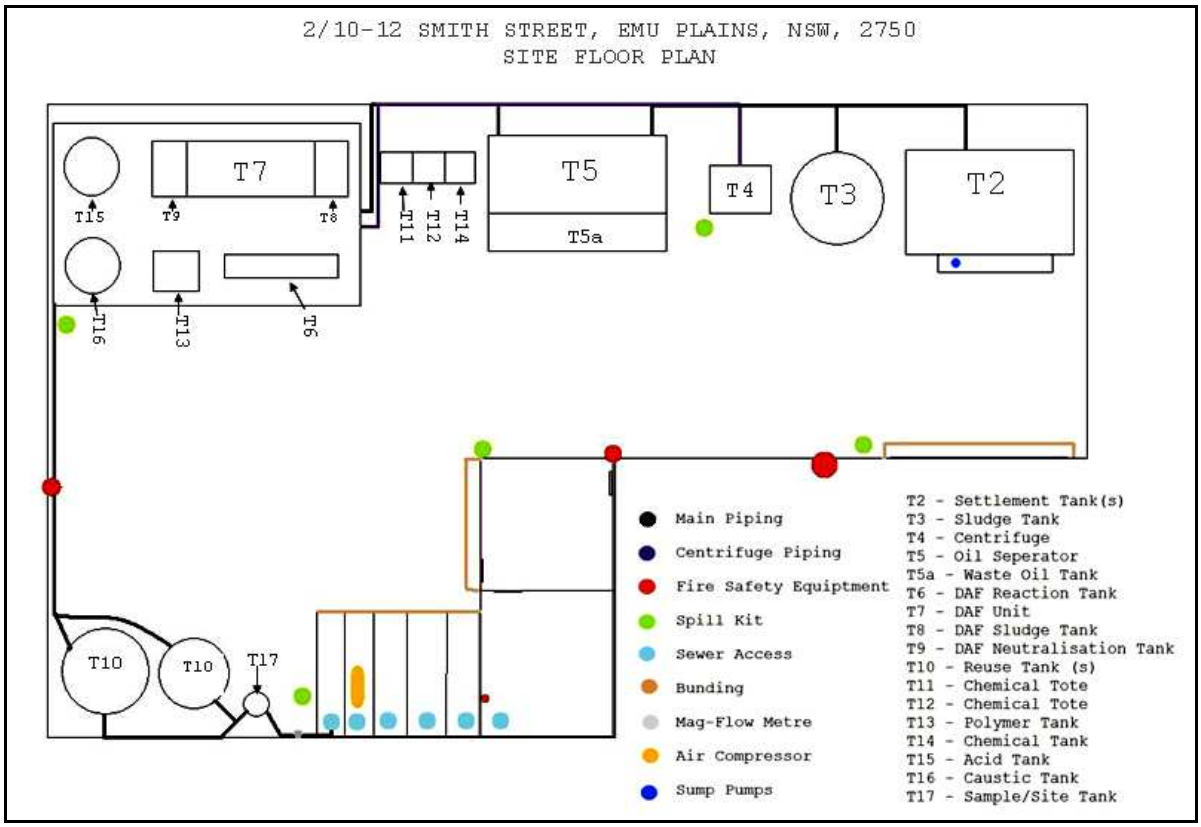
1. INTRODUCTION

This report outlines the predictive modeling and findings of a greenhouse gas assessment including a quantitative analysis of the scope 1 and 2 emissions of the project, and a qualitative analysis of the impacts of these emissions, as per the Director-General's Requirements Section 75F of the Environmental Planning and Assessment Act 1979, for Application Number MP 10_0077, No Fuss Liquid Waste Pty Ltd (No Fuss), Lot 333/DP575290, 10-12 Smith Street Emu Plains.

Waste codes reflect either the contaminants or source of the waste, with the Controlled Waste National Environment Protection Measures (NEPM) waste codes are used in NSW. The facility in question is designed to receive waste coded as J120, Waste oil / hydrocarbons mixtures / emulsions in water, which includes waste from vehicle wash waters, boiler blow down sludge, cooling tower wash waters, textile effluent & residues, industrial plant wash waters, ethylene glycol-water (antifreeze), oil / hydrocarbon (<50%) mixed with water, oil / hydrocarbon (>50%) mixed with water, other (cutting oils, soluble oils), oil /hydrocarbon mixed with water.

The following figure outlines the proposed No Fuss Liquid Waste Pty Ltd (No Fuss) facility at Lot 333/DP575290, 10-12 Smith Street, Emu Plains.



2. REFERENCE DOCUMENTS

The following reference documents were used in determining the Green House Gas emissions:

- The *National Greenhouse and Energy Reporting Act 2007* (*the Act*). *The Act* introduced "a single national reporting framework for the reporting and dissemination of information related to greenhouse gas emissions, greenhouse gas projects, energy consumption and energy production of corporations".
- The National Greenhouse and Energy Reporting (Measurement) Determination 2008 as amended (*the Determination*) [Reporting year 2010-11].
- The National Greenhouse and Energy Reporting Guidelines (*the Guidelines*)
- The National Greenhouse and Energy Reporting (Measurement) Technical Guidelines 2008 v1.1 (*the Technical Guidelines*).

As this is a predictive analysis, *the Determination* documentation for the 2010-11 financial year was used. This is the latest financial year for which data has been released by the Dept Climate Change and Energy efficiency.

3. SOURCE DATA

The following information was provided by Alyce Wing of NO FUSS LIQUID WASTE PTY LTD, 10-12 Smith Street, Emu Plains, NSW, 2750 (Phone: 02 4735 8966, Fax: 02 4735 3663, alyce.no.fuss@bigpond.com):

Diesel oil consumed: 1000 L PER QUARTER.

Electrical energy consumed:

kW rating for electrical devices used in NFLW DAF Unit site

- Pit Pumps x 2 = 1.5kw
- Skimmer Pumps x2 = 0.93kw
- Lauara Pumps x2 = 0.75kw
- Return Pumps x2 = 0.75kw
- Air Ration pumpsx2 = 0.93kw
- Sludge Pump = 0.37
- Pit Pumps x 2 = 1.75kw
- Transfer pumps x 2 = 1.02kw
- Scraper Motor = 2.2kw
- Mixer Motor = 0.25kw
- Air compressor = 2.3kw
- Fridge = 0.05kw
- 19 Fluorescent Lights around the factory and in lab.

4. OPERATIONAL SCOPE 1 GREENHOUSE GAS EMISSIONS

In keeping with the methodology of the NGER Act 2007 and the National Greenhouse and Energy Reporting (Measurement) Determination 2008 as amended (*the Determination*) [Reporting year 2010-11], the Scope 1 emissions analysis only considered emissions that No Fuss Liquid Waste Pty Ltd (No Fuss) has direct operational control over. No Fuss will not have operational control over the vast majority of vehicles delivering materials to and dispatching materials from the facility. The trucks that will be used are those already in use on the adjoining premises. No Fuss currently has four (4) trucks that are used for various pump outs. They range in capacity from 6,000 L to 24,000 L, with each truck designated to a particular waste. At the commencement of operations No Fuss estimate that 1-2 trucks will access the property three times per day to unload. The total annual fuel consumption for the facility over which No Fuss has operational control is estimated to be 4000 L per annum of diesel fuel. There are no other scope 1 emissions associated with the facility as per the NGER *Determination*. The table below shows the Scope 1 emissions associated with the combustion of this diesel fuel:

Liquid Fuel Type	**Use**	**Delivery / Invoiced Total Consumed (L / yr)**	**Start Date**	**End Date**	**Total Consumption (kL / yr)**	**Emissions (t CO_2-e)**	Energy Consumption (TJ)
Diesel oil	Transport	4000.0	01-Jul-10	30-Jun-11	4.000	**10.793**	0.154

The table below shows the specific emissions of each greenhouse gas named in the determination, namely carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O):

Amount of each GHG emitted		
CO_2	CH_4	N_2O
(t CO2-e)	(t CO2-e)	(t CO2-e)
9.125	0.082	0.315

5. OPERATIONAL SCOPE 2 GREENHOUSE GAS EMISSIONS

In keeping with the methodology of the NGER Act 2007, the Scope 2 emissions analysis will only consider emissions that No Fuss Liquid Waste Pty Ltd (No Fuss) has direct operational control over. For this analysis, it is assumed that all energy for the operation of the unit operation in the facility is purchased from the New South Wales grid. The table below itemizes the equipment in the facility which use electricity from grid and hence will have indirect scope 2 emissions associated with their usage.

				Electricity consumed from an electricity transmission or distribution network		
Equipment	**kW**	**Number**	**Estimated usage per annum (hrs / yr)**	**Total used (MWh / yr)**	**Total energy used (GJ / yr)**	**Total energy used (TJ / yr)**
Pit Pumps	1.5	2.00	4380	13.14	47	
Skimmer Pumps	0.93	*2.00*	4380	8.15	29	
Lauara Pumps	0.75	*2.00*	4380	6.57	24	
Return Pumps	0.75	*2.00*	4380	6.57	24	
Air Ration pumps	0.93	*2.00*	4380	8.15	29	
Sludge Pump	0.37	*1.00*	4380	1.62	6	
Pit Pumps	1.75	*2.00*	4380	15.33	55	
Transfer pumps	1.02	*2.00*	4380	8.94	32	
Scraper Motor	2.2	*1.00*	4380	9.64	35	
Mixer Motor	0.25	*1.00*	4380	1.10	4	
Air compressor	2.3	*1.00*	4380	10.07	36	
Fridge	0.05	*1.00*	8766	0.44	2	
2 x 36 W Fluorescent lights in lab	0.036	*2.00*	4380	0.32	1	
17 x 36 W Fluorescent lights in factory. Generally have no requirement due to natural lighting.	0.036	*17.00*	730	0.45	2	
Total estimated	*01-Jul-11*	*30-Jun-12*		90.46	326	0.326
Emission factor NSW	t CO2-e/MWh			0.9	Indirect (scope 2) emission factors from consumption of purchased electricity from grid	
Scope 2 Emissions	t CO2-e			**81.42**		

6. OPERATIONAL TOTAL ENERGY CONSUMPTION

The following table outlines the energy consumption associated with the facility for a financial year, that is, the summation of the energy consumed due to electricity purchased from the grid and diesel oil used in trucks:

		ENERGY CONSUMPTION Estimate for Financial Year 2010/11	
	Units	Scope 1	Scope 2
Diesel - Transport	TJ / yr	0.154	
Electricity	TJ / yr		0.326
ENERGY CONSUMPTION TOTAL for facility	TJ / yr	0.480	

This analysis shows that the facility is well below the NGERS reporting threshold of 100 terajoules (TJ) of energy consumption for a single facility.

7. OPERATIONAL ENERGY PRODUCTION

The following table outlines a maximum upper limit for energy production where the maximum amount of oil is produced by the facility (30 t / yr), that all of that oil is used as a fuel and that the oil is a "fuel oil", which has the highest energy content per unit volume (39.7 GJ / kL). The density of fuel oil is assumed to be that at standard conditions of 874.6 kg / m^3.

Liquid Fuel Type	Use	Delivery / Invoiced Total Produced (L)	Start Date	End Date	Total Production (kL)	Potential Emissions (t CO2-e)	Energy Production (TJ)
Fuel oil	Stationary	34301	01-Jul-10	30-Jun-11	34.301	**92.550**	**1.324**

This analysis shows that the facility is well below the NGERS reporting threshold of 100 terajoules (TJ) for energy production for a single facility.

The energy contained in the recycled energy (1.324 TJ) is 276% that of the energy to produce the recycled oil (i.e. the energy consumption which No Fuss has operational control over). Hence, it is possible for the proposed facility to be energy negative, in that the energy used to process the feed is only 36.3% of the energy embodied in the oil produced. The ultimate use of the oil will vary, however it is possible that by using the recycled oil in place of 'new" fuels, the emissions off-set could be even higher when the full life cycle emissions associated with generating oil are considered.

Assuming that the energy consumption levels are constant regardless of the amount processed, 12437 L of oil will need to be produced for the facility to be energy neutral based on an analysis utilizing NGERS Determination data.

Further more, additional energy resides in the sludge created by this process as it can be further digested into biogas or dried and used in a direct firing operation.

8. CONSTRUCTION GHG EMISSIONS AND ENERGY CONSUMPTION

The table below outlines the likely stationary energy and transport energy equipment requirements that will result in the generation of Scope 1 emissions. All energy is provided via diesel oil. It is assumed that all electricity for the construction site will be provided by an on-site diesel generator and that no electricity will be provided to the site from the grid until operation of the facility commences. Hence, there are expected to be no Scope 2 emissions associated with the construction phase.

The energy content factor and emissions factors for determining greenhouse gas emissions were sourced from The National Greenhouse and Energy Reporting (Measurement) Determination 2008 as amended (*the Determination*) [Reporting year 2010-11]. Volumetric consumption was determined by assuming a total number of hours of operation and multiplying this be the fuel consumption per hour expected under normal operation.

GHG Source	Source Description	Hours of operation	Fuel consumption	Diesel Consumption	Emission Factor	Scope 1 GHG Emissions	Energy
			L / hr	kL	(t CO2-e/kL)	(t CO2-e)	GJ
Stationary energy							
Generator	Yanmar 10 kW Model YEG170DSLS Single phase	990.00	2.31	2.29	2.68	6.14	84.16
Compactor	Wacker DPU 4045 Reversible PLATE COMPACTOR	240.00	1.40	0.34	2.68	0.90	12.36
Transport Fuels							0.00
Dump Truck	Hitachi AH400D Articulated Dump Truck 413 HP	240.00	18.00	4.32	2.70	11.66	158.98
Concrete Boom Pump	SCHWING S 39 SX CONCRETE BOOM PUMP 410 HP	240.00	17.66	4.29	2.70	11.57	157.82
Scraper	Bell scraper tractor 4206D; Makco M3338 gooseneck pull-behind scraper	240.00	49.20	11.81	2.70	31.86	434.53
Bulldozer	CAT D 6 N dozer	240.00	26.00	6.24	2.70	16.84	229.63
Transit Mixer	Cement Concrete Mixer Truck 10 m3 capacity 375 HP Euro 3 Engine	240.00	16.34	3.92	2.70	10.58	144.35
Delivery Truck	Average truck fuel usage from ABS	240.00	26.95	6.47	2.70	17.45	238.02
TOTAL				39.67		106.99	1459.86

9. ANALYSIS OF THE IMPACTS OF THESE EMISSIONS

The construction and operation of the proposed facility will result in an increase in Scope 1 and 2 GHG emissions. The Scope 1 emissions associated with the construction phase are estimated to be 106.99 t CO_2-e / yr, which is approximately equal to 36.7% of the emissions of a large articulated truck traveling 200,000 km per annum and using 53.9 L of diesel per 100 km. The Scope 1 emissions associated with operation are estimated to be 10.793 t CO_2-e / yr, which is approximately equal to 3.7% of the emissions of a large articulated truck traveling 200,000 km per annum and using 53.9 L of diesel per 100 km. Hence, the facility is not expected to be a significant contributor to GHG emissions.

The Scope 2 emissions of 81.42 t CO_2-e / yr will be equivalent to the emissions from approximately 9 average Australian households (where it is assumed that an average Australian household consumes 25 kWh of electricity per day).

The overall energy consumed in the operation of the plant under the operation control of No Fuss is expected to be less than the embodied energy in the oil produced, hence this facility has the potential to be energy negative if the recycled fuel off-sets the use of “newly” generated fossil fuel. An additional environmental benefit is achieved by removing the oil and sludge from streams that could otherwise be disposed of directly as trade waste.

The Scope 1 CO2 -e emissions due to plant operation could be reduced by:

- using renewable energy sources such as bio-diesel or a diesel/ethanol blend in the place of 100% fossil fuel diesel oil,
- using lower emitting fuels such as LPG, CNG or LNG. This option is less desirable to the capital expense of retrofitting trucks.

The Scope 2 CO2 -e emissions due to plant operation could be reduced by:

- using locally generated renewable electricity in place of grid purchased electricity, such as PV solar panels.
- purchase of Greenpower from the grid.

The following table shows the results of a search of emissions to the environment for the postcode 2750 on the National Pollution Inventory (NPI; www.npi.gov.au/). This search showed that four industrial facilities have point sources of emissions which require reporting under the NPI reporting criteria and that diffuse emissions exist for the surrounding area (Greater Sydney Newcastle & Wollongong Regions). Three of the industrial facilities emit predominantly to air, based on the list of the five most statistically significant emissions by each facility.

Registered Business Name	Facility Name	Substance	Air (kg)	Land (kg)	Water (kg)
1. ALUMINIUM EXTRUSIONS & DISTRIBUTION PTY LTD	Capral Aluminium Penrith [Penrith-NSW]	Mercury & compounds	0.0019		
		Carbon monoxide	610		
		Lead & compounds	0.0036		
		Cadmium & compounds	0.0079		
		Arsenic & compounds	0.0014		
2. BORAL RESOURCES (NSW) PTY LTD	Boral Emu Plains Quarry [Emu Plains-NSW]	Carbon monoxide	24,000		
		Sulfur dioxide	3,100		
		Total Volatile Organic Compounds	5,400		
		Particulate Matter 2.5 um	4,900		
		Polycyclic aromatic hydrocarbons (B[a]Peq)	1.7		
3. NATIONAL FOODS MILK LIMITED	National Foods Milk Penrith [Penrith-NSW]	Carbon monoxide	1,200		
		Sulfur dioxide	20		
		Total Volatile Organic Compounds	85		
		Polycyclic aromatic hydrocarbons (B[a]Peq)	0.010		
		Particulate Matter 2.5 um	90		
4. SYDNEY WATER CORPORATION	Penrith Sewage Treatment Plant [Penrith-NSW]	Total Nitrogen			40,000
		Ammonia (total)			2,800
		Total Phosphorus			1,000

[1] Statistical significance of a substance emission is determined by the number of standard deviations from the national mean emission for that substance in the chosen reporting year.
[2] All emission/transfer quantities are displayed to two significant figures. Displayed emission totals may not exactly equal the sum of their individual emissions.

Direct comparisons of all of the GHGs is not possible via the data provided in the NPI. However, the GHG emissions for the proposed facility can be compared with the global warming potential of the reported carbon monoxide emissions. Carbon monoxide has a global warming potential three times that of CO_2 over a 100 year time span, which is the accepted time horizon for GHG analysis. The total GHG emissions would be many times more than only the CO emissions, however data is not available for CO_2, CH_4, N_2O, synthetic gases and other GHGs. Hence, comparing the Scope 1 CO_2-e GHG emissions of the proposed facility with the CO_2-e emissions for **CO only**, the Scope 1 emissions are as follows:

Facility	**t CO2-e / yr**	**% of proposed facility**
No Fuss Proposed Facility	10.8	100%
Facility Sources		
ALUMINIUM EXTRUSIONS & DISTRIBUTION PTY LTD	1.8	589.8%
BORAL RESOURCES (NSW) PTY LTD	72.0	15.0%
NATIONAL FOODS MILK LIMITED	4.0	299.8%
TOTAL	77.8	13.9%
Diffuse Sources		
Greater Sydney Newcastle & Wollongong Regions - Total	2,580,000	0.0004%
Motor Vehicles	1,680,000	0.0006%
Burning(fuel red., regen., agric.)/ Wildfires	570,000	0.0019%
Lawn Mowing	126,000	0.0086%
Solid fuel burning (domestic)	111,000	0.0097%
Lawn Mowing (public open spaces)	33,000	0.0327%

These calculations do not take into account the emissions of carbon dioxide, nitrous oxide, methane and other GHG emissions which are expected to be many times more than the carbon monoxide emissions. Hence, it can be seen that the total Scope 1 emissions for the proposed facility are negligible compared to the diffuse emissions for this geographic area and the other facility emissions in the vicinity of the proposed facility.

10. FURTHER INFORMATION ON RENEWABLE ENERGY

The total estimated maximum electricity demand is 21.114 kW if all devices are used at full load simultaneously. Not including lighting, the demand requirement will be 20.43 kW. Hence, under the Federal Government's "Support for small-scale renewable energy systems" a 20 kW off-grid solar array could be considered, **as long as a three phase load is not required**. The entry level cap ex for a suitable system starts in the range of $62k, however a better understanding of the energy load requirements will be required to match the battery storage capacity with the demand loads.

Off-grid solar power systems under the Solar Credits scheme are defined as units being 1 kilometre from the nearest main-grid line or less than 1 kilometre where written evidence from the local network service provider states the total cost of connecting the systems to the main-grid is more than $30,000.

Conversely, if the proposed facility is connected to grid electricity, given the current government support for renewable energy, a small 1.5 kW solar array could provide electricity in a more economically viable manner than electricity from the grid.