Revised Attachment E

ATTACHMENT No. E

EMISSIONS

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E1. Emissions to Atmosphere

(a) Boiler Emissions
The boiler emission point is labelled A1-1 in Figure E.1 (PL2). Details for this emission point are given in Table E.1(i) and Table E.1(iii).

(b) Main Emissions
There are no main emission points associated with the Mayo Power facility.

(c) Minor Emissions
Minor emission points are labelled in Figure E.1 (PL2). Details for each emission point are given in Table E.1(iv).

(d) Fugitive and Potential Emissions

It is proposed to provide a stand-by generator on-site to generate power in the event of a breakdown to the power supply. This is considered as a potential emission point. Details are given in Table E.1(v).

There is the potential for fugitive emissions to occur during the movement of wood chip. This potential will be reduced through the provision of dust suppression methods at the transfer points. In addition, all conveyors and domes storing the fuel will be fully enclosed. Biomass fuel stored in the log yard and processed in the chipper will comprise of 50% moisture and therefore no dust emissions are likely. Details are given in Table E.1(v).

Further information on the abatement systems for emissions to atmosphere is provided in Attachment No. F.

E2. Emissions to Surface Waters

This section is not applicable. There will be no emissions to surface waters from the proposed facility.

E3. Emissions to Sewer

All emissions to sewer from the site will comply with BAT. Emission points to sewer are shown on Figure E.3.

Surface Water Emissions to Sewer

Surface water run-off from roofs, roadways, hard standings and the fuel storage area on the site will be collected in a dedicated surface water drainage system. Surface water from the adjoining premises, to the east, will also be combined with surface water from the north-western part of the site. The surface water will be monitored before discharge to the Mayo County Council sewer, which serves the site.

The drawings showing the drainage layout for the site are included as Figures J.1 (PL2) and J.2 (PL2).

Process Effluent Emissions to Sewer

Process effluent will arise from a number of sources which are summarised below:

Stream	Source	Characteristics	Quantity
multi-media filter backwash	Raw water multi-media filter system	Same as Lough Conn water, with elevated SS, 200-250mg/l; may contain low doses of coagulant, polyaluminium chloride	Intermittent, 3 times a day for 10 – 20 mins each, 135,000 l/d
Equipment wash down	service water	Same as filtered raw water, could have traces of lubricants or process materials	Average 0l/s
Cooling tower blow down	Blow down from cooling towers	Traces of scale inhibitor and other treatment chemicals	Max 7.3l/s; average 3.5l/s
Boiler water treatment plant regeneration streams including neutralised organic scavenger stream and reverse osmosis concentrate	Water softeners, duplex organic scavengers, reverse osmosis plant	Some of these streams are continuous and some are intermittent; elevated TDS – calcium, magnesium, sodium and chloride salts – up to 17,840mg/l	Max 6.3l/s; average 0.6l/s
Boiler blow down	boiler	One continuous and one intermittent stream; traces of treatment chemicals	Max 1.4l/s; average 0.6l/s

The process effluent will be collected in a 4hour capacity surge tank. From the surge tank it will discharge via a class 1 oil/water separator and will be monitored before discharge to the Mayo County Council sewer, which serves the site.

Refer to Figures D.3.14(PL2) and D.3.15(PL2) for a PFD of the water systems and the process water balance.

Sanitary Effluent

Sanitary effluent will be collected from staff welfare facilities in a dedicated drainage system and treated on site in a proprietary packaged treatment plant. The sanitary effluent will be discharge to the Mayo County Council sewer, which discharges to Killala Bay. Sewage from the adjoining premises, to the east, will also be treated in the onsite treatment plant.

Mayo County Council proposes to construct a municipal sewage treatment plant to serve Killala. When this plant has been completed, Mayo Renewable Power may seek the Agency's permission to discharge untreated sewage to this plant and discontinue the use of the on-site plant.

E4. Emissions to Ground

There are no emissions to ground. Table E.4(i) and Table E.4(ii) are therefore not applicable.

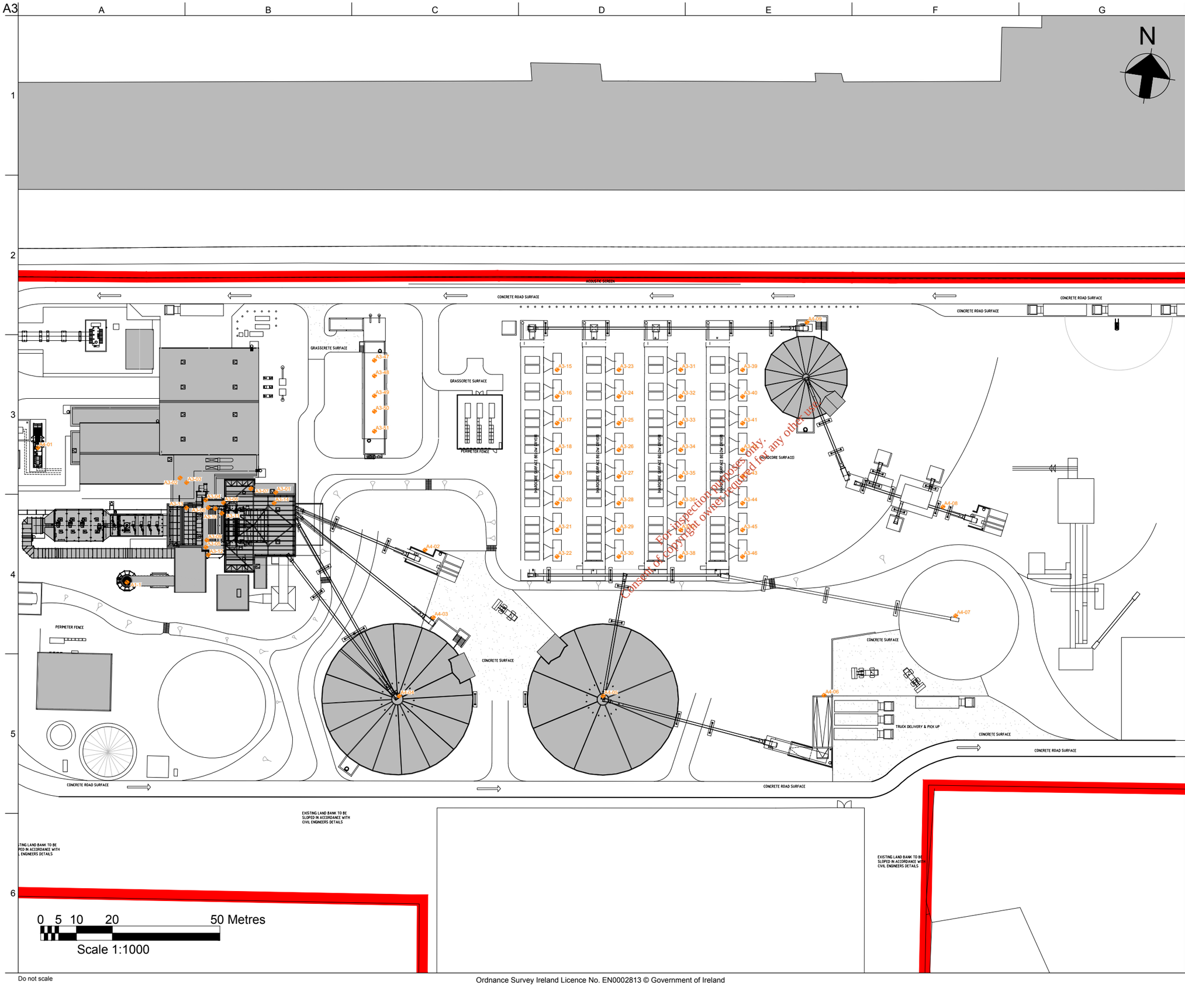
E5. Noise Emissions

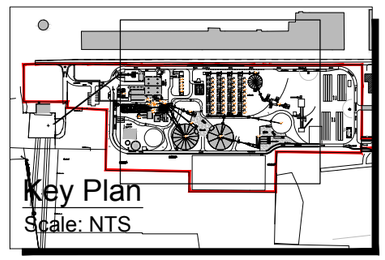
Details of noise sources are given in Table E.5(i) and shown in Figure E.2.

E6. Tabular Data on Emission Points

This information is provided in Excel format on a separate CD-ROM containing sections B.2, E.6 and F.3, as per the Application Form.

A3





Key Plan
Scale: NTS

Issue	Date	By	Chkd	Appd

ARUP

Arup, 50 Ringsend Road
Dublin 2
Tel +353(0)1 233 4455 Fax +353(0)1 668 3169
www.arup.ie

Client
Mayo Renewable Power Ltd.
Killala
Co. Mayo

Job Title
IPPC Licence Application

Drawing Title
Figure: E1
Main and Minor Emissions to Atmosphere

Scale at A3	Date
1:1,000	January 2013

Discipline: Environmental

Drawing Status: **Planning**

Job No	Drawing No	Issue
224582-00	**000**	**PL2**

Do not scale

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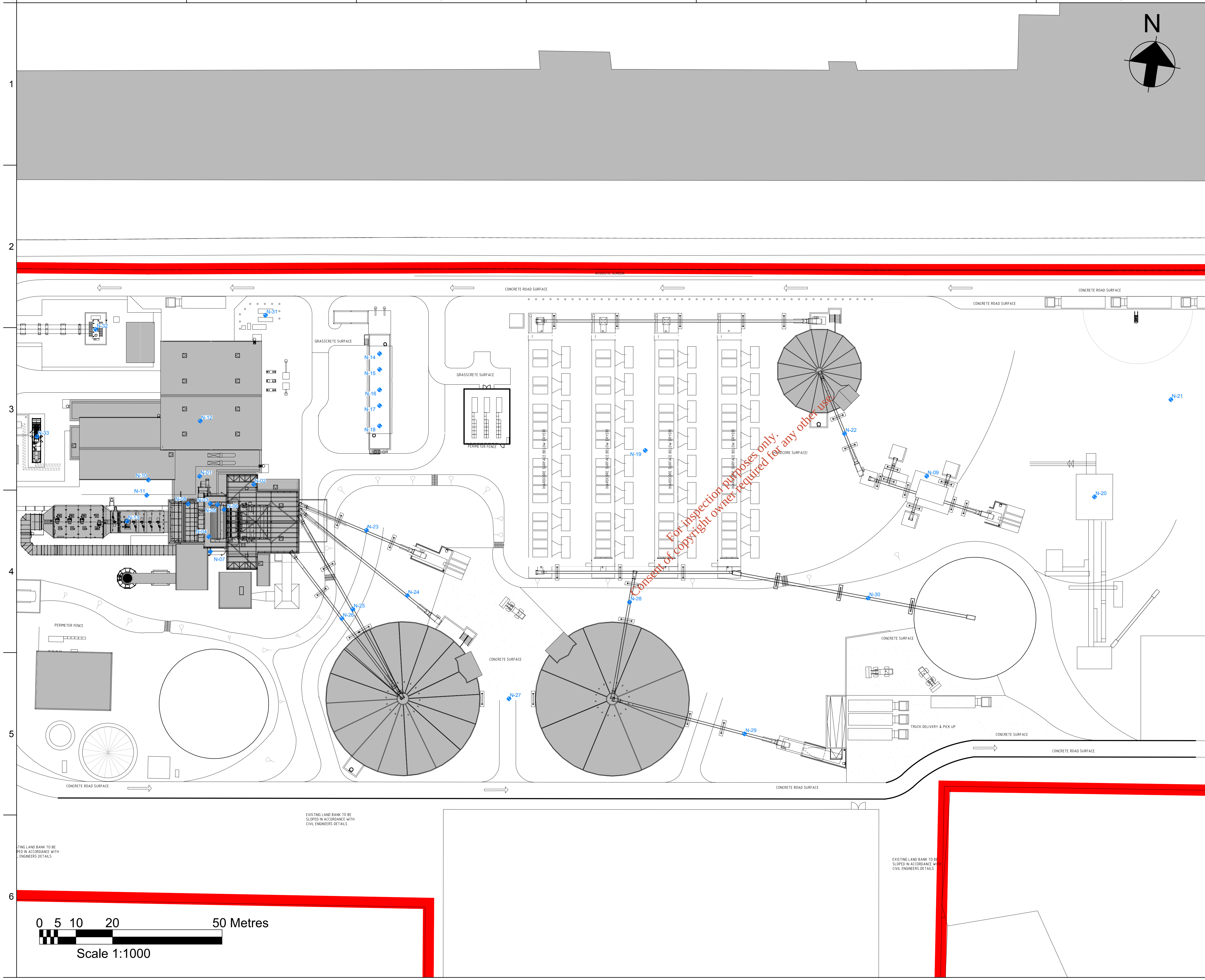
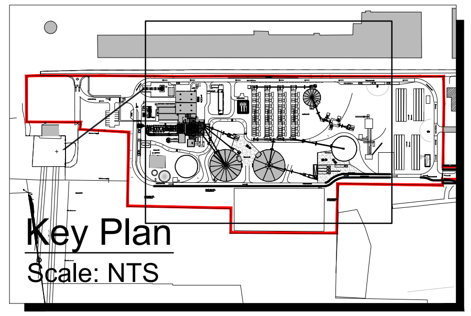
A3

A	B	C	D	E	F	G





Issue	Date	By	Chkd	Appd

ARUP

Arup, 50 Ringsend Road
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www.arup.ie

Client
Mayo Renewable Power Ltd.
Killala
Co. Mayo

Renewable Power Mayo

Job Title
IPPC Licence Application

Drawing Title
Figure: E2
Locations of Main Noise Sources

Scale at A3: 1:1,000	Date: January 2013
Discipline: Environmental	
Drawing Status: **Planning**	
Job No: **224582-00**	Drawing No: **000** — Issue: **PL2**

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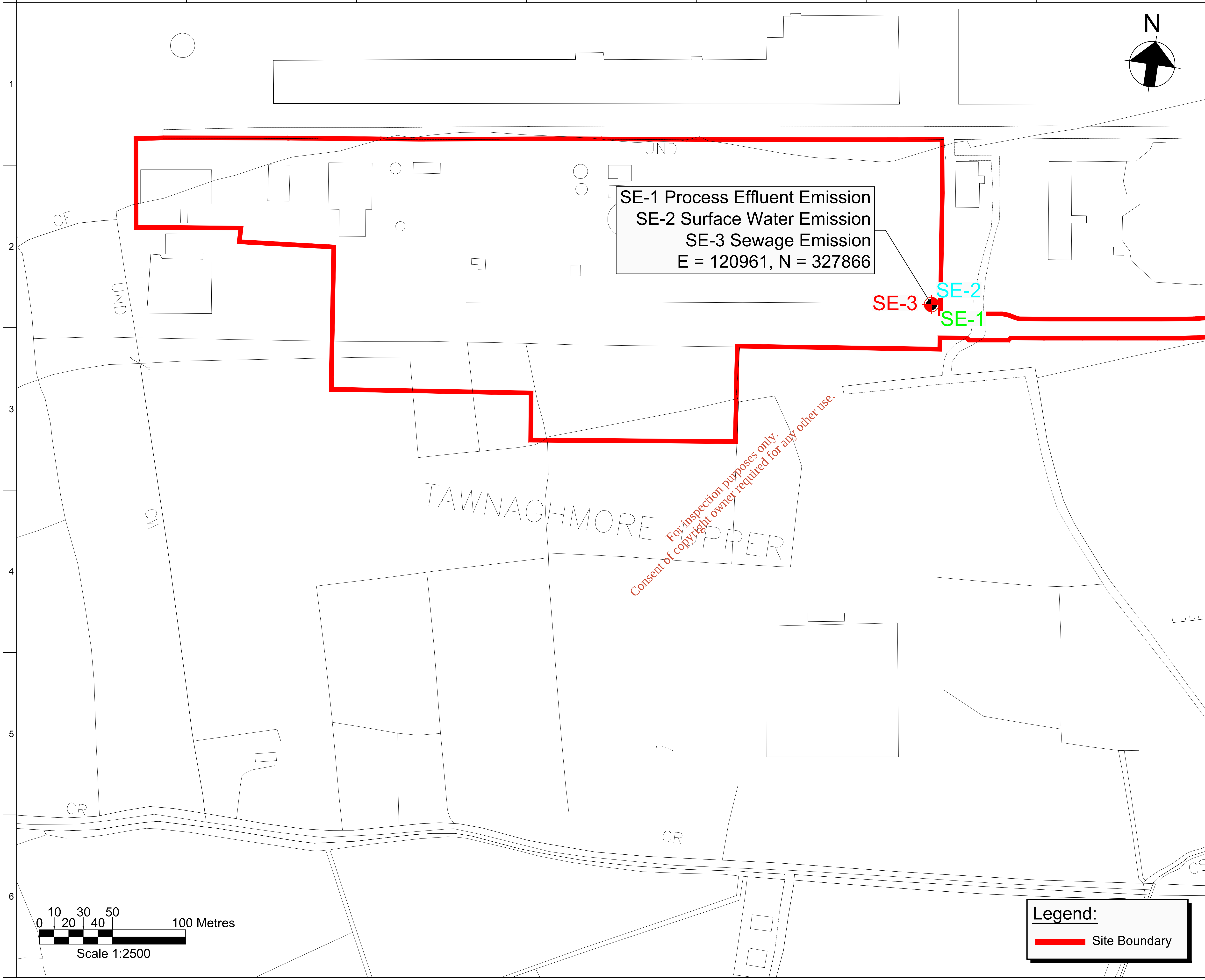
A3



Notes:

1. All coordinates relative to Irish national grid.

Issue	Date	By	Chkd	Appd

ARUP

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Client

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Renewable Power Mayo

Job Title

IPPC Licence Application

Drawing Title

Figure: E3
Water Emission Points

Scale at A3: 1:2,500	Date: January 2013
Discipline: Environmental	
Drawing Status: **Planning**	
Job No: **224582-00**	Drawing No: **000** / Issue: **PL1**

Do not scale

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Table E.1 (i) BOILER EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point:

Emission Point Ref. Nº:	A1-1	
Location:	Adjacent to boiler house	
Grid Ref. (12 digit, 6E,6N):	120661, 327845	
Vent Details	Diameter: 2.134m	Height above Ground(m):66.3
Date of commencement of emission:	End of 2013	

Characteristics of Emission:

Boiler rating Steam Output: Thermal Input:		173,953kg/hr 134.14MW
Boiler fuel Type: Maximum rate at which fuel is burned % sulphur content:		36,387kg/hr
NOx		835.8 mg/Nm^3 0°C. 3% O_2(Liquid or Gas), 6% O_2(Solid Fuel)
Maximum volume* of emission		202,970m^3/hr 0°C, 3 % O_2 (liquid or gas), 6 % O_2 (solid fuel)
Temperature	135°C(max) 50 °C(min)	52°C(avg)

* Volume flow limits for emissions to atmosphere shall be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa), dry gas; 3% oxygen for liquid and gas fuels; 6% oxygen for solid fuels.

(i) 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	335.8	day/yr

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

Emission Point Ref. Nº:	n/a
Source of Emission:	
Location:	
Grid Ref. (12 digit, 6E,6N):	
Vent Details Diameter: Height above Ground(m):	
Date of commencement:	

Characteristics of Emission:

(i) Volume to be emitted:			
Average/day	Nm^3/d	Maximum/day	Nm^3/d
Maximum rate/hour	Nm^3/h	Min efflux velocity	$m.sec^{-1}$
(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)	_____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: ***A1-1***

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
PM	512.6	512.6	112.5	112.5	Multicyclone dust collector and dry electro-static precipitator	20	20	4.44	4.44	35,796	35,796
SOx	202	202	44.35	44.35	None	202	202	44.35	44.35	357,552	357,552
NOx	838	838	169.5	169.5	SCR	198	198	40.2	40.2	352,047	352,047

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(iv): EMISSIONS TO ATMOSPHERE - Minor atmospheric emissions

Emission point Reference Numbers	Description	Emission details[1]				Abatement system employed
		material	mg/Nm^{3} [2]	kg/h.	kg/year	
A3-1	Intermittent blowdown flash steam	Steam	n/a	5.7	45,700	None
A3-2	DA Vent	Air/steam	n/a	27.2	218,185	None
A3-3	DA safety valve	Steam	n/a	0	0	None
A3-4	Steam drum safety valve A	Steam	n/a	0	0	None
A3-5	Steam drum safety valve B	Steam	n/a	0	0	None
A3-6	Superheater outlet safety valve	steam	n/a	0	0	None
A3-7	Continuous blowdown vent	steam	n/a	820	6,607,030	None
A3-8	Steam drum vent A	Steam	n/a	4,536	54,432	None
A3-9	Steam drum vent B	Steam	n/a	4,536	54,432	None
A3-10	Primary superheater vent	Steam	n/a	4,536	54,432	None
A3-11	Secondary superheater vent	Steam	n/a	4,536	54,432	None
A3-12	Sight glass vent	Steam	n/a	0	0	None
A3-13	Economiser outlet vent	Steam	n/a	0	0	None
A3-14	Ammonia tank safety valve	Ammonia	n/a	0	0	None
A3-15 to A3-46	Dryer belt	Dust	n/a	0	0	None
A3-47 to A3-51	Cooling towers	Water vapour	n/a	0	0	None

1 The maximum emission should be stated for each material emitted, the concentration should be based on the maximum 30 minute mean.
2 Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0^{o}C101.3kPa). Wet/dry should be clearly stated. Include reference oxygen conditions for combustion sources.

TABLE E.1(v): EMISSIONS TO ATMOSPHERE – Fugitive and Potential atmospheric emissions

Emission point ref. no. (as per flow diagram)	Description	Malfunction which could cause an emission	Emission details (Potential max. emissions)[1]		
			Material	mg/Nm^3	kg/hour
A4-1	Stand-by Generator	Power cut	Nitrogen oxides	3,256.7	n/a
			Carbon monoxide	291.2	n/a
			Hydrocarbons	65.4	n/a
			Particulate matter	32.6	n/a
A4-2 to A4-9	Points of transfer of wood chip	Malfunction of misting	Dust	n/a	n/a

[1] Estimate the potential maximum emission for each malfunction identified.

TABLE E.2(i): EMISSIONS TO SURFACE WATERS There will be no emissions to Surface Water (One page for each emission)

Emission Point:

Emission Point Ref. Nº:	Not applicable
Source of Emission:	
Location :	
Grid Ref. (12 digit, 6E,6N):	
Name of receiving waters:	
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	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.2(ii): EMISSIONS TO SURFACE WATERS - Characteristics of the emission (1 table per emission point)

Emission point reference number : Not applicable, there will be no emissions to Surface Water

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	

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

Emission Point: ***SE-1 (Process Effluent Emission)***

Emission Point Ref. Nº:	SE-1
Location of connection to sewer:	Mayo County Council sewer near south east entrance to site
Grid Ref. (12 digit, 6E,6N):	120961, 327866
Name of sewage undertaker:	Mayo County Council

Emission Details:

(i) Volume to be emitted			
Normal/day	600m^3	Maximum/day	1,000m^3
Maximum rate/hour	41.7m^3		

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

Periods of Emission (avg)	60 min/hr 24 hr/day 365 day/yr

TABLE E.3(ii): EMISSIONS TO SEWER - Characteristics of the emission (1 table per emission point)

Emission point reference number : SE-1 (Process Effluent Emission)

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	
pH	6 -9				6 -9				Not applicable
Temperature	25°C				25°C				Not applicable
BOD	20				20				Not applicable
Suspended solids			35				35		Not applicable
Total dissolved solids			350				350		Not applicable
Mineral oil	>5					5	5.5		

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

Emission Point: ***SE-2 (Surface Water Emission)***

Emission Point Ref. Nº:	SE-2
Location of connection to sewer:	Mayo County Council sewer near south east entrance to site
Grid Ref. (12 digit, 6E,6N):	120961, 327866
Name of sewage undertaker:	Mayo County Council

Emission Details:

(i) Volume to be emitted			
Normal/day	n/a m^3	Maximum/day	n/a m^3
Maximum rate/hour	n/a 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)	Only following rainfall _____min/hr _____hr/day _____day/yr

TABLE E.3(ii): EMISSIONS TO SEWER - Characteristics of the emission (1 table per emission point)

Emission point reference number : SE-2 (Surface Water Emission)

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	
TOC	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
pH	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

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

Emission Point: ***SE-3 (Sewage Emission)***

Emission Point Ref. Nº:	SE-3
Location of connection to sewer:	Mayo County Council sewer near south east entrance to site
Grid Ref. (12 digit, 6E,6N):	120961, 327866
Name of sewage undertaker:	Mayo County Council

Emission Details:

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

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

Periods of Emission (avg)	60 min/hr 24 hr/day 365 day/yr

TABLE E.3(ii): EMISSIONS TO SEWER - Characteristics of the emission (1 table per emission point)

Emission point reference number : SE-3 (Sewage Emission)

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	
BOD					20				> 90
SS					30				> 90

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

Emission Point or Area: Not applicable, there will be no emissions to ground

Emission Point/Area Ref. Nº:	
Emission Pathway: (borehole, well, percolation area, soakaway, landspreading, etc.)	
Location :	
Grid Ref. (12 digit, 6E,6N):	
Elevation of discharge: (relative to Ordnance Datum)	
Aquifer classification for receiving groundwater body:	
Groundwater vulnerability assessment (including vulnerability rating):	
Identity and proximity of groundwater sources at risk (wells, springs, etc):	
Identity and proximity of surface water bodies at risk:	

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(ii): EMISSIONS TO GROUND - Characteristics of the emission (1 table per emission point)

Emission point/area reference number: Not applicable, there will be no emissions to ground

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	

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

Source	Emission point Ref. No	Equipment Ref. No	Sound Pressure[1] dBA at reference distance	Octave bands (Hz) Sound Pressure[1] Levels dB(unweighted) per band									Impulsive or tonal qualities	Periods of Emission
				31.5	63	125	250	500	1K	2K	4K	8K		
Deaerator Vent	N1		83 at 1m										none	Intermittent (<1%)
Blowdown vent	N2		83 at 1m										none	Intermittent (<1%)
Steam drum vent A	N3		83 at 1m										none	Intermittent (<1%)
Steam drum vent B	N4		83 at 1m										none	Intermittent (<1%)
Primary superheater vent	N5		83 at 1m										none	Intermittent (<1%)
Secondary superheater vent	N6		83 at 1m										none	Intermittent (<1%)
Sight glass vent	N7		85 at 1m										none	Intermittent (<1%)
Economiser outlet vent	N8		85 at 1m										none	Intermittent (<1%)
Screen machine	N9		85 at 1m										none	Continuous daytime
ID Fan	N10		76 at 1m		64	72	73	67	62	62	61	57	None	Continuous
FD Fan	N11		76 at 1m		64	72	73	67	62	62	61	57	none	Continuous
Turbine building	N12		80 at 1m		94	85	73	71	71	74	70	72	None	Continuous
Boiler building	N13		75 at 1m										none	Continuous
Cooling towers	N14-N18		81 at 1m		79	79	79	79	79	75	68	59	none	Continuous
Dryer	N19		75 at 1m										none	Continuous
Wood chippers	N20-N21		108 at 1m										none	Continuous daytime
Conveyors	N22-N30		99.5 at 1m	85	86	92	93	93	93	86	80	75	none	Continuous
Vacuum Pump Skid	N31		75 at 1m										none	continuous
Step-up station Transformer	N32		75 at 1m										none	continuous
Step-down station Transformer	N33		75 at 1m										none	continuous

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

Revised Attachment F

ATTACHMENT No. F

CONTROL AND MONITORING

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F.1. Treatment, Abatement and Control Systems

Flow diagrams are provided which show the abatement systems (Figure D.03.11 (PL2) SCR System, D.3.14 (PL2)).

Details of abatement systems are given in Tables E.1(iii), E.1(iv) and Table F1(i).

Emissions to Air

A Selective Catalytic Reduction (SCR) will be used to reduce nitrogen oxide (NO_x) emissions from the boiler stack. The SCR converts NO_x into diatomic nitrogen, N_2, and water. Ammonia is added to the exhaust gas and is absorbed onto the catalyst.

The SCR controls the flow of Aqeous Ammonia to insure efficient operation and NOx control. The control system monitors NOx and provides the appropriate Aqueous Ammonia flow to control NOx.

No solid or liquid wastes are created in the SCR process.

An Electrostatic Precipitator (ESP) will be provided for control of dust emissions. The ESP utilises a high voltage electric field to impart an electrical charge to the dust particles as they pass through the ESP. The charged particles are attracted to oppositely charged collection plates in the ESP where they are captured. Collected particles are removed from the collection plates by a rapping system that causes the particles to fall into a system of hoppers and screw conveyors that discharge the particles to the Fly Ash Collection System.

Emissions to Water

Surface water run-off from roofs, roadways, hard standings and the fuel storage area on the site will be collected in a dedicated surface water drainage system. All surface water will pass through a class 1 oil/water separator. Surface water from the western and central areas of the site will pass through a dry detention basin. Surface water will be discharge off site to the Mayo County Council sewer.

Surface water from the adjoining premises, to the east, will also be combined with surface water from the north-western part of the site, passed through a Class 1 oil/water separator and discharge off site.

There will be several sources of process effluent. The organic scavenger regeneration stream will pass through a pH neutralisation system before being combined with the other process effluent streams. All process effluent will pass through a Class 1 oil/water separator prior to discharge off site to the Mayo County Council sewer.

Sewage will be treated on site in a packaged sewage treatment plant to give a final effluent with a BOD of 20mg/l and suspended solids of 30mg/l prior to discharge off site to the Mayo County Council sewer.

Sewage from the adjoining premises, to the east, will also be treated in the onsite treatment plant.

Emissions to Ground
There are no emissions to ground.

Noise abatement
It is proposed to provide a single cladding Kingspan KS1000 RW Roof Panel on the roofs of the turbine and boiler buildings. The panels provide a sound reduction of approximately Rw = 25dB. Similar material will be provided on the walls of the building. Enclosures will be provided as required to ensure compliance with the IPPC Licence Limits.

F.2. Emissions Monitoring and Sampling Points

Labelling of Monitoring and Sampling Points
Details for each monitoring and sampling point are given in Table F.2(i) for effluent monitoring and in Table F.2(ii) for ambient noise monitoring.

Surface water will be continuously monitored for TOC and pH. A daily visual inspection will also be undertaken. The monitoring chamber will be adjacent to the eastern site entrance road and a grab sampling facility will be provided.

Process effluent will be monitored for flow, pH, temperature, BOD, SS, TDS and mineral oil. The monitoring chamber will be adjacent to the eastern site entrance road and a grab sampling facility will be provided.

Sewage effluent will be monitored for BOD and SS. The monitoring chamber will be adjacent to the eastern site entrance road and a grab sampling facility will be provided.

F.3. Tabular Data on Monitoring and Sampling Points

This information is provided in Excel format on a separate CD-ROM containing sections B.2, E.6 and F.3, as per the Application Form.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

Emission point reference number *:* *A1-1*

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Particulate matter opacity	Multicyclone dust collector and Electrostatic precipitator	Wear areas on dust collector. ESP- Rotating parts: Rappers, blowers etc	Electrostatic and Multicyclonedust collector – N/A	None
Nitrogen oxides	Selective catalytic reduction, ammonia tank, pumps, furnace inspection grid	Regular pump and nozzle maintenance	Flow control is Tuned with boiler stack data and CEM system is calibrated daily	Redundant pump

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Particulate matter opacity	opacity monitoring	Annual or as-needed	Visually with certified smoke inspector or annual stack test
Nitrogen oxides	Continuous emissions monitoring system (CEMS)	Continuous emissions monitoring system (CEMS)	With calibration gas - automatic

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

Emission point reference number *:*__ SE-1 Process Effluent Emission

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Flow	Pumps	As per manufacturer's instructions	As per manufacturer's instructions	Back up pump
pH	pH neutralisation of organic scavenger regeneration discharge - pH probe and acid and caustic supply pumps	As per manufacturer's instructions	As per manufacturer's instructions	As per manufacturer's instructions
Mineral oil	Oil/water separator	As per manufacturer's instructions	As per manufacturer's instructions	As per manufacturer's instructions

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
pH	pH of organic scavenger regeneration discharge	pH probe	As per manufacturer's instruction
Mineral oil	Visual inspection for signs of hydrocarbons	Not applicable	Not applicable

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

Emission point reference number *:* SE-2 Surface Water Emission

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Silt	Silt traps	As per manufacturer's instructions	N/A	N/A
Mineral oil	Oil/water separator	As per manufacturer's instructions	As per manufacturer's instructions	As per manufacturer's instructions

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
TOC	continuous TOC	TOC analyser	As per manufacturer's instructions
pH	Continuous pH	pH probe	As per manufacturer's instructions

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

Emission point reference number *:* SE-3 Sewage Effluent

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
BOD	Composite sampler	As per manufacturer's instructions	As per manufacturer's instructions	As per manufacturer's instructions
SS	Composite sampler	As per manufacturer's instructions	As per manufacturer's instructions	As per manufacturer's instructions

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
BOD	Quarterly for BOD	24 hour flow proportional composite sampler	As per manufacturer's instructions
SS	Quarterly for SS	24 hour flow proportional composite sampler	As per manufacturer's instructions

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : A1-1

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
NOx	Continuous	Monitoring platform	Continuous emissions monitoring system	Extractive Dilution Monitoring Method
SOx	Continuous	Monitoring platform	Continuous emissions monitoring system	Extractive Dilution Monitoring Method
Particulate matter	Annually	Monitoring platform	Extractive sample per appropriate EPA test method	Annual Stack Test per appropriate EPA test method

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : SE-1 Process Effluent Emission

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
Flow	Continuous	Monitoring chamber adjacent to site entrance, grab sample facility provided	On-line flow meter with recorder	On-line flow meter with recorded
pH	Continuous	Monitoring chamber adjacent to site entrance, grab sample facility provided	pH electrode/meter with recorder	pH electrode/meter with recorder
Temperature	Continuous	Monitoring chamber adjacent to site entrance, grab sample facility provided	On-line temperature probe with recorder	On-line temperature probe with recorder
BOD	Monthly	Monitoring chamber adjacent to site entrance, grab sample facility provided	24 hour flow proportional composite sampler	Standard method
SS	Weekly	Monitoring chamber adjacent to site entrance, grab sample facility provided	24 hour flow proportional composite sampler	Standard method
TDS	Weekly	Monitoring chamber adjacent to site entrance, grab sample facility provided	24 hour flow proportional composite sampler	Standard method
Mineral Oil	Daily	Monitoring chamber adjacent to site entrance, grab sample facility provided	Visual inspection for signs of hydrocarbons	Not applicable

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : SE-2 Surface Water Emission

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
pH	Continuous	Monitoring chamber adjacent to site entrance, grab sample facility provided	pH electrode/meter with recorder	pH electrode/meter with recorder
TOC	Continuous	Monitoring chamber adjacent to site entrance, grab sample facility provided	TOC probe with recorder	TOC probe with recorder
Visual Inspection	Daily	Monitoring chamber adjacent to site entrance, grab sample facility provided	Sample	Examine for colour and odour

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : SE-3 Sewage Emission

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
BOD	Quarterly	Monitoring chamber adjacent to treatment plant, grab sample facility provided	24 hour flow proportional composite sampler	Standard method
SS	Quarterly	Monitoring chamber adjacent to treatment plant, grab sample facility provided	24 hour flow proportional composite sampler	Standard method

TABLE F.2(ii): AMBIENT ENVIRONMENT MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Monitoring Point Reference No : N1-N3

Parameter	Monitoring frequency	Accessibility of Sampling point	Sampling method	Analysis method / technique
Noise	Baseline monitoring	Site boundary	Brüel & Kjær 2250 Light Class 1 Sound Level Meter	Brüel & Kjær 2250 Light Class 1 Sound Level Meter

Revised Attachment G

ATTACHMENT No. G

RESOURCE USE AND ENERGY EFFICIENCY

TABLE OF CONTENTS

G.1. Raw Materials, Intermediates and Products

G.1.1 Raw Materials and Process Materials

The principal raw materials, by-products and ancillary materials to be used at the Mayo Renewable Power (MRP) facility are listed in Tables G.1(i) and G.1(ii). The associated risk and safety phrases are taken from the relevant Safety Data Sheets where available.

Table G.1(i): Details of Process related Raw Materials, Intermediates, Products, etc., used or generated on the site

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored	Annual Usage	Nature of Use	R[3] - Phrase	S[3] - Phrase
FUELS								
1	Wood chip Biomass	None	None	9 tonnes	530,778 tonnes	Boiler Fuel	None	None
2	No. 2 Fuel Oil	68476-30-2	None	344 m2	4,577 tonnes	Boiler Fuel	Not available	Not available
INTERMEDIATES AND PRODUCTS								
3	Boiler Ash	None	None	0	0	Boiler Product	None	None
4	Fly Ash	None	None	60 tonnes	0	Boiler Product	None	None
CONSUMABLES								
5	Ammonia (26% w/w aqueous solution)	1336-21-6	Corrosive, causes burns, dangerous for the environment, very toxic to aquatic organisms	40,000 litres (36 tonnes approx)	250,000 litres	Selective Non Catalytic Reduction of emissions to atmosphere	R34, R50	S(1/2), S26, S36/37/39, S45, S61
6	TOTAL PRESLIA 46	None	None	2000 litres	Not possible to estimate at this stage	Turbine Lubricant	n/a	n/a
7	TOTAL PRESLIA 46	None	None	190 litres	Not possible to estimate at this stage	Turbine Lubricant	n/a	n/a
8	TOTAL PRESLIA 46	None	None	1456 litres	Not possible to estimate at this stage	Turbine Lubricant	n/a	n/a
9	TOTAL PRESLIA 46	None	None	208 litres	Not possible	Lubricant	n/a	n/a

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored	Annual Usage	Nature of Use	R[3] - Phrase	S[3] - Phrase
					to estimate at this stage			
10	TOTAL CARTER EP 680	None	None	20 litres	Not possible to estimate at this stage	Gear Lubricant	n/a	n/a
11	TOTAL DACNIS SE 100	Ingredient: 68037-01-4	Irritation or minor injury possible. Flash point above 97 deg C	20 litres	Not possible to estimate at this stage	Lubricant	Not available	Not available
12	TOTAL DACNIS SE 100	Ingredient: 68037-01-4	Irritation or minor injury possible. Flash point above 97 deg C	208 litres	Not possible to estimate at this stage	Lubricant	Not available	Not available
13	TOTAL EQUIVIS ZS 32	None	None	20 litres	Not possible to estimate at this stage	Hydraulic Oil	None	None
14	TOTAL EQUIVIS ZS 32	None	None	416 litres	Not possible to estimate at this stage	Hydraulic Oil Exterior	None	None
15	TOTAL PRESLIA 68	Ingredient: 95-63-6	None	208 litres	Not possible to estimate at this stage	Turbine Oil	None	None
16	TOTAL PRESLIA 68	Ingredient: 95-63-6	None	208 litres	Not possible to estimate at this stage	Turbine Oil	None	None
17	TOTAL AZOLLA ZS 100	Ingredient: 68649-42-3	None	208 litres	Not possible to estimate at this stage	Lubricant Oil	Ingredients: R38; R41, R51/53	Not available
18	TOTAL AZOLLA ZS 68	Ingredient:	None	208 litres	Not possible to estimate	Hydraulic Oil	R-52/53	S-61

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored	Annual Usage	Nature of Use	R[3] - Phrase	S[3] - Phrase
		68649-42-3			at this stage			
19	TOTAL CARTER SY 220	Ingredients 125643-61-0 80939-62-4	None	20 litres	Not possible to estimate at this stage	Lubricant Oil	None	None
20	TOTAL CARTER EP 220	Ingredients: 64742-62-7 64742-54-7	None	180 litres	Not possible to estimate at this stage	Gear Oil	None	None
21	TOTAL CARTER EP 220	Ingredients: 64742-62-7 64742-54-7	None	208 litres	Not possible to estimate at this stage	Gear Oil Generator Turbine Hall	None	None
22	TOTAL CARTER EP 220	Ingredients: 64742-62-7 64742-54-7	None	208 litres	Not possible to estimate at this stage	Gear Oil	None	None
23	TOTAL CARTER EP 320	None	None	208 litres	Not possible to estimate at this stage	Gear Lubricant	None	None
24	TOTAL CARTER EP 680	None	None	208 litres	Not possible to estimate at this stage	Gear Lubricant	None	None
25	TOTAL CARTER SH 220	None	None	208 litres	Not possible to estimate at this stage	Lubricant Oil	None	S23, S25
26	TOTAL CARTER SY 460	Ingredient: 125643-61-0 80939-62-4	None	208 litres	Not possible to estimate at this stage	Lubricant Oil	None	S23, S25

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored	Annual Usage	Nature of Use	R[3] - Phrase	S[3] - Phrase
27	MOBIL DTE 27 iso vg 100	None	None	20 litres	Not possible to estimate at this stage	Lubricant Oil	Not available	Not available
28	MOBIL DELVAC MX EXTRA 10W40	Ingredients: 68649-42-3	None	208 litres	Not possible to estimate at this stage	Lubricant Oil Turbine Hall	Ingredients: R38, R41, R51/53	Not available
29	MOBIL DTE OIL light iso vg 32	None	None	208 litres	Not possible to estimate at this stage	Lubricant Oil Turbine Hall	Not available	Not available
30	MOBIL mobilgear 600XP220	None	None	208 litres	Not possible to estimate at this stage	Gear oil	Not available	Not available
31	MOBIL mobilgear 600XP320	None	None	208 litres	Not possible to estimate at this stage	Gear oil	Not available	Not available
32	MOBIL mobilgear 600XP460	None	None	208 litres	Not possible to estimate at this stage	Gear oil	Not available	Not available
33	MOBIL SHC 632 iso vg 320	None	None	208 litres	Not possible to estimate at this stage	Lubricant Oil	Not available	Not available
34	MOBIL SHC 632 iso vg 320	None	None	208 litres	Not possible to estimate at this stage	Lubricant Oil	Not available	Not available
35	FONT'CLEANER	Not Available	Dangerous	1000 litres	Not possible to estimate at this stage	Degreaser	Not available	Not available

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored	Annual Usage	Nature of Use	R[3] - Phrase	S[3] - Phrase
36	NEUTRAGEL	Ingredient: 107-21-1	Harmful	208 litres	Not possible to estimate at this stage	Antifreeze	R22	S2 S46
37	TOTAL CALORIS MS 23	Ingredients: 497-18-7; 497-18-7; 497-18-7.	Irritation or minor reversible injury possible; flash point above 97 deg C	50 kg	Not possible to estimate at this stage	Grease	Not available	Not available
38	TOTAL CERAN MM	None	None	600 g	Not possible to estimate at this stage	Lubricating Grease	Not available	Not available
39	TOTAL CERAN WR 2	Ingredient: 8012-95-1	None	10.2 kg	Not possible to estimate at this stage	Lubricating Grease	None	S25
40	TOTAL COPAL OGL O	Ingredients: 64742-52-5; 64742-53-6; 64741-88-4; 64741-89-5; 64742-01-4; 64742-65-0.	Irritation or minor reversible injury possible; flash point above 97 deg C	50 kg	Not possible to estimate at this stage	Lubricating Grease	R-52/53	S-61
41	TOTAL MULTIS COMPLEX EP 2	Ingredients: 64742-52-5; 64742-53-6; 64741-88-4; 64741-89-5; 64742-01-4; 64742-65-0.	Irritation or minor reversible injury possible; flash point above 97 deg C	9.6 kg	Not possible to estimate at this stage	Grease	Not available	Not available

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored	Annual Usage	Nature of Use	R[3] - Phrase	S[3] - Phrase
42	TOTAL MULTIS COMPLEX EP 2	Ingredients: 64742-52-5; 64742-53-6; 64741-88-4; 64741-89-5; 64742-01-4; 64742-65-0.	Irritation or minor reversible injury possible; flash point above 97 deg C	50 kg	Not possible to estimate at this stage	Grease	Not available	Not available
43	TOTAL MULTIS COMPLEX SHD 100	Not available	None	6 kg	Not possible to estimate at this stage	Grease	Not available	Not available
44	TOTAL PERMA CLASSIC	None	None	2.4 kg	Not possible to estimate at this stage	Grease	Not available	S24/25
45	TOTAL SPECIS CU	Not available	None	180 kg	Not possible to estimate at this stage	Grease	Not available	Not available
46	18% Sodium hypochlorite	7681-52-9	Corrosive, causes burns	5.4m^3	0.5m^3	Raw water pre-treatment	R31,R34	S1/2, S28 S45, S50
47	Aluminium sulphate (coagulant)	10043-01-3	-	73.5 m^3	6.2 m^3	Raw water pre-treatment	R41	S26, S39
48	Hydrex 6761 (coagulant and polyelectrolytes)	Mixture	None	118 m^3	10 m^3	Raw water pre-treatment	Not available	Not available
49	Sodium chloride	7647-14-5	None	32,500kg	10 tonnes	De-mineralisation plant pre-treatment	-	-
50	Hydrex 1995 (or Nalco 2584) Caustic	Mixture	Corrosive	5.65 m^3	2 m^3	De-mineralisation plant pre-treatment	R35	Not available
51	30% Hydrochloric Acid	Mixture	Corrosive	5.65 m^3	2 m^3	De-mineralisation plant pre-treatment	R34, R37	S26, S45

Ref. Nº or Code	Material/ Substance(1)	CAS Number	Danger(2) Category	Amount Stored	Annual Usage	Nature of Use	R(3) - Phrase	S(3) - Phrase
52	Hydrex 1995(or Nalco 77224) (Alkalinity)	Mixture	Corrosive	5000kg	2000kg	Boiler water treatment	R35	Not available
53	Hydrex 1992 (or Nalco Eliminox) (Oxygen Scavenger)	Mixture	Irritant	2000kg	1000kg	Boiler water treatment	R22, R38, R43	Not available
54	Hydrex 1805 (or Nalco 72215) (Phosphate)	Mixture	Corrosive	2200kg	100kg	Boiler water treatment	Not available	Not available
55	HydrexX 1640 (or Nalco 5711) (Amine)	Mixture	Corrosive, causes burns	400kg	500kg	Boiler condensate treatment	Not available	Not available
56	98% Sulphuric acid	664-93-9	Corrosive, causes burns, irritant, reacts violently with water, highly reactive, capable of igniting combustible material on contact, toxic	7500kg	4000kg	pH control in cooling tower	R23/25, R35, R36/37/38, R41, R48, R49	S1/2, S21, S23, S24/2, S26, S27, S2, S29, S30, S3/37/39, S41, S45, S46/62/64, S50
57	Hydrex 2990 (or Nalco 3DT118 (Scale inhibitor)	Mixture	Corrosive	9000kg	4000kg	Cooling tower feed water scale inhibitor	Not available	Not available
58	Hydrex 7111(or Nalco 3434) (Sodium hypochlorite)	Mixture	Corrosive	4400kg	2000kg	Cooling tower feed biocide	Not available	Not available
59	Hydrex 7211 (or Nalco 93033) Bromide	Mixture	-	1200kg	1000kg	Cooling tower feed biocide	Not available	Not available
60	Hydrex 2250 (or Nalco 3DT197) (Copper corrosion inhibitor)	Mixture	Corrosive	6000kg	3000kg	Cooling tower feed corrosion inhibitor	Not available	Not available
61	Hydrex 2901 (or Nalco 71130) (Anti-foam)	Mixture	-	1000kg	1000kg	Cooling tower feed anti foam	Not available	Not available

Notes: (1). In cases where a material comprises a number of distinct and available dangerous substances, please give details for each component substance.
(2). c.f. Article 2(2) of SI Nº 77/94
(3). c.f. Schedules 9 and 10 of SI No 62/2004

Table G.1(ii): Details of Process related Raw Materials, Intermediates, Products, etc., used or generated on the site

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
FUELS									
1	Wood chip	Not listed	Yes	Mild, petroleum distillate odour	Not available	-	-	-	-
2	No. 2 Fuel Oil	Not listed	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
PRODUCTS									
3	Boiler Ash	Not listed	No	-	-	-	-	-	-
4	Fly Ash	Not listed	No	-	-	Not available	Not available	Not available	Not available
CONSUMABLES									
5	Ammonia (26% w/w aqueous solution)	Class 3	Yes	Sharp, pungent	5ppm	No	√ – Group 8 (Substances which have an adverse effect on the oxygen balance)	No	√ – Group 7 (ammonia and nitrites)
6	TOTAL PRESLIA 46	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
7	TOTAL PRESLIA 46	Not available	Yes	Characteristic	Not available	√ (Mineral oils and	-	√ (persistent mineral oils	-

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
						hydrocarbons)		and hydrocarbons of petroleum origin)	
8	TOTAL PRESLIA 46	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
9	TOTAL PRESLIA 46	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
10	TOTAL CARTER EP 680	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
11	TOTAL DACNIS SE 100	Not available	Yes	Low Odour	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
12	TOTAL DACNIS SE 100	Not available	Yes	Low Odour	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
13	TOTAL EQUIVIS ZS 32	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
14	TOTAL EQUIVIS ZS 32	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
15	TOTAL PRESLIA 68	Not available	Yes	Characteristic for oil	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
16	TOTAL PRESLIA 68	Not available	Yes	Characteristic for oil	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
17	TOTAL AZOLLA ZS 100	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
18	TOTAL AZOLLA ZS 68	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum	-

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
								origin)	
19	TOTAL CARTER SY 220	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
20	TOTAL CARTER EP 220	Not available	Yes	Characteristic petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
21	TOTAL CARTER EP 220	Not available	Yes	Characteristic petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
22	TOTAL CARTER EP 220	Not available	Yes	Characteristic petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
23	TOTAL CARTER EP 320	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
24	TOTAL CARTER EP 680	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons	-	√ (persistent mineral oils and	-

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
						)		hydrocarbons of petroleum origin)	
25	TOTAL CARTER SH 220	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
26	TOTAL CARTER SY 460	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
27	MOBIL DTE 27 iso vg 100	Not available	Yes	Mild	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
28	MOBIL DELVAC MX EXTRA 10W40	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
29	MOBIL DTE OIL light iso vg 32	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
30	MOBIL mobilgear 600XP220	Not available	Yes	Characteristic	Not available	√ (Mineral oils and	-	√ (persistent mineral oils	-

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
						hydrocarbons)		and hydrocarbons of petroleum origin)	
31	MOBIL mobilgear 600XP320	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
32	MOBIL mobilgear 600XP460	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
33	MOBIL SHC 632 iso vg 320	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
34	MOBIL SHC 632 iso vg 320	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
35	FONT'CLEANER	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available
36	NEUTRAGEL	Not available	Yes	Sweetish	Not available	Not available	Not available	Not available	Not available
37	TOTAL CALORIS MS 23	Not available	Yes	Characteristic	Not available	√ (Mineral oils and hydrocarbons	-	√ (persistent mineral oils and	-

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
						)		hydrocarbons of petroleum origin)	
38	TOTAL CERAN MM	Not available	Yes	Bland odor	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
39	TOTAL CERAN WR 2	Not available	Yes	Characteristic	Not available				
40	TOTAL COPAL OGL O	Not available	Yes	Petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
41	TOTAL MULTIS COMPLEX EP 2	Not available	Yes	Petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
42	TOTAL MULTIS COMPLEX EP 2	Not available	Yes	Petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
43	TOTAL MULTIS COMPLEX SHD 100	Not available	Yes	Petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
44	TOTAL PERMA CLASSIC	Not available	Yes	Characteristic mineral oil	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
45	TOTAL SPECIS CU	Not available	Yes	Petroleum	Not available	√ (Mineral oils and hydrocarbons)	-	√ (persistent mineral oils and hydrocarbons of petroleum origin)	-
46	Sodium hypochlorite	Not listed	No	-	-	-	-	-	√ (Sodium hypochlorite)
47	Aluminium sulphate	Not listed	No	-	-	-	-	-	-
48	HYDREX 6761 (coagulant and polyelectrolytes)	Not listed	Not available			Not available	Not available	Not available	Not available
49	Sodium chloride	Not listed	No	-	-	-	-	-	-
50	Hydrex 1995 (or Nalco 2584) Caustic	Not listed	No	-	-	-	-	-	-
51	30% Hydrochloric Acid	Not listed	yes	Pungent, irritating	-	-	-	-	
52	Hydrex 1995(or Nalco 77224) (Alkalinity)	Not listed	No	-	-	Not available	Not available	Not available	Not available
53	Hydrex 1992 (or Nalco Eliminox) (Oxygen Scavenger)	Not listed	Not available	-	-	Not available	Not available	Not available	Not available
54	Hydrex 1805 (or Nalco 72215) (Phosphate)	Not listed	Not available	-	-	Not available	Not available	Not available	Not available
55	HydrexX 1640 (or Nalco 5711)	Not listed	Not available	-	-	Not available	Not available	Not available	Not available

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
	(Amine)								
56	98% Sulphuric acid	Not listed	No	-	-	Not available	Not available	Not available	Not available
57	Hydrex 2990 (or Nalco 3DT118 (Scale inhibitor)	Not listed	No	-	-	Not available	Not available	Not available	Not available
58	Hydrex 7111(or Nalco 3434) (Sodium hypochlorite)	Not listed	Not available	-	-	Not available	Not available	Not available	Not available
59	Hydrex 7211 (or Nalco 93033) Bromide	Not listed	Not available	-	-	Not available	Not available	Not available	Not available
60	Hydrex 2250 (or Nalco 3DT197) (Copper corrosion inhibitor)	Not listed	Not available	-	-	Not available	Not available	Not available	Not available
61	Hydrex 2901 (or Nalco 71130) (Anti-foam)	Not listed	Not available	-	-	Not available	Not available	Not available	Not available

Notes (cont.): (4). The European Commission priority candidate list

G.2. Energy Efficiency

G.2.1 Energy Usage

Energy will be consumed at MRP in the form of biomass (wood chips), No. 2 Fuel Oil and electricity.

Table G.1 summarises the potential annual energy consumption once operational.

Table G.1: Energy Consumption at MRP

Energy Source	Unit	Annual Consumption
Wood Chips	tonnes	280,000
Type 2 Fuel Oil	tonnes	4,577
Electricity	kWhrs	43,800,000

G.2.2 Energy Saving Measures

Mayo Renewable Power Ltd (MRP) will be subject to the requirements of its IPPC licence during operation. An Environmental Management System/Plan will be developed and will require the facility to optimise the use of energy and material resources. The primary aim of IPPC licensing is to prevent or reduce emissions to air, water and land, to reduce waste and to use energy efficiently. MRP will achieve these objectives by using an advanced, energy-efficient CHP method for the production of renewable energy. Further detail of this efficiency is included below and in Section I.8 of this application.

The following measures are used at Mayo Renewable Power Ltd to increase the energy efficiency:

- **Combustion: minimising the heat loss due to unburned gases and elements in solid wastes and residues from combustion**

  Upon commissioning and start-up, the plant will be performance tested including measurement for excess CO in combustion gases to confirm the boiler's ability to completely combust all the fuel. The boiler will be optimized to do so before turnover to MRP operations. As part of the design, the Continuous Emissions Monitoring (CEMs) equipment will constantly monitor CO, to provide MRP feedback on the conditions of combustion so that excursions will be known and actions can be taken to correct same. This is BAT for combustion control.

- **The highest possible pressure drop in the low pressure end of the steam turbine through the lowest possible temperature of the cooling water (fresh water cooling)**

  MRP is employing the highest pressure drop across the steam turbine as allowed by the turbine vendor to maintain moisture content in back end of the turbine below industry standards to protect the blade material and maximize the power output of the generator.

- **Minimising the heat loss through the flue-gas (utilisation of residual heat or district heating)**

  MRP will employ the operation of flue gas heat recovery through the use of a Condensing Economizer vessel. Combustion gases that normally discharged wholesale to the ambient will be used to warm plant condensate and boiler make-up water. Estimated energy saving are calculated to be 1.36 MM Btu per Hr. and 24.54 MM Btu per Hr. which equates to 7.6 MW/hr of thermal energy.

- **Minimising the heat loss through conduction and radiation with insulation**

  All boiler surfaces, duct work, piping and the condenser will be insulated and lagged to minimize heat loss through conduction and radiation.

- **Minimising the internal energy consumption by taking appropriate measures, e.g. scorification of the evaporator, greater efficiency of the feed water pump, etc.)**

  A comprehensive load list of all parasitic loads has been compiled and categorized so MRP engineers can limit the energy consumption of any device possible. In addition, the boiler will be equipped with sootblowers in the Superheater, Generating Bank and Economizer to maintain cleanliness of the heating surfaces of the evaporator.

- **Preheating the boiler feed water with steam**

  MRP condensate is heated with turbine extracted steam in 2 low pressure feedwater heaters. Discharge from the boiler feed water pump is heated by extracted steam in 2 high pressure feedwater heaters.

- **Improved blade geometry of the turbines**

  The turbine vendor selected for the project will design the machine for the maximum work capability with the given inlet steam conditions. This includes special attention to the blade geometry.

- **Fuel drying**
  Woody biomass will be brought into the plant either in chipped or log form at approximately 50% moisture content. The drying facility will reduce the moisture content from ~50% to ~7%. The use of lower moisture content fuel increases the efficiency of boilers in which they are being used. For example, in the case of the Killala Unit 1 boiler, boiler efficiency goes from ~ 68% at ~ 50% moisture content fuel to ~ 83% at ~ 7% moisture content fuel. The fuel that will be dried in the fuel drying facility will be used in Killala Unit 1 and/or will be sold on the open market.

Revised Attachment H

ATTACHMENT No. H

MATERIALS HANDLING

TABLE OF CONTENTS

H.1. Raw Materials, Intermediates and Products Handling

Raw and process materials in use at the Mayo Renewable Power Plant are listed in tables G.1 and G.2 of Attachment No. G. The storage locations of each of these materials are listed in Table H.1 below. Figure H.1(PL2) attached shows storage locations of raw and process materials.

Table H.1 Storage Locations of Materials at the Mayo Renewable Power plant

Material	Storage Location
Wood Chip Biomass	Three storage domes Log storage areas Wet fuel storage area Waste products area
No. 2 Fuel Oil	3 bunded fuel oil tanks (boiler) Bunded fuel oil tank (diesel fire pump) Bunded fuel oil tank (back-up generator)
Ammonia	Ammonia tank
Boiler Treatment Chemicals	Bunded storage container, boiler building
Water Treatment Chemicals	Bunded storage tanks
Greases and Lubricating Oils	Bunded stores in the maintenance shop
Water	Sprinkler Tank Demineralised Water Tank

The fuel handling process flow diagram is shown in Figure D3.16. The boiler feed process flow diagram is shown in Figure D3.17.

Biomass will be bulk delivered to site and tipped into a purpose built concrete reclaimer. When the reclaimer is full the fuel will be tipped onto the ground to the north of the reclaimer. The concrete reclaimer is sized to accommodate a minimum of three tipper trucks each carrying 20m^3. Screw feeders convey the fuel through an extract onto a belt conveyor which conveys the fuel through a discharger onto a tubelator. Fuel intake area is to be controlled by safety system to ensure screw feeders do not operate unless trucks are actively unloading. Fuel will be stored in two domes each with a capacity of approximately 11,000m^3. Fuel transfer will occur via a conveyor from dome 1 to dome 2 with a splitter option at top of each dome. The fuel feed bypass conveyor leads from the top of dome 2 direct to the internal boiler fuel distribution conveyor and onto the boiler feeder bins. An overflow return conveyor is provided to convey fuel from the internal boiler fuel distribution conveyor back into top of dome 2, as required.

Potential emissions from biomass fuel supply system are dust. These will be prevented using covered conveyors to deliver fuel and storage of biomass within enclosed domes.

The fuel processing system is based on the provision of wet biomass fuel. The fuels will be chipped on site to size of approximately 2.5cm and less. Moisture content of wood chip shall be 50% approximately. Wet biomass will be fed through a screener which will include a fines, oversized and product conveyor system as well as a metal detector with discharge chute incorporated within screener. All metals, fines and oversizes will be discharged to bins provided. Approximately 2,495m^3 of wet fuel storage is available to feed in to dryers. The conveyor from the dome reclaimer pit feeds fuel to dryer feeder conveyor system. Wet biomass will be fed into the dryers at a maximum feed rate of 14 tonnes per hour. The overall output capacity from the dryers will be a maximum of 30 tonnes per hour of dry woodchip at 7% moisture with a bulk density of 220kg/m^3.
Dry storage is accommodated in a 33m diameter dome which holds 6,247m^3. Dry storage dome will be top fed by conveyors from the Belt Dryers and emptied by means of a front loader.
No. 2 fuel oil will be delivered to bunded fuel tanks on site using lorries. A double walled underground pipe will deliver fuel oil to the boiler building boundary. From the boiler building boundary it will be transported in an overground pipe to the boiler.

The diesel fire pump will be fuelled using type 2 fuel oil which will be delivered to the 2m^3 bunded tank adjacent to the diesel fire pump by lorry.

The backup generator will include a 2m^3 fuel oil tank which will be filled by gravity from the main boiler fuel oil tanks.

Oils and greases and other engineering materials will be stored in designated secure bunded storage areas on site. Materials are transported throughout the site by forklift on bunded pallets or by oil/ grease truck.

Water treatment chemical are transported to site in tankers or lorries.

Other raw and process materials are stored in designated areas.

All bunds on site will be regularly visually inspected for integrity. Regular integrity testing will be undertaken to ensure containment.

In addition to the materials listed above raw water will be delivered to the site at an average rate of 7.4 l/sec from Lough Conn using abstraction infrastructure operated by Mayo County Council.

By products produced at the Mayo Renewable Power plant are listed in tables G.1 and G.2. The storage locations of each of these materials are listed in tables H.2 below.

Table H.2 Storage Locations of By Products at the Mayo Renewable Power plant

Material	Storage Location
Fly Ash	Boiler Building Silo
Bottom Ash	Boiler Building enclosed skip

Ash will be transported on site on covered conveyors. Fly ash will be collected in the boiler system and transported using enclosed conveyors to the fly ash storage silo. The silo will be an overhead silo from which lorries are loaded prior to removal from site. Bottom ash will be collected from the boiler in an enclosed container and removed from the site for use as described below.

Bottom ash will be re-used as fertiliser on agricultural land and will be managed in accordance with a nutrient management plan and all applicable legislation. Fly ash will be tested prior to removal from site. Where feasible will be re-used as fertiliser on agricultural land in accordance with a nutrient management plan and all applicable legislation. Fly ash containing hazardous substances will be collected by a waste collection permit holder and delivered to an authorised waste facility.

H.2. Wastes Generated and Handled at Mayo Renewable Power

Details of waste recovery/disposal are provided in Tables H.1(i) and H.1(ii). Waste generated at Mayo Renewable Power can be categorised into:

- Non-hazardous waste which includes municipal waste, non-hazardous industrial waste and other wastes
- Hazardous waste as defined in the EC Directive 91/689/EEC.

In general, segregation of waste will take place where practicable. Resultant waste streams will be recovered or disposed of externally, in accordance with all applicable legislation. The quantities of waste disposed of off site will be reported to the EPA in the Annual Environmental Report.

Incoming biomass fuel will be screened prior to being dried. The wood will be screened for fines, metals and oversizes. Fines and oversizes will be reprocessed and reused where possible. Metals will be disposed of with other non-hazardous wastes. Wood wastes will be stored in the vicinity of the wood screen prior to disposal

Waste Material Storage Locations are shown in Figure H.4 (PL2).

Hazardous Waste

Details of the hazardous waste storage areas at Mayo Renewable Power are provided in Table H.*.

Table H.3 Storage of Hazardous Waste at Mayo Renewable Power

EWC Code	Waste	Storage Location
10 01 04*	Biomass Boiler Fly Ash	Fly Ash Silo adjacent to boiler building
16 06 01*	Lead/Acid Batteries	Bunded and secure battery container in stores
16 06 03*/4	Primary batteries	Bunded and secure battery container in stores
20 01 21*	Fluorescent Tubes	Dedicated secure fluorescent tube coffin container in stores
21 01 35*	Monitors	Cages in stores
20 01 35*	Other Electronic Waste	Cages in stores
13 02 08*	Waste oil	Bunded containers in maintenance shop
15 02 02*	Grease	Bunded containers in maintenance shop

- denotes hazardous wastes

Non- Hazardous Waste

Details of the hazardous waste storage areas at Mayo Renewable Power are provided in Table H.7.

Table H.4 Non Hazardous Waste Storage at Mayo Renewable Power

EWC Code	Waste	Storage Location
20 01 36	Non- hazardous electrical waste	Cages in stores area
20 01 40	Metals including wood waste metals	Dedicated skip in maintenance shop and adjacent to wood screen
20 03 01	Mixed Municipal Waste	Wheeled bin storage area
20 03 07	Bulky Waste	Wheeled bin storage area
15 01 06	Mixed Recyclables	Wheeled bin storage area
13 02 04	Lubricant oil	Bunded containers in maintenance shop
10 01 01	Biomass Boiler Ash	Skip adjacent to boiler building
10 01 01	Biomass Fly Ash	Fly Ash Silo adjacent to boiler building
19 12 07	Wood waste products	Located adjacent to wood screen

Waste Control Measures

A control of wastes procedure for Mayo Renewable Power is included in Attachment No. C All wastes generated will be transferred from site in accordance with local and European waste legislation.

H.2.1 Waste Licence/Permit Holders

Waste arising on site will be collected by authorised waste collection permit holders and delivered to authorised facilities holding a waste facility permit or a waste licence.

The waste collection permit numbers of the collection contractor and the licence or permit number for the ultimate destination will be provided to the Agency in the Annual Environmental Report. Waste collection permits will be reviewed every 2 years in accordance with EPA requirements.

IPPC Licence Application Tables

H.1(i)

H.1(ii)

TABLE H.1(i): WASTE - Hazardous Waste Recovery/Disposal

Waste material	EWC Code	Main source[1]	Quantity		On-site Recovery/Disposal (Method & Location)	Off-site Recovery, reuse or recycling (Method, Location & Undertaker)	Off-site Disposal (Method, Location & Undertaker)
			Tonnes / month	m^3 / month			
Biomass Boiler Fly Ash	10 01 04	Biomass boiler	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	N/A	Disposal to landfill
Lead/Acid Batteries	16 06 01*	Control Room/ maintenance shop	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Primary batteries	16 06 03*/4	Control Room/ maintenance shop	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Fluorescent Tubes	20 01 21*	Control room/ maintenance shop	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Monitors	21 01 35*	Control room	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Other	20 01 35*	Control room/	Not	Not possible	N/A	Recycling at a	N/A

Waste material	EWC Code	Main source[1]	Quantity		On-site Recovery/Disposal (Method & Location)	Off-site Recovery, reuse or recycling (Method, Location & Undertaker)	Off-site Disposal (Method, Location & Undertaker)
			Tonnes / month	m^3 / month			
Electronic Waste		maintenance shop	possible to estimate at this stage	to estimate at this stage		waste facility holding a waste permit/ licence	
Waste oil	13 02 08*	Maintenance shop	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Grease	15 02 02*	Maintenance shop	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A

[1] A reference should be made to the main activity / process for each waste.

TABLE H.1(ii) WASTE - Other Waste Recovery/Disposal

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2] (Method & Location)	Off-site Recovery, reuse or recycling (Method, Location & Undertaker)	Off-site Disposal (Method, Location & Undertaker)
			Tonnes / month	m^3 / month			
Non-hazardous electrical waste	20 01 36	Control room /maintenance Shop	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Wood	17 02 01	Pallets	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Metals	20 01 40	Maintenance Shop and wood screen	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A
Mixed Municipal Waste	20 03 01	Site wide	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	Disposal at a waste facility holding a waste permit/ licence
Bulky Waste	20 03 07	Site wide	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	Disposal at a waste facility holding a waste permit/ licence
Mixed Recyclables	15 01 06	Site wide	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2] (Method & Location)	Off-site Recovery, reuse or recycling (Method, Location & Undertaker)	Off-site Disposal (Method, Location & Undertaker)
			Tonnes / month	m^3 / month			
Lubricant oil	13 02 04	Maintenance Shop	1	1	N/A	Waste oil recycling	N/A
Biomass Boiler ash and fly ash	10 01 01	Biomass Boiler	350	350	N/A	Reuse by spreading on land as fertiliser	
Wood waste	19 12 07	Wood screen	Not possible to estimate at this stage	Not possible to estimate at this stage	N/A	Recycling at a waste facility holding a waste permit/ licence	N/A

1 A reference should be made to the main activity/ process for each waste
2 The method of disposal or recovery should be clearly described and referenced to Attachment H.1

A3

IPPC Site Boundary

Site:
E=120594
N=327865

N

Log storage area

Notes:

1. All coordinates relative to Irish national grid.

Legend:

1. Domes Storage
2. Log Storage Area
3. Wet Fuel Storage Area
4. Water Storage
5. Fire Water Storage
6. Ammonia tank
7. Bunded Fuel Oil Tank (Generator)
8. Bunded Fuel Oil Tank (Fire Pump)
9. Water Treatment Chemicals
10. Grease And Lubricating Oils
11. Boiler Treatment Chemicals
12. Woodchip Biomass Metering Bins

0 10 20 40 100 Metres

Scale 1:2000

Issue	Date	By	Chkd	Appd

ARUP

Arup, 50 Ringsend Road
Dublin 2
Tel +353(0)1 233 4455 Fax +353(0)1 668 3169
www.arup.ie

Client

Mayo Renewable Power Ltd.
Killala
Co. Mayo

Renewable Power Mayo

Job Title

IPPC Licence Application

Drawing Title

Figure: H1
Raw and Process Materials and By-Product Storage on Site

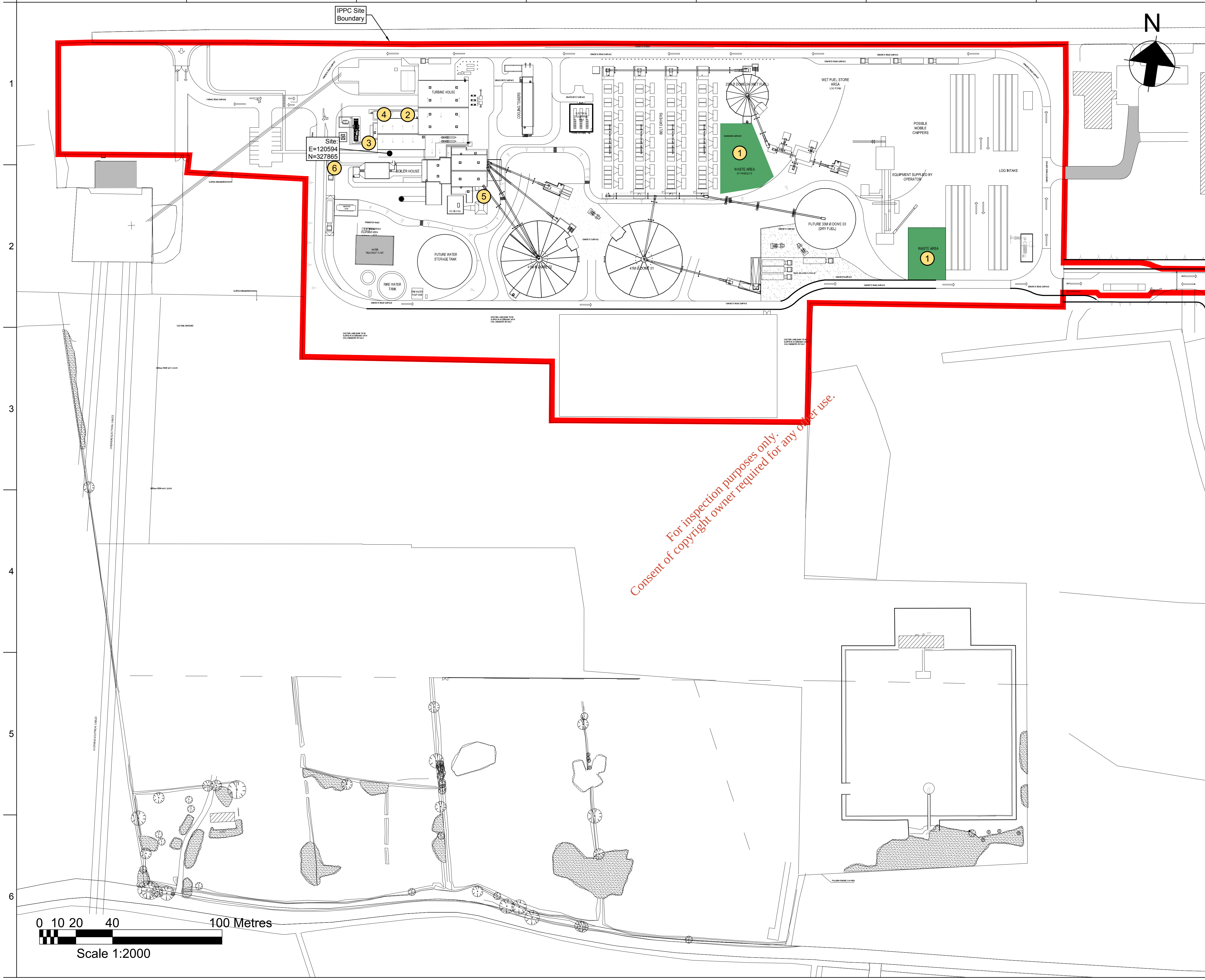
Scale at A3	Date
1:1,000	January 2013

Discipline: Environmental

Drawing Status: **Planning**

Job No	Drawing No	Issue
224582-00	**000**	**PL2**

J:\224000\224582-0004. Internal Project Data\4-02 Drawings\4-02-6 Environmental\IPPC\H-01-___Raw Materials Storage.dwg 30 Jan 2013 10:50:26



Notes:

1. All coordinates relative to Irish national grid.

Legend:

1. Waste Products Area
2. Batteries, Fluorescent Tubes and Electronic Waste
3. Wheeled Bin Storage Area
4. Waste Oils, Lubricant Oils, Grease and Metal Waste
5. Bottom Ash Dumpster
6. Fly Ash Silo

Issue	Date	By	Chkd	Appd

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Co. Mayo

Renewable Power Mayo

Job Title

IPPC Licence Application

Drawing Title

Figure: H4
Waste Storage on Site

Scale at A3: 1:1,000
Date: January 2013
Discipline: Environmental
Drawing Status: **Planning**
Job No: **224582-00**
Drawing No: **000**
Issue: **PL2**

J:\224000\224582-00\4. Internal Project Data\4-02 Drawings\4-02-6 Environmental\IPPC\H-04___Waste Storage.dwg 29 Jan 2013 21:26:41

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Revised Attachment I

ATTACHMENT No. I

EXISTING ENVIRONMENT AND IMPACT OF THE ACTIVITY

TABLE OF CONTENTS

I.1. Assessment of Atmospheric Emissions

I.1.1 Introduction

An air dispersion modelling study of emissions from the proposed boiler was carried out. Modelling results are compared with the air quality standards for pollutant concentrations in ambient air.

The concentrations predicted by modelling are assessed in the context of the receiving environment, represented by the existing ambient 'background' concentrations.

The relevant pollutants considered in the study were nitrogen oxides (NO_x), particulate matter (PM_{10} and $PM_{2.5}$) and sulphur oxides.

I.1.2 Air Dispersion Modelling

The United States Environmental Protection Agency (USEPA) approved air dispersion model *AERMOD* was used to model emissions of NO_X, PM_{10}, $PM_{2.5}$ and SO_x from the proposed stack. Emission data and source characteristics were supplied by Mayo Power Limited. Emission source data for the proposed boiler includes the temperature, efflux velocity, height of discharge and emission rate. Pollutant concentrations are based on emission limit values (ELVs) outlined in the Industrial Emissions Directive (IED) for plants that start to operate after 7 January 2014. The limits have been adjusted to reflect the use of 4% fuel oil and 96% biomass as outlined in Section 40 of the IED to come up with weighted ELVs, as advised by the EPA.

The highest predicted 99.79th percentile of 1-hour average GLCs for NO_2 is 11.2µg/m³, this is less than the AQS of 200 µg/m³. The annual average NO_2 GLC predicted is 0.3µg/m^3. This complies with the air quality standard of 40µg/m^3 for the protection of human health. The predicted value for NO_X is 1.2µg/m³. This complies with the air quality standard of 30µg/m^3 for the protection of vegetation.

The highest predicted 98.08th percentile of 24-hour average GLCs for PM_{10} is 0.8µg/m, this is less than the AQS of 50 µg/m³. The maximum predicted annual concentration of PM_{10} is 0.11µg/m³; this is well within the air quality standard of 40µg/m³.

The maximum predicted annual concentration of $PM_{2.5}$ is 0.07µg/m³; this is well within the concentration cap of 25µg/m³.

The maximum predicted annual concentration of SO_2 is 1.2µg/m³; this is well within the limit of 20µg/m³.

The highest predicted 99.73rd percentile of 1-hour average GLCs for SO_2 is 30µg/m³, this is significantly less than the AQS of 350 µg/m³. The highest predicted 99.18th percentile of 24-hour average GLCs for SO_2 is 14µg/m, this is less than the AQS of 125 µg/m³.

The highest annual GLC of NO_2 for both Mayo Renewable Power Facility and the adjacent Endessa Power Plant show continued compliance with the air quality standards.

The emissions modelled include for the provision of an SCR to reduce the nitrogen dioxide emissions from the stack and the provision of an electro-static precipitator for the reduction of particulate emissions. As the results of the air dispersion modelling are easily in compliance with air quality standards, no further mitigation measures are required.

I.1.3 Greenhouse Gas Emissions

Mayo Power Limited is applying for a greenhouse gas permit for a biomass fuelled combined heat and power station at Tawnaghmore Upper and Tawnaghmore Lower, Killala, Ballina, Co. Mayo.
The new suite of EC Guidance Documents for Phase III reiterate that 'the emission factor of biomass is zero. Thus, no allowances for emissions stemming from biomass have to be surrendered, and the associated costs are avoided.' [Biomass Issues in the EU ETS, MRR Guidance Document No.3 Final Version of 17 October 2012, p6]

Carbon dioxide will arise from the combustion of fuel oil and biomass material. Emissions will be monitored by using a calculation based methodology.
For biomass

- Moisture content will be measured on the conveyor delivering biomass to the power plant eg. using an infra red sensor, which will be used (along with the % ash content) to determine the carbon mass in the biomass fuel. Weight of incoming biomass will also be recorded. This data will be used to calculate the CO2 emissions.

For fuel oil

- Oil meters on the fuel oil burners of the boiler

For both biomass and fuel oil

- Indirectly via Superheated Steam meters on the outlet of the boiler.

The diesel fuel oil meter will be volume corrected to standard temperature and pressure conditions to account for seasonal changes in the temperature of the diesel fuel oil. The moisture content will be tested on each delivery as indicated above, and analysis of the ash content of the fuel is performed on an annual basis or every 20,000MWh, whichever is shorter.

The diesel fuel oil quality data will be used from the National Inventory. The calculation of CO2 emissions based on these values will follow MRR 2012,. Mayo Renewable Power will be allocated a GHG emission limit as a new entrant in the Third Trading Period of EU ETS (2013-20). New installations include installations permitted and starting their normal operation after 30 June 2011.

I.1.4 Atmospheric Emissions Overall Summary

Predicted concentrations show easy compliance with all air quality standards based on maximum emissions from the boiler stack based on the Industrial Emissions Directive.

I.2. Assessment of Impact on Receiving Surface water

Water will not be discharged directly from the Mayo Renewable Power Ltd facility to surface water.

I.3. Assessment of Impact of Discharge to Sewer

Surface water, treated process effluent and treated sewage effluent will be discharged to sewers in the charge of Mayo County Council.

No further treatment of the emissions will be undertaken by Mayo County Council. However, Mayo County Council proposes to construct a municipal sewage treatment plant to serve Killala. When this plant has been completed, Mayo Renewable Power may seek the Agency's permission to discharge the untreated sewage from the site to this plant and discontinue the use of the on-site sewage treatment plant.

The emissions are not likely to have any impact on sewer maintenance operations.

Currently a 1m x 0.6m open concrete surface channel serves the site. The channel extends approximately 190m from the site boundary to an existing sedimentation chamber which is drained by an underground pipe. The open channel will be replaced by a 1500 diameter concrete pipe.

The emissions are not likely to have any impact on sewer integrity.

The emissions are not likely to react with other effluent in the sewer system.

The Mayo County Council sewer ultimately discharges to Killala Bay. Killala Bay is a sea inlet. Dry Weather Flow is not a relevant parameter for a sea inlet. As the emission comprises surface water, treated sewage and neutralised process water, with some elevated TDS, the emission is not likely to have a negative impact on the receiving seawater.

The emission is not likely to have a negative impact on any other environmental media.

I.4. Assessment of Impact of Emissions to Ground/Groundwater

There are no emissions to ground or groundwater due to the activity. Table I.4 (i) and Table I.4 (ii) are not applicable.

I.5. Ground and/ or Groundwater Contamination

The Mayo Renewable Power facility is located on the former Ashai Synthetic Fibres company site. A description of site history is included in Section D. Environmental testing was undertaken at the site in 2006. These results are included in this attachment. The red line boundary on Figure I.1 (PL2) shows tests which took place inside the boundary of the Mayo Renewable Power Ltd IPPC Boundary.

Based on the test results historical activities on the site are not considered to pose significant environmental risks. The attached results will be taken into consideration in demolition, excavation and construction works on the site. Demolition, excavation and construction will take place in accordance with all relevant legislation and best practice.

I.6. Assessment of the Environmental Impact of On-site Waste Recovery and/or Disposal

There will be no on site waste recovery or disposal.

I.7. Noise Impact

I.7.1 Ambient Noise Levels

A baseline noise survey was carried out in September 2011. The locations used for the noise survey are shown in Figure 1 of the attached Revised Noise Impact Assessment Report. These locations are also proposed for future noise monitoring at the facility.

The survey was carried out at three locations and the night-time and day-time levels recorded are outlined respectively in Table I.7.1 and Table I.7.2 below. The main sources of noise are also outlined. There was no evidence of any tonal noise during the noise survey.

Full details of the noise survey are included in the Revised Noise Impact Assessment Report attached in **Addendum I.7**.

Table I.7.1: Noise-time Noise Monitoring Results (15-minute durations)

Location	Start Time	L_{Aeq}	L_{A10}	L_{A90}	Noise Sources
N1	06:30	38.9	41.7	34.7	- Constant hum from the Endessa plant audible in distance - Intermittent traffic on Ballina to Killala Road audible in distance
N2	07:05	55.4	44.7	34.2	- Intermittent traffic on local road to Mullafarry including 2 No. HGV's and 1 No. Car - Constant birdsong
N3	07:36	46.3	49.4	38.5	- Intermittent traffic on local road to Mullafarry including 2 No. HGV's and 1 No. Tractor and cars (number not identifiable at this distance) - Constant birdsong including crows flying overhead and cawing intermittently during the monitoring period

Table I.7.2: Day-time Noise Monitoring Results (30-minute durations)

Location	Start Time	L_{Aeq}	L_{A10}	L_{A90}	Noise Sources
N1	09:51	49.0	48.8	38.4	- Constant activity within the waste management facility located in close proximity to the monitoring location including reversing noises and waste handling equipment - Intermittent HGV's arriving and departing Schutz facility (2 No. movements) - Intermittent vehicle movements within the former Asahi site (2 No. cars during the operating period).
N2	08:50	57.0	49.4	35.0	- Intermittent traffic on local road to Mullafarry including 6 No. Cars and 4 No. HGV's - Cattle looing in field adjacent to monitoring location at beginning of monitoring period - Intermittent dog barking to rear of residence - Constant birdsong
N3	08:09	44.1	47.6	35.7	- Intermittent traffic on local road to Mullafarry including 2 No. HGV's, 2 No. Tractors and a

					number of cars (number not identifiable at this distance). - Constant birdsong

The results indicate that the area in the vicinity of the proposed development, particularly at locations N2 and N3 are typical of a rural environment. There are impacts as a result of traffic on the local Mullafarry Road, specifically from HGV's, which are likely travelling to and from the local Mullafarry Quarry.

Noise levels recorded at monitoring location N1, which is located along the northern site boundary, can be characterised as being more industrial in nature given the proximity of a waste facility and the Schutz facility. Traffic accessing these facilities and the equipment used at the waste facility are the dominant sources of day-noise at this location. This is reflected in the slightly higher background noise level (L_{90}) when compared with N2 and N3.

I.7.2 Noise Impact Assessment

The main sources of noise from the proposed facility are described in Table E.5(i) in Attachment No. E and depicted in Figure E.2.

Noise levels for the proposed facility were predicted for daytime, evening time and night-time operating conditions. Noise sources were modelled as continuous or intermittent, refer to Attachment E. The boiler and turbine were modelled as enclosed noise sources within the buildings. The predicted noise levels and impacts are discussed in the aforementioned Noise Impact Assessment Report included in this attachment.

In summary, the assessment showed that the projected noise levels, arising from the operation of the proposed facility, at the sensitive receptors are substantially below the EPA daytime, evening time and night-time noise limits of 55 dB(A), 50dB(A) and 45 dB(A) respectively. Consequently, it is not considered that the operation of the proposed facility will have a significant effect on the existing ambient noise level.

I.8. Environmental Considerations and BAT

I.8.1 General

The following documents were considered in the assessment of BAT at the Mayo Renewable Power plant as follows:

- Council Directive 96/61/EC concerning integrated pollution prevention and control
- Directive 2010/75/EC on industrial emissions (integrated pollution prevention and control)
- EPA (2008). BAT Guidance Note on Best Available Techniques for the Energy Sector (Large Combustion Plant Sector) (1st Edition)
- European Commission (2006) Integrated Pollution Prevention and Control Reference Document on Best Available Techniques for Large Combustion Plants July 2006 (also known as the LCP BREF).

MRP will invest in BAT based technologies for the proposed Renewable Power Plant as set out in the sections below.

I.8.2 BAT for unloading, storage and handling of biomass and additives

The following measures will be implemented at Mayo Renewable Power which are considered BAT for unloading, storage and handling of biomass, peat and additives:

- Loading and unloading equipment will be used that minimises the height of the fuel drop to the stockpile, to reduce the generation of fugitive dust.
- Transfer conveyors will be placed in safe, open areas above ground so that damage from vehicles and other equipment can be prevented using cleaning devices for conveyor belts to minimise the generation of fugitive dust.
- Conveyors will be enclosed and fitted with well designed, robust extraction and filtration equipment on conveyor transfer points, to prevent dust emissions.
- Transport systems will be rationalised to minimise the generation and transport of dust within the site using good design and construction practices and adequate maintenance.
- Quality checks will be carried out on incoming biomass and related data will be stored on a central computer system for stable combustion.
- Biomass storage areas will be regularly surveyed to detect fires caused by self ignition and to identify risk points for fire prevention.

Where fuel is delivered to power plants in loads BAT requires the type of contamination in each load and analytical knowledge of the type of contamination be obtained. A number of controls will be put in place to ensure quality of the incoming fuel to the plant. Biofuel will be purchased from a facility supplier to an agreed specification. Fuel will consist of wood chips of mesquite, spruce and willow forestry wood, therefore the likely of contamination in the incoming stream is low. Quality of fuel incoming to Mayo Renewable Power will be checked for moisture content along the conveyor. Periodic grab samples will be taken from the conveyor and appropriate parameters tested to ensure biofuel meets the required specification.

While use of a water cooled Stoker Grate Boiler is not listed in the BAT conclusion for Biomass, it is considered to be BAT because it is the only available technology to burn biomass at 11% moisture content. Neither a Bubbling Bed (BB) nor Circulating Fluidized Bed (CFB) boiler systems can be used to burn wood at such a low moisture content fuel. The 11% moisture content fuel is outside the range of control for a BB or CFB boiler. Therefore, the Stoker Grate boiler technology being used is considered BAT for this project application.A PLC based computer control system will be used to control all parameters of combustion, such as fuel flow, distribution air flow, overfire air flow, etc. at Mayo Renewable Power to achieve a high boiler performance with ideal combustion conditions that support the reduction of air emissions. This is also considered to be BAT.

I.8.3 BAT for Thermal Efficiency

The Mayo Renewable Power Plant will be a co-generation heat and power (CHP) plant which is BAT for biomass. The plant will achieve 83% boiler efficiency.

The exergetic efficiency associated with the operation of the Mayo Renewable Power Plant under BAT conditions is 26%. The fuel efficiency of the plant is 83% which is within the 75-90% range which is considered BAT.

The following measures are used at Mayo Renewable Power Ltd to increase the efficiency:

- combustion: minimising the heat loss due to unburned gases and elements in solid wastes and residues from combustion

  Upon commissioning and start-up, the plant will be performance tested including measurement for excess CO in combustion gases to confirm the boiler's ability to completely combust all the fuel. The boiler will be optimized to do so before turnover to

MRP operations. As part of the design, the Continuous Emissions Monitoring (CEMs) equipment will constantly monitor CO, to provide MRP feedback on the conditions of combustion so that excursions will be known and actions can be taken to correct same. This is BAT for combustion control.

- the highest possible pressure drop in the low pressure end of the steam turbine through the lowest possible temperature of the cooling water (fresh water cooling)

  MRP is employing the highest pressure drop across the steam turbine as allowed by the turbine vendor to maintain moisture content in back end of the turbine below industry standards to protect the blade material and maximize the power output of the generator.

- minimising the heat loss through the flue-gas (utilisation of residual heat or district heating)

  MRP will employ the operation of flue gas heat recovery through the use of a Secondary Economizer vessel. Combustion gases that are normally discharged wholesale to the ambient will be used to warm plant condensate and boiler make-up water. Estimated energy saving are calculated to be 0.5 MM Btu per Hr. and 9.8 MM Btu per Hr. which equates to 10.3 MW/hr of thermal energy.

- minimising the heat loss through conduction and radiation with isolation
  All boiler surfaces, duct work, piping and the condenser will be insulated and lagged to minimize heat loss through conduction and radiation.

- minimising the internal energy consumption by taking appropriate measures, e.g. scorification of the evaporator, greater efficiency of the feed water pump, etc.)

  A comprehensive load list of all parasitic loads has been compiled and categorized so MRP engineers can limit the energy consumption of any device possible. In addition, the boiler will be equipped with sootblowers in the Superheater, Generating Bank and Economizer to maintain cleanliness of the heating surfaces of the evaporator.

- preheating the boiler feed water with steam

  MRP condensate is heated with turbine extracted steam in 2 low pressure feedwater heaters. Discharge from the boiler feed water pump is heated by extracted steam in 2 high pressure feedwater heaters.

- Improved blade geometry of the turbines

  The turbine vendor selected for the project will design the machine for the maximum work capability with the given inlet steam conditions. This includes special attention to the blade geometry.

The electrical efficiency of the plant is 36.9%.

I.8.4 BAT for Air Emissions

The Industrial Emissions Directive (Directive 2010/75/EC on industrial emissions (integrated pollution prevention and control) entered into force on 6 January 2011. It will bring about some changes to regulation of IPPC licensed facilities and includes emission limit values which are relevant to Mayo Renewable Power Ltd. A review of the LCP BREF has commenced at EU level which should take into account these changes. This review has not been completed at the time of making this application. To this end in pre-application consultation with the EPA it was agreed that both the Industrial Emissions Directive and the LDP BREF should be taken into account in determining BAT for air emission limits at MRP. Emission limit values recommended in both documents are reviewed and the lower of the two limits will be achieved at the Mayo Renewable Power plant.

The Industrial Emissions Directive will be transposed into Irish national legislation before 7 January 2013. Articles 3(2) and 40(1) set out emission limit values for IPPC licensed facilities which lodge a complete IPPC licence application before 7 January 2013, are put into operation before 7 January 2014 and which use a combination of fuels.

Annex V Part 1of the Industrial Emissions Directive sets out emission limit values which apply to air emissions for biomass and liquid fuels.

The emission limits which will apply at the Mayo Renewable Power Ltd facility where 4% fuel oil and 96% biomass will be used as fuel are set out in Table I.8.1 below. Weighted emission limit values were calculated as required by the Industrial Emissions Directive. Where emission limit values were lower in the LCP BREF for a particular parameter these were adopted as shown in the table.

Table I.8.1 BAT for Air Emissions at Mayo Renewable Power plant.

Parameter	Emission Limit Value	Reference
NO_x	198mg/Nm^3	Industrial Emissions Directive
SO_2	202mg/Nm^3	Industrial Emissions Directive
Dust	20 mg/Nm^3	LCP BREF

An electrostatic precipitator (ESP) will be used for dedusting off gases at the Mayo Renewable Power plant. A cyclone dust collector will be used as a pre-cleaning stage in the flue gas path. This combination was chosen for this project because of its lower operating, maintenance and capital costs. A bag house could have been used, but a bag house would have caused an additional 10" of backpressure which would have translated into an additional 580 hp of parasitic load. The performance capability of the cyclone dust collector and ESP for the fuels being burned on this project will ensure that the dust emission parameters are met throughout the operating range of the plant. In combination these are considered BAT for dust.

Wood biomass contains almost no sulphur therefore no desulphurisation is required. 4% fuel oil will be combusted at the facility however the sulphur emissions associated with this are minimal and will not require desulphurisation to comply with the emission limits values set out above.

An SCR will be used for reduction of nitrogen oxides at Mayo Renewable Power to achieve emission limit values set out in Table I.8 above. This is considered BAT.

Good furnace design, the use of high performance monitoring and process control equipment and process control techniques and maintenance of the combustion system in order to achieve complete combustion will be implemented at Mayo Power. In addition the SNCR will be optimised. These measures are BAT for reduction of carbon monoxide emissions.

Hydrogen fluoride and hydrogen chloride emissions will be minimal and will not exceed the BAT associated emission limit of 25mg/Nm^3.

Ammonia slip (release of unreacted ammonia into the air) will not exceed the BAT associated emission limit of 5mg/Nm^3.

I.8.5 BAT for Water Emissions

The organic scavenger regeneration discharge stream will be neutralised. Oil/water separators will be provided on the surface water drainage system. These are considered BAT.

I.8.7 BAT for Combustion Residues

Ash from the Mayo Renewable Power Ltd will be reused where feasible and subject to testing. It is proposed to sell bottom ash for use in fertiliser in line with normal practice at biomass plants across Europe. Fly ash will be tested for suitability for use as a fertiliser additive and re-used where feasible. Nutrient management plans will be prepared for lands on which ash will be spread. The re-use of ash as fertiliser will be undertaken in accordance with all relevant legislation. Reuse of combustion residues is considered BAT.

I.8.8 BAT for Environmental Management Tools

An Environmental Management System which complies with EN ISO 14001 and Section 3.15 of the LCP BREF will be put in place at Mayo Renewable Power. This is considered BAT.

IPPC Licence Application Tables

I.7(i)

Table I.7(i) (Part 1): AMBIENT NIGHT-TIME NOISE ASSESSMENT

Third Octave analysis for noise emissions should be used to determine tonal noises

	National Grid Reference	Sound Pressure Levels		
	(6N, 6E)	$L(A)_{eq}$	$L(A)_{10}$	$L(A)_{90}$
1. SITE BOUNDARY				
Location 1:	327987, 120889	38.9	41.7	34.7
Location 2:	327460, 120906	55.4	44.7	34.2
Location 3:	327516, 120500	46.3	49.4	38.5
Location 4:				
2. NOISE SENSITIVE LOCATIONS				
Location 1:				
Location 2:				
Location 3:				
Location 4:				

NOTE: All locations should be identified on accompanying drawings.

Table I.7(i) (Part 2): AMBIENT DAY-TIME NOISE ASSESSMENT

Third Octave analysis for noise emissions should be used to determine tonal noises

	National Grid Reference	Sound Pressure Levels		
	(6N, 6E)	$L(A)_{eq}$	$L(A)_{10}$	$L(A)_{90}$
2. SITE BOUNDARY				
Location 1:		49.0	48.8	38.4
Location 2:		57.0	49.4	35.0
Location 3:		44.1	47.6	35.7
Location 4:				
3. NOISE SENSITIVE LOCATIONS				
Location 1:				
Location 2:				
Location 3:				
Location 4:				

NOTE: All locations should be identified on accompanying drawings.

Notes:
1. All coordinates relative to Irish national grid.

Issue	Date	By	Chkd	Appd

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Client
Mayo Renewable Power Ltd.
Killala
Co. Mayo
Renewable Power Mayo

Job Title
IPPC Licence Application

Drawing Title
Figure: I1
Site Layout
Soil and Groundwater Test Locations

Scale at A3: 1:2,500	Date: January 2013
Discipline: Environmental	
Drawing Status: **Planning**	
Job No: **224582-00**	Drawing No: **000**	Issue: **PL2**

Do not scale

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Addendum I

Revised Air Dispersion Modelling Report

Revised Noise Impact Assessment Report

Mayo Renewable Power

IPPC Licence Application

Revised Air Dispersion Modelling Study

REP1

| 28 January 2013

Job number 224582-00

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Contents

1 Introduction

This study is a revised assessment of the likely air quality impact of the proposed Mayo Renewable Power facility at Killala, County Mayo. The assessment has been revised due to changes to the proposed site layout and Industrial Emissions Directive emission limit values.

The relevant pollutants considered in this study are nitrogen oxides (NO_x), particulate matter (PM_{10} and $PM_{2.5}$) and sulphur oxides.

An air dispersion modelling study of emissions from the proposed boiler was carried out. Modelling results are compared with the air quality standards for pollutant concentrations in ambient air.

The concentrations predicted by modelling are assessed in the context of the receiving environment, represented by the existing ambient 'background' concentrations.

2 Methodology

2.1 Air Quality Standards

In order to reduce the risk of poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values are set for the protection of human health and ecosystems.

On April 12th 2011 the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) came into force and transposed EU Directive 2008/50/EC into Irish law. The 2011 regulations revoke the Air Quality standards Regulations of 2002 (S.I. No. 271 of 2002), The Environmental Protection Agency Act, 1992 (Ambient Air Quality Assessment and Management) Regulations, 1999 (S.I. No. 33 of 1999) and the Ozone in Ambient Air Regulations, 2004 (S.I. No. 53 of 2004).

The purpose of the 2011 regulations is to establish limit values and alert thresholds for concentrations of certain pollutants, to provide for the assessment of certain pollutants using methods and criteria common to other European Member States, to ensure that adequate information on certain pollutant concentrations is obtained and made publically available and to provide for the maintenance and improvement of ambient air quality where necessary.

The regulations establish a target value to be obtained in 2010 as well as limit values for concentrations of $PM_{2.5}$. In addition, the regulations provide for a review in 2013 of the proposed limit value for $PM_{2.5}$.

The limit values established under these regulations are included in Table 1 below.

Table 1 Air Quality Standards (AQS) from AQS Regulations 2011 (S.I. No. 180 of 2011)

Pollutant	Limit value for the protection of:	Averaging period	Limit value ($\mu g/m^3$)	Basis of application of limit value	Limit value attainment date
NO_2	Human Health	1-hour	200	≤18 exceedances p.a. (99.79 %ile)	1 January 2010
		Calendar year	40	Annual mean	1 January 2010
NO_x	Vegetation	Calendar year	30	Annual mean	1 January 2010
PM_{10}	Human Health	24-hours	50	≤35 exceedances p.a. (98.1%ile)	1 January 2005
		Calendar year	40	Annual mean	1 January 2005
$PM_{2.5}$	Human Health	Calendar year	25[1]	Annual mean	1 January 2015
		Calendar year	20[2]	Annual mean	1 January 2020
SO_2	Human Health	1-hour	350	≤24 exceedances p.a. (99.73%ile)	1 January 2005
	Human Health	24-hours	125	≤3 exceedances p.a. (99.18%ile)	1 January 2005
	Vegetation	Calendar year	20	Annual mean	1 January 2005

[1] Target value

[2] Limit value to be reviewed by the Commission in 2013 in light of further information on health and environmental effects, technical feasibility and experience of the Target Value in Member states.

2.2 Modelling Methodology

The air dispersion modelling assessment was completed in accordance with the Environmental Protection Agency (EPA) Guidance (*Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)*). The guidance provides a recommended approach for all elements of air dispersion modelling.

The USEPA approved Breeze AERMOD (Version 7.5.0.25) computer package was used to predict the effect of the proposed CHP Plant on ambient air quality. The model predicts ground level concentrations (GLCs) of NO_2 and CO at receptors in the vicinity of the proposed development. The pollutant concentrations are affected by a number of factors which include *inter alia*:

- Emission data.
- Meteorological data,
- The proximity and elevation of the receptors.
- The wake effect from buildings and other structures.
- Conversion of NO_x to NO_2

The only proposed major emission points on site are a boiler stack and a dryer stack. Air dispersion modelling for the do-something scenario was carried out to assess the impact of the proposed scheme on ambient air quality in the vicinity of the site. The do-minimum scenario is represented by the EPA background concentrations (refer to Section 2.3).

2.2.1 Emission Sources used for *AERMOD* Modelling

Emission data and source characteristics were supplied by Mayo Power Limited. Emission source data for the proposed boiler includes the temperature, efflux velocity, height of discharge and emission rate, as outlined in Table 2 below. Pollutant concentrations are based on emission limit values (ELVs) outlined in the Industrial Emissions Directive (IED) for plants that start to operate after 7 January 2014. The limits have been adjusted to reflect the use of 4% fuel oil and 96% biomass as outlined in Section 40 of the IED to come up with weighted ELVs, as advised by the EPA.

Table 2 Source Emission Data

Parameter	Value
Easting	120,604
Northing	327,841
Height (m)	66.3
Diameter (m)	2.134
Volumetric flow rate (Nm^3/s)	61
Actual Velocity (m/s)	20.3
Temp (°C)	52
NO_X concentration (mg/Nm^3)	198
NO_X emission rate (g/s)	12.1
SO_X concentration (mg/Nm^3)	202
SO_X emission rate (g/s)	12.3
PM_{10} concentration (mg/Nm^3)	20
PM_{10} emission rate (g/s)	1.2

2.2.2 Meteorological Data

Data from 2001 to 2005 recorded by the Met Éireann station at Ballina was used. This data was adjusted for the land usage surrounding the site using the tool *AERMET*. The land usage in the vicinity of the proposed Mayo Power facility was inputted as cultivated land for all directions. The meteorological data includes hourly values of wind speed, wind direction, atmospheric stability, ambient temperature and mixing heights.

2.2.3 Receptors

For this modelling situation, three nested cartesian receptor grids were used. The first grid extends for 500 m in each direction from the facility, with receptors at 25

metre intervals. The second grid extends for 1 km in each direction from the facility, with receptors at 100 m intervals. The third grid extends for 5km in each direction from the facility, with receptors at 1 km intervals. Ground level concentrations are predicted at each receptor location. These receptors do not represent individual residences but would be representative of potential worst-case receptors. On-site receptors were excluded from the model.

Terrain elevations were taken from Ordnance Survey maps.

2.2.4 Building Wake Effect

Building data comprised the length, width and height of each section or tier. This data was complied for each building. A software utility called *BPIP* was used, in conjunction with the location and height of emission sources, to calculate direction-specific building downwash factors from the building data. The dimensions, roof heights and location of the buildings were taken from site plans.

2.2.5 Conversion of NO_x to NO_2

The EPA Guidance AG4 advises that detailed modelling of NO_2/NO_X chemistry should use the Plume Volume Molar Ratio Method (PVMRM) in AERMOD. The PVMRM uses both plume size and ozone (O_3) concentration to derive the amount of O_3 available for the reaction between NO and O_3. NO_X moles are determined by emission rate and travel time through the plume segment. The number of O_3 moles is determined by the size of the plume segment and the measured background ambient O_3 concentration. For a given NO_X emission rate and ambient ozone concentration, the NO_2/NO_X conversion ratio is primarily controlled by the volume of the plume. This method has been shown to give better agreement with monitoring data.

For the PVMRM calculation, the following assumptions are made:

- Background ozone is 55.8µg/m_3 (average of Zone D monitoring from EPA long term data)
- NO_2/NO_X equilibrium ratio = 0.90
- NO_2/NO_X in-stack ratio = 0.10

2.3 Existing Environment

The site of the proposed Mayo Power facility is located in Tawnaghmore, approximately 2.3 km from Killala and 10 km from Ballina, Co Mayo. The land usage in the area is primarily agricultural except in the immediate vicinity of the proposed development which is industrial.

The Environmental Protection Agency (EPA) designates four air quality zones for Ireland, which are as follows:

- Zone A (Greater Dublin);
- Zone B (Cork City and its environs);
- Zone C (16 urban areas with population greater than 15,000); and

- Zone D (Areas not in Zones A, B and C).

The proposed development site is predominantly rural in character and is therefore designated as Zone D.
Concentrations of pollutants recorded in Zone D as outlined in the EPA document "Air Quality in Ireland 2011, Key Indicators of Ambient Air Quality [9]"were used to represent typical background levels. Average concentrations of NO_2, PM_{10} and SO_2 recorded in Zone D are outlined in Table 3 below.

Table 3 EPA Monitored Background Pollutant Concentrations (µg/m³)

Year	Nitrogen Dioxide Annual average (µg/m³)	Nitrogen Oxides Annual average (µg/m³)	PM_{10} Annual average (µg/m³)	$PM_{2.5}$ Annual average (µg/m³)	Sulphur Dioxide Annual average (µg/m³)
2010	6.5	9.8	11.5	7.5	2.3
Air Quality Standard	40	30[1]	40	25/20[2]	20 [1]

1 Limit for the protection of vegetation

2 2015/2020 limits

3 Air Quality Impact Assessment

3.1 Emissions from Mayo Renewable Power

Predicted ground level concentrations of NO_2, NO_x, PM_{10}, $PM_{2.5}$ and SO_2 from the boiler source are compared with the relevant limit values and are presented in Table 4.

Table 4 Predicted Ground Level Concentrations Resulting from Boiler Emissions and Comparison with Limit Values (excluding background concentrations)

Parameter	Air Quality Standard (µg/m³)	Highest Predicted Value (µg/m³)	Highest Predicted Value as Percent of Air Quality Standard (%)
Nitrogen Dioxide			
99.79th Percentile of 1-hour Average GLCs	200	11.2	5.6
Annual Average GLC	40 µg/m³ (for protection of human health)	0.34	0.9
Annual Average GLC for NO_X	30 µg/m³ (for protection of vegetation)	1.2	4
Particulate Matter (PM_{10})			
98.08th percentile of 24-hour	50	0.8	1.6

Annual Average GLC	40	0.11	0.3
Particulate Matter ($PM_{2.5}$)			
Annual Average $PM_{2.5}$ GLC	25	0.07[1]	0.3
Sulphur Dioxide			
Annual	20	1.2	6
99.73rd %ile of 1-hour average	350	30	8.6
99.18th %ile of 24-hour average	125	14	11.2

1 Based on a conversion of 65% of PM_{10} is $PM_{2.5}$ from EPA monitoring data at Zone D

The highest predicted 99.79th percentile of 1-hour average GLCs for NO_2 is 11.2µg/m³, this is less than the AQS of 200 µg/m³. The annual average NO_2 GLC predicted is 0.34µg/m^3. This complies with the air quality standard of 40µg/m^3 for the protection of human health. The predicted value for NO_X is 1.2µg/m³. This complies with the air quality standard of 30µg/m^3 for the protection of vegetation.

The highest predicted 98.08th percentile of 24-hour average GLCs for PM_{10} is 0.8µg/m, this is less than the AQS of 50 µg/m³. The maximum predicted annual concentration of PM_{10} is 0.1µg/m³; this is well within the air quality standard of 40µg/m³.

The maximum predicted annual concentration of $PM_{2.5}$ is 0.07µg/m³; this is well within the concentration cap of 25µg/m³.

The maximum predicted annual concentration of SO_2 is 1.2µg/m³; this is well within the limit of 20µg/m³.

The highest predicted 99.73rd percentile of 1-hour average GLCs for SO_2 is 30µg/m³, this is significantly less than the AQS of 350 µg/m³. The highest predicted 99.18th percentile of 24-hour average GLCs for SO_2 is 14µg/m, this is less than the AQS of 125 µg/m³.

3.2 Cumulative Impact

The highest annual GLC of NO_2 for both Mayo Renewable Power Facility and the adjacent Endessa Power Plant are shown in Table 5. The results show the cumulative effect with both plants fully operational will result in continued compliance with the air quality standards.

Table 5: Cumulative Impact Assessment of Mayo Power and Endessa

	NO_2 Annual Average (µg/m^3)
Total Concentration from Mayo Power	0.34
Background concentration [1]	6.5

	NO_2 Annual Average ($\mu g/m^3$)
Maximum Predicted level due to emissions from Endessa[2]	9
Local Cumulative impact ($\mu g/m^3$)	15.8
Air Quality Standard ($\mu g/m^3$)	40

[1] Based on background concentration recorded by EPA for Zone D, 2010

[2] Based on modelling results carried out as part of IPPC Licence (P0566-02) application review, March 2007

4 Mitigation Measures

The emissions modelled include for the provision of an SCR to reduce the nitrogen dioxide emissions from the stack and the provision of an electro-static precipitator for the reduction of particulate emissions. As the results of the air dispersion modelling are easily in compliance with air quality standards, no further mitigation measures are required.

5 Residual Impacts

The residual impact of the proposed development on air quality will not be significant.

6 References

1. S.I. No. 180/2011 — Air Quality Standards Regulations 2011 Government Publications, Dublin.
2. Air Quality in Ireland 2011, Key Indicators of Ambient Air Quality, EPA 2012.
3. Air Dispersion Modelling from Industrial Installations Guidance Note (AG4) EPA, 2012

Mayo Renewable Power

Mayo Renewable Power Plant

Noise Impact Assessment

Rep/01

Issue 2 | 28 January 2013

Ove Arup & Partners Ireland

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Job number 224582-00

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Contents

Figures

1 Introduction

This report has been prepared by Arup for Mayo Renewable Power. It presents a revised assessment of the impact associated with the proposed 40 MW Combined Heat and Power Plant at the Killala Business Park, Killala, County Mayo on the existing noise environment. The report describes the assessment methodology, the existing noise environment and the results of the assessment. Mitigation measures are also proposed as required.

2 Methodology

2.1 Limits and Standards

In April 2012 the EPA published a *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* which supersedes the 2003 document. The main changes in this document relate to the introduction of an evening time limit of 50dB L_{Aeq} (the limits of 55 dB L_{Aeq} and 45 dB L_{Aeq} for daytime and night-time noise, respectively, remain unchanged). The document also redefines night-time as between 23:00 to 07:00 with daytime as 07:00 to 19:00 and evening as between 19:00 to 23:00hrs. The limits referenced in this report are taken from this 2012 guidance document.

Details on the noise emission specifications for the external noise sources were based on information currently available. This provides an indication of the expected noise levels, and provides a basis for a quantitative assessment.

2.2 Monitoring Methodology

Monitoring was carried out in 2011 in compliance with the EPA's *Environmental Noise Survey Guidance Document* (EPA, 2003) and I*SO 1996: Acoustics, Description, Measurement and Assessment of Environmental Noise (Part 1 & 2)* (ISO 2003 & 2007). No further monitoring was carried out to determine the evening time noise levels in accordance with the EPA 2012 guidance as it is not proposed to operate the site during evening or nighttime.

The noise meter was positioned approximately 1.5 metres above ground level and at least 3.5 metres from any reflecting structure. Noise levels were recorded over 15 and 30 minute intervals for night-time and day-time readings respectively.

Following completion of the survey the results were downloaded onto a PC where specialised software was used to analyse the data. The presence of a tonal or impulsive component was also assessed.

The noise levels recorded are discussed in Section 3.

2.2.1 Monitoring Locations

Monitoring locations were identified based on the nature of the proposed activities and proximity of sensitive receptors in the area.

All monitoring locations are described in Table 1 and depicted on Figure 1 (Appendix A).

Table 1: Baseline Environmental Monitoring Locations

Parameter	Monitoring Location	Location Description
Noise	N1	Along northern site boundary opposite Schutz facility.
	N2	At residence located south of the site boundary on the local Mullafarry Road.
	N3	Half way along the western site boundary.

2.2.2 Instrumentation

A Brüel & Kjær 2250 Light Type 1 Sound Level Meter was utilised to carry out the noise assessment. This meter complies with the International Electrotechnical Commission (IEC) *Specification for Sound Level Meters: IEC 61672-1:2002* (IEC, 2002).

The noise meter was calibrated on-site before and after each measurement using a Brüel & Kjær 4231 Acoustic Calibrator. A windshield was used to provide the microphone with effective wind protection.

2.2.3 Monitoring Personnel

All baseline monitoring was carried out by Caitríona Carter a Senior Environmental Scientist with Arup on 23rd September 2011.

2.2.4 Weather Conditions

The weather was primarily overcast with heavy showers on occasion. There was a moderate breeze with some gusts of wind. Temperatures varied from 12 - 15°C.

2.2.5 Measurement Parameters

The following parameters were recorded to assess the impact of environmental noise:

- **L_{Aeq}** – A-weighted equivalent continuous steady sound level during the sample period, effectively representing an average value.
- **L_{A10}** – the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

- **L_{A90}** – the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing

2.3 Forecasting Methods

Calculations have been completed using SoundPLAN modelling software, Version 7.0. The following input data was used to develop the noise model:

- Details of ground topography and ground conditions.
- Noise Data from typical plant to be used as part of the facility.
- Location and height of the nearest sensitive receptors.

Noise predictions were made using this software according to guidelines specified in *ISO 9613-2: Attenuation of Sound Propagation Outdoors: General Method of Calculation, International Organisation for Standardisation, 1996*.

3 Baseline Environment

3.1 Night-time Noise Levels

The noise levels recorded during night-time monitoring periods are outlined in Table 2. The main sources of noise at each location are also included. There was no evidence of any tonal noise during the noise survey.

Table 2: Night-time Noise Monitoring Results (15-minute durations)

Location	Start Time	L_{Aeq}	L_{A10}	L_{A90}	Noise Sources
N1	06:30	38.9	41.7	34.7	- Constant hum from the Endessa plant audible in distance - Intermittent traffic on Ballina to Killala Road audible in distance
N2	07:05	55.4	44.7	34.2	- Intermittent traffic on local road to Mullafarry including 2 No. HGV's and 1 No. Car - Constant birdsong
N3	07:36	46.3	49.4	38.5	- Intermittent traffic on local road to Mullafarry including 2 No. HGV's and 1 No. Tractor and cars (number not identifiable at this distance) - Constant birdsong including crows flying overhead and cawing intermittently during the monitoring period

3.2 Day-time Noise Levels

The noise levels recorded during day-time monitoring periods are outlined in Table 3. The main sources of noise at each location are also included. There was no evidence of any tonal noise during the noise survey.

Table 3: Day-time Noise Monitoring Results (30-minute durations)

Location	Start Time	L_{Aeq}	L_{A10}	L_{A90}	Noise Sources
N1	09:51	49.0	48.8	38.4	- Constant activity within the waste management facility located in close proximity to the monitoring location including reversing noises and waste handling equipment - Intermittent HGV's arriving and departing Schutz facility (2 No. movements) - Intermittent vehicle movements within the former Asahi site (2 No. cars during the operating period).
N2	08:50	57.0	49.4	35.0	- Intermittent traffic on local road to Mullafarry including 6 No. Cars and 4 No. HGV's - Cattle looing in field adjacent to monitoring location at beginning of monitoring period - Intermittent dog barking to rear of residence - Constant birdsong
N3	08:09	44.1	47.6	35.7	- Intermittent traffic on local road to Mullafarry including 2 No. HGV's, 2 No. Tractors and a number of cars (number not identifiable at this distance). - Constant birdsong

As outlined above, no evening time monitoring was carried out as per the new EPA guidance, as it is not proposed to operate the site during evening or night time.

3.3 Interpretation of Results

3.3.1 Night-time Noise

Of the three levels recorded, both N2 and N3 exceeded the night-time limit. This reflects the traffic activity on the Mullafarry Road, particularly HGV's movements which have a significant impact on what is otherwise a quiet rural area. The L_{90}, which is used as a descriptor for background noise, varied from 34 – 38dB(A), indicating that the noise environment in the vicinity of the site, between traffic movements, is reflective of a rural area with low levels of activity.

Night-time noise levels at N1 were below the noise limit and comprised of distant traffic on the main Ballina to Killala Road and a low humming noise from the Endessa plant (located to the west of the former Asahi site).

3.3.2 Day-time Noise

Of the three levels recorded, only N2 exceeds the day-time limit. Again, as with the night-time reading the noise environment at N2 and N3 is impacted by traffic activity in the area. The L_{90}, varied from 35 – 38dB(A), further highlighting that the noise environment in the vicinity of the site, in the absence of traffic, is typical of a rural area with low levels of activity.

Noise levels recorded at N1, whilst below the noise limit, can be characterised as being more industrial in nature given the proximity of a waste facility and the Schutz facility. Traffic accessing these facilities and the equipment used at the waste facility are the dominant sources of noise at this location. This is reflected in the slightly higher background noise level (L_{90}) when compared with N2 and N3.

4 Potential Impacts

4.1 Noise Sources

In principal, noise emissions from the power plant can be limited to any desired level through specification of appropriate sound insulation for the building envelope. This also applies to external noise sources which can also be attenuated as required by means of acoustic enclosures and attenuators on large fans. Cooling tower noise emissions are normally controlled through selection of low noise models. These noise mitigation measures are subject to detailed specification at the design stage, which will take account of the design noise criteria specified in this environmental report.

In addition, the EPA guidelines on environmental noise require that there will be no clearly noticeable tones or impulsive noises at nearest noise sensitive receptors emanating from the proposed facility.

Noise sources are in operation at various times during the day, evening and night, refer to Table 4. Predicted levels are compared to day, evening and night time limits. For the purposes of the assessment, the boiler and turbine buildings were modelled as enclosed sources. All other sources are assumed to be unattenuated unless attenuation in built in by the equipment manufacturer. The noise input data for each item of equipment modelled are provided in the Table 4 below.

Table 4: Noise Emission Data for Noise Model

Source	Period of Emission	Sound Pressure dBA at reference distance
Deaerator Vent	Intermittent (<1%)	83 at 1m
Continuous blowdown vent	Intermittent (<1%)	83 at 1m
Steam drum vent A	Intermittent (<1%)	83 at 1m
Steam drum vent B	Intermittent (<1%)	83 at 1m
Primary superheater vent	Intermittent (<1%)	83 at 1m
Secondary superheater vent	Intermittent (<1%)	83 at 1m
Sight glass vent	Intermittent (<1%)	85 at 1m
Economiser outlet vent	Intermittent (<1%)	85 at 1m
Screen machine	Continuous daytime	85 at 1m
ID Fan	Continuous	76 at 1m
FD Fan	Continuous	76 at 1m
Turbine building	Continuous	80 at 1m
Boiler building	Continuous	75 at 1m
Cooling towers	Continuous	81 at 1m
Dryer	Continuous	75 at 1m
Chippers	Continuous daytime	108 at 1m
Conveyors	Continuous	99.5 at 1m
Vacuum pump skid	Continuous	75 at 1m
Step up transformer	Continuous	75 at 1m
Step down transformer	Continuous	75 at 1m

4.2 Noise Impact Assessment

The revised EPA guidance stipulates a day-time noise limit of 55dB, evening time limit of 50dB and a 45dB limit for night-time hours. These limits apply to the noise level experienced at the site boundary or at the nearest sensitive receptor. Due to the industrial nature of the area surrounding the site and the significant distance of the sensitive receptors from the proposed facility, levels were predicted at the nearest sensitive receptors to the site. Twelve receptors were considered in total as illustrated on Figure 2. All receptors are residential in nature. Levels are predicted at the first floor level at each property to represent a worst-case scenario.

The predicted noise levels are presented in **Table 5.** A discussion of the findings of the assessment is provided in the following sections. Receptor locations are illustrated on Figure 2.

Table 5: Predicted Noise levels from the proposed facility at the Nearest Sensitive Receptors

Receptor No.	Predicted Daytime Plant Noise Level L_{Aeq}dB(A)	Compliance with the EPA Day-time Limit (55 dB)	Predicted Evening Plant Noise Level L_{Aeq}dB(A)	Compliance with the EPA Evening-time Limit (55 dB)	Projected Nighttime Plant Noise Level L_{Aeq}dB(A)	Compliance with the EPA Night-time Limit (55 dB)
1	52	Yes	32	Yes	32	Yes
2	29	Yes	20	Yes	20	Yes
3	31	Yes	21	Yes	21	Yes
4	32	Yes	20	Yes	20	Yes
5	28	Yes	19	Yes	19	Yes
6	46	Yes	26	Yes	26	Yes
7	47	Yes	28	Yes	28	Yes
8	47	Yes	28	Yes	28	Yes
9	47	Yes	28	Yes	28	Yes
10	47	Yes	28	Yes	28	Yes
11	47	Yes	28	Yes	28	Yes
12	46	Yes	34	Yes	34	Yes

Noise levels at the locations to the north are significantly less than the levels predicted to the south due to the screening provided by the buildings to the north. All predicted noise levels are below the EPA daytime, evening-time or night-time noise limits of 55 dB(A), 50dB(A) and 45 dB(A) respectively. Consequently, it is not considered that the operation of the proposed facility will have an effect on the existing ambient noise level. The plant noise will generally be less than the existing background noise and is unlikely to be noticeable at the majority of the receptors.

4.3 Mitigation Measures

As outlined previously, noise emissions from the power plant can be limited to any desired level through specification of appropriate sound insulation for the building envelope. This also applies to external noise sources which can also be attenuated as required by means of acoustic enclosures and attenuators as a minimum. The specification of noise mitigation will be subject to detailed design and will be required to comply with the EPA limits.

4.4 Residual Impacts

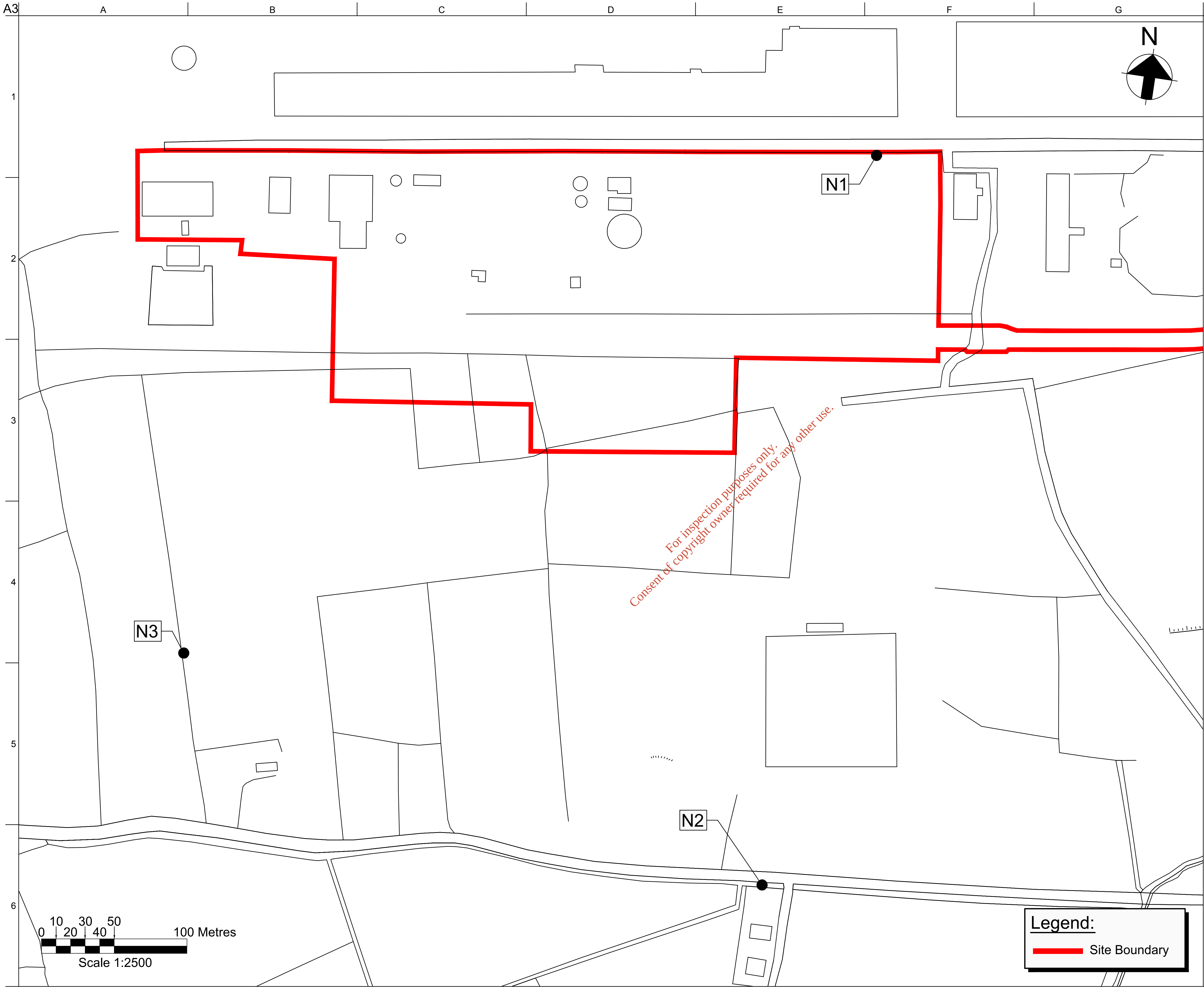
There will be no residual impacts associated with the operation of the proposed development if it is designed to comply with the EPA noise limits outlined above.

5 References

- Environmental Protection Agency (EPA), 2003. Environmental Noise Survey Guidance Document. EPA, Wexford, Ireland.

- EPA, 2006. Guidance Note for Noise in Relation to Scheduled Activities. EPA, Wexford, Ireland.
- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), EPA, 2012
- International Electrotechnical Commission (IEC), 2002. Specification for Sound Level Meters: IEC 61672-1:2002. IEC, Geneva, Switzerland.
- International Standards Organisation (ISO), 2003. ISO 1996-1: Acoustics – Description, measurement and assessment of environmental noise, Part 1: Basic Quantities and Assessment Procedures. ISO, Geneva, Switzerland.
- ISO, 2007. ISO 1996-2: Acoustics – Description, measurement and assessment of environmental noise, Part 2: Determination of environmental noise levels. ISO, Geneva, Switzerland.

Figures



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Renewable Power Mayo

Job Title

Noise Report

Drawing Title

Figure: 1
Noise Monitoring Locations

Scale at A3	1:2500	Date	January 2013
Discipline	Environmental		
Drawing Status	Report		

Job No	Drawing No	Issue
224582-00	NSK0001	SK1

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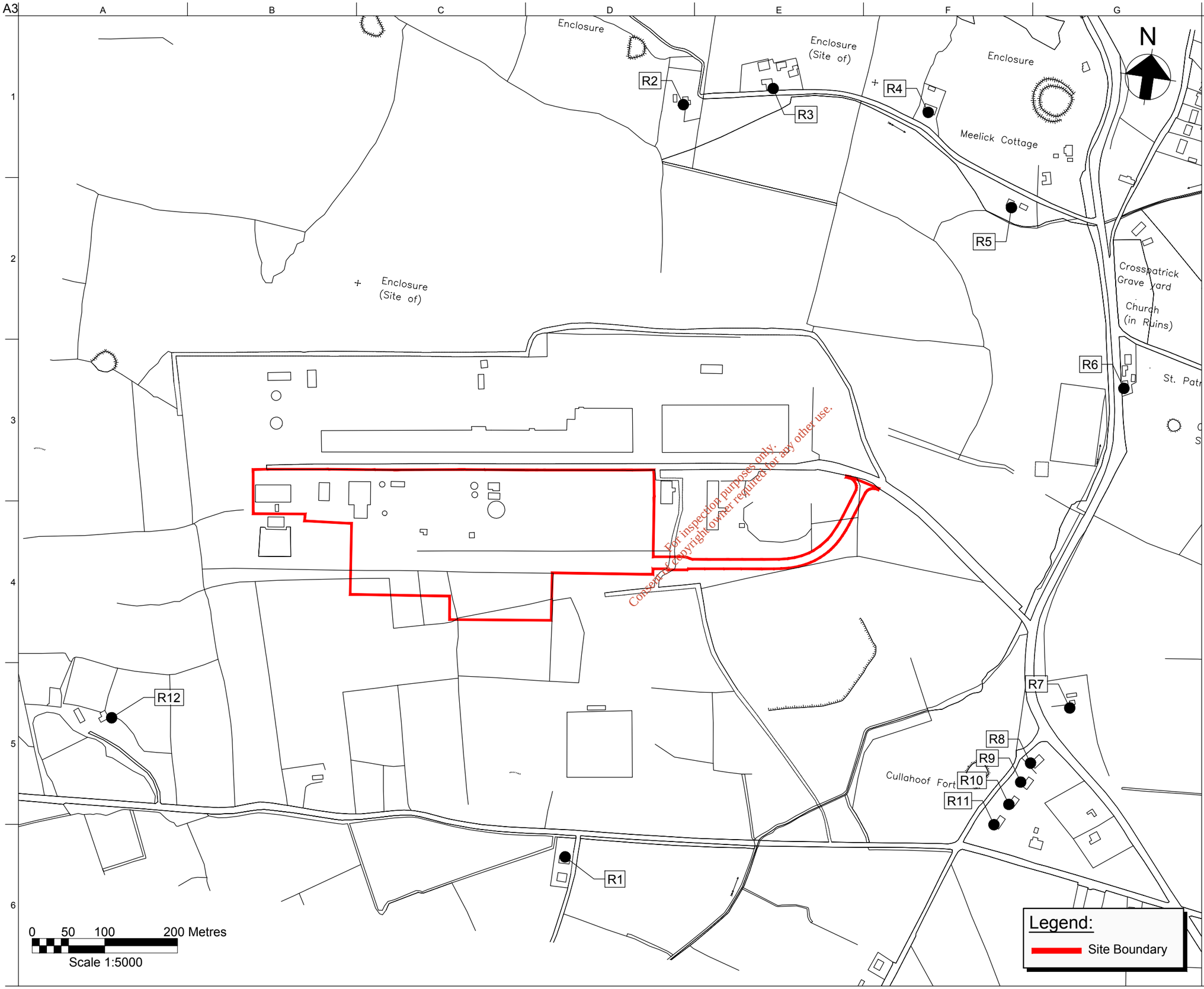

Issue	Date	By	Chkd	Appd

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Job Title

Noise Report

Drawing Title

Figure: 2
Noise Sensitive Receptors

Scale at A3	Date
1:5000	January 2013

Discipline: Environmental

Drawing Status: **Report**

Job No	Drawing No	Issue
224582-00	**NSK0002**	**SK1**

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Revised Attachment J

ATTACHMENT No. J

ACCIDENT PREVENTION AND EMERGENCY RESPONSE

TABLE OF CONTENTS

J.1. Introduction

Mayo Renewable Power Ltd and Dalkia Ltd will develop, implement and maintain an Accident Prevention and Emergency Response policy and plan in compliance with all relevant health and safety and environmental legislation. This commitment shall be the responsibility of management and employees in all functions.

The table below shows the general framework that Mayo Renewable Power Ltd and Dalkia Ltd will follow for the development, implementation and maintenance of the Accident Prevention and Emergency Response policy and plan.

Table J.1 Emergency Response Plan

Section	Title
1	Emergency Response Policy & Procedures
2	Roles and Responsibilities
3	Emergency Response Team Contact Details
4	Emergency Response Training Policy & Procedures
5	Materials On-Site Inventory
6	Materials Handling in Emergency Response
7	Levels of Emergency
8	Response to Emergency, First Line.
9	Emergency Response All Clear
10	Return to Normal Status
11	Emergency Incident Report
12	Fire Evacuation
13	General Evacuation
14	Medical Evacuation
15	Chemical Spills
22	Lubricating Oil Spills
23	Electrical Fires
24	Insurance Reporting
25	Emergency Alarms Signals
26	Maps, Plan, Layouts for Facility
27	Emergency Equipment List & Location
28	Fire Fighting Equipment List and Location
29	Medical Facilities On Site List and Location
30	Emergency Response Command Centre

The plant will operate 24 hours per day 7 days per week, including at holiday periods. There will be no change to the emergency response procedures in these periods.

J.2. Storage of all Raw Materials, Products and Wastes

A drawing showing the storage location of raw materials and products on the site is included in Section H as Figures H.1(PL2) and H.2 (PL2). A drawing showing the storage location of wastes on the site is included in Section H as Figure H.3 (PL2). Details of storage, containment and bunding are also shown on these drawings.

J.3. Spill and Emergency Containment Measures and Structures, Bunding Surface Treatment and Collection Systems

All potentially polluting substances on site will be stored and transported in accordance with the Environmental Protection Agency *"IPC Guidance Note on Storage and Transfer of*

Materials for Scheduled Activities". Retention/ bunding will be designed in accordance with the Guidance note to ensure that in the event of a loss in sealing in containment or any relevant component, leaking substances are retained. Details are included in attachment H.

The Dalkia Ltd Crisis Management Plan is included in attachment C outlining how major emergencies at Dalkia plants are managed. Prior to operation this will be updated to incorporate details of the Mayo Renewable Power Ltd plant.

J.4. Drainage Drawings

The drawings showing the drainage layout for the site are included as Figures J.1 (PL2) and J.2 (PL2). The system was designed to Eurocodes and best civil engineering practice. A comprehensive preventative and predictive maintenance plan for the site drainage system will be put in place to ensure integrity testing of these conduits.

J.5. Catchment Area for each Spill or Run-Off Collection System

The Accident Prevention and Emergency Response policy and plan will include information on the catchment area for each spill and run off collection system.

J.6. Fire Water Retention System

The proposed drainage system allows for fire water containment in a detention basin on site. Prior to the detention basin the fire water shall be treated by passage through a class 1 oil interceptor. It will then be transferred to a detention basin prior to discharge to sewers in the charge of Mayo County Council.

Mayo Renewable Power Ltd will prepare and implement a Fire Water Risk Assessment Report which will document possible contamination of ground, groundwater or surface water from firewater run-off in the event of a fire on site and provisions for containment. The Assessment will be developed with reference to the Environmental Protection Agency's *"Fire-Water Retention Facilities (Draft) Guidance note to Industry on the Requirements for Fire-Water Retention Facilities"*.

J.7. Transport of Materials

Detailed information on transport of raw materials, intermediates and products is included in sections D and G of this application.

J.8. Potential Points of Contamination

J.8.1 Surface Water

The surface water is potentially at risk from any accidental spillage or contamination from fire-water arising at the facility. This risk is minimised by storing raw materials in covered areas where possible and by bunding potentially polluting liquids. Figures J.1(PL2) and J.2(PL2) show the process and surface water conveyance systems.

J.9. ATEX Regulations

The physical properties of the biomass fuel, once chipped and dried gives rise to potentially explosive atmospheres . An Explosion Protection Document will be prepared for the works prior to operation in accordance with Safety, Health and Welfare at Work (General Application) Regulations 2007.

J.10. Environmental Liability Risk Assessment (ELRA)

An Environmental Liabilities Risk Assessment (ELRA) for the facility will be completed and provided to the EPA following grant of an IPPC licence.

J.11. Fire

The following key fire engineering design objectives for the plant are:

- Life safety of occupants
- Property protection, insurance requirements and minimising operational disruption
- Satisfy relevant Legislation
- Hazard identification and risk mitigation

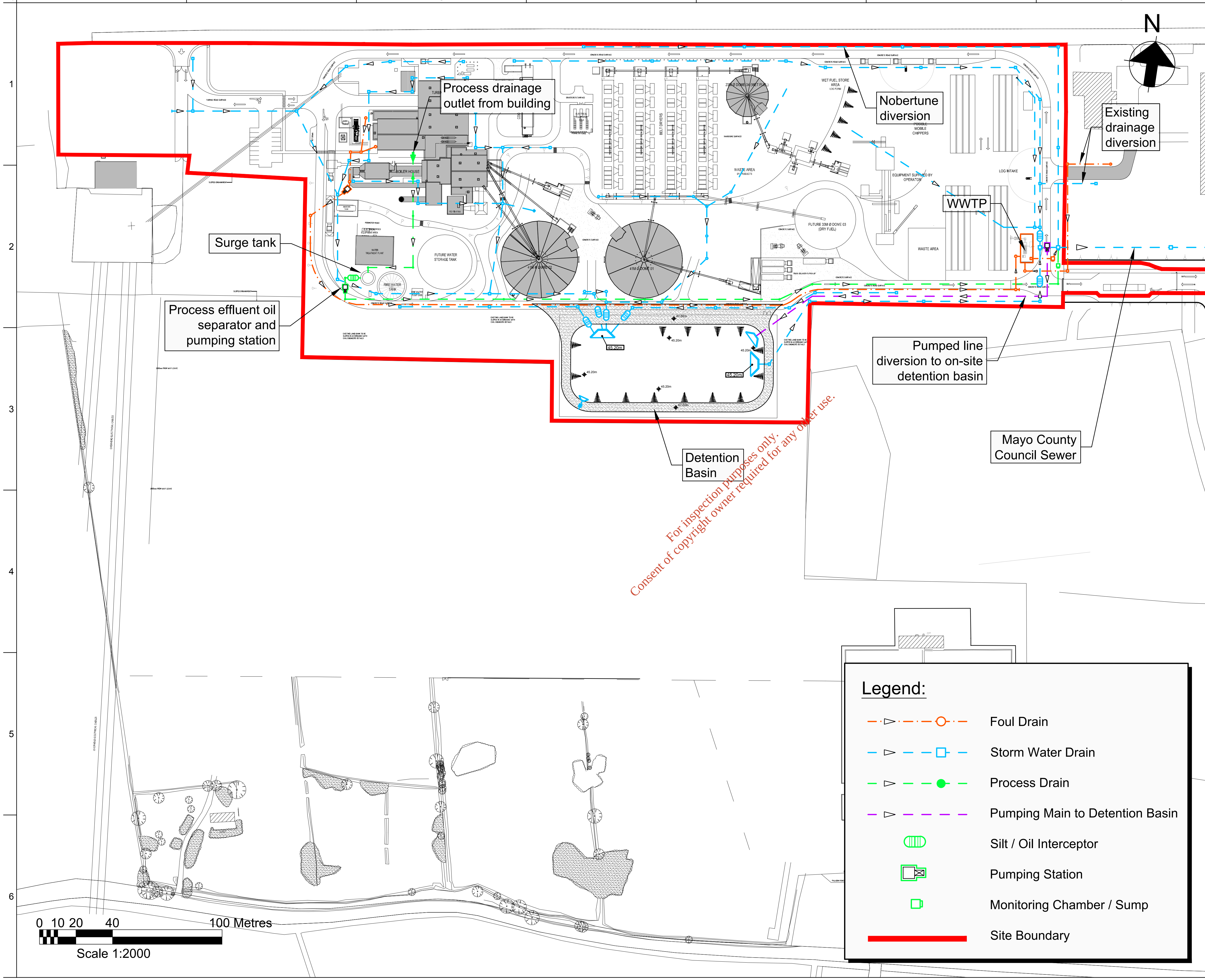
The plant design incorporates the following fire engineering factors to achieve these objectives:

- Fire fighting provisions (water supply, dry/wet mains, mechanical hoses)
- Fire detection systems
- Fire alarm systems
- Fire suppression (conventional sprinklers, misting systems, gaseous suppression and deluge)

Fire fighting storage tanks and a pumphouse will be installed on site. The Accident Prevention and Emergency Response policy and plan will include details of emergency alarm signals, fire evacuation procedures and a fire fighting equipment list with locations.

J.12. Public Liability Insurance

Mayo Renewable Power Ltd will put in place and maintain appropriate Public Liability Insurance including cover for Environmental Impairment or an alternative agreed with the Environmental Protection Agency, for an amount appropriate to the risks posed by the site. Insurance details will be provided to the Environmental Protection Agency as part of the ELRA Report for the site.



Notes:

1. Only main drainage pipe runs are shown. Some land drains, road gullies, catch pits etc. have been omitted for clarity.

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Job Title
IPPC Licence Application

Drawing Title
Figure: J1
Site Layout - Drainage

Scale at A3	Date
1:2,000	January 2013

Discipline: Environmental

Drawing Status
Planning

Job No	Drawing No	Issue
224582-00	000	PL2

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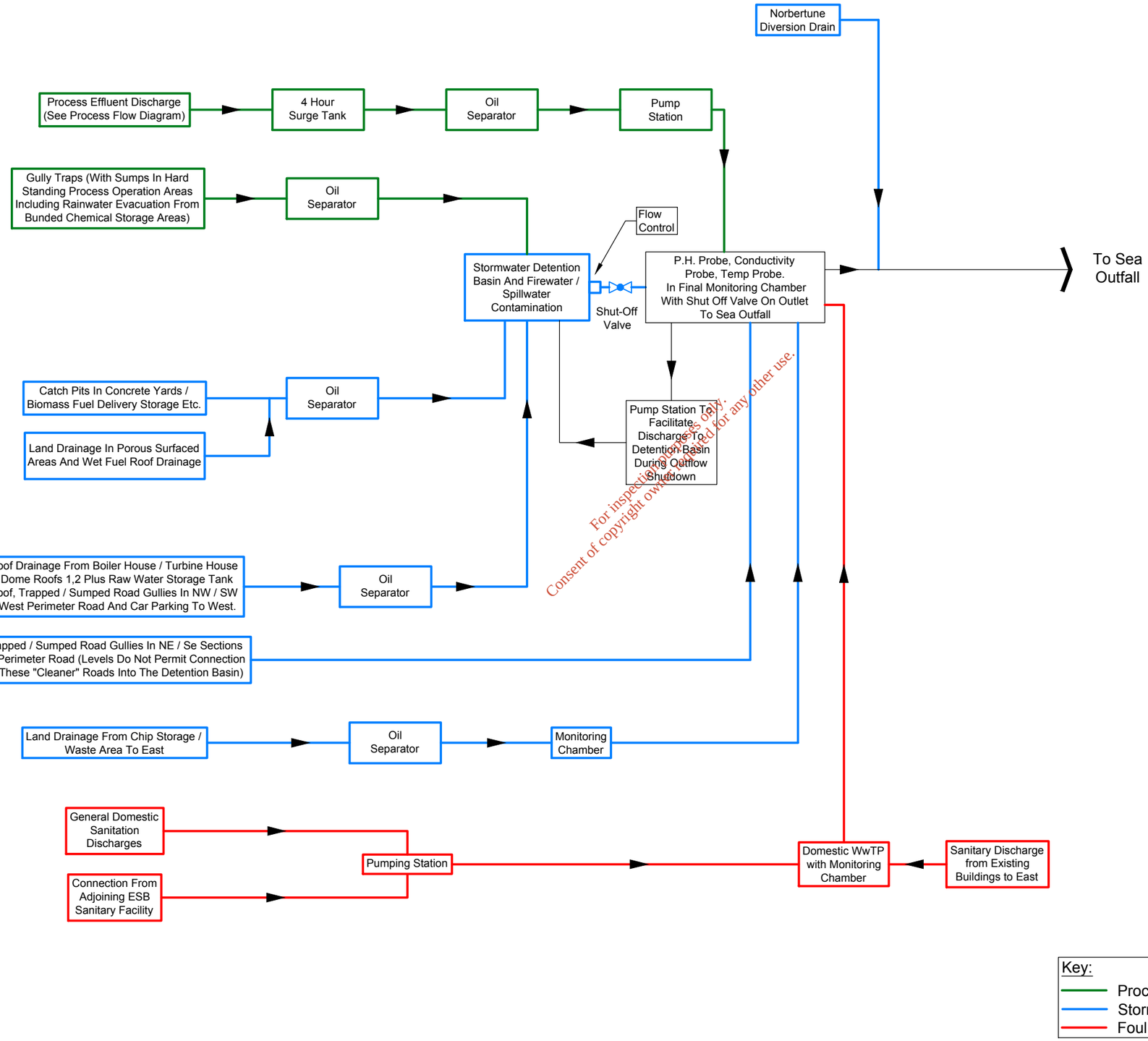

Issue	Date	By	Chkd	Appd

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Job Title

IPPC Licence Application

Drawing Title

Figure: J2
Overall Drainage Flow Diagram
Underground Drainage Network
Treatment Systems and Monitoring

Scale at A3	Date
1:1,000	January 2013

Discipline: Environmental

Drawing Status: **Planning**

Job No	Drawing No	Issue
224582-00	**000**	**PL2**

J:\224000\224582-00\4. Internal Project Data\4-02 Drawings\4-02-6 Environmental\IPPC\J-02___Drainage Flow Diagram.dwg 30 Jan 2013 12:08:33

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Revised Attachment L

ATTACHMENT No. L

STATUTORY REQUIREMENTS

TABLE OF CONTENTS

L.1. Introduction

Section 83 (3) (5) of the Environmental Protection Agency Act, 1992 as inserted by Section 15 of the Protection of the Environment Act 2003, sets out the matters with which the Agency must be satisfied prior to granting a licence or a revised licence. This section is reproduced below.

The Agency shall not grant a licence or revised licence for an activity—
(a) unless it is satisfied that—

(5) The Agency shall not grant a licence or revised licence for an activity—
(a) unless it is satisfied that—
(i) any emissions from the activity will not result in the contravention of any relevant air quality standard specified under section 50 of the Air Pollution Act 1987, and will comply with any relevant emission limit value specified under section 51 of the Air Pollution Act 1987,
(ii) any emissions from the activity will comply with, or will not result in the contravention of, any relevant quality standard for waters, trade effluents and sewage effluents and standards in relation to treatment of such effluents prescribed under section 26 of the Local Government (Water Pollution) Act 1977,
(iii) any emissions from the activity or any premises, plant, methods, processes, operating procedures or other factors which affect such emissions will comply with, or will not result in the contravention of, any relevant standard including any standard for an environmental medium prescribed under regulations made under the European Communities Act 1972, or under any other enactment,
(iv) any noise from the activity will comply with, or will not result in the contravention of, any regulations under section 106,
(v) *any emissions from the activity will not cause significant environmental pollution,*
(vi) the best available techniques will be used to prevent or eliminate or, where that is not practicable, generally to reduce an emission from the activity,
(vii) having regard to Part III of the Act of 1996, production of waste in the carrying on of the activity will be prevented or minimised or, where waste is produced, it will be recovered or, where that is not technically or economically possible, disposed of in a manner which will prevent or minimise any impact on the environment,
(viii) energy will be used efficiently in the carrying on of the activity,
(ix) necessary measures will be taken to prevent accidents in the carrying on of the activity and, where an accident occurs, to limit its consequences for the environment and, in so far as it does have such consequences, to remedy those consequences,
(x) necessary measures will be taken upon the permanent cessation of the activity (including such a cessation resulting from the abandonment of the activity) to avoid any risk of environmental pollution and return the site of the activity to a satisfactory state, and
(xi) the applicant or licensee or transferee, as the case may be, is a fit and proper person to hold a licence

This Attachment describes how the operation of the Mayo Renewable Power Combined Heat and Power (CHP) facility will meet the relevant parts of these requirements.

L.2. Air Quality Legislation

On April 12th 2011 the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) came into force and transposed EU Directive 2008/50/EC into Irish law. The 2011 Regulations revoke the Air Quality Standards Regulations of 2002 (S.I No. 271 of 2002), The Environmental Protection Agency Act, 1992 (Ambient Air Quality Assessment and Management) Regulations, 1999 (S.I. No. 33 of 1999) and the Ozone in Ambient Air Regulations, 2004 (S.I. No. 53 of 2004).

The purpose of the 2011 Regulations is to establish limit values and alert thresholds for concentrations of certain pollutants, to provide for the assessment of certain pollutants using methods and criteria common to other European Member States, to ensure that adequate information on certain pollutant concentrations is obtained and made publically available and to provide for the maintenance and improvement of ambient air quality where necessary.

Particulates (PM_{10} and $PM_{2.5}$) and NO_X arise from biomass combustion gases. It is propose to provide one major emission point on site i.e. the boiler stack. Air dispersion modelling of emissions has been undertaken and indicates that the emissions have no significant environmental effect and will not result in any breach of statutory Air Quality Standards for these pollutants.

The European Commission Directive on Industrial Emissions (Integrated Pollution Prevention and Control) 2010/75/EU, 24th November 2010 provides changes in emission limit values for SO_2, NO_X and particulate matter. These limits will be complied with during the operation of the facility.

L.3. Water Quality Regulations

There will be no direct emissions to surface waters or ground from the proposed activity.

Process effluent will be treated as required and discharged to the Mayo County Council sewer. Surface water will be discharged to the Mayo County Council sewer. All of the surface water will pass through an oil/water interceptor and surface water from the western and central parts of the site will pass through a detention pond.

Sanitary effluent will be treated in a package treatment plant on site prior to discharge to the Mayo County Council sewer.

The emissions from the site will not cause a breach of any relevant water quality standards. To avoid duplication the Local Government (Water Pollution) Act and standards are addressed here together with the following paragraph 83(5) (a)(iii) as many of the standards/limit values were made on foot of EU Directives.

Directive 2000/60/EC (the Water Framework Directive) was adopted by the European Parliament and Council in 2000. The Water Framework Directive (WFD) establishes a legal framework for the protection, improvement and sustainable management of inland surface waters, transitional waters, coastal waters and groundwater. The aim of the WFD is to prevent the deterioration in the

existing status of waters (including the maintenance of "High Status" where it exists) and to ensure that all waters, with some limited exceptions, achieve at least "Good Status" by 2015.

The European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), as amended by the European Communities (Water Policy) (Amendment) Regulations, 2005, transposed the WFD into Irish law establishing eight River Basin Districts (RBDs) on the island of Ireland for the co-ordinated management of water resources. Water bodies were delineated into groundwater, river, lake, transitional and coastal water bodies and, in accordance with the requirements of the WFD, an analysis of the characteristics and impact of human activity on each RBD was undertaken. This analysis provided an assessment of the likely condition of all water bodies and established a baseline for identifying future priority actions for subsequent stages in the river basin planning approach.

The European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. 272 of 2009) give effect to the criteria and standards to be used for classifying surface waters in accordance with the ecological objectives approach of the WFD. In accordance with the regulations waters classified as 'High' or 'Good' must not be allowed to deteriorate.

Waters classified as less than good must be restored to at least good status within a prescribed timeframe. In addition, the regulations address certain shortcomings identified by the European Court of Justice in relation to Ireland's implementation of the Dangerous Substances Directive (2006/11/EC, as amended).

The regulations set standards for biological quality elements and physico-chemical conditions, supporting biological elements (e.g. temperature, oxygen balance, pH, salinity, nutrient concentrations and specific pollutants), which must be complied with. These parameters establish the "ecological status" of a water body.

The "chemical status" of a water body is assessed based on thresholds set for certain chemical pollutants, known as priority and priority hazardous substances. A water body must achieve both "good ecological status" and "good chemical status" before it can be considered to be at "'good status". The regulations also state that, for the purpose of classification, a status of less than good is assigned in the case of a body of surface water where the environmental objectives for an associated protected area requiring special protection by virtue of obligations arising from specific national legislation for the protection of water, or for the conservation of habitats and species directly dependent on water, are not met.

There will be no emissions to surface waters from the Mayo Renewable Power facility.

The old Groundwater Directive (80/68/EEC) will be repealed by 2013 under the WFD but remains in force for preventing or limiting pollution from List I and List II substances until then. It is to be replaced by the requirements of the Water Framework Directive (2000/60/EC) and the Groundwater Directive (2006/118/EC). The purpose of the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010), as amended by the European Communities Environmental Objectives (Groundwater) Regulations 2012, (S.I. No. 149 of 2012), is to transpose the requirements of the two latter Directives into National legislation and provide for transitional arrangements from the old Groundwater Directive (80/68/EEC).

These Regulations aim to:

- Establish a new strengthened regime for the protection of groundwater in line with the requirements of the Water Framework Directive (2000/60/EC) and by the Groundwater Directive (2006/118/EC).
- This is to be achieved by establishing clear Environmental Objectives, Groundwater Quality Standards and Threshold Values for the classification of groundwater and the protection against pollution and deterioration.
- The Regulations also introduce the legal basis for a more flexible, proportionate and risk based approach to implementing the legal obligation to prevent or limit inputs of pollutants into groundwater which already exists under the old Groundwater Directive (80/69/EEC).

There will be no emissions to ground or groundwater from the site. Inadvertent indirect emissions are prevented by bunding of storage tanks, segregation and spillage preventative measures for chemical and waste storage areas, inspection of the integrity of wastewater drains and the use of concrete hardstanding for loading and delivery areas.

Emissions from the Mayo Renewable Power facility will comply with the provisions of SI 419 of 1994, SI 254 of 2001, as amended, on urban wastewater treatment.

L.4. EU Directives and Regulations

L.4.1 Control of Major Accident Hazards Directive (Seveso II)

The activities at the Mayo Renewable Power site do not require compliance with Articles 6 and 7 (Lower Tier Seveso II) and Article 9 (Upper Tier Seveso II) of Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances as amended by Directive 2003/105/EC as implemented in Ireland by SI No 74 of 2006 European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (otherwise known as the Seveso II Regulations) because the quantities of hazardous materials are less than the threshold quantities (refer to **Attachment No. B**).

L.4.2 Registration, Evaluation and Authorisation of Chemicals (REACH) Regulations

REACH, the European Union's (EU) Regulation for the Registration, Evaluation and Authorisation of Chemicals that came into force on 1 June 2007, has one key central aim: to protect human health and the environment from the potential risks arising from the use of chemicals. REACH Regulation (EC) No 1907/2006 and Directive 2006/121/EC amending Directive 67/548/EEC were published in the Official Journal on 30 December 2006.

Prior to operation a review of substances manufactured at and imported to the facility will be undertaken to identify substances manufactured or imported in quantities of 1 tonne or more per year which must be registered with the European Chemical Agency. Chemicals will be registered as required by the Regulations.

L.5. Noise Control Regulations

No relevant noise control regulations have been made under Section 196 of the EPA Act (Noise regulations S.I. No. 179 of 1994).

Although no noise control regulations have been made in Ireland, the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*

recommends that to avoid disturbance the noise level at sensitive locations should not exceed an $L_{Aeq,T}$ value of 55dBA during the daytime 50dBA during the evening time and 45 dBA at night-time. It also advises that audible tones and impulsive noise at any sensitive locations should be avoided.

The Environmental Noise Directive 2002/49/EC relates to the assessment and management of environmental noise. The END aims to "define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to the exposure to environmental noise". For that purpose several actions are to be progressively implemented. It furthermore aims at providing a basis for developing EU measures to reduce noise emitted by major sources, in particular road and rail vehicles and infrastructure, aircraft, outdoor and industrial equipment and mobile machinery.

A noise survey was carried out for this application. Refer to Table I.7 Ambient Noise Assessment in the licence application.

L.6. Significant Environmental Pollution

The emissions from the Mayo Renewable Power facility will not result in significant environmental pollution.

Air dispersion modelling, as discussed in Attachment No. I has indicated that air emissions would not result in significant environmental pollution.

A baseline noise assessment of the site has been carried out. Noise from activities at the Mayo Renewable Power facility does not result in any significant noise pollution at noise sensitive properties adjacent to the site.

Process effluent will be treated, as required, prior to discharge to the Mayo County Council sewer. Nothing in the process effluent will cause significant environmental pollution to the ultimate receiving waters of the Mayo County Council sewer.

Surface water will be passed through a class 1 oil separator prior to discharge to the Mayo County Council sewer.

Sanitary effluent will be treated in a wastewater treatment plant prior to discharge to the Mayo County Council sewer.

The emissions to sewer are not likely to have any impact on sewer maintenance operations or sewer integrity.

There will be no discharge to ground or to groundwater or to surface waters.

L.7. Best Available Techniques

Use of best available techniques is addressed in attachment I.8.

L.8. Waste Management

Production of waste, during operations of the facility, will be prevented or minimised, and where waste is produced, it will be managed in a manner which will, as far as feasible, minimise the impact on the environment.

L.9. Energy Efficiency

Energy efficiency considerations are addressed in Section G.2.

L.10. Prevention of Accidents

Measures will be in place to prevent accidents and to limit the consequences of any accidents which could occur. These are described in Section J.

L.11. Decommissioning Measures

Measures will be taken to avoid a risk of environmental pollution upon the permanent cessation of activities. These are described in Section K.

L.12. Fit and Proper Person

The PoE Act in Section 83(5)(xi) specifies that the Agency shall not grant a licence unless it is satisfied that the applicant or licensee or transferee as the case may be is a fit and proper person. Section 84(4) of the PoE Act specifies the information required to enable a determination to be made by the Agency.

The applicant or other relevant person has not been convicted under the PoE Act, the Waste Management Act 1996, the Local Government (Water pollution) Acts 1977 and 1990 or the Air Pollution Act 1987.

Details of the qualifications, technical knowledge and experience of the relevant Mayo Renewable Power representatives Dave Shaffer and Anne Walsh and Dalkia employees Alan Keogh and Mark Coyne are provided in this Attachment.

An Environmental Liabilities Risk Assessment and Residuals Management Plan will be prepared for the facility and submitted to the Environmental Protection Agency. These will be will be underwritten by Mayo Renewable Power Ltd and include financial details demonstrating that the company will be in a position to meet any financial commitments or liabilities entered into or incurred in carrying on the activity to which the application relates or in consequence of ceasing to carry out the proposed activity.

MRP is wholly owned by Weichert Enterprise, LLC (“Weichert”) which is a private equity investment concern located in New Jersey, USA which has committed approximately $200 million of equity to its investment strategies and has participated in more than $1 billion of financings. In addition to its direct investments, Weichert invests through four general partnerships with 20 professionals, and in which Weichert is either the founding or lead investor. Weichert’s investment interests span a range of sectors from power plants, lower to mid-market industrial businesses, outsourced business services, pharma, manufacturing and health related businesses, and distressed banks.

Weichert's largest investment commitment is in acquiring and restructuring power facilities and, as a consequence, has significant investment experience in the power sector. It was a founding and the largest investor in Rockland Capital Energy Investments, LLC (RCEI), a "pledge fund" founded in 2003 with offices in Houston, Texas and New York. Gerald C. Crotty, President of Weichert Enterprise (see below), serves as the Vice Chairman of RCEI and has since its inception. Through RCEI, Weichert had interests in six separate transactions ranging from a 65MW natural gas (and fuel oil) independent power project to a 1,500MW gas fired combined cycle cogeneration facility. RCEI's projects were geographically diverse including Hawaii, California, Michigan, New Jersey and the U.K.

In 2009, Weichert became the largest investor in Rockland Power Partners (RPP), the successor to RCEI and has acquired interests in five additional significant facilities in the United States in three separate transactions.

Weichert also invested in Astoria Energy LLC, a 1,000MW gas fired power plant project in the Astoria section of Queens, New York. It invested in the critical development phase as well as the construction financing for Phase I – or first 500MW – of Astoria Energy which commenced operations on schedule in 2006.

Weichert is the lead investor in DFW Capital Partners III, headquartered in Teaneck, New Jersey, with a focus on lower middle-market health care, business and industrial service companies. Weichert has executed eight transactions with DFW Capital, and Mr. Crotty serves on DFW's advisory board.

Weichert is the lead investor in 3 Rivers Capital, based in Pittsburgh, Pennsylvania, with a focus on manufacturing and specialty service businesses. Weichert has executed four transactions with 3 Rivers, and Mr. Crotty serves on the board of each of the portfolio companies.

Weichert is also the lead investor in Keefe Ventures, based in Morristown, New Jersey, specializing in distressed community banking organizations. After being approved by the Federal Reserve for certain transactions, Weichert has acquired interests in nine banks through its affiliation with Keefe.

Weichert's proprietary investments – separate from its partnership investments – are divided between insurance and technology companies in ten separate transactions.

The combination of these investments, the exposure to global markets and the firm's leadership and network of professional affiliations provides Weichert with significant investment experience and resources to help ensure MRP's success.

L.13. Habitats

The activity is not carried out on, or located such that it is liable to have an adverse effect on:

- a site of Community importance as described in Part I of SI No. 94 of 1997
- a site where consultation has been initiated in accordance with Article 5 of the EU Habitats Directive (92/43/EEC)
- a European site as defined in Article 2 of the European Communities (Natural Habitats) Regulations, 1997

The Environmental Appraisal Report which accompanied the planning application is included with this attachment for information.

L.14. Phosphorus Regulations

The activities undertaken at the facility will not result in effluent containing phosphorus being discharged to waters. The activity will therefore not have an adverse effect on water quality as defined by S.I. No. 258 of 1998 (Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998).