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

Emission Point Ref. Nº:	AEP-1
Source of Emission:	Proposed Gas Engine No 1
Location :	CHP Plant
Grid Ref. (12 digit, 6E,6N):	247334.1E, 117945.1N
Vent Details Diameter: Height above Ground(m):	 0.35m 16m
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	$72,000m^3/d$
Maximum rate/hour	$3,000m^3/h$	Min efflux velocity	$16.59m.sec^{-1}$
(ii) Other factors			
Temperature	523^0K(max)	^oC(min)	^oC(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____%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/hr 24 hr/day 365 day/yr

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

Emission Point Ref. Nº:	A-EP2
Source of Emission:	Proposed Gas Engine No 2
Location :	CHP Plant
Grid Ref. (12 digit, 6E,6N):	247345.8E, N117949.9N
Vent Details Diameter: Height above Ground(m):	 0.35m 16m
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	$72{,}000 m^3/d$
Maximum rate/hour	m^3/h	Min efflux velocity	$16.59 m.sec^{-1}$
(ii) Other factors			
Temperature	523^0K(max)	^oC(min)	^oC(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____%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/hr 24hr/day 365day/yr

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

Emission Point Ref. Nº:	A-EP-3
Source of Emission:	Proposed Gas Engine-No 3
Location :	CHP Plant
Grid Ref. (12 digit, 6E,6N):	247345.8E, N1179.9N
Vent Details Diameter: Height above Ground(m):	 0.35m 16m
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	$72,000m^3/d$
Maximum rate/hour	m^3/h	Min efflux velocity	$16.59m.sec^{-1}$
(ii) Other factors			
Temperature	523^0K (max)	^oC(min)	^oC(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____%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/hr 24hr/day 365day/yr

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

Emission Point Ref. Nº:	A-EP-4
Source of Emission:	Proposed Gas Flare
Location :	East of CHP Plant
Grid Ref. (12 digit, 6E,6N):	247385E, 117956.9N
Vent Details Diameter: Height above Ground(m):	 2.2m 8.2m
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	m^3/d
Maximum rate/hour	m^3/h	Min efflux velocity	$0.05533 m.sec^{-1}$
(ii) Other factors			
Temperature	$1{,}273^0$ K(max)	ºC(min)	ºC(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____%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)	Only when gas enigines being serviced

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

Emission Point Ref. Nº:	A-EP-5
Source of Emission:	Existing Woodchip Biofilter
Location :	East of Compost Building
Grid Ref. (12 digit, 6E,6N):	247216E, 117831N
Vent Details Diameter: Height above Ground(m):	 757 m^2 3.1m
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	1,200,000m^3/d
Maximum rate/hour	50.000m^3/h	Min efflux velocity	0.0184$m.sec^{-1}$
(ii) Other factors			
Temperature	293ºK(max)	ºC(min)	ºC(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____%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)	60min/hr 24hr/day 365 day/yr

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

Emission Point Ref. Nº:	A-EP6
Source of Emission:	Existing LECA Biofilter
Location :	South East of Compost Building
Grid Ref. (12 digit, 6E,6N):	247239E, 117860N
Vent Details Diameter: Height above Ground(m):	 $251m^2$ 4.45m
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	$1,200,000m^3/d$
Maximum rate/hour	$50,000m^3/h$	Min efflux velocity	$0.05533m.sec^{-1}$
(ii) Other factors			
Temperature	ºC(max)	ºC(min)	ºC(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____$\%O_2$			

(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)	60min/hr 24hr/day 365day/yr

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

Emission Point Ref. Nº:	A-EP7
Source of Emission:	Proposed No 2 LECA Biofilter
Location :	South of Proposed Building No 2
Grid Ref. (12 digit, 6E,6N):	247259E, 117830N
Vent Details Diameter: Height above Ground(m):	 251m^2 4.45
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	1,200,000m^3/d
Maximum rate/hour	50,000m^3/h	Min efflux velocity	0.05533m.sec^{-1}
(ii) Other factors			
Temperature	293^{0}K(max)	^{o}C(min)	^{o}C(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____%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)	_____min/hr _____hr/day _____day/yr

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

Emission Point Ref. Nº:	A-EP8
Source of Emission:	Proposed No 3 LECA Biofilter
Location :	East of Building No 3
Grid Ref. (12 digit, 6E,6N):	247259E, 117830N
Vent Details Diameter: Height above Ground(m):	 251m^2 4.45
Date of commencement:	

Characteristics of Emission :

(i) Volume to be emitted:			
Average/day	m^3/d	Maximum/day	1,200,000m^3/d
Maximum rate/hour	50,000m^3/h	Min efflux velocity	0.05533m.sec^{-1}
(ii) Other factors			
Temperature	293^{0}K(max)	ºC(min)	ºC(avg)
For Combustion Sources: Volume terms expressed as : ☐ wet. ☐ dry. _____%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)	_____min/hr _____hr/day _____day/yr

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

Emission Point Reference Number: ***A-EP1 Gas Engine No 1***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Carbon Monoxide						1400		4.21		36,796	
Oxides of Nitrogen						600		1.8		15,768	
Sulphur Dioxide						500		1.512		13,245	
Total Particulates						130		0.396		3,469	
Non Methane VOC						50		0.144		1261	
HCL						5		0.09		788.4	
HF						5		0.015		132.45	
H_2S						5		0.015		132.45	

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.

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

Emission Point Reference Number: ***AEP-2 Gas Engine No2***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Carbon Monoxide						1400		4.21		36,796	
Oxides of Nitrogen						600		1.8		15,768	
Sulphur Dioxide						500		1.512		13,245	
Total Particulates						130		0.396		3,469	
Non Methane VOC						50		0.144		1261	
HCL						5		0.09		788.4	
HF						5		0.015		132.45	
H_2S						5		0.015		132.45	

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.

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

Emission Point Reference Number: ***AEP-3 Gas Engine No3***

Parameter	Prior to treatment[1]				Brief description of treatment	As discharged[1]					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Carbon Monoxide						1400		4.21		36,796	
Oxides of Nitrogen						600		1.8		15,768	
Sulphur Dioxide						500		1.512		13,245	
Total Particulates						130		0.396		3,469	
Non Methane VOC						50		0.144		1261	
HCL						5		0.09		788.4	
HF						5		0.015		132.45	
H_2S						5		0.015		132.45	

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.

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

Emission Point Reference Number: ***AEP-4 Gas Flare***

Note. Flare will only be operationally intermittently during servicing of the gas engines, so not possible to estimate yearly emission volumes

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Carbon Monoxide						50		0.24			
Oxides of Nitrogen						150		0.36			
Sulphur Dioxide						100		0.5			
Total Particulates						-					
Non Methane VOC						10		0.05			
HCL						5		0.025			
HF						5		0.025			
H_2S						5		0.025			

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.

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

Emission Point Reference Number: ***AEP-5 Existing Woodchip Biofilter***

Parameter	Prior to treatment[1]				Brief description of treatment	As discharged[1]					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Odour Units											

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.

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

Emission Point Reference Number: ***AEP6 Existing LECA Biofilter***

Parameter	Prior to treatment[1]				Brief description of treatment	As discharged[1]					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Odour Units											

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.

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

Emission Point Reference Number: ***AEP-7 Proposed LECA Biofilter***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Odour Units											

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.

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

Emission Point Reference Number: ***AEP-8 Proposed LECA Biofilter***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		g/s			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Odour Units											

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.

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

Emission Point:

Emission Point Ref. Nº:	SW-1
Source of Emission:	Rainwater run-off from yards and buildings
Location :	Out fall from sump
Grid Ref. (10 digit, 5E,5N):	247445E, 117950N
Name of receiving waters:	River Suir
Flow rate in receiving waters:	_____ $m^3.sec^{-1}$ Dry Weather Flow _____ $m^3.sec^{-1}$ 95%ile flow
Available waste assimilative capacity:	kg/day

Emission Details

(i) Volume to be emitted			
Normal/day	m^3	Maximum/day	m^3
Maximum rate/hour	39,240m^3		

The outfall from the storm water attenuation is restricted to a flow rate of 10.96 litres/second, which is the maximum flow that will occur during and after a storm event

(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)	_____min/hr _____hr/day _____day/yr

As emission is rainfall dependent, the period of emission will be intermittent

TABLE E.3(i): EMISSIONS TO SEWER(One page for each emission)

Emission Point: Not Applicable-On Site Wastewater Treatment System

Emission Point Ref. Nº:	
Location of connection to sewer :	
Grid Ref. (10 digit, 5E,5N):	
Name of sewage undertaker:	

Emission Details:

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

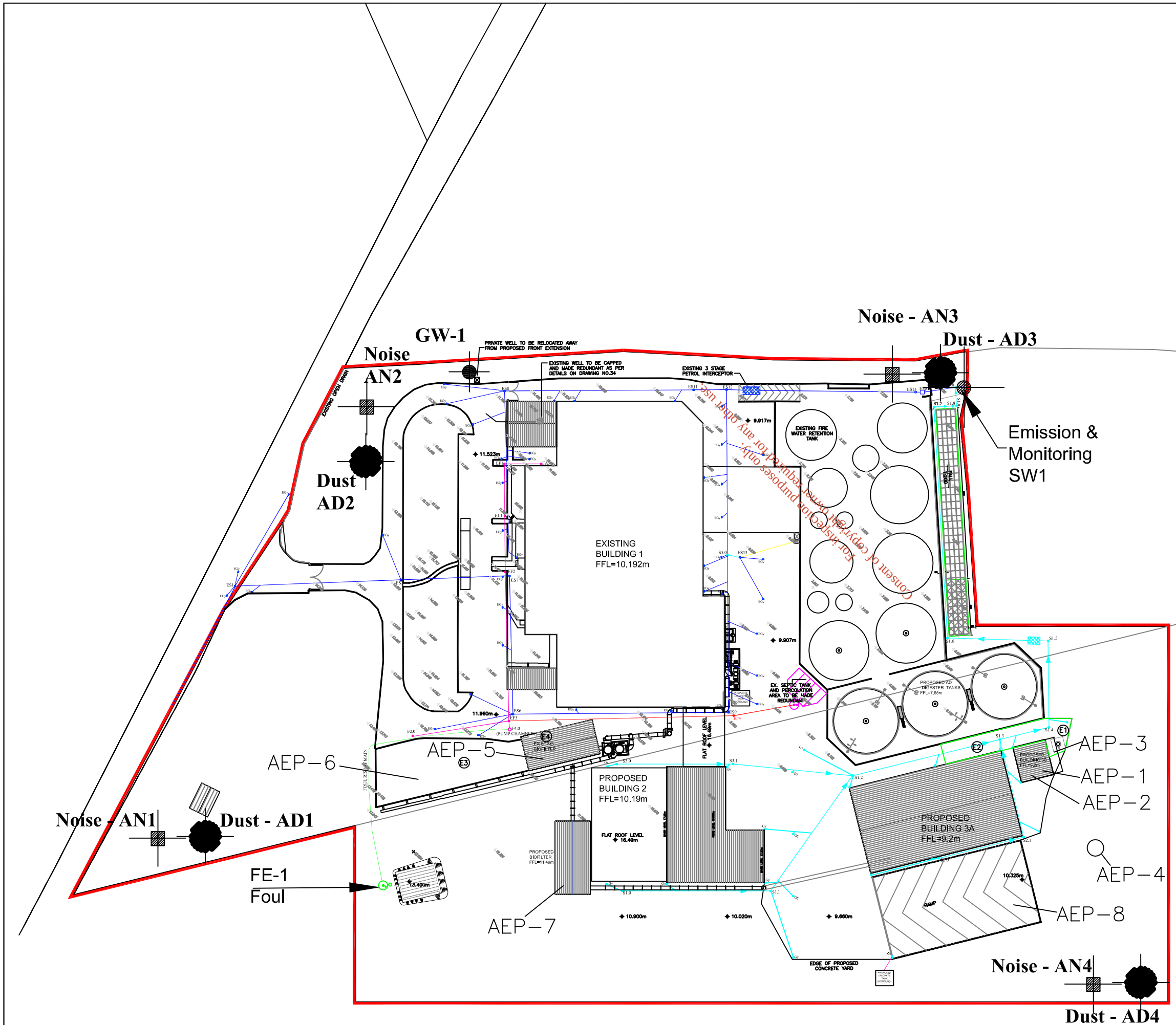
(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations *(start-up /shutdown to be included):*

Periods of Emission (avg)	_____min/hr _____hr/day _____day/yr

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

Emission Point or Area: Percolation Area from Sanitary Wastewater Treatment Plant

Emission Point/Area Ref. Nº:	FE-1
Emission Pathway: (borehole, well, percolation area, soakaway, landspreading, etc.)	Percolation area for new sanitary wastewater treatment plant
Location :	In the south west of site
Grid Ref. (10 digit, 5E,5N):	247220E, 117890N
Elevation of discharge: (relative to Ordnance Datum)	
Aquifer classification for receiving groundwater body:	Regionally Important Aquifer
Groundwater vulnerability assessment (including vulnerability rating):	Low
Identity and proximity of groundwater sources at risk (wells, springs, etc):	None
Identity and proximity of surface water bodies at risk:	None



NOTES

- Noise Monitoring Location
- Dust Monitoring Location
- Surface Water Monitoring Location
- Groundwater Monitoring Location

	X coord	Y coord	
AEP-1	247344.1	117945.1	
AEP-2	247345.8	117949.9	
AEP-3	247345.8	117949.9	
AEP-4	247385	117956.9	
AEP-5	247216	117831	
AEP-6	247239	117860	
AEP-7	247259	117830	
AEP-8	247369.6	117931.1	
AN-1	247210	117810	
AN-2	247439	117825	
AN-3	247444	117940	
AN-4	247210	117810	
AD-1	247211	117807	
AD-2	247437	117823	
AD-3	247440	117935	
AD-4	247215	117930	

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CLIENT
ORMONDE ORGANICS

TITLE
MONITORING LOCATIONS
& EMISSION POINTS
PORTLAW

SCALE	DRAWING No.	REV.
1:500 A3	12193–01	B

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DISPERSION MODELLING ASSESSMENT OF EMISSIONS FROM EXISTING AND PROPOSED BIOLOGICAL TREATMENT FACILITY TO BE LOCATED IN ORMONDE ORGANICS, FIDDOWN, PORTLAW, CO. WATERFORD.

PERFORMED BY ODOUR MONITORING IRELAND ON THE BEHALF OF ORMONDE ORGANICS LTD.

REPORT PREPARED BY:	Dr. Brian Sheridan
REPORT VERSION:	Document Ver.1
ATTENTION:	Mr Martin Morrissey
DATE:	20th Oct 2013
REPORT NUMBER:	2013954(1)
REVIEWERS:	

TABLE OF CONTENTS

Document Amendment Record

Client: ***Ormonde Organics Ltd***

Title: Dispersion modelling assessment of emissions from existing and proposed biological treatment facility to be located in Ormonde organics, Fiddown, Portlaw, Co. Waterford.

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Project Number: 2013954(1)			**DOCUMENT REFERENCE:** Dispersion modelling assessment of emissions from existing and proposed biological treatment facility to be located in Ormonde organics, Fiddown, Portlaw, Co. Waterford.		
2013954(1)	Document for review	B.A.S.	JMC	B.A.S	20/10/2013
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

EXECUTIVE SUMMARY

Odour Monitoring Ireland was commissioned by Ormonde Organics Ltd to perform a dispersion modelling assessment of exhaust gas emissions from the existing and proposed operation of a biological treatment facility to be located in Ormonde Organics, Fiddown, Portlaw, Co. Waterford. Dispersion modelling was performed for the existing facility operations for odour. Dispersion modelling was performed for the proposed facility operations for Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Total particulates, Total non-methane Volatile organic compounds, odours, Hydrogen chloride, Hydrogen fluoride and Hydrogen sulphide. Specific mass emission rates of compounds were collected for historical and library based mass emission data for the odour control systems, gas utilisation engines and flares. These were inputted into the dispersion modelling to allow for the assessment of air quality in the vicinity of the existing and proposed emissions points when in operation.

Dispersion modelling assessment was performed utilising AERMOD Prime (12060) dispersion model. Five years of hourly sequential meteorological data from Rosslare (2002 to 2006 inclusive) was used within the dispersion model. The dispersion modelling assessment was performed in accordance with requirements contained in AG4 – Irish EPA Guidance for dispersion modelling. The total existing and proposed mass limit emission rate of each pollutant was inputted with the source characteristics into the dispersion model in order to assess the maximum predicted ground level concentrations of each pollutant in the vicinity of the facility. This was then compared with statutory and guideline ground level concentration limit values for such pollutants.

The following conclusions are drawn from the study:

1. The assessment was carried out to provide information in line with standard information to be provided regulatory bodies for such projects.

2. Specific dispersion modelling was performed for Odours for the existing facility operations.

3. Specific dispersion modelling was performed for Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Particulate matter, TNMVOC as Benzene, Odour, HCL, HF and H_2S for proposed operations.

4. With regards to odours for the existing facility operations, it is predicted that odour plume spread is in a south easterly direction of approximately 200 metres from the emission points with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Rosslare 2005 (*see Table 4.3*). In accordance with odour impact criterion presented in *Table 2.1*, and in keeping with currently recommended odour impact criterion in this country, no long-term odour impacts will be experienced by receptors in the vicinity of the proposed facility operations. In addition, the predicted ground level concentration of Odour at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1.*

5. With regards to Carbon monoxide for the proposed facility operations, the maximum GLC+Baseline for CO from the operation of the facility is 1,321 µg m^{-3} for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 180 of 2011 and Directive 2008/50/EC, this is 13.21% of the impact criterion. In addition, the predicted ground level concentration of Carbon monoxide at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

6. With regards to Oxides of nitrogen for the proposed facility operations, the maximum GLC+Baseline for NO_2 from the operation of the facility is 94.80µg m^{-3} for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 180 of 2011 and Directive 2008/50/EC, this is 47.40% of the impact criterion. An annual average was also generated to allow comparison with values contained in SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 21.90µg/m^3. When compared the annual average NO_2 air quality impact criterion is 54.75% of the impact criterion. In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

7. With regards to Sulphur dioxide for the proposed facility operations, the maximum GLC+Baseline for SO_2 from the operation of the facility is 148 and 66 µg m^{-3} for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI 180 of 2011 and Directive 2008/50/EC, this is 42.29 and 52.80% of the set target limits established for the 1 hour and 24 hour assessment criteria. An annual average was also generated to allow comparison with SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 10.3 µg/m^3. When compared the annual average SO_2 air quality impact criterion is 51.50% of the impact criterion. In addition, the predicted ground level concentration of Sulphur dioxide at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

8. With regards to Particulate matter for the proposed facility operations, the maximum GLC+Baseline for Particulate matter 10µm from the operation of the facility is 29.10 µg m^{-3} for the maximum 24-hour mean concentration at the 90.40th percentile. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 58.20% of the impact criterion. An annual average was also generated to allow comparison with the SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 24.70 µg/m^3. When compared, the annual average Particulate matter air quality impact is 61.75 % of the impact criterion. An annual average was also generated for $PM_{2.5}$ to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 11.70 µg/m^3. When compared, the annual average $PM_{2.5}$ air quality impact is 46.80% of the impact criterion. In addition, the predicted ground level concentration of Particulate matter at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

9. With regards to TNMVOC as Benzene, the results for the potential air quality impact for dispersion modelling of TNMVOC as Benzene based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2*. TNMVOC as Benzene modelling results indicate that the ambient ground level annual average concentrations could be up to 39.80% of the impact criterion (assuming all TNMVOC is Benzene which will not be the case).

10. With regards to odours for the proposed facility operations, it is predicted that odour plume spread is in a north westerly south easterly direction of approximately 100 to 200 metres from the emission points with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Rosslare 2005. In accordance with odour impact criterion presented in *Table 2.1*, and in keeping with currently recommended

odour impact criterion in this country, no long-term odour impacts will be experienced by receptors in the vicinity of the proposed facility operations. In addition, the predicted ground level concentration of Odour at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1.* A number of key mitigation measures as outlined in *Section 4.1.6* will need to be implemented into the design of the odour containment, capture and treatment system to ensure compliance.

11. With regards to HCL, the maximum GLC+Baseline for HCL from the operation of the facility is 9.81 and 5.68µg/m^3 for the maximum 1-hour mean concentration and max 1 hr 98th percentile concentration. When combined predicted and baseline conditions are compared to guideline limit values, this is 1.31 to 5.68% of the impact criterion. An annual average was also generated to allow comparison with the guideline limits. The maximum predicted annual average ground level concentration in the vicinity of the facility was 0.37µg/m^3. When compared, the annual average HCL air quality impact is 0.46 % of the impact criterion. In addition, the predicted ground level concentration of HCL at each of the 19 sensitive receptors is well within the ground level concentration limit values contained in *Table 2.1*.

12. With regards to HF, the maximum GLC+Baseline for HF from the operation of the facility is 1.65 and 0.95 µg/m^3 for the maximum 1-hour mean concentration and max 1 hr 98th percentile concentration and 0.86 µg/m3 for the maximum 24 hr concentration, respectively. When combined predicted and baseline conditions are compared to guideline limit values, this is 1.03 to 31.67% of the impact criterion. An annual average was also generated to allow comparison with the guideline limits. The maximum predicted annual average ground level concentration in the vicinity of the facility was 0.06 µg/m^3. When compared, the annual average HF air quality impact is 21 % of the impact criterion. In addition, the predicted ground level concentration of HF at each of the 19 sensitive receptors is well within the ground level concentration limit values contained in *Table 2.1*.

13. With regards to H_2S, the maximum GLC+Baseline for H_2S from the operation of the facility is 98 µg/m^3 for the maximum 1-hour mean concentration. When combined predicted and baseline conditions are compared to guideline limit values, this is 70% of the impact criterion. An annual average was also generated to allow comparison with the guideline limits. The maximum predicted annual average ground level concentration in the vicinity of the facility was 5.10µg/m^3. When compared, the annual average H_2S air quality impact is 7.29 % of the impact criterion. In addition, the predicted ground level concentration of H_2S at each of the 19 sensitive receptors is well within the ground level concentration limit values contained in *Table 2.1*.

14. The overall modelling indicates that the facility will not result in any significant impact on air quality in the surrounding area with all ground level concentrations of pollutants well within their respective ground level concentration limit values.

1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland was commissioned by Ormonde Organics Ltd to perform a dispersion modelling assessment of the existing and proposed facility operations for a range of pollutants which could potentially be emitted from the existing and proposed biological treatment facility located in Ormonde Organics Ltd, Fiddown, Portlaw, Co. Waterford.

The assessment allowed for the examination of both short and long term ground level concentrations (GLC's) of compounds as a result of the operation of the existing and proposed emission points – Gas utilisation engine 1 (AEP1), Gas utilisation engine 2 (AEP2), Gas utilisation engine 3 (AEP3), Flare (AEP4) Odour control unit 1 – Existing woodchip biofilter (AEP5). Odour control unit 2 – Existing LECA biofilter (AEP6), Proposed LECA biofilter 2 (AEP7) and Proposed LECA biofilter 3 (AEP8). The main compounds assessed included Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Total particulates, total non-methane volatile organic compounds (as Benzene), Odours, Hydrogen chloride, Hydrogen fluoride and Hydrogen sulphide. Odour were only assessed for the existing facility operations as there are no gas utilisation engines or flares installed on the existing site.

Predicted dispersion modelling GLC's were compared to proposed regulatory / guideline ground level limit values for each pollutant.

The materials and methods, results, discussion of results and conclusions are presented within this document.

1.2 Scope of the work

The main aims of the study included:

- Air dispersion modelling assessment in accordance with AG4 guidance of the existing and proposed mass emission limits of specified pollutants to atmosphere from the biological treatment facility located in Ormonde Organics Ltd, Fiddown, Portlaw, Co. Waterford.
- Assessment whether the predicted ground level concentrations of pollutants are in compliance with ground level concentration limit values as taken from SI 180 of 2011 – Air Quality Regulations, CAFÉ Directive 2008/50/EC, AG4 guidance document, Environment Agency H4 Guidance document and Ta Luft of 2002.

The approach adopted in this assessment is considered a worst-case investigation in respect of emissions to the atmosphere from existing and proposed emission points AEP1 to AEP8. These predictions are therefore most likely to overestimate the GLC's that may actually occur for each modelled scenario. These assumptions are summarised and include:

- Emissions to the atmosphere from the emission points – AEP1 to AEP8 process operation were assumed to occur 24 hours each day / 7 days per week over a standard year at 100% output, excluding AEP4. AEP4 is a flare and will only operate for a period of 1% of the operational year when gas utilisation engine is not operational for service.
- Five years of hourly sequential meteorological data from Rosslare 2002 to 2006 inclusive was screened to assess worst case dispersion year which will provide statistical significant results in terms of the short and long term assessment. This is in keeping with current national and international recommendations. The worst case year Rosslare 2005 was used for data presentation.
- Maximum GLC's + Background were compared with relevant air quality objects and limits;
- All emissions were assumed to occur at maximum potential emission concentration and mass emission rates for each scenario.

- AERMOD Prime (12060) dispersion modelling was utilised throughout the assessment in order to provide the most conservative dispersion estimates.
- Five years of hourly sequential meteorological data from Rosslare 2002 to 2006 inclusive was used in the modelling screen which will provide statistical significant results in terms of the short and long term assessment. The worst case year for Rosslare met station was 2005 and was used for contour plot presentation. This is in keeping with current national and international recommendations (EPA Guidance AG4 and EA Guidance H4). In addition, AERMOD incorporates a meteorological pre-processor AERMET PRO. The AERMET PRO meteorological preprocessor requires the input of surface characteristics, including surface roughness (z0), Bowen Ratio and Albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of Albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc.) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and Albedo and to a distance of 1km for surface roughness in line with USEPA recommendations.
- All building wake effects on all applicable emission points were assessed within the dispersion model using the building prime algorithm (e.g. all buildings / structures / tanks were included).

2. Materials and methods

This section describes the materials and methods used throughout the dispersion modelling assessment.

2.1 Dispersion modelling assessment

2.1.1 Atmospheric dispersion modelling of air quality: What is dispersion modelling?

Any material discharged into the atmosphere is carried along by the wind and diluted by wind turbulence, which is always present in the atmosphere. This process has the effect of producing a plume of air that is roughly cone shaped with the apex towards the source and can be mathematically described by the Gaussian equation. Atmospheric dispersion modelling has been applied to the assessment and control of emissions for many years, originally using Gaussian form ISCST 3. Once the compound emission rate from the source is known, (g s^{-1}), the impact on the vicinity can be estimated. These models can effectively be used in three different ways:

- Firstly, to assess the dispersion of compounds;
- Secondly, in a "reverse" mode, to estimate the maximum compound emissions which can be permitted from a site in order to prevent air quality impact occurring;
- And thirdly, to determine which process is contributing greatest to the compound impact and estimate the amount of required abatement to reduce this impact within acceptable levels (McIntyre et al. 2000).

In this latter mode, models have been employed for imposing emission limits on industrial processes, control systems and proposed facilities and processes (Sheridan et al., 2002).

Any dispersion modelling approach will exhibit variability between the predicted values and the measured or observed values due to the natural randomness of atmospheric environment. A model prediction can, at best, represent only the most likely outcome given the apparent environmental conditions at the time. Uncertainty depends on the completeness of the information used as input to the model as well as the knowledge of the atmospheric environment and the ability to represent that process mathematically. Good input information (emission rates, source parameters, meteorological data and land use characteristics) entered into a dispersion model that treats the atmospheric environment simplistically will produce equally uncertain results as poor information entered into a dispersion model that seeks to simulate the atmospheric environment in a robust manner. It is assumed in this discussion that pollutant emission rates are representative of maximum emission events, source parameters accurately define the point of release and surrounding structures, meteorological conditions define the local atmospheric environment and land use characteristics describe the surrounding natural environment. These conditions are employed within the dispersion modelling assessment therefore providing good confidence in the generated predicted exposure concentration values.

2.1.2 Atmospheric dispersion modelling of air quality: dispersion model selection

The AERMOD model was developed through a formal collaboration between the American Meteorological Society (AMS) and U.S. Environmental Protection Agency (U.S. EPA). AERMOD is a Gaussian plume model and replaced the ISC3 model in demonstrating compliance with the National Ambient Air Quality Standards (Porter et al., 2003) AERMIC (USEPA and AMS working group) is emphasizing development of a platform that includes air turbulence structure, scaling, and concepts; treatment of both surface and elevated sources; and simple and complex terrain. The modelling platform system has three main components: AERMOD, which is the air dispersion model; AERMET, a meteorological data pre-processor; and AERMAP, a terrain data pre-processor (Cora and Hung, 2003).

AERMOD is a Gaussian steady-state model which was developed with the main intention of superseding ISCST3 (NZME, 2002). The AERMOD modeling system is a significant departure from ISCST3 in that it is based on a theoretical understanding of the atmosphere rather than depend on empirical derived values. The dispersion environment is characterized by turbulence theory that defines convective (daytime) and stable (nocturnal) boundary layers instead of the stability categories in ISCST3. Dispersion coefficients derived from turbulence theories are not based on sampling data or a specific averaging period. AERMOD was especially designed to support the U.S. EPA's regulatory modeling programs (Porter at al., 2003)

Special features of AERMOD include its ability to treat the vertical in-homogeneity of the planetary boundary layer, special treatment of surface releases, irregularly-shaped area sources, a three plume model for the convective boundary layer, limitation of vertical mixing in the stable boundary layer, and fixing the reflecting surface at the stack base (Curran et al., 2006). A treatment of dispersion in the presence of intermediate and complex terrain is used that improves on that currently in use in ISCST3 and other models, yet without the complexity of the Complex Terrain Dispersion Model-Plus (CTDMPLUS) (Diosey et al., 2002).

Input data from stack emissions, and source characteristics will be used to construct the basis of the modelling scenarios.

2.2 Air quality impact assessment criteria

The predicted air quality impact from the operation of proposed emission points AEP1 to AEP5 for each scenario is compared to relevant air quality objectives and limits. Air quality standards and guidelines referenced in this report include:

- SI 180 of 2011 – Air Quality Standards Regulations 2011.
- EU limit values set out in the Directives on Air Quality 2008/50/EC.
- Horizontal guidance Note, IPPC H1 and H4, UK Environment Agency.
- AG4 guidance document on dispersion modelling, Environmental Protection Agency.
- Ta Luft of 2002, German regulations

Air quality is judged relative to the relevant Air Quality Standards, which are concentrations of pollutants in the atmosphere, which achieve a certain standard of environmental quality. Air quality Standards are formulated on the basis of an assessment of the effects of the pollutant on public health and ecosystems.

In general terms, air quality standards have been framed in two categories, limit values and guideline values. Limit values are concentrations that cannot be exceeded and are based on WHO guidelines for the protection of human health. Guideline values have been established for long-term precautionary measures for the protection of human health and the environment. European legislation has also considered standard for the protection of vegetation and ecosystems.

The relevant air quality standards for proposed emission sources AEP1 to AEP8 are presented in *Table 2.1*.

2.2.1 Air Quality Guidelines value for air pollutants

Table 2.1 illustrates the guideline and limit values for air quality pollutants in Ireland.

Table 2.1. EU and Irish Limit values set out in the SI 180 of 2011, CAFÉ directive 2008/50/EC, H1 and 4 Guidance documents, AG4 guidance document and Ta Luft of 2002.

POLLUTANT	Objective			
	Concentration	**Maximum No. Of exceedence allowed**	**Exceedence expressed as percentile**	**Measured as**
Nitrogen dioxide and oxides of nitrogen	300 µg m^{-3} NO_2 200 µg m^{-3} NO_2 40 µg m^{-3} NO_2 30 µg m^{-3} NO_2	18 times in a year 18 times in a year -- --	99.79th percentile 99.79th percentile -- --	1 hour mean 1 hour mean Annual mean Annual mean-vegetation
Particulates (PM_{10})	50 µg m^{-3} 40 µg m^{-3}	35 times in a year None	90.40th percentile	24 hour mean Annual mean
Particulates ($PM_{2.5}$)	25 µg m^{-3} – Stage 1 20 µg m^{-3} – Stage 2	None None	-- --	Annual mean Annual mean
Carbon monoxide (CO)	10 mg m^{-3}	None	100th percentile	Running 8 hour mean
Sulphur dioxide (SO_2)	350 µg m^{-3} 125 µg m^{-3} 20 µg m^{-3}	24 times in a year 3 times in a year --	99.73th percentile 99.18th percentile --	1 hour mean 24 hour mean Annual mean and winter mean (1st Oct to 31st March

Table 2.1 continued. EU and Irish Limit values set out in the SI 180 of 2011, CAFÉ directive 2008/50/EC, H1 and 4 Guidance documents, AG4 guidance document and Ta Luft of 2002.

POLLUTANT	Objective			
	Concentration	**Maximum No. Of exceedence allowed**	**Exceedence expressed as percentile**	**Measured as**
Total non-methane VOC's as Benzene	5 µg m^{-3}	None	--	Annual mean
Odour	<1.50 Ou_E/m^3	175 times in a year	98th percentile	1 hour mean
HCL	750 µg m^{-3} 100 µg m^{-3} 80 µg m^{-3}	-- -- --	100th percentile 98th percentile --	1 hour mean 1 hour mean Annual mean
HF	160 µg m^{-3} 3 µg m^{-3} 5 µg m^{-3} 0.30 µg m^{-3}	-- -- -- --	100th percentile 99th percentile 100th percentile	1 hour mean 1 hour mean 24 hour mean Annual mean
H_2S	140 µg m^{-3} 70 µg m^{-3}	-- --	100th percentile --	1 hour mean Annual mean

2.3 Existing Baseline Air Quality

The EPA has been monitoring national Air quality from a number of sites around the country. This information is available from the EPA's website. The values presented for PM_{10}, SO_2, NO_2, and CO give an indication of expected rural imissions of the compounds listed in *Table 2.1*. *Table 2.2* illustrates the baseline data expected to be obtained from rural areas for classical air pollutants. Since the proposed facility is located in a rural area, it would be considered located in a Zone D area according to the EPA's classification of zones for air quality. Traffic and industrial related emissions would be medium.

The results of $PM_{2.5}$ monitoring at Station Road in Cork City in 2007 (EPA, 2007) indicated an average $PM_{2.5}/PM_{10}$ ratio of 0.53 while monitoring in Heatherton Park in 2008 (EPA, 2008) indicated an average $PM_{2.5}/PM_{10}$ ratio of 0.60. Based on this information, a conservative ratio of 0.60 was used to generate a background $PM_{2.5}$ concentration in 2008 of 9.0 µg/m^3 with a value of 10 µg/m^3 recorded in 2010 (*see Table 2.2*)

Table 2.2. Baseline air quality data used to assess air quality impact criterion in a number of Zone D region – Navan and Kilkitt.

Reference air quality data – Source identity	Sulphur dioxide-SO_2 ($\mu g\ m^{-3}$)	Nitrogen dioxide-NO_x as NO_2 ($\mu g\ m^{-3}$)	Particulate matter-PM_{10} ($\mu g\ m^{-3}$)	Carbon monoxide – CO ($mg\ m^{-3}$)	Details
Navan – annual mean (Zone D)	4.20	16.90	23	-	Measured 2008
Navan – 98%ile & mean 24 hr value (Zone D)	9.60	-	23	-	Measured 2008
Navan – 8 hr max (Zone D)	-	-	-	1.04	Measured 2008
Zone B - Heatherton Park – Annual mean $PM_{2.5}$	-	-	9.0 ($PM_{2.5}$) (Heatherton Park)	-	Measured 2008
Kilkitt – annual mean (Zone D)	4.0	8.0 (Castlebar)	8.0		Measured 2009
Kilkitt – 8 hr max (Zone D)				0.40 (Newbridge zone C)	Measured 2009
Zone C - Ennis – Annual mean $PM_{2.5}$	-	-	10	-	Measured 2009
Zone C – Newbridge Benzene Annual mean	-	-	1.40 (Benzene)	-	Measured 2009

Notes: [1] denotes taken from Air quality monitoring report 2008 and 2009, www.epa.ie.

2.4 Meteorological data

Five years of hourly sequential meteorological data was chosen for the modelling exercise (i.e. Rosslare 2002 to 2006 inclusive). A schematic wind rose and tabular cumulative wind speed and directions of all five years are presented in *Section 7*. All five years of met data was screened to provide more statistical significant result output from the dispersion model. This is in keeping with national and international recommendations on quality assurance in operating dispersion models and will provide a worst case assessment of predicted ground level concentrations based on the input emission rate data. Surface roughness, Albedo and Bowen ratio were assessed and characterised around each met station for AERMET Pro processing.

2.5 Terrain data

Topography effects were accounted for within the dispersion modelling assessment Individual sensitive receptors were inputted into the model at their specific height in order to take account of any effects of elevation on GLC's at their specific locations. Topographical data was inputted into the model utilising the AERMAP algorithm. Each receptor was established at a normal breathing height of 1.80 m.

2.6 Building wake effects

Building wake effects are accounted for in modelling scenarios through the use of the Prime algorithm (i.e. all building features located within the facility) as this can have a significant effect on the compound plume dispersion at short distances from the source and can significantly increase GLC's in close proximity to the facility.

3. Results

This section describes the results obtained for the dispersion modelling exercise. All input data and source characteristics were developed in conjunction with engineering drawings for the development.

3.1. Dispersion model input data – Source characteristics

Table 3.1 illustrates the source characteristics utilised within the dispersion model. Grid reference location, stack height (A.G.L), maximum volume flow and temperature of the emission point are presented within this table for reference purposes.

Table 3.1. Source characteristics for proposed emission points AEP1 to AEP8**.**

Parameter	Emission point AEP1 – Gas Engine 1[1]	Emission point AEP2–Gas engine 2[1]	Emission point AEP3–Gas engine 3[1]	Emission point AEP4–Proposed flare[1]
X coordinate	247344.1	247345.8	247345.8	247385
Y coordinate	117945.1	117949.9	117949.9	117956.9
Elevation (A.O.D) (m)	10	10	10	11
Stack height (m)	16	16	16	8.2
Orientation	Vertical	Vertical	Vertical	Vertical
Temperature (K)	523	523	523	1,273
Efflux velocity (m/s)	16.59	16.59	16.59	6.13
Max volume flow (Nm^3/hr)	3,000	3,000	3,000	5,000
Stack tip diameter (m)	0.35	0.35	0.35	2.2
Max building height (AD tank) (m)	13	13	13	13
Max building ground level (m)	10	10	10	10

Table 3.1 continued. Source characteristics for proposed emission points AEP5 to AEP8**.**

Parameter	Emission point AEP5–Existing woodchip biofilter OCU1[2]	Emission point AEP6–Existing LECA biofilter OCU2[2]	Emission point AEP7 – Proposed LECA biofilter OCU3[2]	Emission point AEP8 – Proposed LECA biofilter OCU4[2]
X coordinate	247216 (centre of structure)	247239 (centre of structure)	247259 (centre of structure)	247369.6 (centre of structure)
Y coordinate	117831 (centre of structure)	117860 (centre of structure)	117830 (centre of structure)	117931.1 (centre of structure)
Elevation (A.O.D) (m)	12	11.39	11.39	11.39
Stack height (m)	3.1	4.45	4.45	6.0
Orientation	Vertical-diffuse area source	Vertical-diffuse area source	Vertical-diffuse area source	Vertical-diffuse area source
Temperature (K)	293	293	293	293
Efflux velocity (m/s)	0.0184	0.05533	0.05533	0.084
Max volume flow (Nm^3/hr)	50,000 Am^3/hr	50,000 Am^3/hr	50,000 Am^3/hr	30,000 Am^3/hr
Stack tip diameter (m)	757 m^2	251 m^2	251 m^2	100 m^2
Max building height (AD tank) (m)	13	13	13	13
Max building ground level (m)	10	10	10	10

Notes: [1] denotes referencing conditions for emission point AEP1 to AEP4 are 273.15K, 101.3KPa, dry gas, 5% O_2 for gas engines and 3% O_2 for flare
[2]denotes referencing conditions for emission point AEP5 to AEP8 are 293K, 101.3KPa, wet gas, 20.9% O_2.

3.2 Process emissions - Volume flow rate and flue gas concentration guarantees

The input mass emission rate data used in the dispersion model for each emission point is presented in *Tables 3.2 to 3.9* for each scenario. All source characteristics and location are reported in *Table 3.1*. These will be utilised as process guarantees for the operating process emission point so as to ensure compliance with the stated guideline limits

Table 3.2. Emission values from exhaust stack of the emission source AEP1 - Proposed.

Parameters – Exhaust stack AEP 1	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm^3 5% O_2	3,000	1.17
Oxides of nitrogen (NOx as NO_2)	600	mg/Nm^3 5% O_2	3,000	0.50
Sulphur dioxide (SO_2)	500	mg/Nm^3 5% O_2	3,000	0.42
Total particulates	130	mg/Nm^3 5% O_2	3,000	0.11
Total non-methane Volatile organic compounds	50	mg/Nm^3 5% O_2	3,000	0.040
HCL	5	mg/Nm^3 5% O_2	3,000	0.0250
HF	5	mg/Nm^3 5% O_2	3,000	0.0042
H_2S	5	mg/Nm^3 5% O_2	3,000	0.0042

Table 3.3. Emission values from exhaust stack of the emission source AEP2 - Proposed.

Parameters – Exhaust stack AEP 2	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm^3 5% O_2	3,000	1.17
Oxides of nitrogen (NOx as NO_2)	600	mg/Nm^3 5% O_2	3,000	0.50
Sulphur dioxide (SO_2)	500	mg/Nm^3 5% O_2	3,000	0.42
Total particulates	130	mg/Nm^3 5% O_2	3,000	0.11
Total non-methane Volatile organic compounds	50	mg/Nm^3 5% O_2	3,000	0.040
HCL	5	mg/Nm^3 5% O_2	3,000	0.0250
HF	5	mg/Nm^3 5% O_2	3,000	0.0042
H_2S	5	mg/Nm^3 5% O_2	3,000	0.0042

Table 3.4. Emission values from exhaust stack of the emission source AEP3 - Proposed.

Parameters – Exhaust stack AEP 3	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm^3 5% O_2	3,000	1.17
Oxides of nitrogen (NOx as NO_2)	600	mg/Nm^3 5% O_2	3,000	0.50
Sulphur dioxide (SO_2)	500	mg/Nm^3 5% O_2	3,000	0.42
Total particulates	130	mg/Nm^3 5% O_2	3,000	0.11
Total non-methane Volatile organic compounds	50	mg/Nm^3 5% O_2	3,000	0.040
HCL	5	mg/Nm^3 5% O_2	3,000	0.0250
HF	5	mg/Nm^3 5% O_2	3,000	0.0042
H_2S	5	mg/Nm^3 5% O_2	3,000	0.0042

Table 3.5. Emission values from exhaust stack of the emission source AEP4 - Proposed.

Parameters – Exhaust stack AEP 4	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 3% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	50	mg/Nm^3 3% O_2	5,000	0.069
Oxides of nitrogen (NOx as NO_2)	150	mg/Nm^3 3% O_2	5,000	0.208
Sulphur dioxide (SO_2)	100	mg/Nm^3 3% O_2	5,000	0.139
Total particulates	--	mg/Nm^3 3% O_2	5,000	--
Total non-methane Volatile organic compounds	10	mg/Nm^3 3% O_2	5,000	0.014
HCL	5	mg/Nm^3 3% O_2	5,000	0.007
HF	5	mg/Nm^3 3% O_2	5,000	0.007
H_2S	5	mg/Nm^3 3% O_2	5,000	0.007

Table 3.6. Emission values from exhaust stack of the emission source AEP5 – Existing and Proposed.

Parameters – Exhaust stack AEP 5	Conc. Limit Values	Units	Volume flow (Am^3/hr)	Mass emission rate (Ou_E/s)
Odour units	1,000	Ou_E/m^3	50,000	13,889
Hydrogen sulphide	1	mg/Nm^3	50,000	0.0138 g/s

Table 3.7. Emission values from exhaust stack of the emission source AEP6 – Existing and Proposed.

Parameters – Exhaust stack AEP 6	Conc. Limit Values	Units	Volume flow (Am^3/hr)	Mass emission rate (Ou_E/s)
Odour units	1,000	Ou_E/m^3	50,000	13,889
Hydrogen sulphide	1	mg/Nm^3	50,000	0.0138 g/s

Table 3.8. Emission values from exhaust stack of the emission source AEP7 – Proposed.

Parameters – Exhaust stack AEP 7	Conc. Limit Values	Units	Volume flow (Am^3/hr)	Mass emission rate (Ou_E/s)
Odour units	1,000	Ou_E/m^3	50,000	13,889
Hydrogen sulphide	1	mg/Nm^3	50,000	0.0138 g/s

Table 3.9. Emission values from exhaust stack of the emission source AEP8 - Proposed.

Parameters – Exhaust stack AEP 8	Conc. Limit Values	Units	Volume flow (Am^3/hr)	Mass emission rate (Ou_E/s)
Odour units	700	Ou_E/m^3	30,000	5,834
Hydrogen sulphide	1	mg/Nm^3	30,000	0.0083 g/s

3.3 Dispersion modelling assessment

AERMOD Prime (12060) was used to determine the overall ground level impact of proposed emission points AEP1 to AEP8 located in the biological treatment facility Ormonde Organics site, Fiddown, Portlaw, Co. Waterford. These computations give the relevant GLC's at each 50 and 200-meter X Y Cartesian grid receptor location that is predicted to be exceeded for the specific air quality impact criteria. Individual receptor elevations were established at their specific height above ground and also included a 1.80 m normal breathing zone. A total Cartesian + individual receptors of 1,402 points was established giving a total grid coverage area of 16 square kilometres around the emission points.

Five years of hourly sequential meteorological data from Rosslare (Rosslare 2002 to 2006 inclusive) and source characteristics (*see Table 3.1*), including emission date contained in *Tables 3.2 to 3.6* were inputted into the dispersion model.

In order to obtain the predicted environmental concentration (PEC), background data was added to the process emissions. In relation to the annual averages, the ambient background concentration was added directly to the process concentration. However, in relation to the short-term peak concentrations, concentrations due to emissions from elevated sources cannot be combined in the same way. Guidance from the UK Environment Agency advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum short-term concentration due to emissions from the source to twice the annual mean background concentration.

3.4 Dispersion model Scenarios

AERMOD Prime (USEPA ver. 12060) was used to determine the overall air quality impact of the two existing (AEP5 and AEP6) and five proposed (AEP 1, 2, 3, 4, 7 and 8) combined emission points while in operation at 100% capacity for named air pollutants.

Impacts from the emission points were assessed in accordance with the impact criterion contained in Directive 2008/50/EC, SI 180 of 2011, H1/H4 guidance and AG4 guidance documents.

Twenty one scenarios were assessed within the dispersion model examination for each of the classical air pollutants.

The dispersion modelling is carried out in line with the requirements of guidance document AG4- Dispersion modelling.

The output data was analysed to calculate the following:

Ref Scenario 1: Predicted cumulative ground level concentration of Carbon monoxide emission contribution of cumulative emissions for the 100th percentile of 8 hour averages for Rosslare meteorological station year 2005 for a Carbon monoxide concentration of less than or equal to 200 µg/m^3 assuming 24 hr operation (*see Figure 6.3*).

Ref Scenario 2: Predicted cumulative ground level concentration of Oxides of nitrogen emission contribution of cumulative emissions for the 99.79th percentile of 1 hour averages for Rosslare meteorological station year 2005 for an Oxides of nitrogen concentration of less than or equal to 35 µg/m^3 assuming 24 hr operation (*see Figure 6.4*).

Ref Scenario 3: Predicted cumulative ground level concentration of Oxides of nitrogen emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an Oxides of

nitrogen concentration of less than or equal to 4.20 µg/m^3 assuming 24 hr operation (*see Figure 6.5*).

Ref Scenario 4: Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the 99.73th percentile of 1 hour averages for Rosslare meteorological station year 2005 for an Sulphur dioxide concentration of less than or equal to 100 µg/m^3 assuming 24 hr operation (*see Figure 6.6*).

Ref Scenario 5: Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the 99.18th percentile of 24 hour averages for Rosslare meteorological station year 2005 for an Sulphur dioxide concentration of less than or equal to 40 µg/m^3 assuming 24 hr operation (*see Figure 6.7*).

Ref Scenario 6: Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an Sulphur dioxide concentration of less than or equal to 5.0 µg/m^3 assuming 24 hr operation (*see Figure 6.8*).

Ref Scenario 7: Predicted cumulative ground level concentration of Total particulates as PM_{10} emission contribution of cumulative emissions for the 90.4th percentile of 24 hour averages for Rosslare meteorological station year 2005 for an Total particulates as PM_{10} concentration of less than or equal to 4.4 µg/m^3 assuming 24 hr operation (*see Figure 6.9*).

Ref Scenario 8: Predicted cumulative ground level concentration of Total particulates as PM_{10} emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an Total particulates as PM_{10} concentration of less than or equal to 1.0 µg/m^3 assuming 24 hr operation (*see Figure 6.10*).

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Ref Scenario 9: Predicted cumulative ground level concentration of Total particulates as $PM_{2.5}$ emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an Total particulates as $PM_{2.5}$ concentration of less than or equal to 1.0 µg/m^3 assuming 24 hr operation (*see Figure 6.11*).

Ref Scenario 10: Predicted cumulative ground level concentration of TNMVOC as Benzene emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an TNMVOC as Benzene concentration of less than or equal to 0.40 µg/m^3 assuming 24 hr operation (*see Figure 6.12*).

Ref Scenario 11 Existing: Predicted cumulative ground level concentration of existing Odour emission contribution of cumulative emissions for the 98th percentile of hourly averages for Rosslare meteorological station year 2005 for an Odour concentration of less than or equal to 3.0 Ou_E/m^3 assuming 24 hr operation (*see Figure 6.13*).

Ref Scenario 12 Proposed: Predicted cumulative ground level concentration of Odour emission contribution of cumulative emissions for the 98th percentile of hourly averages for Rosslare meteorological station year 2005 for an Odour concentration of less than or equal to 3.0 Ou_E/m^3 assuming 24 hr operation (*see Figure 6.14*).

Ref Scenario 13: Predicted cumulative ground level concentration of HCL emission contribution of cumulative emissions for the 1 hr maximum value for Rosslare meteorological station year 2005 for a HCL concentration of less than or equal to 7.0 µg/m^3 assuming 24 hr operation (*see Figure 6.15*).

Ref Scenario 14: Predicted cumulative ground level concentration of HCL emission contribution of cumulative emissions for the 98th percentile of 1 hour averages for Rosslare meteorological station year 2005 for an HCL concentration of less than or equal to 3.0 µg/m^3 assuming 24 hr operation (*see Figure 6.16*).

Ref Scenario 15: Predicted cumulative ground level concentration of HCL emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an HCL concentration of less than or equal to 0.20 µg/m^3 assuming 24 hr operation (*see Figure 6.17*).

Ref Scenario 16: Predicted cumulative ground level concentration of HF emission contribution of cumulative emissions for the 1 hr maximum value for Rosslare meteorological station year 2005 for a HF concentration of less than or equal to 1.30 µg/m^3 assuming 24 hr operation (*see Figure 6.18*).

Ref Scenario 17: Predicted cumulative ground level concentration of HF emission contribution of cumulative emissions for the 98th percentile of 1 hour averages for Rosslare meteorological station year 2005 for an HF concentration of less than or equal to 0.50 µg/m^3 assuming 24 hr operation (*see Figure 6.19*).

Ref Scenario 18: Predicted cumulative ground level concentration of HF emission contribution of cumulative emissions for the 100th percentile of 24 hour averages for Rosslare meteorological station year 2005 for an HF concentration of less than or equal to 0.50 µg/m^3 assuming 24 hr operation (*see Figure 6.20*).

Ref Scenario 19: Predicted cumulative ground level concentration of HF emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an HCL concentration of less than or equal to 0.050 µg/m^3 assuming 24 hr operation (*see Figure 6.21*).

Ref Scenario 20: Predicted cumulative ground level concentration of v emission contribution of cumulative emissions for the 1 hr maximum value for Rosslare meteorological station year 2005 for a HF concentration of less than or equal to 1.30 µg/m^3 assuming 24 hr operation (*see Figure 6.22*).

Ref Scenario 21: Predicted cumulative ground level concentration of H_2S emission contribution of cumulative emissions for the Annual average for Rosslare meteorological station year 2005 for an HCL concentration of less than or equal to 0.050 µg/m^3 assuming 24 hr operation (*see Figure 6.23*).

4. Discussion of results

This section will present the results of the dispersion modelling.

AERMOD GIS Pro Prime (Ver. 12060) was used to determine the overall named air pollutant air quality impact of the existing and proposed emission points AEP1 to AEP8 during operation.

Various averaging intervals were chosen to allow direct comparison of predicted GLC's with the relevant air quality assessment criteria as outline in *Section 2.2.1*. In particular, 1-hour, 24 hour, percentile and annual average GLC's of the specified pollutants were calculated at 50 metres distances from the site over a fine and coarse grid extent of 9.0 kilometres squared. Relevant percentiles of these GLC's were also computed for comparison with the relevant pollutant Air Quality Standards to include SI 180 of 2011, Directive 2008/50/EC and AG4 guidance document.

In modelling air dispersion of NOx from combustion sources, the source term should be expressed as NO_2, e.g., NOx mass (expressed as NO_2). Some of the exhaust air is made up of NO while some is made up of NO_2. NO will be converted in the atmosphere to NO_2 but this will depend on a number of factors to include Ozone and VOC concentrations. In order to take account of this conversion the following screening can be performed.

Use the following phased approach for assessment:

Worst case scenario treatment

35% for short-term and 70% for long-term average concentration should be considered to assess compliance with the relevant air quality objective.

This is in accordance with recommendations from the Environmental Agency UK for the dispersion modelling of NO_2 emissions from combustion processes, www.environmentagency.gov.uk

Table 4.1 illustrates the tabular results obtained from the assessment for Rosslare meteorological station for:

- Worst case scenario treatment as detailed above (for NO_x only).

Maximum predicted GLC's are presented within this table to allow for comparison with Directive 2008/50/EC and SI 180 of 2011. In addition, the predicted ground level concentrations at the selected residential receptors are presented in the Discussion of Results section of the document for all pollutants. A total of 19 individual sensitive receptors were included within the dispersion model and the location of same is presented in *Figure 6.1*. Illustrative contour plots for information purposes only are presented in *Section 6* of this report for each modelled scenario.

Table 4.1. Predicted ground level concentrations for various averaging periods for existing and proposed emission points AEP1 to AEP8 for each pollutant at or beyond the boundary of the facility.

Averaging period	Maximum ground level conc (GLC)
Carbon monoxide - 8 hr maximum GLC (µg/m^3)	281
Oxides of nitrogen - 1 hr max 99.79th percentile (µg/m^3)	61
Oxides of nitrogen - Max Annual average (µg/m^3)	5
Sulphur dioxide - 1 hr Max 99.73th percentile (µg/m^3)	140
Sulphur dioxide - 24 hr Max 99.18th percentile (µg/m^3)	58
Sulphur dioxide – Max annual average (µg/m^3)	6.30
Total particulates - 24 hr Max 90.40th percentile (µg/m^3)	6.10
Total Particulates as PM_{10} - Max annual average (µg/m^3)	1.70
Total Particulates as $PM_{2.5}$ - Max annual average (µg/m^3)	1.70
TNMVOC as benzene – Max Annual average	0.59
HCL – 1 hr max (µg/m^3)	9.81
HCL – 1 hr 98th %ile (µg/m^3)	5.68
HCL – Max annual average (µg/m^3)	0.37
HF – 1 hr max (µg/m^3)	1.65
HF – 1 hr 98th %ile (µg/m^3)	0.95
HF – 24 hr max (µg/m^3)	0.86
HF – Max annual average (µg/m^3)	0.063
H_2S – 1 hr max (µg/m^3)	109
H_2S – Max annual average (µg/m^3)	5.10

Table 4.2 presents the comparison between model predictions for air quality impacts, baseline air quality concentrations for the compounds and the percentage impact of the air quality impact criterion anywhere in the vicinity of the facility.

4.1 Assessment of air quality impacts for pollutants from existing and proposed emission points AEP1 to AEP8

Predictive air dispersion modelling was used to ascertain the maximum ground level concentrations at or beyond the boundary of the facility of selected worst case pollutant concentration to allow for comparison with the ground level limit values contained in *Table 2.1*. *Table 4.2* illustrates the results of the dispersion modelling assessment for each pollutant and comparison with the air quality guideline and limit values contained in *Table 2.1*.

Table 4.2. Comparison between predicted GLC's + baseline national air quality data and limit values contained in *Table 2.1*.

Identity	Predicted %ile GLC - (µg m^{-3})	Baseline conc. value (µg m^{-3})[1]	Baseline + Maximum predicted GLC (µg m^{-3})	Impact criterion (µg m^{-3})[2]	% of Criterion
Carbon monoxide - 8 hr maximum GLC (µg/m^3)	281	1,040	1,321.00	10,000	13.21
Oxides of nitrogen - 1 hr max 99.79th percentile (µg/m^3)	61	33.80 (Twice annual mean as per EA)	94.80	200	47.40
Oxides of nitrogen - Max Annual average (µg/m^3)	5	16.90	21.90	40	54.75
Sulphur dioxide - 1 hr Max 99.73th percentile (µg/m^3)	140	8.0 (Twice annual mean as per EA)	148.00	350	42.29
Sulphur dioxide - 24 hr Max 99.18th percentile (µg/m^3)	58	8.0	66.00	125	52.80
Sulphur dioxide – Max annual average (µg/m^3)	6.30	4.0	10.30	20	51.50
Total particulates - 24 hr Max 90.40th percentile (µg/m^3)	6.10	23	29.10	50	58.20
Total Particulates as PM_{10} - Max annual average (µg/m^3)	1.70	23	24.70	40	61.75
Total Particulates as $PM_{2.5}$ - Max annual average (µg/m^3)	1.70	10.0	11.70	25	46.80
TNMVOC as benzene	0.59	1.40	1.99	5	39.80
HCL – 1 hr max (µg/m^3)	9.81	--	9.81	750	1.31
HCL – 1 hr 98th %ile (µg/m^3)	5.68	--	5.68	100	5.68
HCL – Max annual average (µg/m^3)	0.37	--	0.37	80	0.46
HF – 1 hr max (µg/m^3)	1.65	--	1.65	160	1.03
HF – 1 hr 98th %ile (µg/m^3)	0.95	--	0.95	3	31.67
HF – 24 hr max (µg/m^3)	0.86	--	0.86	5	17.20
HF – Max annual average (µg/m^3)	0.063	--	0.06	0.3	21.00
H_2S – 1 hr max (µg/m^3)	98	--	98.00	140	70.00
H_2S – Max annual average (µg/m^3)	5.10	--	5.10	70	7.29

Notes: [1] denotes based on data presented in *Tables 3.1 to 3.9 and 4.1,*
[2] denotes for impact criterion *see Table 2.1.*

As can be observed in *Table 4.2*, the predicted maximum averaging ground level concentration and baseline concentration are presented as a % of the impact criterion contained in *Tables 2.1*.

4.1.1 Carbon monoxide – Ref Scenario 1

The results for the potential air quality impact for dispersion modelling of CO based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for CO from the operation of the facility is 1,321 µg m^{-3} for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 180 of 2011 and Directive 2008/50/EC, this is 13.21% of the impact criterion.

In addition, the predicted ground level concentration of Carbon monoxide at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

4.1.2 Oxides of nitrogen – Ref Scenario 2 and 3

The results for the potential air quality impact for dispersion modelling of NO_X as NO_2 based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for NO_2 from the operation of the facility is 94.80 µg m^{-3} for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 180 of 2011 and Directive 2008/50/EC, this is 47.40% of the impact criterion.

An annual average was also generated to allow comparison with values contained in SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 21.90 µg/m^3. When compared the annual average NO_2 air quality impact criterion is 54.75% of the impact criterion.

In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

4.1.3 Sulphur dioxide – Ref Scenario 4, 5 and 6

The results for the potential air quality impact for dispersion modelling of SO_2 based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for SO_2 from the operation of the facility is 148 and 66 µg m^{-3} for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI 180 of 2011 and Directive 2008/50/EC, this is 42.29 and 52.80% of the set target limits established for the 1 hour and 24 hour assessment criteria.

An annual average was also generated to allow comparison with SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 10.30 µg/m^3. When compared the annual average SO_2 air quality impact criterion is 51.50% of the impact criterion.

In addition, the predicted ground level concentration of Sulphur dioxide at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

4.1.4 Particulate matter – Ref Scenario 7, 8 and 9

The results for the potential air quality impact for dispersion modelling of Particulate matter based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for Particulate matter 10µm from the operation of the facility is 29.10 for the maximum 24-hour mean concentration at the 90.40th percentile. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 58.20% of the impact criterion.

An annual average was also generated to allow comparison with the SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 24.70µg/m^3. When compared, the annual average Particulate matter air quality impact is 61.75 % of the impact criterion.

An annual average was also generated for $PM_{2.5}$ to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 11.70 µg/m^3. When compared, the annual average $PM_{2.5}$ air quality impact is 46.80% of the impact criterion.

In addition, the predicted ground level concentration of Particulate matter at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

4.1.5 TNMVOC as Benzene – Ref Scenario 10

The results for the potential air quality impact for dispersion modelling of TNMVOC as Benzene based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2*. TNMVOC as Benzene modelling results indicate that the ambient ground level annual average concentrations could be up to 39.80% of the impact criterion (assuming all TNMVOC is Benzene which will not be the case).

4.1.6 Odour – Ref Scenario 11 and 12

The results for the potential air quality impact for dispersion modelling of Odour based on the process guaranteed emission rates in *Tables 3.6 to 3.9* are presented in *Table 4.3 and Figures 6.13 and 6.14*. Odour modelling results indicate that the ambient ground level concentrations are below the relevant guideline odour air quality guideline value for both the existing and proposed facility operation.

As can be observed in *Figure 6.13* for the existing facility operation, it is predicted that odour plume spread is in a south easterly direction of approximately 200 metres from the emission points with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Rosslare 2005. In accordance with odour impact criterion presented in *Table 2.1*, and in keeping with currently recommended odour impact criterion in this country, no long-term odour impacts will be experienced by receptors in the vicinity of the existing facility operations.

With regards to the proposed facility operations, as can be observed in *Figure 6.14*, it is predicted that odour plume spread is in a south easterly to easterly direction of approximately 200 metres from the emission points with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Rosslare 2005. In accordance with odour impact criterion presented in *Table 2.1*, and in keeping with currently recommended odour impact criterion in this country, no long-term odour impacts will be experienced by receptors in the vicinity of the proposed facility operations.

A number of key mitigation measures will need to be implemented into the design of the odour containment, capture and treatment system to include:

1. All new buildings should be fitted with a high integrity building fabric with a leakage rate of no greater than 3 m^3/m^2/hr at 50Pa.
2. The facility buildings should be capable of attaining a negative pressure value of at least 10 to 15 Pa when ventilation is applied and the facility is in operation.
3. All sumps, tanks etc. should be sealed with tight fitting high containment efficiency covers so as to prevent the release of odours from such processes.
4. All mechanical processes within the pre-treatment building should be placed under appropriate negative pressure so as to ensure no significant odour release to the headspace of the building.
5. All building should be fitted with appropriate roller doors / access points of sealed nature (max leakage rate of 10 m^3/m^2/hr at 20Pa).
6. All buildings / processes holding or processing material with the potential to generate odours shall be placed under negative ventilation with all odourous air ducted to an appropriate odour control system for treatment. The odour control system shall be capable of providing treatment of odourous air to a level of between 700 and 1,000 Ou_E/m^3 in the treated exhaust air stream.
7. All process specifications shall be independently processed proved including odour control system performance, building integrity testing (leakage rate, smoke integrity testing and applied absolute pressure testing) so as to ensure the containment, capture and treatment systems installed at the facility are functioning adequately. This shall be only carried out by personnel experienced in this method of testing.
8. An odour management plan shall be developed for the operating facility so as to ensure adequate operation of all odour management systems on a day to day basis.

4.1.7 HCL – Ref Scenario 13, 14 and 15

The results for the potential air quality impact for dispersion modelling of HCL based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for HCL from the operation of the facility is 9.81 and 5.68µg/m^3 for the maximum 1-hour mean concentration and max 1 hr 98th percentile concentration. When combined predicted and baseline conditions are compared to guideline limit values contained *in Table 2.1*, this is 1.31 to 5.68% of the impact criterion.

An annual average was also generated to allow comparison with the guideline limits contained in *Table 2.1*. The maximum predicted annual average ground level concentration in the vicinity of the facility was 0.37µg/m^3. When compared, the annual average HCL air quality impact is 0.46 % of the impact criterion.

In addition, the predicted ground level concentration of HCL at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

4.1.8 HF – Ref Scenario 16, 17, 18 and 19

The results for the potential air quality impact for dispersion modelling of HF based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for HF from the operation of the facility is 1.65 and 0.95 µg/m^3 for the maximum 1-hour mean concentration and max 1 hr 98th percentile concentration and 0.86 µg/m^3 for the maximum 24 hr concentration, respectively. When combined predicted and baseline conditions are compared to guideline limit values contained *in Table 2.1*, this is 1.03 to 31.67% of the impact criterion.

An annual average was also generated to allow comparison with the guideline limits contained in *Table 2.1*. The maximum predicted annual average ground level concentration in the vicinity

of the facility was 0.06 µg/m^3. When compared, the annual average HF air quality impact is 21 % of the impact criterion.

In addition, the predicted ground level concentration of HF at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

4.1.9 H_2S – Ref Scenario 20 and 21

The results for the potential air quality impact for dispersion modelling of H_2S based on process guaranteed emission rates in *Tables 3.6 to 3.9* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for H_2S from the operation of the facility is 98 µg/m^3 for the maximum 1-hour mean concentration. When combined predicted and baseline conditions are compared to guideline limit values contained *in Table 2.1*, this is 70% of the impact criterion.

An annual average was also generated to allow comparison with the guideline limits contained in *Table 2.1*. The maximum predicted annual average ground level concentration in the vicinity of the facility was 5.10µg/m^3. When compared, the annual average H_2S air quality impact is 7.29 % of the impact criterion.

In addition, the predicted ground level concentration of H_2S at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

Table 4.3. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations Rec 1 to Rec 19 for Scenarios 1 to 11 (*see Section 4 and Figure 6.1 / 6.2*).

Receptor identity	X coord (m)	Y coord (m)	Scen 1 - (µg/m^3)	Scen 2 - (µg/m^3)	Scen 3 - (µg/m^3)	Scen 4 - (µg/m^3)	Scen 5 - (µg/m^3)	Scen 6 - (µg/m^3)	Scen 7 - (µg/m^3)	Scen 8 -(µg/m^3)	Scen 9 -(µg/m^3)	Scen 10 -(µg/m^3)	Scen 11 - (Ou_E/m^3)
R1	246668.4	117437.1	59.82	18.08	0.45	13.61	3.28	0.38	0.37	0.10	0.10	0.04	0.20
R2	246270.5	118243.7	15.40	11.45	0.14	8.23	2.33	0.12	0.07	0.03	0.03	0.01	0.02
R3	246526.7	118601.3	25.13	12.86	0.18	9.51	3.12	0.15	0.10	0.04	0.04	0.01	0.05
R4	246737.8	118150.8	37.52	24.23	0.38	19.28	4.89	0.32	0.21	0.08	0.08	0.03	0.23
R5	246877	118324	65.07	36.61	0.64	28.63	8.49	0.54	0.30	0.14	0.14	0.05	0.30
R6	246965	118227.7	94.00	50.89	0.90	38.66	11.14	0.75	0.52	0.20	0.20	0.07	0.47
R7	246994.1	118138.7	86.08	53.82	0.89	41.40	11.16	0.74	0.56	0.19	0.19	0.07	0.68
R8	247268	117397.4	44.29	29.03	0.71	20.46	5.21	0.60	0.56	0.16	0.16	0.06	0.70
R9	247298.3	117239.8	44.40	19.92	0.56	14.83	5.01	0.47	0.41	0.12	0.12	0.04	0.39
R10	247179	117077.4	18.66	12.48	0.29	8.89	2.20	0.24	0.23	0.06	0.06	0.02	0.16
R11	247223.9	117318.2	28.03	20.39	0.50	14.95	3.68	0.42	0.42	0.11	0.11	0.04	0.41
R12	247861	118575.7	37.27	24.94	1.25	20.63	6.44	1.05	0.78	0.27	0.27	0.10	0.38
R13	246465.8	118581.4	17.43	11.85	0.16	9.60	2.64	0.14	0.10	0.04	0.04	0.01	0.05
R14	246498.4	117830.3	49.53	29.78	0.45	18.94	5.30	0.38	0.35	0.10	0.10	0.04	0.09
R15	246797.3	118074	54.54	33.75	0.52	25.63	6.38	0.44	0.32	0.12	0.12	0.04	0.34
R16	247318.4	117284.8	54.27	23.38	0.66	17.24	6.09	0.56	0.48	0.15	0.15	0.05	0.52
R17	247261.3	117194	30.51	16.32	0.45	12.55	3.62	0.38	0.35	0.10	0.10	0.04	0.29
R18	247276.9	117346.4	44.24	25.62	0.65	19.32	5.11	0.55	0.51	0.14	0.14	0.05	0.57
R19	247300.8	117201.5	40.90	16.79	0.52	13.16	4.61	0.44	0.37	0.11	0.11	0.04	0.34

Table 4.3 continued. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations Rec 1 to Rec 19 for Scenarios 12 to 21 (*see Section 4 and Figure 6.1 / 6.2*).

Receptor identity	X coord (m)	Y coord (m)	Scen 12 - (Ou_E/m^3)	Scen 13 - ($\mu g/m^3$)	Scen 14 - ($\mu g/m^3$)	Scen 15 ($\mu g/m^3$)	Scen 16 ($\mu g/m^3$)	Scen 17 - ($\mu g/m^3$)	Scen 18 - ($\mu g/m^3$)	Scen 19 - ($\mu g/m^3$)	Scen 20 - ($\mu g/m^3$)	Scen 21 - ($\mu g/m^3$)
R1	246668.4	117437.1	0.31	2.76	0.24	0.02	0.46	0.04	0.08	0.004	11.16	0.05
R2	246270.5	118243.7	0.04	1.69	0.06	0.01	0.28	0.01	0.03	0.001	1.82	0.01
R3	246526.7	118601.3	0.09	1.58	0.12	0.01	0.27	0.02	0.04	0.002	3.53	0.01
R4	246737.8	118150.8	0.41	4.10	0.21	0.02	0.69	0.04	0.07	0.003	8.95	0.06
R5	246877	118324	0.56	3.51	0.42	0.03	0.59	0.07	0.15	0.005	11.65	0.08
R6	246965	118227.7	0.85	5.44	0.60	0.04	0.91	0.10	0.19	0.008	14.60	0.11
R7	246994.1	118138.7	1.14	6.44	0.56	0.04	1.08	0.09	0.15	0.007	14.79	0.13
R8	247268	117397.4	1.05	3.46	0.47	0.04	0.58	0.08	0.06	0.006	16.64	0.13
R9	247298.3	117239.8	0.59	3.33	0.35	0.03	0.56	0.06	0.06	0.005	13.85	0.08
R10	247179	117077.4	0.26	1.26	0.19	0.01	0.21	0.03	0.03	0.002	16.14	0.05
R11	247223.9	117318.2	0.62	1.90	0.33	0.03	0.32	0.06	0.05	0.004	24.98	0.09
R12	247861	118575.7	0.66	1.46	0.58	0.06	0.25	0.10	0.09	0.010	12.67	0.09
R13	246465.8	118581.4	0.09	1.66	0.10	0.01	0.28	0.02	0.03	0.001	2.82	0.01
R14	246498.4	117830.3	0.16	6.98	0.21	0.02	1.17	0.04	0.06	0.004	6.18	0.02
R15	246797.3	118074	0.59	4.07	0.30	0.03	0.68	0.05	0.09	0.004	12.45	0.08
R16	247318.4	117284.8	0.79	4.01	0.41	0.03	0.67	0.07	0.07	0.006	19.23	0.10
R17	247261.3	117194	0.45	2.42	0.28	0.02	0.41	0.05	0.04	0.004	14.73	0.07
R18	247276.9	117346.4	0.85	3.85	0.42	0.03	0.65	0.07	0.06	0.005	14.53	0.11
R19	247300.8	117201.5	0.50	2.99	0.32	0.03	0.50	0.05	0.05	0.004	11.88	0.07

5. Conclusions

Odour Monitoring Ireland was commissioned by Ormonde Organics Ltd to perform a dispersion modelling study of the existing and proposed biological treatment facility located in Fiddown, Portlaw, Co. Waterford. Following a detailed impact and dispersion modelling assessment, it was demonstrated that no significant environmental impact will exist if the source characteristics and emission limit value in the waste gases are achieved.

The following conclusions are drawn from the study:

1. The assessment was carried out to provide information in line with standard information to be provided regulatory bodies for such projects.

2. Specific dispersion modelling was performed for Odours for the existing facility operations.

3. Specific dispersion modelling was performed for Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Particulate matter, TNMVOC as Benzene, Odour, HCL, HF and H_2S for proposed operations.

4. With regards to odours for the existing facility operations, it is predicted that odour plume spread is in a south easterly direction of approximately 200 metres from the emission points with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Rosslare 2005 (*see Table 4.3*). In accordance with odour impact criterion presented in *Table 2.1*, and in keeping with currently recommended odour impact criterion in this country, no long-term odour impacts will be experienced by receptors in the vicinity of the proposed facility operations. In addition, the predicted ground level concentration of Odour at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1.*

5. With regards to Carbon monoxide for the proposed facility operations, the maximum GLC+Baseline for CO from the operation of the facility is 1,321 µg m^{-3} for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 180 of 2011 and Directive 2008/50/EC, this is 13.21% of the impact criterion. In addition, the predicted ground level concentration of Carbon monoxide at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

6. With regards to Oxides of nitrogen for the proposed facility operations, the maximum GLC+Baseline for NO_2 from the operation of the facility is 94.80µg m^{-3} for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 180 of 2011 and Directive 2008/50/EC, this is 47.40% of the impact criterion. An annual average was also generated to allow comparison with values contained in SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 21.90µg/m^3. When compared the annual average NO_2 air quality impact criterion is 54.75% of the impact criterion. In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

7. With regards to Sulphur dioxide for the proposed facility operations, the maximum GLC+Baseline for SO_2 from the operation of the facility is 148 and 66 µg m^{-3} for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI

180 of 2011 and Directive 2008/50/EC, this is 42.29 and 52.80% of the set target limits established for the 1 hour and 24 hour assessment criteria. An annual average was also generated to allow comparison with SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 10.3 µg/m^3. When compared the annual average SO_2 air quality impact criterion is 51.50% of the impact criterion. In addition, the predicted ground level concentration of Sulphur dioxide at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

8. With regards to Particulate matter for the proposed facility operations, the maximum GLC+Baseline for Particulate matter 10µm from the operation of the facility is 29.10 µg m^{-3} for the maximum 24-hour mean concentration at the 90.40th percentile. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 58.20% of the impact criterion. An annual average was also generated to allow comparison with the SI 180 of 2011 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 24.70 µg/m^3. When compared, the annual average Particulate matter air quality impact is 61.75 % of the impact criterion. An annual average was also generated for $PM_{2.5}$ to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 11.70 µg/m^3. When compared, the annual average $PM_{2.5}$ air quality impact is 46.80% of the impact criterion. In addition, the predicted ground level concentration of Particulate matter at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1*.

9. With regards to TNMVOC as Benzene, the results for the potential air quality impact for dispersion modelling of TNMVOC as Benzene based on process guaranteed emission rates in *Tables 3.2 to 3.5* are presented in *Tables 4.1 and 4.2*. TNMVOC as Benzene modelling results indicate that the ambient ground level annual average concentrations could be up to 39.80% of the impact criterion (assuming all TNMVOC is Benzene which will not be the case).

10. With regards to odours for the proposed facility operations, it is predicted that odour plume spread is in a north westerly south easterly direction of approximately 100 to 200 metres from the emission points with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Rosslare 2005. In accordance with odour impact criterion presented in *Table 2.1*, and in keeping with currently recommended odour impact criterion in this country, no long-term odour impacts will be experienced by receptors in the vicinity of the proposed facility operations. In addition, the predicted ground level concentration of Odour at each of the 19 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 2.1.* A number of key mitigation measures as outlined in *Section 4.1.6* will need to be implemented into the design of the odour containment, capture and treatment system to ensure compliance.

11. With regards to HCL, the maximum GLC+Baseline for HCL from the operation of the facility is 9.81 and 5.68µg/m^3 for the maximum 1-hour mean concentration and max 1 hr 98th percentile concentration. When combined predicted and baseline conditions are compared to guideline limit values, this is 1.31 to 5.68% of the impact criterion. An annual average was also generated to allow comparison with the guideline limits. The maximum predicted annual average ground level concentration in the vicinity of the facility was 0.37µg/m^3. When compared, the annual average HCL air quality impact is 0.46 % of the impact criterion. In addition, the predicted ground level concentration of HCL at each of the 19 sensitive receptors is well within the ground level concentration limit values contained in *Table 2.1*.

12. With regards to HF, the maximum GLC+Baseline for HF from the operation of the facility is 1.65 and 0.95 µg/m^3 for the maximum 1-hour mean concentration and max 1 hr 98th percentile concentration and 0.86 µg/m3 for the maximum 24 hr concentration, respectively. When combined predicted and baseline conditions are compared to guideline limit values, this is 1.03 to 31.67% of the impact criterion. An annual average was also generated to allow comparison with the guideline limits. The maximum predicted annual average ground level concentration in the vicinity of the facility was 0.06 µg/m^3. When compared, the annual average HF air quality impact is 21 % of the impact criterion. In addition, the predicted ground level concentration of HF at each of the 19 sensitive receptors is well within the ground level concentration limit values contained in *Table 2.1*.

13. With regards to H_2S, the maximum GLC+Baseline for H_2S from the operation of the facility is 98 µg/m^3 for the maximum 1-hour mean concentration. When combined predicted and baseline conditions are compared to guideline limit values, this is 70% of the impact criterion. An annual average was also generated to allow comparison with the guideline limits. The maximum predicted annual average ground level concentration in the vicinity of the facility was 5.10µg/m^3. When compared, the annual average H_2S air quality impact is 7.29 % of the impact criterion. In addition, the predicted ground level concentration of H_2S at each of the 19 sensitive receptors is well within the ground level concentration limit values contained in *Table 2.1*.

14. The overall modelling indicates that the facility will not result in any significant impact on air quality in the surrounding area with all ground level concentrations of pollutants well within their respective ground level concentration limit values.

6. *Appendix I* - Air dispersion modelling contour plots (Process contributions and illustrative purposes only).

6.1 Site layout drawing and location of existing and proposed emission points – AEP1 to AEP8

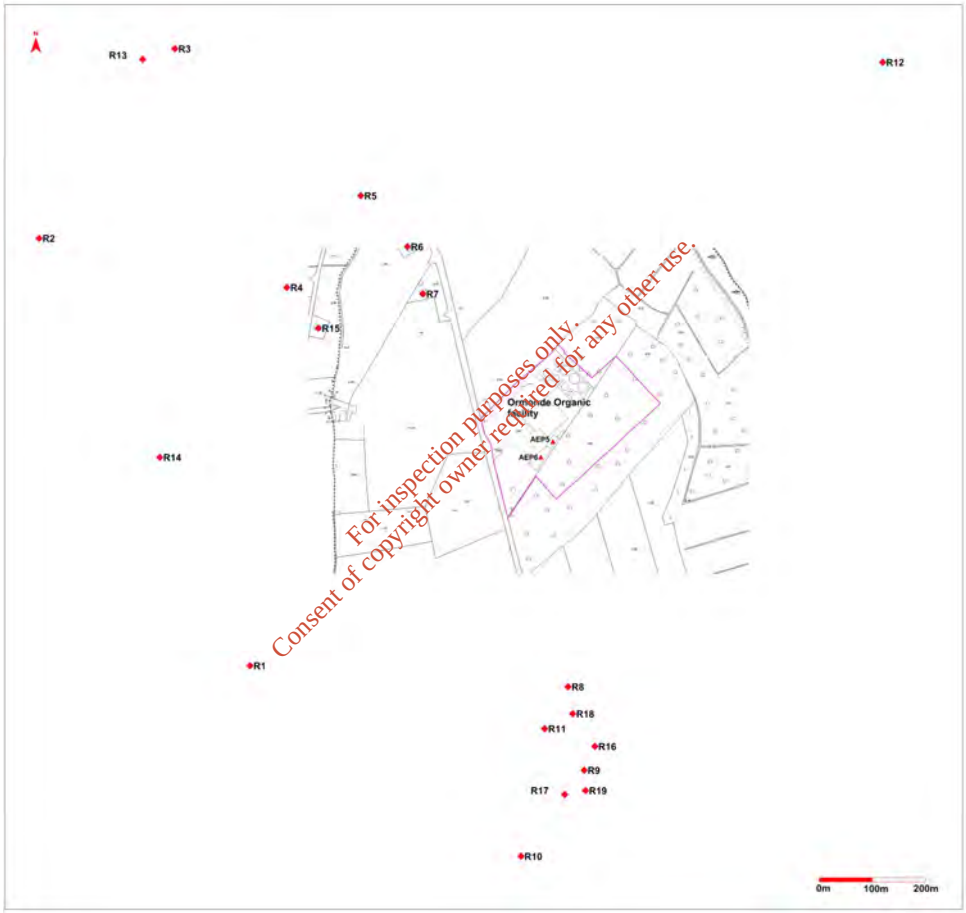


Figure 6.1. Plan view facility layout drawings for existing Ormonde Organics biological treatment facility including specific location of existing emission points AEP5 to AEP6 and nearest sensitive receptors Rec 1 to Rec 19.

Figure 6.2. Plan view facility layout drawings for proposed Ormonde Organics biological treatment facility including specific location of existing and proposed emission points AEP1 to AEP8 and nearest sensitive receptors Rec 1 to Rec 19.

6.2. Dispersion modelling contour plots for Scenarios 1 to 18 – Worst case meteorological year Rosslare 2005

6.2.1 Scenario 1 - Carbon monoxide

Figure 6.3. Predicted 8 hr average CO ground level concentration of 200 µg/m^3 ( ) for Scenario 1 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

6.2.2 Scenario 2 and 3 - Oxides of nitrogen

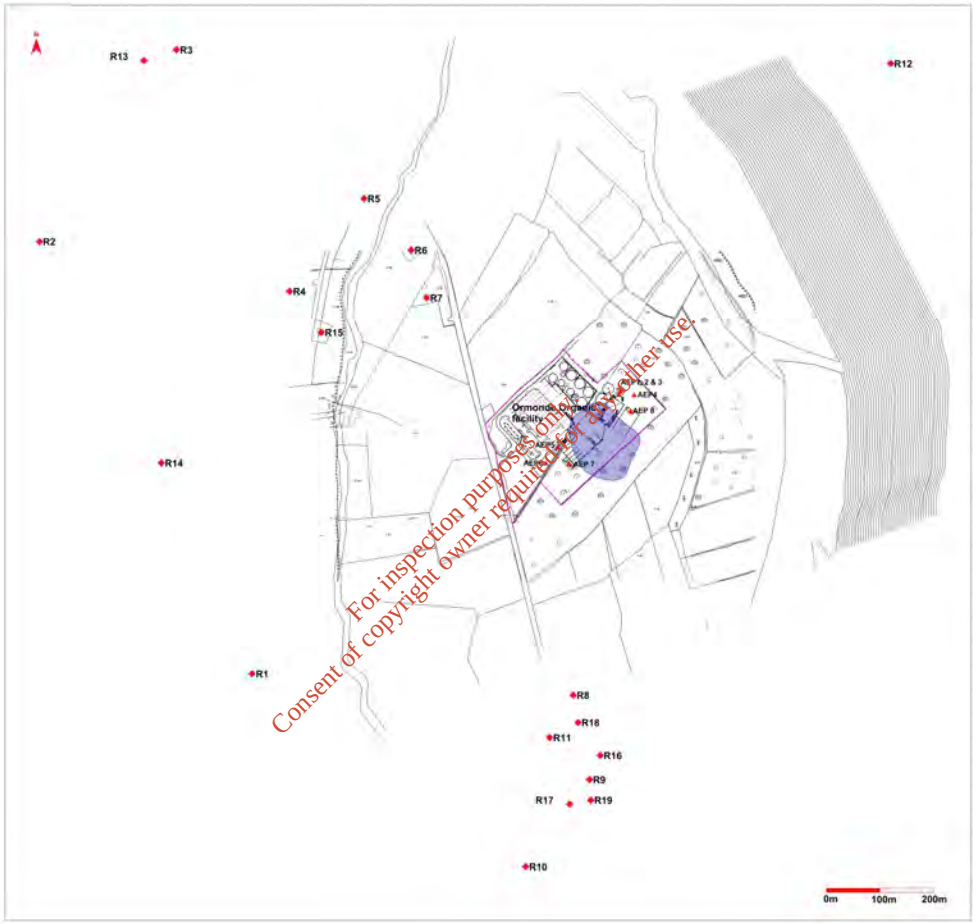


Figure 6.4. Predicted 99.79th percentile of 1 hr averages for NO_2 ground level concentration of 35 µg/m^3 (▬) for cumulative emission for Scenario 2 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

Figure 6.5. Predicted annual average NO_2 ground level concentration of 4.2 µg/m^3 ( ) for cumulative emissions for Scenario 3 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

6.2.3 Scenario 4, 5 and 6 - Sulphur dioxide

Figure 6.6. Predicted 99.73th percentile of 1 hr averages for SO_2 ground level concentration of 100 µg/m^3 ( ) for Scenario 4 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

Figure 6.7. Predicted 99.18th percentile of 24 hr averages for SO_2 ground level concentration of 40 µg/m^3 (▬) for Scenario 5 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

Figure 6.8. Predicted annual average SO_2 ground level concentration of 5 µg/m^3 (——) for Scenario 6 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

6.2.4 Scenario 7, 8 and 9 - Total particulates

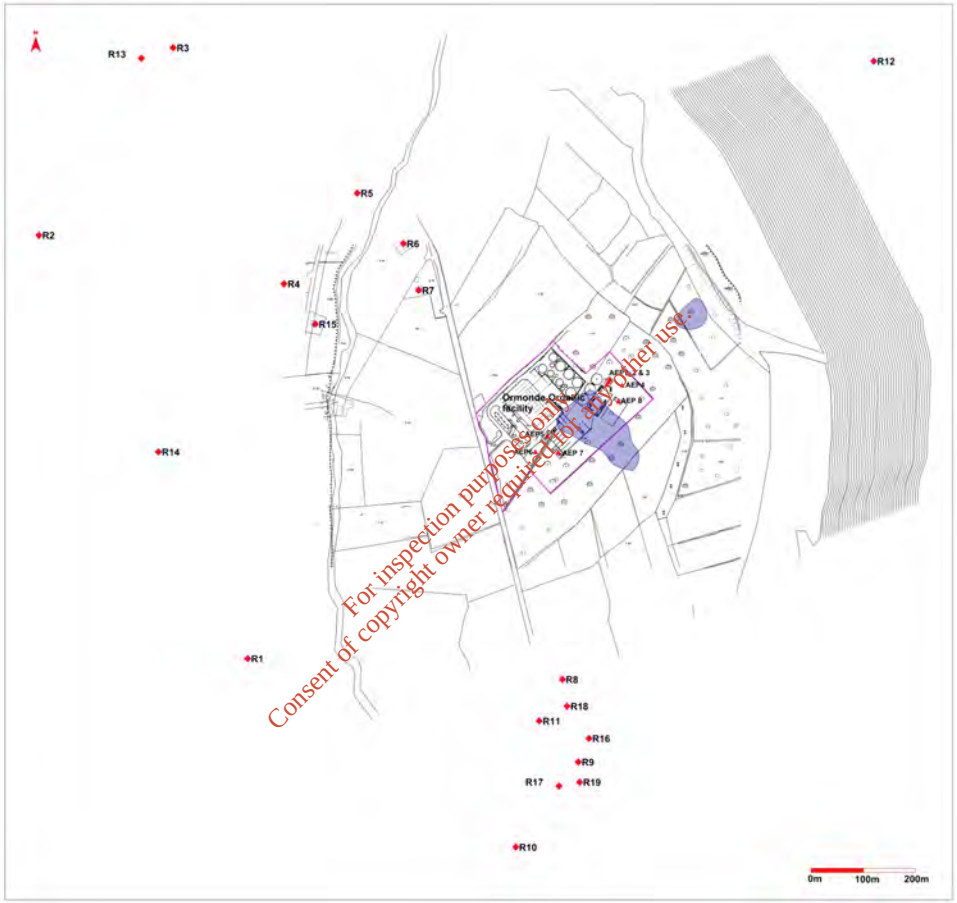


Figure 6.9. Predicted 90.40th percentile of 24 hr averages for Total particulates ground level concentration of 4 µg/m^3 ( ) for Scenario 7 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

Figure 6.10. Predicted annual average Total particulates ground level concentration of 1.0 µg/m^3 ( ) for Scenario 8 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

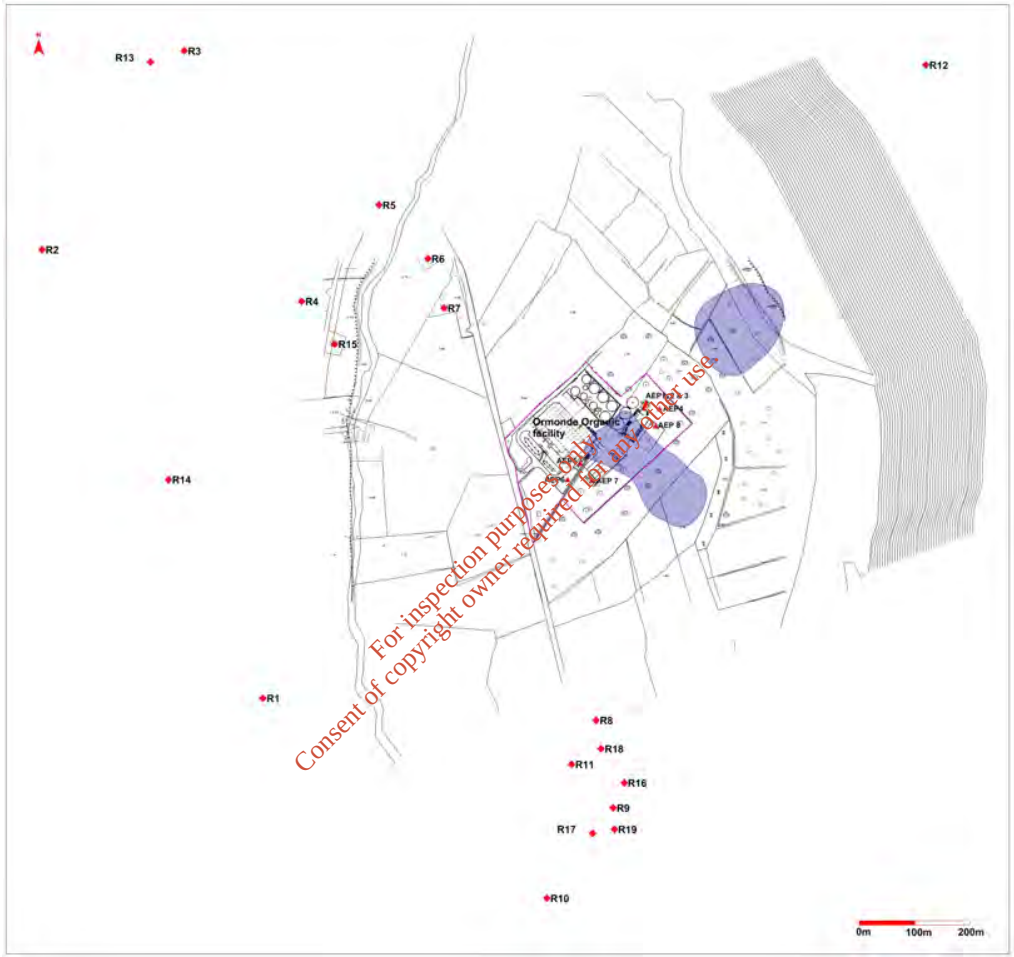


Figure 6.11. Predicted annual average Total particulates as $PM_{2.5}$ ground level concentration of 1.0 µg/m^3 ( ) for Scenario 9 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

6.2.5 Scenario 10 – TNMVOC as Benzene

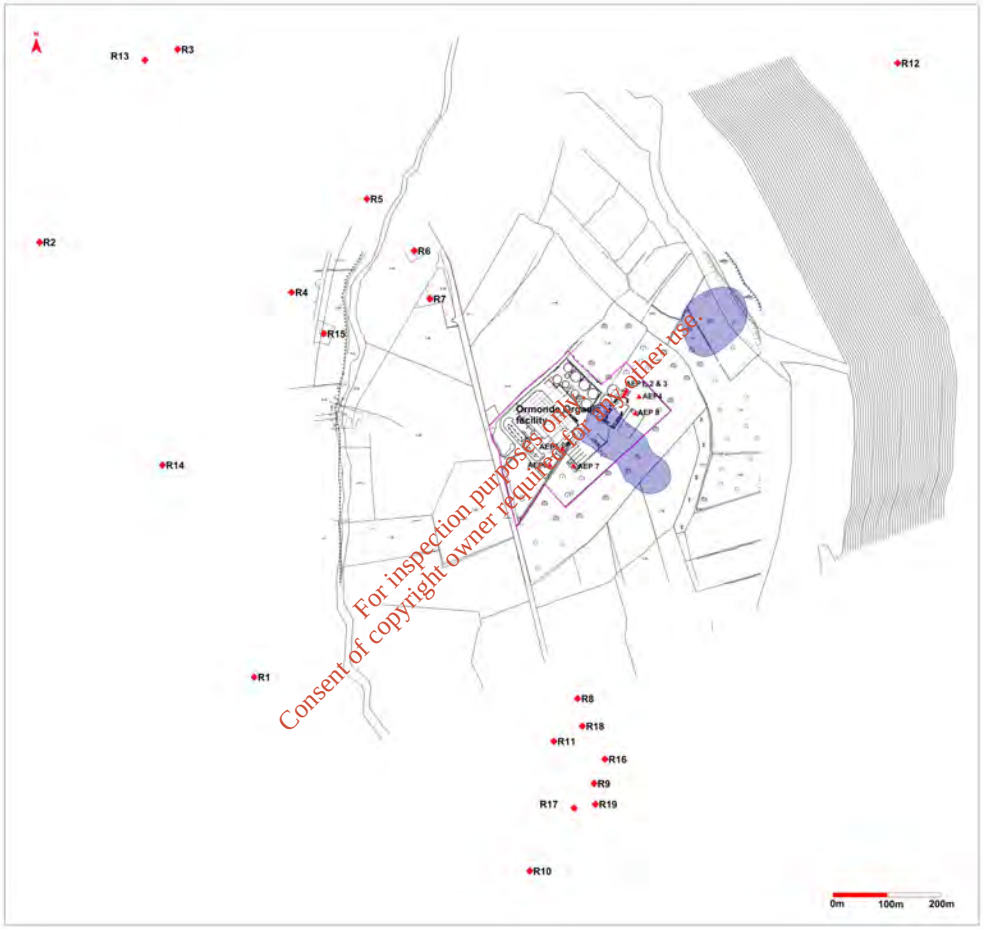


Figure 6.12. Predicted annual averages for TNMVOC as Benzene ground level concentration of 0.40 µg/m^3 ( ) for Scenario 10 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

6.2.6 Scenario 11 and 12 – Odour

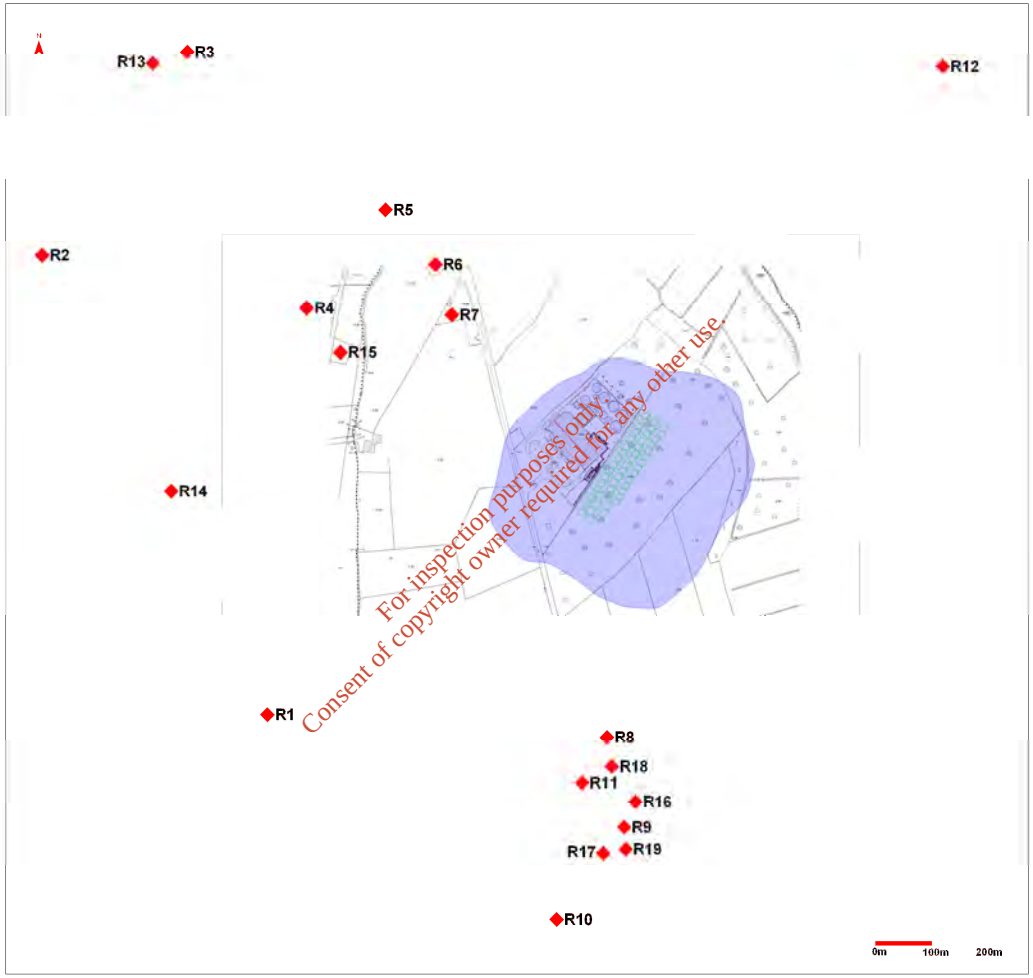


Figure 6.13. Predicted 98th percentile of 1 hr averages for Odour ground level concentration of less than or equal to 3.0 Ou_E/m^3 (——) for cumulative emission for Scenario 11 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation – Existing site operations.

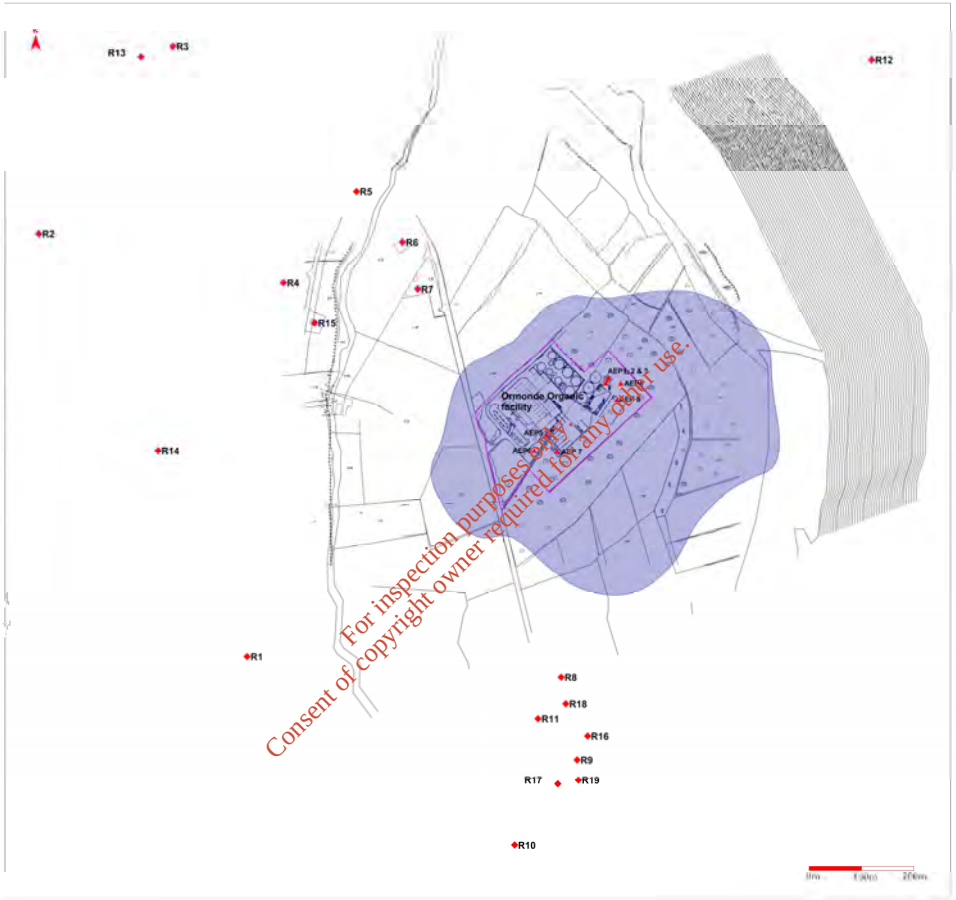


Figure 6.14. Predicted 98th percentile of 1 hr averages for an Odour ground level concentration of less than or equal to 3.0 Ou_E/m^3 (▬) for cumulative emission for Scenario 12 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation – Proposed site operations.

6.2.7 Scenario 13, 14 and 15 – HCL

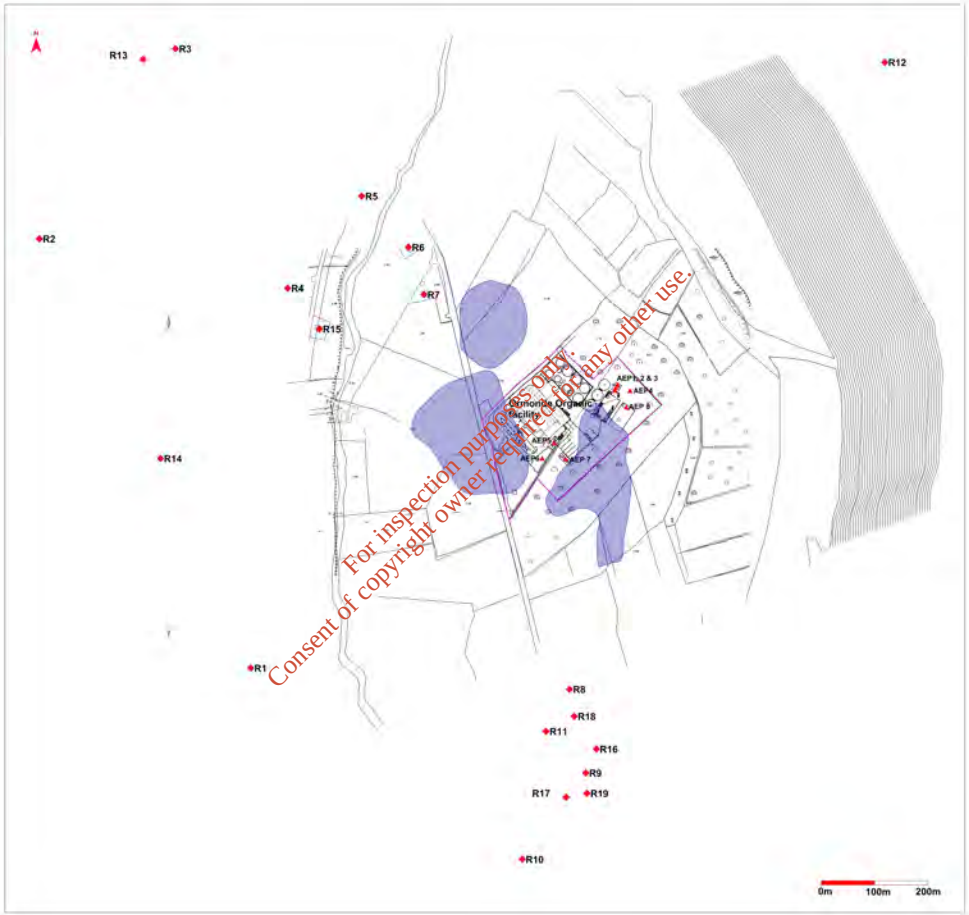


Figure 6.15. Predicted maximum 1 hr averages for an HCL ground level concentration of less than or equal to 7.0 µg/m^3 (▬) for Scenario 13 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

Figure 6.16. Predicted 98 percentile 1 hr average for an HCL ground level concentration of less than or equal to 3.0 µg/m^3 (▬) for Scenario 14 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

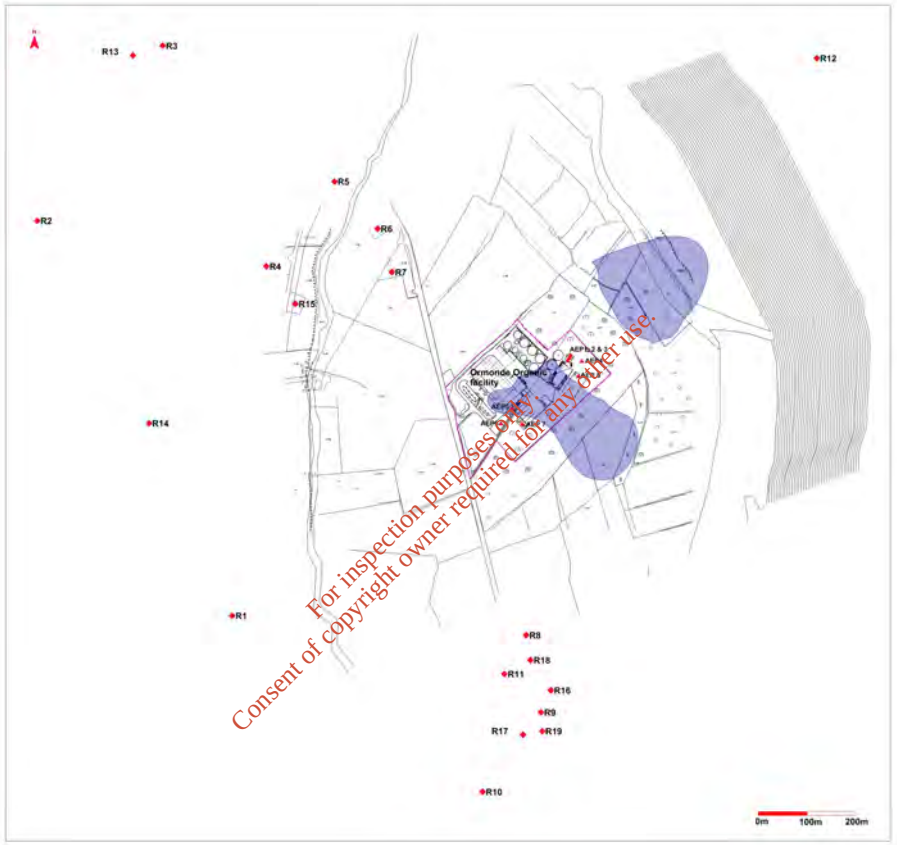


Figure 6.17. Predicted annual averages for HCL ground level concentration of 0.20 µg/m^3 (▬) for Scenario 15 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

6.2.8 Scenario 16, 17, 18 and 19 – HF

Figure 6.18. Predicted maximum 1 hr averages for an HF ground level concentration of less than or equal to 1.30 µg/m^3 (▬) for Scenario 16 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

Figure 6.19. Predicted 98 percentile 1 hr average for an HCL ground level concentration of less than or equal to 0.50 µg/m^3 ( ) for Scenario 17 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

Figure 6.20. Predicted maximum 24 hr averages for an HF ground level concentration of less than or equal to 0.50 µg/m^3 ( ) for Scenario 18 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

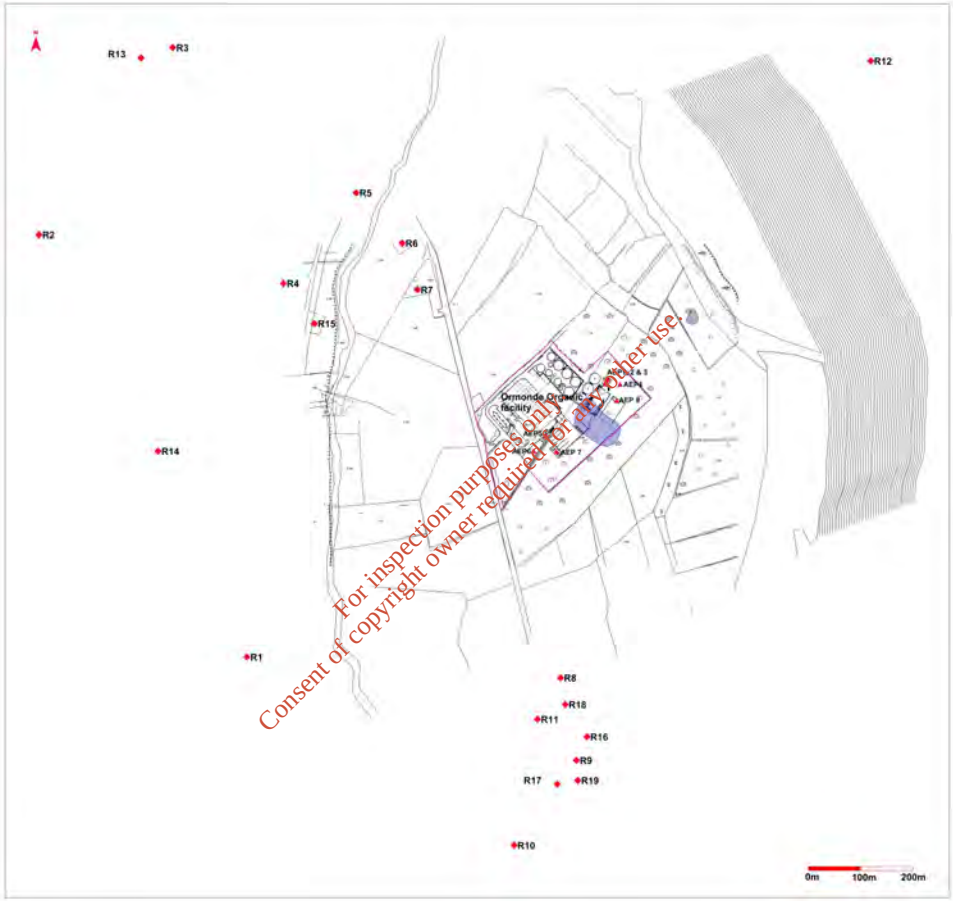


Figure 6.21. Predicted annual averages for HF ground level concentration of 0.050 µg/m^3 ( ) for Scenario 19 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

6.2.9 Scenario 20 and 21 – H_2S

Figure 6.22. Predicted maximum 1 hr averages for an H_2S ground level concentration of less than or equal to 100 µg/m^3 (▬) for Scenario 20 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

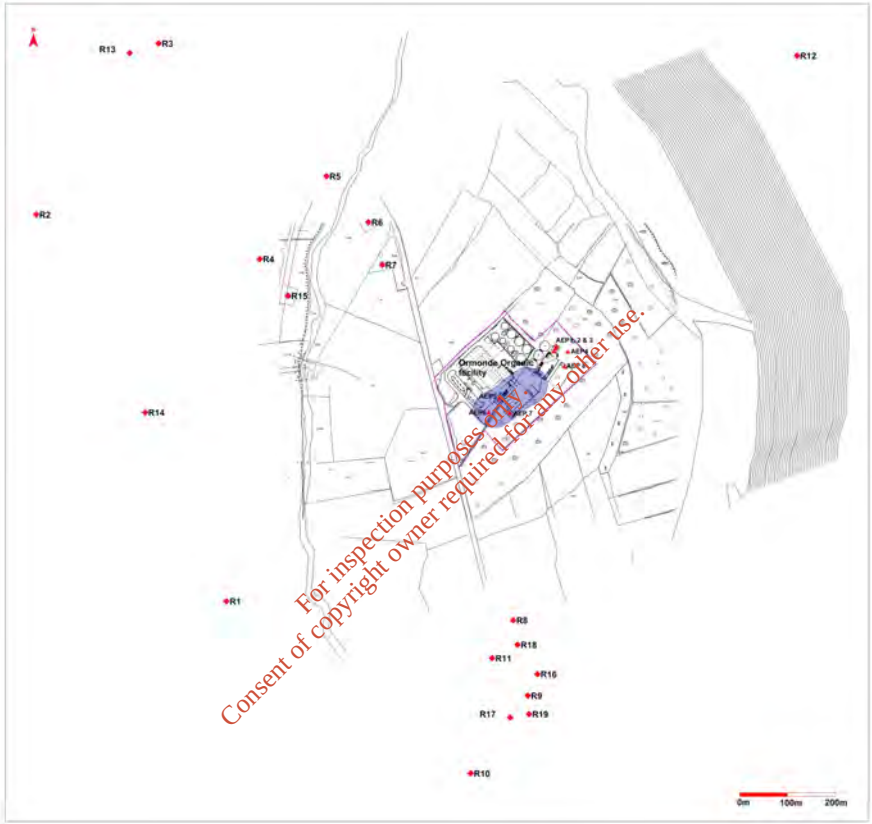


Figure 6.23. Predicted annual averages for H_2S ground level concentration of 3.0 µg/m^3 ( ) for Scenario 21 for Rosslare meteorological station (worst case year 2005) - 24 hr plant operation.

7. *Appendix II* - Meteorological data used within the Dispersion modelling study.

Meteorological file Rosslare 2002 to 2006 inclusive

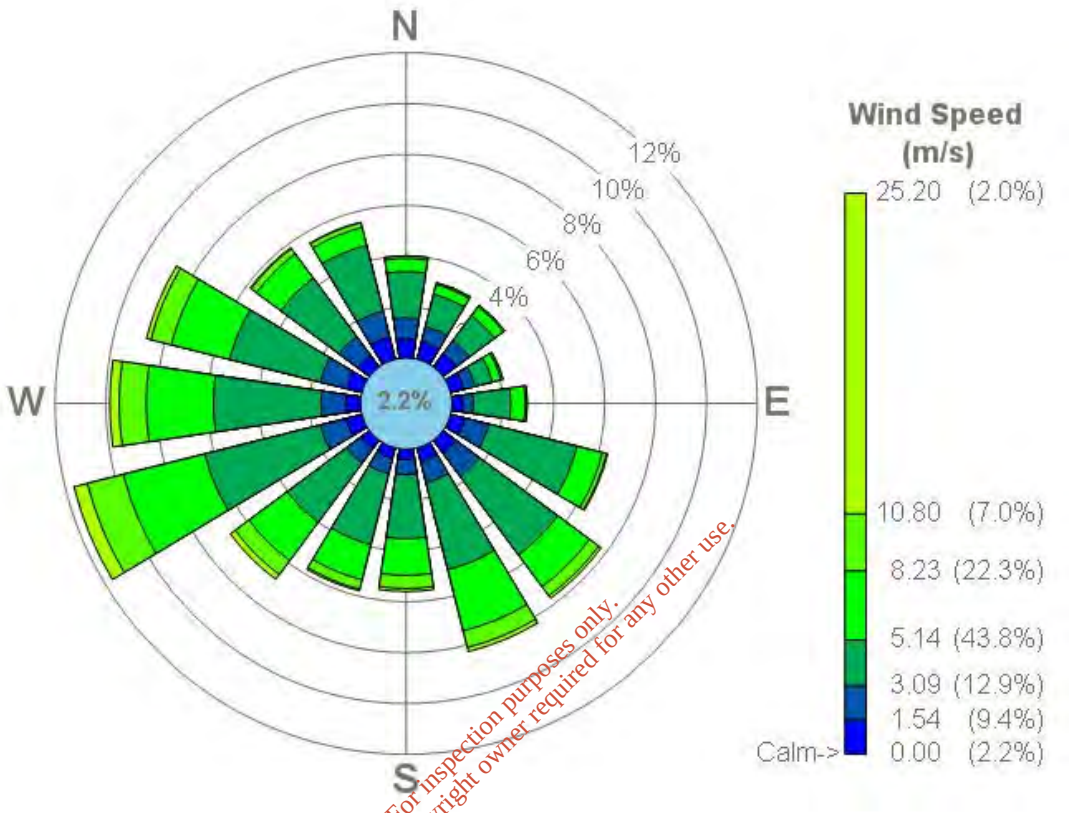


Figure 7.1. Schematic illustrating windrose for meteorological data used for atmospheric dispersion modelling, Rosslare 2002 to 2006 inclusive.

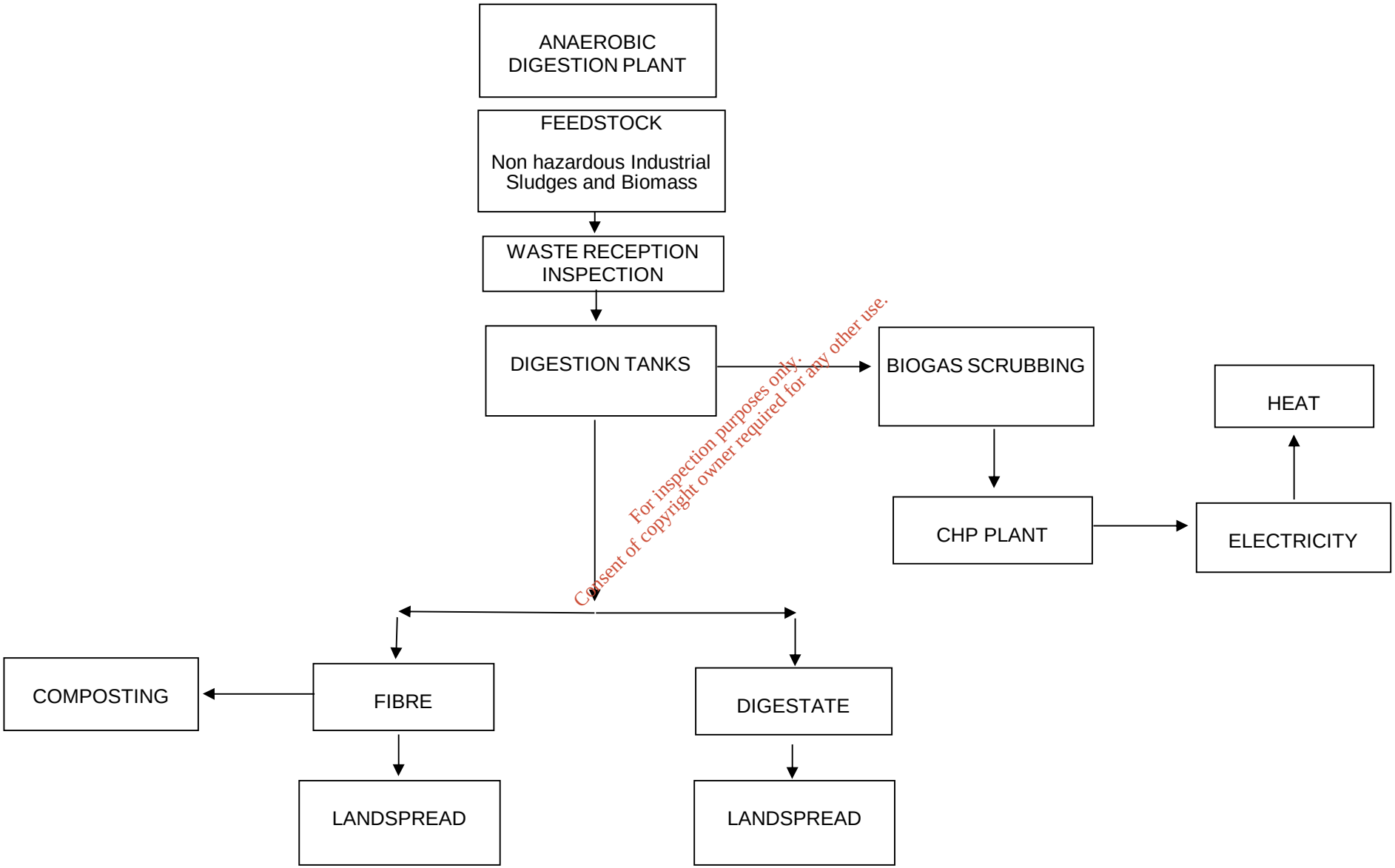
Table 7.1. Cumulative wind speed and direction for meteorological data used for atmospheric dispersion modelling Rosslare 2002 to 2006 inclusive.

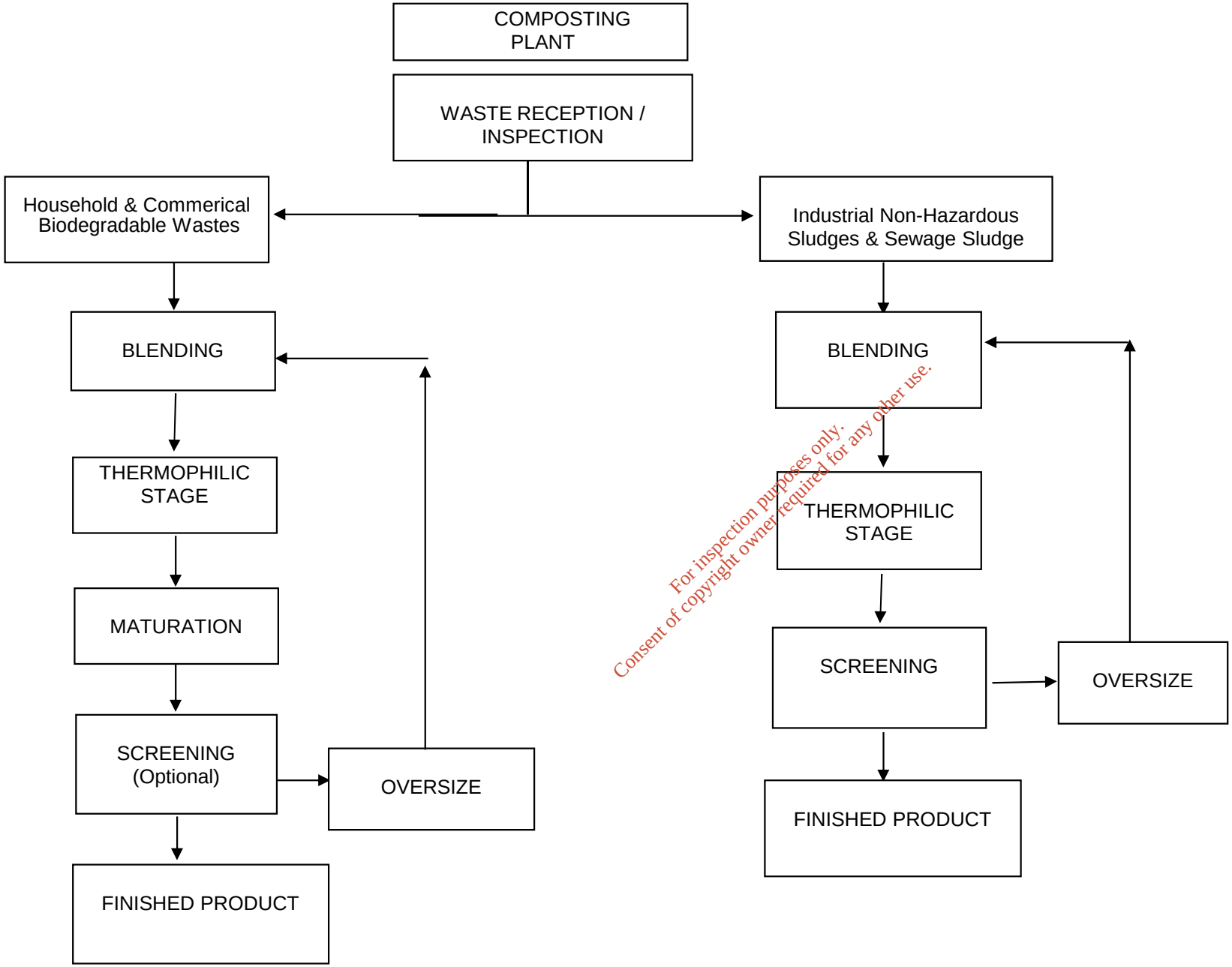
Cumulative Wind Speed Categories							
Relative Direction	**> 1.54**	**>3.09**	**>5.14**	**>8.23**	**> 10.80**	**< 10.80**	**Total**
0	0.75	0.83	1.81	0.52	0.09	0.01	4.02
22.5	0.72	0.61	1.32	0.38	0.07	0.01	3.11
45	0.64	0.64	1.23	0.43	0.06	0.01	3.02
67.5	0.56	0.44	0.70	0.35	0.08	0.01	2.12
90	0.43	0.40	1.48	0.57	0.07	0.00	2.96
112.5	0.59	0.96	3.57	1.03	0.17	0.05	6.36
135	0.64	1.13	3.85	1.55	0.45	0.12	7.74
157.5	0.55	0.87	3.52	2.49	0.67	0.17	8.26
180	0.42	0.59	2.51	1.44	0.52	0.12	5.59
202.5	0.43	0.62	2.87	1.43	0.38	0.07	5.80
225	0.42	0.71	2.90	1.86	0.68	0.24	6.81
247.5	0.64	1.05	4.68	3.30	1.46	0.55	11.67
270	0.56	0.99	4.23	2.64	1.07	0.37	9.85
292.5	0.64	1.06	3.66	2.36	0.83	0.18	8.73
315	0.56	0.92	2.86	1.18	0.25	0.05	5.84
337.5	0.90	1.06	2.66	0.72	0.19	0.02	5.56
Total	**9.44**	**12.85**	**43.85**	**22.26**	**7.04**	**1.99**	**97.42**
Calms	**--**	**-**	**-**	**-**	**-**	**-**	**2.24**
Missing	**-**	**-**	**-**	**-**	**-**	**-**	**0.34**
Total	**-**	**-**	**-**	**-**	**-**	**-**	**100.00**

8. *Appendix III* - Checklist for EPA requirements for air dispersion modelling reporting

Table 8.1. EPA checklist as taken from their air dispersion modelling requirements report.

Item	Yes/No	Reason for omission/Notes
Location map	Section 6	-
Site plan	Section 6	-
List of pollutants modelled and relevant air quality guidelines	Yes	-
Details of modelled scenarios	Yes	-
Model description and justification	Yes	-
Special model treatments used	Yes	-
Table of emission parameters used	Yes	-
Details of modelled domain and receptors	Yes	-
Details of meteorological data used (including origin) and justification	Yes	-
Details of terrain treatment	Yes	-
Details of building treatment	Yes	-
Details of modelled wet/dry deposition	N/A	-
Sensitivity analysis	Yes	Five years of hourly sequential data screened from nearest only valid met station-Rosslare 2002 to 2006 screened. Worst case year Rosslare 2005.
Assessment of impacts	Yes	Pollutant emissions assessment from process identified.
Model input files	No	DVD will be sent upon request. Files are a total of 5.1 GB in size.





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environmental consultants

Project	**Natura 2000 screening report for a proposed development at a composting facility at Killowen, Portlaw, Co Waterford.**
Client	Ormonde Organics Ltd.

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1. Background

According to the EU Birds Directive (79/409/EEC) and Habitats Directive (92/43/EEC), member states are required to designate areas in order to protect priority habitats and species. These sites are known as Special Protection Areas (SPA) and Special Areas of Conservation (SAC) respectively. Collectively, these sites are known as Natura 2000 sites. An "appropriate assessment" (AA) means an assessment, based on best scientific knowledge, of the potential impacts of a plan on the conservation objectives of any Natura 2000 site and the development where necessary of measures to preclude negative effects. The impact assessment must include the indirect and cumulative impacts of approving the plan considered, with any current or proposed activities, development or policies impacting on the site. All plans and projects should aim to identify any possible impacts early in the plan-making process and then either alter the plan to avoid them or introduce mitigation measures to the point where no adverse impacts remain.

An appropriate assessment is an assessment carried out under Article 6(3) and 6(4) of the Habitats Directive.

Article 6(3) of the Habitats Directive states:

Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

Article 6(4) states:

If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a

priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

2. Methodology for appropriate assessment

Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on *Appropriate Assessment under Article 6 of the Habitats Directive –Guidance for Planning Authorities* March 2010.

- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government 2009;

- Managing Natura 2000 Sites: the provisions of Article 6 of the Habitats Directive 92/43/EEC, European Commission

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC;

- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission.

This ecological assessment was carried out by Carl Dixon M.Sc. Applied Ecology and Vincent Murphy M.Sc Ecosystem Conservation & Landscape Management.

These assessment guidelines are usually dealt with in a step by step process. The proposed steps are as follows.

Stage 1. Screening

Screening is the technique applied to determine whether a particular plan would be likely to have significant effects on a Natura 2000 site and would thus warrant an Appropriate

Assessment. The key indicator that will determine if an Appropriate Assessment is required is the determination of whether the development is likely to have *significant environmental effects* on a Natura 2000 site or not.

Stage 2. Appropriate Assessment

This step is required if the screening report indicates that the development is likely to have a significant impacts on a Natura 2000 site. The consideration of the impact on the integrity on the Natura 2000 site of the project, either alone or in combination with other projects, with respect to the site's structure, function and conservation objectives. Where there are adverse impacts, an assessment of the potential mitigation of these impacts in also required.

3. Screening of the proposed development

3.1 Existing development

The site is approximately 19 kilometres north-west of Waterford City, 3 kilometres north of Portlaw village, 2 kilometres south of Fiddtown on the northern side of the River Suir, and 5 kilometres south of Pilltown, also located on the northern side of the River Suir. The subject site is 3.2 hectares in size, approximately, and is located in the townland of Killowen, Portlaw, County Waterford. There is an existing industrial building on site which had previously operated as a Wet Blue Tannery before planning permission was granted for the current Composting Facility operation in 2006.

3.2 Proposed development

It is proposed to expand recovery activities to include anaerobic digestion plant in a new purpose built unit that will complement existing composting operations. The gas generated from the plant will be used to generate electricity in an on-site generator. The existing buildings and structures will be retained. The new elements include:

- Two above ground Anaerobic Digester Tanks and one above ground Digestate Storage Tank in a bunded area to the south east of the disused waste water treatment tanks,

- Maturation and Pasteurisation Building (Buildings 1 and 2) to the east of the existing Compost Building,

- New Biofilter to the west of the Maturation and Pasteurisation Building,
- Waste Reception/Combined Heat and Power Plant (Building No 3) and adjacent Drier Building to the south east of the new Anaerobic Digester Tanks,
- Silage storage area to the south of Building No 3,
- Air locks on the northern and southern entrances to the Compost Building,
- Paved concrete yard surrounding Buildings 1, 2 and 3, and
- Roofing the disused wastewater treatment tanks.

Surface Water

The proposed changes to the site layout will not give rise to any new surface water emission points or changes in the quality of the surface water discharge. Rainwater run-off from the roofs of the new buildings and paved areas will be collected and directed via a new oil interceptor to a new attenuation tank, located in the at the north eastern site . The outlet from the tank will connect to the existing surface water drainage system. A flow control system, ('hydrobrake')will be installed on the outlet from the tank that will limit the flow to 10.9/lsec, which is equivalent to overland flow from unpaved areas. In a 50mm one hour storm event, the additional total flow from the impermeable areas of the entire site will be 196/l/sec, which equates to a 5% increase in the flow from the existing site. There will be no change to the location of the outfall to the river.

Wastewater

Wastewater generated at the site comprises sanitary wastewater from the offices which is treated in the on-site septic tank. This tank is within the footprint of the proposed AD tanks. A new sanitary wastewater treatment system will be installed.

Process water

The leachate produced in the composting process is recirculated and surplus leachate that requires treatment is typically not generated. Any surplus leachate that may arise in the

future will be treated in the AD plant. Depending on the type of biomass, there is the potential for effluent to be generated during the storage of this material. All liquid generated in the storage area will be collected in a concrete underground storage tank and fed into the AD process. The AD process will not generate a wastewater that requires treatment on-site. The liquid digestate produced in the process will be stored in the converted wastewater treatment tanks, which will provide a minimum three months storage, and then sent from the site and applied to agricultural lands. Any run-off from the silage storage area will be collected and treated in the AD plant.

3.3 Site designation

The proposed development is located approximately 300 meters from Lower Suir River cSAC (site code 002137). A full site synopsis for the SAC is included below. Fiddown island pNHA (site code 000402) and Fiddown Island Nature Reserve are both in relatively close proximity upstream of the discharge point, in this tidally influenced area of the River Suir. Maps of the protected areas within 1km of development and discharge point are shown in **Figure 1**, **Figure 2** and **Figure 3**. A list of protected sites within 10km of the proposed development site is given in **Table 1.**

Table 1. Protected sites within 10km.

Site	Code	Distance
SAC &cSAC		
Lower River Suir	002137	230 meters N & E
pNHA		
Lough Cullin	000406	2.71km W
Lower River Suir (Coolfinn, Portlaw)	000399	1.92km S
Fiddown Island	000402	520 meters N
Portlaw Woods	000669	2.61km S
River Suir Below Carrick-On-Suir	000655	5.72km NNW
Tibberaghny Marshes	000411	2.98km N
Nature reserves		
Fiddown Island Nature Reserve		520 Meters N

The designated site considered relevant for the purposes of this report is the Lower River Suir SAC.

3.4 Lower River Suir (Site Code 002137) site synopsis

This site consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary. The Suir and its tributaries flows through the counties of Tipperary, Kilkenny and Waterford. Upstream of Waterford City, the swinging meanders of the Suir crisscross the Devonian sandstone rim of hard rocks no less than three times as they leave the limestone-floored downfold below Carrick. In the vicinity of Carrick-on-Suir the river follows the limestone floor of the Carrick Syncline. Upstream of Clonmel the River and its tributaries traverse Upper Palaeozoic Rocks, mainly the Lower Carboniferous Visean and Tournaisian. The freshwater stretches of the Clodiagh River in Co. Waterford traverse Silurian rocks, through narrow bands of Old Red Sandstone and Lower Avonian Shales before reaching the carboniferous limestone close to its confluence with the Suir. The Aherlow River flows through a Carboniferous limestone valley, with outcrops of Old Red Sandstone forming the Galtee Mountains to the south and the Slievenamuck range to the north. Glacial deposits of sands and gravels are common along the valley bottom, flanking the present-day river course.

The site is a candidate SAC selected for the presence of the priority habitats on Annex I of the E.U. Habitats Directive - alluvial wet woodlands and Yew Wood. The site is also selected as a candidate SAC for floating river vegetation, Atlantic salt meadows, Mediterranean salt meadows, old oak woodlands and eutrophic tall herbs, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon and Otter.

Alluvial wet woodland is declining habitat in Europe as a result of drainage and reclamation. The best examples of this type of woodland in the site are found on the islands just below Carrick-on-Suir and at Fiddown Island. Species occurring here include Almond Willow (Salix triandra), White Willow (S. alba), Grey Willow (S. cinerea), Osier (S. viminalis), with Iris (Iris pseudacorus), Hemlock Water-dropwort (Oenanthe crocata), Angelica (Angelica sylvestris),

Pendulus Sedge (Carex pendula), Meadowsweet (Filipendula ulmaria) and Valerian (Valeriana officinalis). The terrain is littered with dead trunks and branches and intersected with small channels which carry small streams to the river. The bryophyte and lichen floras appear to be rich and require further investigation. A small plot is currently being coppiced and managed by National Parks and Wildlife. In the drier areas the wet woodland species merge with other tree and shrub species including Ash (Fraxinus excelsior), Hazel (Corylus avellana), Hawthorn (Crataegus monogyna) and Blackthorn (Prunus spinosa). This adds further to the ecological interest of this site.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the flood-plain of the river is intact. Characteristic species of the habitat include Meadowsweet (Filipendula ulmaria), Purple Loosestrife (Lythrum salicaria), Marsh Ragwort (Senecio aquaticus), Ground Ivy (Glechoma hederacea) and Hedge Bindweed (Calystegia sepium).

Old oak woodlands are also of importance within the cSAC. The best examples are seen in Portlaw Wood which lies on both sides of the Clodiagh River. On the south-facing side the stand is more open and the Oaks (mainly Quercus robur) are well grown and spreading. Ivy (Hedera helix) and Bramble (Rubus fruticosus) are common on the ground, indicating relatively high light conditions. Oak regeneration is dense, varying in age from 0-40 years and Holly (Ilex aquifolium) is fairly common but mostly quite young. Across the valley, by contrast, the trees are much more closely spaced and though taller are poorly grown on average. There are no clearings; large Oaks extend to the boundary wall. In the darker conditions, Ivy is much rarer and Holly much more frequent, forming a closed canopy in places. Oak regeneration is uncommon since there are as yet few natural clearings. The shallowness of the soil on the north-facing slope probably contributes to the poor tree growth there. The acid nature of the substrate has induced a “mountain” type Oakwood community to develop. There is an extensive species list present throughout including an abundance of mosses, liverworts and lichens. The rare lichen Lobaria pulmonaria, an indicator of ancient woodlands, is found.

Inchinsquillib Wood consists of three small separate sloping blocks of woodland in a valley cut by the young Multeen River and its tributaries through acidic Old Red Sandstone, and Silurian rocks. Two blocks, both with an eastern aspect, located to the north of the road, are

predominantly of Sessile oak (Quercus petraea) and Hazel, with Downy Birch (Betula pubescens), Ash and Holly. The ground flora is quite mixed with for example Wood sedge (Carex sylvatica), Bluebell (Hyacinthoides non-scriptus), Primrose (Primula vulgaris), Wood-sorrel (Oxalis acetosella), Pignut (Conopodium majus) and Hard fern (Blechnum spicant). The base poor nature of the underlying rock is, to some extent masked by the overlying drift. The third block, to the south of the road, and with a northern aspect, is a similar although less mature mixture of Sessile Oak, Birch and Holly, the influence of the drift is more marked, with the occurrence of Wood anemone (Anemone nemorosa) amongst the ground flora.

Floating river vegetation is evident in the freshwater stretches of the River Suir and along many of its tributaries. Typical species found include Canadian Pondweed (Elodea canadensis), Milfoil (Myriophyllum spp.), Fennel Pondweed (Potamogeton pectinatus), Curled Pondweed (P. crispus), Perfoliate Pondweed (P. perfoliatus), Pond Water-crowfoot (Ranunculus peltatus), other Crowfoots (Ranunculus spp.) and the moss Fontinalis antipyretica. At a couple of locations along the river, Oppositeleaved Pondweed (Groenlandia densa) occurs. This species is protected under the Flora (Protection) Order, 1999.

The Aherlow River is fast-flowing and mostly follows a natural unmodified river channel. Submerged vegetation includes the aquatic moss Fontinalis antipyretica and Stream Water-crowfoot (Ranunculus pencillatus), while shallow areas support species such as Reed Canary-grass (Phalaris arundinacea), Brooklime (Veronica beccabunga) and Water Mint (Mentha aquatica). The river bank is fringed in places with Alder (Alnus glutinosa) and Willows (Salix spp.).

The Multeen River is fast flowing, mostly gravel-bottomed and appears to follow a natural unmodified river channel. Water Crowfoots occur in abundance and the aquatic moss Fontinalis antipyretica is also common. In sheltered shallows, species such as Water-cress (Rorippa nasturtium-aquaticum) and Water-starworts (Callitriche spp.) occur. The river channel is fringed for most of its length with Alder, Willow and a narrow strip of marshy vegetation.

Salt meadows occur below Waterford City in old meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing rivers

below Little Island. There are very narrow, non-continuous bands of this habitat along both banks. More extensive areas are also seen along the south bank at Ballynakill, the east side of Little Island, and in three large salt meadows between Ballynakill and Cheekpoint. The Atlantic and Mediterranean sub types are generally intermixed. The species list is extensive and includes Red Fescue (Festuca rubra), Oraches (Atriplex spp.), Sea Aster (Aster tripolium), Sea Couch Grass (Elymus pycnanthus), frequent Sea Milkwort (Glaux maritima), occasional Wild Celery (Apium graveolens), Parsley Water-dropwort (Oenanthe lachenalii), English Scurvygrass (Cochlearia anglica) and Sea Arrowgrass (Triglochin maritima). These species are more representative of the Atlantic sub-type of the habitat. Common Cord-grass (Spartina anglica), is rather frequent along the main channel edge and up the internal channels. The legally protected (Flora (Protection) Order, 1999) Meadow Barley (Hordeum secalinum) grows at the landward transition of the saltmarsh. Sea Rush (Juncus maritimus), an indicator of the Mediterranean salt meadows, also occurs.

Other habitats at the site include wet and dry grassland, marsh, reed swamp, improved grassland, coniferous plantations, deciduous woodland, scrub, tidal river, stony shore and mudflats. The most dominant habitat adjoining the river is improved grassland, although there are wet fields with species such as Yellow Flag (Iris pseudacorus), Meadow Sweet (Filipendula ulmaria), Rushes (Juncus spp.), Meadow Buttercup (Ranunculus acris) and Cuckoo Flower (Cardamine pratensis).

Cabragh marshes, just below Thurles, lie in a low-lying tributary valley into which the main river floods in winter. Here there is an extensive area of Common Reed (Phragmites australis) with associated marshland and peaty fen. The transition between vegetation types is often well displayed. A number of wetland plants of interest occur, in particular the Narrow-leaved Bulrush (Typha angustifolia), Bottle Sedge (Carex rostrata) and Blunt-flowered Rush (Juncus subnodulosus). The marsh is naturally eutrophic but it has also the nutritional legacy of the former sugar factory which discharged into it through a number of holding lagoons, now removed. Production is high which is seen in the size of such species as Celery-leaved Buttercup (Ranunculus sceleratus) as well as in the reeds themselves.

Throughout the Lower River Suir site are small areas of woodland other than those described above. These tend to be a mixture of native and non-native species, although there are some areas of semi-natural wet woodland with species such as Ash and Willow.

Cahir Park Woodlands is a narrow tract of mixed deciduous woodland lying on the flatlying floodplain of the River Suir. This estate woodland was planted over one hundred years ago and it contains a large component of exotic tree species. However, due to original planting and natural regeneration there is now a good mix of native and exotic species. About 5km north west of Cashel, Ardmayle pond is a long, possibly artificial water body running parallel to the River Suir. It is partly shaded by planted Lime (Tilia hybrids), Sycamore (Acer pseudoplatanus) and the native Alder. Growing beneath the trees are shade tolerant species such as Remote sedge (Carex remota).

The site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (Margaritifera margaritifera and M. m. durrovensis), Freshwater Crayfish (Austropotamobius pallipes), Salmon (Salmo salar), Twaite Shad (Alosa fallax fallax), three species of Lampreys - Sea Lamprey (Petromyzon marinus), Brook Lamprey (Lampetra planeri) and River Lamprey (Lampetra fluviatilis) and Otter (Lutra lutra). This is one of only three known spawning grounds in the country for Twaite Shad.

The site also supports populations of several other animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat (Myotis daubentoni), Nattererer's Bat (M. nattereri), Pipistrelle (Pipistrellus pipistrellus), Pine Marten (Martes martes), Badger (Meles meles), the Irish Hare (Lepus timidus hibernicus), Smelt (Osmerus eperlanus) and the Frog (Rana temporaria). Breeding stocks of Carp are found in Kilsheelan Lake. This is one of only two lakes in the country which is known to have supported breeding Carp. Carp require unusually high summer water temperatures to breed in Ireland and the site may therefore support interesting invertebrate populations.

Parts of the site have also been identified as of ornithological importance for a number of Annex I (EU Birds Directive) bird species, including Greenland White-fronted Goose (10), Golden Plover (1490), Whooper Swan (7) and Kingfisher. Figures given in brackets are the average maximum counts from 4 count areas within the site for the three winters between 1994 and 1997. Wintering populations of migratory birds use the site. Flocks are seen in Coolfinn Marsh and also along the reedbeds and saltmarsh areas of the Suir.

Coolfinn supports nationally important numbers of Greylag Geese on a regular basis. Numbers between 600 and 700 are recorded. Other species occurring include Mallard (21),

Teal (159), Wigeon (26), Tufted Duck (60), Pintail (4), Pochard (2), Little Grebe (2), Black-tailed Godwit (20), Oystercatcher (16), Lapwing (993), Dunlin (101), Curlew (195), Redshank (28), Greenshank (4) and Green Sandpiper (1). Nationally important numbers of Lapwing (2750) were recorded at Faithlegg in the winter of 1996/97. In Cabragh marshes there is abundant food for surface feeding wildfowl which total at 1,000 or so in winter. Widgeon, Teal and Mallard are numerous and the latter has a large breeding population - with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the EU Birds Directive, occurs along some of the many tributaries throughout the site.

Landuses adjoining the cSAC consist mainly of agricultural activities including grazing, silage production, fertilising and land reclamation. The grassland is intensively managed and the rivers are therefore vulnerable to pollution from run-off of fertilisers and slurry. Arable crops are also grown. Fishing is a main tourist attraction on stretches of the Suir and some of its tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. The Aherlow River is a designated Salmonid Water under the EU Freshwater Fish Directive. Other recreational activities such as boating, golfing and walking are also popular. Several industrial developments discharge to the river.

The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitat Alluvial Forest. The site also supports populations of several Annex II animal species and a number of Red Data Book animal species. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the river adds further to the ecological interest of this site.

3.3 Fiddown Island Nature Reserve, Co. Kilkenny

Location: 7km east of Carrick-on-Suir. Area (ha.): 21ha

Established in 1988 and it is State owned.

Features of Interest include an alluvial woodland dominated by tree willows formerly used for basket making. The vegetation is characterised by tall herbs, sedges and grasses. It is covered in willow scrub and bordered by reed swamps - the only known site of its type in Ireland. This is upstream of the proposed development and no impact on it is envisaged.

3.4 NPWS site designation qualifying interests

The NPWS lists the following species and habitats as qualifying interests for the River Suir cSAC **(Table 2 and 3).**

Table 2. Qualifying species

Site code	Name	Species code	*Species*
002137	Lower River Suir	1095	*Petromyzon marinus*
002137	Lower River Suir	1096	*Lampetra planeri*
002137	Lower River Suir	1099	*Lampetra fluviatilis*
002137	Lower River Suir	1103	*Alosa fallax*
002137	Lower River Suir	1106	*Salmo salar*
002137	Lower River Suir	1102	*Alosa alosa*
002137	Lower River Suir	1355	*Lutra lutra*
002137	Lower River Suir	1092	*Austropotamobius pallipes*
002137	Lower River Suir	1029	*Margaritifera margaritifera*

Table 3. Qualifying habitats

Site code	Name	Habitat Code	Habitat	% cover Approx.
002137	Lower River Suir	1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	2
002137	Lower River Suir	1410	Mediterranean salt meadows (Juncetalia maritimi)	1
002137	Lower River Suir	3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	1
002137	Lower River Suir	91A0	Old sessile oak woods with Ilex and Blechnum in British Isles	1
002137	Lower River Suir	91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	7
002137	Lower River	6430	Hydrophilous tall herb fringe	1

	Suir		communities of plains and of the montane to alpine levels	
002137	Lower River Suir	91J0	Taxus baccata woods of the British Isles	1

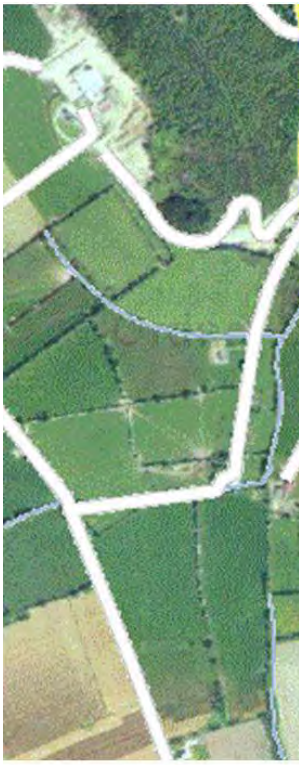

Figure1. Proposed development area outlined in red and the surface water discharge point indicated in orange in relation to the cSAC in the hatched area.

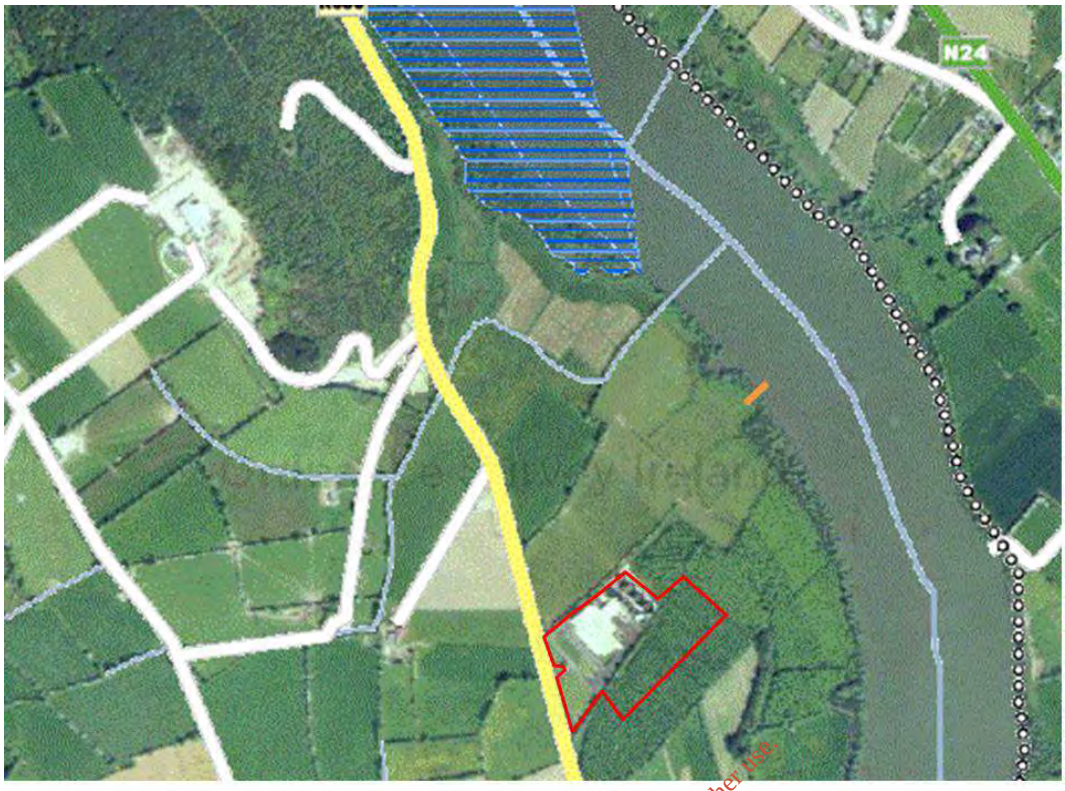

Figure 2. Proposed development area outlined in red and the discharge point indicated in orange in relation to the p NHA in the hatched area.

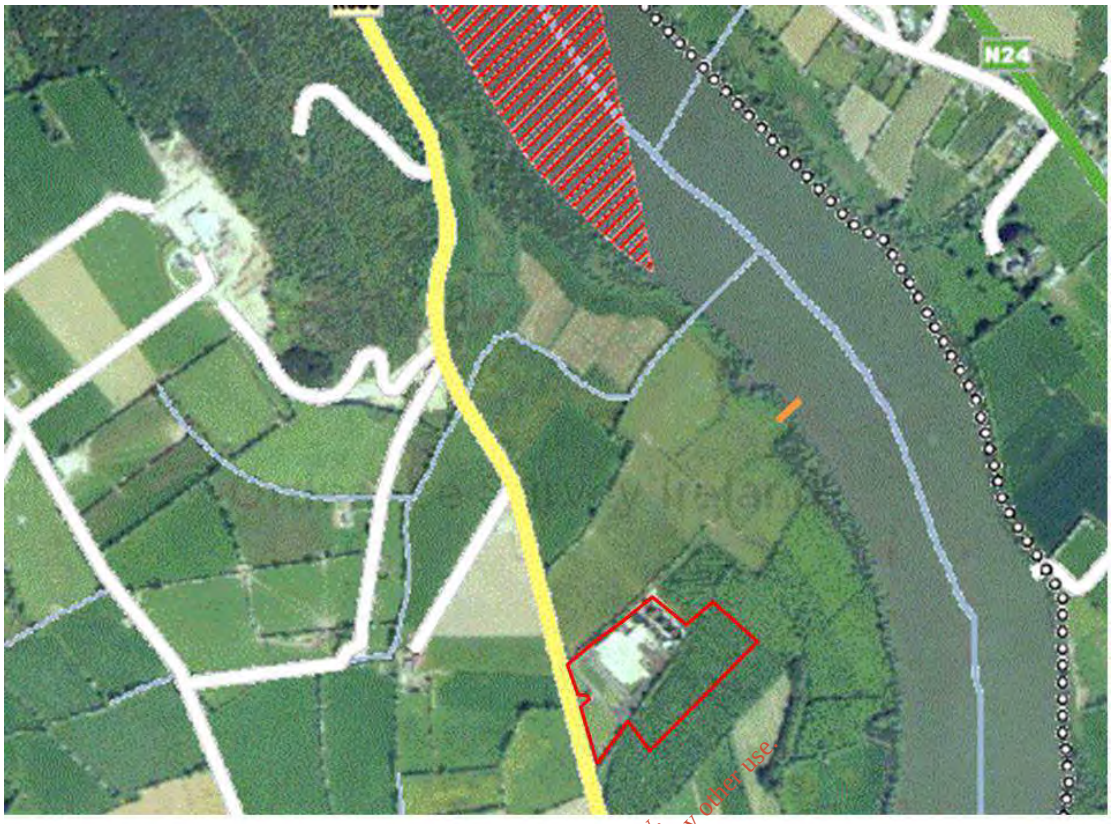

Figure 3. Proposed development area outlined in red and the discharge point indicated in orange in relation to the Fiddown Nature Reserve in the hatched area.

3.5 NPWS rare plants database

The national parks and wildlife service has only one historical of a recording rare or threatened plant species for the 10km grid square S41, and this is shown in **Table 4**. This species was not recorded on or in the vicinity of the site.

Table 4. Rare plant species

Species	Common name	Ten Km square	Recorded date
Cephalanthera longifolia	Narrow-leaved Helleborine	S41	1894

4. Conservation objectives

Draft Generic Conservation Objectives Lower River Suir SAC (002137)

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status sites designated as Special Areas of Conservation and Special Protection Areas. The Government and its agencies are responsible for the

implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, is stable or increasing, and
- the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population data on the species concerned indicate that it is maintaining itself, and
- the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective 1: To maintain the favourable conservation status of the Qualifying Interests of the SAC

- Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]
- White-clawed crayfish (*Austropotamobius pallipes*) [1092]
- Sea lamprey (*Petromyzon marinus*) [1095]
- Brook lamprey (*Lampetra planeri*) [1096
- River lamprey (*Lampetra fluviatilis*) [1099]
- Twaite shad (*Alosa fallax fallax*) [1103]
- Salmon (*Salmo salar*) [1106]
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
- Otter (*Lutra lutra*) [1355]
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Old sessile oak woods with Ilex and Blechnum in British Isles [91A0]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]
- *Taxus baccata* woods of the British Isles [91J0]

Objective 2: To maintain the extent, species richness and biodiversity of the entire site.

Objective 3: To establish effective liaison and co-operation with landowners, legal users and relevant authorities.

5. EPA monitoring

The Environmental Protection Agency carries out a biological assessment of most river channels in the country on a regular basis. The assessments are used to derive Q values, indicators of the biological quality of the water. The biological health of a watercourse provides an indication of long term water quality. The EPA Q value scheme is summarised in **Table 5**.

The intermediate ratings Q1-2, Q2-3, Q3-4 and Q4-5 are used to denote transitional conditions, while ratings within parenthesis indicate borderline values. Great importance is attached to the EPA biotic indices, and consequently it is these data that are generally used to form the basis of water quality management plans for river catchments.

Table 5. EPA biotic index scheme.

Q value	Water quality	Pollution	Condition
5	Good	Unpolluted	Satisfactory
4	Fair	Unpolluted	Satisfactory
3	Doubtful	Moderately polluted	Unsatisfactory
2	Poor	Seriously polluted	Unsatisfactory
1	Bad	Seriously polluted	Unsatisfactory

Source: EPA

In estuarine waterways the EPA rates water quality as Unpolluted, Intermediate, Potentially eutrophic and Eutrophic. The former two are considered to be acceptable estuarine water quality, while the latter two water quality ratings are considered as unsatisfactory.

The 2011Q values for and water quality measurements for the River Suir are shown in **Table 6**. Please note that this section of the River Suir is classified as the Middle Suir Estuary. This

designation begins 1.6 km upstream at Fiddown bridge and continues downstream to the east of Waterford City.

Table 6. EPA Q values for the waterways in relation to the proposed pipeline route

River / waterway	Location	Approx. distance from development site	2011 Q values
Suir	Kilsheelan bridge	20.8 km upstream	3-4
Suir	Churchtown, Carrick-on-Suir	15.1 km upstream	4
Suir	Carrick-on-Suir	9.8 km upstream	3-4
Suir	2km upstream of Carrick-on-Suir to Fiddown bridge	9.8 km upstream to 1.6km upstream	Estuarine & coastal water quality – Potentially eutrophic
Suir	Fiddown bridge (and adjacent to this site)	1.6km upstream to 23.3km downstream	Estuarine & coastal water quality – Eutrophic

6.Water frameworks Directive – Middle Suir Estuary status (IE SE 100 0550)

The Water Framework Directive (WFD) is a key initiative aimed at improving water quality throughout the EU. It applies to rivers, lakes, groundwater, coastal & transitional waters. The Directive requires an integrated approach to managing water quality on a river basin basis; with the aim of maintaining and improving water quality. The Directive requires that management plans be prepared on a river basin basis and specifies a structured approach to developing those plans. It requires that a programme of measures for improving water quality be brought into effect.

Specifically the WFD aims to:

- protect/enhance all waters (surface, ground and coastal waters)
- achieve "good status" for all waters by December 2015
- manage water bodies based on river basins (or catchments)

- involve the public
- streamline legislation

A) The Water Frameworks Directive assesses the water quality of rivers and ranks their status as follows:

- High
- Good
- Moderate
- Poor
- Bad
- Yet to be determined

The Middle Suir Estuary status is determined to be **Moderate** based on the following parameters.

Table 7. Parameters

Disolved Inorganic nitrogen status	Moderate
Molybdate Reactive Phoshherious status	Good
Disolved oxygen as a per cent saturation status	Moderate
Biochenical Oxygen Demand (5 day) status	Moderate
Macroalgae – phytobiomass status	Moderate
Overall protected area	Less than good
Ecological status	Moderate

B) The water frameworks directive also determines the "Risk" level of the river as follows:

- 1a – At risk of not achieving Good Status
- 1b – Probably at risk of not archiving Good Status
- 2a – Expected to achieve Good Status
- 2b – strongly expected to achieve Good Status

The Middle Suir Estuary is considered **1a - At risk of not achieving Good Status** based on the following parameters.

Table 8. Risk parameters

Overall risk from point sources – worst case (2008)	Probably at Risk
Marine direct impacts – worst case	N/A
Worst case of point overall and MDI overall overall (MIMAS) Morphological risk worst case (2008)	Probably at Risk
Transitional overall – worst case overall overall (MIMAS) Morphological risk worst case (2008)	At Risk

C) The water frameworks directive also sets out the future plans for the protection and restoration of rivers as follows:

- Protect
- Restore – 2015
- Restore – 2021
- Restore - 2027

The Middle Suir Estuary is to be **Restored – 2021**

7. Suir Estuary Water Management Unit Action Plan

The facility comes within the above management unit. The status/impacts, pressure/risks and objectives are detailed below in **Tables 9, 10 and 11** respectively.

Table 9 Status impacts

STATUS/IMPACTS	
Overall status	37 RWB - 16 good, 16 moderate, 5 poor. 4 lakes in this WMU, all are moderate status and monitored (Knockaderry Reservoir, Ballyscanlan Lough, Ballyshunnock, Carrigavantry Reservoir). 4 transitional WBs; Lower Suir Estuary, Upper Suir, Mid Suir, and Barrow/Suir/Nore Estuarie – *refer to Transitional and Coastal Action Plan for SERBD*
Status elements	Physio- chemical dictates 8 moderate RWBs (5 good, 3 moderate). The remaining RWBs are dictated by Q score. Status was extrapolated for 21 RWBs. Chemical Status not monitored. Knockaderry Reservoir, status driven by Chlorophyll, Nutrients - Ammonium, Total Phosphorus Ballyscanlan Lough, status driven by Chlorophyll, Nutrients - Total Phosphorus Ballyshunnock, status driven by Chlorophyll, Nutrients - Ammonium, Total Phosphorus Carrigavantry Reservoir, status driven by Chlorophyll, Nutrients - Total Phosphorus
Possible Impacts - EPA Water Quality 2004	SUIR - (Lowest monitoring point along Suir is the only one which falls within Suir Estuary WMU. However, it is within the Transitional waters of the Upper Suir Estuary, rather than a River WB, which is graded as Moderate Status. This monitoring point received a Q-score 3) Mostly satisfactory following improvement at eight locations. Ecological quality was good at 15 locations, moderate at two and poor at five. Continuing polluted downstream of Templemore, in and downstream of Thurles as far as Holycross, and also just upstream of Carrick-on-Suir. The crayfish, a protected species, was recorded at 15 of the 22 sites examined. These successfully reproducing populations could be threatened if reports of the introduction of an alien crayfish to the Suir turn out to be correct. (Based on Q scores from 3 to 4)

Table 10 Pressures and risks

PRESSURES/RISKS (continued)	
Wastewater Treatment Plants (WWTP) and Industrial Discharges	At risk: Fiddown Mooncoin Mullinavat Piltown Sewerage Scheme Grangemockler Portlaw WWTP - Proposed upgrade to 5250 pe. Cheekpoint Faugheen No Section 4 risks 3 IPPCs - at risk
Quarries, Mines & Landfills	There are 13 Quarry within the WMU. There are 2 landfills within the WMU: Kilbarry Landfill Site and Hardbog Landfill. There are no mines within the WMU.
Agriculture	There are 31 waterbodies at risk from agriculture within the WMU: SE_16_9, SE_16_3485, SE_16_3783, SE_16_384, SE_16_359, SE_16_4215, SE_16_3817, SE_16_4291, SE_16_3609, SE_16_1496, SE_16_4191, SE_16_3977, SE_16_869, SE_16_747, SE_16_3309, SE_16_17, SE_16_4252, SE_16_1525, SE_16_1151, SE_16_3186, SE_16_4249, SE_16_3914, SE_16_1502, SE_16_4197, SE_16_4257, SE_16_358, SE_16_1085, SE_16_4174, SE_16_4237, SE_16_3586, SE_16_4321
On-site systems	There are 9323 septic tanks in this WMU, none of them are posing a risk to water quality due to their density, location and unsuitable hydrogeological conditions.
Forestry	There are no waterbodies within the WMU at risk from Forestry.
Dangerous substances	There are no waterbodies at risk from dangerous substances within the WMU.

Morphology	There are no waterbodies at risk
Abstractions	There are 9 waterbodies at risk from abstraction within the WMU: SE_16_3609, SE_16_1496, SE_16_4252, SE_16_3914, SE_16_4174, SE_16_4321, SE_16_4249, SE_16_4237, SE_16_4291.
Other	Lower Suir Estuary transitional WB has been heavily modified.

Table 10 Pressures and risks (continued)

PRESSURES/RISKS	
Nutrient sources	Most TP is diffuse (94%) mainly from agriculture (59%), unsewered properties (10%), unsewered industry (21%) and WWTP (6%).
Point pressures	11 WWTP - Fiddown, Mooncoin, Mullinavat, Piltown, Carrick-on-Suir, Faugheen, Grangemockler, Portlaw, Ballyneil, Waterford, Cheekpoint. 7 Section 4 – 3 private companies, Concrete and Mortar Company, Building Product Producer, Quarries, Retail Centre. 15 IPPCs – Animal Health Products Company, Tape Manufacturers, Pharmaceuticals Company, 2 Plating Companies, 2 Farms, 2 Transportation Companies, Lens Production Company, Carpet Company, Crystal Manufacturers, Research and Development Company, Technology Manufacturing Company, Manufacturing Timber Company. 8 WTP - Lingaun WTP, Ahenny Treatment House, Carrickavantry WW, East Waterford, Coolnamuck Road Treatment, Ballinvir TH, Tullohea TH, Clonamy WTP. 9 EPA Licensed Waste Facilities

Table 11 Objectives

OBJECTIVES	
Restore/Protect 2015	20 river water bodies and 4 lake water bodies
Alternative Objectives	Extended Deadlines – 17 river water bodies with 2021 deadline New Modifications or Development – Piltown flood alleviation pre-feasibility study completed and Waterford City Council undertaking 1st Phase of flood alleviation scheme with OPW funding. HMWB/AWB – 1 HMWB - Lower Suir Estuary (Little Island-Cheek Point)

8. Site inspection

One site inspection was carried out on the 28th October, 2010. Habitats were classified using the general methodology outlined in the Heritage Council publication *A standard methodology for habitat survey and mapping in Ireland* (Heritage Council, 2005). All habitats were classified to level 3 of the classification scheme outlined in *A Guide to Habitats in Ireland* (Fossit, 2000). No listed rare or threatened floral species were recorded on, or in the vicinity of the site. Habitats on site and adjacent to the site are shown on **Fig. 4** and detailed in **Table 12 and 13.**

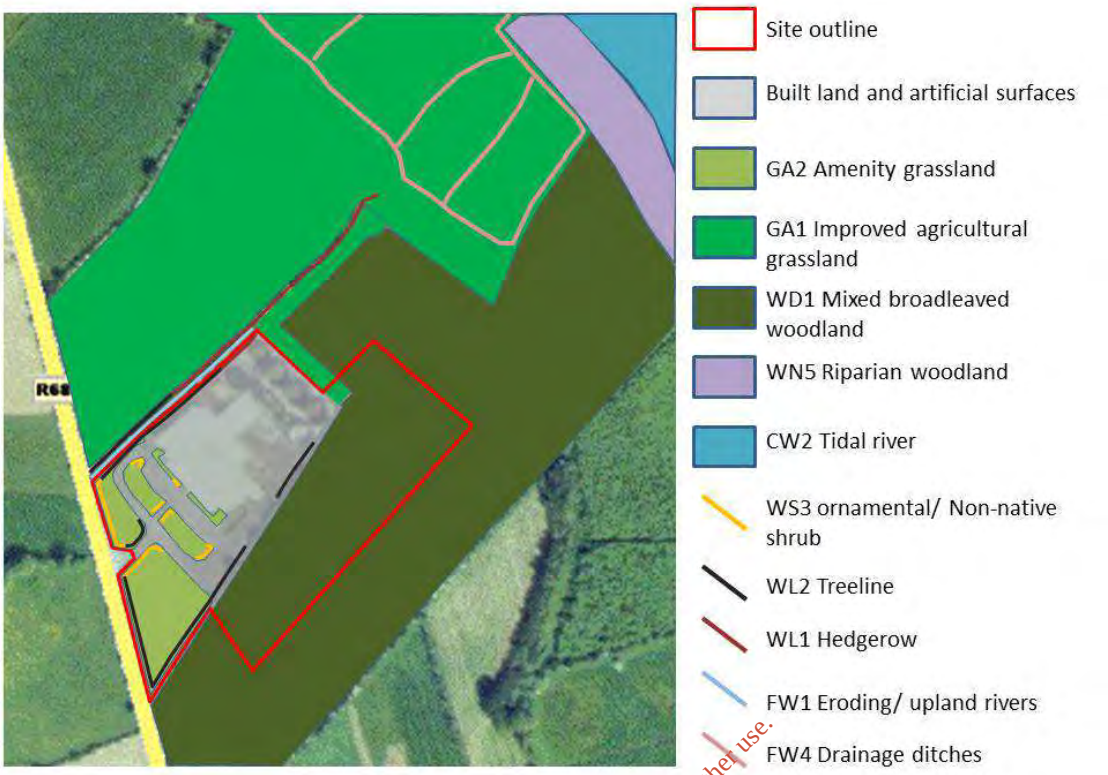

Figure 4. Habitat map.

8.1 Habitat value

The relative values of habitat types are detailed in **Table 12**. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape. The evaluation scheme used in **Table 12** is based on the scheme detailed in the NRA publication *Guidelines for assessment of ecological impacts of National Road Schemes* (**Appendix 2**).

Table 12. Terrestrial habitats

Habitat Type/Species	Habitat Value	Comments
GA1 Improved agricultural grassland	**Low value E**	This habitat includes grassland that has been reseeded and regularly fertilised. It is dominated by grass species, particularly rye-grass, with a poor complement of agricultural weed species.
WD1 Mixed Broadleaved woodland	**Low -Moderate value E-D**	Two areas of plantation grown ash and sycamore. The trees are closely spaced and approximately 8 m tall.
WL1 Hedgerow	**Moderate value D**	The northern boundary of the site is marked by both hedgerow and treeline. The hedgerows is predominantly gorse with hawthorn and bramble. Downey birch and sycamore were also present in the hedgerow.
WL2 Treelines	**Low value E**	The treeline on the northern boundary of the site is a purposefully planted treeline used a screen to obscure the view of the treatment plant from the road and neighbouring houses.
WN5 Riparian woodland	**International value A**	Adjacent to the Suir River is a dense area of Riparian woodland dominated by white willow, with cracked willow and grey willow also present. This habitat will not be significantly affected.
BL3 Built land and artificial surfaces	**Low value E**	This habitat type includes all the buildings, sheds, storage tanks and yards which form the majority of the site.
WS3 Ornamental/ non-native shrubs	**Low value E**	Located at the main entrance to the site.
GA2 Amenity grassland	**Low value E**	Part of onsite landscaping.

Table 13. Aquatic Habitats

Habitat Type/Species	Relative Habitat Value	Comments
Tidal rivers CW2	**International value A**	The tidal section of the River Suir is situated approximately 300 meters to the east of the proposed development area. This section of the river is approximately 280 meters wide, with deep slow flows. The western bank, adjacent to this site, has a levy approximately 5 meters high. The riverside bank of this levy is dominated by willows including white willow, cracked willow and osier. Reed canary-grass and common reed were also present along the waters edge and along the levy.
FW1 Eroding upland rivers	**Low value E**	This habitat type includes the seasonal stream which flows along the northern boundary of the site, associated with the WL1 hedgerow and WL2 treeline habitats.
FW4 Drainage ditches	**Low value E**	Located in the fields between the facility and the River Suir.

9. Fauna

9.1 Mammals

No signs of otter, which are listed as a qualifying interest for the Lower River Suir SAC, were recorded in the vicinity of the site although it is probable that they utilise this part of the Suir River. No suitable or potential roost sites were identified along the section of river in proximity to the site. Bats may feed along the river but buildings on site are modern and do not provide suitable habitat for roosting.

9.2 Birds

A number of common bird species were noted in and around the site which including song thrush, blackbird, robin, blue tit, great tit, jackdaw, rook, hooded crow, chaffinch, woodpigeon, mallard and heron. These species were primarily associated with the treelines and river habitats.

Parts of the SAC site have also been identified as of ornithological importance for a number of Annex I (EU Birds Directive) bird species, including Greenland White-fronted Goose, Golden Plover, Whooper Swan and Kingfisher. None of these species were recorded although kingfisher may occur along the Suir River.

10. Potential impacts

The terrestrial habitats noted above are common low value habitats which are not of ecological value. An area of low diversity broadleaved plantation woodland and sections of associated treelines, which suffer moderate disturbance, will be removed. The line of riparian vegetation which borders the River Suir is of high ecological value. None of these protected habitats will be affected by the proposed changes.

The River Suir supports a number of important aquatic species which could potentially be impacted by deteriorations in water quality. Two lamprey species (*Petromyzon marinus,* and *Lampetra fluviatilis) and* salmon *(Salmo salar),* will migrate through this tidal section of river. Two shad species *(Alosa fallax and Alosa alosa)* occur within the tidal reaches. White clawed crayfish *(Austropotamobius pallipes)* and Freshwater pearl mussel *(Margaritifera margaritifera)* are unlikely to occur in this tidal section of the Suir River.

A significant deterioration in water quality could impact on directly on otters or indirectly by affecting prey species. No potential significant impacts on the qualifying Annex 1 habitats (Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean salt meadows (*Juncetalia maritimi*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Old sessile oak woods with Ilex and Blechnum in British Isles, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) and *Taxus baccata* woods of the British Isles, Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation) have been identified.

11. Conclusions

The proposed changes and developments to the facility will have a minor impact on low diversity habitats within the land ownership area. No terrestrial habitats of value will be affected and there will be no significant direct impact on the Suir River.

No otters were detected although this species is likely to be present along Suir River. However in the absence of any significant increase in noise or significant impacts on water quality no impact on this species is envisaged. Similarly, no direct impact on birds including Annex 1 birds such as kingfisher is envisaged.

Impacts on water quality are the primary concern however the leachate produced in the composting process is re-circulated and surplus leachate that requires treatment is typically not generated. Foul water is treated using a septic tank and percolation area which is located a considerable distance from the Suir River and does not constitute a significant risk to water quality.

The only discharge to the Suir River will be of surface water from the existing facility. Waste is processed indoors and is only moved within the site in sealed containers; therefore no nutrient enrichment of surface water will occur.

The changes to the storm water system will be minor and there will be only a slight increase in discharged surface water (5%) during a 50mm one hour storm event. In the context of the available dilution in the River Suir, the low level of nutrients in the surface water discharge and the use of an oil interceptor the impact on surface water quality within the River Suir SAC is expected to be negligible.

This is predominantly a rural area largely dominated by one-off housing and in the absence of other major discharges no significant cumulative impacts on water quality are envisaged. The objective under the Water Framework Directive for the Middle Suir river is to restore by 2021 and thus water quality within the Lower Suir is expected to improve and reach good status by this date.

Overall there is no evidence to indicate that works will cause significant deterioration of the habitats of the qualifying species and species of special conservation interest or significant disturbance to these species thus ensuring the integrity of the site is maintained.

On the basis that no potentially significant impacts have been identified by this screening report, a Stage 2 Natura Impact Statement is not considered necessary.

Appendix 1 Site photographs

Photograph 1. The existing discharge point location

Photograph 2. View of the Lower River Suir from the discharge point.

Appendix 2 – National Roads Authority – Guidelines for assessment of ecological impacts of National Road Schemes

Rating	Qualifying criteria
A	**Internationally important** Sites designated (or qualifying for designation) as SAC* or SPA* under the EU Habitats or Birds Directives. Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive. Major salmon river fisheries. Major salmonid (salmon, trout or char) lake fisheries.
B	**Nationally important** Sites or waters designated or proposed as an NHA* or statutory Nature Reserves. Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. Major trout river fisheries. Water bodies with major amenity fishery value. Commercially important coarse fisheries.
C	**High value, locally important** Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. Small water bodies with known salmonid populations or with good potential salmonid habitat. Sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Large water bodies with some coarse fisheries value.
D	**Moderate value, locally important** Sites containing some semi-natural habitat or locally important for wildlife. Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any water body with unpolluted water (Q-value rating 4-5).
E	**Low value, locally important** Artificial or highly modified habitats with low species diversity and low wildlife value. Water bodies with no current fisheries value and no significant potential fisheries value.

*SAC = Special Area of Conservation
SPA= Special Protection Area
NHA= Natural Heritage Area

Appendix 2 continued

Criteria for assessing impact significance

(a) Terrestrial habitats

	Site category*				
Impact level	**A sites Internationally important**	**B sites Nationally important**	**C Sites High value, locally important**	**D sites Moderate value, locally important**	**E sites Low value, locally important**
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

Criteria for assessing impact significance

(b) Aquatic habitats

A Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	**Major**	**Severe**	**Severe**	**Severe**
Localised	**Major**	**Major**	**Severe**	**Severe**

B Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	**Major**	**Major**	**Severe**	**Severe**
Localised	**Moderate**	**Moderate**	**Major**	**Major**

C Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	**Moderate**	**Moderate**	**Major**	**Major**
Localised	**Minor**	**Moderate**	**Moderate**	**Moderate**

D Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	**Minor**	**Minor**	**Moderate**	**Moderate**
Localised	**Not significant**	**Minor**	**Minor**	**Minor**

E Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	**Not significant**	**Not significant**	**Minor**	**Minor**
Localised	**Not significant**	**Not significant**	**Not significant**	**Not significant**

In line with the EPA Guidelines (EPA 2002), the following terms are defined when quantifying duration:

Temporary: up to 1 year,
Short-term: from 1-7 years,
Medium-term: 7-15 years,
Long-term: 15-60 years,
Permanent: over 60 years.

Localised impacts on rivers are loosely defined as impacts measurable no more than 250m from the impact source. Extensive impacts on rivers are defined as impacts measurable more than 250m from the impact source. Any impact on salmonid spawning habitat, or nursery habitat where it is in short supply, would be regarded as an extensive impact as it is likely to have an impact on the salmonid population beyond the immediate vicinity of the impact source.

CLOSURE, RESTORATION AND AFTERCARE MANAGEMENT PLAN

ORMONDE ORGANICS LIMITED

PORTLAW

WATERFORD

WASTE LICENCE REG. NO. – W0287-01

TABLE OF CONTENTS

1. Introduction

Ormonde Organics Ltd (Ormonde Organics) has applied to the Environmental Protection Agency EPA for a Waste Licence for its biological waste treatment facility at Killowen. Currently waste treatment activities are confined to the composting of non-hazardous industrial sludge and sewage sludge and the facility is regulated by a Waste Permit granted by Waterford County Council.

The Waste Permit and current planning permission authorises the construction and operation an anaerobic digestion plant at the site. However, it limits the types of wastes that can be accepted and therefore Ormonde Organics lodged the Waste Licence application to allow the acceptance of 40,000 tonnes per annum of non-hazardous organic wastes.

The EPA has requested Ormonde Organics to prepare a fully detailed and costed Closure Restoration and Aftercare Management Plan (CRAMP) for the facility and requires that the preparation of the CRAMP and the evaluation of the amount and form of financial provision is to have regard to the EPA's 'Guidance on environmental Liability Risk Assessment, Residuals Management Plans and Financial provision (2006) (EPA Guidance).

1.1 Facility Description

The facility is located on the site of a former tannery (Michell Ireland), which opened in 1993 and closed in December 2003. The facility operated under an Integrated Pollution Control Licence. The Licence was revised to exclude the tannery buildings and associated wastewater treatment plant, but lands to the north east of the Ormonde Organics site remain within the licence area.

The compost facility, which opened in 2007 and occupies the former tannery buildings and wastewater treatment plant, was designed to treat sewage sludge produced in municipal wastewater treatment plants. As such it was exempt from requiring either a Waste Licence, or Waste Permit.

In September 2010, Waterford County Council granted Ormonde Organics a Waste Permit, to accept and treat a maximum of 8,000 tonnes/year of household biodegradable waste, garden and park waste and septic tank sludges. The 8,000 tonnes is included in the overall annual tonnage of 40,000 tonnes authorised by the planning permission.

In June 2011, the Council issued a revised Permit, which authorised the acceptance and composting of non-hazardous industrial wastewater treatment sludge and other organic waste residues. In April 2012 Waterford County Council granted planning permission for the development of the anaerobic digestion plant and, in May 2013, the Council issued a revised Permit authorising the operation of the anaerobic digestion plant, subject to a maximum annual intake of 8,000 tonnes of non-hazardous organic wastes. Construction works began in 2013.

1.2 Closure Scenarios

The facility has no defined lifetime and the risk of closure is low. The commercial viability of the facility will be kept under review and, if market conditions dictate the need to close the facility, the Plan will be implemented. In the event of the unexpected closure of the facility the EPA and Waterford County Council will be notified. It is envisaged that 'Clean Closure' can be achieved and that restoration works and aftercare management will not be required.

1.3 Closure Plan Update & Review

The Plan will be reviewed and updated annually during the preparation of the Annual Environmental Report. The Plan may also be reviewed based on the impacts of any future on-site incidents that affect soil and groundwater quality.

1.4 Scope of the Plan

The Plan deals with the facility decommissioning and closure, which will involve the removal of all residual consumable materials and wastes, cleaning and removal of all plant and equipment, as well as cleaning of all buildings. Following closure, Ormonde Organics may, depending on the future plans for the facility, apply to surrender the Licence.

1.5 Limitations

Ormonde Organics has begun constructing Stage 1 of the anaerobic digestion plant. Stage 2 will be completed following the grant of the Waste Licence. The CRAMP is based on the assumption that Stages 1 and 2 have been constructed. The CRAMP will be reviewed and updated following the completion of Stage 2 to take account of any operational changes and any relevant conditions set in the Waste Licence.

The assessments of costs identified in this report are based on the information available at the time of the report preparation and may be subject to amendment based on future changes to site operations.

2. Site Evaluation

2.1 Operator Performance

2.1.1 Facility Management

The Facility Manager has 17 years experience in Waste Management and has a Certificate in Compost Facility Operation awarded by Sligo Institute of Technology. The Deputy Manager has a BAgrSci and 6 years experience in waste management. The facility is certified to ISO 14001 Environmental Management System, ISO 9001 Quality System and OHSAS 18001.

2.1.2 Incident History

Since Ormonde Organics began operations at the site in 2007 there have been no incidents (spills, fires, leaks etc) that had potential to cause surface water, soil and groundwater pollution.

2.1.3 Compliance History

Ormonde has not received any notifications of non-compliance with the Waste Permit conditions.

2.1.4 Enforcement History

The facility has never been the subject of any enforcement action taken by the regulatory authorities

2.2 Environmental Pathways & Sensitivities

2.2.1 Surface Water

The site is in the catchment of the River Suir, which is approximately 350m to the northeast of the site. Two unnamed tributaries of the Suir join the river approximately 500m to the north and south of the site. This stretch of the Suir is tidal and is categorised as a Transitional Water Body under the South East River Basin District (SERBD) Management Plan.

The Suir is designated as a Special Area of Conservation (SAC) from immediately south of Thurles to the tidal stretches at the confluence with the Barrow/Nore immediately east of Cheekpoint in County Waterford. (Lower Suir River SAC Site code 002137), which includes the stretch up and downstream of the facility.

The surface water drainage layout is shown on Drawing No 10 P 536-50. Run-off from the building roofs and impermeable areas is collected and directed to oil interceptors and into a storm water attenuation tank (224m^3 capacity). The tank is fitted with a flow restrictor at the outlet to limit the discharge rate. The outlet connects to a sump from where there is a pipe to the river. The sump is fitted with a shut-off valve, which when activated contains storm water within the site.

2.2.2 Geology & Hydrogeology

The soils and subsoils comprise 0.3metres(m) of topsoil overlying approximately 2m of medium dense brown silty clayey sand with gravel and cobbles, which in turn are underlain by at least 2m of firm to stiff, brown, sandy, silty clay with some gravel, cobbles and the occasional boulder. The subsoils range from 34m in the north central part of the site to 12.5m in the north east of the site, thinning towards the river. The subsoils are underlain by a heavily weathered limestone.

The subsoils are not significantly water bearing. An on-site production well provided a sustainable yield of 450m^3/day to the former tannery. Given the reported yields, it is probable that the bedrock is a Regionally Important Aquifer.

The direction of groundwater flow is influenced by the topography and the proximity to the River Suir, and is expected to be predominantly from west to east. It appears that there is hydraulic connectivity between the bedrock aquifer and the River Suir.

The Geological Survey of Ireland (GSI) assigned aquifer vulnerability rating, which indicates the potential susceptibility to contamination from pollution sources at the ground surface, is Low and the site specific information on the type and thickness of the subsoils confirm this classification.

2.2.3 Surrounding Land Use

The lands in the vicinity of the site are primarily used for agricultural and horticultural purposes, with the land immediately to east and south of the site planted with dense deciduous trees. The nearest dwellings are along the R680 and the nearest domestic resident is more than 250 metres from the northwest site boundary.

2.3 Site Processes & Activities

2.3.1 Waste Types & Volumes

The facility is authorised to accept of 40,000 tonnes of organic waste annually, which includes:

- Municipal wastewater treatment sludge,
- Household biodegradable kitchen and canteen waste,
- Other biodegradable waste (Garden & Park Waste), and
- Septic Tank Sludge.
- Non-hazardous industrial and water treatment sludge.

Household kitchen and canteen waste contains animal by-products (ABP), for example uncooked meat, that are subject to regulation by the Department of Agriculture, Fisheries and Food (DAFF). Ormonde Organics has initiated the DAFF approval process and will not accept any wastes containing ABP until the DAFF approval has been obtained.

2.3.2 Waste Acceptance & Handling Procedures

Ormonde Organics has a documented waste acceptance and handling procedure that ensures only suitable wastes are accepted and processed in a manner to produce a good quality product. The incoming wastes are weighed at the weighbridge and the accompanying documentation is checked. Any waste not deemed suitable is not accepted and the driver of the vehicle is instructed to return the waste to the producer.

2.3.3 Composting

Wastes are off-loaded from the delivery vehicles inside the Compost Building. There are separate reception areas for the municipal wastewater sludge and the household biodegradable waste and green waste. Any large items in the household biodegradable wastes are manually removed and bulking agents (shredded green waste) may be added.

The wastewater treatment sludge is loaded into one of nine dedicated concrete walled forced aeration compost bays (Bays 1 to 9). Bays 10 and 11, which are similar to Bays 1 to 9, are used for household waste. The wastewater treatment sludge is moved from Bay to Bay and regularly turned to enhance the composting process and the temperature is monitored until each batch has reached a temperature of more than 55^{0}C for more than three consecutive days.

Upon completion of the thermophilic stage, the sterilised wastewater treatment sludge is moved to the Screening Area where it is screened, with the oversize sent back to the reception area for reuse and the finished product then sent off-site for land application.

To comply with DAFF requirements on the composting of household waste, a temperature of 70^{0}C will be achieved and maintained for a minimum of one hour in the Bays where waste that have the potential to contain ABP materials are composted. The compost will be moved to a dedicated Maturation Area (Bay 12). Following maturation, the product will be moved to the Screening Area, where it will be screened to remove any oversize materials (for example wood chip), which will be returned to the reception area for reuse. The finished product will be sent off site and used for agricultural or horticultural purposes.

Leachate generated in the bays is collected in floor drains and directed to an underground concrete collection tank. The leachate from Bays 10 and 11, which will be used for wastes containing ABP, will be collected separately from the other Bays. The moisture content of the materials is monitored during the compost process and the leachate in the collection tank is recirculated to ensure optimum conditions are maintained. The process is a net water user and normally surplus leachate is not generated. In the unlikely event that surplus leachate is generated, it is sent for treatment at an off-site municipal wastewater treatment plant.

2.3.4 Anaerobic Digestion

The three (3No.) fully enclosed digesters (each 1,800m^3) can process up to 20,000 tonnes per annum of non-hazardous organic waste and biomass, for example silage. The treatment process begins in the Waste Reception Building, where the organic wastes and biomass are off loaded and fed using a loading shovel, into a 40m^3 slide feeding system that moves it via a fully enclosed conveyor to the digester tanks. The contents of the tanks are continuously agitated and maintained at the optimum temperature of 47^{O}C.

The process, which takes approximately 50 days for each batch, generates a biogas, fibre and digestate. The biogas consists largely of methane and carbon dioxide, but also contains a small amount of hydrogen sulphide and ammonia, as well as traces of other gases. The biogas is treated to reduce the levels of ammonia and hydrogen sulphide before being used as a fuel in three gas engines in the Combined Heat and Power (CHP) plant. A gas flare with a capacity of 600m^3/hour is provided as a back–up for when the gas engines are shut down for routine servicing.

The digestate and fibre have a significant nutrient and soil enhancement value and, depending on the time of the year, are either immediately sent off site for application of agricultural lands, or stored in a number of the converted wastewater treatment tanks until ground/weather conditions allow land application.

2.3.5 Emissions

The actual and potential emissions from the facility include noise, dust, exhaust gases from vehicles and mobile plant, odours, bioaerosols, surface water run-off and sanitary wastewater. Leachate generated in the composting processes is collected and stored in tanks located outside the building and there is no direct or indirect connection with the surface water drainage system.

Noise

Noise emission sources include the waste and finished product transport vehicles, the mobile plant, air compressors and air extraction fans. The closest noise sensitive location is 250m from the site boundary.

Dust

Potential dust sources include vehicle movement over the concrete yards during dry periods and during the screening of the finished product. The screening is carried out inside the building, which minimises the risk of dust emissions to atmosphere.

Odours

The incoming wastes and the treatment processes are a source of odours. The composting process is also a source of bioaerosols. The odour control system comprises an air extraction system that directs odorous air and bioaerosols via ducts to odour abatement systems, which comprises wet scrubbers and two biofilters. The abatement systems are subject to a routine maintenance programme, which includes bi-annual air flow rate measurements and olefactometry testing at the surface of the biofilters.

Surface Water

Surface water run-off from the paved areas and building roofs discharges, via an oil interceptor and low attenuation tank to the River Suir.

2.4 Buildings, Plant and Equipment

The site layout is shown on Drawing No 10 P 536-02. It comprises -

- Compost Building, comprising
  - Waste Reception Areas ;
  - 11 No enclosed Forced Aeration Composting Bays;
  - Maturation Area (Bay 12);
  - Screening Area;
  - Offices.
- Building No. 2 linking to the southeast side of the Compost Building, comprising 2 No. pasteurisation areas, 5 No. maturation bays and a workshop.
- 3 No. above ground Anaerobic Digester (AD) Tanks (each 1800m^3) for the treatment of 20,000 tonnes per annum of non-hazardous organic waste and biomass.
- 3 No tanks for storage of incoming organic waste and/or digestate from the AD.
- Building No. 3(A) to the southeast of the AD tanks, comprising an organic waste reception are.
- Combined Heat and Power (CHP) generator, comprising 3 No gas engines.
- A drier building (Building No. 3B) and adjacent gas flare stack associated with the CHP Plant
- A new agricultural silage pit/ biomass storage area to the southeast of Building No. 3 with associated underground effluent storage tank;
- Odour Abatement System (Biofilter) located to the south east of the Compost Building
- Odour Abatement System (Biofilter) to the southwest of Building No. 2.
- Maintenance Workshop to the rear of the Compost Building;
- Weighbridge;
- Natural Gas (Bord Gais) Substation
- Security Fencing;
- Paved open yards, bunded fuel storage areas and landscaped areas.

- Front Loading Shovels
- Forklifts
- Compost Turner
- Air Compressors
- Air extraction fans and ducting
- Odour Abatement Plant
- Telecom
- Electricity
- Water obtained from on-site well
- Sanitary wastewater treated in an on-site septic tank and percolation area.

2.5 Inventory of Raw Materials

The materials/products used on site and the maximum storage capacity are given in Table 2. 1 These include diesel, hydraulic and engine oils and waste oils. Diesel for the mobile plant is stored in a 5000 litre above ground bunded storage tank located beneath a canopy adjoining the Workshop. A second oil storage tank is located in a bund on the western side of the Compost Building, but this is empty and not in use. Lubricating and hydraulic oils and coolants are used in plant maintenance..

The quantities given in the Table are based on the volumes kept on site at any one time, but in the event of the planned closure, the actual quantities should be considerably smaller, as the shutdown would be preceded by a reduction in the on-site inventory.

Table 2.1 Consumables

Resources	Quantities
Diesel	5,000 litres
Waste Oil	1 00 litres
Hydraulic and Engine Oil	410 litres

3. Closure Tasks & Programmes

3.1 Closure Tasks

3.1.1 Materials Management

A planned shutdown of site operations by Ormonde Organics would be carried out after the last batches of waste had been processed and consigned from the site. It would be preceded by a scaling down of activities, thereby reducing the quantities of materials, particularly fuel and wastes, to be dealt with when implementing the CRAMP. It should be possible to return some materials e.g. diesel, engine and hydraulic oils to the suppliers either for resale, or reuse. The remaining materials may have to be disposed of as waste, some of which may be deemed hazardous due to their composition e.g. waste oils.

The residual contents of the digesters and digestate storage tanks will be removed and sent to an off – site treatment facility. A vacuum tanker will empty the leachate storage tank and oil interceptors and the contents will be sent for disposal at a suitably licensed facility. The bio-filter medium will be removed and sent to an off-site recovery facility.???

3.1.2 Buildings

It is not proposed to demolish any of the buildings, tanks or any other structures. The Compost Building will be cleaned out and left in situ for future use. Given the nature of the waste handled at the facility, specialist decontamination will not be required and the cleaning will primarily involve power washing. The wash water will be collected and directed to the leachate collection tank. All bunds will be cleaned and integrity tested to ensure that they are suitable for future use.

3.1.3 Plant & Equipment

The plant and equipment will be either sold for use, or scrapped at an approved waste recycling/recovery facility. At the time of the preparation of this Plan it is not possible to accurately quantify every item of plant that would be suitable for resale, as this depends on their future condition. Those items of plant that cannot be sold will be scrapped. All the metal items have a scrap value and therefore the removal of the plant and equipment should be cost neutral.

Given the nature of the waste handled at the facility, none of the plant items will require specialist decontamination before being scrapped. The cleaning plant and equipment will be carried out on-site and will primarily involve power washing. The decontamination will only be carried out in areas where the wash water can be collected and directed to the leachate collection tank.

3.1.4 Soil & Groundwater Assessment

The scope of the assessment, if required, will be agreed in advance with the EPA, but it may comprise the installation of soil borings and groundwater monitoring wells and the collection and testing of soil and groundwater samples. The investigations will be supervised by an experienced geologist who will log the borings in accordance with BS5930, as amended and adopted by the GSI.

The field observations and results of laboratory results will form the basis for the assessment of the significance of the impact, if any, and the need for and extent of any remedial works. If remedial works are considered necessary, a proposed scope will be submitted to the EPA for approval before implementation.

3.1.5 Environmental Monitoring

Monitoring will continue following the closure of the facility and pending the surrender of the Licence. The extent of the monitoring and the frequency may be amended, subject to the EPA's approval, to reflect the fact that the facility is closed.

3.2 Programme

In the event that the entire facility is closed, all the operational areas will be decommissioned. The decommissioning will take approximately 12 weeks and will be carried out in a number of tasks some of which will happen concurrently.

Task 1: The completion of the composting and anaerobic digestion of the waste batches on-site at the time of the decision to close (8 weeks).

Task 2: Removal of consumables, wastes and leachate from Compost Building, Digesters, Digestate Tanks and biofilters; 3 weeks.

Task 3: Clean out of the Compost Building, Digester Tanks, Digestate Tanks and oil interceptors; 2-3 weeks.

Task 4: Cleaning and consignment of plant and equipment; 1 week.

Task 5 Removal of washwater: 1 day.

Task 6: Cleaning of yards; 1 day.

Task 7: Emptying and degassing of diesel tank; 1 day.

Task 8: Disconnecting site services; 1 day.

Task 9: Closure Plan Validation 2 weeks.

4. Criteria for Successful Closure

Successful decommissioning will only be complete when all buildings, equipment, materials, wastes or any other materials that could result in environmental pollution, are removed from the site and recycled, recovered or disposed in accordance with all regulations in force at the time.

5. Closure Plan Validation

5.1 Closure Audit & Validation Report

Following implementation of the Plan, Ormonde Organics will appoint an experienced independent environmental auditor, who will be approved by the EPA, to carry out a Closure Audit and produce a Validation Report that demonstrates the successful implementation of the Plan. The Closure Audit will address: -

1. Disposal of raw materials;

2. Disposal of wastes;

3. Decommissioning of plant and equipment;

4. Disposal of obsolete equipment;

5. Results of monitoring and testing during the decommissioning period;

6 Soil & Groundwater Assessment, and

7 The need for on-going monitoring, remedial actions or aftercare management.

The Validation Report will describe all of the activities carried out during the Closure Audit and will contain records of the destinations of all wastes and materials consigned from the site during decommissioning. The Report will be submitted to the EPA within three months of execution of the Plan.

6. Closure Plan Costing

The costs of a planned closure will be met in full by Ormonde Organics. The costs of implementing the CRAMP in an unplanned closure scenario where Ormond Organics is not is a position to meet the cost are presented in Table 6.1. The costs are based on the following assumptions:

- The closure will be unforeseen and unexpected with no advance warning that would allow an orderly wind down of activities.
- All of the compost bays and the maturation bay is full. The total of 7,500m^3 equates to 3000 tonnes of compost.
- All of the digesters and digestate storage tanks are full (8000m^3) respectively.
- A temporary site manager and operatives will be appointed to manage the plant to ensure that the composting and anaerobic digestion processes are successfully completed and to implement the decommissioning and clean out.
- The diesel storage tank (5,000) litres is full and there are 2 full 205 litre drums of hydraulic and engine oil on-site. These will be used during the processing of the final AD and compost batches.
- The finished compost will be sold at €7.50/tonne. The digestate and fibre will be sent to the normal outlets, which based on the nutrient value of the materials and proximity of the land banks will be cost neutral
- The entire facility will be decommissioned and cleaned, with all wastes and consumables being removed from the site.
- The decommissioning and building and plant cleaning will be carried out by third parties.
- The cleaning of the plant and equipment and off-site removal will be cost neutral given their resale/scrap value. This is a conservative approach given the type of plant and equipment on-site.
- It is not proposed to demolish any of the buildings or tanks.
- A soils and groundwater assessment will not be required

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€)	Source of unit rates
Facility Management	Site Manager (2 days/week for 10 weeks) 2 No operatives 5 days/week for 10 weeks Utility Bills	20 100	Day Day	500 250	10,000 25,000 2,500	
Materials/Waste Disposal/Recovery	Removal and off site disposal of off-spec compost	10	Tonnes		140	Landfill Rate
	Removal and off-site disposal of digestate*	8,000	m^3	-	-	
	Removal and off site disposal of leachate from collection tank	15	m^3	65	975	WWTP Rate
	Removal and off site disposal of diesel, engine and waste oils	1000	litres	70c	700	EPA Guidance
Building Plant & Equipment Clean Out	Clean out of Compost Building (Included in Management Cost)		Day Rate			
	Cleaning Plant and Equipment (Included in Management Cost)		Day Rate			
	Removal of Plant and Equipment*					
	Cleaning of Digester Tanks, Digestate Tanks and interceptors (High powered jetting +confined space equipment +trained operatives)	2	Day Rate	1,000	2000	Ormonde charge out rates
	Removal of wash water from tanks	25	m^3	30	750	Ormonde charge out rates
Yard Cleaning	Cleaning open yard (Roadsweeper)**	1	Daily Hire			
Environmental Monitoring	Surface water quality monitoring	4	Sample	160	640	
Validation Audit	Validation Report (Consultant)	1		2,500	2,500	
Security Costs	Included in Management Cost		Day			
Services Disconnection	Disconnect electricity and telecoms	1	Day	400	400	
Total Liability €)					45,605	
Contingency (10%)					4,560	
Less the Asset Value of the Compost (€)					22,500	
Net Costs (€)					**27,291**	
VAT @23%(€)					**6,276.93**	

*Cost neutral: ** Use Ormonde's on-site road sweeper

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ENVIRONMENTAL LIABILITY

RISK ASSESSMENT FOR

ORMONDE ORGANICS

KILLOWEN,

PORTLAW,

COUNTY WATERFORD

Prepared For: -

Ormonde Organics Ltd,
Killowen,
Portlaw,
County Waterford

Prepared By: -

O' Callaghan Moran & Associates,
Granary House,
Rutland Street,
Cork

2nd October 2013

Project	Environmental Liability Risk Assessment Portlaw
Client	Ormonde Organics Ltd.

Report No	Date	Status	Prepared By	Reviewed By
	27/09/2013	Draft	Michael Watson, MSc	Jim O'Callaghan MSc, CEnv, MCIWM, IEMA
	21/10/2013	Final	Michael Watson, MSc	Jim O'Callaghan MSc, CEnv, MCIWM, IEMA

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1. INTRODUCTION

1.1 Background

Ormonde Organics Ltd has applied to the Environmental Protection Agency (the Agency) for a Waste Licence for its biological waste treatment facility at Killowen, Portlaw. Currently waste treatment activities are confined to composting non-hazardous industrial sludge and sewage sludge and the facility is regulated by a Waste Permit granted by Waterford County Council.

The current planning permission and Waste Permit authorise the construction and operation an anaerobic digestion plant at the site. However, the Waste Permit limits the types of wastes that can be accepted, therefore Ormonde Organics has applied to the Agency for a Waste Licence to allow the acceptance of 40,000 tonnes per annum of non-hazardous organic wastes.

The Agency has requested Ormonde Organics to submit a fully detailed and costed Environmental Liabilities Risk Assessment (ELRA) which addresses the liabilities and potential liabilities and costs identified from the past and proposed activities, including those liabilities and costs identified in the Closure Restoration and Aftercare Management Plan (CRAMP). The Agency requires that the ELRA be either prepared, or reviewed by and independent and appropriately qualified consultant or expert.

The ELRA should also include a proposal for financial provision to cover any liabilities associated with the operation and that Ormonde Organics will be in a position to put such financial provision in place in the event that a Waste Licence is granted and prior to development works commencing.

The preparation of the ELRA and the evaluation of the amount and form of financial provision should have regard to environmental Protection Agency guidance including 'Guidance on environmental Liability Risk Assessment, Residuals management Plans and Financial provision (2006) (Agency Guidance).

1.2 Methodology

Ormonde Organics appointed O'Callaghan Moran & Associates (OCM) to prepare the ELRA. OCM is an environmental consultancy, established in 1997, which provides environmental services to private and public sectors. OCM has been involved in the completion of environmental risk assessments for Waste Licensed and Integrated Pollution Prevention Control licensed facilities since 2001.

OCM's assessment, which was based on the Agency's current guidance and the recently issued draft revised guidance 'Guidance on assessing and costing environmental liabilities' included the following:

- A review of site operations including waste acceptance, handling and on-site recovery processes, raw material storage and handling practices and emissions to identify and assess existing and potential sources of environmental pollution;

- Establishment of the environmental setting and the identification of any particular sensitive receptors that could be impacted in the short, medium and long term by the site operations;

- Review of the site history and regulatory compliance.

1.3 Limitations

Ormonde Organics has begun constructing Stage 1 of the anaerobic digestion plant. Stage 2 will be completed following the grant of the Waste Licence. The ELRA is based on the assumption that Stages 1 and 2 have been constructed in accordance with the current design. Ormonde Organics will review and update the ELRA following the completion of Stage 2 to take account of any design changes and any relevant conditions set in the Waste Licence, including the completion of a Firewater Retention Assessment.

The assessments of costs required to reduce or mitigate the environmental liabilities identified in this report are based on the information available at the time of the report preparation and may be subject to amendment based on future investigations.

2. SITE OPERATION

2.1 Facility Location

The facility is located at Killowen, approximately 3km north of Portlaw. The River Suir is approximately 350 metres from the north-eastern site boundary. The regional route R680 runs along the western boundary of the site and links Portlaw village to the south with Carrick-on-Suir to the north-west.

2.2 Facility Layout

The site comprises -

- Compost Building, comprising
  - Waste Reception Areas ;
  - 11 No enclosed Forced Aeration Composting Bays;
  - Maturation Area (Bay 12);
  - Screening Area;
  - Offices.

- Building No. 2 linking to the southeast side of the Compost Building, comprising 2 No. pasteurisation areas, 5 No. maturation bays and a workshop.

- 3 No. above ground Anaerobic Digester (AD) Tanks (each 1800m^3) for the treatment of 20,000 tonnes per annum of non-hazardous organic waste and biomass.

- 3 No tanks for storage of incoming organic waste and/or digestate from the AD.

- Building No. 3(A) to the southeast of the AD tanks, comprising an organic waste reception are.

- Combined Heat and Power (CHP) generator, comprising 3 No gas engines.

- A drier building (Building No. 3B) and adjacent gas flare stack associated with the CHP Plant

- A new agricultural silage pit/ biomass storage area to the southeast of Building No. 3 with associated underground effluent storage tank;

- Odour Abatement System (Biofilter) located to the south east of the Compost Building

- Odour Abatement System (Biofilter) to the southwest of Building No. 2.

- Maintenance Workshop to the rear of the Compost Building;

- Weighbridge;

- Natural Gas (Bord Gais) Substation
- Security Fencing;
- Paved open yards, bunded fuel storage areas and landscaped areas.

2.3 Services`

- Telecom
- Electricity
- Water obtained from on-site well
- Sanitary wastewater treated in an on-site septic tank and percolation area.

2.4 Waste Types & Volumes

The site is authorised to accept of 40,000 tonnes of organic waste annually, which includes:

- Municipal wastewater treatment sludge,
- Household biodegradable kitchen and canteen waste,
- Other biodegradable waste (Garden & Park Waste), and
- Septic Tank Sludge.
- Non-hazardous industrial and water treatment sludge.

Household kitchen and canteen waste contains animal by-products (ABP), for example uncooked meat, that are subject to regulation by the Department of Agriculture, Fisheries and Food (DAFF). Ormonde Organics has initiated the DAFF approval process and will not accept any wastes containing ABP until the DAFF approval has been obtained.

2.5 Waste Acceptance & Handling Procedures

Ormonde Organics has a documented waste acceptance and handling procedure that ensures only suitable wastes are accepted and processed in a manner to produce a good quality product. The incoming wastes are weighed at the weighbridge and the accompanying documentation is checked. Any waste not deemed suitable is not accepted and the driver of the vehicle is instructed to return the waste to the producer.

2.6 Composting

Wastes are off-loaded from the delivery vehicles inside the Compost Building. There are separate reception areas for the municipal wastewater sludge and the household biodegradable waste and green waste. Any large items in the household biodegradable wastes are manually removed and bulking agents (shredded green waste) may be added.

The wastewater treatment sludge is loaded into one of nine dedicated concrete walled forced aeration compost bays (Bays 1 to 9). Bays 10 and 11, which are similar to Bays 1 to 9, are used for household waste. The wastewater treatment sludge is moved from Bay to Bay and

regularly turned to enhance the composting process and the temperature is monitored until each batch has reached a temperature of more than 55^0C for more than three consecutive days.

Upon completion of the thermophilic stage, the sterilised wastewater treatment sludge is moved to the Screening Area where it is screened, with the oversize sent back to the reception area for reuse and the finished product then sent off-site for land application.

To comply with DAFF requirements on the composting of household waste, a temperature of 70^0C will be achieved and maintained for a minimum of one hour in the Bays where waste that have the potential to contain ABP materials are composted. The compost will be moved to a dedicated Maturation Area (Bay 12). Following maturation, the product will be moved to the Screening Area, where it will be screened to remove any oversize materials (for example wood chip), which will be returned to the reception area for reuse. The finished product will be sent off site and used for agricultural or horticultural purposes.

Leachate generated in the bays is collected in floor drains and directed to an underground concrete collection tank. The leachate from Bays 10 and 11, which will be used for wastes containing ABP, will be collected separately from the other Bays. The moisture content of the materials is monitored during the compost process and the leachate in the collection tank is recirculated to ensure optimum conditions are maintained. The process is a net water user and normally surplus leachate is not generated. In the unlikely event that surplus leachate is generated, it is sent for treatment at an off-site municipal wastewater treatment plant.

2.7 Anaerobic Digestion

The three (3No.) fully enclosed digesters the capacity to process up to 20,000 tonnes per annum of non-hazardous organic waste and biomass, for example silage. The treatment process begins in the Waste Reception Building, where the organic wastes and biomass are off loaded and fed, using a loading shovel, into a $40m^3$ slide feeding system that moves it via a fully enclosed conveyor to the tanks. The contents of the tanks are continuously agitated and maintained at an optimum temperature of 47^OC.

It takes approximately 50 days for each batch to complete the digestion and post digestion stages, produces a biogas, fibre and digestate. The biogas consists largely of methane and carbon dioxide, but also contains a small amount of hydrogen sulphide and ammonia, as well as traces of other gases. The biogas is treated to reduce the levels of ammonia and hydrogen sulphide before being used as a fuel in three gas engines in CHP plant. A gas flare with a capacity of $600m^3$/hour is be provided as a back–up for when the gas engines are shut down for routine servicing.

The digestate and fibre have a significant nutrient and soil enhancement value and, depending on the time of the year, are either immediately sent off site for application of agricultural lands, or stored in a number of the converted wastewater treatment tanks until ground/weather conditions allow land application.

2.8 Oils & Chemicals

All waste storage and processing is carried out inside the buildings. Diesel for the mobile plant is stored in 5000 litre above ground bunded storage tank located beneath a canopy adjoining the Workshop. A second oil storage tank is located in a bund on the western side of

the Compost Building, but this is empty and not in use. Lubricating and hydraulic oils and coolants used in plant maintenance are stored at the rear of the Compost Building.

Ormonde Organics has developed site specific procedures to deal with spills and any emergencies that may arise to ensure that the appropriate response actions are taken by trained staff to minimise any associated environmental impacts.

2.9 Emissions

The actual and potential emissions from the facility include noise, dust, exhaust gases from vehicles and mobile plant, odours, bioaerosols, surface water run-off and sanitary wastewater. Leachate generated during the composting processes is collected and stored in tanks located outside the building and there is no direct or indirect connection with the surface water drainage system.

Noise
Noise emission sources include the waste and finished product transport vehicles, the mobile plant, air compressors and air extraction fans. The closest noise sensitive location is 250m from the site boundary.

Dust

Potential dust sources include vehicle movement over the concrete yards during dry periods and during the screening of the finished product. The screening is carried out inside the building, which minimises the risk of dust emissions to atmosphere.

Odours

The incoming wastes and the treatment processes are a source of odours. The composting process is also a source of bioaerosols. The odour control system comprises an air extraction system that directs odorous air and bioaerosols via ducts to odour abatement systems, which comprises wet scrubbers and two biofilters. The abatement system is subject to a routine maintenance programme, which includes bi-annual air flow rate measurements and olefactometry testing at the surface of the biofilters.

Surface Water

Surface water run-off from the paved areas and building roofs discharges, via an oil interceptor to the River Suir.

Sanitary Wastewater

Sanitary wastewater is directed to the on-site septic tank, with the effluent from the tank distributed across a percolation area. This is the only direct emission to ground at the site.

2.10 Risk Mitigation Measures

The Waste Permit contains conditions that require the provision of mitigation measures, both infrastructural and procedural, that effectively minimise the risk of environmental liabilities associated with unplanned events. Such measures include:

- Provision of an appropriately experienced Facility Management Team, Environmental Team and implementation of appropriate staff training programmes;
- Implementation of a site Environmental Management System (EMS), including an Environmental Management Programme (EMP) and Corrective Action Procedures;
- Adoption of a site specific Emergency Response Procedure.
- Impermeable concrete surface in all areas of the facility;
- Provision and maintenance of oil interceptors, a retention tank and a shut off valve on the storm water system;
- Provision of appropriate bunding for all tank and drum storage areas, and routine integrity testing of these and underground tanks and pipework to ensure they are and remain fit for purpose;
- Provision and maintenance of appropriate spill response and clean-up equipment in areas where there is a risk of oil spills occurring;
- Adoption of an Odour Management Plan and abatement system monitoring;
- Regular site inspections

3. OPERATION PERFORMANCE

3.1 Site History

The facility is located on the site of a former tannery (Michell Ireland), which opened in 1993 and closed in December 2003. The facility operated under an Integrated Pollution Control Licence. The licence was revised to exclude the tannery buildings and associated wastewater treatment plant, but lands to the south of the treatment plant remain within the licence area.

The compost facility, which opened in 2007 and occupies the former tannery buildings and wastewater treatment plant, was designed to treat sewage sludge produced in local authority waste water treatment plants. As such it was exempt, under Section 51 of the Waste Management Acts 1996 to 2010 (Acts), from the requirement to hold either a Waste Licence or Waste Permit.

In September 2010, Waterford County Council granted Ormonde Organics a Waste Permit, to accept and treat a maximum of 8,000 tonnes/year of household biodegradable waste, garden and park waste and septic tank sludges. The 8,000 tonnes is included in the overall annual tonnage of 40,000 tonnes authorised by the planning permission.

In June 2011, the Council issued the revised Permit, which authorised the acceptance and composting of non-hazardous industrial wastewater treatment sludges and other organic waste residues. In April 2012 Waterford County Council granted planning permission for the development of the anaerobic digestion plant and in May 2013 the Council issued a revised Waste Permit authorising the operation of the anaerobic digestion plant, subject to a maximum annual intake of 8,000 tonnes of non-hazardous organic wastes. Construction works began in 2013.

3.2 Facility Management

The Facility Manager has 16 years experience in Waste Management and has a Certificate in Compost Facility Operation issued by Sligo Institute of Technology. The Deputy Manager has a BAgrSci and 5 years experience in waste management. The facility is certified to ISO 14001 Environmental Management System, ISO 9001 Quality System and OHSAS 18001 and copies of the Certificates are included in Appendix 3.

3.3 Incident History

There have been no incidents (spills, fires, leaks etc) since Ormonde Organics began operations at the site that had potential to cause environmental pollution.

3.4 Compliance History

Ormonde has not received any notifications of non-compliance with the Waste Permit conditions.

3.5 Enforcement History

The facility has never been the subject of any enforcement action taken by the regulatory authorities

4. ENVIRONMENTAL SENSITIVITY

4.1 Surrounding Land Use

Lands surrounding the site are used for agricultural purposes and the immediate east and south of the site are planted with dense deciduous trees. The nearest dwellings in the vicinity of the site are located along the R680 and there are no dwellings within 250 metres of the site. The stretch of the River Suir to the east of the site is designated as a Special Area of Conservation (Lower Suir River SAC Site code 002137).

The nearest domestic resident is more than 250 metres from the northwest existing site boundary. The anaerobic digestion plant is to the east of the composting plant and approximately 400m from the residence

4.2 Surface Water

The site is in the catchment of the River Suir, which is approximately 350m to the east of the site. Two unnamed tributaries of the Suir join the river approximately 500m to the north and south of the site, with the confluence of the River Clodiagh and the Suir approximately 2km to the south of the site. The stretch of the river to the east of the site is part of the Middle Suir. It is tidal and is categorised as a Transitional Water Body under the South East River Basin District (SERBD) Management Plan.

The Suir is designated as a Special Area of Conservation (SAC) from immediately south of Thurles to the tidal stretches at the confluence with the Barrow/Nore immediately east of Cheekpoint in County Waterford. (Lower Suir River SAC Site code 002137). This includes the stretch up and downstream of the facility.

The stormwater drainage layout is shown on Drawing No 10 P 536-50. Run-off from the building roofs and impermeable areas is collected and directed via an oil interceptor into a storm water retention tank (224m^3 capacity) fitted with a flow restrictor at the outlet to limit the flow. The outfall connects to a sump that is fitted with a shut-off valve. The valve, when activated, contains storm water within the site.

4.3 Geology & Hydrogeology

The soils and subsoils comprise 0.3m of topsoil overlying approximately 2m of medium dense brown silty clayey sand with gravel and cobbles, which in turn was underlain by at least 2m of firm to stiff, brown, sandy, silty clay with some gravel, cobbles and the occasional boulder. The subsoils range from 34m in the north central part of the site to 12.5 m in the north east of the site, thinning towards the river. The logs of wells installed at the site indicate the underlain by a heavily weathered limestone.

The subsoils are not significantly water bearing. The on-site production well provided a sustainable yield of 450m^3/day to the former tannery. Given the reported yields, it is probable that the bedrock is Regionally Important Aquifer. The direction of groundwater flow is

influenced by the topography and the proximity to the River Suir, and is expected to be predominantly from west to east. It appears that there is hydraulic connectivity between the bedrock aquifer and the River Suir.

The Geological Survey of Ireland (GSI) assigned aquifer vulnerability rating, which indicates the potential susceptibility to contamination from pollution sources at the ground surface, is Low and the information from the wells installed at the site confirm this rating.

5. RISK ASSESSMENT

5.1 Environmental Liabilities

Environmental liabilities arise from contamination or damage to environmental media (air, surface water, soils and groundwater) that act as pathways to sensitive receptors. As all emissions from the site operations must comply with emission limit values that are designed to ensure that normal activities do not give rise to adverse environmental impacts, the only sources of liabilities are unplanned accidents or incidents. The pathways and receptors that are potentially susceptible to adverse impacts associated with such incidents include, air, soils, groundwater, surface water and occupants of nearby residences.

5.1.1 Emissions to Air

Potential emissions to air from site operations include odours, dust, litter and noise that could occur as a result of a fire/explosion or a failure of the odour abatement system. In the event of release to air during an incident, for example a fire, such emissions (smoke, dust, odours etc) will only have short-term impacts, which will not require post incident remediation. The odour abatement system is subject to regular inspection and maintenance and critical spare parts are kept on site, which reduces the risk of major failure.

5.1.2 Emissions to Soil & Groundwater

The site is fully paved with concrete. The only risk to soil and groundwater is a discharge through damaged paved areas or leaks from the underground pipework. Separate wastewater and surface water collection systems are provided with all process wastewater from the composting plant collected and reused in the process

5.1.3 Emissions to Surface Water

Potential emissions that might affect the quality of the run-off are associated with unexpected releases e.g. spills or leaks of wastewater, oils and contaminated fire water run-off. Surface water from the yards passes through an oil interceptor before leaving the site. The wastewater pipework, digesters and digestate storage tanks regularly to confirm they are fit for purpose.

The diesel storage tank, the digesters and the digestate storage tanks are surrounded by bunds, which eliminate the risk of being damaged by vehicles and will contain any accidental spills and leaks.

Spills and leaks of oil can occur during the refuelling of plant, filling of the storage tank and when handling and storing lubricants and hydraulic fluids and waste oils. Ormonde Organics maintains an adequate supply of spill kits to contain and absorb any oil spill at the facility. A shut off-valve is provided on the surface water sump. In

the event of an incident (spill, fire), the valve can be shut to contain run off inside the site.

5.2 Risk Identification

The plausible risks identified at the site are presented in Table 5.1.

Table 5.1 Risks

Risk ID	Process	Potential Hazards/Risks
1	Diesel Storage	Accidental spill/release to surface water drain
2	Diesel Storage	Accidental spill/release to ground
3	AD Digesters/Digestate Tanks	Accidental release of liquor to surface water drains
4	AD Digesters/Digestate Tanks	Accidental release of liquor to ground
5	Fire in compost plant	Fire water run-off entry to surface water drains
6	Fire in compost plant	Firewater run-off to ground

5.3 Risk Analysis

An assessment of the risks presented by the facility operations was completed taking consideration of site specific characteristics and the Classification Tables for Likelihood and Consequence in the Agency's Draft Guidance Document (Ref Table 5.2 and 5.3).

Table 5.2 – Risk Classification Table (Likelihood)

Risk	Category	Description
1	Very Low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High chance of hazard occurring
5	Very High	Very high chance of hazard occurring in 30 yr period

Table 5.3– Risk Classification Table (Consequence)

Risk	Category	Description
1	Trivial	No damage or negligible change to the environment
2	Minor	Minor/localised impact or nuisance
3	Moderate	Moderate damage to the environment
4	Major	Severe damage to the environment
5	Massive	Massive damage to a large area, irreversible in the medium term

The Risk Analysis Form is presented in Table 5.4. The assignation of the severity rating scores took into consideration the mitigation measures that are already in place.

Table 5.4 Risk Analysis Form

Risk ID	Process	Potential Risks	Environmental Effect	Likelihood	Basis of Likelihood	Consequence	Basis of Severity	Risk Score (Likelihood x Consequence)
1	Diesel Storage	Entry of diesel to surface water drains during filling/dispensing, or failure of tank/pipework	Surface water contamination	2	Oil stored in fully bunded area. Maximum amount on site at any one time is 5000 litres. Spill containment and clean-up equipment provided All drainage passes through and interceptor and retention tank that limits flow to the river and a shut off valve is provided. The risk is **Low** .	3	Surface water run-off is discharged to River Suir 350 m to the east of the site. The severity of impact, including cost of remediation would be **Moderate.**	6
2	Diesel Storage	Seepage of diesel to ground during filling/dispensing, or failure of tank/pipework	Soil/ Groundwater contamination	2	Oil stored in fully bunded area. Maximum amount on site at any one time is 5000litres. Spill containment and clean-up equipment provided. The risk is **Low** .	3	Subsoils are poorly permeable and not water bearing. Subsoil thickness prevents downward movement to bedrock aquifer. No remediation required and cost of repair would be **Minor.**	6
3	AD Tanks & Digestate Storage Tanks	Entry of liquid to surface water drains due to rupture of tank or damage to pipework as result of structural failure or explosion	Surface water contamination	2	The AD tanks are recently constructed and the Digestate Tanks have been recently refurbished. All tanks are provided with bunds. The tanks and pipework are subject to regular inspection and integrity testing, which will identify any damage and facilitate quick repair .All drainage passes through a retention tank that limits flow to the river and a shut off valve is provided. Tanks fitted with a blast release roof to minimise damage in event of explosion The risk is **Low**.	3	Surface water run-off is discharged to the River Suir, 350 m to the east of the site. Given the restricted flow from the retention tank, the presence of the shut off valve and the dilution available in the river, the severity of impact, including cost of remediation would be **Moderate.**	6

4	AD Tanks/ Digestate tanks	Seepage of liquid leak from tanks to ground due to rupture of tanks or damage as a result of structural failure or explosion	Soil/ Groundwater contamination	2	All operational areas are paved with concrete and surrounded by a perimeter kerb. Routine inspection and repair of damaged paved areas. The tanks and pipework are subject to regular inspection and integrity testing, which will identify any damage and facilitate quick repair. Tanks fitted with a blast release roof to minimise damage in event of explosion The risk is **Low**	2	Subsoils are poorly permeable and not water bearing. Thick layer of low permeability subsoils above bedrock aquifer. No remediation required and cost of repair would be **Minor.**	4
5	Firewater Run-off	Entry of firewater run-off to surface water drainage system in response to fire at the Compost Plant	Surface water contamination	2	The APP and ERP minimises the risk of fire and ensure rapid response to incident. All operational areas are paved with concrete and surrounded by a perimeter kerb. All drainage passes through a retention tank that limits flow to the river and a shut off valve is provided. The risk is **Low**.	3	Surface water run-off is discharged to the River Suir, 350 m to the east of the site. Given the restricted flow from the retention tank, the presence of the shut off valve and the dilution available in the river, the severity of impact, including cost of remediation would be **Moderate**	6
6	Firewater Run-off	Seepage of firewater run-off to ground	Soil and groundwater contamination	2	All operational areas are paved with concrete and surrounded by a perimeter kerb. Routine inspection and repair of damaged paved areas. The APP and ERP minimises the risk of fire and ensure rapid response to incident. All operational areas are paved with concrete and surrounded by a perimeter kerb that will contain run-off. The risk is **Low**.	3	Subsoils are poorly permeable and not water bearing. Subsoil thickness prevents downward movement to bedrock aquifer. No remediation required and cost of repair would be **Minor.**	6

5.4 Risk Evaluation

The risks associated with the operation of the facility fall into three categories

1 Risk of surface water and or soil and groundwater contamination associated with diesel storage and handling.

2 Risk of surface water and/or soil and groundwater contamination associated with the an incident at the AD plant and digestate storage tanks

3 Risk of surface water and/or soil and groundwater contamination associated with a fire at the Compost Plant

The diesel storage tank is located inside a bund and the maximum amount of diesel stored in the tank at any one time is 5000 litres. The entire operational area is paved and the storm water drains connect to oil interceptors.

The wastes accepted and processed in the Compost Building are not flammable and the compost materials and finished product have a high moisture content. There are limited ignition sources inside the building. The maximum volume of waste/compost in the building at any one time is 7,500m^3, the majority of which is stored in the composting and maturation bays, with a small amount in the screening area. The bays are essentially concrete bunkers that limit the spread of fire within the building. Any composting materials damaged by a fire in an individual bay remains suitable for composting and would not require removal from the site.

The capacity of each AD digester is 1,800m^3. The headspace in the tank is 700mm and each tank is fitted with a blast release roof, which means that in the highly unlikely event of an explosion the side walls of the tank will not be damaged and there will be no risk of a domino effect with the other tanks. Only a relatively small amount of liquor will overtop the tank, but this will be contained within the bund.

Each of the risks have been ranked to assist in the prioritisation of treatment and these are presented in Table 5.5.

Table 5.5 Risk Ranking

Risk ID	Process	Potential Risk	Consequence	Likelihood	Risk Score
1	Diesel Storage	Surface water contamination	3	2	6
2	Diesel Storage	Soil and Groundwater contamination	3	2	6
3	AD Digesters/Digestate Tanks	Surface water contamination	3	2	6
5	Fire in compost plant	Surface water contamination	3	2	6
6	Fire in compost plant	Soil and Groundwater contamination	3	2	6
4	AD Digesters/Digestate Tanks	Soil and Groundwater contamination	2	2	4

A colour coded risk matrix (Table 5.6) has been prepared to provide a broad indication of the critical nature of each risk and is a visual tool for regular risk reviews since the success of mitigation can be easily identified.

Table 5.6 Risk Matrix

Likelihood

V. High	5					
High	4					
Medium	3		**5, 6**			
Low	2		**2**	**1, 2, 3**		
V. Low	1					
Consequence		Trivial	Minor	Moderate	Major	Massive
		1	2	3	4	5

Red – High-level risks requiring priority attention.

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Amber – Medium-level risks requiring treatment, but not as critical as a High risk.

Green – Lowest-level risks that do not need immediate attention but there is a need for continuing awareness and monitoring on a regular basis.

There are no risks in the red zone requiring priority attention. The risks are located in the green zone indicating a need for continuing awareness and monitoring on a regular basis. This is achieved by a combination of the material handling procedures, site inspections and maintenance programmes, the design and construction of the tanks and containment bunds and the routine integrity testing of the tanks, pipelines and bunds.

6. RISK TREATMENT

The risk management programme for the facility is set out in Table 6 .1

Table 6.1 –Risk Management Programme

Risk ID	Potential Risk	Risk Score	Mitigation Measures	Outcome	Action	Person Responsible
1	Oil spill entering River Suir via the surface water drains	6	Oil storage tank is bunded and the bund is subject to regular inspection and integrity testing. All surface water passes through an oil interceptor and retention tank that limits flow and a shut off valve is provided. ERP ensures rapid response to an incident and oil spill clean-up equipment maintained on site.	No documented procedure that specifies the methods for the filling of the oil storage tank and the mobile plant. ERP needs to be updated to refer to closing the shut-off valve in the event of an oil spill.	Any damage identified in the routine inspections and testing to be immediately repaired. Records of site inspections and integrity testing to be maintained. ERP to be amended to include instructions on the activation of the shut off valve.	Facility Manager
2	Seepage of oil spill to ground.	6	All operational areas are paved with concrete and surrounded by a perimeter kerb. Routine inspection and repair of damaged paved areas	No documented procedure that specifies the methods for the filling of the oil storage tank and the mobile plant.	Any damage to paved areas identified in the routine inspections to be repaired as soon as practical	Facility Manager
3	Entry of accidental release of digesting liquid and digestate to the River Suir via the surface water drains	6	All storage tanks are provided with bunds and are subject to regular inspection and testing. All surface water drainage passes through retention tank that limits flow and a shut off valve is provided. ERP ensures rapid response to an accidental release.	ERP needs to be updated to refer to closing the shut-off valve in the event of an accidental release from the digesters and storage tanks	Any damage identified in the routine inspections and testing to be immediately repaired. Records of site inspections and integrity testing to be maintained. ERP to be amended to include instructions on the activation of the shut off valve.	Facility Manager

Risk ID	Potential Risk	Risk Score	Mitigation Measures	Outcome	Action	Person Responsible
4	Seepage to ground of accidental release of digesting liquid and digestate	4	All operational areas are paved with concrete and surrounded by a perimeter kerb. Routine inspection and repair of damaged paved areas. Natural subsoils prevent downward movement of contaminants from reaching the bedrock aquifer	No additional mitigation measures required	Any damage to paved areas identified in the routine inspections to be repaired as soon as practical.	Facility Manager
5	Entry of firewater run-off to the River Suir via the surface water drains.	6	The site design and method of operation minimises the risk of fire, while the ERP ensures a rapid response to incident. All drainage passes through a retention tank that limits flow to the river and a shut off valve is provided.	ERP needs to be updated to refer to closing the shut-off valve in the event of a release from the digesters and storage tanks	ERP to be amended to include instructions on the activation of the shut off valve.	Facility Manager
6	Seepage to ground of contaminated firewater run-off	6	The site design and method of operation minimises the risk of fire, while the ERP ensures a rapid response to incident. All operational areas are paved and yards are surrounded by a perimeter kerb. Routine inspection and repair of damaged paved areas. Natural subsoils prevent downward movement of contaminants from reaching the bedrock aquifer	No additional mitigation measures required .	Any damage to paved areas identified in the routine inspections to be repaired as soon as practical	Facility Manager

7. COSTING

7.1 Worst Case Scenario

The risk analysis identified a number of risks with a moderate consequence; therefore, further analysis was conducted to determine the worst case scenario. It was determined that a fire in the Compost Building and the consequent entry of contaminated firewater run-off to the surface water drains is the worst case scenario for the activity.

7.2 Quantification & Costing

The costs, which are presented in Table 7.1, are based on the following assumptions:

- The surface water shut-off valve is closed within 5 minutes of the fire alarm and before the emergency services arrive at the site. The storm water retention tank has a capacity of 224m^3 and this, in conjunction with the storage capacity provided by the perimeter kerb, is sufficient to contain the fire water run-off. .

- The fire service will be on site in 15 minutes, which is double the time estimated by Dublin Fire Brigade in their pre fire planning survey for the site. It is assumed that the fire will be fought over a 16 hour period by two fire crews.

- The fire is contained within the composting bay in which it starts and does not spread to the other bays.

- The rates for transport and treatment of contaminated water are those current rates that apply at the facility.

In addition to making provision for unexpected environmental liabilities, account must be taken of the costs managing an unplanned closure scenario. The costs of this are presented in the separately prepared CRAMP, and are contained in Table 7.2

Table 7.1 Worst Case Costs

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€	Source of unit rates
Emergency Response	Fire Services Attendance on Site	4	Call Out Fee	€600	€2,400	
	Spill containment consumables (booms)	1		100	€5,000	
Clean Up Actions	Transport and off-site treatment of contaminated fire water	224	tonne	€15	€3,360	Current agreement between Ormonde Organics and operators of municipal WWTP)
	Removal and off-site disposal of fire damaged materials	100	tonne	€140	€14,000	Landfill Rate
	Cleaning Yard*s	1				
	Surface water quality monitoring	4	Sample	160	640	
Total (€)					**€25,400**	
Contingency (20%)					**€5,080**	
Total Including Contingency (€)					**€30,480**	
VAT @23%					**€7,010.40**	

*Use on-site road sweeper

Table 7.2 CRAMP Costings

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€)	Source of unit rates
Facility Management	Site Manager (2 days/week for 10 weeks) 2 No operatives 5 days/week for 10 weeks Utility Bills	20 100	Day Day	500 250	10,000 25,000 2,500	
Materials/Waste Disposal/Recovery	Removal and off site disposal of off-spec compost	10	Tonnes		140	Landfill Rate
	Removal and off-site disposal of digestate*	8,000	m^3	-	-	
	Removal and off site disposal of leachate from collection tank	15	m^3	65	975	WWTP Rate
	Removal and off site disposal of Oils	1000	litres	70c	700	EPA Guidance
Building Plant & Equipment Clean Out	Clean out of Compost Building (Included in Management Cost)		Day Rate			
	Cleaning Plant and Equipment (Included in Management Cost)		Day Rate			
	Removal of Plant and Equipment*					
	Cleaning of Digester Tanks, Digestate Tanks and interceptors (High powered jetting +confined space equipment +trained operatives)	2	Day Rate	1,000	2000	Ormonde charge out rates
	Removal of wash water from tanks	25	m^3	30	750	Ormonde charge out rates
Yard Cleaning	Cleaning open yard (Roadsweeper)**	1	Daily Hire			
Environmental Monitoring	Surface water quality monitoring	4	Sample	160	640	
Validation Audit	Validation Report (Consultant)	1		2,500	2,500	
Security Costs	Included in Management Cost		Day			
Services Disconnection	Disconnect electricity and telecoms	1	Day	400	400	
Total Liability (€)					45,605	
Contingency (10%)					4,560	
Less the Asset Value of the Compost(€)					22,500	
Net Costs (€)					**27,291**	
VAT @23%					**6,276.93**	

*Cost neutral: ** Use Ormonde's on-site road sweeper.

8. CONCLUSION

This ELRA has been carried out in accordance with Agency's draft Guidance (July 2013). The Financial Provision is based on the risk that are considered to be the worst case scenario (€34,490) and the cost of implementing the CRAMP in the event of an unplanned closure. (€33,568) This is the maximum liability that may be incurred and, as such, the required financial provision is estimated to be €68,058.

Ormonde Organics has insurance cover in place in the amount of €6,500,000 which is significantly more than cost of the 'worst case' environmental liability scenario at the facility. Ormonde Organics will agree the form of the financial provision, for example insurance, bond, guarantee or fund, for the CRAMP with the Agency after the Licence has been issued.

Evaluation of Impacts

Description	Impact No.	Character	Magnitude	Duration	Consequences	Significance of Impact	Certainty
Climate	1	Increased CO_2	Traffic increase from 1/10 minutes to 1/6 minutes	Long Term	Negligible Impact on Kyoto Commitments	Imperceptible	Medium
Traffic	2	Increase in Traffic Volume	Traffic increase from 1/10 minutes to 1/6 minutes	Long Term	None Known	Imperceptible	Medium
Landscape	3	New Biowaste Treatment Area & Reception Building	-	Long Term	None – Invisible from Public Viewpoints	Positive in terms of Site Development	High
Ecology	-	-	-	-	-	-	-
Soils and Geology	3	Increased Discharge to Surface Water Drainage System	Extra Roofed & Paved areas.	Long Term	None Known	Imperceptible	High
Water	4	Silting of municipal sewer during development work	Limited to Site	3 Months	Loading of Municipal Sewer	Insignificant	Low
Air 1	5	Bioaerosols	Limited to Site. by operational procedures	Long-Term	None Known	Imperceptible	Medium
Air 2	6	Dust	On-site Paved Areas, External Processing Area	Long-Term	Nuisance	Imperceptible	Medium
Air 3	7	Odour	Inside Building	Long-Term	Nuisance	Insignificant	Medium
Noise	8		On-Site	During Operational Hours	Annoyance	Imperceptible	High
Archaeology	-	-	-	-	-	-	-
Material Assets	9	Non-Renewable Resource Consumption	Minimal.	Long-Term	None Known	Imperceptible	High
Human Beings	-	-	-	-	-	-	-

	Climate	Traffic	Soils & Geology	Water	Ecology	Air	Noise	Landscape	Human Beings	Cultural Heritage	Materials Assets
Climate											
Traffic											
Soils & Geology					√						
Water											
Ecology											
Air									√		
Noise											
Landscape											
Human Beings											
Cultural Heritage											
Materials Assets											

WASTE LICENCE APPLICATION

NON-TECHNICAL SUMMARY

FOR

ANAEROBIC DIGESTION FACILITY

AT

ORMONDE ORGANICS Ltd,

KILLOWEN,

PORTLAW,

COUNTY WATERFORD

22nd October 2012

1 NON-TECHNICAL SUMMARY

Ormonde Organics Ltd. (Ormonde Organics) is Ireland's leading sludge management company. Its composting facility at Killowen, which is approximately 3 kilometers (km) north of the town of Portlaw, County Waterford, has been in operation since 2007. The existing facility is allowed to accept a total of 40,000 tonnes of sewage sludge, kitchen waste, green waste (grass and tree cuttings) and septic tank waste per annum.

Ormonde Organics has seen an opportunity to introduce a new way of sludge treatment (anaerobic digestion) that will produce electricity and heat, which can either be used on site or sold to the National Grid. This will result in an increase in job numbers and help sustain the existing 20 full time jobs.

The application for a Waste Licence is in accordance with the requirements of the Waste Management Acts, 1996 to 2011. This non-technical summary contains the information specified in Article 12 (1) (u) of the Waste Management (Licensing) Regulations, 2004 (S.I. No. 395 of 2004).

Compliance with Requirements of the Waste Management Act 1996 to 2011

Best Available Techniques (BAT) will be used to prevent/eliminate or, where this may be deemed not practicable, limit/abate/reduce emissions of environmental concern resulting from on-site recovery activities.

Nature of the Facility

Existing Facility

The existing facility occupies the site and buildings of the former Michell Ireland tannery, which closed in 2003. The site covers 3.2 hectares (ha) and is accessed off the R680 Carrick on-Suir to Waterford Road.

The facility operates in accordance with planning permission granted by Waterford County Council and a Waste Permit granted by Waterford County Council. The planning permission allows the facility to take in and compost a total of 40,000 tonnes of sewage sludge, kitchen waste, green waste (grass and tree cuttings), septic tank waste and a range of non hazardous organic wastes annually. The Permit specifies the way in which the facility should be operated to ensure it does not cause either environmental pollution, or nuisance to neighbours.

The site layout is shown on Drawing No 10P536-01. Composting is carried out inside the main building, which has offices at the front. There is a workshop, weighbridge, paved open yards, parking areas and a disused waste water treatment plant. There are 20 workers, including management, technical and office staff and general operatives.

The kitchen wastes include materials defined as animal by-products (raw and cooked meats). The biological treatment (composting and anaerobic digestion) of such materials are regulated by a European Union (EU) Directive that requires controls to be provided to ensure that the materials are treated to such a level that the end products does not present any risk to animal or human health. These controls include providing separate processing areas for wastes containing animal by products and other wastes. Ormonde Organics has applied to the Department of Agriculture, Fisheries and Marine for approval to process wastes containing animal by-products.

Proposed Changes

The proposed layout is shown on Drawing No. 10P539-2. There will be no change to the total amount of waste accepted annually, which will remain at 40,000 tonnes. It is proposed to construct three new anaerobic digestion tanks. Associated with these will be a new waste reception building, a biomass (silage) area, a new building for the pasteurisation of wastes that contain animal by-products before it is processed, a new compost maturation building and a building to house the gas engines and a gas flare, which that will only be used if too much gas is produced.

A number of the existing tanks in the disused wastewater treatment plant will be upgraded and used to store the incoming wastes and the digestate. The existing septic tank and percolation area will be replaced by a new treatment system at a different location within the site.

Classes of Activity

The relevant activities as per the Third and Fourth Schedule of the Waste Management Acts 1996 – 2011 will be as follows: -

Third Schedule – Waste Disposal Activities

None

Fourth Schedule – Waste Recovery Activities

Principal Activity:

R3: 'Recycling /reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes), which includes gasification and pyrolisis using the components as chemicals'. (P)

It is intended to continue composting operations and also carry out the anaerobic digestion of biodegradable wastes. This is the principal activity, as all of wastes will be processed under this Class.

R1: 'Use principally as a fuel or other means to generate energy:'

It is intended to use the gases produced in the anaerobic digestion process to generate heat and power

R13: ‘Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in section 5(1)), pending collection, on the site where the waste is produced).’

It is intended to store wastes at the facility pending operations R3 and R1

R12: ‘Exchange of waste for submission to any of the operations numbered R 1 to R 11 (if there is no other R code appropriate, this can include preliminary operations prior to recovery including pre-processing such as, amongst others, dismantling, sorting, crushing, compacting, pelletising, drying, shredding, conditioning, repackaging, separating, blending or mixing prior to submission to any of the operations numbered R1 to R11).’

It is intended to process the wastes prior to use.

Quantity and Nature of the Waste to be Recovered or Disposed

A maximum of 40,000 tonnes per annum will be processed. Total waste inputs are shown on Table 1.1

Table 1.1 Waste Types and Amounts

Waste Type	Maximum Capacity*
Household, Commercial & Industrial Source Separated Waste	20,000
Non-Hazardous Sludges including Sludges from Industrial, Municipal, Water & Waste Water Treatment Plants	20,000
Total	**40,000**

*Subject to Market Conditions

Raw and Ancillary Materials, Substances, Preparations, Fuels & Energy used on the Site

Raw materials and energy that will be used include: -

- Diesel for on-site equipment,
- Hydraulic oil and engine oil for use in on-site equipment,
- Electricity,
- Water.
- Acid for Scrubers in Biofilter system.
- Woodchip

Plant, Methods, Processes, Abatement, Recovery, Treatment and Operating Procedures

The estimated type and number of machinery items that will be used at the facility on a regular basis includes: -

- Front Loading Shovels
- Forklifts
- Compost Turner
- Air Compressors
- Air extraction fans and ducting
- Odour Abatement Plant
- Telecom
- Electricity
- Water obtained from on-site well.
- Sanitary wastewater treated in an on-site septic tank and percolation area.
- AD Plant – CHP engines & Flare

Waste Processing

Composting

It is not proposed to change the existing composting process. The wastes treated at the site are sludges from industrial sites such as the food and drink industry and sludge produced urban waste water treatment plants operated by the local authorities. The sludges are mixed with woodchip and then loaded into specially constructed compost bays in the Compost Building. The bays have pipes in the floor, through which air is pumped up into the mixture of sludge and woodchip. The objective is to maintain a high oxygen level in the mixture to encourage oxygen using (aerobic) bacteria to grow and feed on the organic matter.

To accommodate the regulations regarding strict separation of waste containing animal by-products from other wastes, additional maturation and pasteurisation capacity will be provided in new Building 3. To ensure effective odour control, air locks will be installed on the northern and southern entrances to the Compost Building.

Anaerobic Digestion (AD)

The wastes that are currently composted can also be used to generate energy (heat and electricity). This can be done by using a different treatment process, called anaerobic digestion. Unlike composting, this process uses bacteria that do not need oxygen (anaerobic) to feed on the organic matter. The process breaks down waste into solid and liquid residues and gases. The gases include methane which can be used as a fuel to produce heat and electricity. Biomass (for example grass silage is can also be digested and a concrete lined silage storage area will be provided, which will be used to store biomass before it is fed into to the process

The wastes/silage will be fed into large fully enclosed tanks, which are continuously stirred and the temperature rises to the optimal level. The gases will drawn off and treated and fed to the gas engines which generate electricity and heat. The electricity will either be sold to the national grid, or used at the facility instead of the ESB supply and the heat may be used in the process. The residue from the process will include a fibre like solid and a liquid (digestate). The solid residue and digestate, which contain nutrients, will be used on farmland as an alternative to chemical fertilisers.

The anaerobic digestion plant will involve the construction of three new tanks, a new waste reception building, a building to house the gas engines and a gas flare that will only be used if too much gas is produced. A number of the existing tanks in the wastewater treatment plant will be converted and used to store the incoming wastes and also the digestate during the wetter months when it can not be landspread.

Information Related to Section 40(4) (a) to (d) of the Waste Management Act

Emissions from the facility will not result in the contravention of any relevant standard or emission limit prescribed under enactment. The proposed development is consistent with the Joint Waste Management Plan for the South East Region 2006 – 2011.

The proposed activities are based on best management practice and take into consideration the BAT Guidance Note for the Waste Sector: Waste Transfer Activities published by the EPA. The facility operations, when carried out in accordance with licence conditions, will not cause environmental pollution.

The facility Manager and Deputy have the required qualifications and experience to operate the facility.

Energy will be used efficiently and the heat produced by the biological treatment processes will be used at the facility. The facility will be designed, constructed and operated to minimise the environmental impacts of any incident/accident.

An assessment of the effects of the changes on the habitats in the surrounding area (Appropriate Assessment) was completed and is included in the application.

Source, Location, Nature, Composition, Quantity, Level and Rate of Emissions

Groundwater

The biological waste treatment processes will not give rise to and direct or indirect emissions to groundwater. Sanitary wastewater from the toilets will be treated in the proposed new waste water treatment plant that will replace the existing septic tank.

Surface Water

The site is in the catchment of the River Suir, which is approximately 350m to the east of the site. Rainwater from the existing roofs and paved areas is collected in the facility's surface water drainage system. All rainwater run-off passes through an oil interceptor and then to a sump located in the bund around the former wastewater treatment tanks, from where there is an underground pipe to the river.

There will be no change to the location of the outfall to the river. There will be an increase in the volume of rainwater run-off from the extension area. A storage tank will be built to collect and store the run-off and release it at a controlled rate to the existing drains so that it does not cause flooding either within or outside the site boundaries. .

Air

The proposed changes will mean a slight increase in the level of traffic to and from the facility with a consequent minor increase in exhaust emissions and dust. Odours from the sludge treatment process are controlled by an odour control system, installed in 2007, which collects air and treats it in a series of scrubbers and filters. This control system has proven to be effective. A new odour control system, similar to the one already in use, will be provided to collect and treat air from the new buildings where the wastes will be treated.

Noise

All waste processing is and will continue to be carried out either indoors or in fully enclosed units.

Assessment of the Effects of Emissions on the Environment

Groundwater

The only emission to groundwater will be the new percolation area serving the proposed septic tank/waste water treatment system. The ground conditions are suitable for the use of the proposed system and the design and installation will comply with the guidance specified in the EPA Manual on Wastewater Treatment Systems.

Surface Water

The proposed changes will not affect the quality of the run-off to the River Suir. The increase in the amount of run-off will not give rise to flooding.

Air

The proposed changes will mean a slight increase in the level of traffic to and from the facility with a consequent minor increase in exhaust emissions and dust. The current dust control measures, which include damping down paved areas in dry weather, have proven to be effective and will continue to be used.

Odours from the waste treatment processes will be controlled by odour control system that collects air and treats it in a series of scrubbers and filters. The existing and proposed systems are and will be designed to minimise the risk of odours causing problems off site.

Noise

All waste processing is and will continue to be carried out either in doors or in fully enclosed units, which will minimise the risk of noise disturbance at off site locations.

Monitoring and Sampling Points

Dust

Dust will be monitored annually

Noise

Noise will be monitored annually

Odour

Daily odour patrols around the site perimeter will be carried out.

Surface Water

The surface water discharge from the site will be monitored annually. As the discharge will be intermittent and linked to rainfall events grab samples will be collected.

Air Emissions

Air emissions from the biofilters and CHP engines will be monitored regularly.

Wastewater

Emissions to the new percolation area will be monitored annually.

Prevention and Recovery of Waste

Waste oils generated during plant and vehicle maintenance will be collected and sent off-site for recovery.

Off-site Treatment or Disposal of Solid or Liquid Wastes

The leachate produced in the composting process is recirculated and surplus leachate, which would require on-site treatment is typically not generated. Any surplus leachate that may arise in the future will be treated in the proposed anaerobic digestion plant.

The proposed anaerobic digestion plant will not generate a wastewater that requires treatment on-site. The liquid digestate produced in the process will be sent from the site and applied to agricultural lands. Any run-off from the silage storage area will be collected and treated in the anaerobic digestion plant.

Emergency Procedures to Prevent Unexpected Emissions

Ormonde Organics has prepared and Emergency Response Procedure for the existing operations and this will be undated following the issue of the Waste Licence. Ormonde Organics has prepared an Environmental Liabilities Risk Assessment that identifies the 'worst case' scenario for environmental pollution at the facility.

Closure, Restoration and Aftercare of the Site

It is not anticipated that the facility will close in the medium to long term. In the unlikely event that the facility shuts down it will be decommissioned in accordance with the Closure Restoration and Aftercare Management Plan (CRAMP) agreed with the EPA after the licence is issued. Post closure measures for the monitoring and maintenance of the buildings will also be as agreed with the EPA.

A1

EXISTING SITE PLAN
SCALE 1:500

Referenced drawings		Revision change notes			Issue register					
Dwg No.	Dwg Title	Rev.	Date	Description	Rev.	Date	Description	Dwn.	Chkd.	Appvd.
DWG1	DESCRIPTION					04.11.11	PLANNING	BD	IB	

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Drawing Title: EXISTING SITE PLAN
Date: 01.10.11
Scale: 1:500
Drawn By: BD
Checked By: IB

Client: ORMONDE ORGANICS
Job Description: PROPOSED ANAEROBIC DIGESTION PLANT AT PORTLAW, CO.WATERFORD
Project No: 10P536
Drawing Ref: 01
Rev:

B O W E consulting Engineers Civil and Structural
Bowe Consulting Engineers
(059) 9137422
(059) 9137411
4 Castle Street Carlow
E-mail info@bce.ie
www.bce.ie

A1
PROPOSED CONCRETE YARD
SCALE 1:2000
PROPOSED CONCRETE YARD SHOWN HATCHED
Note:
ITM (Irish Transverse Mercator)
Co-ordinate System Used
North Sign Refers to Grid North
Level Tied to Ordnance Datum (Malin Head)
O.S. Sheet No. 5562-B 5497-D
SITE AREA
PROPOSED TOTAL SITE AREA = 56,816m2 (5.7hectare or 14acre)
EXISTING SITE AREA = 3.2hectare
LEGEND
PROPOSED EMISSION POINT LIST
E1 GAS FLARE
E2 CHP PIPE
E3 EXISTING BIOFILTER TO BE RETAINED
E4 PROPOSED BIOFILTER
E5 EXISTING BIOFILTER TO BE RETAINED
EXISTING SITE FACILITIES /BUILDINGS
ALTERED SITE FACILITIES/BUILDINGS
PROPOSED BUILDINGS/ SITE FACILITIES
SITE BOUNDARY
EXISTING GRASS
EXISTING TREES AND HEDGEROW
1.2m STOCK PROOF FENCE
1.8m CHAIN LINK FENCE
SITE NOTICE LOCATION
TOP OF BANK
WEIGH BRIDGE
Bord Gas substation
PROPOSED BUILDING 4
EXISTING BUILDING 1
PROPOSED BUILDING 5
PROPOSED BUILDING 2
PROPOSED BUILDING 3A
PROPOSED BUILDING 3B
NOTE ALL EXISTING TANKS TO BE ROOFED
GATE
6m OPENNING FORMED IN EXISTING BUND WALL Ex. PIPES TO BE ADJUSTED
ENCLOSED CONVEYOR
EXISTING CONCRETE BUND TO BE EXTENDED TO ENCLOSE THE PROPOSED AD TANKS
AD TANK 1
AD TANK 2
AD TANK 3
FLARE
LINE DENOTING EXTENT OF THE EXISTING FACILITY
TRIAL HOLE
RELOCATE TREATMENT PLANT AND PERCOLATION AREA
VENTIALTION PIPE TO BE PLACED UNDERGROUND WHERE IT CROSSES THE PROPOSED YARD
NOTE AGRI. SPEC. SILAGE STORAGE PIT WITH 5m HIGH SURROUNDING CONCRETE WALL
RAMP
9.917m
11.523m
11.960m
9.907m
9.660m
10.325m
PROPOSED SITE LAYOUT
SCALE 1:500

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Referenced drawings		Revision change notes			Issue register					
Dwg No.	Dwg Title	Rev.	Date	Description	Rev.	Date	Description	Dwn.	Chkd.	Appvd.
						04.11.11	PLANNING	BD	IB	

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Drawing Title: PROPOSED SITE LAYOUT
Date: 01.10.11
Scale: 1:500 1:2000
Drawn By: BD
Checked By: IB

Client: ORMONDE ORGANICS
Job Description: PROPOSED ANAEROBIC DIGESTION PLANT AT PORTLAW, CO.WATERFORD
Project No: 10P536
Drawing Ref: 02
Rev:

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Referenced drawings	
Dwg No.	Dwg Title
DWG1	DESCRIPTION

Revision change notes		
Rev.	Date	Description

Issue register					
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PROPOSED CONCRETE YARD
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ATTACHMENT 8

Ormonde Organics Accounts

Company Registration No. 403413 (Eire)

ORMONDE ORGANICS LIMITED

ABRIDGED FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30 JUNE 2011

ORMONDE ORGANICS LIMITED

CONTENTS

ORMONDE ORGANICS LIMITED

AUDITORS' REPORT TO THE DIRECTORS OF ORMONDE ORGANICS LIMITED PURSUANT TO SECTION 18(4) OF THE COMPANIES (AMENDMENT) ACT, 1986

We have examined:

(i) the abridged financial statements for the year ended 30 June 2011 on pages 7 to 20 which the directors of Ormonde Organics Limited propose to annex to the annual return of the company; and

(ii) the financial statements to be laid before the Annual General Meeting, which form the basis for those abridged financial statements.

Respective responsibilities of directors and auditors

It is your responsibility to prepare the abridged financial statements. It is our responsibility to form an independent opinion on those abridged financial statements and to report our opinion to you.

Basis of opinion

The scope of our work for the purpose of this report was limited to confirming that the directors are entitled to annex abridged financial statements to the annual return and that those abridged financial statements have been properly prepared pursuant to Section 10 to 12 of the Companies (Amendment) Act, 1986, from the financial statements to be laid before the annual general meeting. The scope of our work for the purpose of this report does not include examining or dealing with events after the date of our report on the shareholder financial statements.

Opinion

In our opinion the directors are entitled under Section 18 of the Companies (Amendment) Act, 1986 to annex abridged financial statements for the year ended 30 June 2011 to the annual return of the company, and the abridged financial statements on pages 7 to 20 have been properly prepared pursuant to Sections 10 to 12 of that Act.

O' Neill Foley

Chartered Accountants
Registered Auditor

21 September 2011

Patrick's Court
Patrick Street
Kilkenny

ORMONDE ORGANICS LIMITED

AUDITORS' REPORT TO THE DIRECTORS OF ORMONDE ORGANICS LIMITED PURSUANT TO SECTION 18(3) OF THE COMPANIES (AMENDMENT) ACT, 1986

On 21 September 2011 we reported, as auditors of Ormonde Organics Limited, to the directors of the company on the copy of the abridged financial statements for the year ended 30 June 2011 on pages 7 to 20 and our report was as follows:

"We have examined:

(i) the abridged financial statements for the year ended 30 June 2011 on pages 7 to 20 which the directors of Ormonde Organics Limited propose to annex to the annual return of the company; and

(ii) the financial statements to be laid before the Annual General Meeting, which form the basis for those abridged financial statements.

Respective responsibilities of directors and auditors
It is your responsibility to prepare the abridged financial statements. It is our responsibility to form an independent opinion on those abridged financial statements and to report our opinion to you.

Basis of opinion
The scope of our work for the purpose of this report was limited to confirming that the directors are entitled to annex abridged financial statements to the annual return and that those abridged financial statements have been properly prepared pursuant to Section 10 to 12 of the Companies (Amendment) Act, 1986, from the financial statements to be laid before the annual general meeting. The scope of our work for the purpose of this report does not include examining or dealing with events after the date of our report on the shareholder financial statements.

Opinion
In our opinion the directors are entitled under Section 18 of the Companies (Amendment) Act, 1986 to annex abridged financial statements for the year ended 30 June 2011 to the annual return of the company, and the abridged financial statements on pages 7 to 20 have been properly prepared pursuant to Sections 10 to 12 of that Act."

Other information

On 21 September 2011 we reported, as auditors of Ormonde Organics Limited, to the members on the company's financial statements for the year ended 30 June 2011 to be laid before its annual general meeting, and our report was as follows:

"We have audited the financial statements of Ormonde Organics Limited for the year ended 30 June 2011 set out on pages 6 to 20. These financial statements have been prepared under the accounting policies set out therein.

Respective responsibilities of directors and auditors
As described in the Statement of Directors' Responsibilities on page 3 the company's directors are responsible for the preparation of the financial statements in accordance with applicable law and the accounting standards issued by the Accounting Standards Board and published by the Institute of Chartered Accountants in Ireland (Generally Accepted Accounting Practice in Ireland).

Our responsibility is to audit the financial statements in accordance with relevant legal and regulatory requirements and International Standards on Auditing (UK and Ireland).

This report is made solely to the company's members, as a body, in accordance with Section 193 of the Companies Act, 1990. Our audit work has been undertaken so that we might state to the company's members those matters we are required to state to them in an auditors' report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the company and the company's members as a body, for our audit work, for this report, or for the opinions we have formed.

We report to you our opinion as to whether the financial statements give a true and fair view, in accordance with Generally Accepted Accounting Practice in Ireland, and are properly prepared in accordance with the Companies Acts, 1963 to 2009. We also report to you whether in our opinion: proper books of account have been kept by the company; whether, at the balance sheet date, there exists a financial situation requiring the convening of an extraordinary general meeting of the company; and whether the information given in the directors' report is consistent with the financial statements. In addition, we state whether we have obtained all the information and explanations necessary for the purposes of our audit, and whether the company's balance sheet and its profit and loss account are in agreement with the books of account.

We also report to you if, in our opinion, any information specified by law regarding the directors' remuneration and transactions is not disclosed and, where practicable, include such information in our report.

We read the directors' report and consider the implications for our report if we become aware of any apparent misstatements within it.

ORMONDE ORGANICS LIMITED

AUDITORS' REPORT TO THE DIRECTORS OF ORMONDE ORGANICS LIMITED (CONTINUED)

PURSUANT TO SECTION 18(3) OF THE COMPANIES (AMENDMENT) ACT, 1986

Basis of opinion

We conducted our audit in accordance with International Standards on Auditing (UK and Ireland) issued by the Auditing Practices Board. An audit includes examination, on a test basis, of evidence relevant to the amounts and disclosures in the financial statements. It also includes an assessment of the significant estimates and judgements made by the directors in the preparation of the financial statements, and of whether the accounting policies are appropriate to the company's circumstances, consistently applied and adequately disclosed.

We planned and performed our audit so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or other irregularity or error. In forming our opinion we also evaluated the overall adequacy of the presentation of information in the financial statements.

Opinion

In our opinion the financial statements:

- give a true and fair view, in accordance with Generally Accepted Accounting Practice in Ireland, of the state of the company's affairs as at 30 June 2011 and of its profit for the year then ended ; and
- have been properly prepared in accordance with the requirements of the Companies Acts, 1963 to 2009.

We have obtained all the information and explanations we consider necessary for the purposes of our audit. In our opinion, proper books of account have been kept by the company. The financial statements are in agreement with the books of account.

In our opinion, the information given in the directors' report is consistent with the financial statements.

The net assets of the company, as stated in the balance sheet, are not more than half of the amount of its called up share capital and, in our opinion, on that basis there did exist at 30 June 2011 a financial situation which, under section 40(1) of the Companies (Amendment) Act 1983, would require the convening of an extraordinary general meeting of the company. "

Emphasis of matter - Going concern

In forming our opinion, which is not qualified, we draw your attention to note 2 of the financial statements which indicates that the company has made a profit for the year of €43,396, excess of current liabilities over current assets of €5,468,487 and had a net shareholders deficit of €3,265,699 at the balance sheet date. These conditions indicate the existence of a material uncertainty which may cast significant doubt about the company's ability to continue as a going concern. The financial statements have been prepared on a going concern basis, the validity of which depends upon the profitability of the company and continuing financial support of the company bankers and parent company. The financial statements do not include any adjustments that would result from the company being unable to continue as a going concern.

O' Neill Foley

Chartered Accountants
Registered Auditor

21 September 2011

Patrick's Court
Patrick Street
Kilkenny

This is to certify that this is a true copy of the auditors' report in respect of Ormonde Organics Limited.

Martin Morrissey
Director
21 September 2011

Michael Murphy
Director

ORMONDE ORGANICS LIMITED

DIRECTORS' REPORT SUBMITTED WITH SHAREHOLDERS' FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30 JUNE 2011

The directors present their report and financial statements for the year ended 30 June 2011.

Principal activities and review of the business
The principal activity of the company continued to be that of organic waste material transport and disposal.

The results for the year and the financial position at the year end were considered satisfactory by the directors in the current economic conditions. The directors have altered the company's work practices in line with the changing business environment and with this expect improved results in the foreseeable future.

Principle risks and uncertainties
The directors consider the following to be principal risks and uncertainties faced by the company:

Economic risk

The risk of interest rates and/or inflation having an adverse impact on turnover.

This risk is managed by due consideration of the interest rate environment, cost controls and management of turnover.

Market risk

The directors of the company manage market risk through careful attention to markets and through innovative products and pricing.

Financial risk

The company has budgetary and financial reporting procedures, supported by appropriate key performance indicators, to manage credit, liquidity and other financial risk.

Key performance indicators used by management include assessment of turnover, costs and profitability.

Results and dividends
The results for the year are set out on page 7.

The directors do not recommend payment of an ordinary dividend.

Post balance sheet events
There have been no significant events affecting the company since the period-end.

Future developments
The company will continue to operate at an improved activity level in the ensuing year.

Directors
The following directors have held office since 1 July 2010:

Martin Morrissey
Michael Murphy

ORMONDE ORGANICS LIMITED

DIRECTORS' REPORT SUBMITTED WITH SHAREHOLDERS' FINANCIAL STATEMENTS (CONTINUED)

FOR THE YEAR ENDED 30 JUNE 2011

Directors' interests
The directors' beneficial interests in the shares of the company and holding companies are as stated below:

Ormonde Organics Limited

	"A" Ordinary Shares of €1 each	
	30 June 2011	**1 July 2010**
Martin Morrissey	-	-
Michael Murphy	-	-

	"B" Ordinary Shares of €1 each	
	30 June 2011	**1 July 2010**
Martin Morrissey	-	-
Michael Murphy	-	-

Ormonde Organics Holdings Limited

	Ordinary of €0.01 each	
	30 June 2011	**1 July 2010**
Martin Morrissey	694,400	694,400
Michael Murphy	99,200	99,200

BAL Trading Limited

	Ordinary of €1 each	
	30 June 2011	**1 July 2010**
Martin Morrissey	6	6
Michael Murphy	4	4

Books of account
The company's directors are aware of their responsibilities, under section 202 of the Companies Act 1990 to maintain proper books of account and are discharging their responsibility by employing qualified and experienced staff, and ensuring that sufficient company resources are available for the task.

The books of account are held at the company's business premises, Killowen Portlaw Co. Waterford .

Taxation status
The company was a close company as defined by Section 430 Taxes Consolidation Act 1997 and this position has not changed since the end of the financial year.

Auditors
O' Neill Foley were appointed as the company's auditors and in accordance with section 160(2) of the Companies Act 1963, they continue in office as auditors of the company.

ORMONDE ORGANICS LIMITED

DIRECTORS' REPORT SUBMITTED WITH SHAREHOLDERS' FINANCIAL STATEMENTS (CONTINUED)

FOR THE YEAR ENDED 30 JUNE 2011

Directors' responsibilities

The directors are responsible for preparing the financial statements in accordance with applicable law and Generally Accepted Accounting Practice in Ireland including the accounting standards issued by the Accounting Standards Board and promulgated by the Institute of Chartered Accountants in Ireland.

Company law requires the directors to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the company and of the profit or loss of the company for that period. In preparing those financial statements, the directors are required to:

- select suitable accounting policies and then apply them consistently;
- make judgements and estimates that are reasonable and prudent;
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the company will continue in business.

The directors are responsible for keeping proper accounting records which disclose with reasonable accuracy at any time the financial position of the company and to enable them to ensure that the financial statements comply with the Companies Acts 1963 to 2009. They are also responsible for safeguarding the assets of the company and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

By order of the board

Martin Morrissey
Director
21 September 2011

Michael Murphy
Director

ORMONDE ORGANICS LIMITED

PROFIT AND LOSS ACCOUNT

FOR THE YEAR ENDED 30 JUNE 2011

	Notes	2011 €	2010 €
Gross profit		1,236,054	936,685
Administrative expenses		(1,139,355)	(2,111,636)
Operating profit/(loss)	4	96,699	(1,174,951)
Impairment of fixed asset	4	-	(1,629,829)
Profit/(loss) on ordinary activities before interest		96,699	(2,804,780)
Interest payable and similar charges	5	(53,303)	(101,422)
Profit/(loss) on ordinary activities before taxation		43,396	(2,906,202)
Tax on profit/(loss) on ordinary activities	6	-	-
Profit/(loss) for the year	14	43,396	(2,906,202)

The profit and loss account has been prepared on the basis that all operations are continuing operations.

There are no recognised gains and losses other than those passing through the profit and loss account.

We have relied on specified exemptions contained in sections 11 and 12 of the Companies (Amendment) Act, 1986 on the grounds that the company is entitled to the benefit of those exemptions as a medium company.

Approved by the board and authorised for issue on 21 September 2011

Martin Morrissey
Director

Michael Murphy
Director

ORMONDE ORGANICS LIMITED

BALANCE SHEET
AS AT 30 JUNE 2011

	Notes	2011 €	2011 €	2010 €	2010 €
Fixed assets					
Tangible assets	7		2,523,493		2,854,497
Investments	8		50		50
			2,523,543		2,854,547
Current assets					
Stocks	9	5,733		4,372	
Debtors	10	1,219,518		1,542,727	
		1,225,251		1,547,099	
Creditors: amounts falling due within one year	11	(6,693,738)		(7,295,458)	
Net current liabilities			(5,468,487)		(5,748,359)
Total assets less current liabilities			(2,944,944)		(2,893,812)
Creditors: amounts falling due after more than one year	12		(320,755)		(415,283)
			(3,265,699)		(3,309,095)
Capital and reserves					
Called up share capital	13		100		100
Share premium account	14		814,939		814,939
Profit and loss account	14		(4,080,738)		(4,124,134)
Shareholders' funds	15		(3,265,699)		(3,309,095)

On 21 September 2011, we prepared the abridged financial statements and have relied on specified exemptions contained in sections 11 and 12 of the Companies (Amendment) Act 1986 on the grounds that the company is entitled to the benefit of those exemptions as a medium company.

Approved by the board and authorised for issue on 21 September 2011

Martin Morrissey
Director

Michael Murphy
Director

ORMONDE ORGANICS LIMITED

CASH FLOW STATEMENT

FOR THE YEAR ENDED 30 JUNE 2011

		2011		2010
	€	€	€	€
Net cash inflow from operating activities		600,881		352,445
Returns on investments and servicing of finance				
Interest paid	(4,082)		(5,962)	
Interest element of finance lease rentals	(49,221)		(95,460)	
Net cash outflow for returns on investments and servicing of finance		(53,303)		(101,422)
Capital expenditure				
Payments to acquire tangible assets	(227,867)		(336,847)	
Receipts from sales of tangible assets	251,123		143,384	
Net cash inflow/(outflow) for capital expenditure		23,256		(193,463)
Net cash inflow before management of liquid resources and financing		570,834		57,560
Financing				
Other new long term loans	100,000		200,000	
Capital element of finance lease contracts	(539,813)		(844,961)	
Net cash outflow from financing		(439,813)		(644,961)
Increase/(decrease) in cash in the year		131,021		(587,401)

ORMONDE ORGANICS LIMITED

NOTES TO THE CASH FLOW STATEMENT

FOR THE YEAR ENDED 30 JUNE 2011

1	**Reconciliation of operating profit/(loss) to net cash inflow from operating activities**	**2011**	**2010**
		€	**€**
	Operating profit/(loss)	96,699	(1,174,951)
	Depreciation of tangible assets	399,545	1,006,392
	(Profit)/loss on disposal of tangible assets	(91,797)	87,553
	(Increase)/decrease in stocks	(1,361)	602
	Decrease in debtors	323,209	283,275
	(Decrease)/Increase in creditors within one year	(125,414)	149,574
	Net cash inflow from operating activities	600,881	352,445

2	**Analysis of net debt**	**1 July 2010**	**Cash flow**	**Other non-cash changes**	**30 June 2011**
		€	**€**	**€**	**€**
	Net cash:				
	Bank overdrafts	(348,232)	131,021	-	(217,211)
	Bank deposits	-	-	-	-
	Debt:				
	Finance leases	(749,725)	539,813	-	(209,912)
	Debts falling due after one year	(200,000)	(100,000)	-	(300,000)
		(949,725)	439,813	-	(509,912)
	Net debt	(1,297,957)	570,834	-	(727,123)

3	**Reconciliation of net cash flow to movement in net debt**	**2011**	**2010**
		€	**€**
	Increase/(decrease) in cash in the year	131,021	(587,401)
	Cash outflow from decrease in debt and lease financing	439,813	644,961
	Movement in net debt in the year	570,834	57,560
	Opening net debt	(1,297,957)	(1,355,517)
	Closing net debt	(727,123)	(1,297,957)

ORMONDE ORGANICS LIMITED

NOTES TO THE ABRIDGED FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2011

1 Accounting policies

1.1 Accounting convention

The financial statements are prepared under the historical cost convention.

1.2 Compliance with accounting standards

The financial statements are prepared in accordance with applicable law and the accounting standards issued by the Accounting Standards Board and promulgated by the Institute of Chartered Accountants in Ireland (Generally Accepted Accounting Practice in Ireland), which have been applied consistently (except as otherwise stated).

1.3 Turnover

Turnover represents amounts receivable for goods and services net of VAT and trade discounts.

1.4 Tangible fixed assets and depreciation

Tangible fixed assets are stated at cost less depreciation. Depreciation is provided at rates calculated to write off the cost less estimated residual value of each asset over its expected useful life, as follows:

Land and buildings Leasehold	5%
Plant and machinery	15%
Fixtures, fittings & equipment	15%
Motor vehicles	20%

1.5 Leasing

Assets obtained under hire purchase contracts and finance leases are capitalised as tangible assets and depreciated over the shorter of the lease term and their useful lives. Obligations under such agreements are included in creditors net of the finance charge allocated to future periods. The finance element of the rental payment is charged to the profit and loss account so as to produce a constant periodic rate of charge on the net obligation outstanding in each period.

Rentals payable under operating leases are charged against income on a straight line basis over the lease term.

1.6 Investments

Fixed asset investments are stated at cost less provision for diminution in value.

1.7 Stock

Stock is valued at the lower of cost and net realisable value.

1.8 Deferred taxation

Deferred taxation is provided in full in respect of taxation deferred by timing differences between the treatment of certain items for taxation and accounting purposes. The deferred tax balance had not been discounted.

1.9 Foreign currency translation

Monetary assets and liabilities denominated in foreign currencies are translated into euro at the rates of exchange ruling at the balance sheet date. Transactions in foreign currencies are recorded at the rate ruling at the date of the transaction. All differences are taken to profit and loss account.

2 Business review and going concern

The company has made a profit for the year of €43,396, excess of current liabilities over current assets of €5,468,487 and had a net shareholders deficit of €3,265,699 at the balance sheet date. The company has altered its work practices due to the current business environment to reduce operating costs to a sustainable level. On this basis and with continued financial support from the company bankers and parent company, the directors consider it appropriate to prepare the financial statements on a going concern basis. The financial statements do not include any adjustments to the carrying amount or classification of assets and liabilities that may arise if the company was unable to continue as a going concern.

3 Impairment of fixed asset

The directors carried out an impairment review of the company's fixed assets to comply with the requirements of Financial Reporting Standard (FRS) 11. Based on directors valuation of fixed assets, an impairment provision of €Nil (2010 - €1,629,829) has been charged to the profit and loss account.

4 Operating profit/(loss)

	2011	2010
	€	€
Operating profit/(loss) is stated after charging:		
Depreciation of tangible assets	399,545	1,006,392
Loss on disposal of tangible assets	-	87,553
Operating lease rentals		
- Plant and machinery	167,064	169,056
- Other assets	310,508	371,411
Auditors' remuneration	6,430	15,834
Exchange differences	30	-
and after crediting:		
Government grants	20,839	-
Profit on disposal of tangible assets	(91,797)	-

5 Interest payable

	2011	2010
	€	€
On bank loans and overdrafts	4,082	5,962
Lease finance charges	49,221	95,460
	53,303	101,422

NOTES TO THE ABRIDGED FINANCIAL STATEMENTS (CONTINUED)
FOR THE YEAR ENDED 30 JUNE 2011

6 Taxation	2011	2010
	€	€
Current tax charge	-	-
Factors affecting the tax charge for the year		
Profit/(loss) on ordinary activities before taxation	43,396	(2,906,202)
Profit/(loss) on ordinary activities before taxation multiplied by standard rate of Irish corporation tax of 12.50% (2010: 12.50%)	5,425	(363,275)
Effects of:		
Non deductible expenses	188	236
Depreciation add back	49,943	125,799
Capital allowances	(57,476)	(57,174)
Chargeable disposals	(11,475)	10,942
Other tax adjustments	13,395	283,472
	(5,425)	363,275
Current tax charge	-	-

The company has estimated losses of € 3,102,923 (2010: € 2,673,022) available for carry forward against future trading profits.

NOTES TO THE ABRIDGED FINANCIAL STATEMENTS (CONTINUED)
FOR THE YEAR ENDED 30 JUNE 2011

7 Tangible fixed assets

	Land and buildings Leasehold	Plant and machinery	Fixtures, fittings & equipment	Motor vehicles	Total
	€	€	€	€	€
Cost					
At 1 July 2010	2,046,405	5,267,092	89,184	1,349,684	8,752,365
Additions	82,488	92,943	10,865	41,571	227,867
Disposals	-	(598,000)	-	(119,957)	(717,957)
At 30 June 2011	2,128,893	4,762,035	100,049	1,271,298	8,262,275
Depreciation					
At 1 July 2010	443,340	4,254,545	69,869	1,130,114	5,897,868
On disposals	-	(438,676)	-	(119,955)	(558,631)
Charge for the year	94,270	204,147	4,047	97,081	399,545
At 30 June 2011	537,610	4,020,016	73,916	1,107,240	5,738,782
Net book value					
At 30 June 2011	1,591,283	742,019	26,133	164,058	2,523,493
At 30 June 2010	1,603,065	1,012,547	19,315	219,570	2,854,497

Included above are assets held under finance leases or hire purchase contracts as follows:

	Plant and machinery	Motor vehicles	Total
	€	€	€
Net book values			
At 30 June 2011	242,464	133,528	375,992
At 30 June 2010	26,428	72,250	98,678
Depreciation charge for the year			
At 30 June 2011	86,167	82,071	168,238
At 30 June 2010	1,396,449	543,032	1,943,189

In the opinion of the directors, the value to the company of the tangiable fixed assets is not less than the book amount shown above.

8 Fixed asset investments

	Unlisted investments €
Cost	
At 1 July 2010 & at 30 June 2011	50
Net book value	
At 30 June 2011	50
At 30 June 2010	50

Holdings of more than 20%
The company holds more than 20% of the share capital of the following companies:

Company	Country of registration or incorporation	Shares held Class	%
Subsidiary undertakings			
Irish Horticultural Inputs (IHI) Limited	Ireland	Ordinary	50.00

The aggregate amount of capital and reserves and the results of these undertakings for the last relevant financial year were as follows:

	Principal activity	Capital and reserves 2011 €	Profit/(loss) for the year 2011 €
Irish Horticultural Inputs (IHI) Limited	Compost for horticultural and agricultural purposes	(27,636)	(12,208)

9 Stocks

	2011 €	2010 €
Finished goods and goods for resale	5,733	4,372

There are no material differences between the replacement cost of stock and the balance sheet amounts.

NOTES TO THE ABRIDGED FINANCIAL STATEMENTS (CONTINUED)
FOR THE YEAR ENDED 30 JUNE 2011

10 Debtors	2011 €	2010 €
Trade debtors	760,809	946,255
Amounts owed by parent and fellow subsidiary undertakings	378,108	391,954
Other debtors	-	14,561
Prepayments and accrued income	80,601	189,957
	1,219,518	1,542,727

11 Creditors: amounts falling due within one year	2011 €	2010 €
Bank loans and overdrafts	217,211	348,232
Net obligations under finance lease and hire purchase contracts	189,157	534,442
Trade creditors	774,713	845,161
Amounts owed to parent and fellow subsidiary undertakings	5,148,936	5,235,311
Other creditors	46,439	67,181
Accruals and deferred income	317,282	265,131
	6,693,738	7,295,458

Included in other creditors are amounts relating to taxation, as follows:		
V.A.T. control account	2,022	-
P.A.Y.E. control account	44,417	67,181
	46,439	67,181

12 Creditors: amounts falling due after more than one year	2011 €	2010 €
Net obligations under finance leases and hire purchase agreements	20,755	215,283
Other loans	300,000	200,000
	320,755	415,283
Analysis of loans		
Wholly repayable within five years	300,000	200,000
Included in current liabilities	-	-
	300,000	200,000
Loan maturity analysis		
In more than five years	300,000	200,000
Net obligations under finance leases and hire purchase contracts		
Repayable within one year	189,157	534,442
Repayable between one and five years	20,755	215,283
	209,912	749,725
	209,912	749,725
Included in liabilities falling due within one year	(189,157)	(534,442)
	20,755	215,283

13 Share capital	2011 €	2010 €
Authorised		
500,000 "A" Ordinary Shares of €1 each	500,000	500,000
500,000 "B" Ordinary Shares of €1 each	500,000	500,000
	1,000,000	1,000,000
Allotted, called up and fully paid		
55 "A" Ordinary Shares of €1 each	55	55
45 "B" Ordinary Shares of €1 each	45	45
	100	100

14 Statement of movements on reserves

	Share premium account €	Profit and loss account €
Balance at 1 July 2010	814,939	(4,124,134)
Profit for the year	-	43,396
Balance at 30 June 2011	814,939	(4,080,738)

15 Reconciliation of movements in shareholders' funds

	2011 €	2010 €
Profit/(Loss) for the financial year	43,396	(2,906,202)
Opening shareholders' funds	(3,309,095)	(402,893)
Closing shareholders' funds	(3,265,699)	(3,309,095)

16 Contingent liabilities

The company bankers have provided a guarantee to €140,000.

17 Financial commitments

At 30 June 2011 the company was committed to making the following payments under non-cancellable operating leases in the year to 30 June 2012:

	Land and buildings	
	2011 €	2010 €
Operating leases which expire:		
In over five years	258,000	282,600

18 Employees

Number of employees

The average monthly number of employees (including directors) during the year was:

	2011 Number	2010 Number
Production	20	17
Sales	1	2
Admin	4	4
	25	23

Employment costs	2011 €	2010 €
Wages and salaries	869,618	1,073,017
Social security costs	94,445	109,470
	964,063	1,182,487

19 Ultimate parent company

The ultimate parent company is BAL Trading Limited, a company owned and controlled by Martin Morrissey and Michael Murphy.

20 Related party relationships and transactions

Sales to parent company Bal Trading Limited under normal trading terms were €Nil (2010 - €Nil). Purchases from parent company Bal Trading Limited under normal trading terms were €282,000 (2010 - €300,000). Creditors due to parent company Bal Trading Limited at the balance sheet date were €219,636 (2010 - €182,196).

Creditors due to fellow subsidiary company Ormonde Organics Holdings Limited at the balance sheet date were €4,329,958 (2010 - €4,607,266). The company has availed of the Related Party Disclosure exemption from the requirement to give details of transactions with entities that are part of the group as permitted in the Financial Reporting Standard Number 8.

Debtors due from fellow subsidiary company Eras Eco Limited at the balance sheet date were €378,108 (2010 - €391,954). The company has availed of the Related Party Disclosure exemption from the requirement to give details of transactions with entities that are part of the group as permitted in the Financial Reporting Standard Number 8.

Sales to fellow subsidiary company Morrissey Fencing Limited under normal trading terms were €3,684 (2010 - €33,118). Purchases from fellow subsidiary company Morrissey Fencing Limited under normal trading terms were €5,369 (2010 - €75,000). Credtors due to fellow subsidiary company Morrissey Fencing Limited at the balance sheet date were €599,342 (2010 - €445,849).

Sales to connected company Irish Horticultural Inputs (IHI) Limited under normal trading terms were €5,500 (2010 - €6,250). Purchases from connected company Irish Horticultural Inputs (IHI) Limited under normal trading terms were €Nil (2010 - €Nil).

Rent of €118,500 was paid to Morrissey, Murphy, Bailey and O'Reilly Partnership in the year.

Bank borrowings are secured by directors guarentee to €480,000.

Bank borrowings of Ormonde Organic Holdings Limited are secured by guarantee from this company to €1,400,000 and supported by fixed and floating charge over the assets of this company.

21 Approval of financial statements

The directors approved the financial statements on the 21 September 2011.

ATTACHMENT 9

Interaction of Impacts