Appendix 7

D3.1 Materials Management

D3.1 MATERIALS MANAGEMENT

1. INTRODUCTION

The major process streams for the two elements (i.e. materials recycling facility and waste to energy plant) are described in detail in Attachment D2.1. Table 1.1 details the total throughputs for the materials recycling facility. Tables 1.2 to 1.5 detail the total throughputs for the Waste to Energy Plant for both a nominal capacity of 150,000 tonnes of waste and for a maximum design capacity of 180,000 tonnes of waste.

Table 1.1 Inputs and Outputs to Materials Recycling Facility

The classification and descriptions of the wastes as described below are obtained from the European Waste Catalogue,

Section 20 refers to "Municipal wastes (Household waste and similar commercial, industrial and institutional wastes) including separately collected fractions"

Section 20 01 refers to "Separately collected fractions"

Section 20 03 refers to "Other Municipal Wastes"

Inputs	Annual Usage	Outputs	European Waste Code	Annual Production
Dry Recyclable Fraction of Industrial and Commercial Waste	20,000 tonnes	Paper	20 01 01	20,000 tonnes
		Cardboard	20 01 01	
		Plastics	20 01 39	
		Wood	20 01 38	
		Metals	20 01 40	
		Mixed Municipal/Residual Waste	20 03 01	
		Residual Waste from Materials Recycling Facility	19 12 12	

Table 1.2 Inputs to Waste to Energy Plant (based on nominal capacity of 150,000 tonnes/annum)

Inputs	Annual Usage (tonnes)
Waste	150,000 (375,000 – 500,000m^3)[1]
Water[2]	110,000 m^3
Ammonia (25% solution)[3]	600
Urea[3]	400
Activated Carbon/Lime Mixture	225
Lime[4]	900
Limestone[4]	1,600
Activated Carbon/Lime Mixture[5]	225
Lignite Cokes[5]	100
Cement[6]	1,600
Iron Silicate[6]	600
Natural Gas	202,400 Nm^3

Notes:
1. Density of municipal solid waste varies from 0.3 to 0.4 tonnes/m^3
2. This will be supplied from stored rainwater and groundwater. Depending on rainfall patterns about 36,000m^3 of rainwater will be used with the balance being supplied from groundwater.
3. Either ammonia solution or urea can be used in the Furnace.
4. Either lime or limestone can be used in the Wet Flue Gas Cleaning System.
5. Either activated carbon/lime mixture or lignite cokes will be used in the Tail End Flue Gas Cleaning System.
6. If a solidification plant is installed at the site, either cement or iron silicate can be used.

Table 1.3 Outputs from Waste to Energy Plant (based on nominal capacity of 150,000 tonnes/annum)

The classification and descriptions of the wastes as described below are obtained from the European Waste Catalogue,

Section 19 refers to "Wastes from waste treatment facilities, off-site waste water treatment plants and the water industry"

Section 19 01 refers to "Wastes from incineration or pyrolysis of waste"

Outputs	European Waste Code	Annual Production (tonnes)	Annual Production (m^3)
Electricity	-	105 GWhours	-
Bottom Ash	19 01 12	30,000	18,750[1]
Boiler Ash	19 01 15/19 01 16[2]	1,500 – 3,000	1,875 – 10,000[3]
Flue Gas Cleaning Residues	19 01 13/ 19 01 10[4]	3,500 – 5,000	4,375 – 16,667[5]
Gypsum	19 01 99	1,000	1,000 – 1,429[6]
Metals	19 01 02	2,100	272

Notes:
1. Density of bottom ash is approximately 0.625 tonnes/m^3
2. Boiler ash is expected to be non-hazardous. However, this is dependent on analysis.
3. Density of boiler ash varies from 0.3 to 0.8 tonnes/m^3
4. Flue gas cleaning residues will include a small amount of spent activated carbon/lime mixture
5. Density of flue gas cleaning residues varies from 0.3 to 0.8 tonnes/m^3
6. Density of gypsum varies from 0.7 to 1.0 tonnes/m^3

Table 1.4 Inputs to Waste to Energy Plant (based on maximum design capacity of 180,000 tonnes/annum)

Inputs	Annual Usage (tonnes)
Waste	180,000 (450,000 – 600,000m^3)[1]
Water[2]	112,500 m^3
Ammonia (25% solution)[3]	1,320
Urea[3]	900
Activated Carbon/Lime Mixture	270
Lime[4]	3,960
Limestone[4]	7,200
Activated Carbon/Lime Mixture[5]	270
Lignite Cokes[5]	240
Cement[6]	3,600
Iron Silicate[6]	1,200
Natural Gas	202,400 Nm^3

Notes:
1. Density of municipal solid waste varies from 0.3 to 0.4 tonnes/m^3
2. This will be supplied from stored rainwater and groundwater. Depending on rainfall patterns about 36,000m3 of rainwater will be used with the balance being supplied from groundwater.
3. Either ammonia solution or urea can be used in the Furnace.
4. Either lime or limestone can be used in the Wet Flue Gas Cleaning System.
5. Either activated carbon/lime mixture or lignite cokes will be used in the Tail End Flue Gas Cleaning System.
6. If a solidification plant is installed at the site, either cement or iron silicate can be used.

Table 1.5 Inputs and Outputs to Waste to Energy Plant (based on maximum design capacity of 180,000 tonnes/annum)

The classification and descriptions of the wastes as described below are obtained from the European Waste Catalogue,

Section 19 refers to "Wastes from waste treatment facilities, off-site waste water treatment plants and the water industry"

Section 19 01 refers to "Wastes from incineration or pyrolysis of waste"

Outputs	European Waste Code	Annual Production (tonnes)	Annual Production (m^3)
Electricity	-	105 GWhours	-
Bottom Ash	19 01 12	36,000	22,500[1]
Boiler Ash	19 01 15/19 01 16[2]	1,800 – 3,600	2,250 – 12,000[3]
Flue Gas Cleaning Residues	19 01 13/ 19 01 10[4]	4,200 – 6,000	5,250 – 20,000[5]
Gypsum	19 01 99	1,200	1,200 – 1,714[6]
Metals	19 01 02	2,520	326

Notes:
1. Density of bottom ash is approximately 0.625 tonnes/m^3
2. Boiler ash is expected to be non-hazardous. However, this is dependent on analysis.
3. Density of boiler ash varies from 0.3 to 0.8 tonnes/m^3
4. Flue gas cleaning residues will include a small amount of spent activated carbon/lime mixture
5. Density of flue gas cleaning residues varies from 0.3 to 0.8 tonnes/m^3
6. Density of gypsum varies from 0.7 to 1.0 tonnes/m^3

Appendix 8

E2.1 Proposed Waste Types and Quantities

PROPOSED WASTE TYPES AND QUANTITIES

1. MATERIALS RECYCLING FACILITY

2. TABLE E.2.1 WASTE TYPES AND QUANTITIES

WASTE TYPE	Nominal Capacity		Maximum Capacity	
	TONNES PER ANNUM	TOTAL (over life of site) tonnes[1]	TONNES PER ANNUM	TOTAL (over life of site) tonnes[1]
Household waste collected by or on behalf of the local authority	-	-	-	-
Household waste delivered to civic waste facilities and other bring facilities	-	-	-	-
Other household waste	-	-	-	-
Commercial Waste[2]	20,000	400,000	30,000	600,000
Sewage Sludges	-	-	-	-
Construction and Demolition Waste	-	-	-	-
Industrial Sludges	-	-	-	-
Industrial waste not elsewhere specified	-	-	-	-
Hazardous Waste	-	-	-	-

Notes:
1. This table has been completed on the basis of a site lifespan of 20 years. However, this can be extended with maintenance/replacement of items of equipment.
2. The materials recycling facility is aimed at separately collected fractions of industrial and commercial dry recyclable waste. However, separately collected household waste could also be accepted at this facility.

MATERIALS RECYCLING FACILITY

TABLE E.2.2 HAZARDOUS WASTE TYPES AND QUANTITIES

HAZARDOUS WASTE	European Waste Code	DETAILED DESCRIPTION	Nominal Tonnes Per Annum	Maximum Tonnes Per Annum
Waste Oil		-	-	-
Oil filters		-	-	-
Asbestos		-	-	-
Oil/Sand Mixtures or Mixtures of Oil and Other Material		-	-	-
Wood Preservation Waste		-	-	-
Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal		-	-	-
Wastes from Inorganic Chemical Processes		-	-	-
Wastes from Organic Chemical Processes		-	-	-
Agrochemical Wastes		-	-	-
Infectious Healthcare Waste		-	-	-
Photographic Processing Waste		-	-	-
Paint, inks, adhesives and resins		-	-	-

MATERIALS RECYCLING FACILITY

TABLE E.2.2 HAZARDOUS WASTE TYPES AND QUANTITIES CONTD.

HAZARDOUS WASTE	European Waste Code	DETAILED DESCRIPTION	Nominal Tonnes Per Annum	Maximum Tonnes Per Annum
Batteries and accumulators		-	-	-
Fluorescent tubes and other mercury containing waste		-	-	-
OTHER HAZARDOUS WASTE (APPLICANT TO SPECIFY)		-	-	-

MATERIALS RECYCLING FACILITY

TABLE E.2.3 NON-HAZARDOUS WASTE TYPES

INERT WASTE	Check (if accepted)	European Waste Code	Additional Information
Stones and Soil	☐		
Topsoil	☐		
Brick	☐		
Natural Sand	☐		
Concrete	☐		
Pottery & China	☐		
Asphalt, tar and tarred products	☐		
BIODEGRADABLE WASTE	**Check (if accepted)**	**European Waste Code**	**Additional Information**
Wood & Wood Products	☑	20 01 38	These will be accepted as part of the dry recyclable fraction from commercial/industrial premises for the Materials Recycling Facility[1]
Paper & Paper Products	☑	20 01 01	These will be accepted as part of the dry recyclable fraction from commercial/industrial premises for the Materials Recycling Facility[1]
Vegetable Matter	☐		
Non-Infectious Health-Care Waste	☐		
Natural & Manmade Fibres	☐		
Street Cleaning Residues	☐		
Gully Emptyings	☐		
Septic Tank Sludge	☐		
Dredging spoil	☐		
Food Stuffs	☐		
Oil/Water Mixtures	☐		
Vegetable Oil	☐		
Oil and Fat	☐		
Animal faeces, urine and manure (including spoiled straw) effluent, collected separately and treated off-site	☐		
Animal Blood	☐		

Notes:

1. **The materials recycling facility is aimed at separately collected fractions of industrial and commercial dry recyclable waste. However, separately collected household waste could also be accepted at this facility.**

MATERIALS RECYCLING FACILITY

TABLE E.2.4 OTHER WASTES

OTHER WASTES	Check (if accepted)	European Waste Code	Additional Information
Gypsum based Constructon Materials	☐		
Dried Paints, Dried Varnish & Dried Lacquer	☐		
Foundry Sand & spent blasting grit	☐		
Glass	☑	20 01 02	Glass may come into the Materials Recycling Facility as part of dry recyclable waste
Latex & Rubber Solutions	☐		
Solid, Fully Polymerised Plastics	☑	20 01 39	These will be accepted as part of the dry recyclable fraction from commerical premises for the Materials Recycling Facility
Solid Rubber (excluding tyres)	☐		
Electronic and Electrical Waste	☐		
Waste from incineration or pyrolysis of municipal and similar commercial, industrial and institutional wastes	☐		
OTHER WASTES (APPLICANT TO SPECIFY)	**Check (if accepted)**	**European Waste Code**	**Additional Information**
Ferrous Metals	☑	20 01 40	These will be accepted as part of the dry recyclable fraction from commercial/industrial premises for the Materials Recycling Facility
Non-ferrous Metals	☑	20 01 40	These will be accepted as part of the dry recyclable fraction from commercial/industrial premises for the Materials Recycling Facility.
Mixed Municipal/Residual Waste	☑	20 03 01	Mixed municipal/residual waste may come into the Materials Recycling Facility as part of dry recyclable waste
	☐		
	☐		
	☐		
	☐		

3. WASTE TO ENERGY PLANT

TABLE E.2.1 WASTE TYPES AND QUANTITIES

WASTE TYPE	Nominal Capacity		Maximum Capacity	
	TONNES PER ANNUM	TOTAL (over life of site) tonnes[1]	TONNES PER ANNUM	TOTAL (over life of site) tonnes*
Household waste collected by or on behalf of the local authority, Other household waste, Commercial Waste, Sewage Sludges, Industrial Sludges and Industrial waste not elsewhere specified	150,000 [2]	3,000,000	180,000 [2]	3,600,000
Household waste delivered to civic waste facilities and other bring facilities	-	-	-	-
Construction and Demolition Waste	-	-	-	-
Hazardous Waste	-	-	-	-

Notes:

1. This table has been completed on the basis of a site lifespan of 20 years. However, this can be extended with maintenance/replacement of items of equipment.
2. The expected capacity of the waste to energy plant is 150,000 tonnes/annum. However, the maximum design capacity, depending on calorific value and plant availability, is 180,000 tonnes/annum. The waste will be made up of the following categories of waste:
   - Household waste collected by or on behalf of the local authority
   - Other household waste
   - Commercial Waste
   - Sewage Sludges
   - Industrial Sludges
   - Industrial waste not elsewhere specified

   It is not possible at this stage to provide a detailed breakdown of the anticpated quantities of these types of wastes.

WASTE TO ENERGY PLANT

TABLE E.2.2 HAZARDOUS WASTE TYPES AND QUANTITIES

HAZARDOUS WASTE	European Waste Code	DETAILED DESCRIPTION	Nominal Tonnes Per Annum	Maximum Tonnes Per Annum
Waste Oil		-	-	-
Oil filters		-	-	-
Asbestos		-	-	-
Oil/Sand Mixtures or Mixtures of Oil and Other Material		-	-	-
Wood Preservation Waste		-	-	-
Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal		-	-	-
Wastes from Inorganic Chemical Processes		-	-	-
Wastes from Organic Chemical Processes		-	-	-
Agrochemical Wastes		-	-	-
Infectious Healthcare Waste		-	-	-
Photographic Processing Waste		-	-	-
Paint, inks, adhesives and resins		-	-	-

WASTE TO ENERGY PLANT

TABLE E.2.2 HAZARDOUS WASTE TYPES AND QUANTITIES CONTD.

HAZARDOUS WASTE	European Waste Code	DETAILED DESCRIPTION	Nominal Tonnes Per Annum	Maximum Tonnes Per Annum
Batteries and accumulators		-	-	-
Fluorescent tubes and other mercury containing waste		-	-	-
OTHER HAZARDOUS WASTE (APPLICANT TO SPECIFY)		It is anticipated that a household hazardous waste collection system will be in operation to remove household hazardous waste such as batteries from residual waste. However, if there is some household hazardous waste mixed with the incoming waste, the incineration and gas cleaning systems will be able to deal with this.	-	-

Waste to Energy Plant

Table E.2.3 Non-Hazardous Waste Types

INERT WASTE	Check (if accepted)	European Waste Code	Additional Information
Stones and Soil	☐		
Topsoil	☐		
Brick	☐		
Natural Sand	☐		
Concrete	☐		
Pottery & China	☐		
Asphalt, tar and tarred products	☐		
BIODEGRADABLE WASTE	**Check (if accepted)**	**European Waste Code**	**Additional Information**
Wood & Wood Products	☑	20 01 38	Residual waste may contain some of this material from domestic, commercial or industrial facilities
Paper & Paper Products	☑	20 01 01	Residual waste may contain some of this material from domestic, commercial or industrial facilities
Vegetable Matter	☑	20 01 08	Residual waste may contain some of this material from domestic, commercial or industrial facilities
Non-Infectious Health-Care Waste	☑	20 01 32	This will be accepted at the Waste to Energy Plant
Natural & Manmade Fibres	☑	20 01 10 20 01 11	Residual waste may contain some of this material from domestic, commercial or industrial facilities
Street Cleaning Residues	☑	20 03 03	This will be accepted at the Waste to Energy Plant.
Gully Emptyings	☑	20 03 99	This will be accepted at the Waste to Energy Plant
Septic Tank Sludge	☑	20 03 04	This will be accepted at the Waste to Energy Plant
Dredging spoil	☐		
Food Stuffs	☑	20 01 08	Residual waste may contain some of this material from domestic, commercial or industrial facilities
Oil/Water Mixtures	☐		
Vegetable Oil	☐		
Oil and Fat	☐		
Animal faeces, urine and manure (including spoiled straw) effluent, collected separately and treated off-site	☐		
Animal Blood	☐		

WASTE TO ENERGY PLANT

TABLE E.2.4 OTHER WASTES

OTHER WASTES	Check (if accepted)	European Waste Code	Additional Information
Gypsum based Constructon Materials	☐		
Dried Paints, Dried Varnish & Dried Lacquer	☐		
Foundry Sand & spent blasting grit	☐		
Glass	☑	20 01 02	Residual waste may contain some of this material from domestic, commercial or industrial facilities
Latex & Rubber Solutions	☐		
Solid, Fully Polymerised Plastics	☑	20 01 39	Residual waste may contain some of this material from domestic, commercial or industrial facilities
Solid Rubber (excluding tyres)	☐		
Electronic and Electrical Waste	☐		
Waste from incineration or pyrolysis of municipal and similar commercial, industrial and institutional wastes	☐		
OTHER WASTES (APPLICANT TO SPECIFY)	**Check (if accepted)**	**European Waste Code**	**Additional Information**
Mixed Municipal waste	☑	20 03 01	Indaver will not be sorting residual waste accepted at the Waste to Energy Plant. This material should be separated at source. Therefore the waste accepted at the Waste to Energy Plant may contain small quantities of wood, plastic, paper, etc.
Residual Waste from Materials Recycling Facility	☑	19 12 12	The residual waste from the Materials Recycling Facility will be sent to the Waste to Energy Plant for incineration.
Meat and Bonemeal	☑	02 02 02	This non-hazardous material may be accepted at the Waste to Energy Plant
Wastewater Treatment Sludges	☑	19 08 05 19 02 06	This non-hazardous material may be accepted at the Waste to Energy Plant

Appendix 9

H9.5 Surface Water Emissions

Table 1.14 SURFACE WATER EMISSIONS

(ONE TABLE PER EMISSION POINT)

Emission Point Ref. Nº:	SW1	
Source of Emission:	Surface run-off	
Location of emission point:	Wet drain to west of site	
Grid Ref. (12 digit, 6E, 6N):	306128 E, 270865 N	
Date of commencement:	2004	
Periods of emission (avg.):	The period or periods during which excess surface water is discharged will be dependent on rainfall patterns and cannot be defined exactly.	
Volume to be emitted:	Average/day:	0 m^3/d
	Maximum rate/hour:	50 m^3/h
	Maximum rate/day:	575 m^3/d
Name of receiving water:	River Nanny	
Flow rate in receiving water:	....0.04 m^3 sec^{-1} Dry Weather Flow ....0.25 m^3 sec^{-1} 95%ile flow	
Available waste assimilative capacity: kg/day	**Not available**	

Appendix 10

Air Emissions – Table 1.1

Air Emissions – Table 1.2

1.1 AIR EMISSIONS

(ONE TABLE PER EMISSION POINT)

Emission Point Ref. Nº:			
Name of emission point:	Back-up Generator		
Source of Emission:			
Location of emission point:			
Grid Ref. (12 digit, 6E, 6N):			
Date of commencement:			
Periods of emission (avg.):	60 min/hr	1 hr/day	12 day/yr
Volume to be emitted:	Average/day: m^3/d		
	Maximum rate/hour: 3,702 m^3/h		
	Maximum rate/day: 88,848 m^3/d		
Vent diameter: **Vent height above ground:**	..........m ....m		
Min. efflux velocity:	17.2 m/sec		
Temperature:	Max..........°C	Min..........°C	Avg..........°C
For Combustion Sources: **Volume terms expressed as :**	☐ **wet** √ ☐ **dry**	**__11__%O_2**	

1.2 AIR EMISSIONS CHARACTERISATION

(one table per emission point)

Emission Point Reference Number:___________________________

Parameter name	Prior to treatment				As discharged					
	mg/Nm^3		kg/h		mg/Nm^3		kg/h		kg/year	
	Average	Max	Average	Max	Average	Max	Average	Max	Average	Max
NOx						432		1.6		14016
TOC						259		0.96		8410
CO						4		0.016		140

Appendix 11

Impact Assessment of Backup Generator Emissions

Cumulative Impact Assessment for Particulates, PCDD and PCDF

Annual Average Impact Assessment of SO2

Response to Question No. 5

Question 1:

"Provide completed Tables 1.1 Air Emissions and 1.2 Air Emissions Characterisation for the back-up generator (emission point reference A2.1 given in Attachment H1.4, Drawing No. 2666-22-DR-009). Provide details on any emissions and the impact of such emissions on the environment from operating this generator. Provide details on the monitoring of any such emissions from this generator."

Response:

The back-up generator is expected to run only when both the national grid and the Carranstown incinerator are down. A monthly "test run" of the back-up generator will be carried out for one hour per month. Therefore, the back-up generator is expected to run at most for 12 hours per year. Emissions of NOx, TOC and CO from the back-up generator are detailed in Table 1. For comparison, average emission rates of NOx, TOC and CO from the incinerator are also detailed. Annual emissions from the back-up generator are negligible compared to those from the incinerator. In particular, annual emissions of NOx from the back-up generator are only 0.0006% of those from the incinerator.

Table 1 Air Emission Values From Indaver Ireland, Carranstown, Co. Meath

Daily Average Values	Incinerator: Expected Operating Values		Back-up Generator	
	Emission Rate (g/s)	**Emission Rate (tonnes/annum)(1)**	**Emission Rate (g/s)**	**Emission Rate (tonnes/annum)(2)**
Gaseous & vaporous organic substances expressed as total organic carbon (TOC)	0.035	23	0.27	0.012
Nitrogen Oxides (as NO_2)	5.25	3402	0.44	0.019
Average Value	**Emission Rate (g/s)**	**Emission Rate (tonnes/annum)(1)**	**Emission Rate (g/s)**	**Emission Rate (tonnes/annum)**
Carbon Monoxide	0.7	454	0.004	0.0002

(1) Tonnes per annum for incinerator calculated based on operating conditions of 24 hours per day at design volume flow for 7500 hours/annum.

(2) Tonnes per annum for back-up generator calculated based on operating conditions of 12 hours/annum.

Question 2:

"The maximum air volume to be discharged from emission point reference A1.1 appears to be listed differently in different sections of the application...Please reconcile these figures and confirm that the dispersion model used the correct value."

Response:

The maximum air volume flow from emission point reference A1.1 was 150,980 Nm^3/hr, and the typical air volume flow was 126,000 Nm^3/hr (both are normalised to 273 K, 11% O_2 and 0% H_2O).

Question 3:

"The Cumulative Impact Assessment in Section H1.2 was carried out for NO_2 and SO_2. This should also be carried out for particulates and dioxins."

Response:

Cumulative Impact Assessment for Particulates and PCDD/PCDFs

A cumulative impact assessment for PCDD/PCDFs and particulates has been carried out and is detailed below. The impact of nearby sources was examined where interactions between the plume of the point source under consideration and those of nearby sources can occur. These include:

a. the area of maximum impact of the point source,
b. the area of maximum impact of nearby sources,
c. the area where all sources combine to cause maximum impact[1,2].

The approach taken in the cumulative assessment followed the USEPA recommended Prevention of Significant Deterioration (PSD) Increment approach[2] as outlined in Section 1.2 of the Air Quality Chapter of the EIS.

The current location would be considered a Class II area and thus the PSD applicable to Class II areas has been applied in the current case. Due to the variations in pollutant averaging times and standards between the USA and the EU, only relative PSD can be derived. The relative PSD, as a percentage of the respective National Ambient Air Quality Standards (NAAQS), has be applied to the corresponding EU ambient air quality standards in order to calculate an equivalent PSD increment for Ireland. In the current context, the PSD increment has been applied to zones where significant overlap occurs between plumes from each of the sources. The PSD increment has not been applied per se, as existing facilities were not designed to this standard.

The project's impact area is the geographical area for which the required air quality analysis for PSD increments are carried out. The USEPA has defined the "impact area" as a circular area with a radius extending from the source to the most distant point where dispersion modelling predicts a significant ambient impact will occur irrespective of pockets of insignificant impact occurring within it. Within this impact area, all nearby sources should be modelled, where "nearby" is defined as any point source expected to cause a significant concentration gradient in the vicinity of the proposed new source.

In order to determine compliance, the predicted ground level concentration (based on the full impact analysis and existing air quality data) at each model receptor is compared to the applicable ambient air quality limit value or PSD increment. If the predicted pollutant concentration increase over the baseline concentration is below the applicable increment, and the predicted total ground level concentrations are below the ambient air quality standards, then the applicant has successfully demonstrated compliance.

When an air quality standard or PSD increment is predicted to be exceeded at one or more receptors in the impact area, it should be determined whether the net emissions increase from the proposed source will result in a significant ambient impact at the point of each violation, and at the time the violation is predicted to occur. The source will not be considered to cause or contribute to the violation if its own impact is not significant at any violating receptor at the time of each violation. In relation to nearby sources, Platin Cement is the only significant nearby source of particulates and PCDD/PCDFs. Modelling of particulate and PCDD/PCDF emissions from Marathon Power was not deemed necessary.

The cumulative impact assessment has been carried out to assess the impact of emissions from Indaver Ireland on the surrounding environment. As such, several conservative approximations have been made in regards to the operating details and physical characteristics of the surrounding sources and of Indaver Ireland. In particular, the PCDD/PCDF emissions from Indaver have been modelled at their emission limits, which are significantly higher than their typical emission levels. In addition, all particulate emissions from Platin Cement are assumed to be PM_{10}, and have been modelled at their IPC emission limits under maximum operation. PCDD/PCDF emissions from Platin Cement were estimated using the dioxin and furan emissions inventory recently prepared for the EPA(3). The guidance for assessing cumulative impacts includes assessing everywhere off-site, including within the site boundary of all nearby sources(2). Thus, the results outlined in this chapter, in regards to emissions from nearby sources, may apply to areas on-site within each source (and thus will not fall under the domain of ambient legislation) and will also most likely overestimate the impact of these sources in the surrounding environment.

PM_{10}

The cumulative impact of particulates has been assessed in Table 2. Each individual source has been modelled both separately and as part of the cumulative assessment. Emissions data for the sources used in the cumulative assessment is detailed in Tables 4-5.

The impact of nearby sources has been examined where interactions between the plume of the point source under consideration and those of nearby sources may occur. These locations were:

1) the area of maximum impact of the point source,
2) the area of maximum impact of nearby sources,
3) the area where all sources combine to cause maximum impact(2).

In the area of the maximum impact of Indaver Ireland (Grid Co-ordinate 306500, 271100), the impact from Platin Cement was minor. In relation to the 90.1^{th}%ile of 24-hour concentrations, the cumulative impact at this point was 6% of the limit value in the absence of Indaver Ireland. In the presence of Indaver Ireland, the assessment indicated that there is no significant cumulative impact, with concentrations remaining at 6% of the limit value at this point.

The annual average cumulative assessment was likewise minor at the area of the maximum impact of Indaver Ireland (Grid Co-ordinate 306500, 271100). The overall impact leads to an increase of 1% in the annual average levels leading to a cumulative level of 3% of the limit value.

In the area of the maximum impact of Platin Cement, the impact from Indaver Ireland was very small. In relation to the 90.1th%ile of 24-hour concentrations, the impact of Indaver Ireland at the point of maximum impact of Platin Cement was less than 1% of the limit value.

The annual average cumulative assessment was likewise minor at the area of the maximum impact of each individual source. The overall impact leads to an increase of less than 1% in the annual average level for Platin Cement.

PCDD/PCDFs

The cumulative impact of PCDD/PCDFs has been assessed in Table 3. Each individual source has been modelled both separately and as part of the cumulative assessment. Emissions data for the sources used in the cumulative assessment is detailed in Tables 4-5.

In the area of the maximum impact of Indaver Ireland (Grid Co-ordinate 306455, 271004), the impact from each source was minor. In relation to the annual concentration, the cumulative impact was 0.0002 fg/m^3 in the absence of Indaver Ireland, at the location of the maximum impact from Indaver Ireland Ltd. In the presence of Indaver Ireland, the assessment indicated that the cumulative annual concentrations would be 4.90 fg/m^3 at this location. Hence there is almost no overlap in PCDD/PCDF concentrations from the two sources at this location.

In the area of the maximum impact of each nearby source, the impact from Indaver Ireland was very small. In relation to the annual concentration, the impact of Indaver Ireland at the point of maximum impact of Platin Cement was 0.59 fg/m^3. Because the levels of PCDD/PCDFs from Platin Cement are negligible at the location of the maximum impact from Indaver Ireland Ltd., in the region where both sources combine to cause the maximum impact, the levels are equivalent to those from Indaver Ireland alone.

REFERENCES

(1) USEPA (2003) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1
(2) USEPA (1989) Prevention of Significant Deterioration
(3) EPA (2000) Inventory of Dioxin & Furan Emissions to Air, Land and Water in Ireland for 2000 & 2010 – URS Dames & Moore

Table 2 Assessment of Cumulative Impact of Particulate Emissions (as PM_{10}) ($\mu g/m^3$)

Pollutant	Platin Cement	Indaver Ireland	All Sources Except Indaver	Significance Criteria	All Sources	Limit Value[1]
Impact of each source at Indaver Maximum – 90.1th%ile of 24-hour Averages	2.95 (306500, 271100)	-	2.95 (306500, 271100)	12.5[2]	3.06 (306500, 271100)	50
Impact of each source at Indaver Maximum – Annual Average	0.68 (306500, 271100)	-	0.68 (306500, 271100)	10[2]	1.18 (306500, 271100)	40
Indaver Impact At Maximum of Each Source – 90.1th%ile of 24-hour Averages	0.20 (306300, 271900)	-	-	12.5[2]	0.20 (306300, 271900)c	50
Indaver Impact At Maximum of Each Source – Annual Average	0.051 (306300, 271900)	-	-	10[2]	12.1 (306300, 271900)	40

(1) Directive 1999/30/EC

(2) PSD Increment for PM_{10} applicable in the current application (except for the All Sources scenario).

Note: Grid co-ordinates are National Grid co-ordinates and refer to the location of local maximum

Note: Input information on nearby sources is given in Tables 4-5

Table 3 Assessment of Cumulative Impact of PCDD/PCDF Emissions (fg/m^3)

Pollutant	Platin Cement	Indaver Ireland	All Sources Except Indaver	All Sources	Limit Value
PCDD/PCDF Annual Average	0.135 (305000, 273000)	4.90 (306455, 271004)	0.135 (305000, 273000)	4.90 (306455, 271004)	-
Impact of each source at Indaver Maximum – Annual Average	0.0002 (305000, 273000)	-	0.0002 (305000, 273000)	4.90 (306455, 271004)	-
Indaver Impact At Maximum of Each Source – Annual Average	0.592 (305000, 273000)	-	-	4.90 (306455, 271004)	-

Note: Grid co-ordinates are National Grid co-ordinates and refer to the location of local maximum
Note: Input information on nearby sources is given in Tables 4-5

Table 4 Source Emission Data for Emissions from Indaver Ireland used for Cumulative Assessment

Stack Reference	Stack Height (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temperature (K)	Max Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	Concentration (mg/Nm^3)	Mass Emission (g/s)
Maximum	40	2.0	3.14	373	150980	20.5	PM_{10} – 10 Dioxins – 0.1 ng/m^3	PM_{10} – 0.42 Dioxins – 4.2E-9

Table 5 Source Emission Data For Emissions from Platin Cement used for Cumulative Assessment (1)

Stack Reference	Stack Height (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temperature (K)	Max Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	Concentration (mg/Nm^3)(2)	Mass Emission (g/s)(2)
Kiln 1	106.7	2.3	4.15	513	96,000	12.1	PM_{10} – 120 Dioxins – 0.060 ng/m^3	PM_{10} – 3.2 Dioxins – 1.6E-9
Kiln 2	103.3	3.7	10.8	397	299,000	11.2	PM_{10} – 120 Dioxins – 0.061 ng/m^3	PM_{10} – 0.42 Dioxins – 5.1E-9
Raw Mill 1	32	1.20	1.13	305	62000	17.0	PM_{10} – 100	PM_{10} – 1.72
Coal Mill 1	30	0.71	0.40	303	12000	9.34	PM_{10} – 100	PM_{10} – 0.33
Coal Mill 2	45	1.00	0.79	319	31000	12.8	PM_{10} – 100	PM_{10} – 0.86
Cement Mill 1	30	0.71	0.40	302	14500	11.3	PM_{10} – 100	PM_{10} – 0.40
Cement Mill 2	30	0.96	0.72	303	24000	10.2	PM_{10} – 100	PM_{10} – 0.67
Cement Mill 3	30	0.96	0.72	303	24000	10.2	PM_{10} – 100	PM_{10} – 0.67
Cement Mill 2 Sep	29	2.00	3.14	299	143000	13.8	PM_{10} – 50	PM_{10} – 1.99

(1) Taken from EIS for the site, and also IPC Licence No.268.

(2) Dioxin emissions calculated based on EPA Inventory of Dioxin & Furan Emissions for Ireland(3)

Question 4:

"An assessment of the annual average impact of SO_2 from the emission point reference A1.1 should be included."

Response:

The annual average results for SO_2 are included in Table 6. An annual average limit of 20 μg/m^3 for SO_2 is applied for the protection of vegetation in highly rural areas away from major sources of SO_2 such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the SO_2 limit for the protection of vegetation should be carried out distances greater than:

- 5 kilometers (km) from the nearest motorway or dual carriageway
- 5 km from the nearest industrial installation
- 20 km from a major urban conurbation or more than 5km from other built-up areas

As a guideline, a monitoring station should be indicative of approximately 1000 km^2 of surrounding area. Indaver Ireland Ltd. does not consider the Directive limit for the protection of vegetation should be applied in this case, given the nearby presence of an industrial installation (the site itself) and the presence of a built-up area, Duleek within 5km. Nevertheless, the predicted annual average SO_2 levels reach only 33% of the limit value for the protection of vegetation.

Table 6 Dispersion Model Results – Sulphur Dioxide

Pollutant / Scenario	Background (µg/m³)	Averaging Period	Process Contribution (µg/m³)	Predicted Emission Concentration (µg/Nm³)	Standard[1] (µg/Nm³)
SO_2 / Maximum	4	99.7th%ile of 1-hr means	52	60	350
		99.2th%ile of 24-hr means	20	24	125
		Annual Average	2.6	6.6	20
SO_2 / Design	4	99.7th%ile of 1-hr means	20	28	350
		99.2th%ile of 24-hr means	7	11	125
		Annual Average	1.0	5.0	20
SO_2 / 50% of maximum	4	99.7th%ile of 1-hr means	42	50	350
		99.2th%ile of 24-hr means	15	19	125
		Annual Average	2.3	6.3	20

(1) Directive 1999/30/EC

Question 5:
"Please indicate what reference 28 refers to on p.8 of 35 of Appendix 1.2 of Section H1.2."

Response:
Reference 28 refers to:

UK DETR (1998) Review & Assessment: Pollutant-Specific Guidance, The Stationary Office.

Appendix 12

Possible Impacts on Habitats in Surrounding Areas by Air Emissions

H4.1 Impact on Ecology

Biosphere Environmental Services
29 La Touche Park, Greystones, Co. Wicklow
Tel/Fax (01) 2875249 Mobile 087 2309906 E-mail maddenb@eircom.net

BES

For attention of:
Ms Laura Burke,
Indavar Ireland,
4 Haddington Terrace,
Dun Laoghaire,
Co Dublin.

29th April 2003

Re. Waste Management Facility, Carranstown
Possible Impacts on Habitats in Surrounding Areas by Air Emissions

Dear Ms Burke,

In regards to the query re. possible impacts on habitats within the path of the air emission plume, I can confirm that there are no habitats of significant conservation importance within this area. The habitats present are predominantly pasture grassland, arable land and hedgerows, all widespread habitats of low conservation value.

The nearest designated site of conservation importance is Duleeks Common proposed Natural Heritage Area (site code 1578) which lies approximately 2 km to the south–west of the proposed development site. This is shown by the air dispersion modelling analysis (carried out by Project Management Ltd. and AWN Consultants) to be outside of the range of the air emission plume. Two further sites of conservation importance are located along the River Boyne, the Boyne River Islands Candidate Special Area of Conservation (site code 1862) and Dowth Wetlands proposed Natural Heritage Area (site code 1862). Both of these sites are situated approximately 4 km north-north-west of the proposed development site and are also outside of the range of the air emission plume.

Re. possible impacts on the common species of flora and fauna within the path of the air emission plume, I note that studies carried out by Project Management Ltd. and by AWN Consultants show that all the maximum predicted ground level concentrations of emissions were found to be below Irish and EU air quality standard limits and WHO guideline values. Furthermore, the cumulative emissions from the waste to energy plant and the two other developments in the vicinity did not cause the maximum predicted ground level concentrations of emissions to reach air quality standard limit values and guidelines. As the projected emissions will be well within national and international limit values, I would consider that there would be no significant impacts by air emissions on the flora and fauna within the general area or on designated sites for conservation in the region.

Yours sincerely,

Dr Brian Madden

H4.1 IMPACT ON ECOLOGY

1. CONSTRUCTION IMPACTS AND MITIGATIONS

Construction at the site will be ongoing for approximately 18 to 24 months. Site clearance and construction will involve the removal of some of the existing habitats. A large section of the land under meadow and pasture will be built upon. All of the hedgerows that mark the internal boundaries within the site will be removed and the hedgerow that borders the R152 road will be removed to accommodate a site entrance and road widening. During the construction phase it is possible that some of the remaining hedgerows and ditches could be damaged by earthworks or machinery on site.

The removal of the meadow and pasture grassland habitats is not considered significant as these habitats are of negligible scientific interest and have little conservation value and therefore no mitigation measures are required. The internal hedgerows to be removed have negligible to low ecological value based on the survey and therefore their removal is not predicted to have a significant impact. Therefore no mitigation measures are required. The planting of a new hedgerow along the northwest boundary of the site parallel to the railway line will partly compensate for the loss of these hedgerows.

Measures will be taken during the construction phase to prevent the remaining hedgerows from being damaged. Care will be taken while machinery is operating in the vicinity of the hedgerows and building materials will not be stored within 10 m of the hedgerows. Any sensitive areas will be protected with temporary fencing. Any accidental damage will be repaired using the same tree and shrub species that are already present (ash, hawthorn).

During landscaping of the site, preference will be given to the planting of native tree and shrub species most of which will already be established in the general vicinity. As part of the landscape plan 50,000 saplings are proposed to be planted. It is also proposed to enhance the wildlife value of the site by planting species which are useful to wildlife. Landscaping is discussed in greater detail in Attachment H7.1.

A wet drain in the field adjacent to the western boundary of the site feeds into a tributary of the River Nanny and it is possible that contaminated water could enter the wet drain during the construction phase. Silt traps will be used to prevent any suspended solids from entering the drain. Any potentially polluting substances such as oil, paints or other chemicals will be stored on site in properly bunded areas. These mitigation measures should prevent any contaminated water from entering the drain.

2. OPERATIONAL IMPACTS AND MITIGATION

Atmospheric emissions from waste to energy plant will consist of oxides of nitrogen (NO_x), sulphur dioxide (SO_2), metals and dioxins. Emissions of NO_x and SO_2 could contribute to acid rain which can cause acidification and degradation of ecosystems. These emissions can have local and transboundary effects. Emissions of dioxins and metals could also have a negative impact on flora and fauna, as these chemicals can be toxic at certain concentrations.

Air dispersion modelling (see Attachment HI.2) has predicted a maximum annual average ground level concentration of 18 $\mu g/m^3$ NO_x and 6.6 μ/m^3 SO_2. EU Directive 99/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air sets ground level concentration limit values for the protection of human health and the environment. These limit values came into effect in July 2001. The Directive specifies an annual limit value for the protection of vegetation of 30 $\mu g/m^3$ NO_x and a limit value for the protection of ecosystems of 20 $\mu g/m^3$ SO_2. As the predicted concentrations of NO_X and SO_2 are well below the European limit values it is unlikely that atmospheric emissions from the proposed waste to energy plant will have any negative impacts on the surrounding habitats and ecosystems. Therefore, no further mitigation measures are required other than the design considerations.

The maximum hourly average ground level dioxin concentration is predicted to be 0.0074 pg/m^3 and the maximum predicted annual average concentration is 0.00029 pg/m^3. These predicted concentrations are significantly less than typical background concentrations measured throughout Europe and those measured by the survey on site (0.028 pg/m^3 to 0.046 pg/m^3). Given that the plant will not significantly increase background concentrations of dioxins, there will not be any significant impact on dioxins in vegetation.

CONCLUSIONS

The site is located in an area which has for a long period been intensively managed for agricultural purposes. This has resulted in a limited number of habitats on the site and consequently a low diversity of flora and fauna. The types of flora and fauna encountered on the site are typical of the agricultural area in which the site is located. Mitigation measures will be put in place to prevent any negative impacts occurring and therefore the construction and operation of the proposed development is not predicted to have a significant negative impact on flora and fauna.

Appendix 13

Heat Balance

Heat Balance for Carranstown Incinerator