File Note

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Project title	MVV Environment Baldovie Ltd (MEB), Permit Variation Permit No: PPC/A/1003157	Job number	270251-00
cc	Debbie Harper (Arup), Bruce Braithwaite (MVV)	File reference	PPC/2020/H1
Prepared by	John Hodgson (Arup)	Date	06 March 2020
Subject	Emissions and Impact Assessment Report – H1 Software Tool Assessment		

1 Overview

The H1 software tool assessment has been completed for the proposed parallel operations of the MEB existing and new Energy from Waste (EfW) facilities at Baldovie, Dundee. The assessment identifies the emissions from and the energy use of the proposed facilities.

MEB is seeking to vary Permit No: PPC/A/1003157 (as varied; issued by SEPA on 28 February 2019) to allow for parallel operations of both facilities for a period of up to 10 years, commencing in April 2020.

A summary of the results of the assessments undertaken using the H1 assessment tool are included below, with the software tool 'pages' included as an Appendix.

The outputs from the H1 tool for emissions that have been considered by the more detailed assessment reports, including; the Air Quality Assessment; the Habitats Regulations Appraisal; and the Noise Assessment, are not reported in this section.

2 Water

2.1 Waste process water

Process water would be produced during the operation of the facility, as boiler water blowdown and wastewater from the demineralisation of potable water, to produce the boiler feed water.

As much of the process water as possible would be used in the wet ash discharger, to replace the water lost through evaporation and in the exported ash. Further process water may be used for the moistening of the recirculate in the flue gas treatment system, however there would be a discharge of process water required.

The existing fluidised bed facility has a water-cooled condensation system with each line using 300 tonnes per line of water extracted from the Dighty Burn under an existing abstraction licence and this will not change. The new moving grate facility will have an air-cooled condensation system and therefore will not require the same large quantities of water. The estimated demand on the towns water system under normal operational conditions will be less than 5m³ per hour including the demand of the RCPP for demineralised water production and this has been agreed with Scottish Water.

The waste process water would consist of potable water with an elevated level of the dissolved solids that naturally occur in the water.

Due to the build-up of dissolved solids in the boiler water blowdown and demineralisation wastewater the waste process water may require neutralisation and temperature correction prior to final discharge, to meet the conditions of the discharge consent agreed with Scottish Water.

The waste process water would be discharged into the foul water drainage which discharges to the existing Scottish Water foul water sewer under Forties Road.

A detailed assessment of the effect of this emission on the receiving sewer and wider environment is not considered to be necessary. This is due to the characteristics of the waste process water and control of the impact on the receiving sewer network imposed by the discharge consent. The impact of the point source aqueous emission on the water environment is considered to be insignificant.

2.2 Surface water drainage

The surface water drainage system would collect run-off from roofs, site roads and other areas of impermeable surfacing where there is negligible risk of surface waters becoming contaminated by waste or other materials.

The surface water would be drained using various SuDS components which extend around the majority of the perimeter of the site. To comply with the new SuDS Manual ‘Simple Index Tool’ method for designing attenuation of on-site surface water runoff, an attenuation basin will be provided, which all surface water would run through before joining the Scottish Water surface water sewer, running along Forties Road.

An emergency shut-off valve is provided immediately downstream of the SuDS basin, to prevent any water discharging to the environment via the public sewer in the event of an accidental spill on site.

It is considered that, given the control measures that would be in place, there would be no risk of fugitive emissions to surface water, sewer or groundwater arising from the Facility’s activities.

3 Visual impacts

Visible plume modelling was carried out as part of the updated Air Quality dispersion modelling included in the Air Quality Assessment.

The facility is within sight of sensitive local receptors, the local residential population. The results of the modelling show that parallel operation of the existing and new facilities would result in visible plumes greater than 20m in length for a period of 45 hours of the year. The findings

demonstrate that the plume length would exceed the boundary of the site in less than 5% of daylight hours.

In line with the H1 guidelines, the visual impact is therefore considered to be low.

4 Photochemical Ozone Creation

Ground level ozone is a highly reactive pollutant that may damage human health, vegetation and materials. It is produced by the action of sunlight on Volatile Organic Compounds (VOCs) and NOx depending on:

- the availability of NOx downwind of a source controls the area within which ozone may form; and
- the presence and characteristics of VOCs within this area controls the magnitude and distribution of ozone.

The potential for VOCs to form ozone depends on their structure and reactivity. It can be expressed as an index of Photochemical Ozone Creation Potential (POCP).

Appendix A of the (now-withdrawn) H1 Annex F Air Emissions guidance sets out POCP values for a large range of pollutants derived from organic compounds, relative to ethylene. The POCP of the facility was calculated within the H1 software tool, based on the emission of sulphur dioxide and nitrogen dioxide.

The POCP for both the existing and new facilities has been assessed as being **1,109.3**. The breakdown of this is provided in Table 1 below.

Table 1 Photochemical Ozone Creation Potential (POCP)

Emission	**Annual rate (tonnes/year)**	**POCP value per tonne**	**POCP**
Nitrogen dioxide (existing Lines 1 and 2)	138.76	2.8	388.52
Sulphur dioxide (existing Lines 1 and 2)	34.68	4.8	166.46
Nitrogen dioxide (new Line 3)	138.58	2.8	388.03
Sulphur dioxide (new Line 3)	34.65	4.8	166.30

5 Global Warming Potential

The global warming potential (GWP) of the parallel operation of the EfW CHP facility has been calculated, based on direct carbon dioxide emissions, from the combustion of fuel at the facility, and as indirect carbon dioxide (CO_2) emissions from indirect energy use.

The total global warming potential is calculated as **138,621.49**. The breakdown of this is provided in Table 2 below

Table 2 Global warming potential impacts

Substance	Source	Annual rate (MWh/yr)	GWP value per tonne	CO_2 Factor (t/MWh)	GWP
CO_2 Energy: direct	Direct emissions	396,273.00	1.00	0.35	138,354.55
CO_2 Energy: indirect	Indirect emissions	496.00	2.4	0.17	197.61
CO_2 Process: direct	Existing Line 1	17.34	1.00	1.0	17.34
CO_2 Process: direct	Existing Line 2	17.34	1.00	1.0	17.34
CO_2 Process: direct	New Line 3	34.65	1.00	1.0	34.65

6 Waste Impact Score

Table 3 provides information on the waste likely to be produced, the proposed disposal or recovery options and the assessment of the associated impact scores.

Table 3 Output waste streams

Waste stream	Mass (tonnes)	Final treatment or disposal method	Score	Waste type	Score	Impact score
Air Pollution Control Residues (APCR) (Line 3)	3,850	Landfill	30	Hazardous	10	1,155,000
APCR (Lines 1 & 2)	2,788	Landfill	30	Hazardous	10	836,400
Cyclone Ash (Lines 1 & 2)	5,434	Other recycling	3	Inert	1	16,302
Incinerator Bottom Ash (Line 3)	26,400	Other recycling	3	Other non-hazardous	2	158,400
Incinerator Bottom Ash (Lines 1 & 2)	14,491	Other recycling	3	Other non-hazardous	2	86,946
Process Effluent (Lines 1 & 2)	207,367	Biological and physico -chemical treatment	12	Other non-hazardous	2	4,976,808
Process Water (Line 3)	2,250	Biological and physico -chemical treatment	12	Other non-hazardous	2	54,000

Recovered Metals (Ferrous)	293	Other recycling	3	Inert	1	879
Recovered Metals (Non-ferrous)	196	Other recycling	3	Inert	1	588
Rejected waste (unquantified)	0	Landfill	30	Other non-hazardous	2	0

6.1 Waste storage

Paragraph 4.2.1 of the PPC permit for MEB imposes a restriction that "the maximum quantity of waste stored at the Permitted Installation (including waste awaiting dispatch elsewhere) shall not exceed 5,025 tonnes." By operating the two sites in parallel this will not have had to increase.

Lines 1 and 2 have the capacity to store 800 tonnes residual MSW in the MSW hall and 700 tonnes in the RDF store; 85 tonnes of Cyclone Ash; 25 tonnes of Air Pollution Control Residues and 45 tonnes of IBA. Total 1,655 tonnes of waste.

Line 3 will have the capacity to store 580 tonnes of MSW in the delivery pit; and 2,207 tonnes in the waste storage bunker; 500 tonnes of IBA; and 80 tonnes of Air Pollution Control Residues. Total 3,367 of waste.

Total capacity of ALL wastes and residues that could be stored at MEB for all 3 lines – 5,022 tonnes.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	John Hodgson (Arup)	Debbie Harper	Gordon DiamondClick here to enter text.
Signature			

Facility Reference Information

Please complete the following information:

Company Name:	MVV Environment Baldovie Limited (MEB)
Location:	MEB EfW Facility, Forties Road, Dundee DD4 0NS
Permit Number:	PPC/A/1003157

If you have data already stored in a previous version of the H1 software you may import it by pressing the button to the right.

Import Utility

Please note that before the import can take place any data that already exists in this copy of the tool will be removed. Please also note that any 'Operating Mode' information you had entered in your Air and Water inventories will defer to the default of 100% on data import

NOTE ON MICROSOFT ACCESS SECURITY WARNING
Depending on your security settings, you may get a security notice appearing each time the import routine connects to a table in your source database. You need to click 'Open' on this message for the Import routine to be successful. There are 18 tables to connect to in total but if you place your cursor over the 'Open' button you will be able to repeatedly click your mouse to make this process execute quickly and without too much frustration. We apologise for this inconvenience but it is an aspect of Microsoft Security provisions that are beyond our control.

Describe the Objectives

Depending on the reason for the assessment you will need to complete different parts of the tool.

Select the type of assessment:

◉ a)	to carry out an ENVIRONMENTAL ASSESSMENT of the releases resulting from the facility as a whole	Do Steps 1, 2 and 3 only
○ b)	to conduct a costs/benefits OPTIONS APPRAISAL to determine BAT or support the case for derogation under the Industrial Emission Directive.	Do Steps 1,2, 3 and 4 and continue with 5 and 6 if necessary

1.1 Briefly summarise the objectives and reason for the assessment in terms of the main environmental impacts or emissions to be controlled:

To assess the environmental impacts of all emissions from all activities associated with the parallel operation of lines 1 and 2 of the existing energy from waste facility and line 3 of the energy from waste combined heat and power facility which is under construction, to support a PPC application.
Permit No: PPC/A/1003157 (as varied; issued by SEPA on 28 February 2019)

Scope of Environmental Assessment

List the activities included in the assessment

Number	Activity

Use the 'Add' button at the bottom left to create a new activity

1	Delivery of Municipal Solid Waste, Commercial and Industrial Waste at the site
2	Waste Storage
3	Waste Charging
4	Incineration
5	Energy Generation
6	Flue Gas Treatment
7	Bottom Ash Management
8	Fly Ash Handling
9	Raw materials storage and handling
10	Waste processing into RDF including metals recovery

Comments

Energy Consumption

Please list all Energy Sources and Annual Consumption

Select energy sources by Clicking on 'Add' and using the pull-down list.

Number	Energy Sources		Delivered MWh/yr	Conversion Factor	Primary MWh/yr	CO2 Factor	CO2 tonne/yr
1	Waste fuel	direct emissions	392863	1.00	392,863	0.35	137,502
2	Electricity from public supply	indirect emissions	496	2.40	1,190	0.17	198
3	Gas oil	direct emissions	3410	1.00	3,410	0.25	853

Comments

Parasitic energy used on site, generated from combustion of waste is included in the total energy input in the waste (383263 MWh and 9600MWh) - from Heat and Power plan
Electricity use from the public supply, used during facility start up following maintenance, is accounted for as it represents energy input to the facility. 346MWh/ye (Lines 1&2), 150MWh/yr (Line 3)

Raw Materials

Please list all Raw Materials Consumed:

Number	Material	Annual Consumption	Units
1	Waste (Line 3)	153216	tonnes/year
2	Potable Water (Line 3)	40000	tonnes/year
3	Sodium Hydroxide (NaOH) (Line 3)	7	tonnes/year
4	Calcium Hydroxide (Line 3)	1920	tonnes/year
5	Lighting heating oil (Line 3)	108	tonnes/year
6	Urea (stored as a 40% aqueous solution) (L3)	360	tonnes/year
7	Powdered Activated Carbon (Line 3)	36	tonnes/year
8	Hydrochloric Acid (HCl) (Line 3)	24	tonnes/year
9	Ammonia water 24% (Line 3)	3.5	tonnes/year
10	Waste (Lines 1 & 2)	150000	tonnes/year
11	Potable Water (Lines 1 & 2)	45625	tonnes/year
12	Sodium Hydroxide (NAOH) for RCPP (L1&2)	30	tonnes/year
13	Calcium Hydroxide for FGT (Lines 1&2)	1346	tonnes/year
14	Light heating oil (Lines 1&2)	616	tonnes/year
15	Ammonia for SCR (Lines 1 & 2)	400	tonnes/year
16	Powdered Activated Carbon (Lines 1&2)	21	tonnes/year
17	Hydrochloric Acid (HCl) (Lines 1&2)	28	tonnes/year
18	Silica Sand for fluidised bed (Lines 1&2)	2435	tonnes/year
19	Dolomite for fluiduised bed (Lines 1&2)	285	tonnes/year
20	Sulphuric Acid for cooling tower (Lines 1&2)	12	tonnes/year
21	Sodium hypochlorite for cooling tower (L1&2)	14	tonnes/year
22	River water (estimated) (Lines 1 & 2)	177155	tonnes/year

Comments	The demineralised water production plant will serve all 3 lines now. If we only consider the share of demin water produced for line 3 and for the PROCESS the water demand would be 20000 tpa. Together with sanitary use we may end up with 40000 tpa. For lines 1+2 the water consumption should even be less than previously stated, because the ion exchanger technology produces less waste water than the old RO plant

Waste Inventory

Please list all Waste Streams emitted:

Are there any Waste emissions? Yes

Number	Waste Stream	Mass tonne/yr	Category of Waste	Disposal/Recovery Option
1	Incinerator Bottom Ash (Line 3)	26,400	other non-hazardous	Other Recycling (R3:R4:R5:R11 and R12
2	APCR (Line 3)	3,850	hazardous	Landfill (D5)
3	Recovered Metals (ferrous) (Lines 1&2)	293	inert	Other Recycling (R3:R4:R5:R11 and R12
4	Process Water (Line 3)	2,250	other non-hazardous	Biological and Physico-chemical treatme
5	Rejected waste (unquantified)	0	other non-hazardous	Landfill (D5)
6	Recovered Metals (non-ferrous) (Lines 1&2)	196	inert	Other Recycling (R3:R4:R5:R11 and R12
7	Incinerator Bottom Ash (Lines 1&2)	14,491	other non-hazardous	Other Recycling (R3:R4:R5:R11 and R12
8	APCR (Lines 1&2)	2,788	hazardous	Landfill (D5)
9	Cyclone Ash (Lines 1&2)	5,434	inert	Other Recycling (R3:R4:R5:R11 and R12
10	Process Effluent (Lines 1&2)	207,367	other non-hazardous	Biological and Physico-chemical treatme

Comments: Process water - 2250m3 per annum, plus sanitary waste water. pH and temp is checked before discharge to public foul sewer
Rejected waste - The waste flow model assumes that there will be no waste rejected from the facility and the quantity is therefore set as zero. However rejected waste is included within the table, as there is a potential for waste to be rejected, if it is unsuitable for combustion in the facility.

Performance Indicators

Enter consumption data to determine your performance indicators

Which of the following parameters do you use for calculating your performance: Raw Material

Please describe and justify your choice

This demonstrates the efficiency of the process in producing electricity per tonne of raw material

Basic Consumption Data:

	Name	Annual Quantity	Units
Amount of Product:	Electricity	124,710	MWh
Main Raw Material:	Waste	303,216.00	tonnes
Potable Water:			m3
Non Potable Water:			m3
Energy:		396,769.00	MWh
Waste: Inert:		5,923.00	tonne
Hazardous:		6,638.00	tonne
Stable Non-reactive Hazardous:			tonne
Biodegradable Non-hazardous:			tonne
Other Non-hazardous:		250,508.00	tonne

Specific Consumption per tonnes of Waste:

Production Efficiency:	0.41	MWh/tonnes
Potable Water:		m3
Non Potable Water:		m3
Energy:	1.31	MWh
Waste: Inert:	0.02	tonne
Hazardous:	0.02	tonne
Stable Non-reactive Hazardous:		tonne
Biodegradable Non-hazardous:		tonne
Other Non-hazardous:	0.83	tonne

Photochemical Ozone Creation Impacts

Number	Substance	Annual Rate tonne/yr	POCP Value per tonne	POCP
2	Nitrogen Dioxide	69.38	2.8	194.26
6	Sulphur Dioxide (24 Hour Mean)	17.34	4.8	83.26
2	Nitrogen Dioxide	138.58	2.8	388.03
6	Sulphur Dioxide (24 Hour Mean)	34.65	4.8	166.30
2	Nitrogen Dioxide	69.38	2.8	194.26
6	Sulphur Dioxide (24 Hour Mean)	17.34	4.8	83.26
			Total:	1,109.37

Comments

Global Warming Potential Impacts

Substance	Source	Annual Rate MWh/yr	GWP Value per tonne	Annual GWP
C02 Energy: direct	direct emissions	396,273.00	1.00	138,354.55
C02 Energy: indirect	indirect emissions	496.00	1.00	197.61
Carbon dioxide Process: direct	Existing Line 1 (A1)	17.34	1.00	17.34
Carbon dioxide Process: direct	Existing Line 2 (A2)	17.34	1.00	17.34
Carbon dioxide Process: direct	New Line 3	34.65	1.00	34.65
			Total:	138,621.49

Comments

Waste Impact Score Calculation

Number	Waste Stream	Mass	Final treatment or disposal method	(Score)	Waste Type	(Score)	Impact Score
2	APCR (Line 3)	3,850	Landfill (D5)	30	hazardous	10	1155000
8	APCR (Lines 1&2)	2,788	Landfill (D5)	30	hazardous	10	836400
9	Cyclone Ash (Lines 1&2)	5,434	Other Recycling (R3:R4:R5:R11 and R12)	3	inert	1	16302
1	Incinerator Bottom Ash (Line 3	26,400	Other Recycling (R3:R4:R5:R11 and R12)	3	other non-hazardous	2	158400
7	Incinerator Bottom Ash (Lines	14,491	Other Recycling (R3:R4:R5:R11 and R12)	3	other non-hazardous	2	86946
10	Process Effluent (Lines 1&2)	207,367	Biological and Physico-chemical treatmen	12	other non-hazardous	2	4976808
4	Process Water (Line 3)	2,250	Biological and Physico-chemical treatmen	12	other non-hazardous	2	54000
3	Recovered Metals (ferrous) (L	293	Other Recycling (R3:R4:R5:R11 and R12)	3	inert	1	879
6	Recovered Metals (non-ferrou	196	Other Recycling (R3:R4:R5:R11 and R12)	3	inert	1	588
5	Rejected waste (unquantified)	0	Landfill (D5)	30	other non-hazardous	2	0

Comments