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Appendix D1
Civil Engineering Specification

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**Civil Engineering Specification
Bio-Energy Facility
The Downs
Mullingar
Co. Westmeath**

May 17th 2010

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Client	Revision	Date	Compiled	Checked	Approved
Bio Agrigas Ltd. c/o ORS Consulting Engineers Marlinstown Office Park Mullingar Co. Westmeath	D1	23/05/11	D.H.	D.C	

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1 Executive Summary

The following civil engineering specifications report is submitted in support of a planning application to construct a Bio Energy Plant on lands at The Downs, Mullingar, Co. Westmeath. The plant will consist of an anaerobic Digestion facility that will process up to a maximum of 20,000 tonnes of non hazardous waste material and produce electricity to sell to the national grid. The waste material will be taken primarily from agricultural and food processing industry.

The proposed development is situated on c. 2.30Ha site and located to the north of an existing commercial premises with surrounding lands mainly agriculture at Newdown, The Downs, Mullingar, Co. Westmeath, off the Dublin Sligo Road (N4). The site is bounded to the north by the Regional Road, The Downs to Killucan road (R156), to the east by agricultural land, to the west by agricultural lands and proposed N4 the Downs Grade Separation and to the South by N4 Dual Carriageway.

1.1 Water Usage

The estimated water usage for this development is laid out as follows:

- (1) Production Demand – 4,600M³/Annum
- (2) Human Demand – 54M³/annum

- The proposed development shall use water for both human consumption and for the operation of the plant. It is envisaged that a water/liquid demand of 4,600m³ per annum will be required in total for the production process.
- Separate Rainwater harvesting systems will be employed on site to reduce the water demand (see drawing No. **111_001_810**). This rainwater will be collected in the following locations:
 - i. Leachate tank from silage/storage pits to supply water for production process.
 - ii. Rain water harvesting system from roof of Tanks and Reception Building to supply water for production process.
 - iii. Rain water harvesting system from roof of Admin Building to supply non-potable water to admin building and truck wash area.
- It is expected that the proposed rainwater harvesting system employed on site shall provide enough water for the entire production process.
- The above mentioned tanks have been designed in accordance with BS 8515:2009. (See attached calculation sheets).
- Please note – in the event that the above rainwater collection system does not meet the required water output, due to an extended period of dry weather, water shall be taken from the existing 100mm watermain servicing the existing facility.
- In the event of an extended dry period the water supply to the proposed development will be via a proposed 100mm \varnothing uPVC watermain. The proposed 100mm \varnothing uPVC watermain shall connect to the existing local authority watermain at the main entrance commercial site bordering the development. Please refer to ORS drawing no. **111_001_809**.
- The anticipated water demand for this development will be approximately 0.15 m³ / day with calculations based on E.P.A. standards.

- The watermain will incorporate 4 No. hydrants compliant with BS750 so that no building is situated greater than 46m from same. The watermain shall have a minimum cover of 900mm, and shall be overlain with tape containing a tracer wire.
- A 240m³ fire water storage tank will also be constructed. Please refer to ORS drawing no. **111_001_809** for size and location. Please refer also to correspondence with Westmeath Chief Fire Officer in appendix D of this document

1.2 Surface Water

Storm design calculations are provided in section 2.0 for the proposed surface water pipe work. It is envisaged that the proposed development will result in an increase of impermeable area of 0.699Ha resulting in a flow of 89 litres/second.

- A number of surface water attenuation facilities have been designed in accordance with the Greater Dublin Strategic Drainage Study and shall cater for a 100 year storm event. The attenuation facilities shall be in the form of a concrete tank or similar. See ORS drawing **111_001_808**. All surface water runoff will be attenuated to a runoff of 9.5l/s/ha
- NSB Class 1 Petrol/Oil Interceptors or similarly approved are proposed to be installed before each discharge to receiving waters.
- All secondary manholes and surface water services shall be not more than 12m from the main sewer.
- Reinstatement details for the surface water pipe work shall be as per guidelines set down in the Department of the Environment publication "Recommendations for Site Development Works for Housing Areas".
- All surface water shall be drained from impermeable areas through precast lockable gully traps positioned as per ORS drawing **111_001_807**.
- Surface water runoff from the silage storage pits will be catered for by proposed drainage channels. This runoff will be kept isolated from other rain water runoff and stored in separate concrete tank or similar approved. See ORS drawing **111_001_807**.

1.3 Foul Water

- All head runs within the foul sewer system have been designed in accordance with BS 8301 – Code of Practice for Building Drainage.
- Foul Sewer Design calculations are provided in section 3.0 for the proposed foul sewer pipe work.
- Please refer to ORS drawing no. **111_001_808** for location of discharge points.
- A full site suitability assessment has been carried out and is submitted as part of this application.

1.4 Road Gradients

Road gradients have been kept between 1/20 and 1/200 as per the Department of the Environment publication "Recommendations for Site Development Works at Housing Areas".

Appendix A – Surface Water Design Calculations

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Ireland & Central Eastern Europe

ATTENUATION CALCULATIONS

ORS Ref:

111_001

Attenuation System 1

CLIENT:

PROJECT DESCRIPTION:

DRAWING REFERENCE:

Bio Agrigas
Proposed Development @ New Downs, Mullingar, Co. Westmeath
111_001_807

M560 (mm)

M52d (mm)

16

52

M560/M52d

0.32

Location

SAAR (mm)

Mullingar

929

Return Period (Years)

Duration (mins)	0.5	1	2	5	10	20	30	100
15	4.70	6.10	6.70	9.30	11.40	13.90	15.70	21.00
30	6.20	7.90	8.80	12.20	15.00	18.10	20.20	27.00
60	8.50	10.60	11.90	16.10	19.60	23.50	25.00	34.00
120	10.70	13.20	14.80	19.80	23.70	28.30	31.00	41.00
240	14.50	17.80	19.60	25.50	30.10	35.20	38.00	49.00
360	17.80	21.40	23.50	30.20	35.30	40.70	45.00	57.00
720	22.40	27.00	29.60	38.00	44.40	51.20	56.00	70.00
1440	27.90	33.40	36.20	45.80	53.10	60.40	66.00	83.00
2880	33.60	40.20	43.50	55.10	63.90	72.80	79.00	97.00

Note: 5l/sec/Ha specified by Westmeath Co.Co

Return Period (Years)	100
Allowable Outflow (l/s/ha)	5
Total Site Area (ha)	2.310
Impermeable Area (ha)	0.699
Total Allowable Outflow (l/s)	11.55
90% Impermeable Area (ha)	0.629
Total Green Area (ha)	1.611
10% Green Area (ha)	0.161
Total Contributing Area (ha)	0.790

Total Storage (m³)	241
--------------------	-----

Duration (hours)	Duration (mins)	Rainfall (mm)	Rainfall (m³/ha)	Total Contrib. Area (ha)	Proposed Run-Off (m³)	Allowable Outflow (m³)	STORAGE (m³)
0.25	15	21.00	210	0.790	166	10	156
0.50	30	27.00	270	0.790	213	21	193
1.00	60	34.00	340	0.790	269	42	227
2.00	120	41.00	410	0.790	324	83	241
4.00	240	49.00	490	0.790	387	166	221
6.00	360	57.00	570	0.790	450	249	201
12.00	720	70.00	700	0.790	553	499	54
24.00	1440	83.00	830	0.790	656	998	-342
48.00	2880	97.00	970	0.790	766	1996	-1229



Ireland & Central Eastern Europe

ATTENUATION CALCULATIONS

ORS Ref:

111_001

Attenuation System 2

Bio Agrigas

Proposed Development @ New Downs, Mullingar, Co. Westmeath

111_001_807

CLIENT:

PROJECT DESCRIPTION:

DRAWING REFERENCE:

M560 (mm)	16
M52d (mm)	52

M560/M52d

0.32

Location	Mullingar
SAAR (mm)	929

Return Period (Years)

Duration (mins)	0.5	1	2	5	10	20	30	100
15	4.70	6.10	6.70	9.30	11.40	13.90	15.70	21.00
30	6.20	7.90	8.80	12.20	15.00	18.10	20.20	27.00
60	8.50	10.60	11.90	16.10	19.60	23.50	25.00	34.00
120	10.70	13.20	14.80	19.80	23.70	28.30	31.00	41.00
240	14.50	17.80	19.60	25.50	30.10	35.20	38.00	49.00
360	17.80	21.40	23.50	30.20	35.30	40.70	45.00	57.00
720	22.40	27.00	29.60	38.00	44.40	51.20	56.00	70.00
1440	27.90	33.40	36.20	45.80	53.10	60.40	66.00	83.00
2880	33.60	40.20	43.50	55.10	63.90	72.80	79.00	97.00

Return Period (Years)	100
Allowable Outflow (l/s/ha)	5
Total Site Area (ha)	0.640
Impermeable Area (ha)	0.201
Total Allowable Outflow (l/s)	3.20
90% Impermeable Area (ha)	0.181
Total Green Area (ha)	0.439
10% Green Area (ha)	0.044
Total Contributing Area (ha)	0.225

Total Storage (m³)	69
--------------------	----

Duration (hours)	Duration (mins)	Rainfall (mm)	Rainfall (m³/ha)	Total Contri. Area (ha)	Proposed Run-Off (m³)	Allowable Outflow (m³)	STORAGE (m³)
0.25	15	21.00	210	0.225	47	3	44
0.50	30	27.00	270	0.225	61	6	55
1.00	60	34.00	340	0.225	76	12	65
2.00	120	41.00	410	0.225	92	23	69
4.00	240	49.00	490	0.225	110	46	64
6.00	360	57.00	570	0.225	128	69	59
12.00	720	70.00	700	0.225	157	138	19
24.00	1440	83.00	830	0.225	186	276	-90
48.00	2880	97.00	970	0.225	218	553	-335



Ireland & Central Eastern Europe

ATTENUATION CALCULATIONS

ORS Ref:

111_001

Attenuation System 3

Bio Agrigas

Proposed Development @ New Downs, Mullingar, Co. Westmeath

111_001_807

CLIENT:

PROJECT DESCRIPTION:

DRAWING REFERENCE:

M560 (mm)

16

M52d (mm)

52

M560/M52d

0.32

Location

Mullingar

SAAR (mm)

929

Return Period (Years)

Duration (mins)	0.5	1	2	5	10	20	30	100
15	4.70	6.10	6.70	9.30	11.40	13.90	15.70	21.00
30	6.20	7.90	8.80	12.20	15.00	18.10	20.20	27.00
60	8.50	10.60	11.90	16.10	19.60	23.50	25.00	34.00
120	10.70	13.20	14.80	19.80	23.70	28.30	31.00	41.00
240	14.50	17.80	19.60	25.50	30.10	35.20	38.00	49.00
360	17.80	21.40	23.50	30.20	35.30	40.70	45.00	57.00
720	22.40	27.00	29.60	38.00	44.40	51.20	56.00	70.00
1440	27.90	33.40	36.20	45.80	53.10	60.40	66.00	83.00
2880	33.60	40.20	43.50	55.10	63.90	72.80	79.00	97.00

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Return Period (Years)	100
Allowable Outflow (l/s/ha)	5
Total Site Area (ha)	0.155
Impermeable Area (ha)	0.070
Total Allowable Outflow (l/s)	0.78
90% Impermeable Area (ha)	0.063
Total Green Area (ha)	0.086
10% Green Area (ha)	0.009
Total Contributing Area (ha)	0.071

Total Storage (m ³)	24
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Duration (hours)	Duration (mins)	Rainfall (mm)	Rainfall (m ³ /ha)	Total Contrib. Area (ha)	Proposed Run-Off (m ³)	Allowable Outflow (m ³)	STORAGE (m ³)
0.25	15	21.00	210	0.071	15	1	14
0.50	30	27.00	270	0.071	19	1	18
1.00	60	34.00	340	0.071	24	3	21
2.00	120	41.00	410	0.071	29	6	24
4.00	240	49.00	490	0.071	35	11	24
6.00	360	57.00	570	0.071	41	17	24
12.00	720	70.00	700	0.071	50	33	16
24.00	1440	83.00	830	0.071	59	67	-8
48.00	2880	97.00	970	0.071	69	134	-65

Appendix B – Foul Sewer Design Calculations

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Ireland & Central Eastern Europe

PROPOSED FOUL SEWER DESIGN CALCULATIONS

ORS Ref:
111_001

Bio Agrigas

111_001_808_D1

Proposed Development @ New Downs, Mullingar, Co. Westmeath

CLIENT:
PROJECT DESCRIPTION:
DRAWING REFERENCE:

Unit Type	Number	Flow (l/day/person)	BOD (g/day/person)	Persons	Total Flow (l/day)	Total BOD (g)	P.E.
Administration Building	1	60	30	5	300	150	1.666666667

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					300	150	1.666666667
						300	litres/day
						0.00	litres/second
						0.02	l/s @ 6 DWF

Appendix C – Water Demand Calculations

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Administration Building:

- 60 litres/day/person
- Assuming 5 staff
- $5 \times 60 = 600 \text{ l/day} = 0.3 \text{ m}^3/\text{day}$

As a rainwater harvesting system is proposed to be utilized for the administration building the water demand will decrease. It is assumed this system will reduce the water demand by up to 50%. Therefore the calculated water demand for the administration building is 150L per day

Daily Water Demand = $0.15 \text{ m}^3/\text{day}$

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Appendix D – Fire Officer Correspondence

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Colin Bolger

From: Pat Hunt [phunt@westmeathcoco.ie]
Sent: 02 March 2011 14:34
To: Brian Collentine
Cc: Yvonne Haughey
Subject: Meeting to discuss bio-energy facility at the Downs, Mullingar (14h30 01.03.11)

Follow Up Flag: Follow up
Flag Status: Red

Brian,

Further to the meeting yesterday to discuss the above, I'd just like to note, for the record, a synopsis of what we discussed:

- a) The proposed site is located in Newdowns, The Down's, Mullingar in agricultural lands located 300m north-east of the proposed R156/N4 interchange
- b) The site covers an area of 250mx300m approx and contains 3 No. storage pits (construction similar to silage pits), 2 No. Anaerobic digester tanks (approx 8m high above existing ground), 2 No. Post-Digestion Storage Tanks (8m high over existing ground, 2m beneath it), Pre-Storage Tanks (8m above existing ground level), 1 No. Gas Clearing Vessel (6m high) and 1 No. Reception Building and 1 No. Weighbridge/Staff Accommodation Building.
- c) The proposed site is served with a single access with internal access around the site for heavy goods vehicles/maintenance/delivery trucks. 24 hour security is provided and a small number of staff is employed at the facility.

From a fire safety perspective/fire safety certification perspective we would require the following:

- a) A ringed watermains around the site with hydrants located on same in accordance with the requirements of Section 5, Technical Guidance Document B (2006)
- b) The only buildings that require a formal fire safety certificate application are the Weighbridge Building and Reception Building (refer Drawing No. 111/01/200)
- c) On completion of the building, an orientation visit for the local fire brigade be provided to allow the development of a pre-fire plan for the facility.

Regards.....Pat

Pat Hunt, Senior Assistant Chief Fire Officer, Westmeath Fire & Rescue Service, Athlone Fire Station, Beechpark, Athlone, Co. Westmeath

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