Appendix D2

Site Suitability Assessment

Engineering a Sustainable Future

ORS Consulting Engineers / ORS Building / Marlinstown Office Park / Mullingar, Co. Westmeath / Ireland

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Site Suitability Assessment, Bioenergy Facility, The Downs, Mullingar, Co. Westmeath

March 18th 2011

Client	Revision	Date	Compiled	Checked	Approved
Bio Agrigas Ltd.	D1	18/03/2011	JB		
The Downs, Mullingar, Co. Westmeath					

SITE CHARACTERISATION FORM

File Reference: 111-001-17s-110318SSA1jb

1.0 GENERAL DETAILS (From planning application)

Prefix: Mr. First Name: Thomas Surname: Flynn (Bio Agrigas Ltd.)

Address: The Downs, Mullingar, Co. Westmeath

Site Location and Townland: The Downs, Mullingar, Co. Westmeath

Telephone No: 044 9343182 Fax No: N/A

E-Mail: N/A

Maximum no. of Residents: 4 No. of Double Bedrooms: 0 No. of Single Bedrooms: 0

Proposed Water Supply: Mains ✓ Private Well/Borehole ☐ Group Well/Borehole ☐

2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type): Cut, Peat - Please note EPA Maps (Appendix C)

Aquifer Category: Regionally Important ☐ Locally Important LI Poor ☐

Vulnerability: Extreme ☐ High ☐ Moderate ✓ Low ☐ High to Low ☐ Unknown ☐

Bedrock Type: DPUL - Dinantian Pure Unbedded Limestones - Refer to GSi Maps (Appendix B)

Name of Public/Group Scheme Water Supply within 1 km: None within 250m

Groundwater Protection Scheme (Y/N): No Source Protection Area: SI ☐ SO ☐

Groundwater Protection Response: R1

Presence of Significant Sites (Archaeological, Natural & Historical): None Visible within 250m radius

Past experience in the area: None Visible within 250m radius

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

From the desk study and the soil classification (Cut, Peat), we can assume that the potential suitability of the site is poor. Groundwater and Surface Water are the potential targets at risk. It appears from the available maps that we have all required site clearances. Because of the R1 classification, a standard depth of trial hole is sufficient (2.5m).

Note: Only information available at the desk study stage should be used in this section.

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment

Landscape Position: Sited on Backslope

Slope: Steep (>1:5) ☐ Shallow (1:5-1:20) ☐ Relatively Flat (<1:20) ☑

Surface Features within a minimum of 250m (Distance To Features Should Be Noted In Metres)

Houses: None within 250m, Agricultural Hardware Store and Farm 200m to South (Refer to Appendix A)

Existing Land Use: Existing greenfield for pasture and grazing

Vegetation Indicators: Rushes evident to south of site indicating possibility of wet conditions

Groundwater Flow Direction: South West to North East - Refer to Appendix A and Appendix G

Ground Condition: Ground condition exhibits no trampled damage

Site Boundaries: Native Hedgerows and Trees

Roads: Off National Primary Route (N6) - 400m to South

Outcrops (Bedrock And/Or Subsoil): None Within 250m

Surface Water Ponding: None Within 250m

Lakes: None Within 250m

Beaches/Shellfish: None Within 250m

Areas/Wetlands: None Within 250m

Karst Features: None Within 250m

Watercourse/Stream*: Trib. of Riverstown River (100m to NE)

Drainage Ditches*: Ditch 10m to West (Refer to Appendix A)

Springs / Wells*: None Within 250m (Refer to Appendix B)

Comments:
(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

Direction of Groundwater flow is South West to North East
1. Following the visual assessment, we can assume that the potential suitability of the site to treat the wastewater is poor i.e. from the results of the desk study and visual assessment, the hydraulic conductivity may be inadequate.
2. From our desk study and visual assessment, it would appear that minimum separation distances are currently complied with and the site is of sufficient area to continue this trend.
3. We have moved from, after the desk study, an idea of whether groundwater as a resource, wells and/or surface water are likely to be at risk or not to one where we know with more certainty if they are at risk i.e. The presence of a drainage ditch to the west of the site and also the presence of rushes to the south may indicate that a conventional septic tank may not be acceptable but is subject to trial hole investigations and to results of P and T Tests.

***Note and record** water level

3.2 **Trial Hole** (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas, which are at or adjacent to significant sites (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 2.40

Depth from ground surface to bedrock (m) (if present): 0.00

Depth from ground surface to water table (m) (if present): 0.80

Depth of water ingress: 0.00

Rock type (if present): Waulsortian mudbank limestone

Date and time of excavation: 12/03/2011 14:45

Date and time of examination: 15/03/2011 08:45

	Depth of P/T Test*	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m		CLAY Cohesive,Threads = 4 Av. Ribbons = 100mm	Not Dilatant	Granular	Low & Uncompact	Brown	Closely Spaced Root Channels
0.2 m							
0.3 m							
0.4 m	P Test	SILT/CLAY (95.050mOD) Cohesive Threads = 5 Av. Ribbons = 115mm	Not Dilatant	Blocky	High & Uncompact	Grey	Few Root Channels
0.5 m							
0.6 m							
0.7 m							
0.8 m	T Test	Water Table below this level (94.450mOD)					
0.9 m							
1.0 m							
1.1 m							
1.2 m							
1.3 m							
1.4 m							
1.5 m							
1.6 m							
1.7 m							
1.8 m							
1.9 m							
2.0 m							
2.1 m							
2.2 m							
2.3 m							
2.4 m		Base of Hole					
2.5 m		Note: No Bedrock Encountered Mottling evident 0.25m BGL					
2.6 m							
2.7 m							
2.8 m							
2.9 m							
3.0 m							

Evaluation:

Water was encountered 0.8m from surface and evidence of mottling encountered 0.25m below surface thus indicating saturated subsoil unsuitable for percolation. Groundwater and Surface water are the potential targets at risk. Note: Desk Assessment indicated the soil type as Peat, however on-site visual inspection of the Trial Hole and Classification of Soil Samples from each Horizon have shown that this is not the case, as indicated above.

Likely T value: 50.00

Note: *Depth of percolation test holes should be indicated on log above. (Enter P or T at depts as appropriate).
** See Appendix E for BS 5930 classification.
*** 3 samples to be tested for each horizon and results should be entered above for each horizon.
**** All signs of mottling should be recorded.

3.3(a) Percolation ("T") Test for Deep Subsoils and/or Water Table

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	810	815	800
Depth from ground surface to base of hole (mm) (B)	1,200	1,195	1,210
Depth of hole (mm) [B - A]	390	380	410
Dimensions of hole [length x breadth (mm)]	350 x 350	355 x 340	365 x 355

Step 2: Pre-Soaking Test Holes

Date and Time pre-soaking started						

Each hole should be pre-soaked twice before the test is carried out. Each hole should be empty before refilling.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test			
Time filled to 400 mm			
Time water level at 300 mm			
Time to drop 100 mm (T_{100})	0.00	0.00	0.00
Average T_{100}			0.00

If T_{100} > 300 minutes then T-value >90 – site unsuitable for discharge to ground
If $T_{100} \leq 210$ minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1			0.00			0.00			0.00
2			0.00			0.00			0.00
3			0.00			0.00			0.00
Average Δt Value			0.00			0.00			0.00
	Average Δt/4 = [Hole No.1]		0.00 (t_1)	Average Δt/4 = [Hole No.2]		0.00 (t_2)	Average Δt/4 = [Hole No.3]		0.00 (t_3)

Result of Test: T = 0.00 (min/25 mm)

Comments:

T Test not carried out as level of Water Table is above invert level of T Test Holes.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No.	1				2				3			
Fall of water in hole (mm)	Time Factor = T_f	Time of fall (mins) = T_m	K_{fs} = T_f / T_m	T – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	K_{fs} = T_f / T_m	T – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	K_{fs} = T_f / T_m	T – Value = 4.45 / K_{fs}
300 - 250	8.1				8.1				8.1			
250 - 200	9.7				9.7				9.7			
200 - 150	11.9				11.9				11.9			
150 - 100	14.1				14.1				14.1			
Average T- Value	T- Value Hole 1= (t_1)			0.00	T- Value Hole 1= (t_2)			0.00	T- Value Hole 1= (t_3)			0.00

Result of Test: T = 0.00 (min/25 mm)

Comments:

T Tests were saturated and therefore T tests were not carried out.

3.3(b) Percolation ("P") Test for Shallow Soil / Subsoils and/or Water Table

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	410	380.00	390
Depth of hole (mm)	410	380	390
Dimensions of hole [length x breadth (mm)]	325 x 310	305 x 310	295 x 300

Step 2: Pre-Soaking Test Holes

Date and Time pre-soaking started	14/03/2011	11:32	14/03/2011	11:36	14/03/2011	11:40

Each hole should be pre-soaked twice before the test is carried out. Each hole should be empty before refilling.

Step 3: Measuring P_{100}

Percolation Test Hole No.	1	2	3
Date of test	15/03/2011	15/03/2011	15/03/2011
Time filled to 400 mm	09:11	09:14	09:16
Time water level at 300 mm	10:04	10:06	10:19
Time to drop 100 mm (P_{100})	53.00	52.00	63.00
Average P_{100}			56.00

If P_{100} > 300 minutes then T-value >90 – site unsuitable for discharge to ground
If $P_{100} \leq 210$ minutes then go to Step 4;
If P_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $P_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δp (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δp (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δp (min)
1	10:04	10:55	51.00	10:06	10:58	52.00	10:19	11:19	60.00
2	10:56	11:53	57.00	11:00	11:51	51.00	11:20	12:23	63.00
3	11:55	12:53	58.00	11:52	12:47	55.00	12:27	13:32	65.00
Average Δp Value			55.33			52.67			62.67
	Average Δp/4 = [Hole No.1]		13.83 (p_1)	Average Δp/4 = [Hole No.2]		13.17 (p_2)	Average Δp/4 = [Hole No.3]		15.67 (p_3)

Result of Test: P = 14.22 (min/25 mm)

Comments:

P Test Value is between 3 and 75 and has therefore passed. Site is suitable for a packaged wastewater treatment system with polishing filter at ground surface or overground provided invert level of percolation pipes is at least 900mm above level of water table (94.450mOD).

Step 5: Modified Method (where $P_{100} > 210$ minutes)

Percolation Test Hole No.	1				2				3			
Fall of water in hole (mm)	Time Factor = T_f	Time of fall (mins) = T_m	K_{fs} = T_f / T_m	P – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	K_{fs} = T_f / T_m	P – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	K_{fs} = T_f / T_m	P – Value = 4.45 / K_{fs}
300 - 250	8.1				8.1				8.1			
250 - 200	9.7				9.7				9.7			
200 - 150	11.9				11.9				11.9			
150 - 100	14.1				14.1				14.1			
Average P- Value	P- Value Hole 1= (p_1)			0.00	P- Value Hole 1= (p_2)			0.00	P- Value Hole 1= (p_3)			0.00

Result of Test: P = 0.00 (min/25 mm)

Comments:

3.4 The following associated Maps, Drawings and Photographs should be appended to this site characterisation form.

1. Discovery Series 1:50,000 Map indicating overall drainage, groundwater flow direction and housing density in the area.
2. Supporting maps for vulnerability, aquifer classification, soil, bedrock.
3. North point should always be included.
4. (a) Sketch of site showing measurements to Trial Hole location and
   (b) Percolation Test Hole locations,
   (c) wells and
   (d) direction of groundwater flow (if known),
   (e) proposed house (incl. distances from boundaries)
   (f) adjacent houses,
   (g) watercourses,
   (h) significant sites
   (i) and other relevant features.
5. Cross sectional drawing of the site and the proposed layout[1] should be submitted.
6. Photographs of the trial hole, text holes and site (date and time referenced).

[1] The calculated percolation area or polishing filter area should be set out accurately on the site layout drawing in accordance with the code of practice's requirements.

4.0 CONCLUSION of SITE CHARACTERISATION

Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system(s) that is (are) appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater.

Not Suitable for Development ☐

Suitable for [1]		**Discharge Route**
1. Septic tank system (septic tank and percolation area)	No	Discharge to Ground Water
2. Secondary Treatment System		
a. septic tank and filter system constructed on-site and polishing filter; or	No	
b. packaged wastewater treatment system and polishing filter	Yes	

5.0 RECOMMENDATION

Propose to install: Packaged wastewater treatment system and polishing filter

and discharge to: Ground Water

Trench Invert level (m): 96.20

Site Specific Conditions (e.g. special works, site improvement works testing etc.

- Proposed to install Bord na Móna Platinum Sewage Treatment Plant followed by Puraflo Peat Modules followed by a SAND polishing filter.

- All elements of the treatment system should be subject to an annual maintenance agreement.

- Propose trench invert of 96.200mOD.

- Refer to attached design drawings (Appendix G)

- Note proposal is to install a Bord na Móna Platinum Sewage Treatment Plant followed by Puraflo Peat Modules followed by a SAND polishing filter which will yield a 5:5 discharge quality. ORS feel this is warranted due to the proximity of the nearest receptor (water table).

- Testing should be carried out following installation so as to ensure that final effluent discharge achieves 5:5 (BOD:TSS)

[1] note: more than one option may be suitable for a site and this should be recorded

[2] A discharge of sewage effluent to "waters" (definition includes any or any part of any river, stream, lake, canal, reservoir, aquifer, pond, watercourse or other inland waters, whether natural or artificial) will require a licence under the Water Pollution Acts 1977-90. Refer to Section 2.6.2.

6.0 TREATMENT SYSTEM DETAILS

SYSTEM TYPE: Septic Tank System

Tank Capacity (m^3)		Percolation Area		Mounded Percolation Area	
		No. of Trenches		No. of Trenches	
		Length of Trenches (m)		Length of Trenches (m)	
		Invert Level (m)		Invert Level (m)	

SYSTEM TYPE: Secondary Treatment System

Filter Systems

Media Type	Area (m^2)*	Depth of Filter	Invert Level
Sand/Soil			
Soil			
Constructed Wetland			
Other	5.75	0.80	94.38

Package Treatment Systems

Type		
Bord na Mona Platinum		
Capacity PE	8.00	
Sizing of Primary Compartment	3.25	m^3

SYSTEM TYPE: Tertiary Treatment System

Polishing Filter: Surface Area (m^2)*	72.00	**Package Treatment System:** Capacity (pe)	4.00
or **Gravity Fed:**		**Constructed Wetland:** Surface Area (m^2)*	
No. of Trenches			
Length of Trenches (m)			
Invert Level (m)			

DISCHARGE ROUTE:

Groundwater	✓	Hydraulic Loading Rate * ($l/m^2.d$)	10.00
Surface Water **		Discharge Rate (m^3/hr)	

TREATMENT STANDARDS:

Treatment System Performance Standard (mg/l)	BOD	SS	NH_3	Total N	Total P
	5.00	5.00	5.00	2.50	2.50

QUALITY ASSURANCE:

Installation & Commissioning	On-going Maintenance
System should be constructed and commissioned under the supervision of a qualified site suitability assessor and a contractor with experience working to EPA CoP 2009 standards and requirements.	All elements of the treatment system should be subject to an annual maintenance agreement.

* Hydrolic loading rate is determined by the percolation rate of subsoil

** Water Pollution Act discharge licence required

7.0 SITE ASSESSOR DETAILS

Company: ORS Consulting Engineers

Prefix: Mr. First Name: John Surname: Brennan

Address: ORS Building,
Marlinstown Office Park,
Mullingar,
County Westmeath

Qualifications/Experience: Civil Engineer and Qualified FETAC Site Suitability Assessor (Level 7)

Date of Report: 24/05/2011

Phone: 044 934 2518 Fax: 044 934 4573 e-mail j.brennan@ors.ie

Indemnity Insurance Number: Refer to copy of PI Insurance previously submitted to Westmeath County Council

Signature: _____

Appendix A – OSI Maps (O.S. Ireland under licence no. EN 0045806)

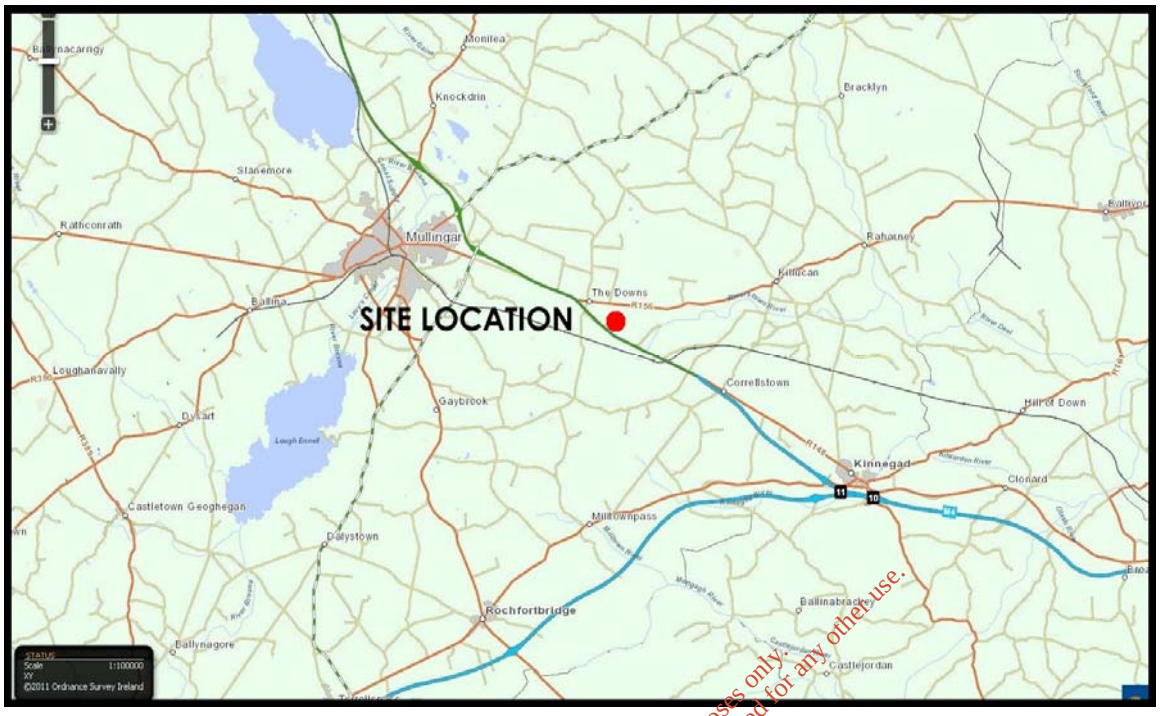


Figure 1: OSI Map 1

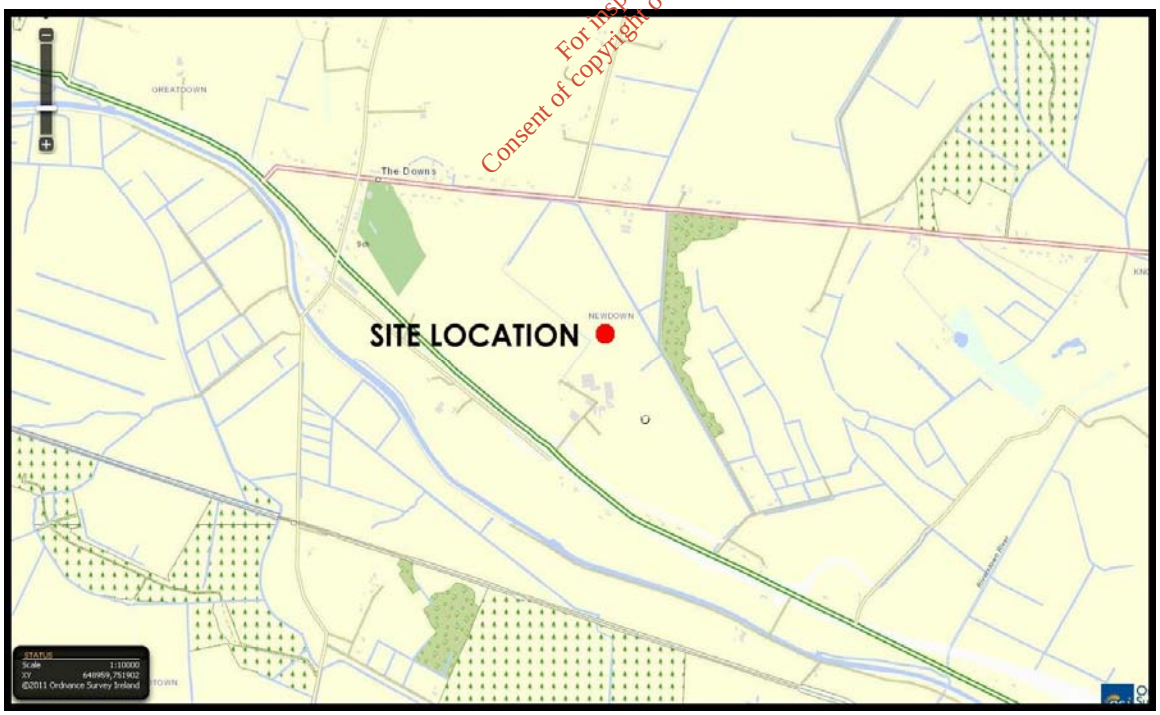


Figure 2: OSI Map 2

Figure 3: OSI Map 3 showing Direction of Groundwater Flow

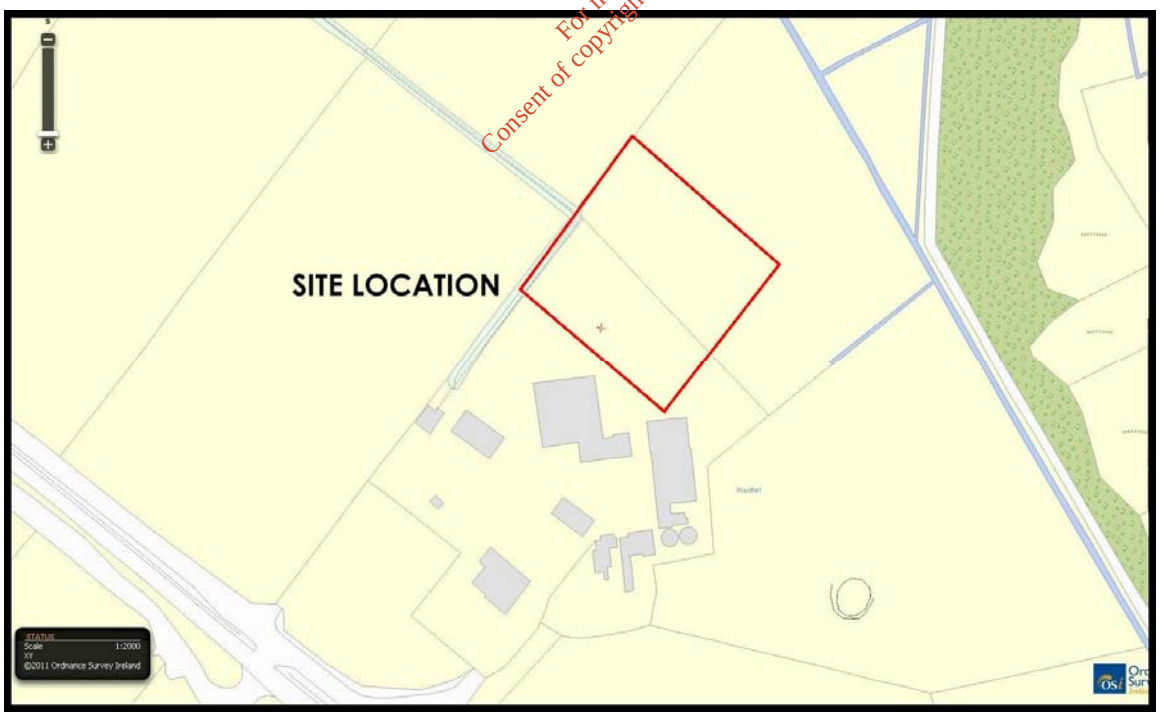
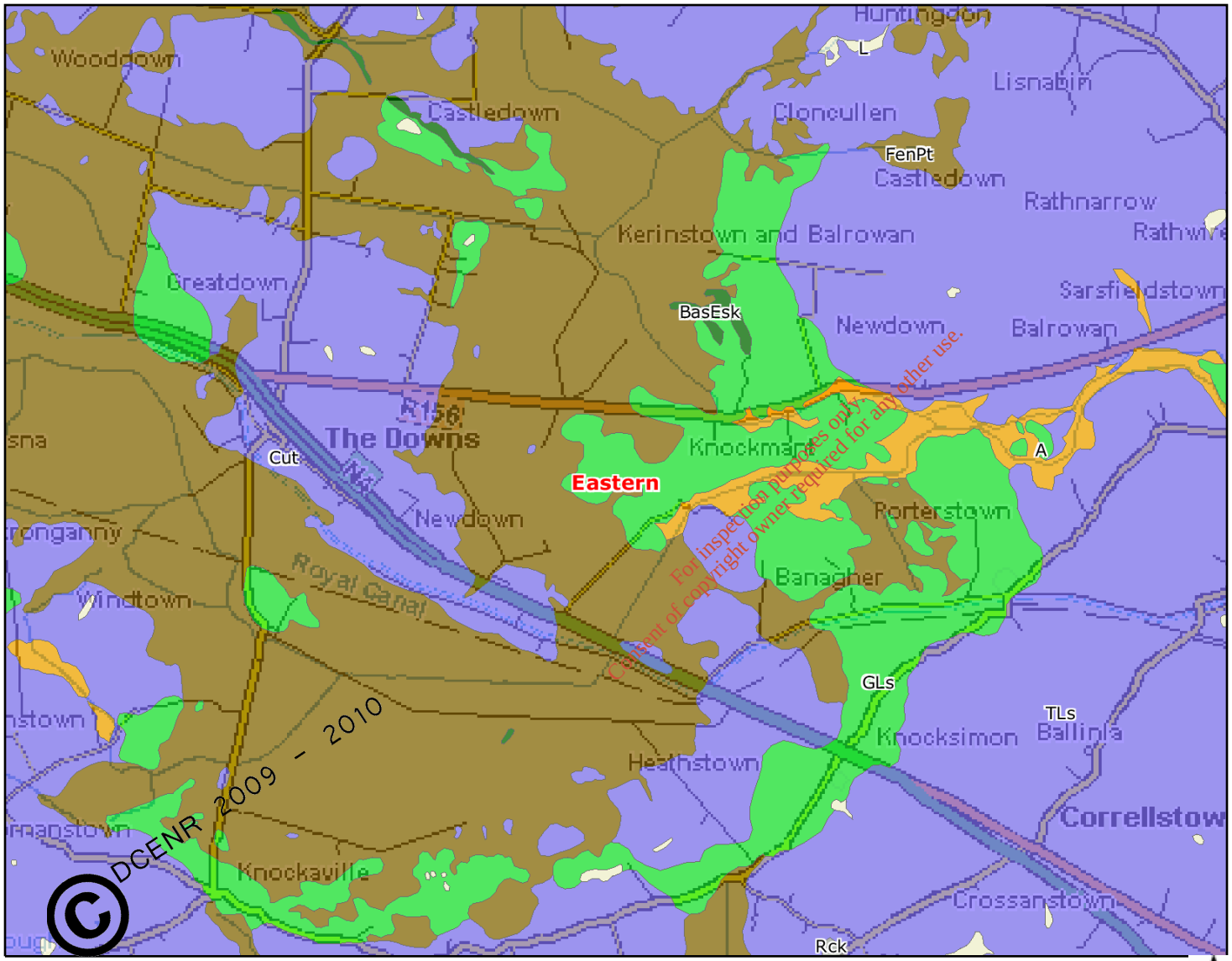


Figure 4: OSI Map 4 showing Direction of Groundwater Flow

Appendix B – GSI Maps (P.T.O.)

111_001_Teagasc Subsoils (Peat)



0 1000 2000 3000 m.

Map center: 252399, 250530

Legend

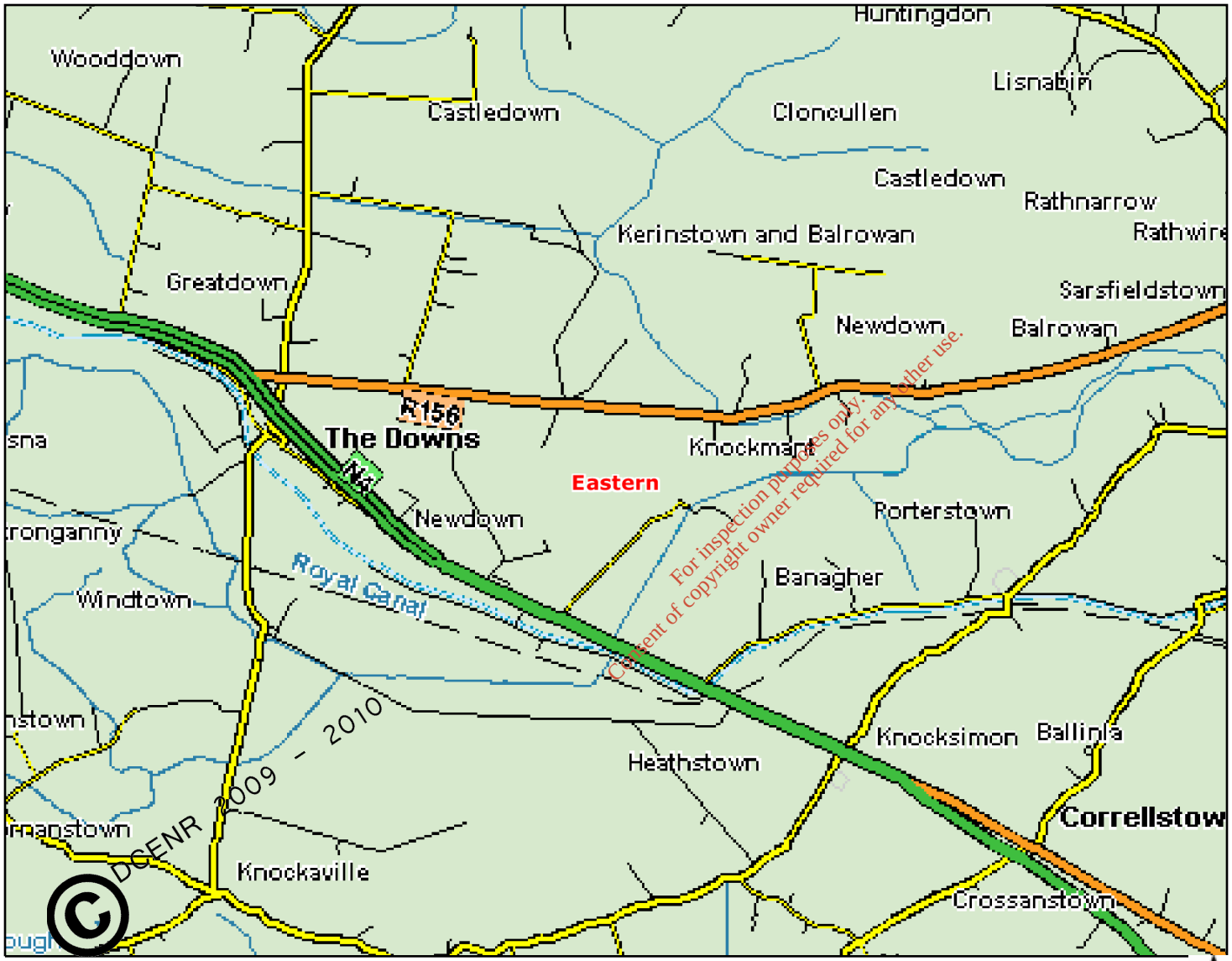
RBD Subsoils

- Alluvium
- Beach sands and gravels
- Bedrock outcrop and subcrop
- Esker sands and gravels
- Glaciofluvial sands and gravels
- Lake sediments
- Made ground
- Marine/estuarine silts and clays
- Marsh
- Peat
- Scree
- Till derived chiefly from Devonian sandstones
- Till derived chiefly from Lower Palaeozoic rocks
- Till derived chiefly from Namurian rocks
- Till derived chiefly from granite
- Till derived chiefly from limestone
- Till derived chiefly from metamorphic rocks
- Till derived from metamorphic rocks
- Till derived from mixed Devonian and Carboniferous rocks
- Water
- Windblown sands
- RBD Boundaries

Scale: 1:40,000

Snapshot Date: 16-Mar-2011

111_001_Source Protection Area



0 1000 2000 3000 m.

Map center: 252399, 250530

Legend

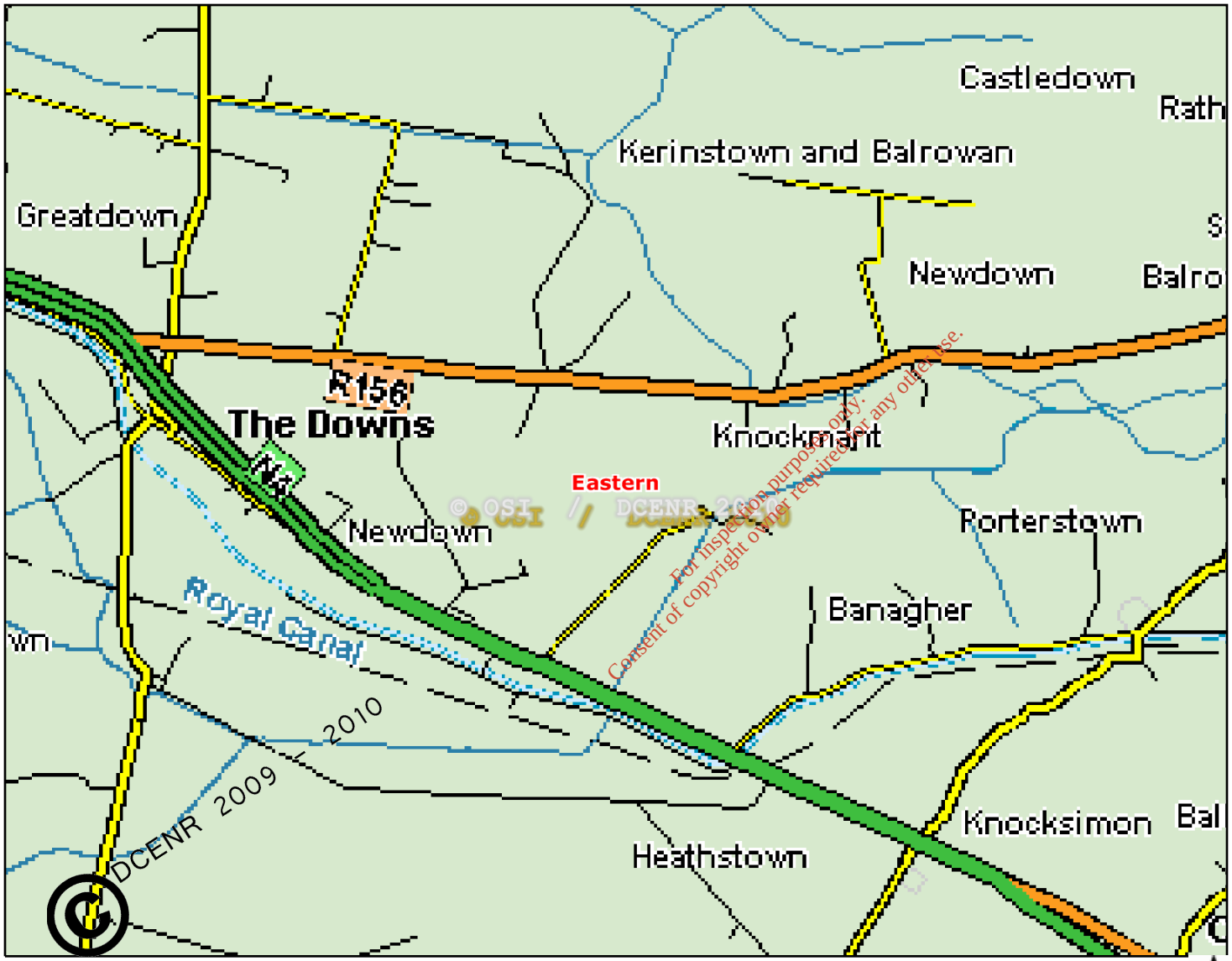
Source Protection Area

- SI - Inner Protection Area
- SO - Outer Protection Area
- RBD Boundaries

Scale: 1:40,000

Snapshot Date: 16-Mar-2011

111_001_National Draft Gravel Aquifer Map



Legend

National Draft Gravel Aquifer Map

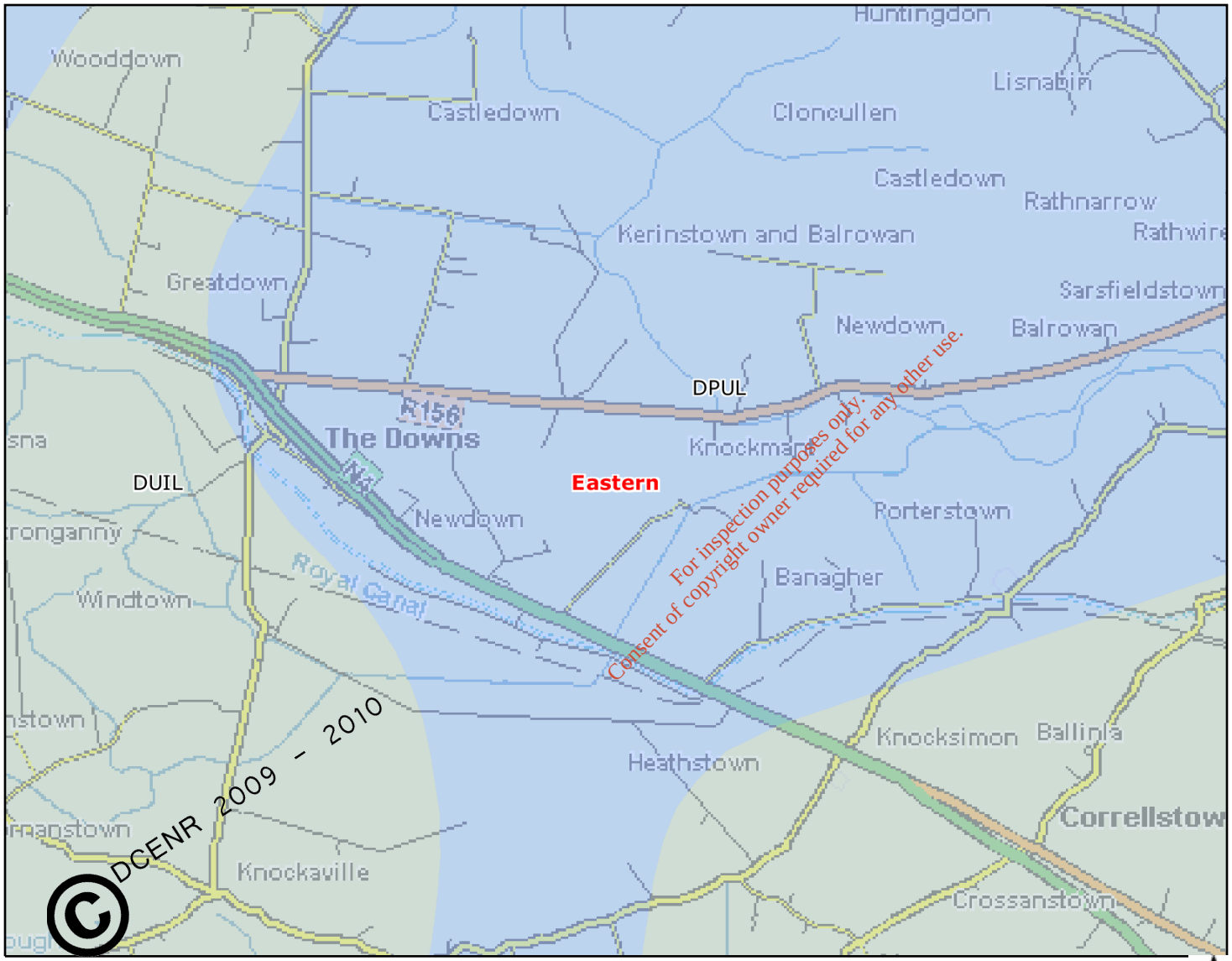
- Rg - Regionally important, extensive sand/gravels aquifers
- Lg - Locally important, sand/gravel aquifers
- No gravels present
- Not Mapped
- RBD Boundaries
- Watermark

Scale: 1:30,000

Map center: 252399, 250530

Snapshot Date: 16-Mar-2011

111_001_National Draft Generalised Bedrock (DPUL)



0 1000 2000 3000 m.

Map center: 252399, 250530

Legend

National Draft Generalised Bedrock Map

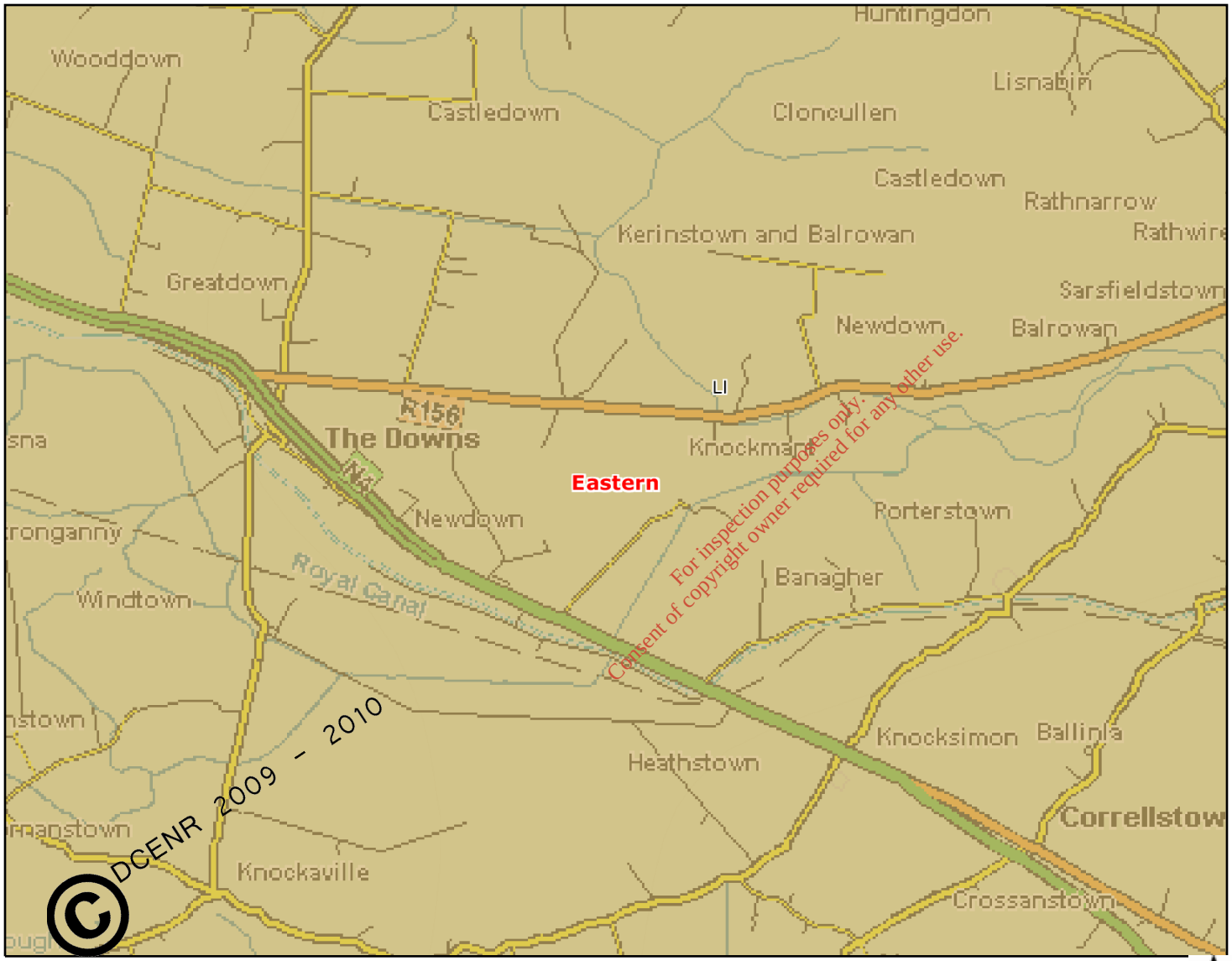
- BV - Basalts and other Volcanic rocks
- CM - Cambrian Metasediments
- DDL - Dinantian Dolomitised Limestones
- DESSL - Dinantian early Sandstones, Shales and Limestones
- DKS - Devonian Kiltorcan type Sandstones
- DLIL - Dinantian Lower Impure Limestones
- DMSC - Dinantian Mudstones and Sandstones Cork Group
- MSSL - Dinantian Mixed Sandstones, Shales and Limestones
- DORS - Devonian Old Red Sandstones
- DPBL - Dinantian Pure Bedded Limestones
- DPUL - Dinantian Pure Unbedded Limestones
- DS - Dinantian Sandstones
- DSL - Dinantian Shales and Limestones
- DUIL - Dinantian Upper Impure Limestones
- GII - Granites and other Igneous Intrusive rocks
- NSA - Namurian Sandstones
- NSH - Namurian Shales
- NU - Namurian Undifferentiated
- OM - Ordovician Metasediments
- OV - Ordovician Volcanics
- PM - Precambrian Marbles
- PQGS - Precambrian Quartzites, Gneisses and Schists
- PTMG - Permo Triassic Mudstones and Gypsum
- PTS - Permo Triassic Sandstones
- SMV - Silurian Metasediments and Volcanics
- WSA - Westphalian Sandstones
- WSH - Westphalian Shales

RBD Boundaries

Scale: 1:40,000

Snapshot Date: 16-Mar-2011

111_001_National Draft Bedrock Aquifer Map (LI)



0 1000 2000 3000 m.

Map center: 252399, 250530

Legend

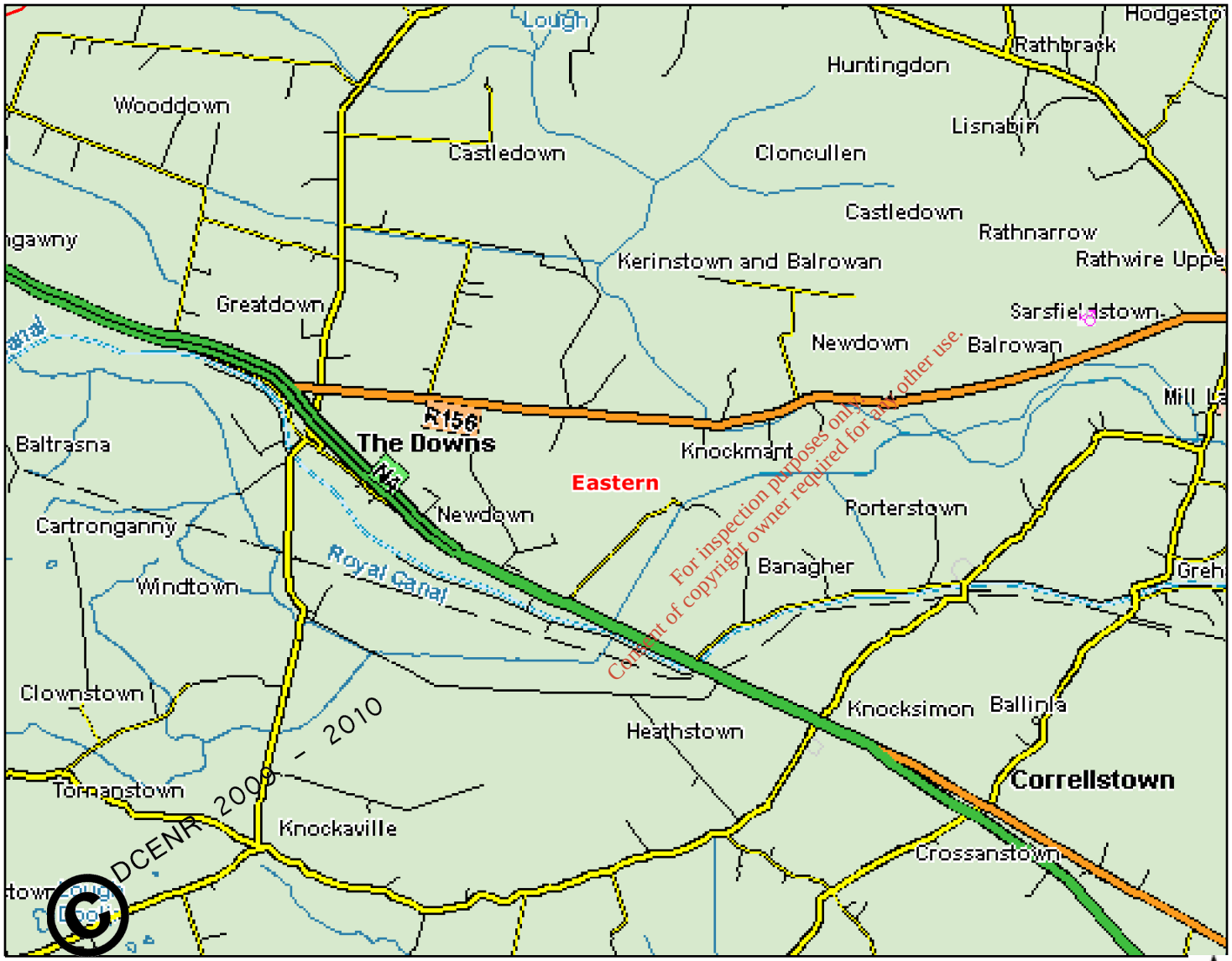
National Draft Bedrock Aquifer Map

- Rf - Regionally Important Aquifer - Fissured bedrock
- Rk - Regionally Important Aquifer - Karstified
- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- Rkc - Regionally Important Aquifer - Karstified (conduit)
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Lk - Locally Important Aquifer - Karstified
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Unclassified
- RBD Boundaries

Scale: 1:40,000

Snapshot Date: 16-Mar-2011

111_001_Karst Features



Map center: 252399, 250530

Legend

Karst Features

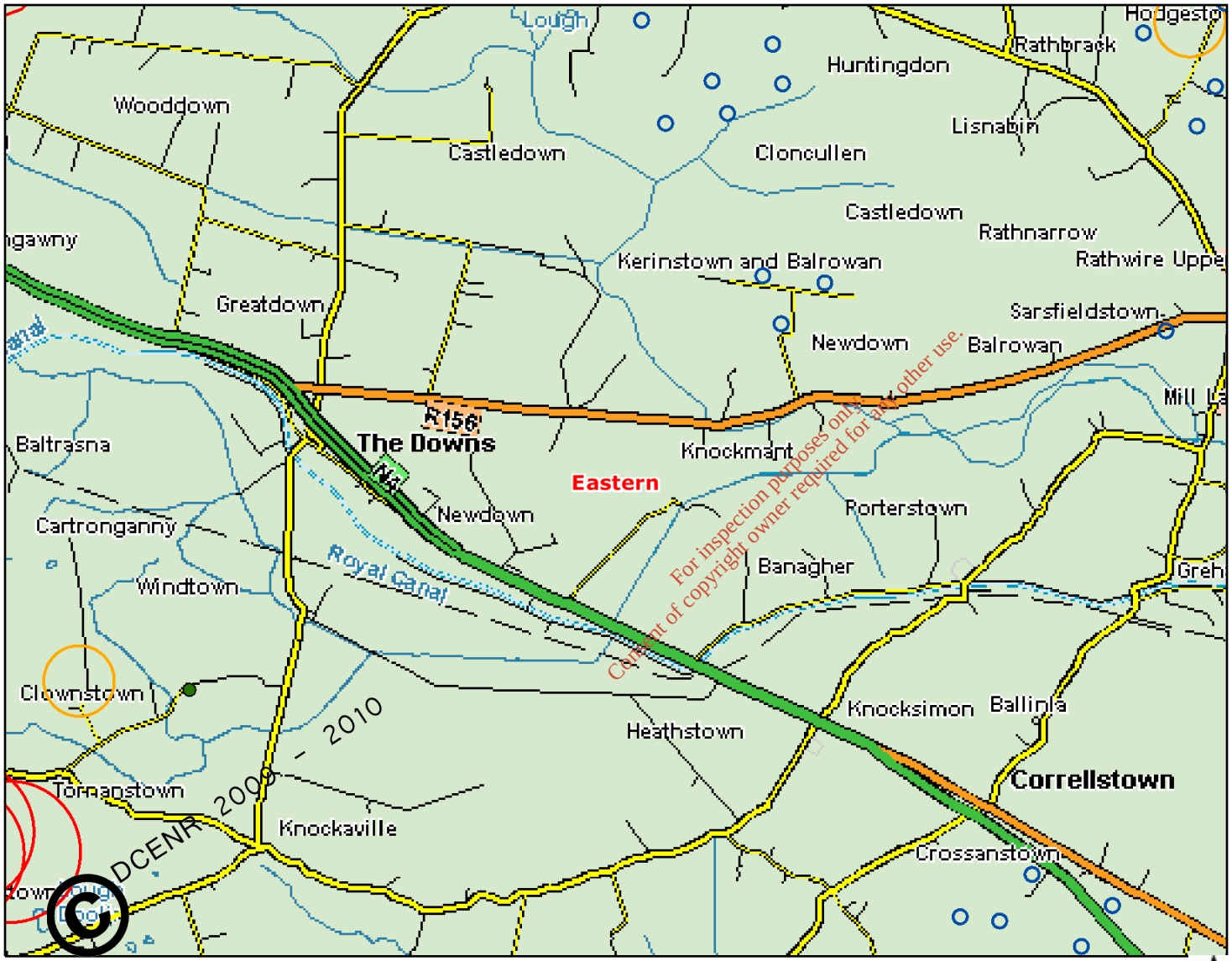
- Borehole
- Cave
- Dry Valley
- Enclosed Depression
- Estevelle
- Spring
- Superficial Solution Features
- Swallow Hole
- Turlough

RBD Boundaries

Scale: 1:45,000

Snapshot Date: 16-Mar-2011

111_001_Groundwater Well Data



0 1200 2400 3600 m.

Map center: 252399, 250530

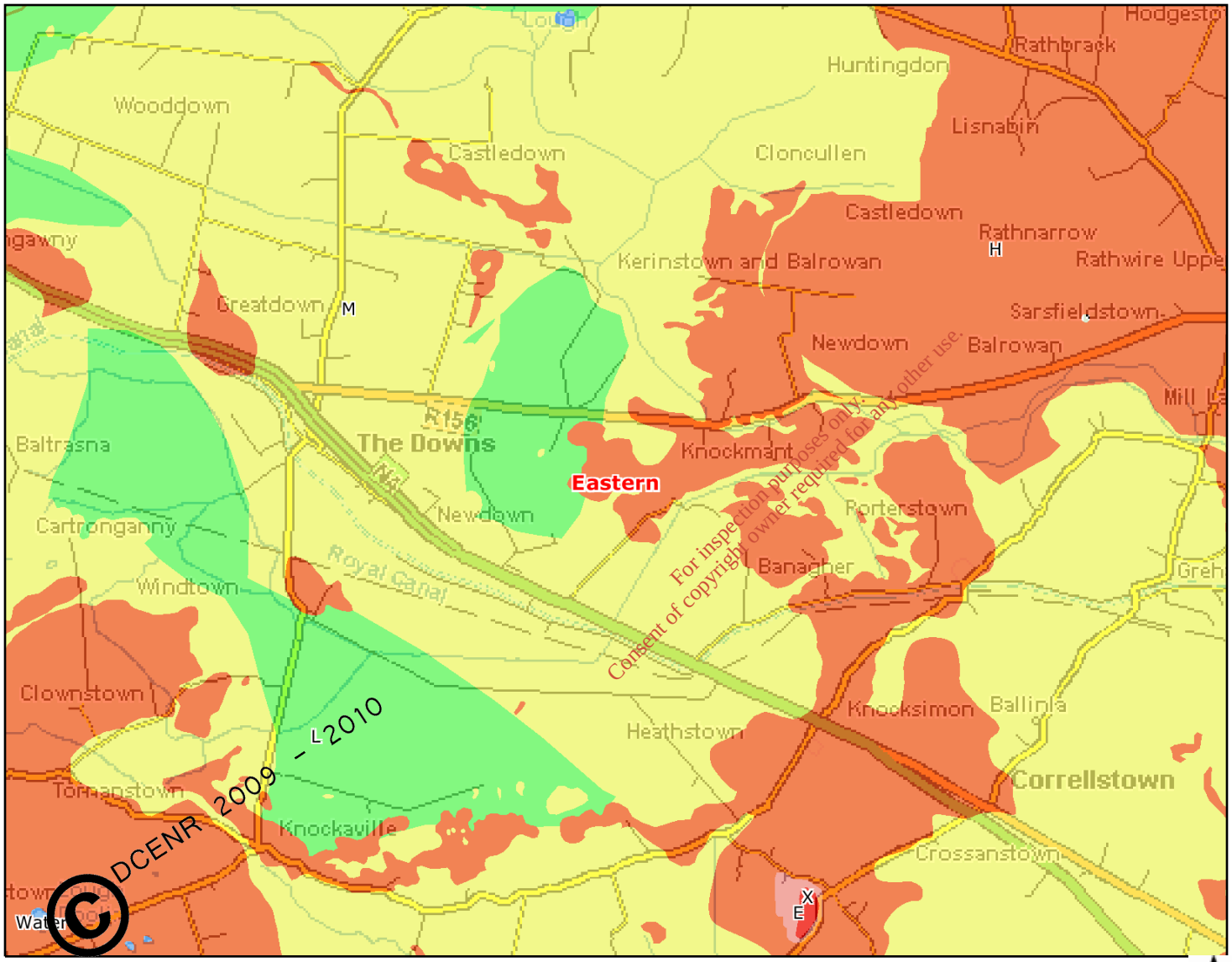
Legend

- Wells Accuracy within 10m to 50m
- Wells Accuracy within 100m
- Wells Accuracy within 200m
- Wells Accuracy within 500m
- Wells Accuracy within 1km
- RBD Boundaries

Scale: 1:45,000

Snapshot Date: 16-Mar-2011

111_001_Eastern Interim Vulnerability



0 1200 2400 3600 m.

Map center: 252399, 250530

Legend

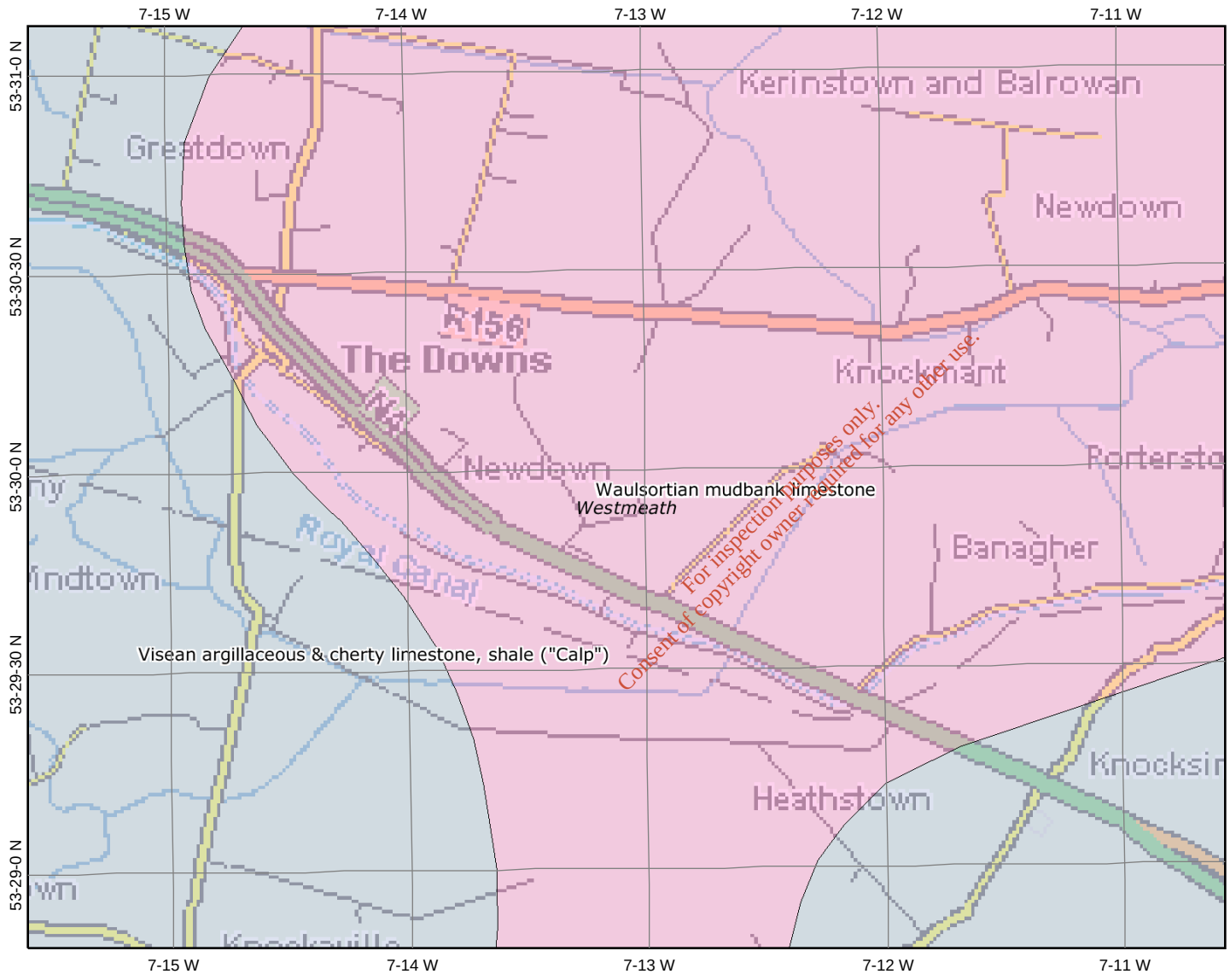
Interim Vulnerability

- E (Rock near Surface or Karst)
- E - Extreme
- H - High
- M - Moderate
- L - Low
- HL - High to Low. Only an interim study took place.
- Water
- RBD Boundaries

Scale: 1:45,000

Snapshot Date: 16-Mar-2011

111_001_Bedrock_1_1 Million Solid Geology



Map center: 251890, 250203

Legend

Bedrock Geology 1:1 Million

- Appin Group, Dalradian, schist, marble, quartzite
- Argyll Group, Dalradian, schist, marble, quartzite, amphibolite
- Cambrian greywacke, slate, quartzite
- Carboniferous volcanic rocks
- Cretaceous chalk, flint, glauconitic sandstone
- Devonian volcanic rocks
- Grampian Group, Dalradian, schist
- Jurassic mudstone & limestone
- Lower-Middle Ordovician slate, sandstone, greywacke, conglomerate
- Lower-Middle Ordovician volcanic rocks
- Mesoproterozoic gneiss
- Meta-dolerite, meta-gabbro
- Mid. Devonian ORS, sandstone, siltstone & mudstone
- Middle-Upper Ordovician slate, sandstone, greywacke, conglomerate
- Middle-Upper Ordovician volcanic rocks
- Moffat Shale - facies shale & greywacke (Ordovician-Silurian)
- Namurian shale, sandstone, siltstone & coal
- Neoproterozoic schist and gneiss
- Oligocene clay, sand & lignite
- Ordovician granitic rocks
- Ordovician metagabbro & orthogneiss suite (Con…)
- Palaeocene columnar tholeiitic basalt lava
- Palaeocene laterite, bauxite & lithomarge
- Palaeocene olivine basalt lava (Lower Basalt Fm.)
- Palaeocene olivine basalt lava (Upper Basalt Fm.)

111_001_Bedrock Faults 100k

0 1.5 3 4.5 km.

Map center: 252399, 250530

Legend

- Bedrock Faults 100k
- RBD Boundaries

Scale: 1:60,000

Snapshot Date: 16-Mar-2011

Appendix C – EPA and NPWS Maps

Figure 5: EPA Soils Data

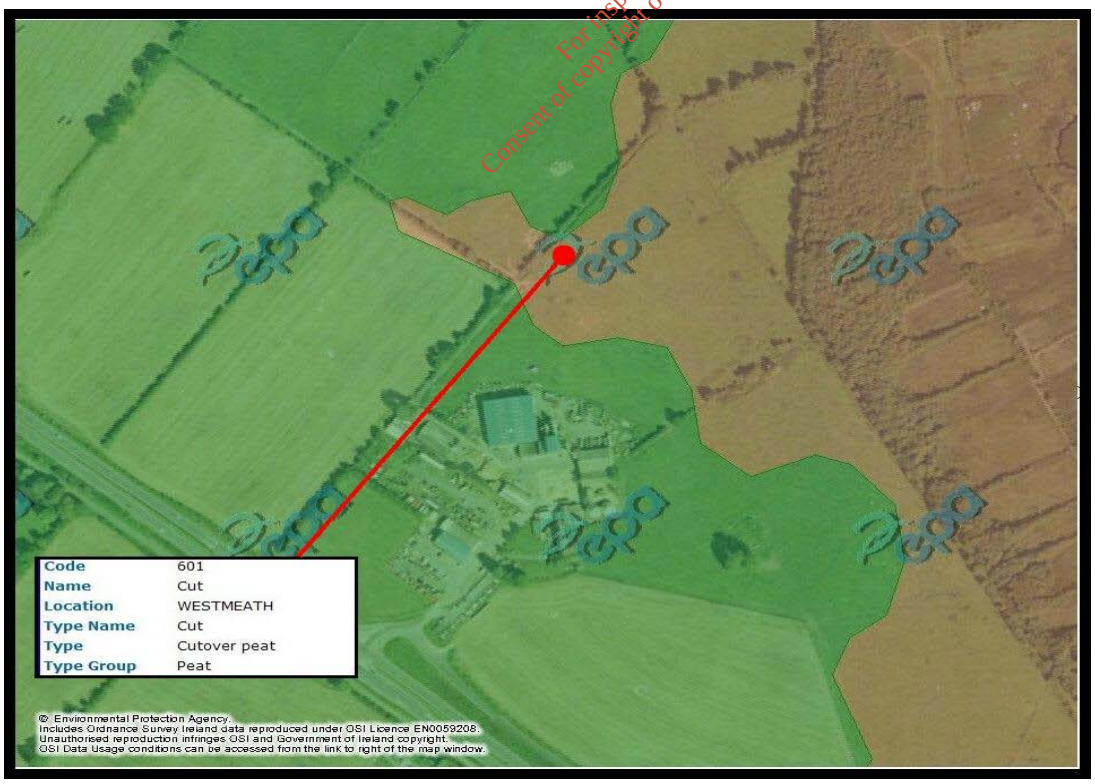


Figure 6: EPA Subsoils Data

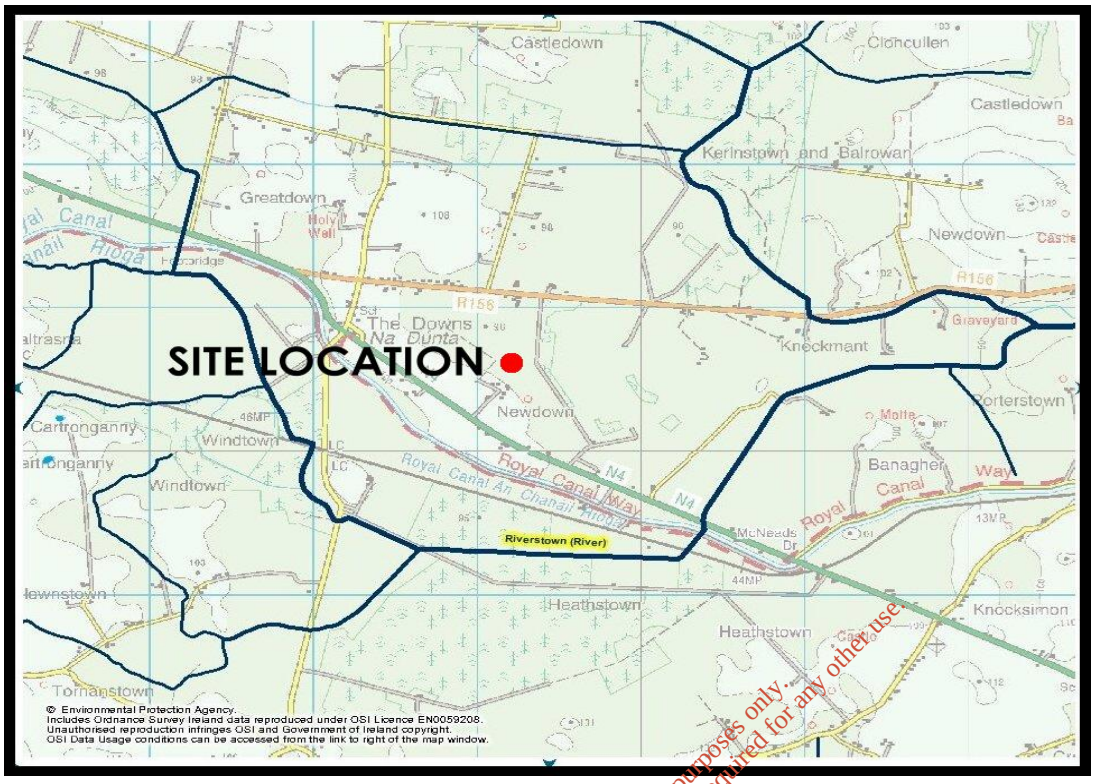


Figure 7: EPA Water Features Map

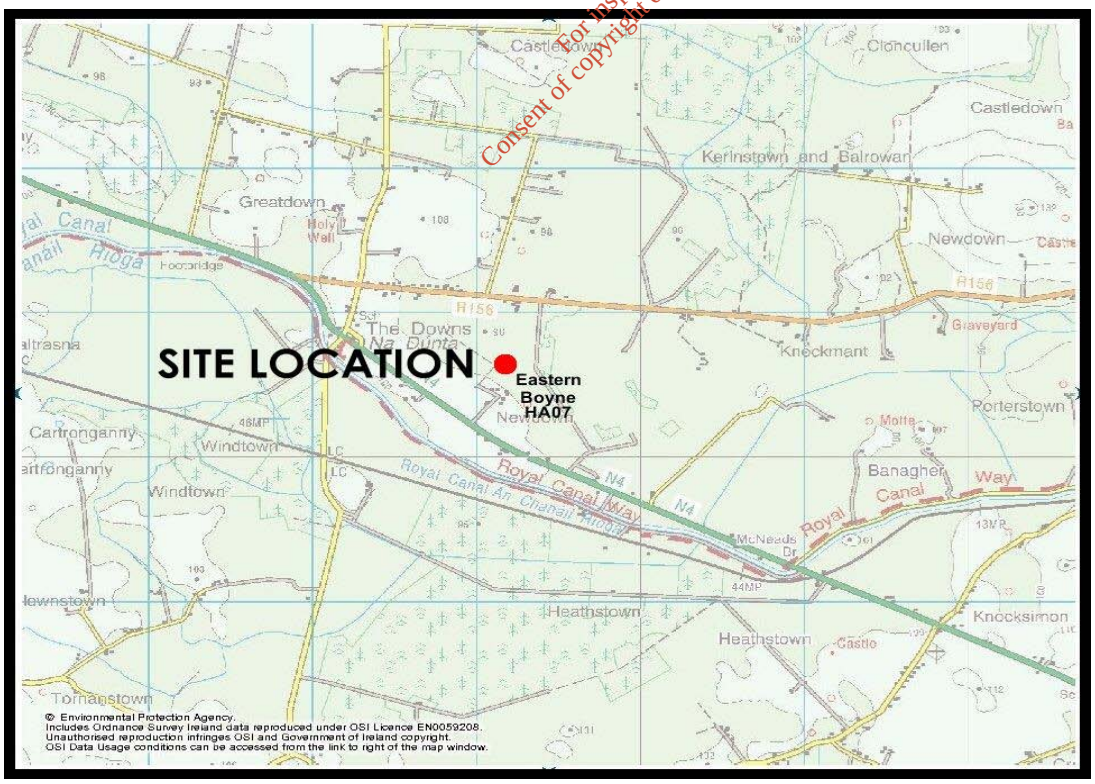


Figure 8: EPA River Regions Map

Appendix D – OPW Flood Hazard Map (PTO)

OPW *National Flood Hazard Mapping*

Summary Local Area Report

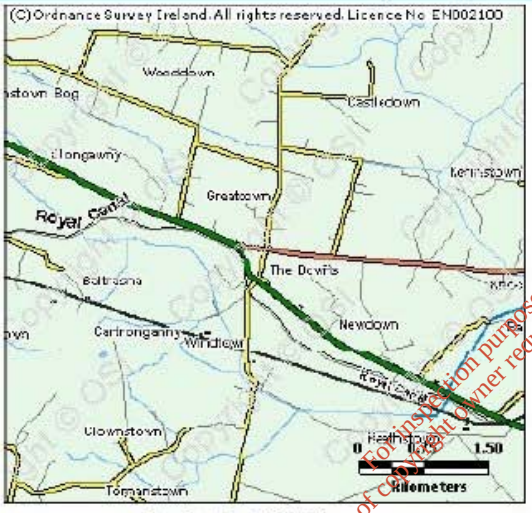
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Westmeath

NGR: N 502 511

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:62,129

Map Legend

- Flood Points
- Multiple / Recurring Flood Points
- Areas Flooded
- Hydrometric Stations
- Rivers
- Lakes
- River Catchment Areas
- Land Commission *
- Drainage Districts *
- Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

0 Results

Report Produced: 16-Mar-2011 10:02

Appendix E – Site Photographs

Fig. 9 – Test Area Viewed from North

Fig. 10 – Test Area Viewed from West

Fig. 11 – Test Area looking South East

Fig. 12 – Test Area Viewed From South

Fig. 13 – Test Area looking West

Fig. 14 – Test Area looking North

Fig. 15 – T Hole 1

Fig. 16 – P Hole 1 (following Pre-Soak)

Fig. 17 – T Hole 2

Fig. 18 – P Hole 2 (following Pre-Soak)

Fig. 19 – T Hole 3

Fig. 20 – P Hole 3 (following Pre-Soak)

Fig. 21 – Trial Hole

Fig. 22 – Trial Hole

Fig. 23 – Trial Hole Horizon A and B

Fig. 24 – Trial Hole Horizon A and B

Fig. 25 – P Hole 1 (During Testing)

Fig. 26 – P Hole 2 (During Testing)

Fig. 29 – P Hole 3 (During Testing)

Fig. 30 – Horizon A and B Samples

Fig. 31 – Horizon A and B Samples

Fig. 32 – Horizon A Thread Test

Fig. 33 – Horizon A Ribbon Test

Fig. 34 – Horizon A Dilatancy Test

Fig. 35 – Horizon B Sample

Fig. 36 – Horizon B Thread Test

Fig. 37 – Horizon B Ribbon Test

Fig. 38 – Horizon B Dilatancy Test

Fig. 37 – Testing Area after Testing

Appendix F – Test Hole Report Issued to Client Prior To Testing

TEST AREA DETAILS

Site Suitability Assessment, The Downs, Mullingar, Co. Westmeath

March 2011

Client	Revision	Date	Compiled	Checked	Approved
Tom Flynn, *The Downs,* *Mulllingar,* *Co. Westmeath*	*D1*	*03/03/2011*	*BD*		

1.0 TRIAL HOLE

- ***One hole required***
- Excavation to be as per drawing ***111_001_411_A*** and be at least ***2.5m*** deep, with steps as shown for access
- If there is a wet weather forecast for the two days following excavation this hole should be covered.
- There is no small test hole required at the base of this hole.
- **Please ensure hole is covered prior to inspection**

Figure 1: Typical Trial Hole Excavation

2.0 T TEST HOLES

- ***Three holes required***
- Excavation to be as per drawing ***111_001_411_A*** with steps as shown for access.
- The loose disturbed soil at the base of the hole should be scraped away from the position of the test hole.
- The soil must not be 'loosened up' by machine before hand digging the test hole.
- Test Hole to be 300 x 300 x 400mm deep to be ***hand dug*** at the base of this hole – this must be dug by hand to the exact size required or the tests cannot be carried out until they are corrected.
- If any large rocks are discovered against the sides or base of this hole a new hole must be dug.
- Approximately 1200 litres of water will be required beside these holes for the test. These should be refilled between test days.
- **Please ensure holes are covered prior to inspection**

Figure 2: Typical T Test Hole Excavation

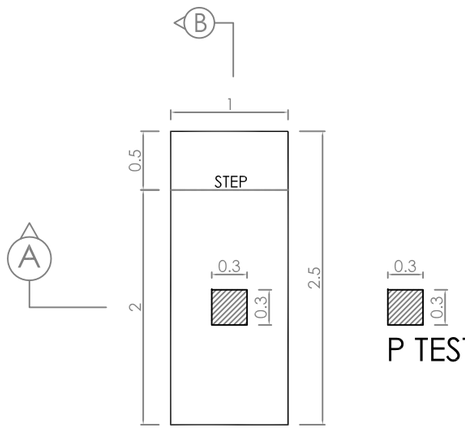
3.0 P TEST HOLES

- ***Three holes required***
- Excavation to be as per drawing ***111_001_411_A.***
- Test Hole to be 300 x 300 x 400mm deep to be ***hand dug*** at the base of this hole – this must be dug by hand to the exact size required or the tests cannot be carried out until they are corrected.
- If any large rocks are discovered against the sides or base of this hole a new hole must be dug.
- **Please ensure holes are covered prior to inspection**

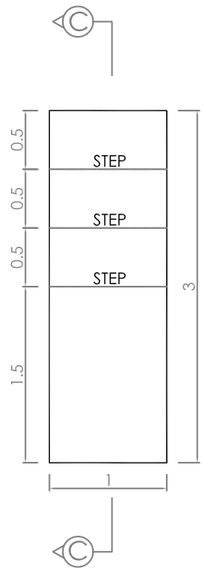
Figure 3: Typical P Test Hole Excavation

Appendix G – ORS Design Drawings

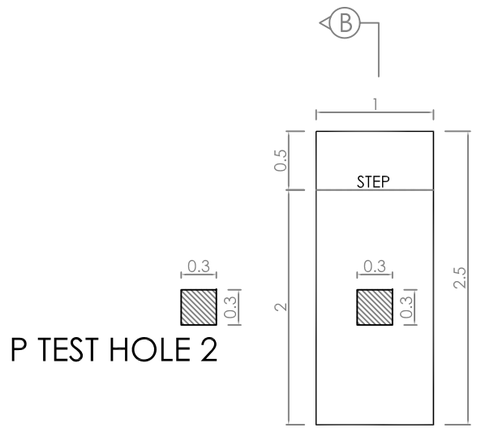
REV	INIT	DESCRIPTION	DATE
D1	JB	ISSUED TO CLIENT	03/03/11



P TEST HOLE 1

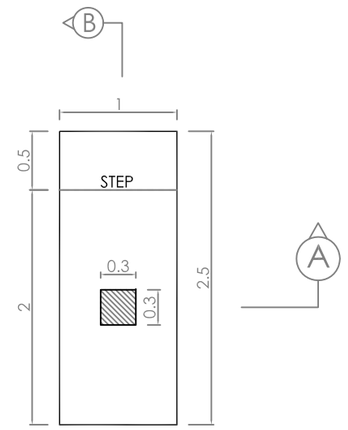


TRIAL HOLE



P TEST HOLE 2

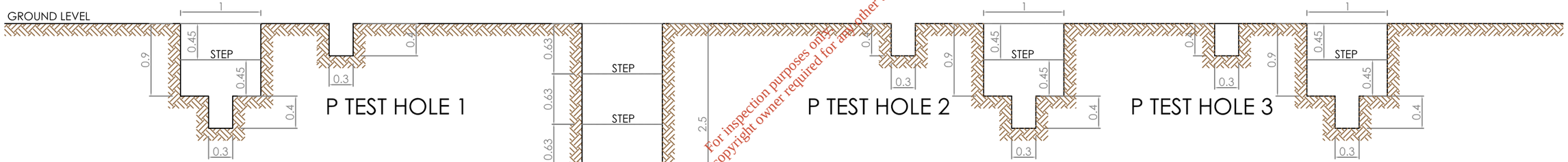
P TEST HOLE 3



T TEST HOLE 1

T TEST HOLE 2

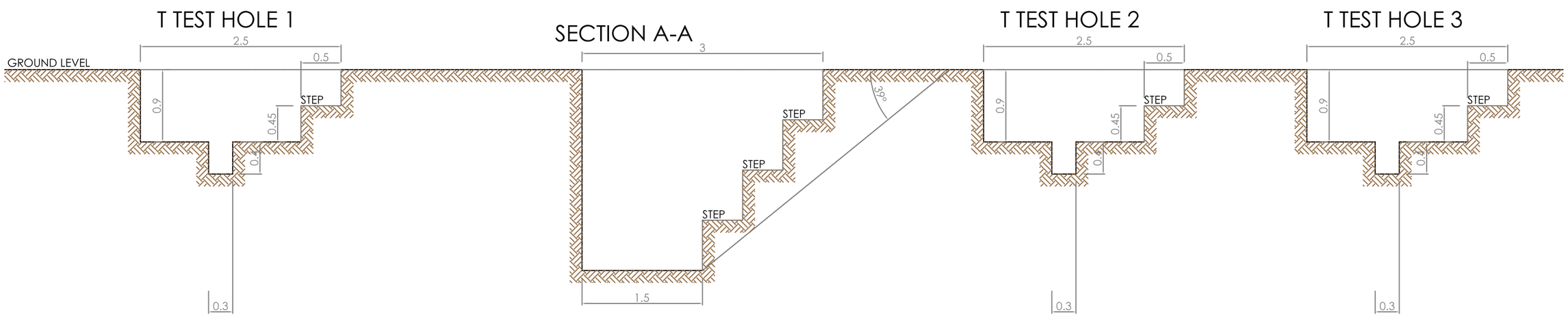
T TEST HOLE 3



P TEST HOLE 1

P TEST HOLE 2

P TEST HOLE 3



SECTION B-B

SECTION C-C

SECTION B-B

SECTION B-B

CLIENT

MR. TOM FLYNN

THE ORS BUILDING,
MULLINGAR,
CO. WESTMEATH
Tel: 044 934 2518
Fax: 044 934 4573
E-mail: info@ors.ie
WEB: www.ors.ie

PROJECT TITLE

PROPOSED BIOENERGY FACILTY
@ THE DOWNS, MULLINGAR

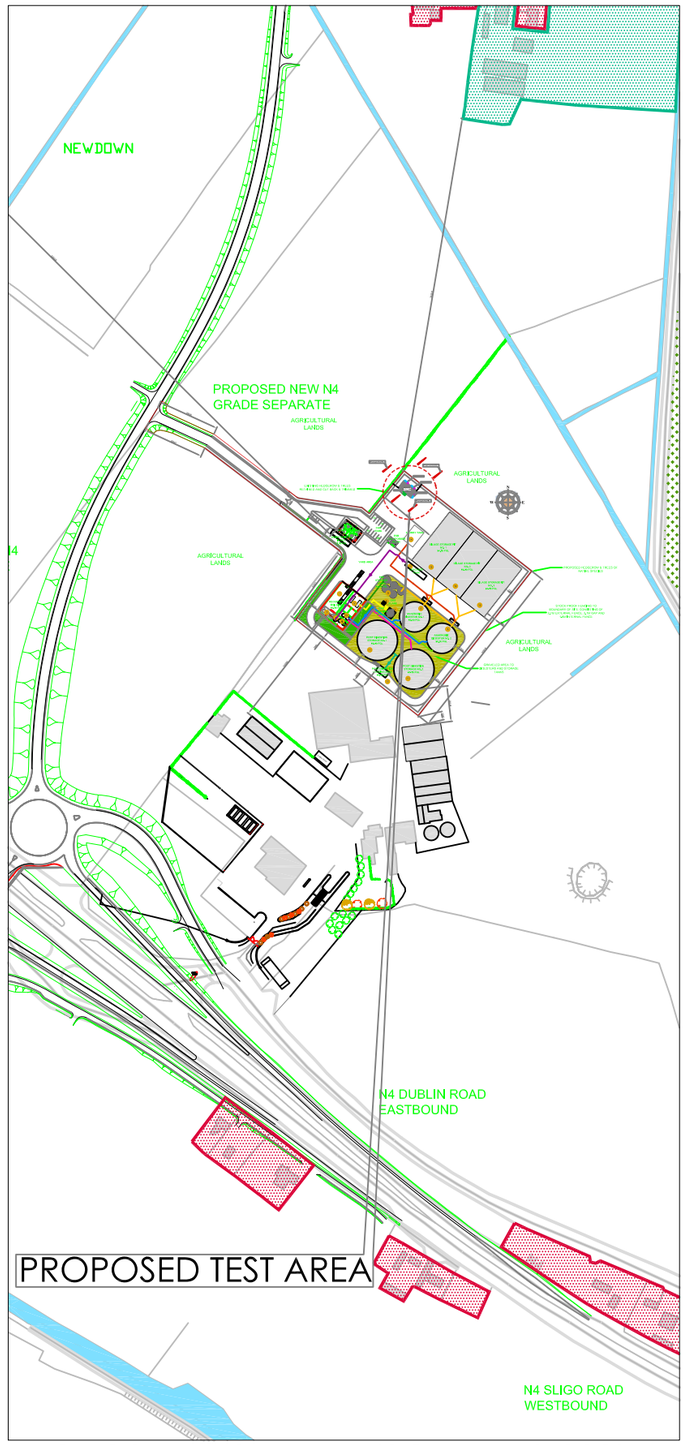
DRAWING TITLE

TEST HOLE DIMENSIONS

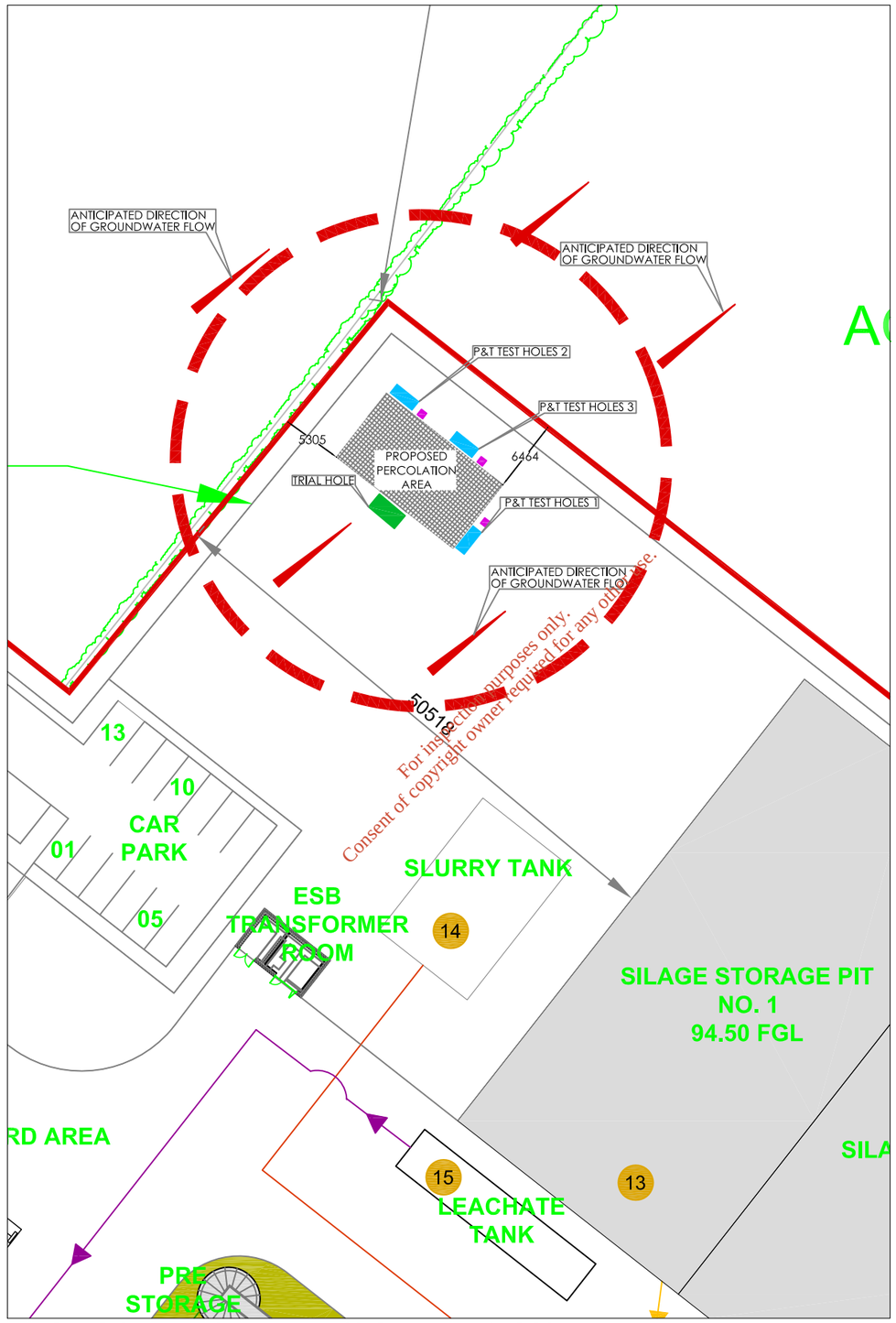
DRAWN	SCALE	DRAWING NO.	REV.
BD	NTS	111_001_411	D1
CHECKED	DATE		
	03/11		
APPR'D.	STATUS	AMENDMENT DATE	PAPER SIZE
	ISSUE	03/03/2011	A3

IS EN ISO 9001:2000 Cert. no. 3324

REV	INIT	DESCRIPTION	DATE
D1	JB	ISSUED TO CLIENT	03/03/11



PROPOSED TEST AREA (SCALE: 1/5000)



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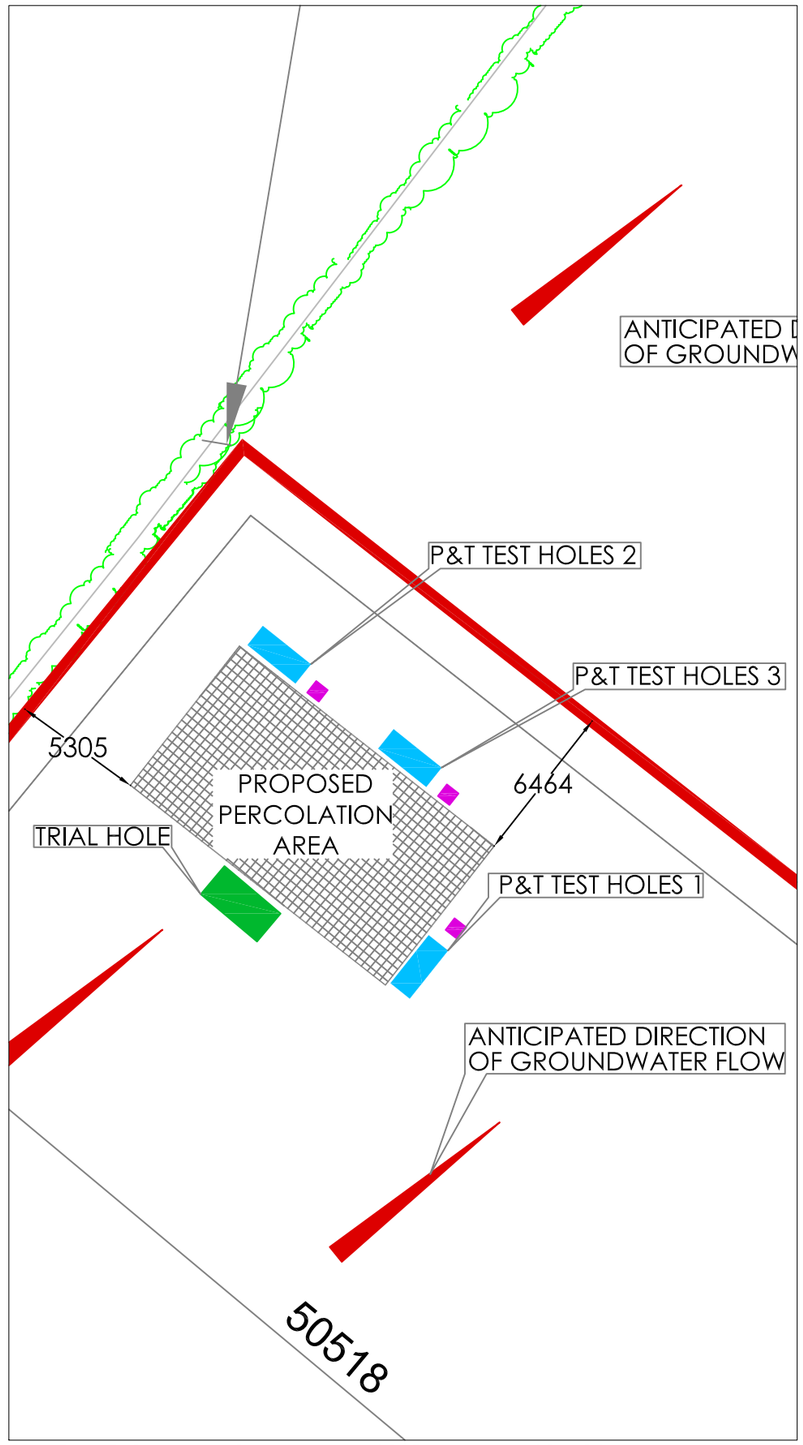

PROPOSED TEST AREA (SCALE: 1/250)

CLIENT: MR. TOM FLYNN

ORS
THE ORS BUILDING, MULLINGAR, CO. WESTMEATH
Tel: 044 934 2518
Fax: 044 934 4573
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WEB: www.ors.ie

PROJECT TITLE: PROPOSED BIOENERGY FACILITY @ THE DOWNS, MULLINGAR

DRAWING TITLE: TEST AREA LOCATION

DRAWN	SCALE	DRAWING NO.	REV.
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	03/11		
APPR'D.	STATUS	AMENDMENT DATE	PAPER SIZE
	PLANNING	03/03/2011	A3

IS EN ISO 9001:2000 Cert. no. 3324

REV	INIT	DESCRIPTION	DATE
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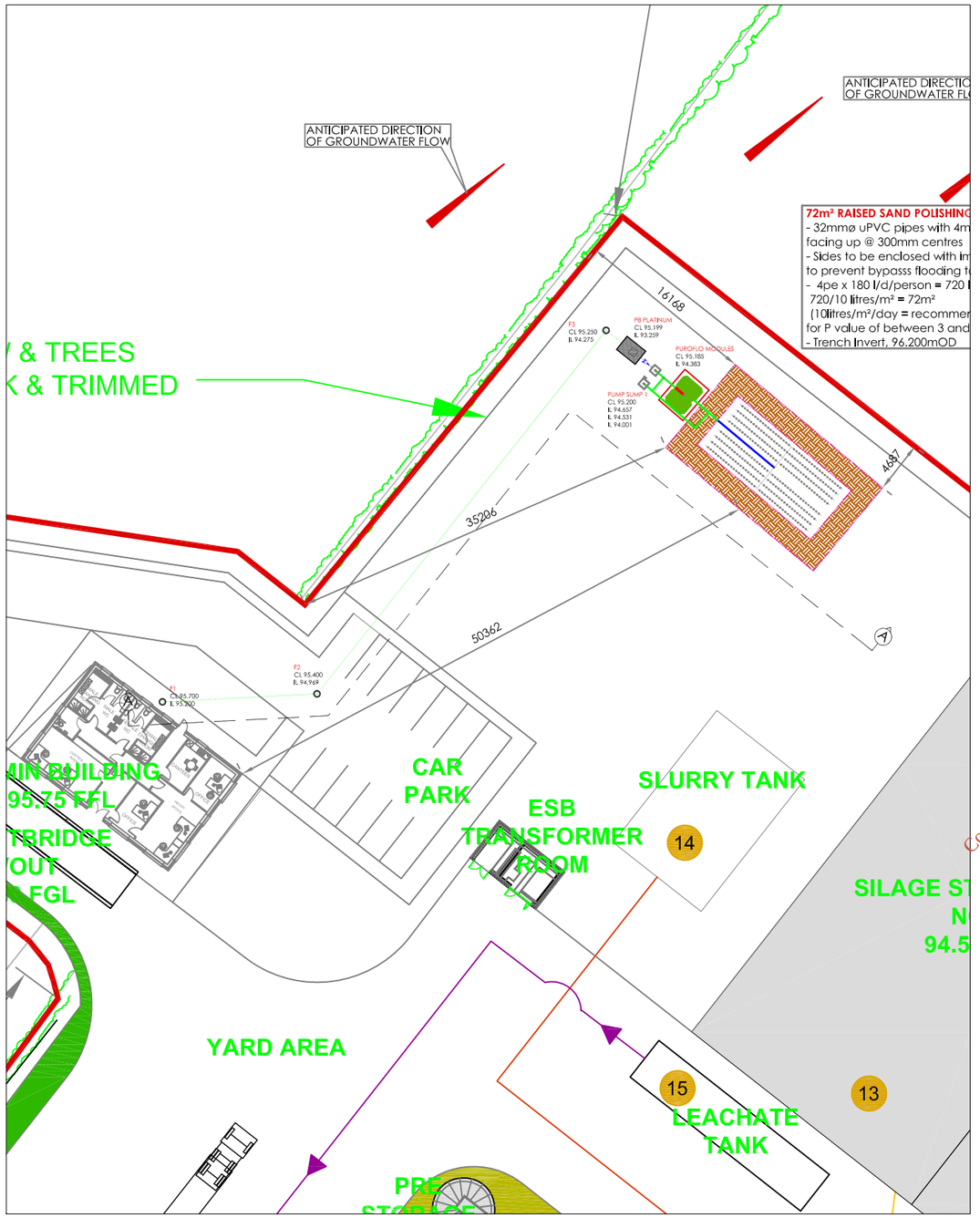
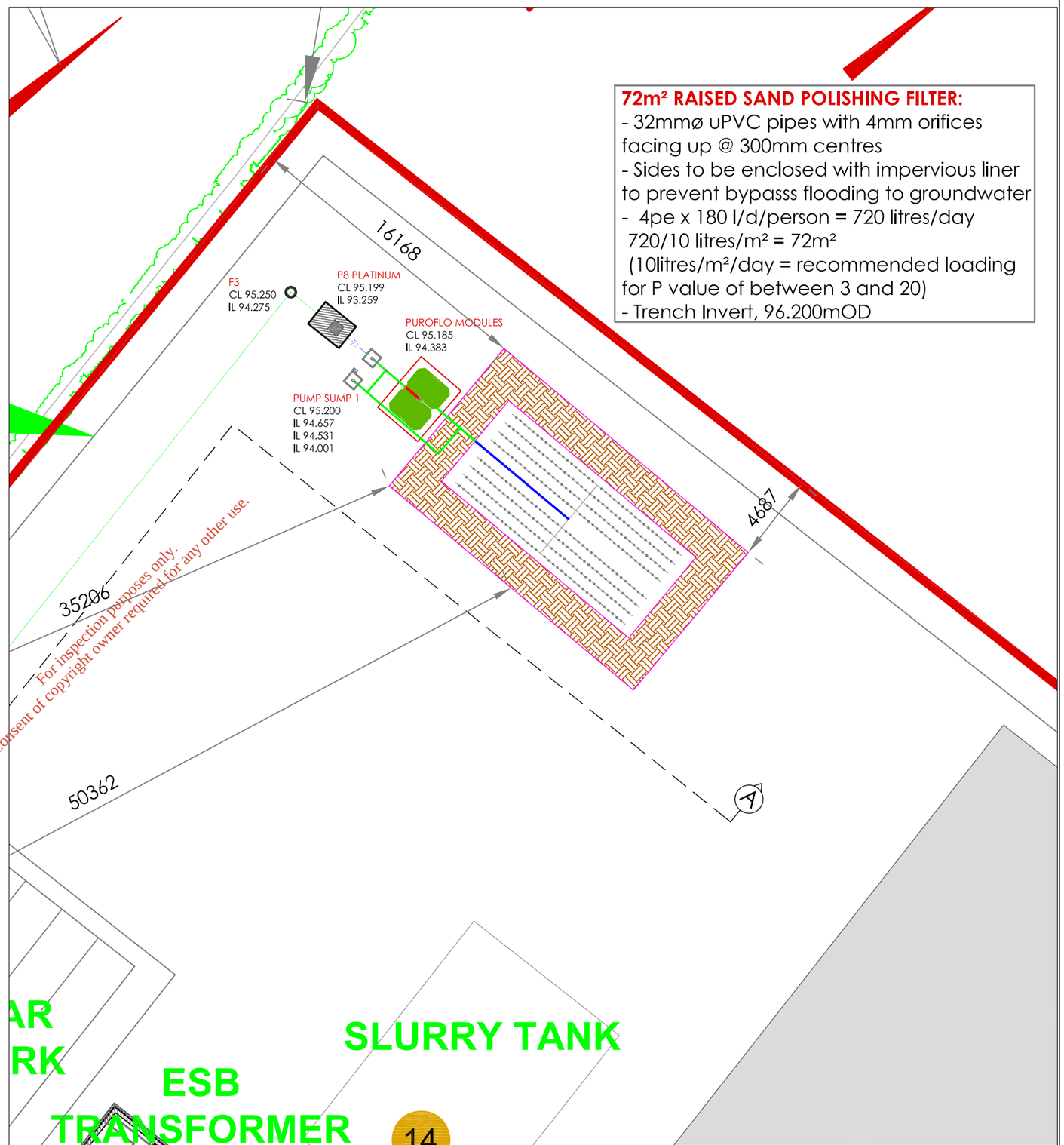


WASTE WATER TREATMENT SYSTEM PLAN (SCALE 1/500)



WASTE WATER TREATMENT SYSTEM PLAN (SCALE 1/250)

CLIENT: BIO AGRIGAS LTD.

THE ORS BUILDING,
MULLINGAR,
CO. WESTMEATH
Tel: 044 934 2518
Fax: 044 934 4573
E-mail: info@ors.ie
WEB: www.ors.ie

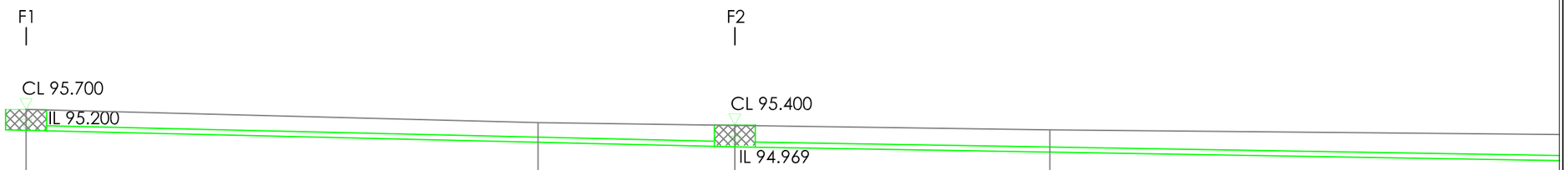
PROJECT TITLE: PROPOSED BIOENERGY FACILITY @ THE DOWNS, MULLINGAR

DRAWING TITLE: WASTE WATER TREATMENT SYSTEM PLAN

DRAWN	SCALE	DRAWING NO.	REV.
JB	AS SHOWN	111_001_413	D1
CHECKED	DATE 05/11		
APPR'D.	STATUS PLANNING	AMENDMENT DATE 24/05/2011	PAPER SIZE A3

IS EN ISO 9001:2000 Cert. no. 3324

REV	INIT	DESCRIPTION	DATE
D1	JB	ISSUED FOR PLANNING PURPOSES	24/05/11

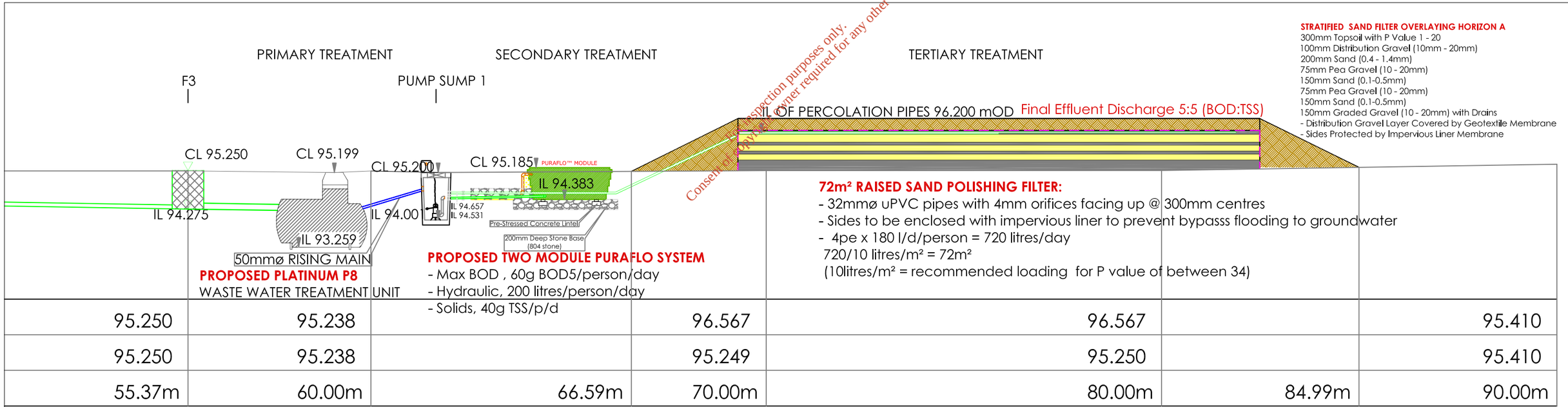


SECTION A-A

WASTEWATER TREATMENT ARRANGEMENT
Horizontal Scale 1:100
Vertical Scale 1:100

DATUM 92m

PROPOSED GROUND LEVELS	95.700	95.442	95.400	95.301		95.210
EXISTING GROUND LEVELS	95.750	95.442	95.387	95.301		95.210
CHAINAGE	00.00m	10.00m	13.84m	20.00m		30.00m



95.250	95.238		96.567	96.567		95.410
95.250	95.238		95.249	95.250		95.410
55.37m	60.00m	66.59m	70.00m	80.00m	84.99m	90.00m

NOTES:
- Dimensions to be checked on site by contractor
- Contractor to be experienced in installation of soil polishing filters
- Contractor to be familiar with EPA 2009 Code of Practice and Site Suitability Assessment
- Contractor to notify ORS if any conflicting site information is discovered during the works
- Contractor to certify their own works and provide same to client
- FOR PLANNING PERMISSION PURPOSES ONLY

CLIENT: BIO AGRIGAS LTD.

THE ORS BUILDING,
MULLINGAR,
CO. WESTMEATH
Tel: 044 934 2518
Fax: 044 934 4573
E-mail: info@ors.ie
WEB: www.ors.ie

PROJECT TITLE: PROPOSED BIOENERGY FACILITY @ THE DOWNS, MULLINGAR

DRAWING TITLE: PROPOSED WASTE WATER TREATMENT SYSTEM SECTION

DRAWN	SCALE	DRAWING NO.	REV.
JB	AS SHOWN	111_001_414	D1
CHECKED	DATE 05/11		
APPR'D.	STATUS PLANNING	AMENDMENT DATE 24/05/2011	PAPER SIZE A3

IS EN ISO 9001:2000 Cert. no. 3324

Appendix H – Bord Na Mona Platinum and Puroflo System Details

Cl/SfB
(52.3)

IRISH AGRÉMENT BOARD

BUILDING PRODUCT CERTIFICATION

CERTIFICATE No. 99/0060

Bord na Móna, Environmental Division,
Newbridge, Co. Kildare, Ireland.
Tel: 045-431201 Fax: 045-431647

PURAFLO LIQUID EFFLUENT TREATMENT SYSTEM

Systémes de traitement des eaux résiduaires
Abwasseraufbereitung

The Irish Agrément Board is designated by Government to issue European Technical Approvals.
Irish Agrément Board Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997.**
The Irish Agrément Board operates in association with the **National Standards Authority of Ireland (NSAI)** as the National Member of UEAtc.

PRODUCT DESCRIPTION:
This Certificate relates to Puraflo™ Liquid Effluent Treatment System.

USE:
For the treatment of septic tank effluent from single dwellings.

MANUFACTURING AND MARKETING:
The system is manufactured and marketed by:
Bord na Móna Environmental Division,
Newbridge, Co. Kildare, Ireland.

PART 1 CERTIFICATION

1.1 ASSESSMENT
In the opinion of the Irish Agrément Board (IAB), the Puraflo™ Liquid Effluent Treatment system is satisfactory for the purpose defined above, and meets the requirements of the Building Regulations 1997 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997

Requirements:

Part D – Materials and Workmanship.
The Puraflo™ Liquid Effluent Treatment System is made of acceptable materials as indicated in Part 4 of this Certificate.

Part H – Drainage and Waste Disposal

H1 – Drainage Systems:
The Puraflo™ Liquid Effluent Treatment System is easily integrated with new and existing septic tanks constructed to meet Building Regulations requirements.

H2 – Septic Tanks:
The Puraflo™ Liquid Effluent Treatment System is an aerobic system and is used in addition to a septic tank fitted with an outlet filter system. The Puraflo™ Liquid Effluent Treatment System can be used where septic tank systems and their percolation areas are not acceptable, or where sites do not comply with the recommendations of S.R.6.: 1991 *Septic Tank Systems Recommendations for Domestic Effluent Treatment and Disposal from a Single Dwelling House* and/or where septic tank percolation systems have failed.

2.1 DESCRIPTION

This Certificate relates to the Puraflo™ Liquid Effluent Treatment System. The system consists of a filter system fitted to the outlet of the connected septic tank, an effluent collecting chamber (sump), a pump and a number of biofibrous media containing modules. The Puraflo™ modules (Figs. 1a and 1b) are manufactured from polyethylene. Each module utilises approx. 2.5 cubic metres of biofibrous media which is compacted into 2 cubic metres. The effluent from the septic tank is evenly distributed over the surface of the biofibrous media and percolates through the media before emerging as a treated liquid at the base of the unit. The treatment of the waste within the system is achieved by a combination of physical, chemical and biological interactions between the pollutants and the biofibrous media. The system is designed to treat the waste water from single dwellings with a total population of up to 15 persons using 2, 4 or 6 modules as required.

Septic Tank Outlet Filter

A special baffle filter similar to that illustrated in Fig. 2 is fitted on the outlet pipe from the septic tank to retain solids.

Pump Sump & Pump Unit

The pump sump consists of a concrete or corrosion free polyethylene sump (Figs. 3, 4, 5) fitted with a submersible pump (0.30 kW rating, single phase) with thermal overload protection. Effluent from the septic tank flows by gravity to the sump from where it is pumped via a 40–50mm (1.5–2 in.) pump line to the modules containing the biofibrous media. The standard pump can cater for a head of up to 6 metres. An alarm float is installed in the sump and a visual/audible warning unit is located in the dwelling served by the system to alert the owner to pump malfunctions.

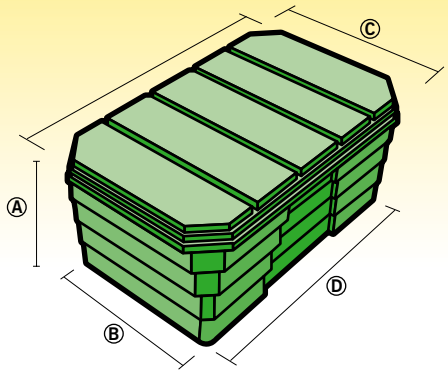


Figure 1a: Puraflo™ Module.
(Dimensions shown in Section 3.2.5)

Figure 2: Baffle Filter

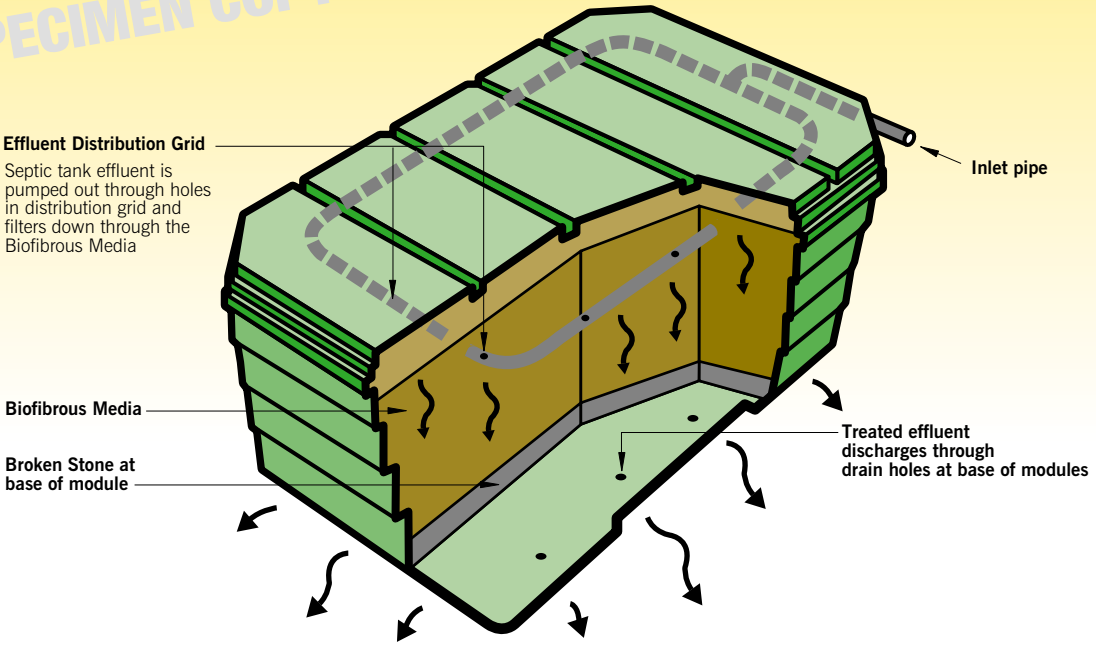


Figure 1b: Cutaway View of the Puraflo™ Module.

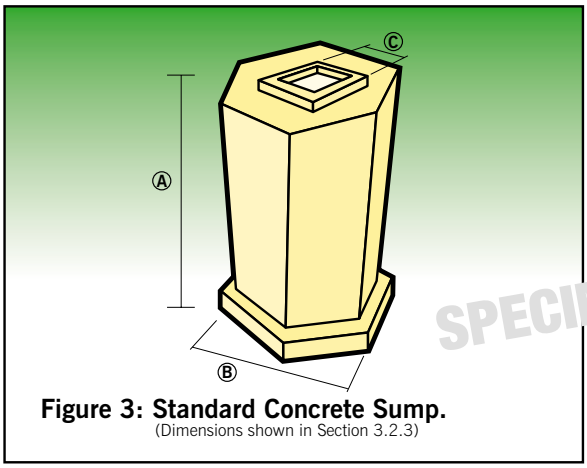


Figure 3: Standard Concrete Sump.
(Dimensions shown in Section 3.2.3)

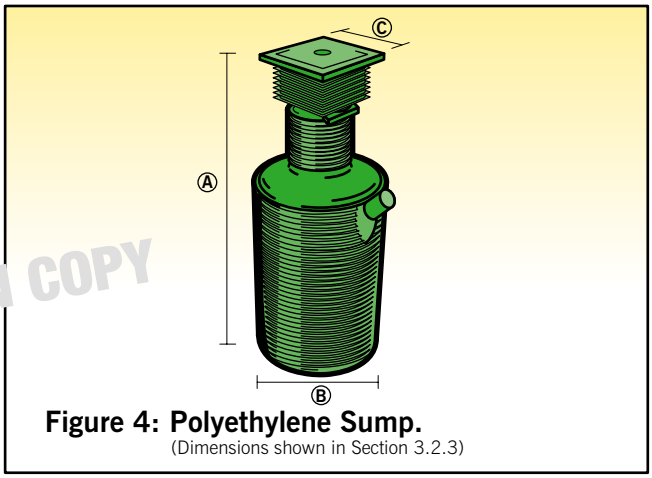


Figure 4: Polyethylene Sump.
(Dimensions shown in Section 3.2.3)

Puraflo™ Modules

Biofibrous media is filled in layers into Puraflo™ modules approx. 0.76m deep x 2.5m^2 with a contained volume of approximately 2m^3 of compacted biofibrous media.

Product Range

The Puraflo™ Liquid Effluent Treatment System is supplied in combinations of Puraflo™ modules to suit the following applications:

- Single house unit using two modules of total area 5m^2 to serve a population of up to 6 persons.
- Single house unit using 3 modules of total area 7.5m^2 to serve a population of up to 9 persons.
- Single house unit using 4 modules of total area 10m^2 to serve a population of up to 11 persons.
- Single house unit using 5 modules of total area 12.5m^2 to serve a population of up to 13 persons.
- Single house unit using 6 modules of total area 15m^2 to serve a population of up to 15 persons.

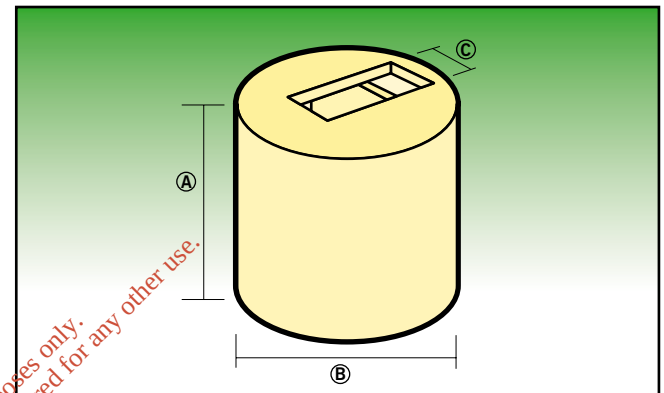


Figure 5: Baffle Wall Sump.
(Dimensions shown in Section 3.2.3)

2.2 PIPEWORK/ASSEMBLY

Pipework used for the manifold and distribution system is in accordance with BS 3505: 1986 *Specification for unplasticised polyvinyl chloride (PVC-U) pressure pipes for cold potable water* and relevant parts of BS 4346: *Joints and fittings for use with unplasticised PVC pressure pipes*. A pump, a sampling chamber (Fig. 6) and a PVC distribution manifold complete the pipework assembly. All electrical connections are completed on site.

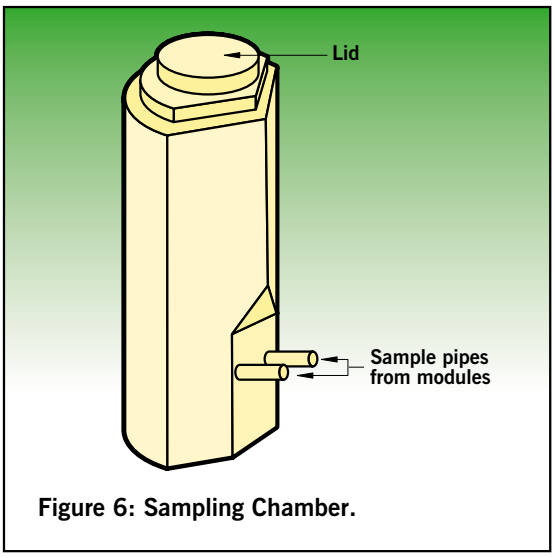


Figure 6: Sampling Chamber.

2.3 DELIVERY, STORAGE AND MARKING

The Puraflo™ modules are completed ready for delivery at the manufacturer's works. Off-loading of each individual module must be carefully supervised using chains, steel cables or lifting bars with SWL of 800kg and should conform with the requirements of the Safety in Industry Act 1980. The manufacturer's instructions must be followed to avoid damage to the modules during off-loading and placing in the excavation. Suitable lifting equipment must be employed.

The modules are labelled on the outside to indicate the IAB identification Mark incorporating the number of this Certificate.

2.4 INSTALLATION PROCEDURE

2.4.1 GENERAL

The Puraflo™ modules can be installed above or at ground level depending on the height of the local watertable or vertical separation requirements.

(i) For connection to a septic tank meeting the requirements of the Building Regulations 1991, and permitting the fitting of an outlet baffle filter, a concrete (or polyethylene) sump is installed adjacent to the septic tank as illustrated in Fig. 7.

(ii) For connection to septic tanks not permitting the fitting of an outlet baffle filter, a special concrete sump is installed as illustrated in Fig. 8. This sump is comprised of 2 chambers with the first chamber designed to accommodate the outlet filter and to provide for desludging.

Installation and the sequence of steps are detailed in the manufacturer's instruction manual, must be followed exactly.

2.4.2 SITE PREPARATION

Site Preparation is as follows:

(i) *Septic Tank*
For installations where a new septic tank is required excavations to the necessary depth are made to receive a septic tank conforming to the requirements of the Building Regulations 1991 including all necessary blinding of the base to ensure a uniform bearing support.

(ii) *Pump Sump*
A suitable excavation is prepared downstream of the septic tank to receive the concrete or polyethylene pump sump.

(iii) *Puraflo™ Modules*
An area is prepared and levelled to create an even surface on which to place concrete blocks and lintels to support the modules.

Broken stone approx. 25–50mm is filled level with the top of the concrete blocks and lintels over this area to a depth of 200mm approx.

Depending on site conditions, various designed lengths of stone filled drain may be required extending from the stone base under the modules.

A pipe trench 450mm deep (minimum) x 150mm wide is excavated from the sump to the modules.

(iv) *Electrical Supply*
A trench 450mm deep (minimum) x 150mm wide is excavated from power source to the sump for an armoured cable electrical supply to the pump.

(v) *Disposal of Treated Effluent*
The disposal route for the treated effluent will depend on local conditions. Normally the treated effluent is disposed of by soil percolation. The materials in percolation areas are chosen and laid as described in Section 2.4.8 of this Certificate.

2.4.3 PLACING AND LEVELLING OF MODULES

(i) Using a lifting frame, the modules are positioned carefully on the lintels. Each module is checked for level when fitted.

(ii) Effluent inlet pipes are checked for proper orientation for connecting to the pump line.

2.4.4 INSTALLATION OF SUMP AND ASSOCIATED PIPEWORK

(i) The sump is fitted at least 0.5m from a new septic tank or at least 1m from an existing septic tank.

(ii) The septic tank outlet is connected to the sump using a 110mm dia. pipe at a gradient of 1 in 100.

(iii) Backfilling is compacted around the sump below the outlet pipe and the cable entry ensuring that the material used for backfilling is free of stones and material which could damage the sump.

(iv) A pump line 40–50mm dia. is laid from the sump to the modules.

(v) The pump line is connected to the outlet from the pump.

(vi) The pump line is connected to the manifold at the modules.

(vii) The manifold is placed in position and connected by 40mm dia. plastic flexible pipes to the effluent distribution grids in the modules.

2.4.5 CONNECTION OF ELECTRICAL SUPPLY

(i) The armoured cable from the power source to the sump is placed unstretched in the bottom of the cable trench. A 5 core 5mm PVC SWA cable is used.

(ii) The armoured cable is connected to the terminal box provided in the sump.

(iii) The control panel is installed. The power supply to the control panel is taken from an independent MCB to avoid nuisance tripping to existing circuits. The control panel has an ELCB fitted to protect the pump and control system.

(iv) The cable from the sump is connected to the control panel.

2.4.6 COMMISSIONING

(i) The alarm float is suspended approximately 150mm above the submersible pump.

(ii) The pump MCB is switched off at the Puraflo™ panel.

(iii) The sump is filled with clean water until the alarm float lifts; under these conditions the alarm should indicate a fault.

(iv) The pump MCB is switched on to restore the power supply to the pump. With the pump operating properly the alarm will switch off when the water level in the sump drops below the level specified in (i) above.

(v) All pipe connections in the sump and at the modules are checked for leaks.

2.4.7 LOCATION

The septic tank should not be closer than 7 m from the dwelling served and should not be nearer than 20 m from the nearest point of any other dwelling.

The Puraflo™ Liquid Effluent Treatment System and septic tank should not be located in any area where vehicles could traverse or damage them and provision should be made for access for a tank emptying vehicle and its equipment.

The separation distance from wells should be not less than 20 m except in the case of very sandy soils or gravels, where a minimum distance of 40 m should be maintained. In all cases the percolation area should be located down gradient of any nearby well. Where it is not possible to locate the percolation area down gradient of any nearby well a separation distance of at least 100 m, depending on percolation conditions, must be maintained. If necessary a mound of top soil (of appropriate characteristics) may be constructed to

achieve the required 0.5 m minimum vertical separation between the base of the Puraflo™ unit and the seasonally high water table. Typical setback distances for the Puraflo™ system are shown in Table 1 below.

Feature	Minimum Setback Distances (m)	
	Treatment Modules	*Percolation Area*
Dwelling served	7	5
Adjacent dwelling	10	5
Site boundaries	1	1
Watercourse	3	3
Roads	3	1
Walls	3	1
Drinking Water Sources	20	40–100

Table 1: *Recommended setback distances for various elements of the Puraflo™ Liquid Effluent Treatment System.*

2.4.8 TREATED WASTE WATER DISPOSAL

Treated waste water may be disposed of by either of the following means:

(a) *Sub-Surface Disposal:*
The treated effluent from the base of the Puraflo™ Liquid Effluent Treatment System passes downwards into a prepared area filled with 25–50mm approx. broken stone to a depth of 250mm. The extent of the percolation area will be determined by the population served and the subsoil type at the site in accordance with the recommendations in Tables 2a, 2b and 2c. Percolation drains are constructed (see Fig. 9) adjacent to the Puraflo™ modules to make up the required percolation area. Percolation drains, 400mm wide x 400mm deep (approx.) depending on site conditions shall be filled to a depth of 250mm with 25–50mm (approx.) broken stone and covered with geotextile or other protective material before backfilling (to prevent the entry of silt). A typical subsurface disposal field is illustrated in Fig. 9.

(b) Alternatively the treated effluent can be collected and pumped to irrigation in which case a site specific engineered design will be prepared.

(c) *Surface Water Disposal*
Treated effluent from the base of the Puraflo™ Liquid Effluent Treatment System can be discharged directly or via a stone filled drain to receiving waters (ditch or drain). If this option is selected a licence to discharge to waters, (on a case by case basis) will be required from the local authority to comply with the Water Pollution Acts (1977–1990 incl. amendments).

2.4.8.1 GENERAL GUIDANCE FOR THE SIZING OF PERCOLATION AREA

The required percolation areas for treated effluent are derived from consideration of the effluent quality (e.g. 95% reduction in BOD and 99% reduction in faecal bacteria) and the soil percolation characteristics.

Table 2a refers only to percolation characteristics. Table 2a should be regarded as guidance only so that water logging of sites does not occur. For each site a test shall be carried out in accordance with approved percolation test procedures in order to confirm the suitability of the percolation system (see section 2.4.8.2).

Different configurations of percolation areas are acceptable. This also applies to sites where split percolation areas are needed to obtain the recommended total area.

Soil Group	Soil Classification Description	Percolation Rate
1	Sand, gravels, loam sand	Very good
2	Sandy loam, loam, sandy clay loam	Good
3	Silty loam, clay loam, silty clay loam	Moderate
4	Sandy clay, silty clay, clay	Poor

Table 2a: *Identification of soil groupings*

2.4.8.2 PERCOLATION TEST PROCEDURES

A standard "T" test (or other approved soil percolation test) is carried out by the developer/owner to identify the soil group and measured percolation rate. The size of the soil disposal area required is based on the results of this test used in conjunction with the physical properties of the soil and the level of effluent treatment achieved. The depth within the soil profile where this test should be conducted will reflect the invert level at which the effluent will be introduced to the soil. In the majority of instances this will be within 30cm of the surface.

2.4.8.3 SOIL PERCOLATION AREA

	Percolation area (m^2)			
	Soil Group			
Population served	Group 1	Group 2	Group 3	Group 4
up to 6	10	20	45	65
6–11	15	30	60	95
11–15	20	40	80	120

Table 2b: *Soil percolation area with Puraflo™ system in various soil classification groupings.*

2.4.8.4

The relationship between the 'percolation area', reported in Table 2b and the 'linear pipe (m)' length of percolation trench required is 1:1. In Table 2b the figures can be expressed as m^2 percolation area or linear m of percolation trench. An actual length of 10m is allowed within the prepared area beneath and surrounding the **Puraflo™** modules. Additional length of percolation trench is installed by inserting drains of up to 20m in length and a minimum of 2m apart.

2.4.8.5 MAXIMUM 'LONG TERM' HYDRAULIC LOADINGS

Maximum hydraulic loading $l/m^2/d$			
Soil Group			
Group 1	Group 2	Group 3	Group 4
135	68	34	23

Table 2c: *Maximum 'long term' hydraulic loadings applied to the soil percolation areas in each soil group.*

2.5 COMMISSIONING

Commissioning will be carried out by Bord na Móna Environmental Division personnel or their appointed agents after installation is completed and all services are connected.

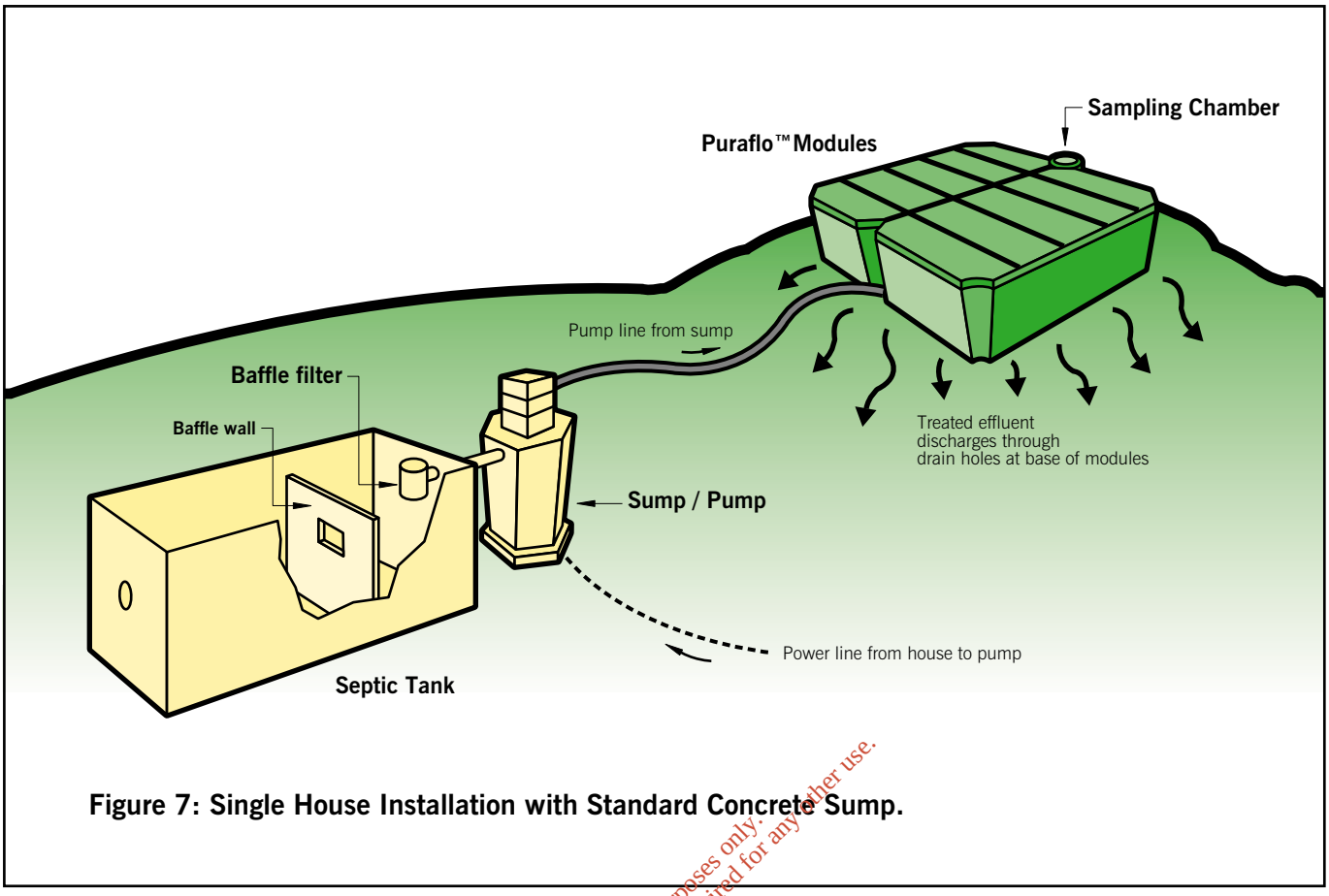


Figure 7: Single House Installation with Standard Concrete Sump.

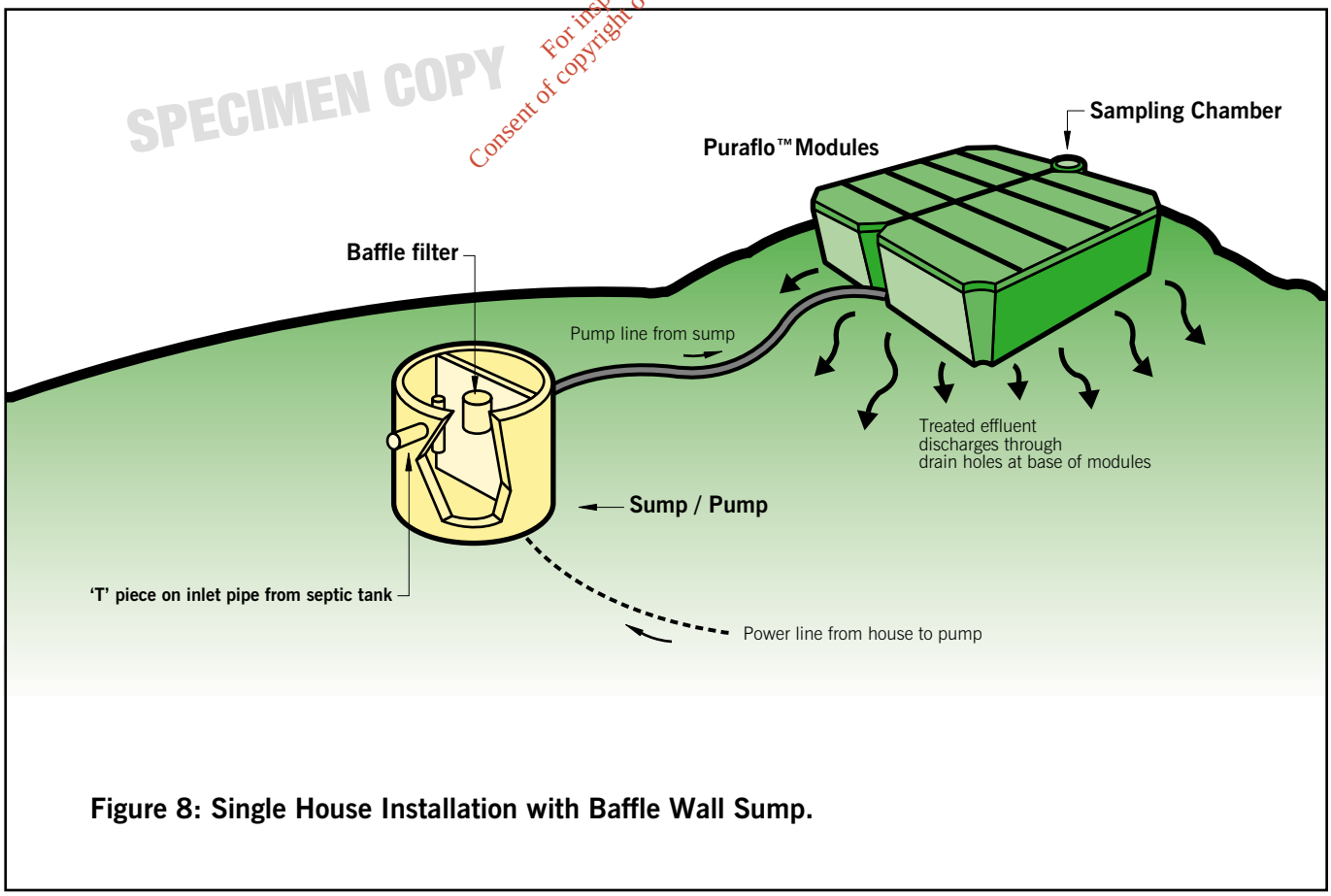


Figure 8: Single House Installation with Baffle Wall Sump.

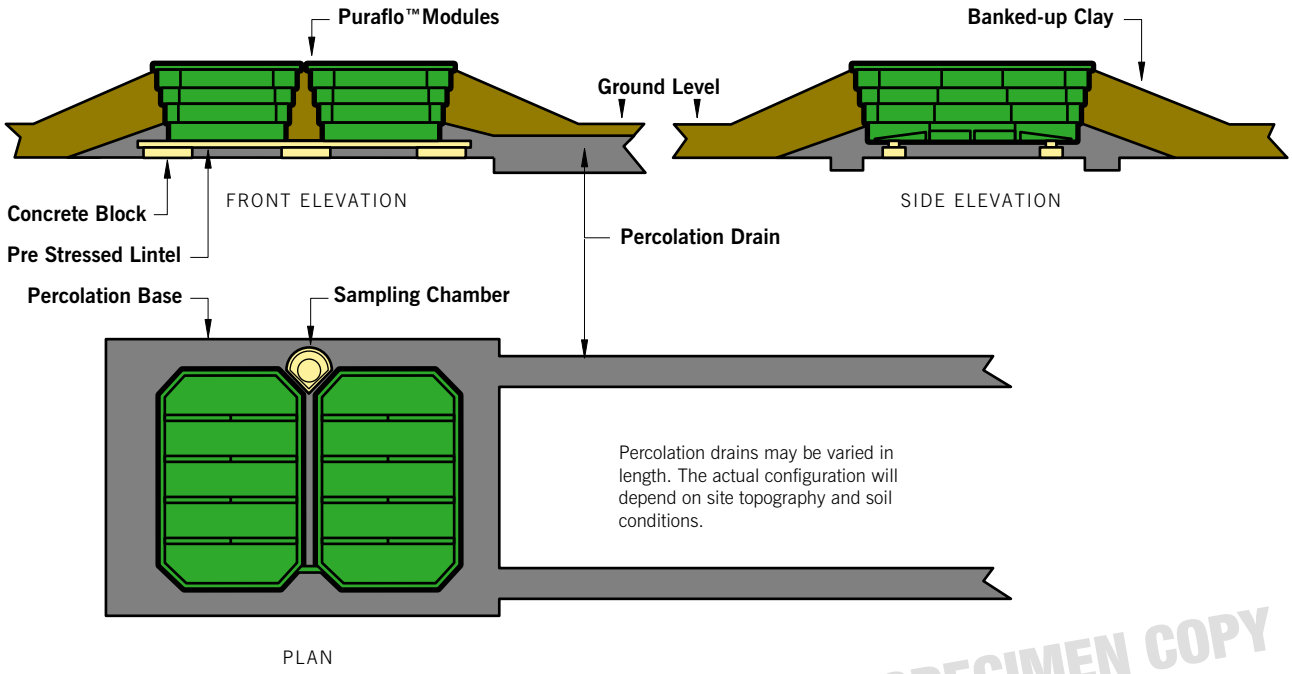


Figure 9: Typical Sub-Surface Disposal Field. (Drawing not to scale)

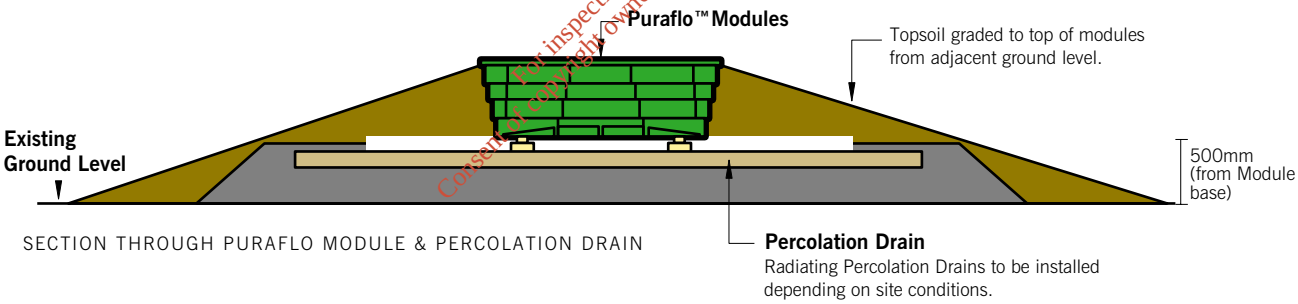


Figure 10: Disposal for Site with High Water Table. (Drawing not to scale)

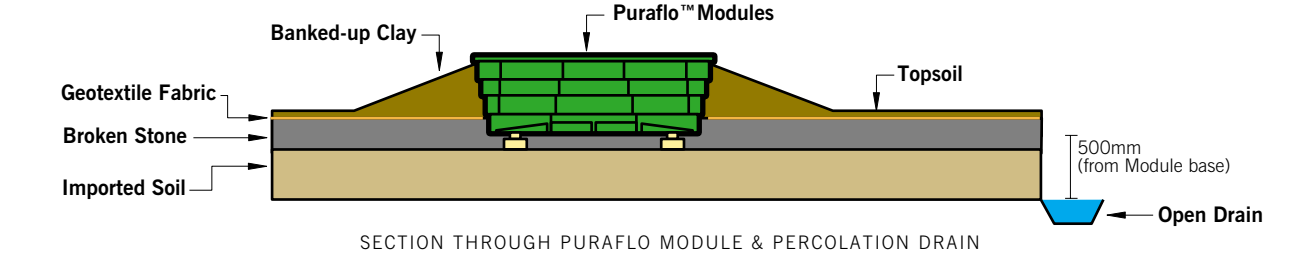


Figure 11: Disposal for Site with Poor Percolating Soil and Receiving Water. (Drawing not to scale)

3.1 GENERAL

The Puraflo™ Liquid Effluent Treatment System has been designed to treat domestic waste water from up to 15 persons. It is suitable for installation at sites where a septic tank and percolation system does not afford an environmentally safe and acceptable means of disposing of domestic waste water. Such sites include those where the water table is high and where soil types do not afford good percolation. To ensure optimum efficiency the drainage of the premises served must be checked to ensure that storm water from roofs and paved surfaces does not discharge into the system.

The system is designed and installed in accordance with the Puraflo™ Liquid Effluent Treatment System Specifications. Due to the high quality effluent treatment achieved (see Table 4, Section 3.2.10) the Puraflo™ Liquid Effluent Treatment System may be installed close to habitable buildings, as indicated in Section 2.4.7 subject to any special requirements of the particular site.

The Puraflo™ Liquid Effluent Treatment System is supplied with an alarm which will alert the owner to a pump malfunction and this will enable corrective action to be taken before overflow occurs. Details of corrective actions are contained in the Puraflo™ maintenance manual supplied with the unit.

3.2 DESIGN BASIS

The Puraflo™ liquid effluent treatment system is supplied in a modularised configuration. Daily waste water loadings of up to 3.0m^3/d (equivalent to a population of 15 persons) can be treated. Table 3 details the range of populations served, the associated hydraulic generation and the modular arrangement used in each case.

Max. Population Served	Daily Flow m^{3}d^{-1} (max)	Puraflo™ area required (m^2)	No of Modules
6	1.2	5	2
9	1.8	7.5	3
11	2.2	10	4
13	2.6	12.5	5
15	3.0	15	6

Table 3: *Modular configuration*

DESIGN CRITERIA

Assumptions:

Hydraulic loadings	200 l/p/d*
Organic Loadings	60g BOD_5/p/d
Solid Loadings	40g TSS/p/d

Max. Application rates *(to the biofilter after primary settlement)*

Hydraulic loadings	240 l/m^2/d
Organic loadings	average 72g BOD/m^2/d
Solid Loadings	average 24g TSS/m^2/d

3.2.1 SEPTIC TANK

The Septic tank should meet the requirements of the Building Regulations 1991. The septic tank should allow for the fitting of an outlet baffle filter; otherwise the baffle wall sump shown in Fig. 5 will be installed to provide for the fitting of the baffle filter in the first chamber of this sump, while the second chamber acts as the pump sump.

3.2.2 FILTER

An outlet baffle filter (see Fig. 2) is installed upstream of the pump sump to retain solids.

3.2.3 SUMP

The sump used may be single chamber concrete, single chamber polyethylene (Figs. 3 and 4) or a concrete sump with baffle wall and baffle filter (Fig. 5) as described in Section 2.4.1. Where the concrete sump with a baffle wall is employed access via a manhole is provided to facilitate desludging.

Pump sump dimensions are shown below with reference to Figs. 3, 4 and 5.

	DIMENSIONS (mm)		
Sump type	**A**	**B**	**C**
Polyethylene	1840	720	480
Concrete (standard)	1480	880	500
Baffle wall sump	1300	1440	380

3.2.4 Pump Unit and Electrical Installation

The irrigation pump used is of a standard submersible type which can vary in size depending on site conditions. It delivers a discharge volume of 0.2 to 2.0 l/s. against a discharge head of 1 to 6m. All models are single phase 220–240 volt 50-Hz motor with enclosures to IP 68. Effluent from the tank flows by gravity to the sump from where it is pumped via a 40–50mm diameter pumping main to the biofilter modules containing the biofibrous media. A visual/audible warning unit is installed to alert the owner to pump malfunctions.

The design and installation of the pump and electrics are in compliance with 'The National Rules For Electrical Installations' (ETCI), published by the 'Electro-Technical Council of Ireland'.

3.2.5 MODULES and MEDIA

The Puraflo™ modules (see Fig. 1) are manufactured from high density polyethylene. A minimum of two Biofilter modules shall be installed with dimensions as shown below.

(i) *Biofilter Module Dimensions, mm, are shown below and illustrated in Fig. 1.*

Biofilter Module	DIMENSIONS (mm)				
	A	B	C	D	E
	760	1185	1400	2150	1935

(ii) *Fibre*
The peat fibres consist of root residues of eriophorum (cottongrass) plants extracted from bog peats.

Specifications of Fibres

Moisture content	50–70% by weight
Fines content (<5mm)	30% max.

(iii) *Typical Physical Characteristics of Fibre Media*

Loose density (range @50% m/c)	110–140 kg/m^3
Organic matter content	>95% w/w (anhydrous basis)

(iv) *Typical Botanical Composition of Fibre Media*

Fibre (eriophorum)	50% (v/v)
Humic materials	40% (v/v)
Sphagnum materials	10% (v/v)

(v) *Typical Design Specification for Puraflo™* single house system.

PARAMETER	SPECIFICATION
Media Type	100% fibre (Biofibre)
Compaction	50%
Depth of compacted media	0.7m
Distribution of septic tank effluent over modules	Rectangular pipe grid
Minimum Number of modules per installation	2 modules
Total Hydraulic load (max.)	3.0m/day (6 modules)
Total Organic loading (max.)	0.900 kg/day (septic tank and Puraflo™ System) 0.630 kg/day (Biofilter alone) (6 modules)
Sample Chamber	In all installations

3.2.6. BROKEN STONE
The stone filter under the Puraflo™ modules and in the drainage trenches is composed of 25–50mm approx. broken stone.

3.2.7 LIQUID EFFLUENT ANALYSIS
The pH, BOD and suspended solids (T.S.S.) concentrations demonstrated in Table 4 will be attained within a few weeks of commissioning. It is predicted that the stipulated nitrate (NO_3) and ammonia (NH_3) values will be consistently achieved over the lifetime of the biofibrous media, currently estimated to be at least 10 years.

3.2.8 MONITORING SYSTEM ALARM
The installed electrical warning system will signal an alarm to indicate impending flooding or failure of the pump unit.

3.2.9 COMMISSIONING
Commissioning of the unit must include testing of the alarm system and the completion of all safety checks.

3.2.10 MAINTENANCE SYSTEM
During desludging of the septic tank the sump unit must also be de-sludged. Following removal of the sludge the pump should be hosed down and the resulting sludge removed from the sump.

The units should not be opened or the media disturbed. Any such disruption of the media may result in channelling of the effluent or over-compaction leading to flooding.

Table 4: *Treated Waste Water Quality*

PARAMETER	CONCENTRATION
pH (pH units)	5–8
B.O.D. (mg/l)	< 15
T.S.S. (mg/l)	< 15
NH_3-N (mg/l)	< 5
Nitrate-N (mg/l)	20
Total Coliforms elimination	> 99.9%
Faecal Coliforms elimination	> 99.9%
*Pathogenic Bacteria	Absent

**Including Salmonella spp, Shigella spp, Sulphide reducing Clostridia, Staphylococcus spp and Psudomonas aeruginosa*

PART 4 TECHNICAL INVESTIGATIONS

4.1 ENVIRONMENTAL ASSESSMENT

The treated waste water from a number of working installations has been comprehensively monitored for 18 months. The test results show that values stated for the parameters listed in Table 4 are consistently achievable over a range of operating conditions.

4.2 STRENGTH

The design and testing of the plant has been assessed as satisfactory. The modules and sumps have adequate resistance to handling stresses, the loads applied by ground pressure and internal liquid loads.

4.3 WATER PENETRATION

The plant and modules with its pipe connections when correctly installed will not allow seepage either into or from the surrounding soil.

4.4 DURABILITY

The biofibrous media when installed, used and maintained in accordance with the requirements of this Certificate will have a life of at least 10 years. The mechanical components of the system excepting pumps will have a life in excess of 20 years.

Spent treatment media should be disposed of in accordance with National Waste Regulations.

4.5 CLEANING AND MAINTENANCE

All Puraflo™ units are inspected by Bord na Móna personnel for their performance after one year approx. of operation and the effluent analysed. As part of routine maintenance the owner must keep the inlet and outlet from the septic tank free from blockages and desludge the septic tank. The septic tank and the first chamber of the two chamber sump (where this option is used) should be desludged at least once per annum.

4.6 SAFETY

4.6.1 SAFETY OF PERSONNEL

The Puraflo™ Liquid Effluent Treatment System is generally installed above ground level. All pump sump covers are securely fixed, to prevent unauthorised access.

The treatment system should be positioned, or marked, or protected to prevent superimposed loading or accidental impact by vehicles and underground electric cables should be marked with warning tape.

4.6.2 SAFETY OF SYSTEM

The Puraflo™ Liquid Effluent Treatment System has a visual/audible warning device connected to the pump/sump unit to alert the owner to malfunctions of the pump.

4.7 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE

- Watertightness
- Strength of covers, modules & sumps
- Resistance of units to hydrostatic pressure
- Quality of treated effluent

4.8 OTHER INVESTIGATIONS

(i) Existing data on the history of use of previous installations was assessed.

(ii) The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

(iii) Site visits were conducted to assess the practicability of installation.

(iv) A user survey and visits to established sites were conducted to evaluate performance in use.

(v) No failures of the product in use have been reported to the IAB.

5.1 CONDITIONS OF CERTIFICATION

The National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this certificate and in accordance with the manufacturer's instructions and usual trade practice. This certificate shall remain valid so long as:

(a) the specification of the product is unchanged;

(b) the Building Regulations, 1997 and any other regulation or standard applicable to the product/process, its use or installation remain unchanged;

(c) the product continues to be assessed for the quality of its manufacture and marking by NSAI;

(d) no new information becomes available, which in the opinion of the NSAI would preclude the granting of the certificate;

(e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.

5.2 The IAB mark and certification number may only be used on or in relation to products/processes in respect of which a valid certificate exists. If the certificate becomes invalid, the certificate holder must not use the IAB mark and certification number and must remove them from products already marked.

5.3 In granting this certificate, the NSAI makes no representation as to:

(a) the presence or absence of patent rights subsisting in the product/process; or

(b) the legal right of the certificate holder to market, install or maintain the product/process; or

(c) whether individual products have been manufactured or installed by the certificate holder in accordance with the descriptions and specifications set out in this certificate.

5.4 This certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this certificate relating to the safe use of the certified product or process are preconditions to the validity of the certificate. However, the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act, 1989 or of any other current or future statute or current or future common law duty of care owed by the manufacturer or by the certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage, including personal injury, arising as a direct or indirect result of the use of this product or process.

5.7 Where reference is made in this certificate to any Act of the Oireachtas, regulation made thereunder, statutory instrument, code of practice, national standards, manufacturer's instructions or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this certification.

THE IRISH AGRÉMENT BOARD

This Certificate No. 97/0060 is accordingly granted to Bord na Móna on behalf of the Irish Agrément Board.

Date of Issue: 02 June 1995

Signed: _____

Director of Standards, NSAI

Readers may check that the status of this Certificate has not changed by contacting the

Irish Agrément Board,
NSAI, Glasnevin, Dublin 9. Ireland.

Telephone: (01) 807 3800.
Telex: 32501.
Telefax: (01) 807 3838.

IRISH AGRÉMENT BOARD

BUILDING PRODUCT CERTIFICATION

Irish Agrément Board,
NSAI,
Glasnevin,
Dublin 9.
Ireland.
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Telex: 32501.
Telefax: (01) 807 3838.

IRISH AGRÉMENT BOARD

BUILDING PRODUCT CERTIFICATION

CERTIFICATE No. 03/0186

Cl/SfB

(52.3)

Acorn Environmental Systems Ltd., Somerset Bridge
Bridgwater, Somerset, TA6 6LL UK.
Tel: 0044 (1278) 439325 Fax: 0044 (1278) 439324
e-mail: info@acornsystems.com website: www.acornsystems.com

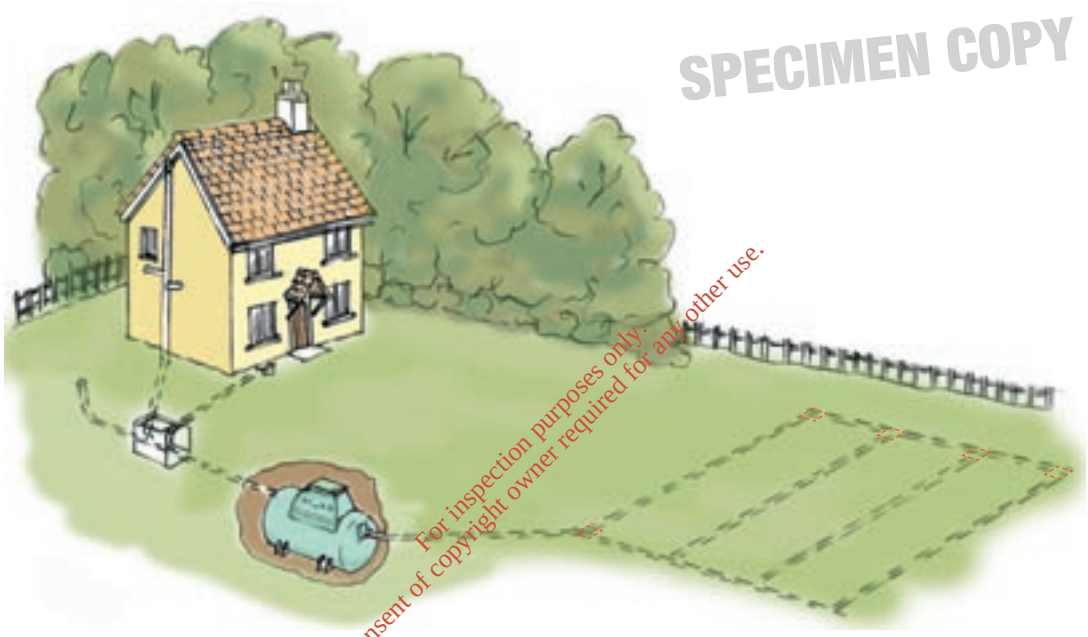
Acorn Platinum Mini Wastewater Treatment System for Single Dwellings

Systemes de Traitement des Eaux Residuaires. Abwasser Aufbereitung

The Irish Agrément Board is designated by Government to issue European Technical Approvals.

Irish Agrément Board Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2002.**

The Irish Agrément Board operates in association with the **National Standards Authority of Ireland (NSAI)** as the National Member of UEAtc.



PRODUCT DESCRIPTION

This Certificate relates to the Acorn Platinum Mini Wastewater Treatment System for Single Dwellings. The system utilises the Biological Aerated Filter (BAF) process to treat domestic wastewater from dwellings with a population equivalent of up to six persons.

The unit is manufactured from glass-reinforced plastic (GRP), is cylindrical in shape and has three operating zones.

The tank capacity is 3250 litres. For design loadings and flows, the retention time is in excess of 48 hours and the de-sludging interval is at least one year.

The life of the GRP tank, when installed and operated in accordance with the Certificate holder's instructions, should be in excess of 25 years. However, mechanical components, subject to normal wear and tear, will require replacement within this time.

USE:

The product is for use in wastewater treatment systems designed in accordance with BS 6297: 1983 *Code of practice for design and installation of small sewage treatment works and cesspools,* and the *EPA wastewater treatment manual – Treatment Systems for Single Houses 2000,* for the collection and treatment of domestic wastewater, including the separation and partial digestion of suspended matter, prior to discharge of the treated effluent.

MANUFACTURE

The product is manufactured by:

Acorn Environmental Systems Ltd.
Somerset Bridge
Bridgwater
Somerset, TA6 6LL. UK.

PART 1 CERTIFICATION

1.1 ASSESSMENT

In the opinion of the Irish Agrément Board (IAB), the Acorn Platinum Mini Wastewater Treatment System is satisfactory for the purpose defined above, and can meet the requirements of the Building Regulations 1997 to 2002, as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997 to 2002

REQUIREMENT: D & H

D1 & D3 - Materials and Workmanship

D3 - The Acorn Platinum Mini Wastewater Treatment System, as certified in this Irish Agrément Board Certificate, is manufactured from proper materials and is fit for its intended use. (See Part 4 of this Certificate).

D1 - The Acorn Platinum Mini Wastewater Treatment System, used in accordance with this Irish Agrément Board Certificate, can meet the requirements for materials and workmanship.

PART H - DRAINAGE AND WASTE DISPOSAL

H1 Drainage systems:
The Acorn Platinum Mini Wastewater Treatment System is easily installed and incorporated into soil percolation systems to meet Building Regulation requirements.

H2 Septic tanks:
The Acorn Platinum Mini Wastewater Treatment System has been designed for use in wastewater treatment systems, for the collection and treatment of domestic wastewater, when installed in accordance with the recommendations of BS 6297: 1983 and the EPA wastewater treatment manual – Treatment Systems for Single Houses.

The quality of effluent from the Acorn Platinum Mini Wastewater Treatment System exceeds that of the effluent from a septic tank and can meet the Building Regulation requirements.

Information on the design capacity, ventilation, safety and location requirements is given in this Irish Agrément Certificate (see sections 2, 3 and 4 of this certificate).

PART 2 TECHNICAL SPECIFICATION AND CONTROL DATA

2.1 DESCRIPTION

2.1.1 System Details

The Acorn Platinum Mini Wastewater Treatment System utilises the Biological Aerated Filter (BAF) process to treat domestic wastewater from dwellings with a population equivalent of up to six persons.

The cylindrical tank and access turret, air compressor unit, access cover and internal partitions are manufactured from glass-reinforced plastic (GRP).

The submerged filter beds in the filter chamber are comprised of hundreds of randomly packed pieces of UV stable uPVC, supported on a uPVC open mesh panel.

An air compressor supplies air to an air bubble diffuser system in the filter zone. The compressor, which is located within an integral chamber at the top of the unit, operates on a continuous basis. The unit operates off a normal domestic power supply, and is connected to the dwelling served by a residual current device (RCD).

Inlet and outlet pipe and vent pipe connections are provided and are clearly labelled.

The unit is accessed via the pedestrian duty manhole cover, designed to be flush with ground level. The cover is held in place by tamper proof stainless steel rivets.

Discharge from the tank is by gravity but provision can be made for pumped discharge, by incorporating an additional pump if required.

2.1.2 Treatment

Treatment is carried out in three phases, in the primary settlement zone, the filter chamber and the final settlement zone, as follows:

Zone 1 - Primary settlement: Domestic wastewater enters the primary settlement chamber. Here, heavy solids settle out on the base of the compartment, where they remain until de-sludging. Lighter debris and grease rise to the surface to form a crust. The remaining effluent (supernatant liquor), is displaced from the primary settlement zone into the filter chamber.

Zone 2 - Biological oxidation: As the supernatant liquor passes over the submerged media in the filter chamber, it is biodegraded (digested) by the micro-organisms (or biomass), which develop and grow in suspension, and on the media. These naturally occurring micro-organisms utilise the organic material present in the effluent, as a food source, to reduce the biochemical oxygen demand (BOD) of the effluent. In order to achieve this, the micro-organisms require an adequate supply of oxygen. This is provided by aerating the filter chamber via the air diffuser arrangement. Excess micro-organisms are shed from the media surface as solid particles known as humus solids.

Zone 3 - Final settlement: Treated effluent is displaced from the filter chamber into the final settlement zone or humus chamber. Here humus solids settle out and form a sludge on the base of the tank. They are then returned via a sludge return system, to the primary settlement zone. The final effluent is displaced from the humus tank and discharged to the percolation area by gravity unless otherwise specified.

2.2 MANUFACTURE

2.2.1 General

The tank is manufactured in two sections, by hand lay-up, from cold setting polyester resin and reinforced glass fibres. The sections are joined with stainless steel rivets to form a cylindrical shape. The joint is sealed with layers of polyester resin.

The air compressor housing, access cover and internal partitions are laminated separately before being incorporated into the unit.

The biomass supporting media is manufactured from high density, corrosion-resistant plastic. Internal and external pipe work, media and grids are fitted prior to final water tightness testing. The inlet, outlet and vent pipe connections are labelled.

2.2.2 Product range

The system is designed to collect domestic wastewater from dwellings having a population equivalent of up to six persons. System details are shown in Table 1.

Table 1. Acorn Platinum Mini Wastewater Treatment System – basic information

Total Capacity	litres	3250
Primary settlement chamber	litres	1500
Filter chamber	litres	900
Final settlement chamber	litres	850
Maximum number of full-time residents	(p/day)	6
O/A Length	(m)	2.13
O/A Width	(m)	1.47
Height	(m)	1.9
Weight (empty)	(Kg)	320
Design flow rate	(m^3/day)	1.2
BOD load	(Kg/day)	0.36
Ground level to inlet invert level	(m)	0.8
Inlet invert to base	(m)	1.3
Outlet invert to base	(m)	1.2
Motor rating (air blower)	(Watts)	50
Filter media surface area/volume	m^2/m^3	126 / 0.6
De-sludge period	year	1
Thickness	mm	6 (± 10%)
Retention time (for design case)	hours	48

Ancillary items

10mm Air Supply Lines
50W air compressor
300 W Submersible pump (optional)
Electrical control panel float switch and alarm.
110 mm uPVC inlet and outlet sockets to BS 4660: 2000 *Thermoplastics ancillary fittings of nominal sizes 110 and 160 for below ground gravity drainage and sewage*
Air diffuser manifold
0.6 m3 YTH cascade filterpak media
electrical cable glands
stainless nuts, bolts and rivets

All components in contact with effluent are made of uPVC, polyethylene, glass reinforced plastic, or stainless steel.

Quality control

The Certificate holder operates a quality management system and continuous quality control is exercised during manufacture. Quality checks include carcass spray weight, tank wall thickness, visual inspection and water tightness.

2.3 DELIVERY, STORAGE AND MARKING

The unit is delivered to site fully assembled. It shall be lifted with certified webbing straps at the points recommended by the Certificate holder. Off loading shall be carefully supervised and lifting equipment shall be selected taking into account the unit weight, dimensions and the distance of lift required (see Table 1). All lifting equipment and procedures shall comply with the requirements of the Safety, Health and Welfare at Work Act 1989. The Certificate holder's instructions shall be followed to avoid damage to the tank during off-loading and installation.

Each unit bears a unique serial number, for traceability purposes, which is located on an identification plate within the turret. The plate also carries with the Certificate holder's details, model type and population equivalent capacity, such that all are clearly visible. Labels denote the inlet and outlet points of the unit.

The tank is supplied with full installation instructions and is labelled with the IAB identification Mark incorporating the number of this Certificate.

The tank should be stored upright, on ground which is level and free of sharp objects, with the cover in place to prevent ingress of water.

2.4 INSTALLATION PROCEDURE

2.4.1 General

Acorn Environmental Systems Ltd. supply detailed installation instructions and a network of Authorised Acorn Distributors offers a full installation, commissioning or installation supervision service.

Acorn Environmental Systems Ltd. recommends that a competent person, eg an appropriately qualified engineer or surveyor, conduct a site suitability assessment. Based on this assessment, the competent person should design and supervise installation and commissioning of the unit.

2.4.2 Electrical Works

Electrical connections shall be strictly in accordance with the Certificate holder's instructions, ET101: 2002 *National Rules for Electrical Installations (3rd Edition) incorporating Amendment No. 1 2001* and ET 207 : 2003 *Guide to the National Rules for Electrical Installations As Applicable To Domestic & Similar Installations,* published by the Electro-Technical Council of Ireland (ETCI). Electrical connections shall be carried out by a competent person, using materials suitable for the purpose.

Electrical cables shall be protected from accidental damage eg by a suitable conduit.

2.4.3 Site Works

The excavation shall be of sufficient size to permit placement of the unit and back filling and to allow for timbering and sheeting as necessary to meet the requirements of The Safety, Health and Welfare at Work Act, 1989. There should be sufficient area on site to permit excavation, dumping of excess spoil, backfilling, handling and installation, without causing damage to the unit or the ancillary equipment.

Unless adequate structural protection is provided, the unit shall be protected from damage due to superimposed loading eg by erection of a suitable fence. The distance between the fence and the unit should be equal to or greater than the depth of excavation for the unit.

Although the unit is strongly moulded in GRP (glass reinforced plastic) and has an extremely high tensile strength, it is important that care is exercised to prevent accidental damage arising from blows from tools or concentrated pressure on the shell from levering etc.

Similarly, sharp corners or edges of bricks and stones shall be kept clear of the unit. This shall be borne in mind when back-filling, as the resultant load of a sharp object could fracture the unit.

The tank should not be lifted if it contains water.

2.4.4 Design

Ground conditions should be similar to those required to support house foundations. The system should not be used in unsuitable ground conditions.

Good ground working practice shall be followed, particularly with regard to the gradient on drainage pipe runs. The inlet pipe should have a gradient of between 1:40 and 1:70. The outfall pipe should have a final gradient of between 1:70 and 1:200.

Storm water run-off eg from roofs or paved areas shall be excluded from the system.

The system shall not be installed in areas liable to localised flooding, unless adequate additional protection is provided in accordance with the Certificate holder's instructions.

The thickness and strength of concrete surround shall be selected to suit the ground conditions, imposed loads etc for the design life of the unit. Minimum requirements are given in this certificate.

Adequate provision should be made for access, inspection and maintenance, in the drainage system upstream and downstream of the unit, through the provision of manholes, distribution chambers etc.

Adequate provision shall be made for ventilation, to ensure that noxious odours and dangerous gases can escape.

2.4.5 Health and Safety

Excavation, placing and backfilling should be carried out strictly in accordance with the requirements of the Safety, Health and Welfare at Work Act 1989 and all other relevant legislative requirements.

2.4.6 Procedure

a) Equipment and materials

The Acorn Platinum Mini Wastewater Treatment System is of lightweight construction and can be handled by a mini-digger.

It is recommended that all plant and materials necessary for the installation should be on site before excavation commences.

b) Tank Installation – dry site

A dry site is defined as one where the local water table never rises above the base of the treatment unit.

Where unstable ground conditions prevail, e.g. soft ground or shrinking clay, further advice shall be sought from a competent person. Additional excavation may be required beneath the tank. This should be backfilled with hardcore and sand blinding, to provide a firm base for the concrete bed, in accordance with the engineer's instructions.

The base of the excavation is graded and levelled to within ± 20mm. A foundation of semi-dry concrete is laid and levelled. The concrete shall be of sufficient thickness (minimum 225mm) and grade 25N to ensure that the unit is fully supported with due regard to subsoil conditions and loads imposed by the unit when full. Care shall be taken to eliminate voids.

The tank is lifted into position using slings attached to the two inbuilt lifting eyes on the outside of the tank. Care should be taken to prevent damage to external flanges or pipe work and to ensure correct orientation of the inlet and outlet pipe work. The concrete is haunched up around the base of the unit, ensuring the top of the tank is level and that all connections line up. The top flange shall be level to within ± 5mm in all directions.

The excavation is then backfilled, in 500mm lifts, with a minimum of 200mm thick grade 25N concrete, to the underside of the pipe work connections, ensuring the connections remain exposed.

The backfilled concrete shall be carefully compacted around the unit, to ensure even transfer of ground loads and to prevent stress concentrations. Vibrating pokers shall not be used as these may damage the GRP unit. Allow an initial set of concrete between lifts and wait at least 24 hours for the concrete to harden before final backfill/landscaping. Where a high water table exists, continue dewatering for 24 hours.

To prevent uplift, the unit should be ballasted by filling with water. As backfilling progresses, the water level should be maintained just above the backfill level.

c) Additional requirements for wet sites:

A wet site is defined as one where the local water table can rise above the base of the treatment unit.

A 250 mm hardcore sub-base is laid, compacted and levelled. The excavation shall be kept dry by pumping excess water via a 200 mm uPVC pipe embedded in the hardcore, using a site pump/sump hole/suction hose arrangement. Dewatering should be continued for as long as necessary and at least until the concrete has set.

The excavation is then lined with a continuous layer of 1200 gauge polyethylene sheet. The grade and thickness of the concrete base should be designed to suit site conditions (minimum 250 thick, grade 25 N). The installation should then continue in accordance with the requirements for dry sites.

c) Drainage Connections

The tank is provided, at the inlet and outlet, with 110mm PVCu pipes connections to BS 4660. These should be connected, via a flexible connection to allow for differential movement, (300mm length of pipe with flexible joints), to the drainage system. Suitable adapters shall be used for connection to other types of pipe work.

d) Venting

Venting positions are provided and are clearly marked on the unit. A low level vent should be provided.

e) Ducting

A 50 mm uPVC duct should be laid from the marked connection point on the unit to the power supply (to house the steel armoured cable).

f) Completion of backfilling

When connections to drainage and ventilation pipework are complete and ducting in place, continue backfilling with concrete, terminating 100mm below the underside of the top flange. The remaining backfilling should be completed to ground level, using selected non-angular excavated material.

Alternatively:, if preferred, a concrete cover slab can be cast around the inspection hatch. If this latter course is chosen, it is essential that the backfill is properly consolidated to minimise settlement.

If uneven settlement of the cover slab takes place, it may fracture the tank access turret. It is therefore advisable, especially where traffic may pass nearby, to extend the cover slab outwards to solid ground, beyond the excavation and to incorporate reinforcement mesh if necessary.

2.5 LOCATION

The units should be sited so that adequate access is available for safe installation, subsequent maintenance and de-sludging of the unit. De-sludging should be carried out by means of a de-sludging tanker, which requires access to within 30m of the unit, without transgressing the minimum separation distance from the unit and the effluent percolation system given in Table 2.

Table 2

MINIMUM SEPARATION DISTANCE (m)		
	Unit	Irrigation area
Dwelling served	7(1)	10(3)
Adjacent dwelling	7(1)	10(3)
Wall	3(1)	3
Road	4(1)	4
Site boundary	3(1)	3
Potable water source	10	30-100(2)
Water course	10	10
Lake	50	50

1. The depth of excavation to accommodate the Acorn Platinum Mini Wastewater Treatment System shall be taken into account when determining this distance. The separation distance should be such that the excavation does not undermine adjacent buildings, roads or walls. This distance should be not less than 1.5 times the excavation depth.

2. The separation distance should be not less than 30 metres except in the case of very free draining soils or gravels, where a minimum distance of 40 metres should be maintained. The irrigation area should be down hill of any nearby well. Where this is not possible, a separation distance of at least 100 metres shall apply.

3. These minimum permissible distances are for guidance only . Each site should be assessed on its own merits by a 'Competent Person'. However, where the site permits, irrigation areas should be located at greater separation distances from the dwelling. Also where possible on sloping sites the irrigation area should be down slope from the dwelling.

2.6 TREATED WASTE WATER DISPOSAL

2.6.1 General Principles

The unit produces a fully treated wastewater, (BOD <20 mg/l; suspended solids <30 mg/l), which is more easily absorbed into soil strata than septic tank effluent. There are two methods used for the disposal of treated wastewater.

a) Sub-surface irrigation, or
b) Raised percolation bed

2.6.2 Site Suitability Assessment

The site suitability and choice of disposal method will be largely determined by the detailed site assessment, which should be undertaken by a 'competent person' as defined by the appropriate Authority.

The report should include a detailed visual inspection of the site, inspection of the trial hole for soil profile, depth of water table, percolation value,(eg. Standard 'T/P' test) together with local knowledge of the area. From this information it should be possible to ascertain the suitability of the site and the size and type of percolation area required. Reference should also be made to the publication - *Ground Water Protection Responses for On-Site Waste Water Systems for Single Houses published by EPA/DoELG/GSI (2001).*

The results of this assessment will (a) determine if the site is suitable and (b) enable the selection of the most suitable method for disposing of the final treated effluent, having due regard to soil type and percolation characteristics, water table level and other factors.

Guidance for sizing of a percolation area is set out in Table 3. Treated wastewater is discharged from the unit by gravity or by pumping if a raised bed facility is required.

2.6.3 Sub-Surface percolation

The treated wastewater discharges, by pump or by gravity, into a network of perforated pipes laid in stone filled trenches. The objective is to spread the effluent as evenly as possible over the required land area, thus minimising the possibility of the ground becoming over-saturated.

The discharge from the unit has minimal suspended solids and is therefore, much more readily absorbed than septic tank effluent. The extent of the irrigation system may be determined by the site assessment, taking into account the soil type and percolation test results, as well as the population to be served; (see Table 3). These values are given for guidance only and should be discussed in detail with the competent person who conducted the site suitability assessment.

For gravity discharges the perforated pipe is 110 nominal diameter (see Figure 3). For pumped discharges the perforated pipe is 32mm diameter (see figure 3b). Trenches are generally 450-1000mm wide with the pipes laid on 250mm of clean 15-25mm stone and covered with a polyethylene or geo-textile layer. Layout of the trenches will be determined by site topography; the overall fall of the pipes should be not more than 1 in 200. The pipes should be at least 1 metre above the highest water table level or fissured rock strata.

2.6.4 Raised percolation bed

Where the irrigation pipes have to be above existing ground level, e g. thin top soils and/or rock or water table close to the surface, a banked-up irrigation system may be suitable. The base of the percolation trench should be at least 1200 mm above the highest water table or fissured rock strata. It is however, generally similar to sub-surface percolation (See Figure 4). A discharge pump is available with the unit where necessary.

2.6.5 Access to percolation pipes

For monitoring, sampling and maintenance purposes, access to the effluent percolation systems should be provided at the end of each irrigation or filter trench via a suitably constructed inspection chamber.

2.6.6 Further treatment

In some instances (e.g. proximity to a drinking water source), the effluent may require "polishing" before discharge, to reduce coliform bacteria levels. A commonly used method is to pass the discharge through a sand filter. In this situation, the discharge is pumped to the sand filter using an effluent pump set capable of discharging in 180 litre doses. Polishing filters can be partly or wholly above ground soil, covered or open. A typical filter serving a 4-person household would have a plan area of 8 to 20 m2, depending on design and type of sand used.

Where part of the polishing system is exposed above ground, care shall be taken to ensure there is no risk of casual or accidental access to the area.

2.7 ALARM

A visual and audible alarm is available to warn of breakdown or loss of power.

2.8 COMMISSIONING

It is recommended that commissioning is carried out by Acorn Environmental Systems Ltd. service technicians or their approved distributors, after installation is complete and all services are connected.

2.9 SERVICING AND MAINTENANCE

Acorn Environmental Systems Ltd or their approved distributors, offer service and maintenance contracts with their own technicians or with Authorised Acorn distributors. They will also carry out repair work.

2.10 ENCLOSURE

The area around the tank and percolation area should be fenced off to protect it from farm animals and other unwanted traffic.

Table 3. Guidance for sizing of percolation area (in linear metres of percolation pipe)

Population served	Required length of trench (m)	
	'T/P' values 21-50* Loading at 25 l/m^2 per day	'T/P' values 5-20* Loading at 50 l/m^2 per day
	Trench width 450 mm	Trench width 450 mm
3	48	24
4	64	32
5	80	40
6	96	48

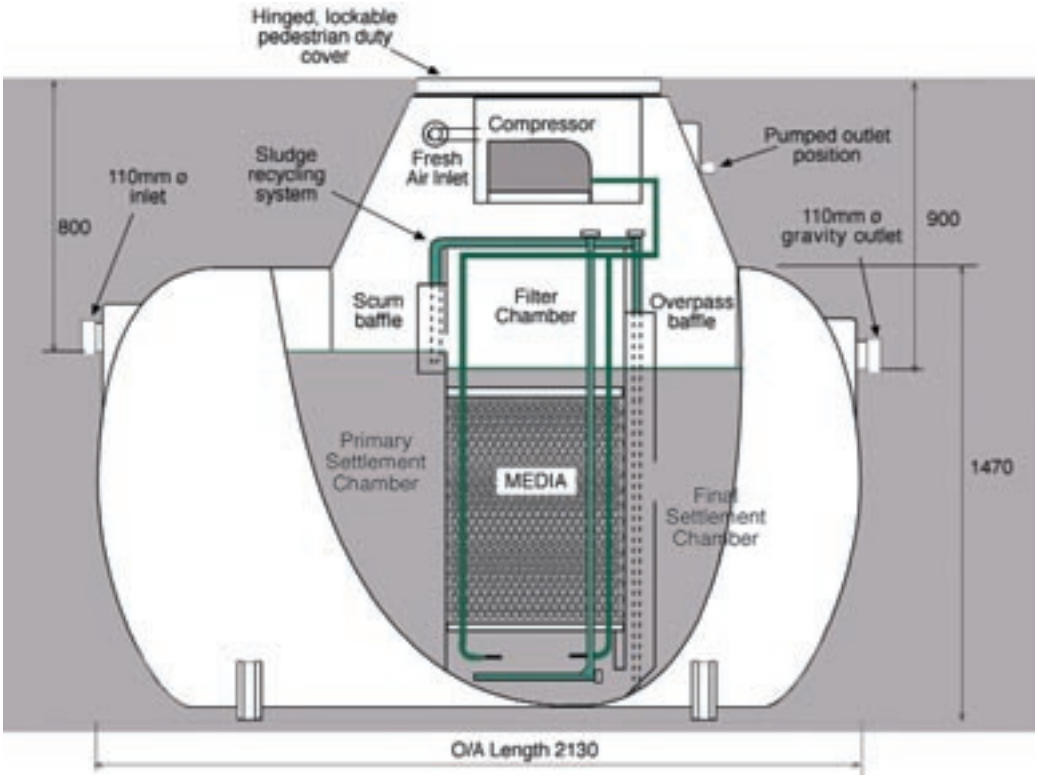


Fig. 1. Section through tank

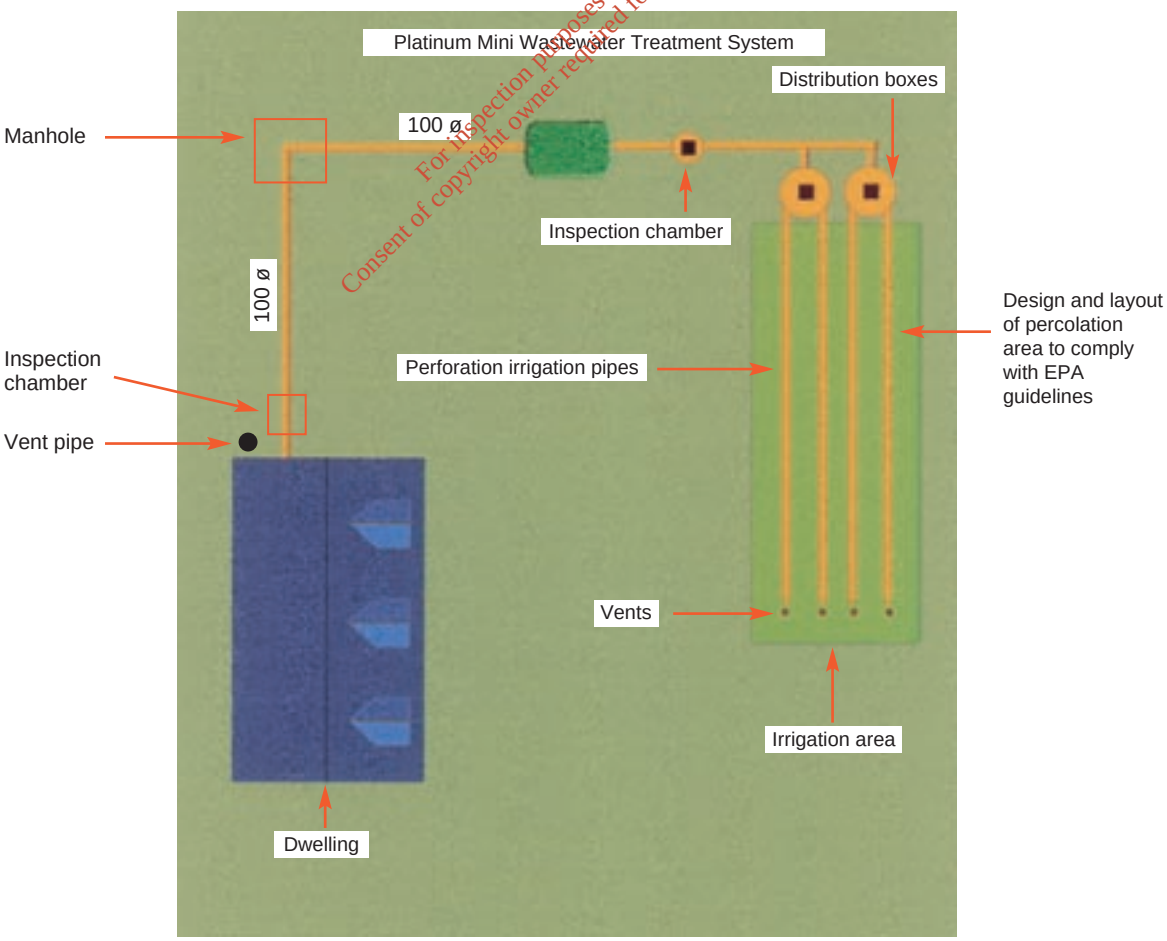


Fig. 2. Schematic layout for the Platinum Mini Wastewater Treatment System

Note: All separation distances to comply with EPA guidelines (see Table 2).

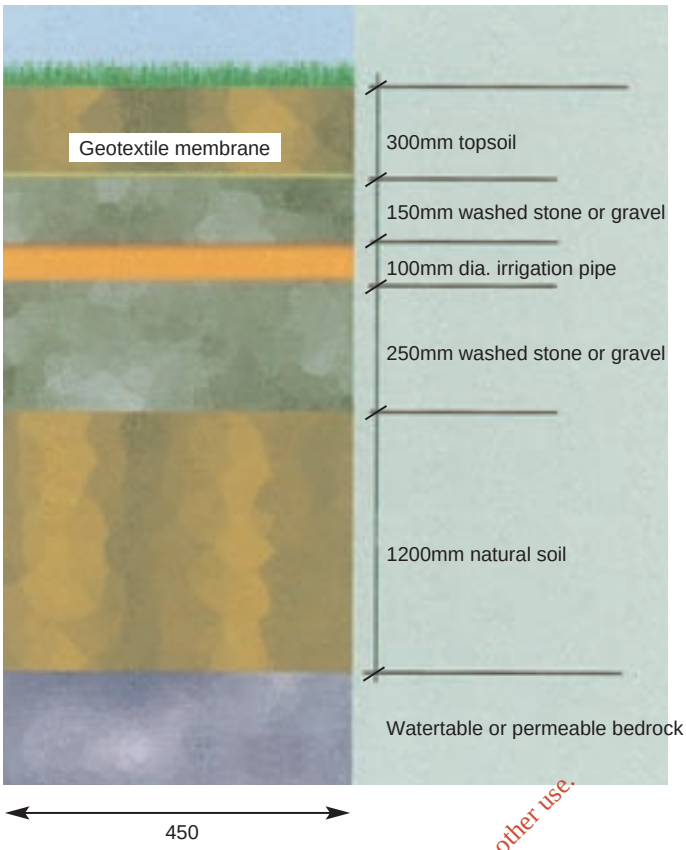


Fig. 3. Section through percolation trench

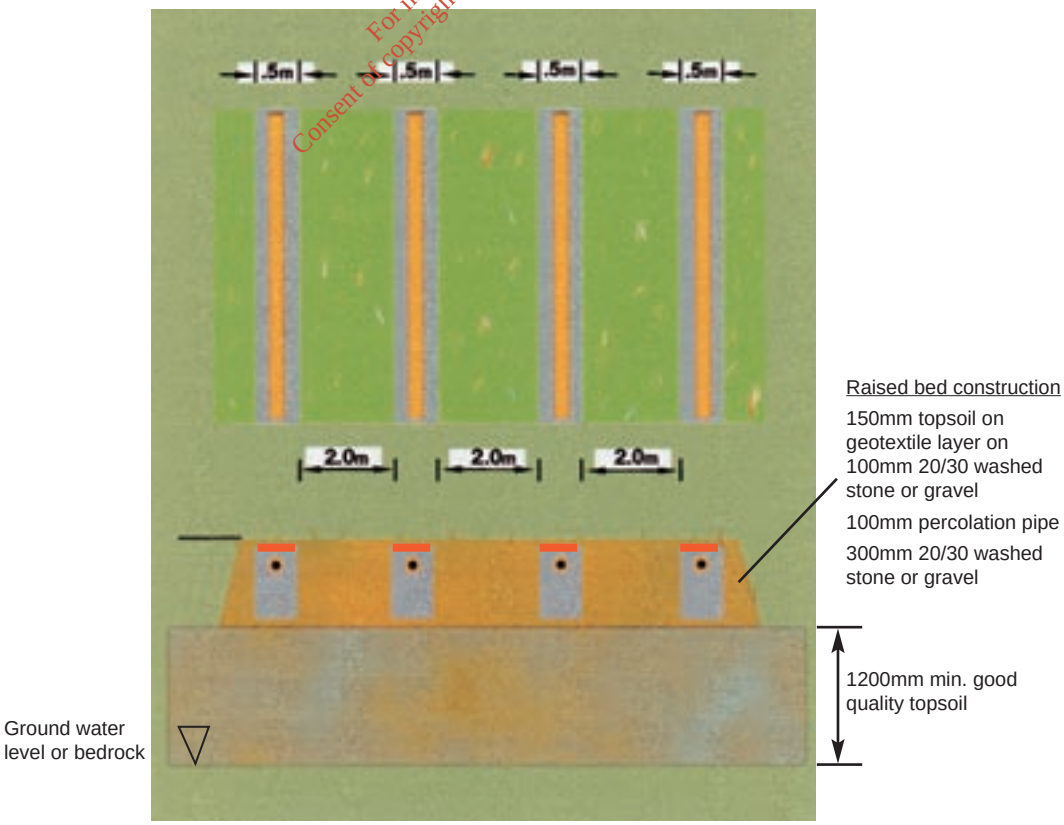


Fig. 4. Typical plan and section through raised percolation bed

PART 3 DESIGN DATA

3.1 GENERAL

The Acorn Platinum Mini Wastewater Treatment System is suitable for the collection and treatment of domestic sewage and shall be installed in accordance with the Certificate holder's instructions, the *EPA waste water treatment manual – treatment systems for single houses 2000* and to conform with the recommendations of BS 6297: 1983. The following conditions shall be observed for all wastewater treatment system installations:

(1) Design loadings shall be based on the maximum population served;

(2) It is a condition of Irish Agrément Board Certification that detailed site assessment records and installation locations are maintained by the Certificate holder or his agent for inspection/audit.

(3) The unit shall be sited/installed in accordance with the relevant Building Regulations.

(4) Ground water and flood levels shall always be below outlet level.

(5) The effluent shall be discharged to a suitable sub-soil irrigation system or raised percolation bed. The irrigation system shall be correctly designed in accordance with the detailed site assessment report for the 'particular site'.

(6) All waste water treatment systems shall be indelibly marked with the model type and person equivalent capacity in such a way that when installation has been completed, these details are clearly visible for record purposes.

The effluent resulting from the sewage treated by the Acorn Platinum Mini Wastewater Treatment System will normally be within Royal Commission Standard (ie suspended solids content less than 30 mg per litre and Biochemical Oxygen Demand (BOD) less than 20 mg per litre) provided that the hydraulic and BOD loadings are within the limits recommended by the Certificate holder for the unit installed (200 litres per head per day and 60 grammes per head per day, respectively). Under certain unusual conditions, the resulting effluent may not be within Royal Commission Standards. This is normal for any biological sewage treatment process, and may be caused by unusual hydraulic or BOD loading, weather conditions, contamination by excessive quantities of (a) offal and grease,(b) household disinfectants, (c) detergents or poisoning of microbiological flora or fauna by other chemicals.

3.2 DESIGN BASIS

3.2.1 General

The relevant dimensions of Acorn Platinum Mini Wastewater Treatment System certified in this Agrément Certificate is shown in Table 1.

3.2.2 Wastewater quality

Table 4. Treated waste water characteristics

	Standard
pH	6-9
BOD	< 20 mg/l
Suspended solids	< 30 mg/l
Ammonia	< 20 mg/lN
Total Phosphorus	< 10.5 mg/lP *

* This number will depend on the use and quantities of detergents used in the dwelling served by the system and could result in a higher figure.

The specification and power requirements of the Acorn Platinum Mini Wastewater Treatment System are listed in Table 1.

The unit can be used to provide temporary sewage treatment facilities. A short period of acclimatisation shall be allowed after commissioning of the unit before a full degree of treatment can be expected. This period is generally a few weeks and is normal for any biological treatment plant.

PART 4 TECHNICAL INVESTIGATIONS

4.1 ENVIRONMENTAL ASSESSMENT

The treated wastewater from a number of working Acorn installations has been monitored. The test results show that values stated for the parameters listed in Table 4 are consistently achievable over a range of operating conditions.

4.2 STRENGTH

The Certificate holder's design has been assessed as satisfactory. The Acorn Platinum Mini Wastewater Treatment System has adequate resistance to resist damage from minor impacts during handling but it shall be slung and supported at the points recommended and marked by the Certificate holder. The unit has sufficient structural strength to resist soil loads in non-cohesive dry soils, but it is recommended that excavations are backfilled with dense mass concrete, to resist uplift of units, due to buoyancy. The cover and frame assembly is suitable for pedestrian traffic only.

4.3 WATERTIGHTNESS

The Acorn Platinum Mini Wastewater Treatment System, when correctly installed, has been assessed as fully capable of preventing seepage either into or from the surrounding soil. The pipe joints, when correctly made, will be watertight.

4.4 DURABILITY

The structural properties of the glass reinforced plastic, from which the tank is constructed, in common with all similar materials, will deteriorate with time. This deterioration is accelerated by contact with ground water, sewage and dissolved or suspended organic or inorganic compounds. The resulting loss of strength or stiffness has been taken into account in the Certificate holder's design code. In the opinion of the IAB the product will have a life in excess of 25 years when installed in accordance with this Certificate. Protected steel components may require further protection by painting, but this should not be required for at least 10 years. The mechanical and electrical components are liable to wear during operation, but the design layout is such that they can be replaced as and when required.

4.5 CLEANING AND MAINTENANCE

Cleaning and maintenance should be carried out in accordance with the Certificate holder's Operation and Maintenance Instructions.

To obtain access to interior of the tank, open the manhole cover using the lifting key provided. The cover is of lightweight, but strong construction, and will lift easily. Both the compressor and the associated pipe work can also be accessed for removal and cleaning.

The tank is easily de-sludged, in the conventional manner by a suction tanker. De-sludging should be carried out in accordance with the Certificate holder's instructions.

Summary of maintenance instructions

The Acorn Platinum Mini Wastewater Treatment System is de-sludged by a suction tanker. Care shall be taken to avoid damage by the hose nozzle. Both the primary and final settlement zones shall be de-sludged in accordance with the Certificate holder's recommendations.

Local damage to GRP components can be repaired by the Certificate holder, or a suitably experienced person, using standard GRP repair techniques. Any repairs shall be carried out in dry conditions. The GRP laminate to be repaired shall be thoroughly cleaned, dried, lightly abraded and prepared with a suitable bonding agent.

Rust spots on steelwork should be wire brushed and coated with zinc-based paint.

Frequency of inspection

An inspection of the system shall be carried out regularly and at least every six months.

4.6 SAFETY

4.6.1 Safety of personnel

The access cover is securely fixed and lockable, to prevent unauthorised access. The access cover shall not be left off an unattended tank.

Sewage treatment plants are potentially dangerous, particularly when being desludged. Desludging shall never be carried out alone. If it is necessary to enter the unit, adequate safety precautions shall be made to ensure the safety of personnel involved. Naked lights, which can cause explosions, shall not be used in the vicinity of the tanks.

The unit should be positioned, or marked, or protected, to prevent superimposed loading or accidental impact by vehicles.

4.7 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE

- Resin/glass ratio based on BS 4994: 1987
- Barcol hardness, based on BS 4549: Part 1: 1997
- Degree of cure, by the Coggeshall test.
- Watertightness.
- Strength of cover and frame assemblies.
- Resistance of units to hydrostatic and ground pressure.
- Resistance to flotation.
- Environmental performance.
- Laminate thickness.
- Flexural tests on composite specimens to BS 2782 Part 10.
- Water absorbsion tests on composite specimens to BS EN ISO62: 1999.
- Gel coat tickness.

4.8 OTHER INVESTIGATIONS

(i) The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

(ii) An examination of the results of sample analysis of effluent from Acorn Platinum Mini Wastewater Treatment Systems, to measure suspended solids content and Biochemical Oxygen Demand, was undertaken.

(iii) An assessment of the tank was made in relation to degradation of mechanical properties owing to exposure to sewage, ground water, dissolved salts and dilute acids or alkalis; long-term loading conditions.

(iv) Site visits were conducted to assess the practicability of installation.

Bought in components

(v) Suitability for use.

No failures of the product in use have been reported to the IAB.

PART 5 CONDITIONS

5.1 CONDITIONS OF CERTIFICATION

The National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") has assessed the performance and method of installation of the system and the quality of the materials used in its manufacture and certifies the system to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this certificate and in accordance with the manufacturer's instructions and usual trade practice. This certificate shall remain valid so long as:

(a) the specification of the product is unchanged;

(b) the Building Regulations, 1997 to 2002 and any other regulation or standard applicable to the product/process/system, its use or installation remain unchanged;

(c) the product continues to be assessed for the quality of its manufacture and marking by NSAI;

(d) no new information becomes available, which in the opinion of the NSAI would preclude the granting of the certificate;

(e) the system continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.

5.2 The IAB mark and certification number may only be used on or in relation to the system in respect of which a valid certificate exists. If the certificate becomes invalid, the certificate holder must not use the IAB mark and certification number and must remove them from products already marked.

5.3 In granting this certificate, the NSAI makes no representation as to:

(a) the presence or absence of patent rights subsisting in the product/process/system; or

(b) the legal right of the certificate holder to market, install or maintain the product/process/system; or

(c) whether individual products have been manufactured or installed by the certificate holder in accordance with the descriptions and specifications set out in this certificate.

5.4 This certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this certificate relating to the safe use of the certified product or process are preconditions to the validity of the certificate. However, the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act, 1989 or of any other current or future statute or current or future common law duty of care owed by the manufacturer or by the certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage, including personal injury, arising as a direct or indirect result of the use of this product or process.

5.7 Where reference is made in this certificate to any Act of the Oireachtas, regulation made thereunder, statutory instrument, code of practice, national standards, manufacturer's instructions or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this certification.

THE IRISH AGRÉMENT BOARD

This Certificate No. 03/0186 is accordingly granted to Acorn Environmental Systems Ltd. on behalf of the Irish Agrément Board.

Date of Issue: August 2003

Signed: _____

Chief Executive, NSAI

Readers may check that the status of this Certificate has not changed by contacting the Irish Agrément Board, NSAI, Glasnevin, Dublin 9. Ireland.

Telephone: (01) 807 3800.
Telefax: (01) 807 3842.
www.nsai.ie

IRISH AGRÉMENT BOARD
BUILDING PRODUCT CERTIFICATION

Irish Agrément Board
NSAI
Glasnevin
Dublin 9
Ireland
Telephone: (01) 807 3800
Telefax: (01) 807 3842

Appendix D3

Foul Sewer Layout
General services Layout
Surface Water layout
Roads make-up
Watermain Layout
Rainwater Harvesting Layout

A3

LEGEND					
	GULLY		PROPOSED FOUL SEWER MANHOLE	I.L.	INVERT LEVEL
	PROPOSED SURFACE WATER PIPES		EXISTING MANHOLE		BOUNDARY LINE
	EXISTING SURFACE WATER PIPES	F	FOUL SEWER	DP/MH	DROP MANHOLE
	PROPOSED FOUL SEWER PIPES	S	SURFACE WATER	EP	ELECTRIC POLE
	EXISTING FOUL SEWER PIPES	FC MH	FLOW CONTROL MANHOLE	TP	TELEPHONE POLE
	PROPOSED 100mmØ WATERMAIN	O/F MH	OVERFLOW MANHOLE	LP	LAMP POST
	PROPOSED SURFACE WATER MANHOLE	C.L.	COVER LEVEL		GATE

NOTE:
ALL LEVELS RELATE TO MALIN HEAD DATUM.

REFER TO SITE SUITABILITY ASSESSMENT FOR DETAILS ON PROPOSED TREATMENT SYSTEM

AGRICULTURAL LANDS

F3
CL 95.090
IL 94.123

LEVELS TO BE CONFIRMED PRIOR TO CONSTRUCTION

F1
CL 95.409
IL 94.460

F2
CL 95.383
IL 94.330

CAR PARK

F.F.L. 95.500
HUMAN AREA

SLURRY TANK

STAND-OFF MANHOLE

94.650

STORAGE PIT 1

94.500

STORAGE PIT 2

94.500

94.650

STORAGE PIT 3

94.500

94.650

AGRICULTURAL LANDS

ANDS

YARD AREA

PEA STORAGE AREA

FLARE

GAS CLEANUP HOUSE

F.F.L 96.500
RECEPTION BUILDING

ANAEROBIC DIGESTOR No. 1

96.000

ANAEROBIC DIGESTOR No. 2

96,000

POST DIGESTION STORAGE No. 1

96.500

POST DIGESTION STORAGE No. 2

96.500

POST DIGESTION LOADING AREA

PROPOSED BIOFILTER UNIT. PLEASE REFER TO BS FOR FURTHER INFORMATION

LEVELS TO BE CONFIRMED PRIOR TO CONSTRUCTION

REMOVE VEGETATION FROM HEDGES

PROPOSED FOUL SEWER SERVICES LAYOUT

SCALE 1: 1000

CBR 2

TEMPORARY ACCESS ROAD 4M WIDE WITH PASSING BAYS EVERY 200M

PROPOSED FOUL SEWER SERVICES LAYOUT

SCALE 1: 2500

DRAFT

ON ORIGINAL
0 5 10 15 20 30 40 50mm

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
D2	26/04/12	ISSUED FOR APPROVAL	RN	DC

SITE LOCATION

Datum: Malin Head
Grid System: ITM

CLIENT:	BIO AGRIGAS LTD
PROJECT:	PROPOSED BIOENERGY FACILITY AT NEWDOWNS, THE DOWNS, CO. WESTMEATH
TITLE:	PROPOSED FOUL SEWER SERVICES LAYOUT

DRAWN:	CHECKED:	APPROVED:	DRAWING NO:	REV:
RN	DC		111_001_808	D2

DATE: JULY 2012 SCALE: AS SHOWN

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A3

LEGEND					
GULLY		PROPOSED FOUL SEWER MANHOLE		I.L.	INVERT LEVEL
PROPOSED SURFACE WATER PIPES		EXISTING MANHOLE			BOUNDARY LINE
EXISTING SURFACE WATER PIPES	F	FOUL SEWER		DP/MH	DROP MANHOLE
PROPOSED FOUL SEWER PIPES	S	SURFACE WATER		EP	ELECTRIC POLE
EXISTING FOUL SEWER PIPES	FC MH	FLOW CONTROL MANHOLE		TP	TELEPHONE POLE
PROPOSED 100mmØ WATERMAIN	O/F MH	OVERFLOW MANHOLE		LP	LAMP POST
PROPOSED SURFACE WATER MANHOLE	C.L.	COVER LEVEL			GATE

NOTE:
ALL LEVELS RELATE TO
MALIN HEAD DATUM.

REFER TO SITE SUITABILITY ASSESSMENT FOR DETAILS ON PROPOSED TREATMENT SYSTEM

AGRICULTURAL LANDS

6 CU.M RAINWATER HARVESTING TANK

LEVELS TO BE CONFIRMED PRIOR TO CONSTRUCTION

PROPOSED 46M FIRE HYDRANT RADIUS

CAR PARK

SLURRY TANK

STAND-OFF MANHOLE

STORAGE PIT 1

STORAGE PIT 2

STORAGE PIT 3

240 CU.M CAPACITY FIRE WATER RETENTION TANK

YARD AREA

PROPOSED 100MM Ø uPVC WATERMAIN

PROPOSED TANKERWAY

PRE-STORAGE AREA

FLARE

GAS CONTROL PANEL

ANAEROBIC DIGESTOR No. 1

ANAEROBIC DIGESTOR No. 2

POST DIGESTION STORAGE No. 1

POST DIGESTION STORAGE No. 2

POST DIGESTION LOADING AREA

PROPOSED CONNECTION TO EXISTING 100mmØ WATERMAIN ON-SITE

PROPOSED BIOFILTER UNIT. PLEASE REFER TO EIS FOR FURTHER INFORMATION

TO HYDROLOSIS UNIT IN RECEPTION BUILDING

FLOW CONTROL POINT LIMITING FLOW TO 11.5SL/SECOND

PETROL INTERCEPTOR INSTALLED PRIOR TO DISCHARGE TO WATER COURSE

PROPOSED ATTENUATION TANK 27MX7MX1.4M DEEP TO CATER FOR 100 YEARFLOOD EVENT AND ALLOWANCE FOR 10% CLIMATE CHANGE. STORAGE PROVIDED = 262 CU.M

LEACHATE TANK 15MX5MX2.1M DEEP PROVIDING STORAGE OF 126 CU.M

GRAVELED AREA TO DIGESTERS AND STORAGE TANKS

OVERFLOW PIPE FROM RAINWATER HARVESTING SYSTEM REFER TO Dwg. No. 111_001_401

TANK AT END OF COLLECTION SYSTEM FOR RAINWATER HARVESTING. 15MX5MX1.6M DEEP PROVIDING STORAGE FOR 120CU.M

EXACT LOCATION OF HEADWALL TO BE FINALISED WITH LOCAL AUTHORITY

INTERCEPTION OF FLOW PIPE TO ENTER WATER

NON-RETURN VALVE TO BE INSTALLED

CBR 2

TEMPORARY ACCESS ROAD 4M WIDE WITH PASSING BAYS EVERY 200M

GENERAL SERVICES LAYOUT
SCALE 1: 1000

GENERAL SERVICES LAYOUT
SCALE 1: 2500

DRAFT

ON ORIGINAL
0 5 10 15 20 25 30 40 50mm

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
D2	26/04/12	ISSUED FOR APPROVAL	RN	DC

SITE LOCATION

Datum: Malin Head
Grid System: ITM

CLIENT:	BIO AGRIGAS LTD
PROJECT:	PROPOSED BIOENERGY FACILITY AT NEWDOWNS, THE DOWNS, CO. WESTMEATH
TITLE:	GENERAL SERVICES LAYOUT

DRAWN:	CHECKED:	APPROVED:	DRAWING NO:	REV:
RN	DC		111_001_806	D2
DATE:	SCALE:			
	JULY 12			

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IS.EN.ISO 9001:2008 Cert. no. 3324

A3

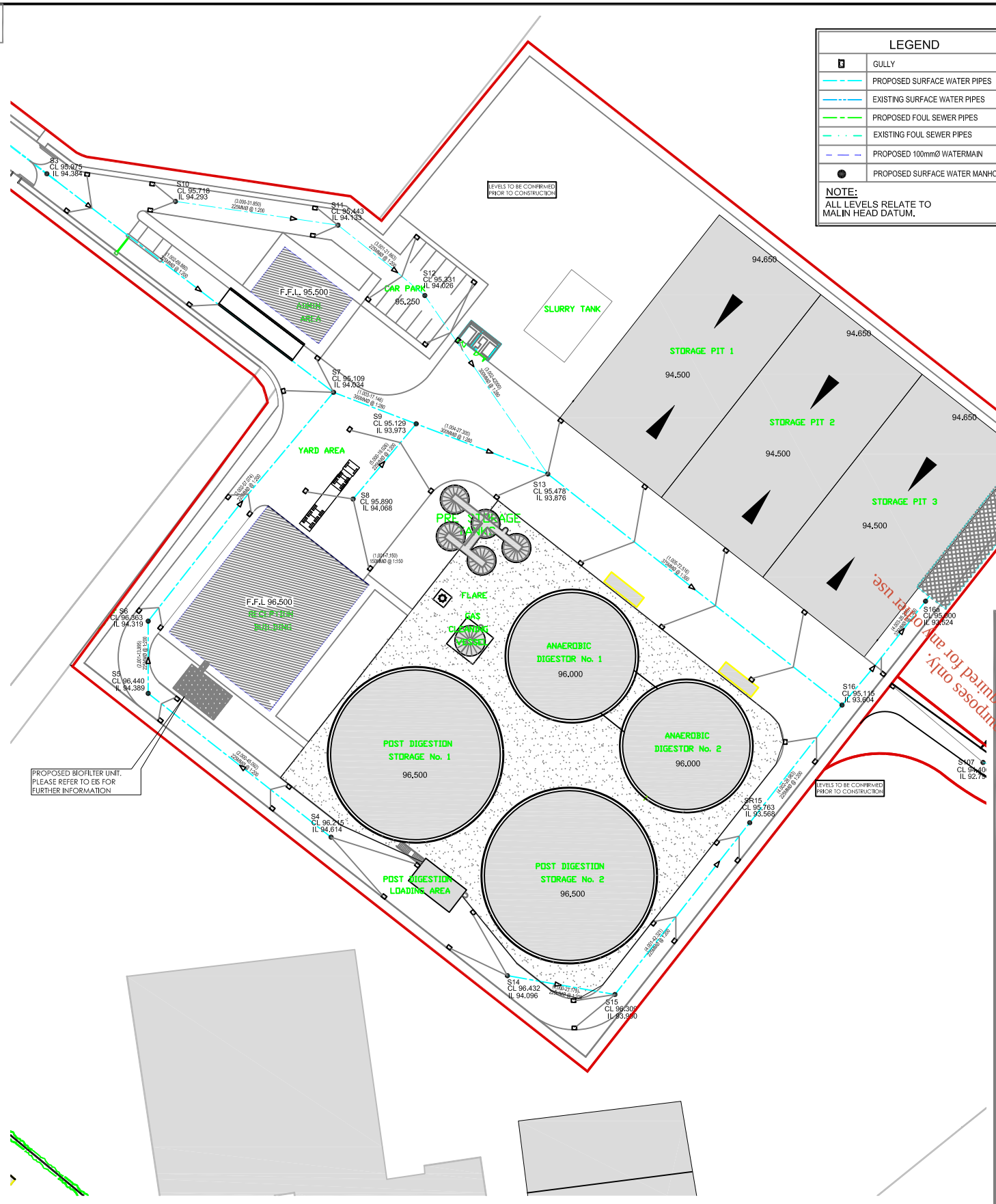
REVISION DATE 31/05/11

REVISION 1

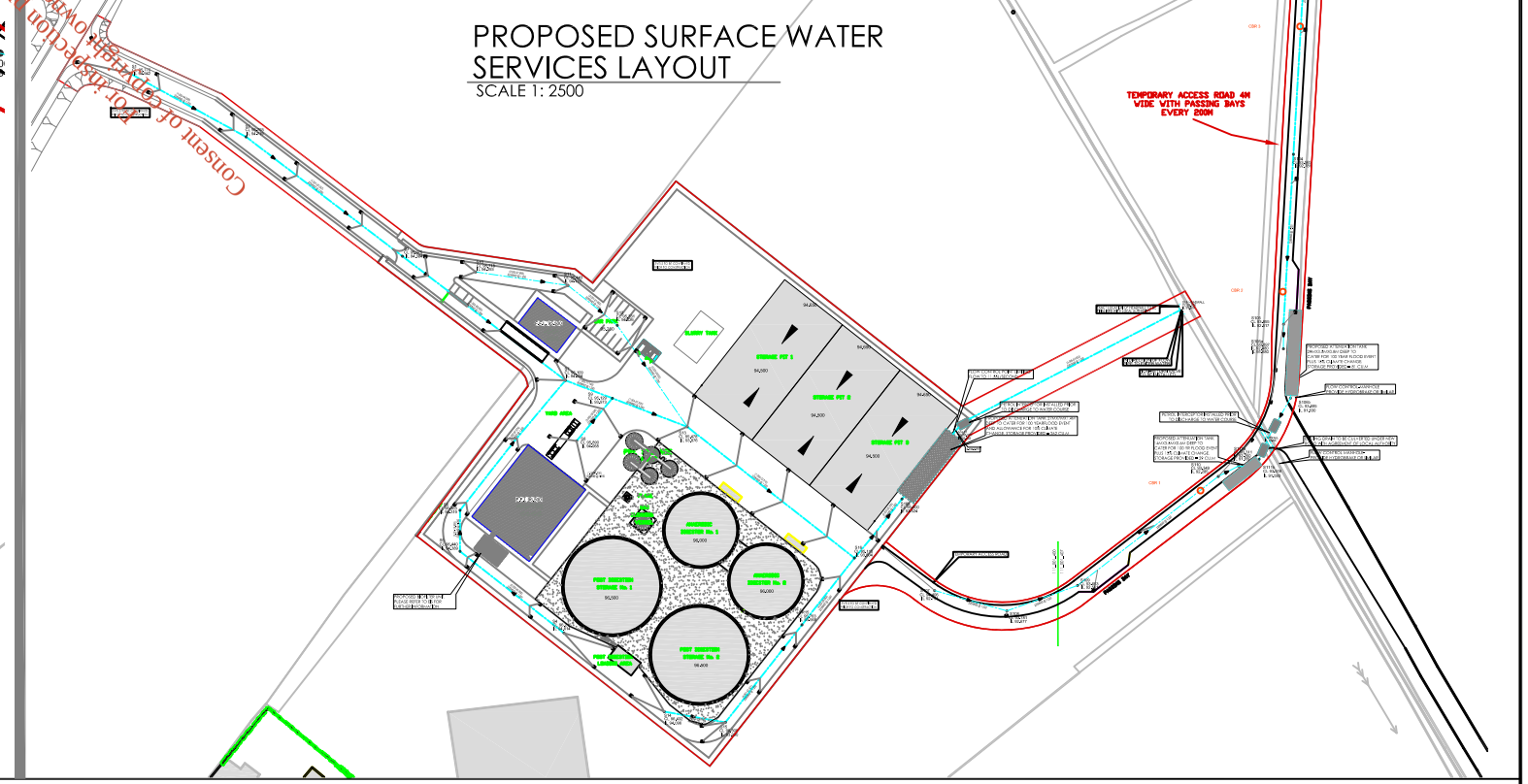
FORM NO FRM-010

LEGEND					
	GULLY		PROPOSED FOUL SEWER MANHOLE	I.L.	INVERT LEVEL
	PROPOSED SURFACE WATER PIPES		EXISTING MANHOLE		BOUNDARY LINE
	EXISTING SURFACE WATER PIPES	F	FOUL SEWER	DP/MH	DROP MANHOLE
	PROPOSED FOUL SEWER PIPES	S	SURFACE WATER	EP	ELECTRIC POLE
	EXISTING FOUL SEWER PIPES	FC MH	FLOW CONTROL MANHOLE	TP	TELEPHONE POLE
	PROPOSED 100mmØ WATERMAIN	O/F MH	OVERFLOW MANHOLE	LP	LAMP POST
	PROPOSED SURFACE WATER MANHOLE	C.L.	COVER LEVEL		GATE

NOTE:
ALL LEVELS RELATE TO MALIN HEAD DATUM.



PROPOSED SURFACE WATER SERVICES LAYOUT
SCALE 1: 1000



PROPOSED SURFACE WATER SERVICES LAYOUT
SCALE 1: 2500

DRAFT

ON ORIGINAL
0 5 10 15 20 30 40 50mm

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
D2	26/04/12	ISSUED FOR APPROVAL	RN	DC

SITE LOCATION

Datum: Malin Head
Grid System: ITM

CLIENT:	BIO AGRIGAS LTD
PROJECT:	PROPOSED BIOENERGY FACILITY AT NEWDOWNS, THE DOWNS, CO. WESTMEATH
TITLE:	PROPOSED SURFACE WATER SERVICES LAYOUT

DRAWN:	CHECKED:	APPROVED:	DRAWING NO:	REV:
RN	DC		111_001_807	D2
DATE: JULY 2012	SCALE: AS SHOWN			

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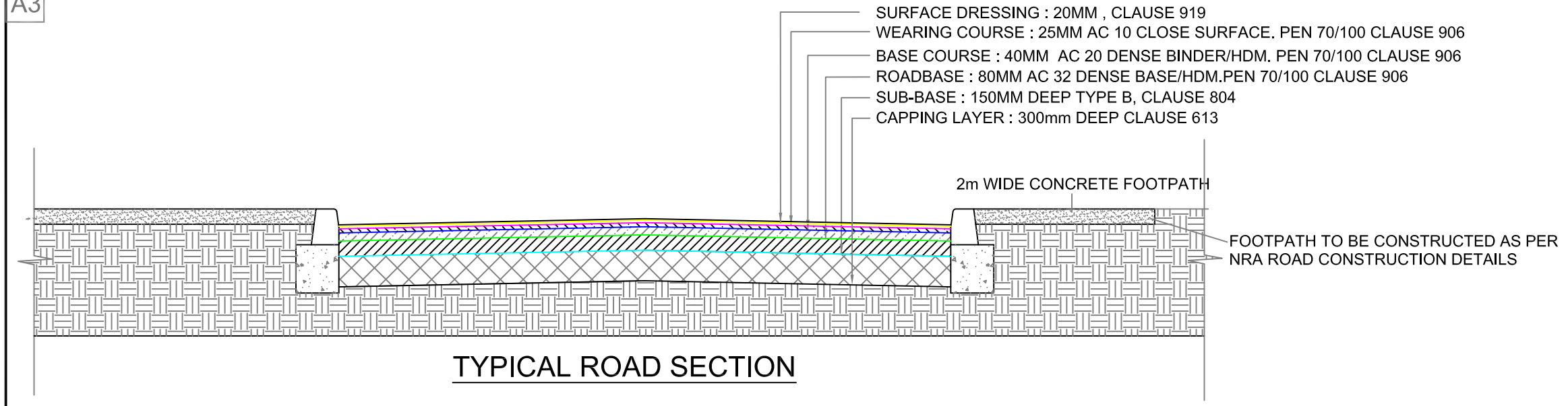
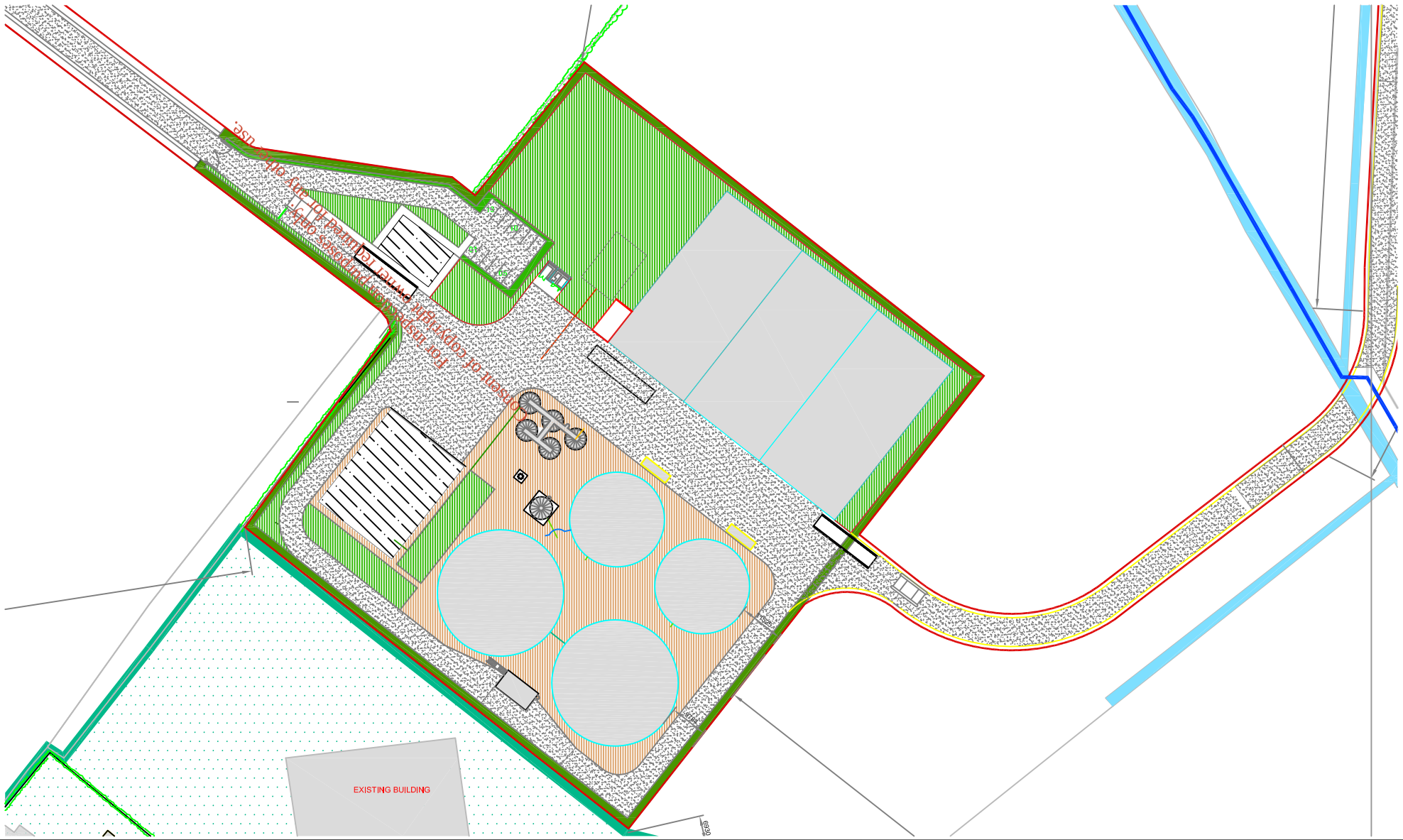


TYPICAL ROAD SECTION

LANDSCAPING LEGEND:

- INTERNAL ROAD
- GRASS AREA
- GRAVELLED AREA
- CONCRETE AREA
- BUILDING

LAYER	DEPTH	MATERIAL TO BS594987:2007	NRA SPECIFICATION
SURFACE DRESSING		DOUBLE SURFACE DRESSING LAYER, 14MM FIRST LAYER 6MM SECOND LAYER STANDARD CATIONIC EMULSION, 1.61/M² AND 0.61/M² FIRST AND SECOND LAYERS RESPECTIVELY. MINIMUM PSV60	CLAUSE 919
WEARING COURSE	25MM	AC 10 CLOSE SURFACE. PEN 70/100	CLAUSE 906
BASE COURSE	40MM	AC 20 DENSE BINDER/HDM. PEN 70/100	CLAUSE 906
ROAD BASE	80MM	AC 32 DENSE BASE/HDM. PEN 70/100	CLAUSE 906
SUB-BASE	150MM	TYPE B	CLAUSE 804
CAPPING	300MM	6F2. CRUSHED ROCK	CLAUSE 613



REVISION 1 FORM NO FRM-010 REVISION DATE 31/05/11

EPA Export 01-08-2012:00:09:28

DRAFT

ON ORIGINAL

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REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:

SITE LOCATION

Datum: Malin Head
Grid System: ITM

CLIENT:	THOMAS FLYNN
PROJECT:	PROPOSED BIOENERGY FACILITY AT NEWDOWNS, THE DOWNS, CO. WESTMEATH
TITLE:	ROADS MAKE UP
DRAWN: FMS	CHECKED:
APPROVED:	DRAWING NO: 111_001_802
REV: D1	DATE: JULY 12
SCALE:	

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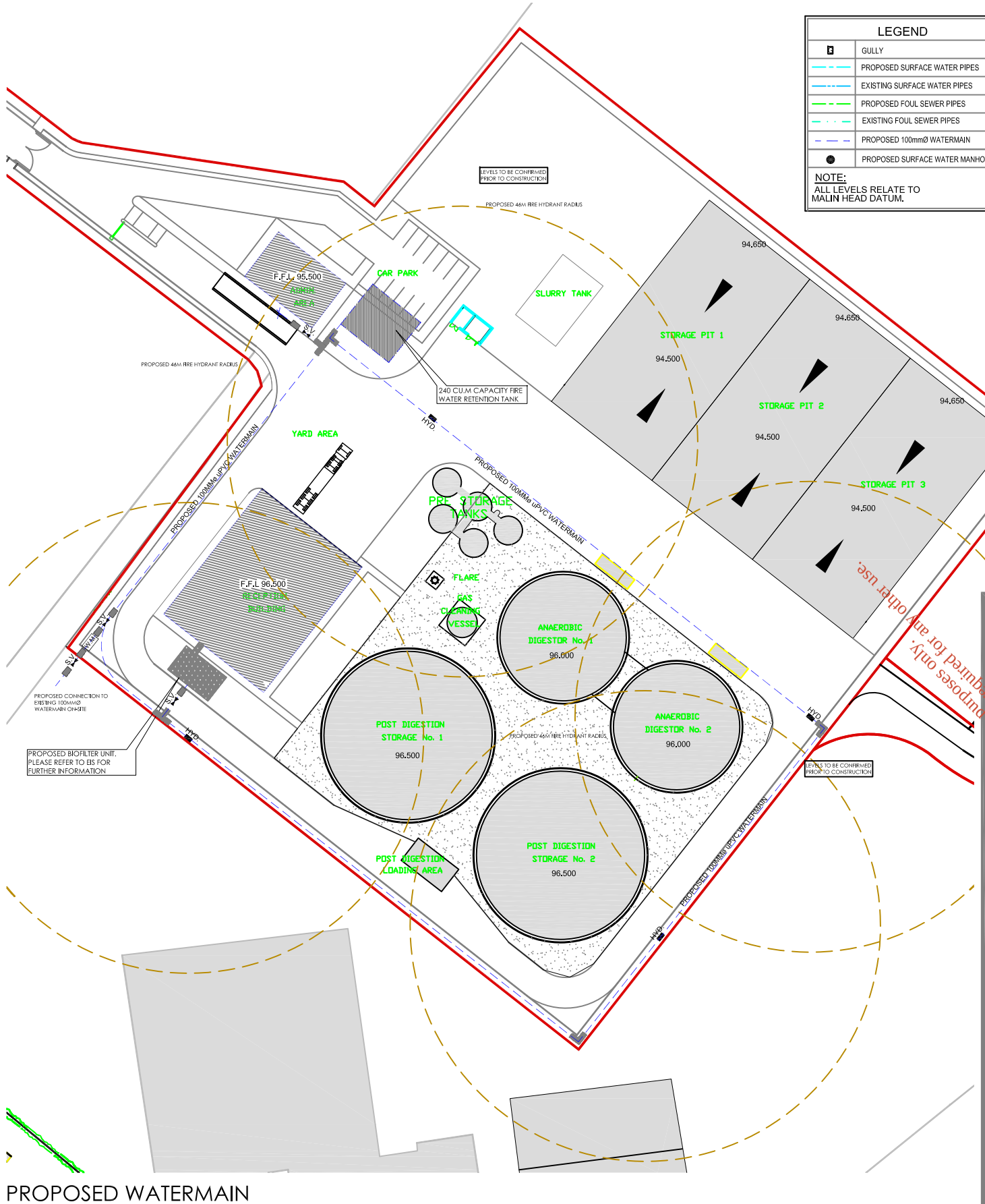
REVISION DATE 31/05/11

REVISION 1

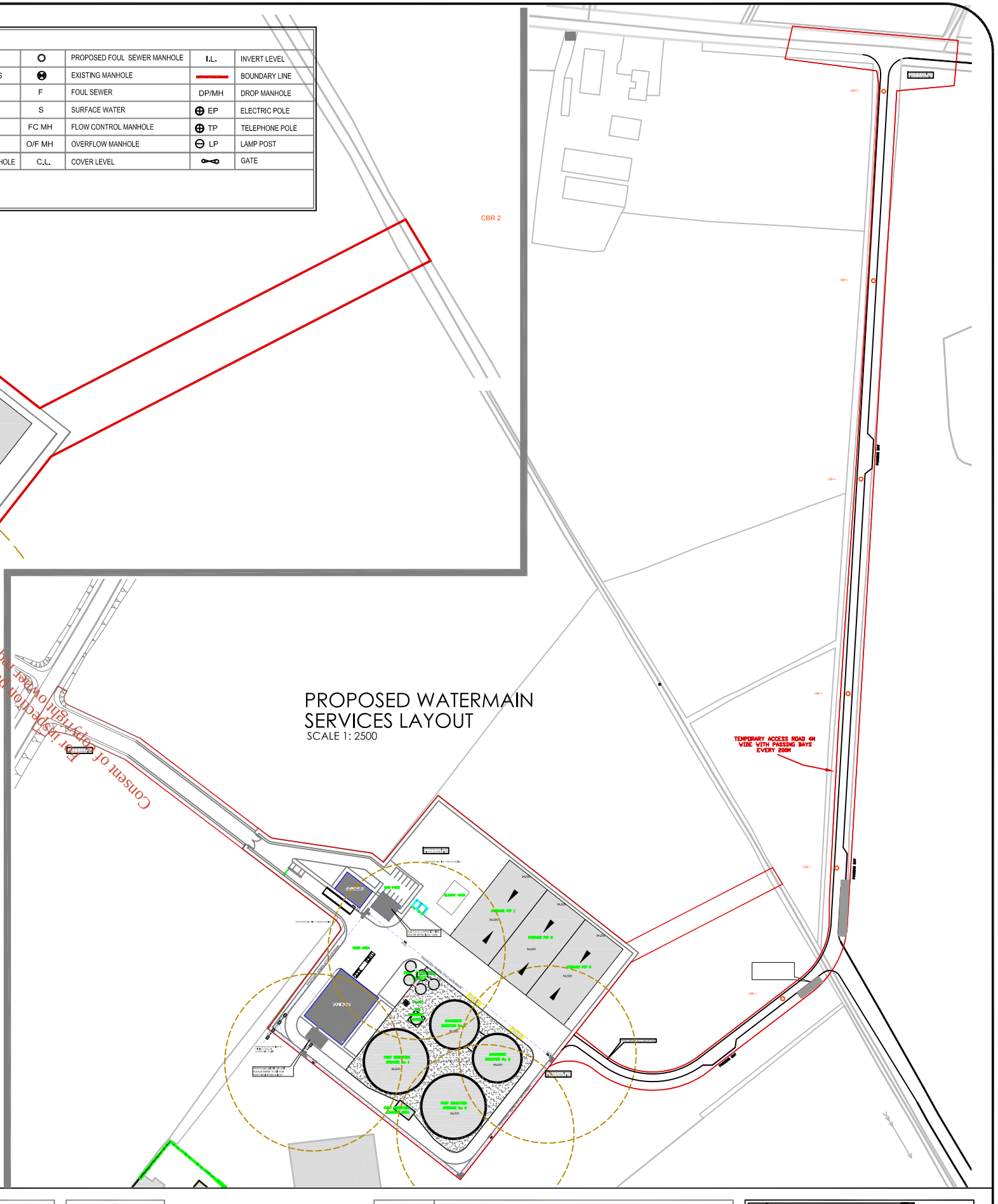
FORM NO FRM-010

LEGEND					
GULLY		PROPOSED FOUL SEWER MANHOLE		I.L.	INVERT LEVEL
PROPOSED SURFACE WATER PIPES		EXISTING MANHOLE			BOUNDARY LINE
EXISTING SURFACE WATER PIPES		F	FOUL SEWER	DP/MH	DROP MANHOLE
PROPOSED FOUL SEWER PIPES		S	SURFACE WATER	EP	ELECTRIC POLE
EXISTING FOUL SEWER PIPES		FC MH	FLOW CONTROL MANHOLE	TP	TELEPHONE POLE
PROPOSED 100mmØ WATERMAIN		O/F MH	OVERFLOW MANHOLE	LP	LAMP POST
PROPOSED SURFACE WATER MANHOLE		C.L.	COVER LEVEL		GATE

NOTE:
ALL LEVELS RELATE TO
MALIN HEAD DATUM.



PROPOSED WATERMAIN
SERVICES LAYOUT
SCALE 1: 1000



PROPOSED WATERMAIN
SERVICES LAYOUT
SCALE 1: 2500

DRAFT

ON ORIGINAL
0 5 10 15 20 25 30 40 50mm

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
D2	26/04/12	ISSUED FOR APPROVAL	RN	DC

SITE LOCATION

Datum: Malin Head
Grid System: ITM

CLIENT:	BIO AGRIGAS LTD
PROJECT:	PROPOSED BIOENERGY FACILITY AT NEWDOWNS, THE DOWNS, CO. WESTMEATH
TITLE:	PROPOSED WATERMAIN SERVICES LAYOUT

DRAWN:	CHECKED:	APPROVED:	DRAWING NO:	REV:
RN	DC		111_001_809	D2

DATE: JULY 2012
SCALE: AS SHOWN

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REVISION DATE 31/05/11

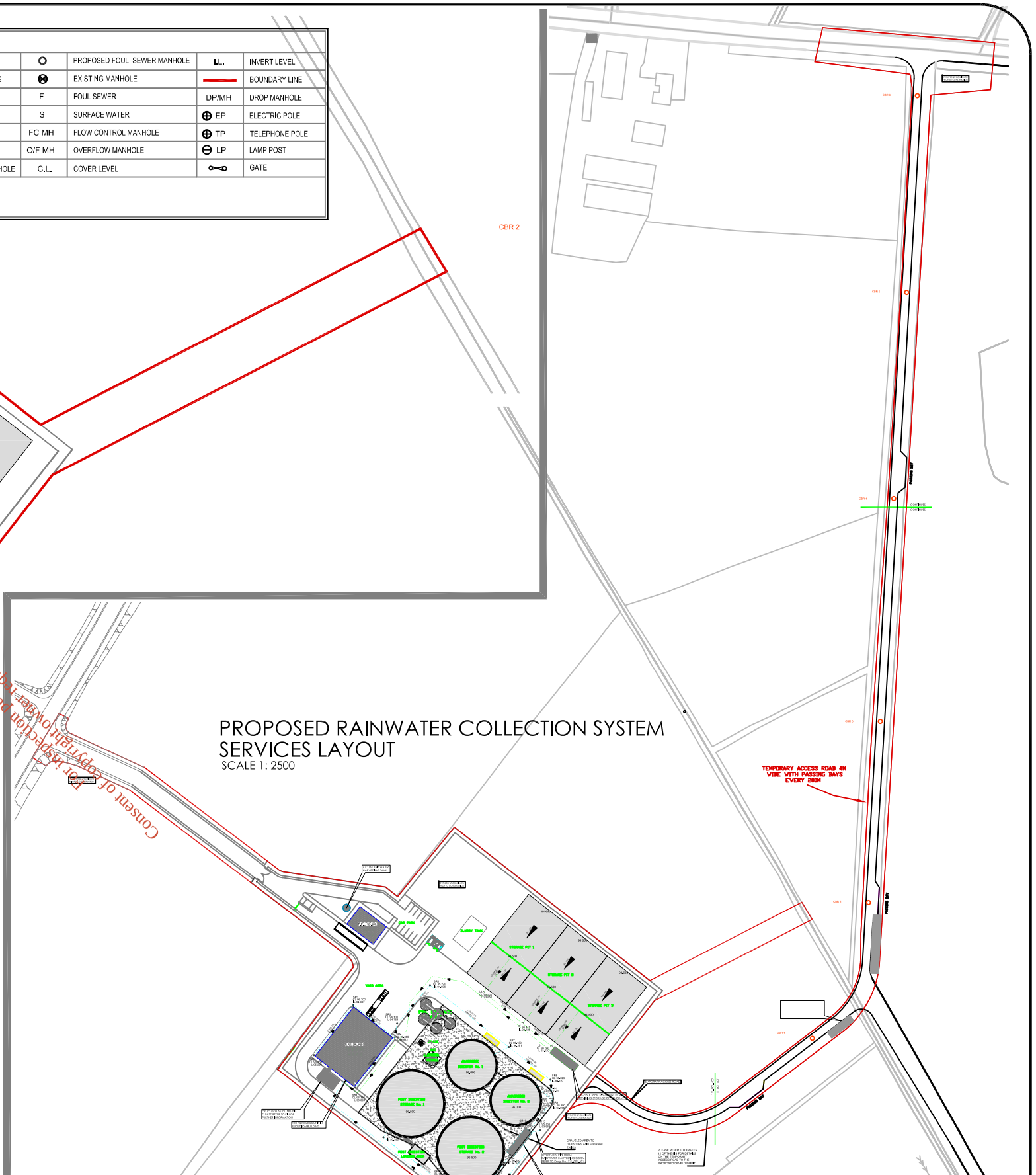
REVISION 1

FORM NO FRM-010

LEGEND					
	GULLY		PROPOSED FOUL SEWER MANHOLE	I.L.	INVERT LEVEL
	PROPOSED SURFACE WATER PIPES		EXISTING MANHOLE		BOUNDARY LINE
	EXISTING SURFACE WATER PIPES	F	FOUL SEWER	DP/MH	DROP MANHOLE
	PROPOSED FOUL SEWER PIPES	S	SURFACE WATER	EP	ELECTRIC POLE
	EXISTING FOUL SEWER PIPES	FC MH	FLOW CONTROL MANHOLE	TP	TELEPHONE POLE
	PROPOSED 100mmØ WATERMAIN	O/F MH	OVERFLOW MANHOLE	LP	LAMP POST
	PROPOSED SURFACE WATER MANHOLE	C.L.	COVER LEVEL		GATE

NOTE:
ALL LEVELS RELATE TO
MALIN HEAD DATUM.

PROPOSED RAINWATER COLLACTION SYSTEM
SERVICES LAYOUT
SCALE 1: 1000



PROPOSED RAINWATER COLLECTION SYSTEM
SERVICES LAYOUT
SCALE 1: 2500

DRAFT

Figured dimension only to be taken from this drawing. All dimensions to be checked on site. Consultants to be informed immediately of any discrepancies before work proceeds.

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ON ORIGINAL
0 5 10 15 20 25 30 40 50mm

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
D2	26/04/12	ISSUED FOR APPROVAL	RN	DC

SITE LOCATION

Datum: Malin Head
Grid System: ITM

CLIENT:	BIO AGRIGAS LTD
PROJECT:	PROPOSED BIOENERGY FACILITY AT NEWDOWNS, THE DOWNS, CO. WESTMEATH
TITLE:	PROPOSED RAINWATER COLLECTION SYSTEM SERVICES LAYOUT

DRAWN:	CHECKED:	APPROVED:	DRAWING NO:	REV:
RN	DC		111_001_810	D2
DATE: JULY 2012	SCALE: AS SHOWN			

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