KAVANAGH BURKE
CONSULTING ENGINEERS

Engineering Report

for

Extension to House at Mount Carmel, Crookshane

at

Rathcoole,
Co. Dublin.

Job No:	**D500**
Client:	**Gareth McHale**
Date:	**09th May 2022**
Local Authority:	**South Dublin County Council**
Revision:	**Planning**
	PL2

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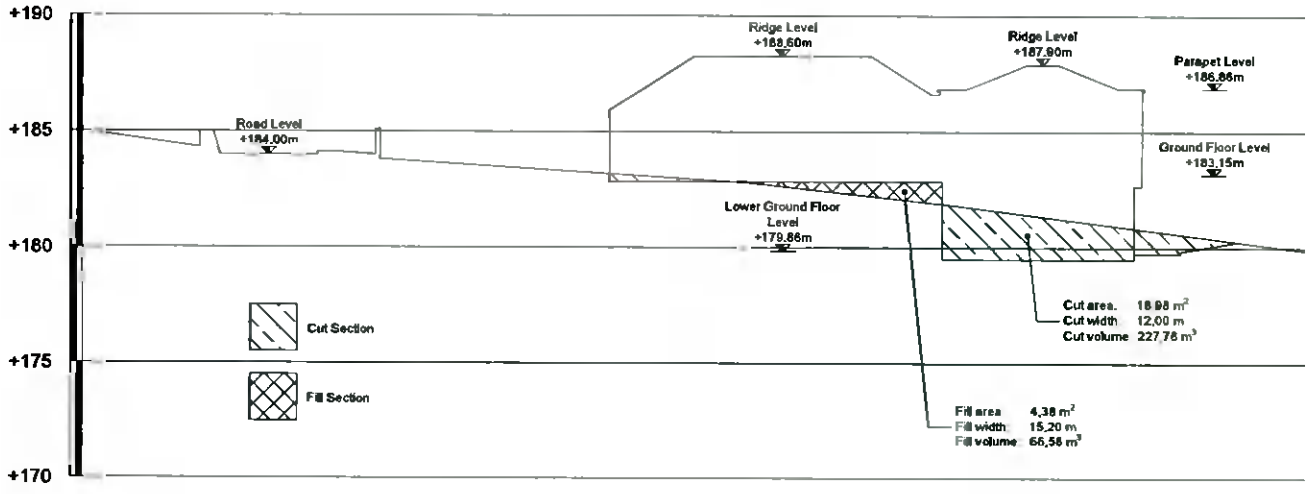
Cut and fill calculation.

Cut and fill computations were made to assess the amount of ground works necessary for the construction for the project:

- Required cut volume: 278 m^3.
- Required fill volume: 67 m^3.

See the cut and fill longitudinal section below.



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Soakaway Trench Design.

Introduction.

The projected soakaway trench system, along with other minor proposed SuDS for this development (permeable paving and green roofs), collects all runoff from impervious areas (roofs and footpaths).

The surface water drainage network is designed to catch all surface water of a 1 in 10 years return period storm and carry it to the soakaway trench for final infiltration on site, thus no increase of outflow is generated due to this development.

Contributing area.

Impermeable Areas: 370 m^2

Soil Class: $Soil_2$, taken from Soil Survey/Classification maps
Runoff Potential: Low
Soil Value: 0.3, derived from:

$$SOIL = \frac{(0.15S_1 + 0.30S_2 + 0.40S_3 + 0.45S_4 + 0.5S_5)}{S_1 + S_2 + S_3 + S_4 + S_5} = \frac{0.3S_2}{S_2} = 0.3$$

Calculate runoff from developed area. For this calculation hardstanding areas are assumed to provide 100% runoff, and non-hardstanding areas are assumed to provide 30% runoff.

Total Runoff Area: **370 m^2**

Soil filtration rate 'f'.

Soil infiltration factor - took from Appendix B:

Site characterisation form = result of Test P = 16.22min / 25mm,
Therefore: *f = 0.00154130702836004932182490752158 m/min.*

Note, all calculation based on BRE Digest 365.

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Calculation of Trench length:

Return period - 1:10 years.

Include 10% increase in rainfall depths as an allowance for climate change.

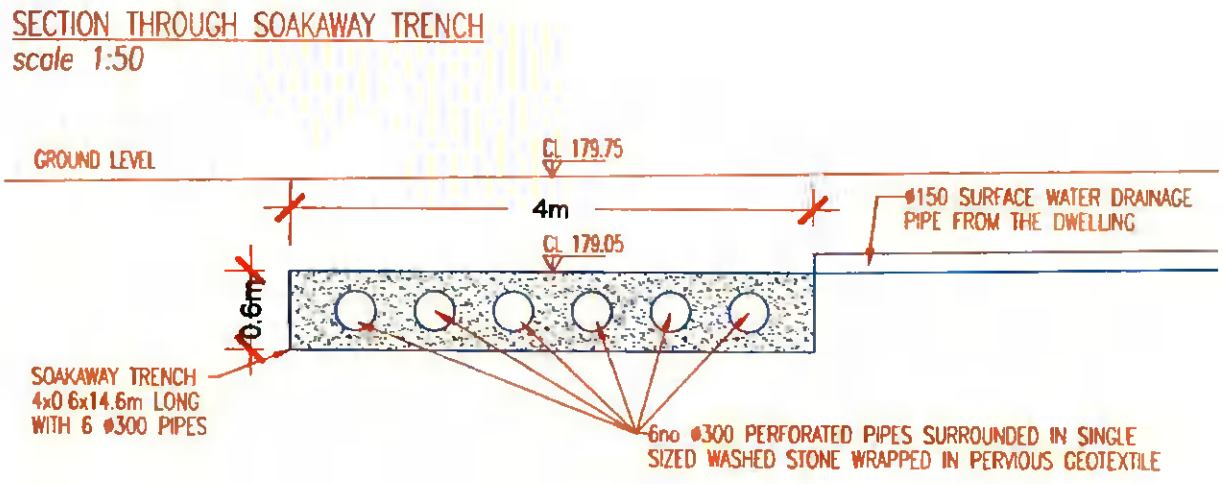
Refer to Met Éireann Statistic Rainfall figures below:

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 301510, Northing: 225580,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.8,	4.1,	4.9,	6.0,	6.7,	7.3,	9.3,	11.6,	13.1,	15.3,	17.3,	18.8,	21.2,	23.1,	24.7,	N/A ,
10 mins	4.0,	5.8,	6.8,	8.3,	9.4,	10.2,	12.9,	16.1,	18.3,	21.3,	24.1,	26.2,	29.6,	32.2,	34.4,	N/A ,
15 mins	4.7,	6.8,	8.0,	9.8,	11.0,	12.0,	15.2,	19.0,	21.5,	25.1,	28.3,	30.9,	34.8,	37.9,	40.5,	N/A ,
30 mins	6.1,	8.9,	10.4,	12.8,	14.4,	15.6,	19.7,	24.5,	27.7,	32.2,	36.3,	39.5,	44.4,	48.3,	51.6,	N/A ,
1 hours	8.1,	11.7,	13.7,	16.7,	18.7,	20.3,	25.6,	31.6,	35.7,	41.4,	46.5,	50.6,	56.8,	61.7,	65.7,	N/A ,
2 hours	10.7,	15.4,	17.9,	21.8,	24.4,	26.4,	33.1,	40.8,	45.9,	53.2,	59.7,	64.8,	72.6,	78.7,	83.8,	N/A ,
3 hours	12.6,	18.1,	21.0,	25.4,	28.5,	30.8,	38.6,	47.4,	53.3,	61.6,	69.1,	74.9,	83.8,	90.8,	96.6,	N/A ,
4 hours	14.2,	20.2,	23.5,	28.4,	31.8,	34.4,	42.9,	52.7,	59.2,	68.4,	76.6,	83.0,	92.8,	100.5,	106.9,	N/A ,
6 hours	16.7,	23.7,	27.5,	33.2,	37.1,	40.1,	50.0,	61.3,	68.7,	79.2,	88.6,	95.9,	107.2,	116.0,	123.2,	N/A ,
9 hours	19.7,	27.9,	32.2,	38.8,	43.3,	46.8,	58.2,	71.2,	79.7,	91.8,	102.6,	110.9,	123.8,	133.8,	142.1,	N/A ,
12 hours	22.1,	31.2,	36.1,	43.4,	48.4,	52.2,	65.8,	79.1,	88.6,	101.9,	113.8,	122.9,	137.1,	148.1,	157.2,	N/A ,
18 hours	26.1,	36.6,	42.3,	50.8,	56.5,	61.0,	75.5,	92.0,	102.8,	118.1,	131.7,	142.2,	158.4,	170.9,	181.4,	N/A ,
24 hours	29.3,	41.0,	47.3,	56.7,	63.1,	68.0,	84.1,	102.3,	114.3,	131.1,	146.1,	157.6,	175.4,	189.2,	200.7,	240.8,
2 days	36.9,	50.2,	57.2,	67.5,	74.3,	79.6,	96.6,	115.5,	127.8,	144.9,	159.9,	171.4,	189.0,	202.5,	213.6,	252.3,
3 days	43.2,	57.7,	65.3,	76.3,	83.6,	89.2,	107.1,	126.8,	139.5,	157.0,	172.3,	184.0,	201.8,	215.4,	226.5,	265.0,
4 days	48.8,	64.4,	72.4,	84.1,	91.8,	97.7,	116.4,	136.8,	149.9,	167.9,	183.5,	195.4,	213.5,	227.2,	238.5,	277.1,
6 days	58.7,	76.2,	85.0,	97.9,	106.2,	112.6,	132.7,	154.4,	168.2,	187.1,	203.4,	215.7,	234.3,	248.5,	260.0,	299.3,
8 days	67.6,	86.6,	96.2,	110.0,	119.0,	125.8,	147.1,	169.9,	184.3,	204.0,	220.9,	233.6,	252.8,	267.3,	279.2,	319.3,
10 days	75.8,	96.3,	106.5,	121.1,	130.6,	137.8,	160.2,	184.0,	199.0,	219.4,	236.8,	250.0,	269.7,	284.6,	296.7,	337.5,
12 days	83.6,	105.3,	116.2,	131.6,	141.5,	149.0,	172.4,	197.1,	212.7,	233.7,	251.6,	265.1,	285.3,	300.6,	312.9,	354.5,
16 days	98.2,	122.2,	134.1,	150.8,	161.6,	169.7,	194.8,	221.2,	237.7,	259.9,	278.8,	292.9,	314.0,	329.8,	342.6,	385.7,
20 days	111.8,	137.9,	150.7,	168.7,	180.2,	188.8,	215.4,	243.3,	260.6,	283.8,	303.5,	318.2,	340.1,	356.5,	369.7,	414.0,
25 days	128.0,	156.4,	170.2,	189.5,	201.8,	211.1,	239.4,	268.8,	287.1,	311.5,	332.0,	347.4,	370.2,	387.2,	400.9,	446.6,

NOTES-
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Size of soakaway trench is chosen as follows:



D = 0.30 m (300mm ϕ pipes)
H = 0.60 m (of single sized washed stone, 30% voids min)
w = 4.00 m (width of stone filled trench)
n = 6 (6 No. 300mm ϕ pipes will be placed within the 4m wide trench)

Inputs for following Spreadsheet:

1) A - Area contributing to the soakaway = 370 m^2.
2) B - Half of effective depth of the trench x 2 No. sides = 0.3 x 2 = 0.6 m.
3) Soil infiltration rate 'f' = 0.00154131 m/min.
4) $S_A(m^2)$, Effective storage area taken that the surrounding stone has 30% of voids and pipes have 100% effective area = [(h x w) - n x (r^2 x 3.14)] x 0.3 + n x (r^2 x 3.14) = 1.01673m^2, where n represents No. of pipes.
5) t(min), Rainfall duration given in table proceeding (Met Éireann Statistic Rainfall figures).
6) R - Rainfall depth (mm) for return period of 10 years, given in table proceeding (Met Éireann Statistic Rainfall figures), increased by 10% for climate change.
7) Time for trench to half empty = S x 0.5 x L_{req} / (f x B x L^{req}), it has to be less than 24h as per BRE Digest 365.

See spreadsheet over for computations of the above elements.

JOB:	G.McHale - House at Red Gap	**REF:**	D500 - D1
DESIGNED:	PB	**DATE:**	06-May-22

ROADSIDE SOAKWAY DESIGN : TRENCH

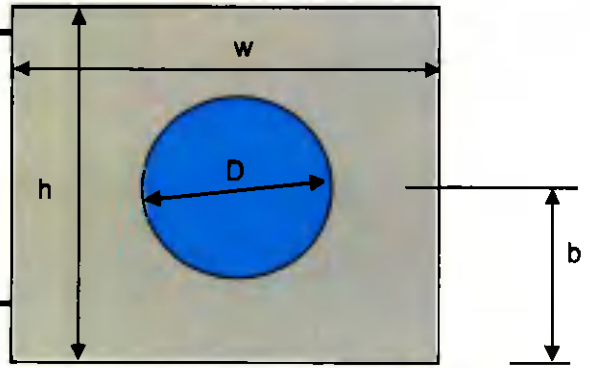
Inputs			
A =	370		Impermeable Area (m^2)
B (2b) =	0.6		Filtration Depth to 1/2 Effective Depth
f =	0.00154131		Filtration Coefficient (m per min)
S =	1.0167		Storage CSA (m^2)

Time (mins) t	Rainfall (mm) R	Inflow (m^3) =A x R	Required Trench Length (m) L
5	10.23	3.8	3.7
10	14.19	5.3	5.1
15	16.72	6.2	6.0
30	21.67	8.0	7.7
60	28.16	10.4	9.7
120	36.41	13.5	11.9
240	47.19	17.5	14.1
360	55.00	20.4	15.1
540	64.02	23.7	15.6
720	71.28	26.4	15.7
1440	92.51	34.2	14.6
2880	106.26	39.3	10.7

Actual L(m)	TIME TO HALF EMPTY
	550 mins
16.0	Or
	9.16 hrs

TRENCH

D =	0.3	m	
h =	0.6	m	
w =	4.0	m	
No. of pipes =	6		



B = 2*b

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Appendix B: Site Characterisation Form

APPENDIX B: SITE CHARACTERISATION FORM

File Reference:

1.0 GENERAL DETAILS (From planning application)

Prefix: Mr. First Name: GARETH Surname: MACHALE

Address: MOUNT CARMEL, REDGAP, RATHCOOLE, CO. DUBLIN

Site Location and Townland: MOUNT CARMEL, REDGAP, RATHCOOLE, CO. DUBLIN

Telephone No: Fax No:

E-Mail:

Maximum no. of Residents: 8 No. of Double Bedrooms: 6 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): Sandstone and Shale TILL. TILL derived from Lower Palaeozoic Sandstones and Shales

Aquifer Category: Regionally Important ☐ Locally Important ☐ Poor Pl

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

Bedrock Type: TIPPERKEVIN FORMATION. GREYWACKE AND SHALE. SILURIAN METASEDIMENTS AND VOLCANICS.

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

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

Groundwater Protection Response: R2[1]

Presence of Significant Sites (Archaeological, Natural & Historical): None Noted

Past experience in the area: NO

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 GROUNDWATER IS A TARGET RISK.

R2[1] : Acceptable subject to normal good practice. Where domestic water supplies are located nearby, particular attention should be given to the depth of subsoil over bedrock such that the minimum depths required in Section 6 of the Code of Practice : Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. </= 10).

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 sloping to Northwest

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: HOUSES >20M

Existing Land Use: EQUINE

Vegetation Indicators: NONE

Groundwater Flow Direction: UNKNOWN

Ground Condition: FIRM

Site Boundaries: >3M

Roads: >50M

Outcrops (Bedrock And/Or Subsoil): None Noted

Surface Water Ponding: None Noted Lakes: None Noted

Beaches/Shellfish: None Noted Areas/Wetlands: None Noted

Karst Features: None Noted

Watercourse/Stream*: None Noted

Drainage Ditches*: >100m Dry

Springs / Wells*: None Noted

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).

THE GROUNDWATER IS A TARGET RISK.

*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): 0.50

Depth from ground surface to water table (m) (if present): 2.10

Depth of water ingress:

Rock type (if present): Shale

Date and time of excavation: 11/04/2016 11:30

Date and time of examination: 14/04/2016 09:46

	Depth of P/T Test*	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m	P	TOPSOIL		Crumb	Firm	Brown	Random
0.2 m	P						
0.3 m	P						
0.4 m	P	Sandy gravelly CLAY		Structureless Massive	Firm	Brown	Random
0.5 m							
0.6 m	T						
0.7 m	T						
0.8 m	T						
0.9 m	T						
1.0 m							
1.1 m							
1.2 m		Highly fractured clayey SHALE BEDROCK		Angular	Dense	Grey Brown	Interparticle
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							
2.5 m							
2.6 m							
2.7 m							
2.8 m							
2.9 m							
3.0 m							

Likely T value:

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:

Groundwater was not encountered at the excavated depth of 2.10m
Bedrock was encountered at a depth of 0.50m.

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)	600	600	600
Depth from ground surface to base of hole (mm) (B)	1,000	1,000	1,000
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

Date and Time pre-soaking started	14/04/2016	10:08	14/04/2016	10:11	14/04/2016	10:16

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	15/04/2016	15/04/2016	15/04/2016
Time filled to 400 mm	10:42	10:42	10:42
Time water level at 300 mm	10:58	10:58	11:06
Time to drop 100 mm (T_{100})	16.00	16.00	24.00
Average T_{100}			18.67

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	10:58	11:18	20.00	10:58	11:18	20.00	11:06	11:34	28.00
2	11:21	11:45	24.00	11:24	11:49	25.00	11:37	12:12	35.00
3	11:48	12:18	30.00	11:52	12:20	28.00	12:16	13:00	44.00
Average Δt Value			24.67			24.33			35.67
	Average Δt/4 = [Hole No.1]		6.17 (t_1)	Average Δt/4 = [Hole No.2]		6.08 (t_2)	Average Δt/4 = [Hole No.3]		8.92 (t_3)

Result of Test: T = 7.06 (min/25 mm)

Comments:

T Test passed. Due to high bedrock level a P Test is required.

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	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

Date and Time pre-soaking started	14/04/2016	10:25	14/04/2016	10:28	14/04/2016	10:31

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	15/04/2016	15/04/2016	15/04/2016
Time filled to 400 mm	10:58	10:58	10:58
Time water level at 300 mm	11:42	11:50	11:38
Time to drop 100 mm (P_{100})	44.00	52.00	40.00
Average P_{100}			45.33

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	11:42	12:34	52.00	11:50	12:50	60.00	11:38	12:26	48.00
2	12:37	13:41	64.00	12:53	14:01	68.00	12:31	13:23	52.00
3	13:45	15:09	84.00	14:03	15:31	88.00	13:26	14:34	68.00
Average Δp Value			66.67			72.00			56.00
	Average Δp/4 = [Hole No.1]		16.67 (p_1)	Average Δp/4 = [Hole No.2]		18.00 (p_2)	Average Δp/4 = [Hole No.3]		14.00 (p_3)

Result of Test: P = 16.22 (min/25 mm)

Comments:

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:

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): -0.45

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

The polishing filter must have a minimum thickness of 900mm of free draining unsaturated soil between the point of infiltration of the effluent and the water table or bedrock. The Polishing filter must be constructed in accordance with table 8.1, EPA CoP 2009 and under the supervision of a suitably qualified person.

All works to be supervised and certified by a suitably qualified engineer.

[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	See Site Suitability Report
Capacity PE	8.00
Sizing of Primary Compartment	3.20 m^3

SYSTEM TYPE: Tertiary Treatment System

Polishing Filter: Surface Area (m^2)*	60.00
or Gravity Fed:	
No. of Trenches	
Length of Trenches (m)	
Invert Level (m)	

Package Treatment System: Capacity (pe)	6.00
Constructed Wetland: Surface Area (m^2)*	

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
See Site Suitability Report					

QUALITY ASSURANCE:

Installation & Commissioning	On-going Maintenance
Installation should be supervised and certified by a suitably qualified Civil Engineer or similar qualified person approved by the Local Authority. Confirmation from the mechanical aeration system suppliers that the system has been installed and is functioning correctly, should be obtained by the client.	The client must enter a maintenance contract and the system should be serviced periodically. The tank should be de-sludged periodically (a minimum of once a year) by a licensed contractor.

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

** Water Pollution Act discharge licence required

7.0 SITE ASSESSOR DETAILS

Company: DECLAN KEARNS & ASSOCIATES

Prefix: Mr. First Name: DECLAN Surname: KEARNS

Address: TULLYWEST, KILDARE, CO. KILDARE

Qualifications/Experience: B.Eng., NCEA Dip. Env. Eng., NCEA, Cert. Eng., MIEI, FETAC CERT EF 241859 722383

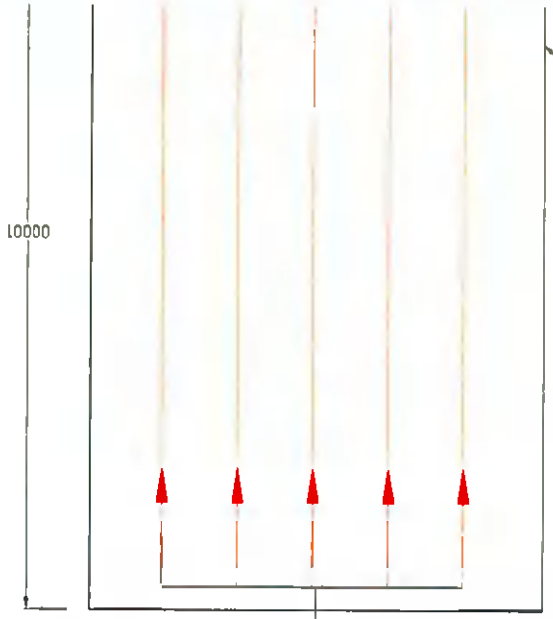
Date of Report: 16/04/2016

Phone: 0862111590 Fax: e-mail info@dkassociates.ie

Indemnity Insurance Number: IE/DG14/07528

Signature: Declan Kearns

Digitally signed by Declan Kearns
DN: cn=Declan Kearns, o=DKAL, ou, email=info@dkassociates.ie, c=IE
Date: 2016.06.16 10:06:23 +01'00'



REFER TO POLISHING FILTER DESIGN REPORT
FOR PIPE DIAMETERS TO LATER DETAIL

PLAN OF 60M2 RAISED SOIL POLISHING FILTER & EFFLUENT TREATMENT SYSTEM

1. MINIMUM SOIL THICKNESS BENEATH INVERT OF DISTRIBUTION SYSTEM = 900MM
2. GRAVEL PROTECTION LAYER : 150MM OF 8 TO 32MM WASHED GRAVEL
3. INFILTRATION LATERALS : 32MM DIA. PVC WITH 6MM ORRICES AT 300MM SPACINGS. INFILTRATION LATERALS SHOULD BE LAID WITH THE HOLES FACING UPWARDS
4. GRAVEL DISTRIBUTION LAYER : 250MM OF 8 TO 32MM WASHED GRAVEL
5. LATERAL PIPES LAID AT 1000MM CENTRES
6. EFFLUENT TREATMENT SYSTEM AND POLISHING FILTER TO BE INSTALLED AND CONSTRUCTED IN STRICT ACCORDANCE WITH EPA CoP 2009

PLAN OF ETS AND SOIL POLISHING FILTER TO EPA CoP 2009

Rev.
Declan
Consult
Tullywe
Phone :
Email:
Project
PRC
RAT

Gareth MacHale - Photos

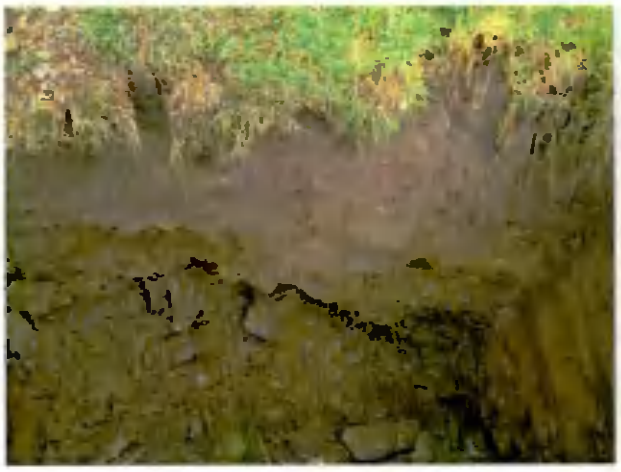


Figure 1. Trial Pit

Figure 2. T – Test 1

Figure 3. T – Test 2

Figure 4. T – Test 3

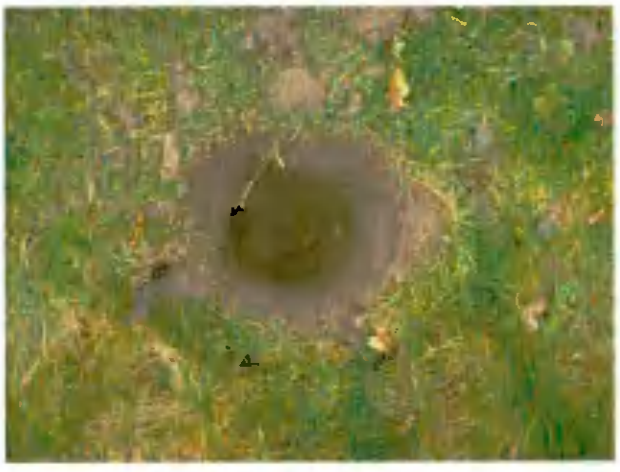


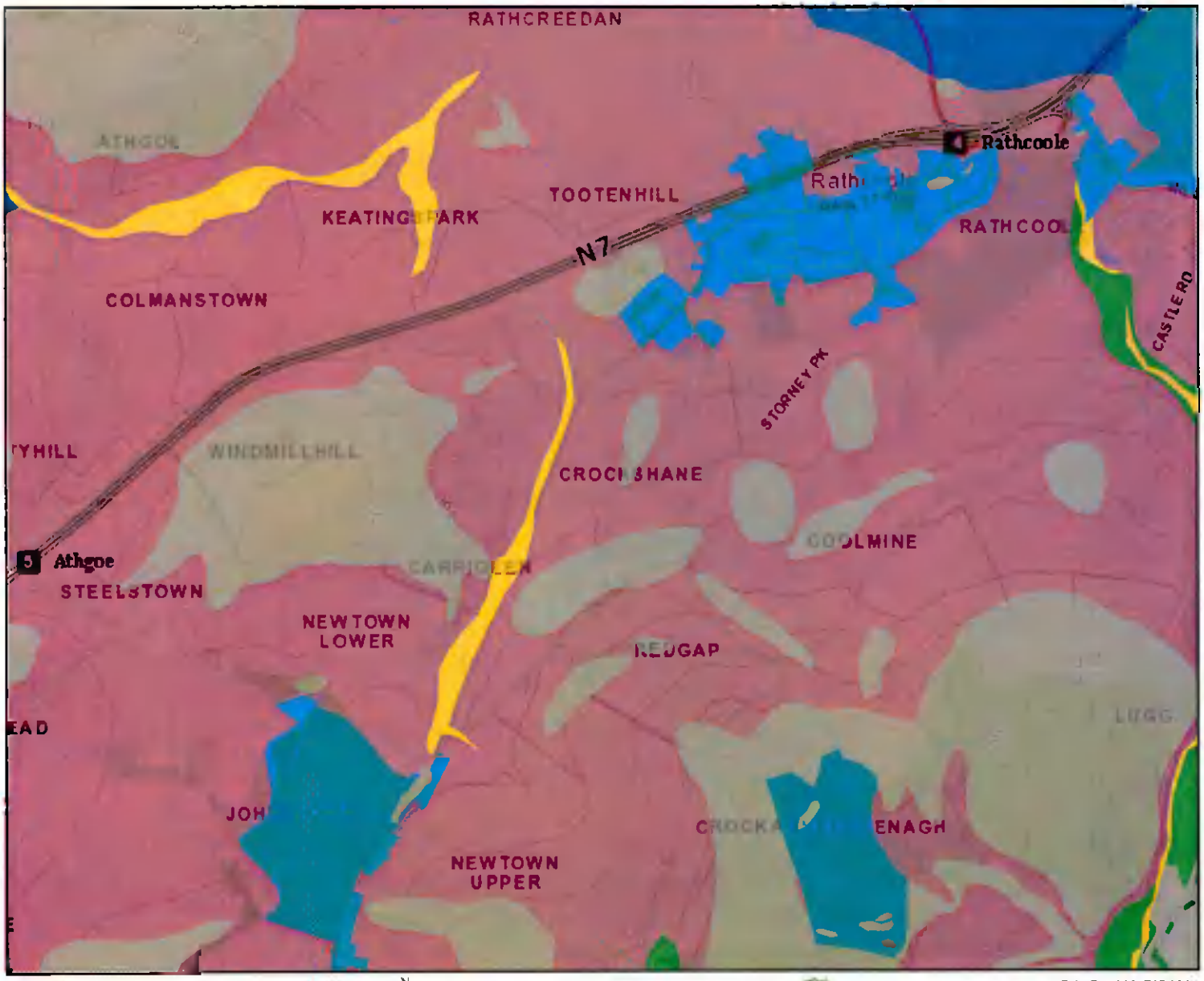
Figure 5. P – Test 1

Figure 6. P – Test 2

Figure 7. P – Test 3

Figure 8. View of Site

SOILS MAP



Legend

Teagasc Subsoils

- Alluvium
- Gravels derived from limestones
- Bedrock outcrop or subcrop
- Made ground
- Till derived from Lower Palaeozoic sandstones and shales
- Till derived from limestones

OSI Basemap

Scale: 1:25,000

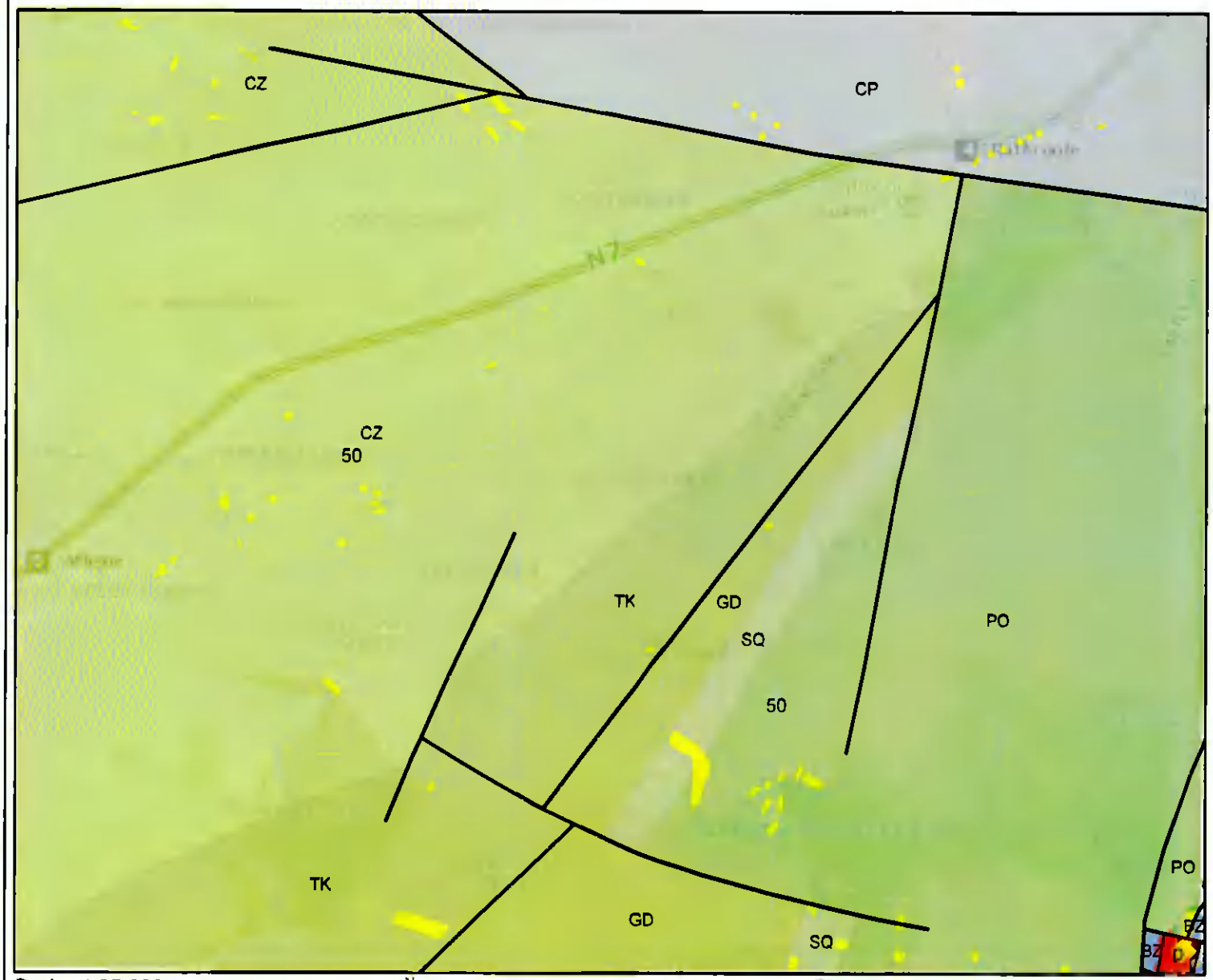
Geological Survey of Ireland

N W E S

0 0.175 0.35 0.7 mi
0 0.275 0.55 1.1 km

Map Centre Coordinates (ITM) 701,086 725,601
Snapshot Date: June 12, 2018

BEDROCK MAP



Legend

Bedrock Structure Labels
Structrual Symbol Labels

Bedrock Stratigraphy
Boundary of Igneous Intrusion

Bedrock Structure
11F1-2

Bedrock Outcrop
Outcrop

Generalised Bedrock (Rock Unit Groups)
Dinantian Upper Impure Limestones
Granites & other Igneous Intrusive rocks
Silurian Metasediments and Volcanics
Ordovician Metasediments

OSI Basemap

Scale: 1:25,000

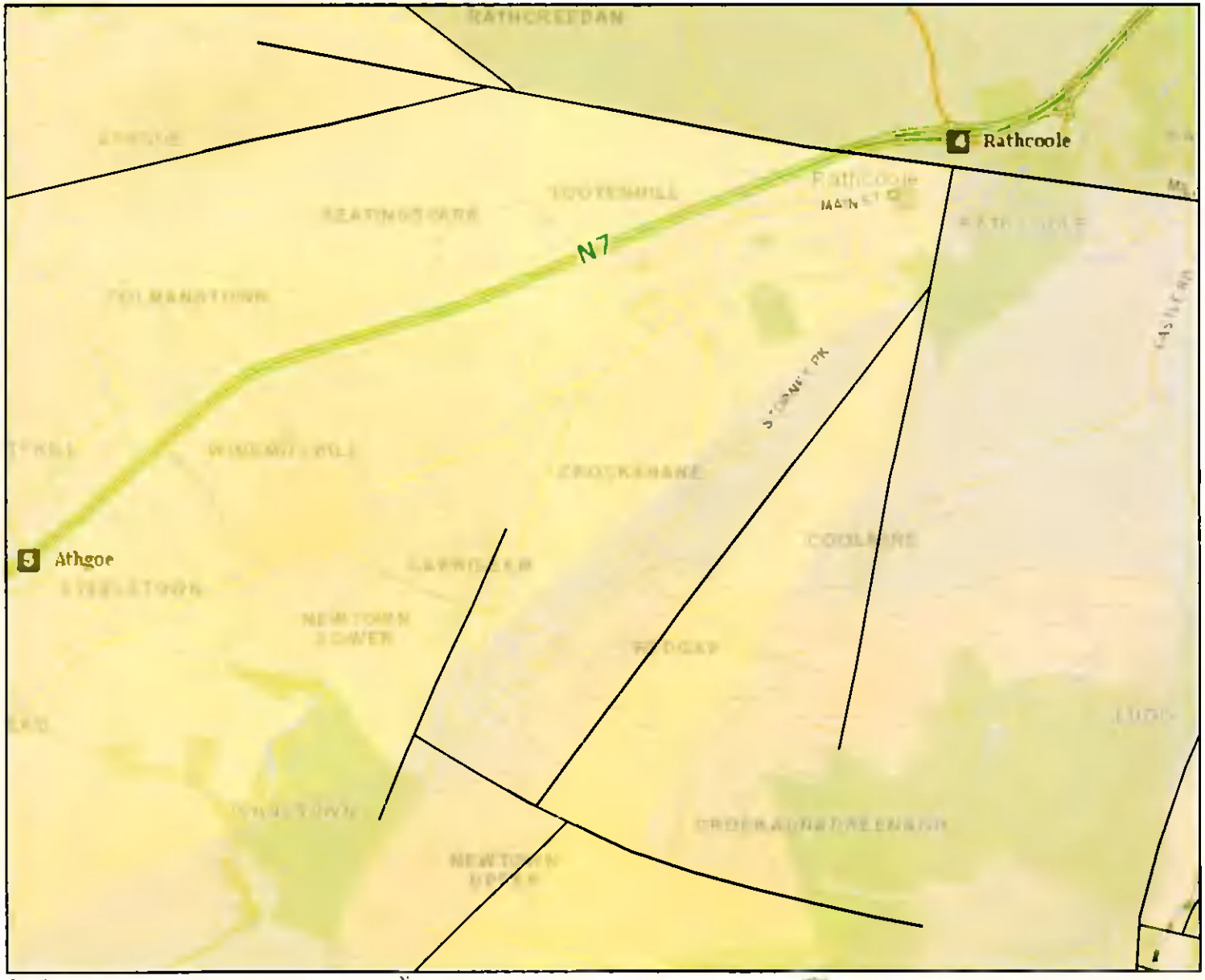
Geological Survey of Ireland

N W E S

0 0.175 0.35 0.7 mi
0 0.275 0.55 1.1 km

Map Centre Coordinates (ITM) 701,086 725,601
Snapshot Date: June 12, 2016

AQUIFER MAP



Legend

Bedrock Aquifer Faults

Bedrock Aquifer Faults

Bedrock Aquifer

LI - 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

OSI Basemap

Scale: 1:25,000

Geological Survey of Ireland

0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

Map Centre Coordinates (ITM) 701,086 725,601

Snapshot Date: June 12, 2016

VULNERABILITY MAP

Legend

Groundwater Vulnerability

- K - Rock at or near surface or Karst
- E - Extreme
- H - High
- M - Moderate
- L - Low
- OSI Basemap

Scale: 1:25,000

Geological Survey of Ireland

0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

Map Centre Coordinates (ITM) 701,086 725,601

Snapshot Date: June 12, 2016

KAVANAGH BURKE
CONSULTING ENGINEERS

Maintenance Agreement for the Premier Tech Aqua LTD Waste Water Treatment Unit

PREMIER TECH AQUA

Maintenance Agreement for the Premier Tech Aqua Ltd Waste Water Treatment Unit

6PE/8PE/12PE/16PE/20PE/25

Client: Gareth MaChale **Our Ref:** MA160616 (2)

Location: Mount Carmel, Redgap, Rathcoole, Co Dublin

The Premier Tech Aqua ASP 8PE Unit requires ongoing maintenance. To ensure the unit operates there are three important criteria which must be adhered to:

1. Compressor must run constantly and be positioned where it is not subject to flooding/ground water.
2. The unit must be desludged every 1-3 years (depending on the population served)
3. Excessive use of detergents and cleaners must be avoided. (Premier Tech Aqua strongly recommend the use of phosphate free detergents and cleaning agents)

In addition to this Premier Tech Aqua Ltd., shall visit the plant once yearly (see charges below) to carry out maintenance by checking:

- **Quality of Effluent** - Visual Check
- **Quality of Aeration** - Visual Check
- **Air Compressor**
- **Electrical Connect**
- **Pump** (Where Fitted)

The first 18 months carries our manufacturer's warranty from the date of commissioning and provided that the unit has been checked and desludged accordingly, Premier Tech Aqua shall then repair/replace any defective parts. Local Authorities require the customer to hold a maintenance agreement.

Payment Terms: ***Paid in-full, in advance.***

Cost: Premier Tech Aqua will undertake to carry out this service for a fee of €200.00 (incl. VAT) yearly (Parts Excluded). Emergency calls will be charged at our standard rates plus materials and mileage.

**Please note Premier Tech Aqua will return a signed copy once we receive the original copy of the maintenance
contract signed complete with payment from the client

Material Parts Price List: - Available on Request

Client,
Signed: _____
_____
Date: _____
Phone No: _____

Premier Tech Aqua Ltd
Signed:

Date: _____

Payment Type Included: (Please tick as appropriate)
Cash Cheque Credit Card Details

Disclaimer: Premier Tech Aqua Ltd cannot be responsible for equipment damage owing to unfavourable site conditions. Premier Tech Aqua cannot guarantee the long-term operation of the plant unless it is serviced regularly. Terms and conditions subject to change.

Premier Tech Aqua Limited
Quartertown Industrial Estate
Mallow, Co Cork Tel: 022 51411

PREMIER TECH
AQUA

Premier Tech Aqua ASP Wastewater Treatment Unit

Designed and tested in accordance with EN12566-3 and with the EPA Code of Practice and Flows and Loads

1.0 Description

The Premier Tech Aqua ASP sewage treatment plant has an inner central chamber and an outer settlement tank. The plant treats sewage using the extended aeration principle in the central bio-zone chamber. A simple course bubble diffuser, housed in a draft tube, introduces the air that provides the oxygen to the bacteria that then treats the sewage. The bio-zone retains the mixture of water, sewage and air until a level of treatment has been achieved. The treated effluent then enters the conical clarifier tank where settlement takes place and the settled solids are drawn back towards the draft tube with the diffuser in it and returned to the bio-zone. The effluent finally leaves the plant over a weir that extends around the circumference of the tank at the outlet level. The movement of fluid through the whole system is by gravity displacement. There are no moving parts in the treatment plant.

1.1 Specifications

Premier Tech Aqua Ltd will be responsible for the supply and mechanical and electrical installation of:

1.1.1. One Premier Tech ASP treatment system, complete with safety cover.
1.1.2. One compressor kit, to be supplied when the unit is ready for commissioning.
1.1.3. Commissioning of the Premier Tech Aqua ASP unit. The time and date of the commissioning shall be agreed between the two parties.
1.1.4. It is the client's responsibility to do any preparatory work prior to commissioning of the system by Premier Tech Aqua.

1.2 Client Responsibilities

The client is responsible for the following:

1.2.1. The placing of the Premier Tech Aqua ASP in the area agreed in the Site Suitability Assessment and in accordance with the "Installation, Operation and Maintenance Manual" provided when the unit is delivered to the site and supervised accordingly.

1.2.2. The provision of a 3 x 2.5 SWA cable from the dwelling house or garage to the Premier Tech Aqua ASP unit, allowing an excess of 2 meters at the tank.

1.3 Quality of Treated Effluent

The Premier Tech Aqua ASP unit will provide final effluent, prior to percolation to the following standard

B.O.D. mg/l	20
Total Suspended Solids mg/l	30
Ammonia mg/l	20

Premier Tech Aqua Limited
Quartertown Industrial Estate
Mallow, Co Cork Tel: 022 51411

PREMIER TECH AQUA

2.0 Maintenance

The Premier Tech Aqua ASP unit is designed to ensure minimal maintenance requirement. Premier Tech Aqua Ltd does offer customers the option of an annual Service Agreement which involves a visit by one of our service engineers. They will check the system as per enclosed Service Agreement. The price for this service is €200.00 per year and is inclusive of VAT. This is not included in the overall unit price.

3.0 Commercial Details

1.2 Copyright and Confidentiality

All technical and financial information provided in this document, submitted by Premier Tech Aqua Ltd or provided in subsequent related correspondence or contract documentation is the intellectual property and copyright of Premier Tech Aqua Ltd and shall be treated as confidential by the Company and by its servants and agents. No such information shall be divulged to other persons, companies and organisations for any reason or purpose whatsoever without the express prior permission in writing of Premier Tech Aqua Ltd. and all reasonable care shall be taken by the company and its servants or agents to prevent such information being lost or inadvertently transmitted to or acquired by other parties or organisations.

1.3 Payment Terms

Gross including VAT, to be paid in full by cheque upon delivery to site.

1.4 Validity

Our offer will remain open for a period of six months from date of Quotation.

1.5 Prices

All prices are quoted in euros, unless otherwise stated and will remain fixed for the validity and completion period indicated.

1.6 Despatch Period

Despatch period to be agreed by both parties.

1.7 Programme of Works

Time schedule to be agreed by both parties.

4.0 Calculations

Please see attached Site Suitability Assessment.

5.0 Premier Tech Aqua has a policy of continual product development thus the above information may be subject to change without notice.

Premier Tech Aqua Limited
Quartertown Industrial Estate
Mallow, Co Cork Tel: 022 51411

PREMIER TECH AQUA

Site Suitability Assessment

Ref: SSA160616 (2)

1.0 Applicant Details

Name of Applicant: Gareth MaChale

Telephone No: N/A

Address of Applicant: Mount Carmel, Redgap, Rathcoole, Co Dublin

Maximum No. of Residents: 8

Site Location and Townland: Mount Carmel, Redgap, Rathcoole, Co Dublin

Proposed Water Supply: Private Well / Borehole

Engineer / Requested By: Declan Kearns

2.0 Desk Study

Soil Type: Sandstone and Shale TILL. Till derived from Lower Palaeozoic Sandstones and Shales

Bedrock Type: Tipperkevin formation. Greywacke and shale. Silurian metasediments and volcanics.

Vulnerability Class: Extreme

Aquifer Type: Pl

Groundwater Protection Class: R2[1]

Presence of Significant Sites: None Noted

Past Experience in the area: No

Soil Profile:

0 mm - 0300 mm	Brown TOPSOIL
0300 mm - 1200 mm	Brown CLAY
1200 mm – 2100 mm	Grey Brown SHALE BEDROCK

3.0 Visual assessment

Landscape: Site is sloping to Northwest

Slope of Site: Steep (>1:5) Shallow (1:5 - 1:20) V Relatively Flat (1:20)

Site Boundaries: >3m

Premier Tech Aqua Limited
Quartertown Industrial Estate
Mallow, Co Cork Tel: 022 51411

PREMIER TECH AQUA

4.0 Test Result

T-Value: 7.06 **P-Value:** 16.22

Depth from ground surface to bedrock (bgl): 0.50

Depth from ground surface to water table (bgl): 2.10

Date test carried out: 14/04/2016

5.0 Recommendations

Premier Tech Aqua recommend the following:

To install a Premier Tech Aqua Conder ASP8 Pumped Wastewater Treatment Plant.

Construction is to be carried out as per Code of Practice, Wastewater Treatment and Disposal Systems Serving Single Houses (P.E.≤ 10) and as per Site Assessors recommendations.

Clients Responsibility:

It is the clients responsibility to provide a 3 x 2.5 SWA cable from the dwelling / garage to the unit with 2 meters to spare at the tank.

Date: 16/06/2016

Premier Tech Aqua Limited
Quartertown Industrial Estate
Mallow, Co Cork Tel: 022 51411