Kildare County Council,
Water Services Section

SITE CHARACTERISATION AND ASSESSMENT FOR EXISTING HOUSING ESTATE AT TIMOLIN, COUNTY KILDARE

TIER 2 HYDROGEOLOGICAL ASSESSMENT FOR DISCHARGE TO GROUNDWATER

August 2015

EurGeol Robert Meehan, B.A., Ph.D., PGeo.
Soil, subsoil and landscape geologist
86 Athlumney Castle, Navan, County Meath.

Tel: +353-(0)46-9070070 Mob: +353-(0)87-6875558 email: antalamhireland@gmail.com

www.talamhireland.ie

SCOPE OF THIS REPORT

The findings of this report are the result of a desk study and geological field interpretation. Interpretations and conclusions included in the report are based on knowledge of the ground conditions following detailed investigations, as well as the regional soils, subsoils and bedrock geology, and the experience of the author. Dr. Robert Meehan has prepared this report in line with best current practice and with all reasonable skill, care and diligence in consideration of the limits imposed by the survey techniques used and the resources devoted to it by agreement with the client. The interpretative basis of the conclusions contained in this report should be taken into account in any future use of this report.

Dr. Robert Meehan accepts no responsibility for any matters arising if any recommendations contained in this document are not carried out, or are partially carried out, without further advice being obtained from Dr. Robert Meehan.

SUPPLEMENTARY DETAILS, MAPS AND DIAGRAMS

1.0 GENERAL DETAILS

The figure of 100 people population equivalent refers to the potential

- Maximum 5 residents per day using the facilities at the 12 no. houses in the existing, older housing estate which is currently served by the existing septic tank on the site (3 bedroomed houses, which equates to 5 p.e. x 12 = 60 people)
- Maximum 6 residents per day using the facilities at the 6 no. houses in the adjacent, existing 'Mill Brook' housing estate (3 bedroomed houses, which equates to 5 p.e. x 6 = 30 people)
- Plus a 'buffer' of 10 p.e. to potentially cater for additional loading

Figures from Mr. Colum Fagan, A/Executive Engineer, Water Services Section, Kildare County Council.

The maximum potential volume of wastewater generated is therefore (100 p.e. x 150 litres per person) = 15,000 litres per day (15.0m^3/day).

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment

SURFACE FEATURES (Distance to features should be noted in metres)	
HOUSES:	**The existing twelve houses in the estate will be between 30m and 75m from the proposed WWTS and polishing filter area (and up-gradient of them).** **The six houses to the southwest will be between 10m and 22m from the proposed WWTS and polishing filter area (and alongside).** **The two houses to the south will be approx. 62m and 75m from the proposed WWTS and polishing filter (and down-gradient).** **There are seven other houses to the southwest, between approx. 82m and 250m from the proposed WWTS and polishing filter (all alongside).** **There are also four other houses to the northwest which are between approx. 80m and 140m from the proposed WWTS and polishing filter (and up-gradient).** **There are no other domestic houses within 250m of the proposed WWTS and infiltration area.**
EXISTING LAND USE:	**The site is surrounded by agricultural pasture to the east and southeast, with many residential gardens and 'made' ground to the north, west and southwest. Arable crops are grown further to the west and east.**
SITE BOUNDARIES:	**The site is bounded by fences to the northeast and southeast, and walls to the northwest and southwest.** **The site of sufficient size to install a new WWTS and polishing filter area, once the percolation rates are moderate to rapid.**

GROUNDWATER FLOW DIRECTION:	**Assumed to be towards the south, downslope towards the Botkoge River which is approx. 110m to the south of the site.** **The water level in the adjacent spring, 70m south of the site, was 1.5m below ground level there on 28th May 2015; groundwater was at 4.6m bgl at that time in BH2, which is at approx. 5m higher elevation. From this, the general groundwater gradient seems to be in keeping with this north-south assumption.**
ROADS:	**A third class road faces the site to the southwest, approx. 70m down-gradient of the proposed WWTS and polishing filter area, while the R448 road is approx. 95m to the northwest, and up-gradient.**
WATERCOURSE/STREAM*:	**The closest surface watercourse to the site is the Botkoge River, approx. 110m to the south of the site. This runs is a 1.6m-2.3m deep channel, and is approx. 0.9m deep and 2.5m across.** **This is joined by a smaller stream which rises from a spring approx. 95m east of the site, and flows towards the southwest. This stream is 0.2m depe, in a 1.2m-1.8m channel.** **These are the only streams or other watercourses within 250m of the site.**
DRAINAGE DITCHES*:	**There are no drainage ditches within 250m of the proposed WWTS and polishing filter.**
SPRINGS/WELLS*:	**Springs occur approx. 70m south and 105m east of the proposed WWTS and polishing filter.** **No wells occur within 250m of the proposed WWTS and polishing filter, though two boreholes have been bored as part of the accompanying Tier 2 Hydrogeological Risk Assessment.** ***As all the wells in the locality will therefore meet the required separation distances of the Groundwater Protection Responses of GSI/EPA/DoELG and the EPA Code of Practice (2009), none are deemed to be at risk from the proposed WWTS and polishing filter area.***

3.2 Trial Hole Number 2

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

Depth of trial hole (m):	**3.1m**	**Date and time of excavation:**	**11/05/2015 12.45**	**Date and time of examination:**	**13/05/2015 13.50**
Depth from ground surface to bedrock (m)	**>3.1m**	**Depth from ground surface to water table (m)**		**>3.1m**	

Depth below ground level	Indicate the depth of T & P tests here	Soil/Subsoil Texture & Classification	Soil Structure	Density/ Compactness	Colour **	Preferential flowpaths
0.1m		***'A' horizon*** Organic loam	Crumb	Compact	Very dark brown (2/2 10YR)	Abundant shrub and grass roots and rootlets
0.2m		***'B' horizon*** slightly sandy SILT with occasional gravels (2, 2, 1 threads; 60mm, 50mm, 80mm ribbons; dilatant, raspy)	Subangular blocky	Variable firm to stiff	Very dark brown (2/2, 10YR)	Occasional shrub and grass roots and rootlets
0.3m						
0.4m						
0.5m						
0.6m		***'C_1' horizon*** silty SAND with occasional gravels and cobbles (0, 1, 1 threads; 50mm, 40mm, 40mm ribbons; slightly dilatant, very raspy, cohesive)	Massive, yet fissile	Variable soft to firm	Very dark brown (2/2, 10YR)	Fissile partings
0.7m						
0.8m						
0.9m						
1.0m						
1.1m						
1.2m						
1.3m						
1.4m						
1.5m						
1.6m						
1.7m						
1.8m						
1.9m		***'C_2' horizon*** gravelly SAND with opccasional cobbles (0, 0, 0 threads; 0mm, 0mm, 0mm ribbons; non-dilatant, very raspy)	Massive, yet fissile	Variable soft to stiff	Brown (4/3, 10YR)	Fissile partings
2.0m						
2.1m						
2.2m						
2.3m						
2.4m						
2.5m						
2.6m						
2.7m						
2.8m						
2.9m						
3.0m		Base of hole				

Other Information					
Depth of water ingress	**None**	**Rock Type (if present)**	**Not met**	**Likely T value**	**3-10**

Mottling present (Yes or No)	**No**	**Smearing present in topsoil (Yes or No)**	**No**	**Smearing present in subsoil (Yes or No)**	**No**

EVALUATION:

The upper 0.1m-0.13m of the trial hole encounters very dark brown, organic loam topsoil, which is unmottled.

This is underlain by the 'B' horizon, which extends to 0.31m/0.36m depth and is a firm to stiff, subangular blocky, very dark brown, slightly sandy SILT with occasional gravels.

The soil sequence is therefore of a well aerated, brown earth of high base status topsoil draining vertically or sub-vertically to the subsoil.

The subsoil below these layers consists of two horizons. The 'C_1' horizon extends to 1.1m/1.24m depth and is a soft to firm, massive, yet fissile, very dark brown, silty SAND with occasional gravels and cobbles. This is underlain to the base of the hole by the 'C2' horizon; a brown, soft to stiff, massive yet fissile, gravelly SAND with occasional cobbles. As no mottling is seen in the subsoil units, this entire zone is therefore unsaturated throughout the year.

Neither bedrock nor the water table was met in the trial hole, at 3.1m below ground level. There therefore exists at least 3.1m depth of unsaturated soil and subsoil material between the ground surface and the water table on this portion of the site.

The site is therefore probably suitable for a mechanical aeration system and discharge to ground into the subsoil, if the 'T' and 'P' values are between 3 and 75. The values are likely to be between 3 and 10.

3.3(a) Percolation ("T" and "P") Tests Number 4 @ relevant subsoil layer

Percolation Test Hole	T4		P4
Depth from ground surface to top of hole (mm) (A)	400		0
Depth from ground surface to base of hole (mm) (B)	800		400
Depth of hole (mm) [B - A]	400		400
Dimensions of hole [length x breadth (mm)]	300 x 300		300 x 300
Each hole must be pre-soaked twice before the test is carried out (from 10.00 am to 5.00 pm and from 5.00 pm to next morning)			
Date of test	12/05/2015		12/05/2015
Date and times of pre-soaking of test holes	11/05/2015, 14.00 and 15.20		
Time filled to 400 mm	11.08		11.02
Time water level at 300 mm	11.23		11.22

Test Hole No.	T4						P4		
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	11.23	11.39	16				11.22	12.05	43
2	11.39	12.00	21				12.05	12.48	43
3	12.00	12.27	27				12.48	13.42	54
Average Δt			21.3	Average Δt			Average Δt		46.7
Average Δt/4 = 5.3 (t_4)				Average Δt/4 = ()			Average Δt/4 = 11.7 (p_4)		

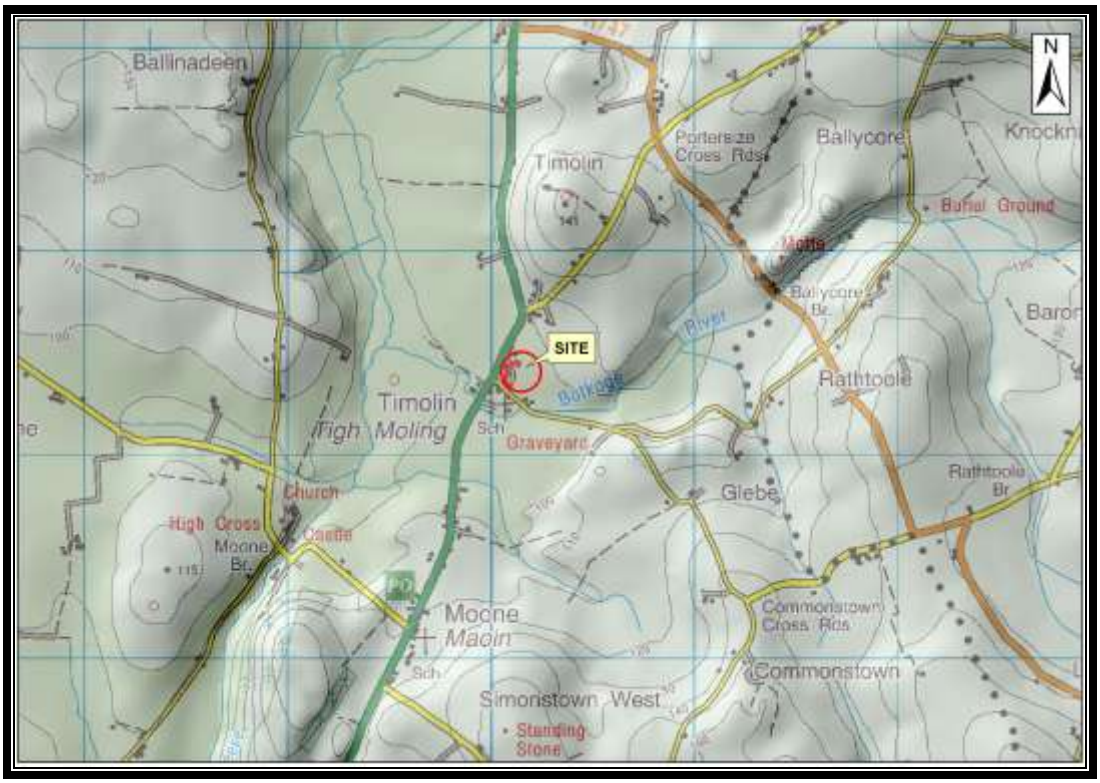

Figure 1: Location of the site at Timolin, marked with a red circle (O.S. Licence EN 057915).

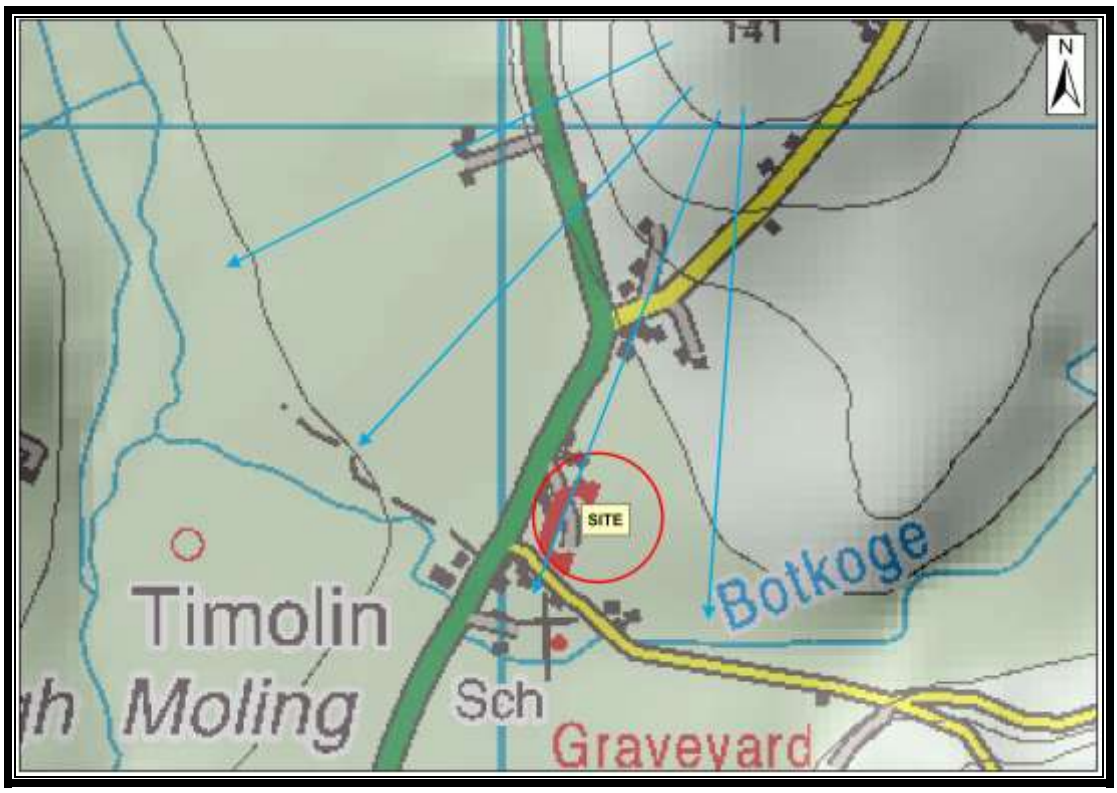

Figure 2: Interpreted groundwater flow direction under and around the site, which is thought to be generally southwards towards the Botkoge River (O.S. Licence EN 0057915).

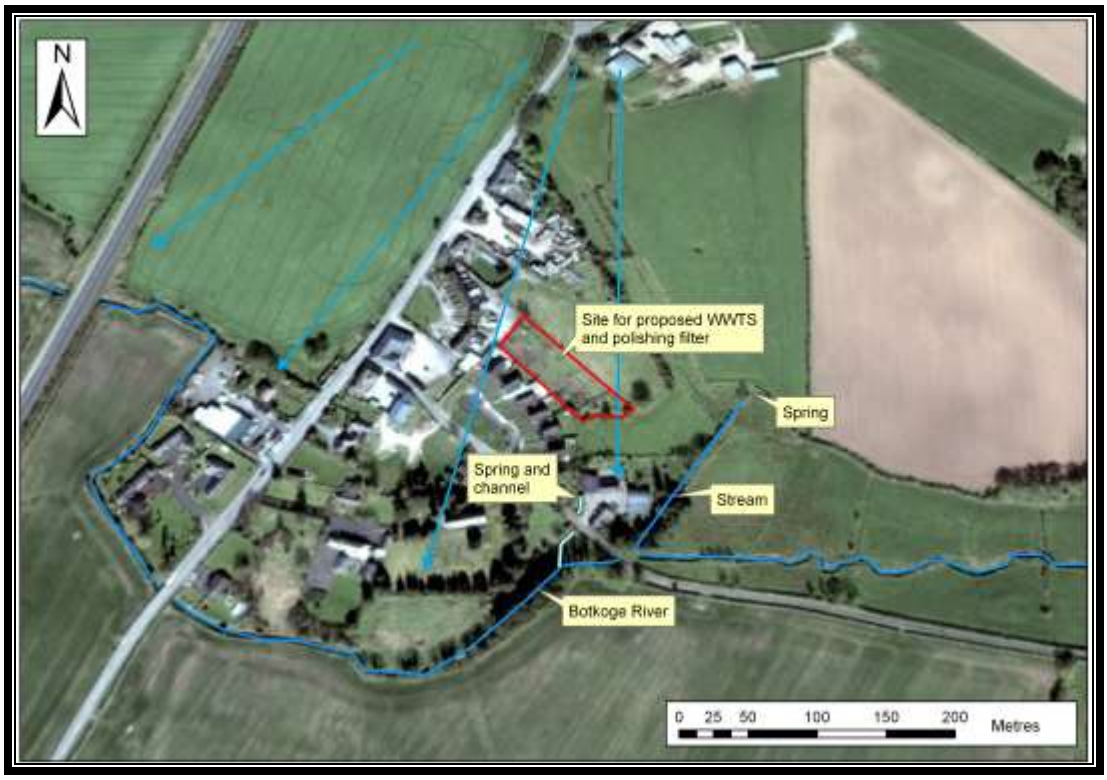

Figure 3: Features around the site, including houses, roads, streams, drainage ditches, springs, hedgerows and land use.

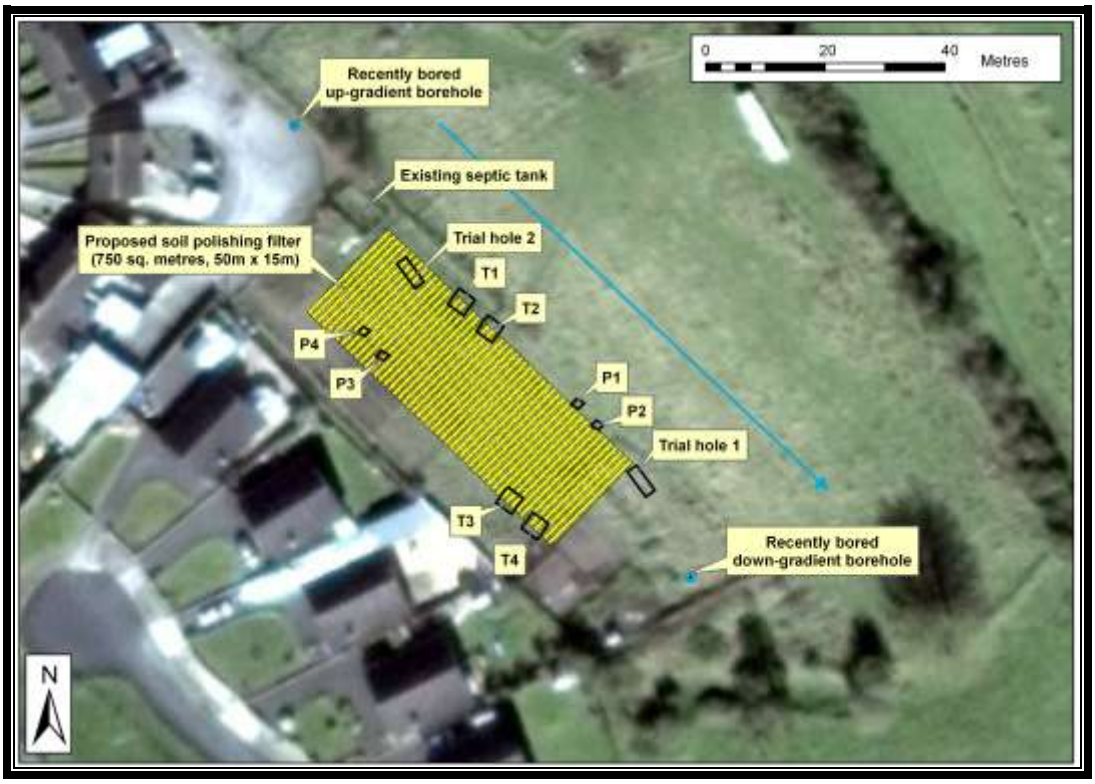

Figure 4: Location of trial hole and percolation test holes on the site, in relation to the existing septic tank and the proposed new polishing filter area.

Plate 1: View of the site from the south, while excavating the test hole. See the well drained appearance of the land around the site. The holes were dug at the edge of the footprint of where the proposed polishing filter area will be located.

Plate 2: Profile of soil and subsoil in trial hole number 1. See the well aerated nature of the topsoil and the subsoil, with no mottling throughout the profile. See also the absence of bedrock and the water table at 2.1m below ground level.

Plate 3: Profile of soil and subsoil in trial hole number 2. See the well aerated nature of the topsoil and the subsoil, with no mottling throughout the profile. See again the absence of bedrock and the water table at 3.1m below ground level.

Plate 4: Water falling on morning of Tuesday 12th May 2015 in 'T' test hole number 1.

Plate 5: Water falling on morning of Tuesday 12th May 2015 in 'T' test hole number 2.

Plate 6: Water falling on morning of Tuesday 12th May 2015 in 'T' test hole number 3.

Plate 7: Water falling on morning of Tuesday 12th May 2015 in 'T' test hole number 4.

Plate 8: Water falling on morning of Tuesday 12th May 2015 in 'P' test hole number 1.

Plate 9: Water falling on morning of Tuesday 12th May 2015 in 'P' test hole number 2.

Plate 10: Water falling on morning of Tuesday 12th May 2015 in 'P' test hole number 3.

Plate 11: Water falling on morning of Tuesday 12th May 2015 in 'P' test hole number 4.

Plate 12: The existing septic tank system on the site, which must be decommissioned as part of the proposed development.

Complete Laboratory Solutions
[Tel] 091 574355
[Fax] 091 574356
[Email] services@cls.ie
[web] www.cls.ie

CERTIFICATE OF ANALYSIS

Client : Robert Meehan, B.A., PhD, PGeo
Robert Meehan, Consultant Geologist
86 Athlumney Castle,
Navan,
Co. Meath

Report No. : 261844
Date of Receipt : 29/05/2015
Start Date of Analysis : 29/05/2015
Date of Report : 06/07/2015
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	*	Result	Units
597184	Timolin site, GW1 (up-gradient)	Colour	R	<4	mg/l Pt Co
		Turbidity	R	0.9	N.T.U.
		pH	R	7.2	pH Units
		Conductivity @20C	R	608	uS/cm
		Alkalinity, total	R	298	mg/l CaCO3
		Total Nitrogen as N	R	6.65	mg/L
		Nitrate as N	R	5.97	mg/l
		Nitrite as N	R	0.005	mg/l
		Total Phosphorus as P	R	<0.05	mg/l
		Copper, total	R	2	ug/l
		Sodium, total	R	13	mg/l
		Chloride	R	22.9	mg/l
		Iron, total	R	31	ug/l
		Ammonium as NH4-N	R	<0.005	mg/l
		Potassium, total	R	6	mg/l
		Total Hardness (Kone)	R	338	mg/l CaCO3
		Cyanide (Total)	S	<0.5	ug/l
		Mercury	S	<0.02	ug/l
		Magnesium, total	R	20	mg/l
		Sulphate	R	19.2	mg/l
		Uranium	S	3.009	ug/l
		Temperature (by client)	R	10.9	°C
		TDS (gravimetric)	R	429	mg/l
		Un-ionised Ammonia (Calculation, pH & Temp. depend	R	0.00002	mg/l
		Arsenic, total	R	<0.5	ug/l
		Manganese, total	R	90	ug/l
		Zinc, total	R	10	ug/l
		Chromium, total	R	<0.5	ug/l
		Calcium, total	R	444	mg/l
		Nickel, total	R	2	ug/l
		Aluminium, Total	R	8	ug/l
		Lead, total	R	<0.5	ug/l
		Antimony, total	R	2	ug/l
		Cadmium, total	R	<0.5	ug/l
		Barium, total	R	30	ug/l
		Selenium, total	R	2	ug/l
		TOC	R	1.51	mg/L
		Odour (absence/presence)	R	No	
		Clostridium Perfringens in Water	R	32	cfu/100ml
		Boron, total (mg/l)	R	0.016	mg/l
		E coli (Filtration) (Environmental Waters)	R	41	cfu/100ml
		Total Coliforms (Filtration) (Environmental Waters)	R	51	cfu/100ml
		Enterococci (Environmental Waters- Incubated at 37°C and 44 °C)	R	47	cfu/100ml
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	R	0.018	mg/l

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Ros Muc, Connemara,
Co. Galway

Complete Laboratory Solutions,
MedPharma Division,
Unit 3a, Small Business Park, Mervue, Galway

Complete Laboratory Solutions
[Tel] 091 574355
[Fax] 091 574356
[Email] services@cls.ie
[web] www.cls.ie

Approved by: Barbara Lee

Barbara Lee
Environmental Scientist

See below for test specifications and accreditation status.
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* Location of analysis: R=Ros Muc, M=MedPharma, S=Subcontracted.

Test	Specification	CLS 17025 status	GMP/FDA[1]	ISO[2]	Sub[3]	Sub 17025 Status
Colour	CLS 29	Yes	No	Yes	No	No
Turbidity	CLS 30	Yes	No	Yes	No	No
pH	CLS 26	Yes	No	Yes	No	No
Conductivity @20C	CLS 67	Yes	No	Yes	No	No
Alkalinity, total	CLS 54	No	No	Yes	No	No
Total Nitrogen as N	CLS 152	Yes	No	Yes	No	No
Nitrate as N	Konelab CLS 39	Yes	No	Yes	No	No
Nitrite as N	Konelab CLS 37	Yes	No	Yes	No	No
Total Phosphorus as P	CLS 151	Yes	No	Yes	No	No
Copper, total	ICP-MS CLS 129	Yes	No	Yes	No	No
Sodium, total	ICP-MS CLS129	Yes	No	Yes	No	No
Chloride	Konelab CLS 36	Yes	No	Yes	No	No
Iron, total	ICP-MS CLS129	Yes	No	Yes	No	No
Ammonium as NH4-N	Konelab CLS 40	Yes	No	Yes	No	No
Potassium, total	ICP-MS CLS129	Yes	No	Yes	No	No
Total Hardness (Kone)	Konelab CLS 77	Yes	No	Yes	No	No
Cyanide (Total)		No	No	N/A	Yes	No
Mercury	Atomic Fluorescence	No	No	N/A	Yes	Yes
Magnesium, total	ICP-MS CLS129	Yes	No	Yes	No	No
Sulphate	Konelab CLS 88	Yes	No	Yes	No	No
Uranium	ICP	No	No	N/A	Yes	No
Temperature (by client		No	No	Yes	No	No
TDS (gravimetric)	CLS 93	No	No	Yes	No	No
Un-ionised Ammonia (Calculation, pH & Temp. depend	Konelab CLS 40	No	No	Yes	No	No
Arsenic, total	ICP-MS CLS 129	Yes	No	Yes	No	No
Manganese, total	ICP-MS CLS129	Yes	No	Yes	No	No
Zinc, total	ICP-MS CLS 129	Yes	No	Yes	No	No
Chromium, total	ICP-MS CLS129	Yes	No	Yes	No	No
Calcium, total	ICP-MS CLS129	Yes	No	Yes	No	No
Nickel, total	ICP-MS CLS129	Yes	No	Yes	No	No
Aluminium, Total	ICP-MS CLS129	Yes	No	Yes	No	No
Lead, total	ICP-MS CLS 129	Yes	No	Yes	No	No
Antimony, total	ICP-MS CLS 129	Yes	No	Yes	No	No
Cadmium, total	ICP-MS CLS 129	Yes	No	Yes	No	No
Barium, total	ICP-MS CLS129	Yes	No	Yes	No	No
Selenium, total	ICP-MS CLS129	Yes	No	Yes	No	No
TOC	CLS 150	Yes	No	Yes	No	No
Odour (absence/presence)		No	No	Yes	No	No
Clostridium Perfringens in Water	CLS 43	Yes	No	Yes	No	No
Boron, total (mg/l)	ICP-MS CLS129	Yes	No	Yes	No	No
E coli (Filtration) (Environmental Waters	CLS 16	Yes	No	Yes	No	No
Total Coliforms	CLS 16	Yes	No	Yes	No	No

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(Filtration) (Environmental Waters						
Enterococci (Environmental Waters Incubated at 37°C and 44 °C)	CLS 42	Yes	No	Yes	No	No
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	Yes	No	Yes	No	No

[1]Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
[2]Laboratory Analysis, Sampling, Technical Backup, Training, Food Safety Program Auditing and Monitoring are all ISO 9001:2008 certified (Ros Muc site only).
[3]Subcontracted.

Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
597184	Timolin site, GW1 (up-gradient)	Good condition	28/05/2015

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MedPharma Division,
Unit 3a, Small Business Park, Mervue, Galway

SITE CHARACTERISATION FORM
COMPLETING THE FORM

Step 1:

Goto Menu Item **File, Save As** and save the file under a reference relating to the client or the planning application reference if available.

Use the **Clear Form** button to clear all information fields.

Notes:

All calculations in this form are automatic.

Where possible information is presented in the form of drop down selection lists to eliminate potential errors.

Variable elements are recorded by tick boxes. In all cases only one tick box should be activated.

All time record fields must be entered in twenty hour format as follows: HH:MM

All date formats are DD/MM/YYYY.

All other data fields are in text entry format.

This form can be printed out fully populated for submission with related documents and for your files. It can also be submitted by email.

Section 3.2

In this section use an underline _____ across all six columns to indicate the depth at which changes in classification / characteristics occur.

Section 3.4

Lists supporting documentation required.

Section 4

Select the treatment systems suitable for this site and the discharge route.

Section 5

Indicate the system type that it is proposed to install.

Section 6

Provide details, as required, on the proposed treatment system.

APPENDIX B: SITE CHARACTERISATION FORM

File Reference:

1.0 GENERAL DETAILS (From planning application)

Prefix: First Name: Kildare County Council Surname:

Address: Timolin, County Kildare

Site Location and Townland: Timolin, County Kildare

Telephone No: 045.980431 Fax No:

E-Mail: CFagan@kildarecoco.ie

Maximum no. of Residents: 100 No. of Double Bedrooms: No. of Single Bedrooms:

Proposed Water Supply: Mains ✔ Private Well/Borehole Group Well/Borehole

2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type): Grey brown podzolics of the Elton Series

Aquifer Category: Regionally Important Locally Important Poor Pu

Vulnerability: Extreme High ✔ Moderate Low High to Low Unknown

Bedrock Type: Silurian Metasediments and Volcanics

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

Groundwater Protection Scheme (Y/N): Yes Source Protection Area: SI SO

Groundwater Protection Response: R1

Presence of Significant Sites (Archaeological, Natural & Historical): A graveyard occurs approx. 70m southwest of the site.

Past experience in the area: Soils in this area are generally well drained, with infiltration dominating over runoff.

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).

The site, initially, seems suitable for discharge to ground.
As the soil type in the area is a well drained grey brown podzolic, surface water is not likely to be at risk around the site.
Groundwater as a resource will be at risk if the minimum depths required are not achieved on the site, or if the percolation rate is too rapid.
Old, disused wells in the area still in use may also be at risk, if the minimum separation distances are not adhered to.
Groundwater and wells are therefore the main potential targets, following the desk study.

Given the response and the aquifer type, the site is potentially suitable for a mechanical aeration system serving the housing estate(s), and discharge to ground, if the minimum depths required are met on the site, if the minimum separation distances can be met, and if the percolation rate is adequate.

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: Site is on southeastern mid-backslope of a low ridge, in a ridge and valley landscape

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: The existing twelve houses in the estate will be between 30m and 75m from the proposed WWTS and polishing filter area (and up-

Existing Land Use: The site is surrounded by agricultural pasture to the north, east and south, with many residential gardens and 'made'

Vegetation Indicators: No vegetation indicators grow within 250m of the proposed WWTS and polishing filter area.

Groundwater Flow Direction: Assumed to be towards the south, downslope towards the Botkoge River which is approx. 110m to the so

Ground Condition: The fields surrounding the site are firm and even. Poaching was not observed.

Site Boundaries: The site is bounded by fences to the northeast and southeast, and walls to the northwest and southwest. The site of su

Roads: A third class road faces the site to the southwest, approx. 70m down-gradient of the proposed WWTS and polishing filte

Outcrops (Bedrock And/Or Subsoil): None within 250m of proposed WWTS and polishing filter area.

Surface Water Ponding: None visible at time of assessment wi Lakes: None within 250m of the site.

Beaches/Shellfish: None within 250m of the site. Areas/Wetlands: None within 250m of the site.

Karst Features: None found within 250m of the site; the area is underlain by non-calcareous bedrock.

Watercourse/Stream*: The closest surface watercourse to the site is the Botkoge River, approx. 110m to the south of the site. This runs

Drainage Ditches*: A drainage ditch extends off from adjacent to the the northwestern corner of the site, northwestwards. This is 0.6m-1

Springs / Wells*: Springs occur approx. 70m south and 105m east of the proposed WWTS and polishing filter. No wells occur within 2

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).

Following the desk study surface water was not thought to be at risk; this was corroberated during the visual assessment when it was seen that the majority of the area on and around the site seems well drained.

From this, the surface water around the site does not seem to be a potential target, if the soil adjacent to the proposed polishing filter area is found to be saturated to the surface.

Groundwater is still a target following the visual assessment, unless the minimum depths required are met on the site and there exists adequate percolation.

Wells in the area are not considered to be at risk, as none occur within 250m of the proposed WWTS and polishing filter area.

Following from the visual assessment, it was decided to excavate the trial holes at either end of the proposed polishing filter, adjacent to but not within the proposed filter area. Here the ground was firm and dry (Plate 1).

***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): 2.10

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

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

Depth of water ingress:

Rock type (if present): None met

Date and time of excavation: 11/05/2015 11:30 Date and time of examination: 13/05/2015 13:30

	Depth of P/T Test*	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m		Organic loam		Crumb	Compact	Very dark brown	Abundant grass roots and rootlets
0.2 m			0, 0, 0 threads; 30mm, 40mm, 40mm ribbons slightly dilatant, raspy				
0.3 m				Subangular blocky	Very soft	Very dark brown	Occasional grass roots and rootlets
0.4 m	P1-P4	gravelly silty SAND					
0.5 m							
0.6 m							
0.7 m							
0.8 m	T1, T2	sandy GRAVEL with occasional cobbles	0, 0, 0 threads; 0mm, 0mm, 0mm ribbons; non-dilatant, very raspy	Granular	Uncompact	Dark brown	Beds of GRAVEL up to 0.25m thick
0.9 m	T3, T4						
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			BASE OF	HOLE			
2.3 m							
2.4 m							
2.5 m							
2.6 m							
2.7 m							
2.8 m							
2.9 m							
3.0 m							

Likely T value: 5.00

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.

3.2 **Trial Hole (contd.)** Evaluation:

The upper 0.1m-0.22m of the trial hole encounters organic loam topsoil, which is very dark brown, and is unmottled.
The 'B' horizon below this extends to 0.41m/0.51m and is a very soft, subangular blocky, gravelly silty SAND, which is very dark brown.
The soil sequence is therefore of a well drained brown earth of high base status, which is unmottled throughout.
This is underlain by the 'C' horizon, to the base of the hole, which is an uncompact, granular, dark brown, sandy GRAVEL with occasional cobbles. Beds of GRAVEL are seen in this unit, up to 0.25m thick.
The rainwater falling on the site therefore infiltrates through 2.1m+ subsoil before reaching the water table and bedrock under the site.

The site is therefore potentially suitable for a mechanical aeration system and ground discharge, which requires 0.9m depth of unsaturated soil and subsoil below the polishing filter gravel and above bedrock and the water table, and as the 'T' values are likely to be low (3-20).

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)	350	350	400
Depth from ground surface to base of hole (mm) (B)	750	750	800
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	320 x 310	300 x 300	310 x 300

Step 2: Pre-Soaking Test Holes

Date and Time pre-soaking started	11/05/2015	14:00	11/05/2015	14:00	11/05/2015	14:00

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	12/05/2015	12/05/2015	12/05/2015
Time filled to 400 mm	11:16	11:14	11:11
Time water level at 300 mm	11:22	11:29	11:24
Time to drop 100 mm (T_{100})	6.00	15.00	13.00
Average T_{100}			11.33

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	11:22	11:34	12.00	11:29	12:09	40.00	11:24	12:12	48.00
2	11:34	11:49	15.00	12:09	12:32	23.00	12:12	12:58	46.00
3	11:49	12:08	19.00	12:32	12:58	26.00	12:58	13:50	52.00
Average Δt Value			15.33			29.67			48.67
	Average Δt/4 = [Hole No.1]		3.83 (t_1)	Average Δt/4 = [Hole No.2]		7.42 (t_2)	Average Δt/4 = [Hole No.3]		12.17 (t_3)

Result of Test: T = 7.81 (min/25 mm)

Comments:

T1, T2 and T3 confirm the classification of the subsoil as a gravelly silty SAND, underlain by a sandy GRAVEL with occasional cobbles. All holes were empty on the morning of the tests following two presoaks the previous day, at 14.00 and 15.20. The T test rates support the observations made on the trial hole and the visual assessment with respect to the textural and drainage class of the subsoil.

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:

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)	400	400.00	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	320 x 300	290 x 290

Step 2: Pre-Soaking Test Holes

Date and Time pre-soaking started	11/05/2015	14:00	11/05/2015	14:00	11/05/2015	14:00

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	12/05/2015	12/05/2015	12/05/2015
Time filled to 400 mm	10:55	10:58	11:00
Time water level at 300 mm	11:05	11:06	11:25
Time to drop 100 mm (P_{100})	10.00	8.00	25.00
Average P_{100}			14.33

If P_{100} > 300 minutes then P-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	11:05	11:38	33.00	11:06	11:34	28.00	11:25	12:13	48.00
2	11:38	12:19	41.00	11:34	12:16	42.00	12:13	13:05	52.00
3	12:19	13:04	45.00	12:16	13:08	52.00	13:05	14:34	89.00
Average Δp Value			39.67			40.67			63.00
	Average Δp/4 = [Hole No.1]		9.92 (p_1)	Average Δp/4 = [Hole No.2]		10.17 (p_2)	Average Δp/4 = [Hole No.3]		15.75 (p_3)

Result of Test: P = 11.94 (min/25 mm)

Comments:

P1, P2 and P3 confirm the classification of the topsoil as an organic loam, underlain by a gravelly silty SAND.
All holes were empty on the morning of the tests following two presoaks the previous day, at 14.00 and 15.20.
The P test rates support the observations made on the trial hole and the visual assessment with respect to the textural and drainage class of the topsoil and the subsoil.

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, test 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	Yes	
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): 0.80

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

The existing septic tank system on the site should be decommissioned, and mechanical aeration system installed on the site which complies with British Standard B.S. 6297: 1983 (incorporating amendment No. 1 of 1990).

A soil polishing filter must been installed following this, for tertiary treatment. The infiltration area is constructed as a polishing filter bed, situated under the southeastern portion of the site (where the tests were carried out).

The proposed polishing filter should be 3m from the northeastern fence boundary of the site, and 16m northwest of the fence at the southeastern boundary of the site. Given the 'T' and 'P' values for the site, this polishing filter is required to be 750 square metres in area for the maximum discharge from the site of 15m3. This equates to an area of 50m x 15m.

The filter bed should consist of 400mm depth of 8mm-32mm pebble gravels, laid at a depth of 700mm below ground level on the site, and overlain with geotextile and covered within 300mm depth of topsoil. The distribution pipework should be laid at a depth of 400mm below ground level, near the top of this filter bed, and in six cells of 15m x 8.33m.

Further details of the filter and pipe layout are shown in Figures 4 and 5 at the end of this report, as well as the accompanying pipework design by Ash Environmental Ltd..

The installation of the mechanical aeration system and polishing filter area should be certified as being in compliance with the EPA (2009) guidelines and the recommendations here by the engineer/architect/competent person certifying the fitting of the treatment system on the site.

[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			

Package Treatment Systems

Type	
	O'Reilly Oakstown Super BAF System
Capacity PE	100.00
Sizing of Primary Compartment	
	m^3

SYSTEM TYPE: Tertiary Treatment System

Polishing Filter: Surface Area (m^2)*	750.00	**Package Treatment System:** Capacity (pe)	
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 * ($l/m^2.d$)	20.00
Surface Water **		Discharge Rate (m^3/hr)	

TREATMENT STANDARDS:

Treatment System Performance Standard (mg/l)	BOD	SS	NH_4 - N	Total N	Total P
O'Reilly Oakstown Wastewater Treatment System	20.00	30.00	10.00	21.00	12.50

QUALITY ASSURANCE:

Installation & Commissioning	On-going Maintenance
Servicing to be undertaken by a competent individual with professional indemnity insurance.	De-sludging at least once per year, or when scum in observed in the second chamber of the tank, or when the depth of sludge in the second compartment is greater than 400mm.

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

** Water Pollution Act discharge licence required

7.0 SITE ASSESSOR DETAILS

Company: Robert Meehan - Consultant Geologist

Prefix: Dr. First Name: Robert Surname: Meehan

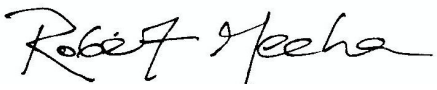
Address:
86 Athlumney Castle,
Navan,
County Meath

Qualifications/Experience: BA, PhD, PGeo., EurGeol, FETAC/FAS Course Certified, Professional Indemnity Insurance Holder (€2 millic

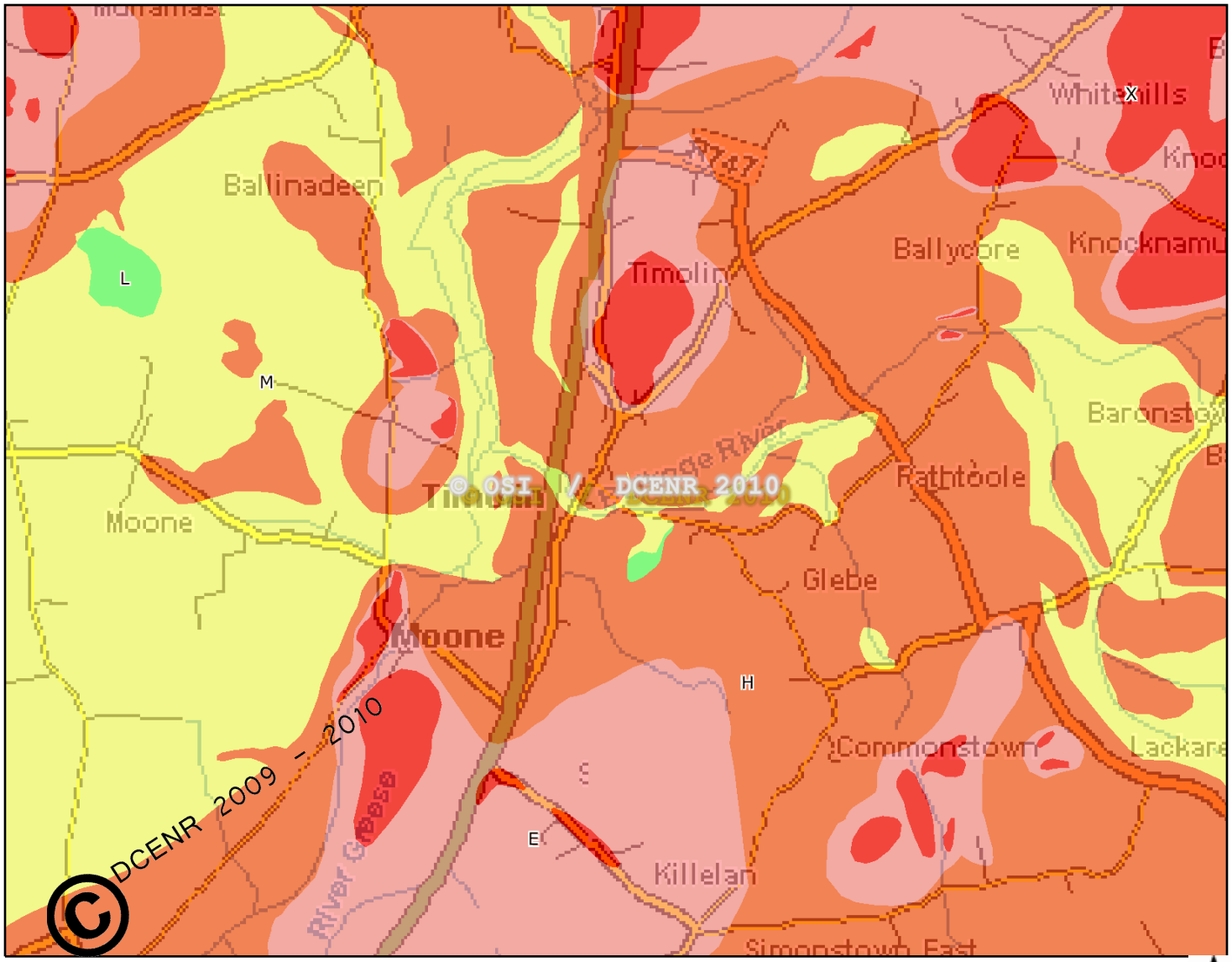
Date of Report: 12/08/2015

Phone: 087-6875558 Fax: 046-9070070 e-mail antalamhireland@gmail.com

Indemnity Insurance Number: AMTUE13006/11/00029

Signature: 

Timolin Groundwater Vulnerability



Legend

Vulnerability

- X (Rock near Surface or Karst)
- E - Extreme
- H - High
- M - Moderate
- L - Low
- Water

Watermark

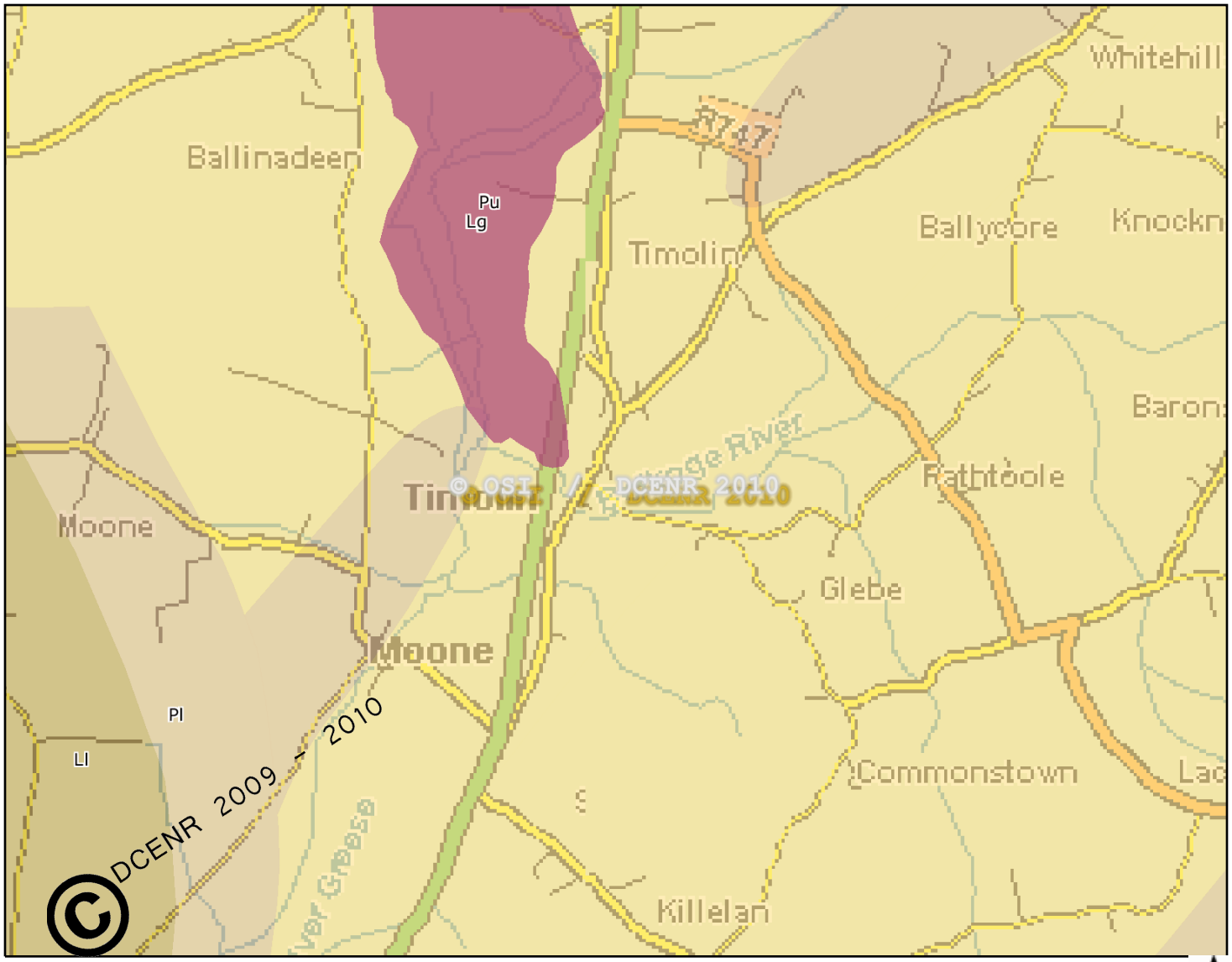
0 900 1800 2700 m.

Map center: 280147, 193356

Scale: 1:33,478

Snapshot Date: 12-Aug-2015

Timolin Aquifers



Legend

National Draft Gravel Aquifer Map

- Rg - Regionally important, extensive sand/gravels aquifers
- Lg - Locally important, sand/gravel aquifers

National Draft Bedrock Aquifer Map

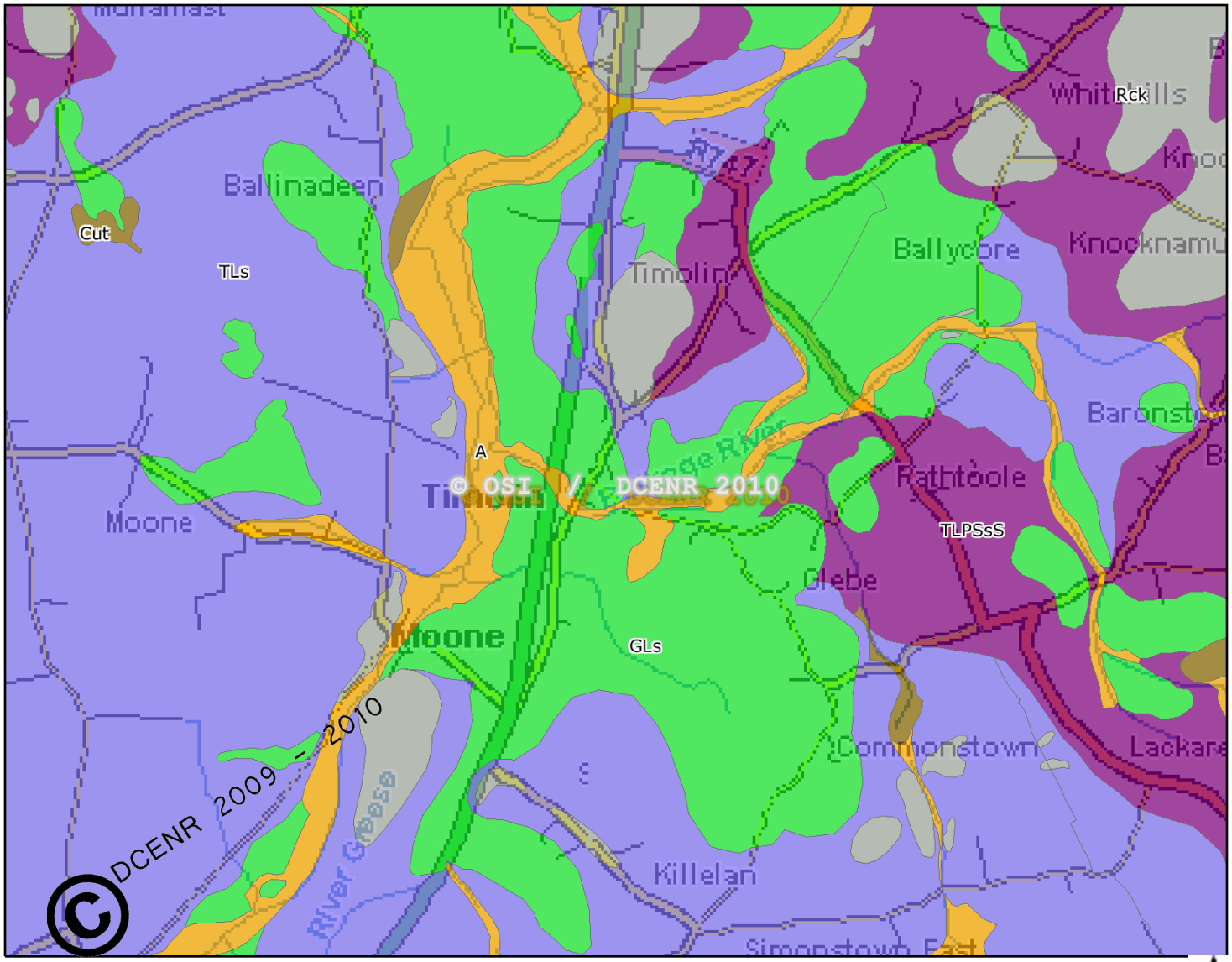
- Rf - Regionally Important Aquifer - Fissured bedrock
- Rk - Regionally Important Aquifer - Karstified
- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- Rkc - Regionally Important Aquifer - Karstified (conduit)
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- 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
- Watermark

Scale: 1:30,599

Map center: 280147, 193356

Snapshot Date: 12-Aug-2015

Timolin Subsoils



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

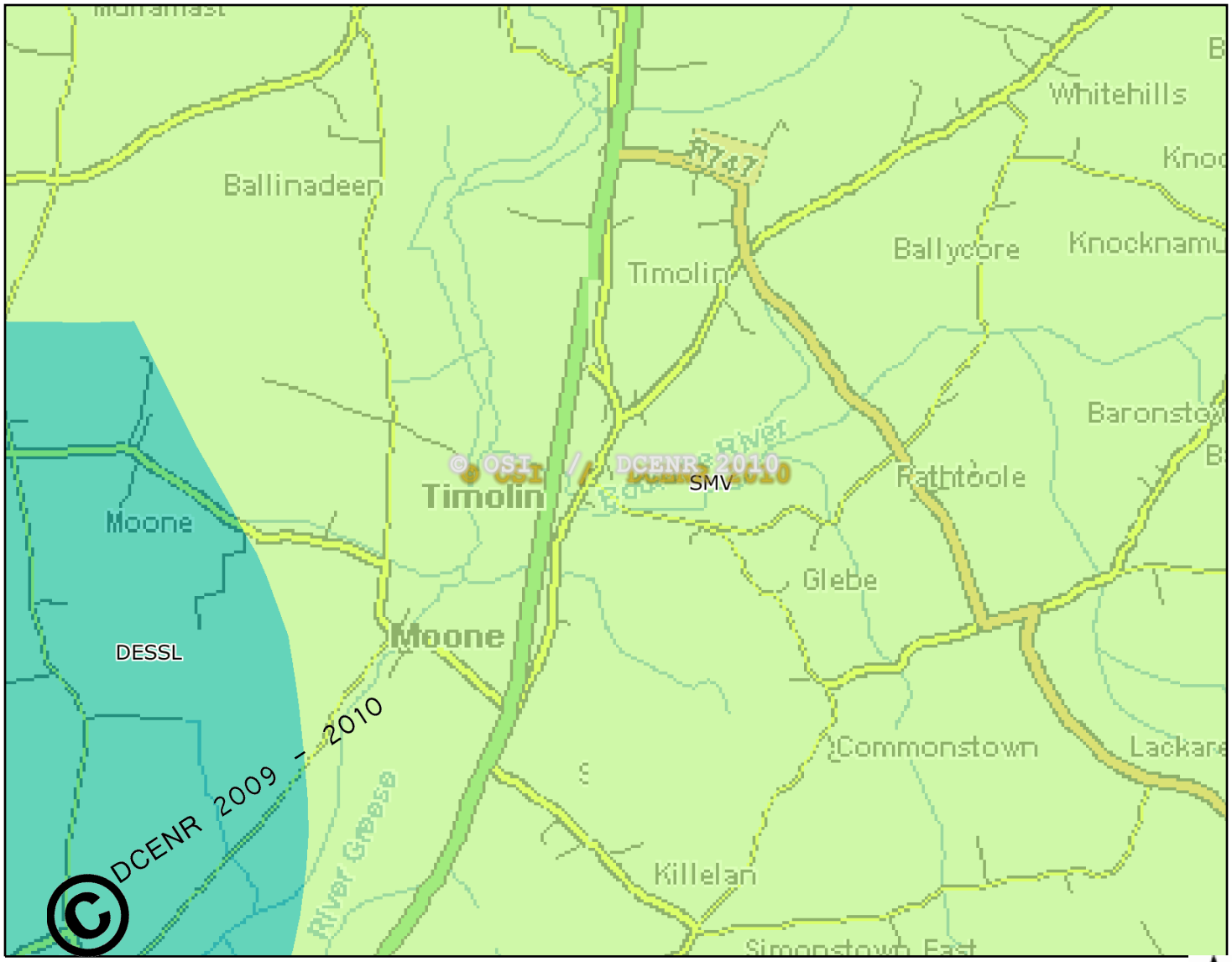
Watermark

Map center: 280147, 193356

Scale: 1:33,478

Snapshot Date: 12-Aug-2015

Timolin Bedrock



0 900 1800 2700 m.

Map center: 280147, 193356

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

Watermark

Scale: 1:33,478

Snapshot Date: 12-Aug-2015

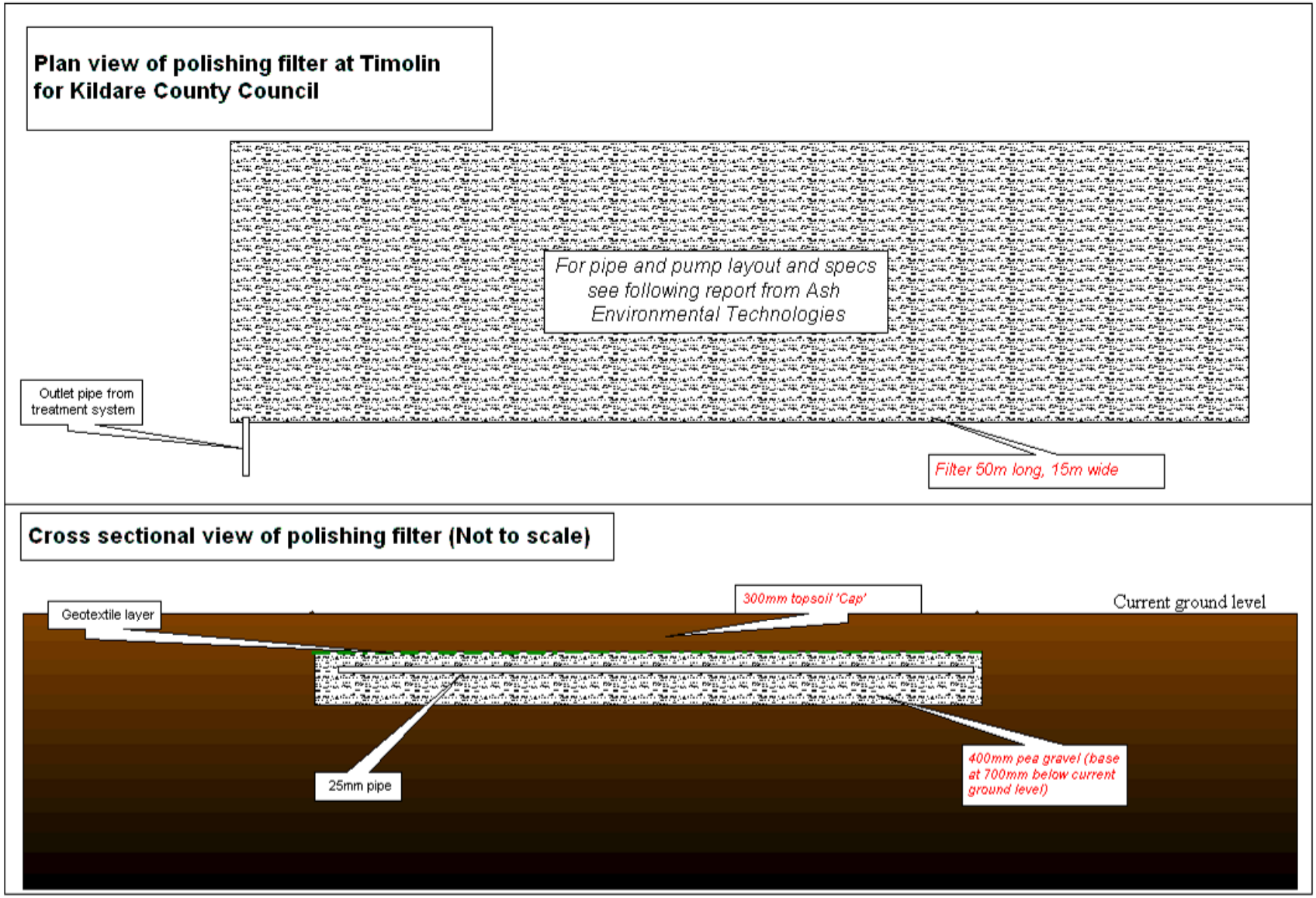


Figure 5: Plan and profile views of polishing filter at Timolin for Kildare County Council.

Proposed Design Details

Project:	Kildare Co Council Housing
Address:	Timolin, Co Kildare
Ref:	15 1212
Contact:	Robert Meehan
Tel:	087 687 5558
Date:	11 August 2015

Important. No account is taken of site elevation, contours or pump details unless requested. The information provided here is to assist the system designer and is based on the US EPA Design Manual 2002. Detailed site specific designs are required by the Irish EPA Code of Practice 2009 in section 10.1.1 option 2- - Pumped Discharge. Please see our installation guidelines before installation.

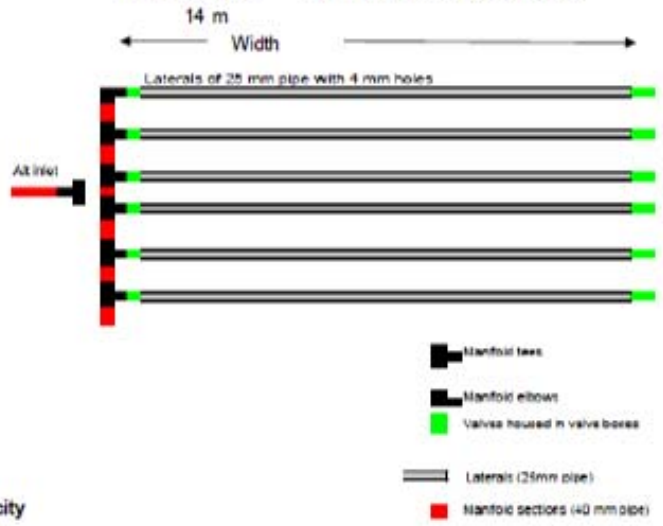
Ash Environmental Technologies

Specialists in onsite wastewater products
www.ashtecs.ie

Pressure Pipe Network for Sand/Soil Polishing Filter - Single Sided Manifold Layout

				Details for each of 6 zones Area	L	W	
Dimensions of area				125.0	8.33	15	sq metres (metres)
Design flow	PE	16.7		2500.05	*litres/day/zone*		
Infiltration rate (Litres/M2)				20.0	**check rate matches site assessment**		
Approx no of doses (per design flow and pipe volume)				12.8	*no.*		
Pump run time per dose				1.25	*mins*		
Manifold pipe diameter				40	mm	7.0	m
Length of manifold sections -pre-cut		5	x	1.40	m		
Lateral pipe diameter				25	mm		
Separation distance between laterals				1.4	*m*		
No of Lateral pipe lengths				6	*no.*		
Length of Laterals				14	*m*		
Total length of lateral pipes with pre-drilled holes				84	*m*		
Pump minimum operating capacity				144	*litres/min*	**check pump selection is suitable**	
Minimum pipe network dose volume				196	*litres*	**check pump tank is suitable**	
Indexing valve feeder pipes estimated dose volume				40	*litres*		
Minimum pump tank operating volume				236	*litres*		
Length of rising main from pump tank to pressure system inlet manifold				0	*metres*	**check length of rising main & pump capacity**	
Diameter of rising main				0			
Static head on site (elevation)				0	*metres*		

NOT TO SCALE **Details for each of 6 zones**



Notes: 1 *Many secondary treatment systems do not pump sufficient quantity of water in each pumping event to fill the pipe network for long enough to get even distribution. Pumps supplied may be designed to discharge small volumes under minimal pressure from the tank. A suitable pump and pump tank should be selected to avoid future problems such as overloaded areas and leakage from filters.*

2 We can arrange INSTALLATION or oversight of the pipe network if required.

3 We can also provide CERTIFICATION of the pressurisation of the system and certification of suitability of PUMP AND PUMP DOSING arrangements.

Please call Ash Environmental at 0404 66433 if you require further information or assistance.

www.ashtecs.ie

Specialists in onsite wastewater

Distributing Valves (Indexing Valves)

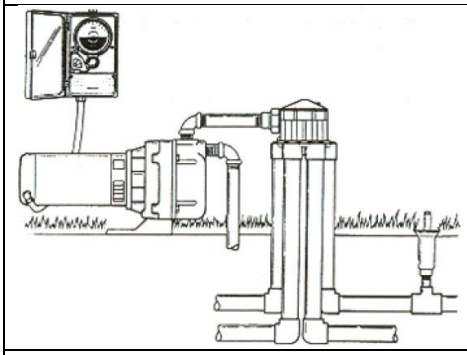
Distributing or indexing valves are used to dose up to 6 outlet pipes with a single pump. They are ideal for wastewater pressure systems which require dosing of multiple sections or zones. This reduces the size of pump required thereby saving pump and energy costs. Valves are essential when pumping to a large pipe network or to pump to a number of pockets of area on a small site or landscaped commercial areas.

The 6000 Series line of distributing valves offers exceptional reliability and durability even under the dirtiest water conditions.

With a metal die-cast body, the 6000 series valves are capable of high pressure applications and are recommended to be used on pump fed systems. The 6000 series is ideal for onsite wastewater and effluent water applications.

The 6000 valve is available in 4 or 6 outlet models that are cammed for 2 to 6 zone operation. With only one moving part (the stem and disk assembly), the valve is easily serviced and maintained.

The valve requires 57 litres/min (15 GPM) to operate and works at pressures from 25 to 150 PSI (1.7 bar to 10 bar).



For direct pump - fed installations, the 6000 Series Distributing Valve is directly connected to the discharge side of the pump and is cycled from one zone to the next by turning the pump off and on. In wastewater systems this is usually done automatically by the pump float switch cutting in and out as the water level rises and falls.

Install the valve as close to the pump as possible and ensure suction line to the pump has a proper check valve installed and all joints are completely sealed.

The number of valve outlets can be easily adjusted by changing the valve cam.

The valve inlet is 1.5” threaded and the outlets are 1.5” plain. Metric adapters are used to connect to pipes. Unions are recommended on inlets and outlets to allow valve maintenance.

We supply fully assembled valves with fittings with secure access housing.

Valves are essential when pumping to a large pipe network or to pump to a number of pockets of area on a small site.

Ash Environmental Technologies Ltd., Unit 2 Wicklow Enterprise Park, The Murrough, Wicklow, Co Wicklow,
Tel: 0404 66433; Fax 0404 66464; email: sales@ashtecs.com www.ashtecs.ie

MODELS

Four Outlet Models

6402	Cammed for 2 Zone Operation
6403	Cammed for 3 Zone Operation
6404	Cammed for 4 Zone Operation

Six Outlet Models

6605	Cammed for 5 Zone Operation
6606	Cammed for 6 Zone Operation

OTHER OPTIONS: ADD TO PART NUMBER

RCW	Reclaimed Water Use

SPECIFICATIONS

- Construction:
  Valve Top/Housing: Die Cast Metal
  Valve Outlets: High Strength ABS Polymer
- Flow Range: 15-150 GPM
- Pressure Rating: 25 - 150 PSI
- Pressure Loss:

4 Outlet Valve:	Flow (GPM)	20	40	60	80	100
	PSI Loss	2.5	3.5	5.0	7.5	10.0
6 Outlet Valve:	Flow (GPM)	20	40	60	80	100
	PSI Loss	3.0	4.0	6.0	9.0	11.0

- Inlet: Threaded 1-1/2" NPT Connection
- Outlets: Slip and Glue Connections to 1-1/2" PVC Pipe
- Dimensions: HEIGHT: 7", WIDTH: 8"

6000 INDEXING VALVE

The 6000 line of indexing valves offers exceptional reliability and durability even under the dirtiest water conditions.

FOR MORE INFORMATION ON RCW PRODUCTS, PLEASE SEE PAGES 36 AND 37.

FEATURES/BENEFITS

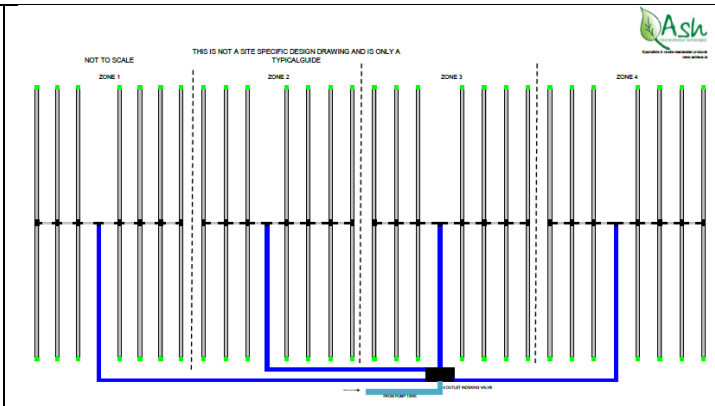
- Metal Die-Cast Body–Durable, long lasting, and capable of high pressure applications.
- Available in 4 and 6 Outlet Models–Can quickly and easily change from two to six watering zones.
- Simplicity of Design–Valves are easily maintained and serviced for long product life.
- Operates at 15 GPM at Pressures of 25–150 PSI- Ideal for pump-fed systems or high-flow city water systems.
- Built-in Atmospheric Vacuum Breaker–Releases any vacuum created between the pump and the valve on shut down.
- Two Year Limited Warranty.

K-RAIN MODEL 6000: INDEXING VALVE

With a metal die-cast body, the 6000 valves are capable of high pressure applications and are recommended to be used on pump fed systems or high-flow city water systems. The 6000 is also ideal for onsite wastewater and effluent water applications.

The 6000 valve is available in 4 or 6 outlet models that are cammed for 2 to 6 zone operation. With only one moving part (the stem and disc assembly), the valve is easily serviced and maintained.

The valve requires 15 GPM to operate and works at pressures from 25 to 150 PSI.



Example of a 4 zone pipe network using a 4 outlet indexing valve