Attachment E.1: Emissions to Atmosphere

No additional sources of emissions to atmosphere are proposed by this application. Please refer to Chapter 7 of the accompanying EIS for a description of emissions to atmosphere. It is proposed to increase the maximum short term average volume flowrate to allow for daily fluctuations based on the waste input and operating conditions. The maximum annual average flowrate of 147,000 Nm^3/hr has been increased to 183,700 Nm^3/hr based on average measured values at the plant.

Drawing (21098\WL\010 Rev A) of Appendix F1 shows the locations of all emission points including those to atmosphere. More details about the type and nature of the emissions are provided in Table E.1 (ii) (a) and E.1 (iii) (a) in Appendix E1. Details on the minor emissions source are provided in Table E.1 (ii) (b) and E.1 (iii) (b) in Appendix E2

Attachment E.2: Emissions to Surface Waters

Other than additional storm water runoff from roofs of the new permanent modular office block and maintenance buildings (and associated additional hardstanding and parking areas), there are no modifications to the surface water emissions as approved in Waste Licence W0167-02. The additional run off from hardstanding areas is minor and the existing attenuation system and corresponding maximum discharge rate are as previously agreed with the local authority and agency. Chapter 11 of the accompanying EIS and Attachment D.1.k describe the existing surface water management system. Please refer to the relevant Tables of Appendix E3 for further details.

Attachment E.3: Emissions to sewer

There are no emissions to sewer from the facility. All sanitary effluent from staff and visitor facilities will be treated onsite in Puraflo treatment systems as outlined in Attachment D.1.k.

For this reason, Tables E.3(i) and E.3(ii) have not been included.

Attachment E.4: Emissions to Groundwater

Chapters 9 and 10 of the EIS describe the potential impacts of site activities on groundwater (primarily related to emissions from the treatment of domestic effluent at the onsite waste water treatment systems). With the additional percolation area proposed for the new modular office building, there will now be three minor emissions from the facility to ground, which will be referred to as:

- GW1 Groundwater percolation area (Gatehouse)
- GW2 Groundwater percolation area (Main Process Building)
- GW3 Groundwater percolation area (New Modular Office Building)

Please refer to Chapters 9 and 10 for further details and the Tables of Appendix E4 for details.

Attachment E.5: Noise emissions

There are six existing potential sources of continuous noise due to the operation of process equipment, which will be referred to as:

- N1 Stack
- N2 Air Cooled Condensors
- N3 Turbine Cooling
- N4 Fan Turbine Building
- N5 Compressor Louver Grids
- N6 Cooling Oven Grid

No additional noise sources are proposed in this application. Please refer to Section 8 of the EIS which provides information on the existing noise emissions from site activities. A copy of the tables relating to noise emissions as previously submitted is enclosed in Appendix E5.

Attachment E.6: Other Environmental Nuisances

On the basis of the assessments presented in the accompanying EIS, the proposed amendments to the facility will not result in any additional environmental nuisances. Mitigation measures are in place to ensure vermin (including birds flies and rodents), dust, litter and traffic nuisances are minimised. A brief description of these mitigation measures are outlined below with references to the appropriate section of the EIS.

E.6.1 Vermin Control

Vermin including birds, flies and rodents are attracted to untreated waste and associated odours. To prevent access of vermin to untreated waste, all waste delivery trucks are enclosed and waste handling and storage takes place in the enclosed waste reception hall. The hall is maintained under negative pressure to prevent odour emissions.

Ensuring the rapid turnover of waste in the reception hall and bunker also minimises odour emissions and the potential for vermin. Most of the waste delivered to the facility will be loaded directly into the waste bunker and will be processed within four days on average. There will be no storage of waste in the reception hall.

All parts of the facility are kept clean and tidy through good housekeeping measures, which reduces bird and fly nuisance. In addition, a comprehensive rodent control plan is in place, implemented by a specialist rodent control company who visit the site eight times per year. Records of these site visits are maintained by Indaver Ireland.

E.6.2 Dust Control

Potential sources of dust from the facility include stored waste, solid consumables, and residues. As outlined in Attachment E.1, all solid materials are be transported and handled in fully enclosed environments to prevent dust emissions. Maintaining the bunker area under negative pressure also helps to prevent dust emissions from stored waste.

Dust emissions from traffic will be minimal as the roads, parking areas and service yards are paved. Good housekeeping practices such as litter patrols (see below) and keeping the site clean help to maintain the roads free of dust.

There are currently no issues with dust emissions from the site and the proposed review will not alter this situation in any material way.

E.6.3 Litter

All waste is handled in enclosed areas and stored in the main process building under negative pressure to limit windborne litter. The waste bunker is large enough to allow acceptance of waste during periods of shutdown to ensure waste is never stored outside of this area. The area is kept clean and odour free through good housekeeping practices including regular

washing and sweeping of the operating areas and monitoring of waste deliveries. The facility also operates "litter patrols" around the site and on local approach roads to ensure that litter is not an issue.

E.6.4 Traffic

As the application entails the transport of an increased volume of waste to site, increased traffic movements will occur. A comprehensive traffic assessment has been included in Chapter 13 of the EIS.

No additional on-site measures are required for the extra tonnage proposed.

E.6.5 Fire Control

Fire risk and emergency response measures are outlined in Chapter 5 of the accompanying EIS and in Attachment D.1.o. There are no additional measures proposed as part of the review application.

Appendix E1

Appendix E1: Revised Emissions Table E.1(ii)(a)

TABLE E.1(ii)(a) MAIN EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. N^{o}:	A2-1
Source of Emission:	Waste to energy plant (stack)
Location :	Main process building - See drawing 21098\WL\010 Rev A in Attachment B Appendix B2
Grid Ref. (12 digit, 6E,6N):	306331E, 270963N
Vent Details Diameter: Height above Ground(m):	 2.2m 65m
Date of commencement:	October 2011

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	4,008,000 Nm^3/d[1]	Maximum/day[2]	4,408,800Nm^3/d
Maximum rate/hour	200,000Nm^3/h [3]	Min efflux velocity	17.06 m/sec [4]
(ii) Other factors			
Temperature	150^{o}C(max)	130^{o}C(min)	140^{o}C(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ✓ dry. 11 %O_2			

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)[5]	60 min/h 24 h/day 325 day/y

[1] Based on an annual average flowrate of 167,000 Nm^3/h.
[2] Based on maximum annual average flowrate of 183,700 Nm^3/h.
[3] Based on short term average (e.g over a 60 minute period)
[4] At conditions on exit of stack e.g. actual exit temperature, 5.6% O_2 and wet
[5] Based on an average of 7,800 hours operation per year

TABLE E.1(iii)a: MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A2-1***

Parameter[6]	Prior to treatment[(1)]				Brief description of treatment	As discharged[7(1)]					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.[8]		kg/year	
	Avg	Max	Avg	Max		Avg[9]	Max[10]	Avg	Max	Avg	Max
Dust	2,000	3,000	294	612	Baghouse Filter	5	10	0.74	2.04	6,439	17,870
SO2	658	1,664	97	339	Spray Dryer absorber/lime slurry	40	50	5.88	10.2	51,509	89,532
NOx (as NO2)	160	160	24	33	SNCR	160	200	23.5	40.8	206,035	357,408
Hg	0.2	0.5	0.03	0.1	Clay Injection/baghouse filter/activated carbon	0.04	0.05	0.006	0.01	52	89
HCl	1,472	2,984	216	609	Spray Dryer absorber/lime slurry	8	10	1.18	2.04	10,302	17,870
HF	10	30	1.47	6.12	Spray Dryer absorber/lime slurry	0.8	1	0.12	0.2	1,030	1,787
PCDD/F[11]	0.000005	0.000005	1.0	1.0	Clay Injection/baghouse filter/activated carbon	0.00000005	0.000000 1	0.0085	0.02	0.0001	0.0002

[6] All values are at standard conditions of T=273 Kelvin, P=101.3kPa, 11% O2 dry gas. All heavy metals measurements include compounds eg Cd represents Cadmium, and its compounds.
[7] All values are relevant for the sample period specified under Directive 2000/76/EC. For Cd, Tl, Hg and Heavy Metals categories the sample period is between 30 minutes and 8 hours. For dust, TOC, HCl, HF, CO,SO2 and NOx the sample period represented in Table E.1 is 24 hours.
[8] The average discharge is based on a the maximum annual average flow rate of 147,000 NM3/h as modelled in Chapter 7 of the EIS. The maximum discharge is based on the maximum average 24 hour average flowrate and should only be considered for this timeframe.
Average
[9] Average values are based on guaranteed emission limits from the supplier pre construction. Actual emission rates are expected to be lower in line with experience from Belgium
[10] Maximum values are based on maximum concentrations permitted under Directive 2000/76/EC over the specified sample period

Heavy Metals[12]	100	150	14.7	30.6	Clay Injection/baghouse filter/activated carbon	0.4	0.5	0.06	0.10	515	894
Cd & Tl	0.4	1	0.06	0.2	Clay Injection/baghouse filter/activated carbon	0.04	0.05	0.006	0.01	52	89
TOC	8	10	1.18	2.04	Combustion optimisation	8	10	1.18	2.04	10,302	17.870
CO	40	50	5.9	10.2	Combustion optimisation	40	50	5.9	10.2	51,509	89,352

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0^{o}C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.

[11] All PCDD/F values are expressed on maximum concentrations permitted under the Directive 2000/76/EC over the specified sample period
[12] Heavy metals includes Antimony (Sb), Arsenic (As), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb)m Manganese (Mn), Nickel (Ni), Vanadium (V) and their compounds

Appendix E2

Appendix E2: Revised Minor Emissions Table E.1(ii)(b)

TABLE E.1(ii)(b) MAIN EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. N^{o}:	A2-2
Source of Emission:	Emergency Generator
Location :	Main process building - See drawing 21098\WL\010 Rev A in Attachment B Appendix B2
Grid Ref. (12 digit, 6E,6N):	306347E, 270099N
Vent Details Diameter: Height above Ground(m):	 0.25m 3m
Date of commencement:	October 2011

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	0 m^3/d	Maximum/day	3,656 m^3/d
Maximum rate/hour	3,656 m^3/hr	Min efflux velocity	20.7 m/sec
(ii) Other factors			
Temperature			150^{o}C(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ✓ dry. 11 %O_2			

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/h 1 h/day 12 day/y

TABLE E.1(iii): MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: ***A2-2***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged[13]					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Nox	As discharged				Maintenance for Efficient Operation		500		1.83		21.94
CO	As discharged				As above		650		2.38		28.52
TOC	As discharged				As above		150		0.55		6.58
Particulates	As discharged				As above		100		0.37		4.39

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0^{o}C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.

[13] All values are at standard conditions of T=273K, P=101.3kPa, 11%O2 dry gas

Appendix E3

Appendix E3: Revised Table E.2(i)

TABLE E.2(i): EMISSIONS TO SURFACE WATERS (One page for each emission)

Emission Point:

Emission Point Ref. N^{o}:	SW1
Source of Emission:	Surface water drainage outfall
Location :	Wet drain to west of site- See drawing ref 21098\WL\010 Rev A in Attachment B Appendix B2
Grid Ref. (10 digit, 5E,5N):	30612E, 27086N
Name of receiving waters:	River Nanny
Flow rate in receiving waters:	0.01 m^3/s Dry Weather Flow 0.06 m^3/s 95%ile flow
Available waste assimilative capacity:	Refer to Chapter 11 of accompanying EIS- Study by KD Environmental 2012

Emission Details:

(i) Volume to be emitted			
Normal/day[14]	40.5m^3	Maximum/day[15]	5,166.7m^3
Maximum rate/hour[16]	215.28m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	The period or periods during which surface water will be discharged will depend on rainfall patterns and cannot be defined exactly. The normal volumetric emission per day given above assumes a continuous discharge based on annual average rainfall.

[14] Flow will depend on rainfall periods but for the purposes of this assessment, the normal flow is averaged over a typical year's rainfall (671.8mm- 2011 Dublin Airport MET station) and a non-permeable collection area of 22,000m^2
[15] Based on maximum discharge rate of 59.8 litres per second
[16] Based on maximum discharge rate of 59.8 litres per second

Appendix E4

Appendix E4: Revised Table E.4(i)

TABLE E.4(i): EMISSIONS TO GROUNDWATER (1 Page for each emission point)

Emission Point or Area:

Emission Point/Area Ref. N^{o}:	GW1
Emission Pathway: (borehole, well, percolation area, soakaway, landspreading, etc.)	Percolation area
Location :	Northern margin of site- See drawing ref 21098\WL\010 Rev A in Attachment B Appendix B2
Grid Ref. (10 digit, 5E,5N):	30638E, 27101N
Elevation of discharge: (relative to Ordnance Datum)	29.0m OD
Aquifer classification for receiving groundwater body:	Rkd (regionally important , diffuse karst aquifer, good development potential)
Groundwater vulnerability assessment (including vulnerability rating):	M (moderate)
Identity and proximity of groundwater sources at risk (wells, springs, etc):	Chapter 10 of the 2009 EIS identifies wells within a 3km radius of the site. This shows there are 2 domestic wells 600m to the west of the site, 5 domestic wells 1 to 1.5km to the south-east and 1 domestic well to the north. Other wells are further than 2.5km from the site.
Identity and proximity of surface water bodies at risk:	River Nanny (tributary) 180m from site River Boyne 3.5km from site

Emission Details:

(i) Volume to be emitted			
Normal/day	0.75 m^3	Maximum/day	1.5 m^3
Maximum rate/hour	0.06 m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/h 24 h/day 365 day/y

TABLE E.4(i): EMISSIONS TO GROUNDWATER (1 Page for each emission point)

Emission Point or Area:

Emission Point/Area Ref. N^{o}:	GW2
Emission Pathway: (borehole, well, percolation area, soakaway, landspreading, etc.)	Percolation area
Location :	Adjacent to security building – See drawing ref 21098\WL\010 Rev A in Attachment B Appendix B2
Grid Ref. (10 digit, 5E,5N):	30617E, 27089N
Elevation of discharge: (relative to Ordnance Datum)	32.6m O.D
Aquifer classification for receiving groundwater body:	Rkd (regionally important , diffuse karst aquifer, good development potential)
Groundwater vulnerability assessment (including vulnerability rating):	M (moderate)
Identity and proximity of groundwater sources at risk (wells, springs, etc):	Chapter 10 of the 2009 EIS identifies wells within a 3km radius of the site. This shows there are 2 domestic wells 600m to the west of the site, 5 domestic wells 1 to 1.5km to the south-east and 1 domestic well to the north. Other wells are further than 2.5km from the site.
Identity and proximity of surface water bodies at risk:	River Nanny (tributary), 180m from site River Boyne 3.5km from site

Emission Details:

(i) Volume to be emitted			
Normal/day	0.23m^3	Maximum/day	0.45 m^3
Maximum rate/hour	0.02m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/h 24 h/day 365 day/y

TABLE E.4(i): EMISSIONS TO GROUNDWATER (1 Page for each emission point)

Emission Point or Area:

Emission Point/Area Ref. N^{o}:	GW3
Emission Pathway: (borehole, well, percolation area, soakaway, landspreading, etc.)	Percolation area
Location :	Centre of site-at Modular Office Building- See drawing ref 21098\WL\010 Rev A in Attachment B Appendix B2
Grid Ref. (10 digit, 5E,5N):	306374E, 270890N
Elevation of discharge: (relative to Ordnance Datum)	37.3m OD
Aquifer classification for receiving groundwater body:	Rkd (regionally important , diffuse karst aquifer, good development potential)
Groundwater vulnerability assessment (including vulnerability rating):	M (moderate)
Identity and proximity of groundwater sources at risk (wells, springs, etc):	Chapter 10 of the 2009 EIS identifies wells within a 3km radius of the site. This shows there are 2 domestic wells 600m to the west of the site, 5 domestic wells 1 to 1.5km to the south-east and 1 domestic well to the north. Other wells are further than 2.5km from the site.
Identity and proximity of surface water bodies at risk:	River Nanny (tributary), 180m from site River Boyne 3.5km from site

Emission Details:

(i) Volume to be emitted			
Normal/day	2.7 m^3	Maximum/day	5.4 m^3
Maximum rate/hour	0.225 m^3		

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/h 24 h/day 365 day/y

Appendix E5

Appendix E5: Noise Emission Table E.5(i)

Table E.5(i): NOISE EMISSIONS - Noise sources summary sheet

Source	Emission point Ref. No	Grid Reference	Equipment Ref. No[17]	Sound Pressure[1] dBA at reference distance	Octave bands (Hz) Sound Pressure[1] Levels dB(unweighted) per band									Impulsive or tonal qualities	Periods of Emission
					31.5	63	125	250	500	1K	2K	4K	8K		
Stack	N1	30633E, 27096N	N/A	94	-	82	89	92	79	75	69	70	70	None	Continuous
Air Cooled Condensers	N2	30626E, 27104N	N/A	98	-	82	87	88	88	93	91	83	80	None	Continuous
Turbine Cooling	N3	30628E, 27099N	N/A	86	-	64	69	72	83	80	77	72	64	None	Continuous
Grate Cooling	N4	30625E, 27100N	N/A	86	-	69	74	77	81	80	76	71	63	None	Continuous
Pump house louver	N5	30621E, 27102N	N/A	89	-	59	73	78	79	82	82	85	71	None	Continuous
Emergency generator	N6	30635E, 27010N	N/A	101	-	60	65	81	90	94	95	97	83	None	Continuous

1. For items of plant sound power levels may be used.

[17] Equipment reference numbers will be made available to the EPA once the Piping and Instrument Diagrams (P&ID) have been completed as part of the detailed design phase.