MK Environmental Solutions Ltd.

Ballingale,
Ferns,
Enniscorthy.

Percolation Test Report
For on-site waste water treatment

On behalf of
Sarah Jane Kearney.

- Permission for a new site with proposed treatment system and sand filter.
- Proposed replacement of an existing septic tank system to treatment system and sand filter and alterations to existing site boundaries (applicant's parents property).

Site @
Cruagh Lane,
Cruagh,
Rathfarnham,
Dublin 16.

TEL/FAX: 053-9388333 086-3364102
Directors: M. Kehoe & O. Whelan.
VAT NO: IE6430807B

SITE PICTURES:

TRIAL HOLE.

TRIAL HOLE SPOIL.

TRIAL HOLE PROFILE

TOPSOIL LAYER NO: 1.

SUBSOIL LAYER NO: 2

SUBSOIL LAYER NO:3

TOPSOIL SAMPLE.

SUBSOIL NO:2 SOIL SAMPLE.

SUBSOIL NO:3 SOIL SAMPLE.

T TEST T1 @ 800mm INVERT.

T TEST T2 @ 600mm INVERT.

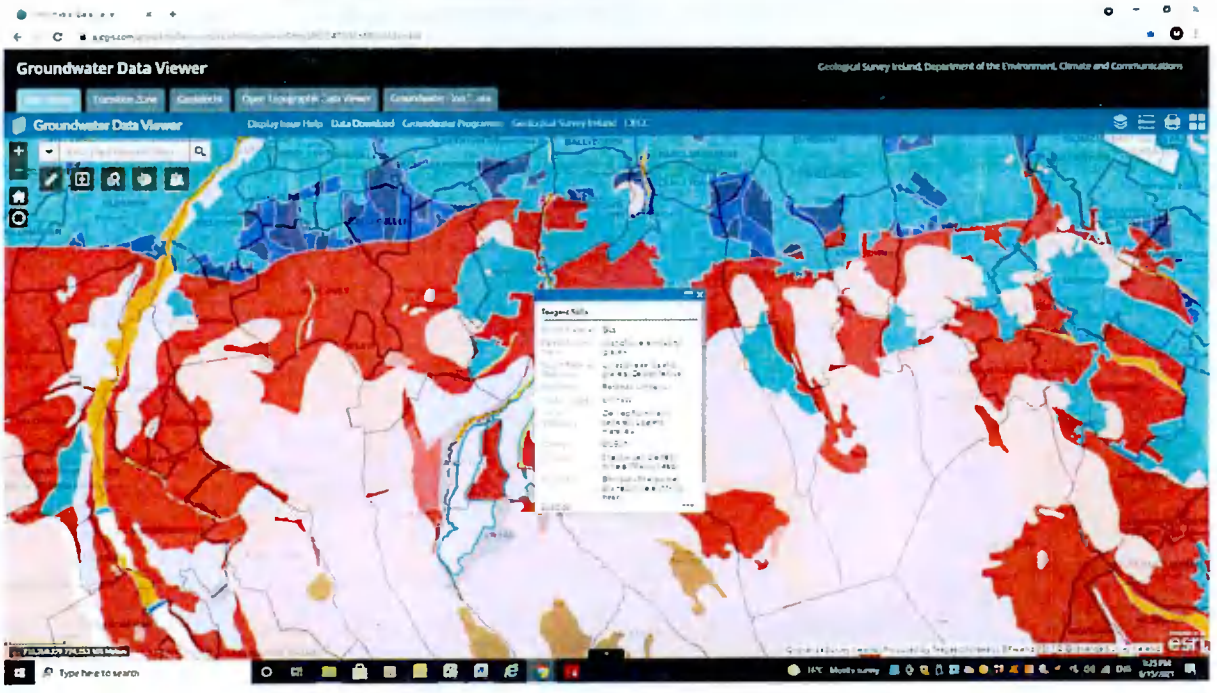
T TEST T3 @ 700mm INVERT.

SOIL SAMPLES.

TRIAL HOLE LOCATIONS.

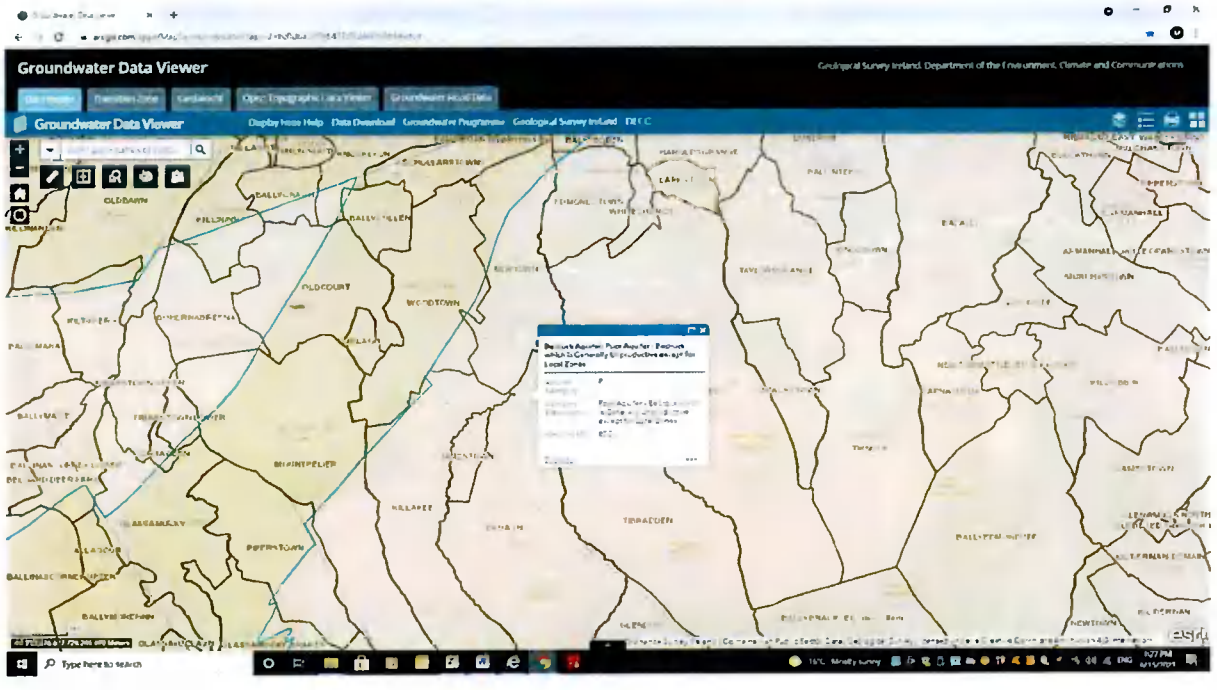
SUDS ASSESSMENT.

Topsoils map of the site:
Renzinas, Lithosols. Shallow well drained mineral.



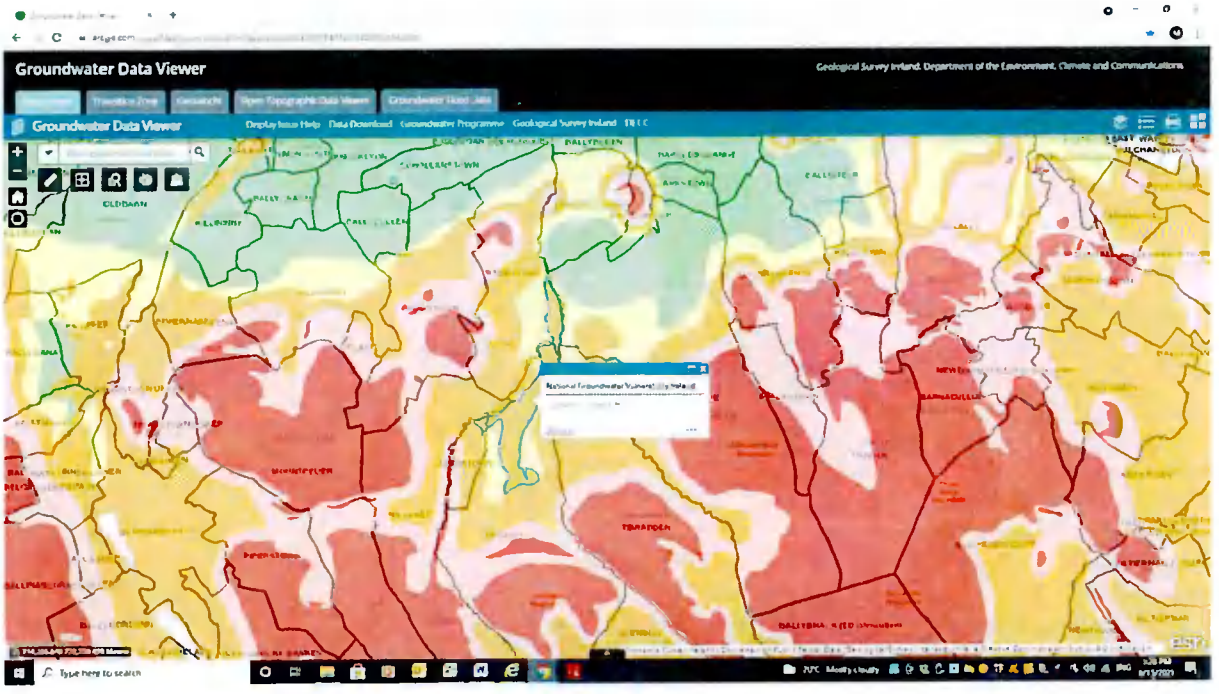
Aquifer Map of the proposed site:

Poor Aquifer. Bedrock which is generally unproductive. Pl.

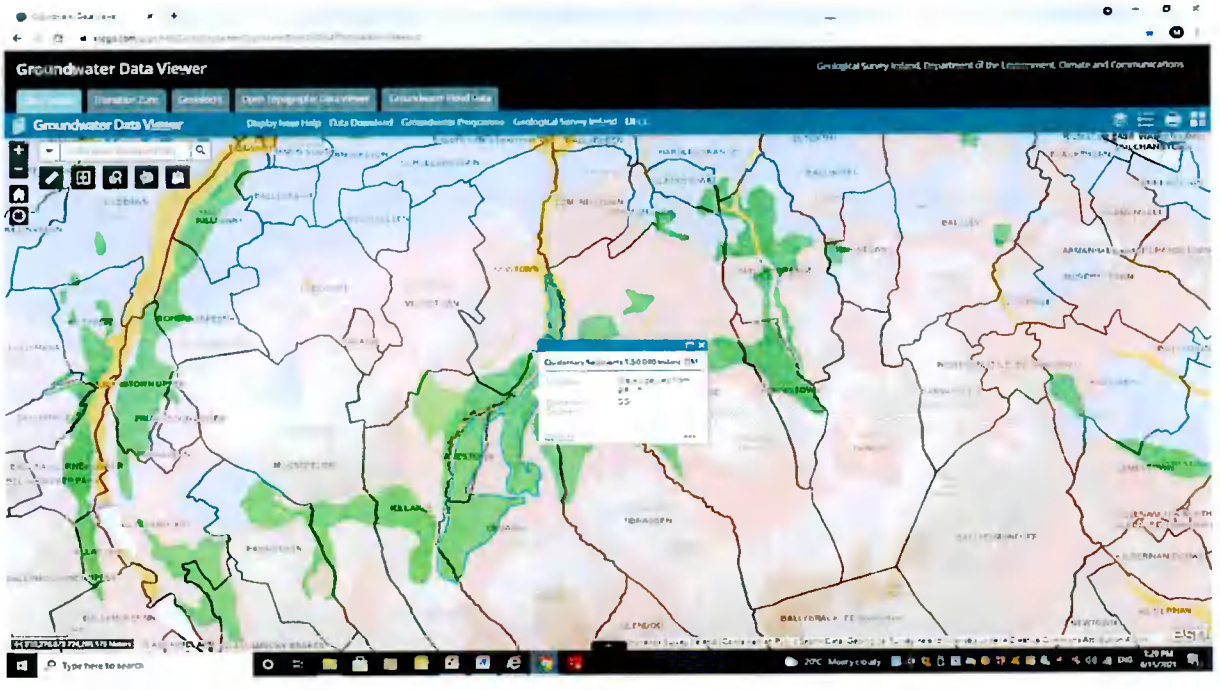


Vulnerability Map of the proposed site:

High Vulnerability Rating – I.G.I.S. Web Browser.

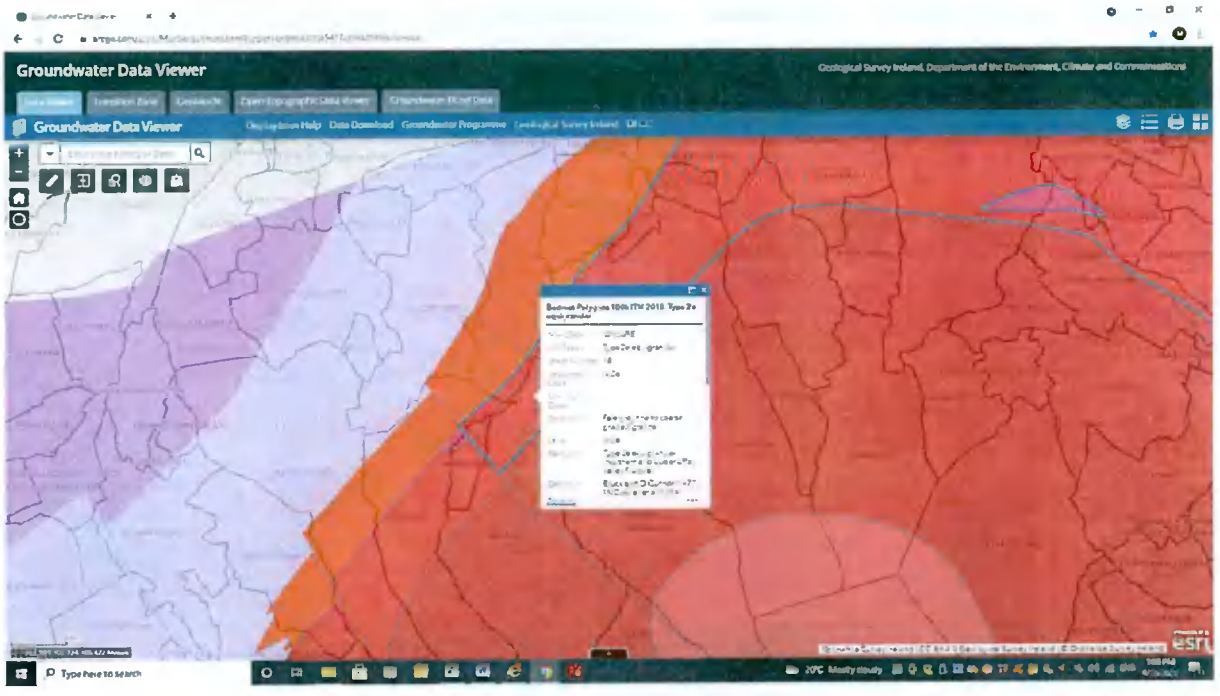


I.G.I.S. Web Browser Subsoil map of the site: GGr. Gravels derived from granite.

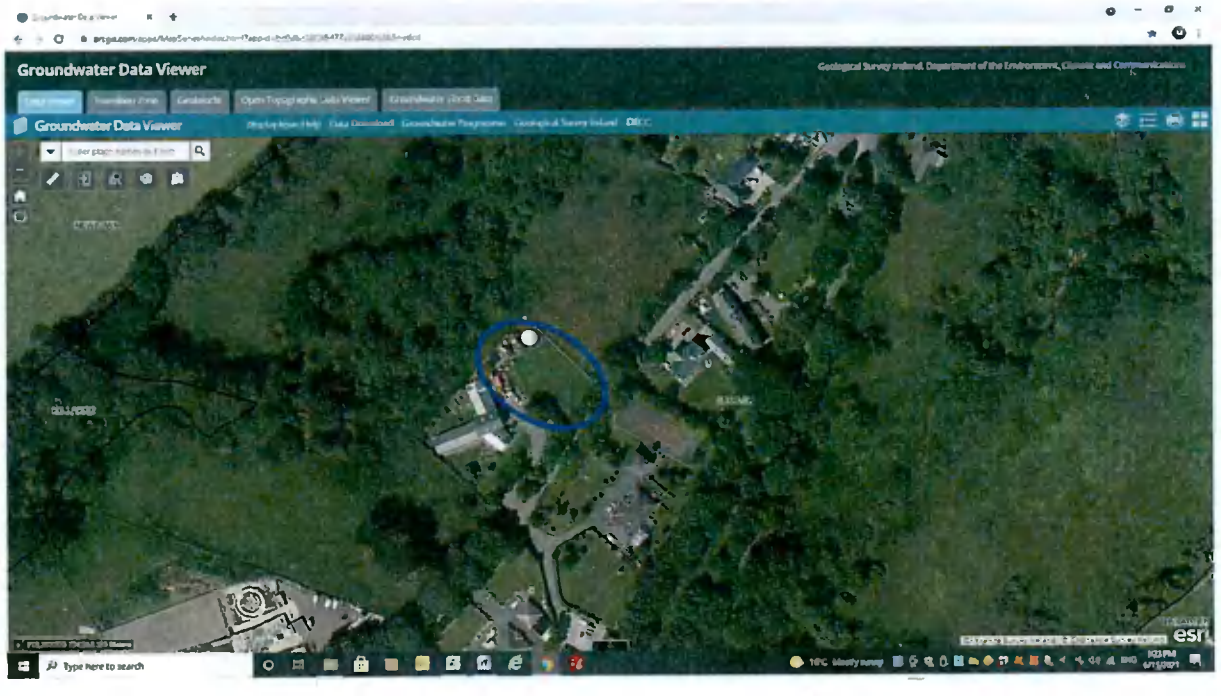


Bedrock Map of the proposed site:

Type 2e equigranular. Pale, grey fine to coarse grained granite.



Site location shown in blue – test area shown in white.



Groundwater Protection Responses for On-site Wastewater Systems for Single Houses - Summary

The potential suitability of a site for the development of an on-site system is assessed using the methodology outlined in *Wastewater Treatment Manual: Treatment Systems for Single Houses* (EPA, 2000). The groundwater protection responses set out below should be used during the desk study assessment of a site to give an early indication of the suitability of a site for an on-site system. Information from the on-site assessment should be used to confirm or modify the response.

Response Matrix for On-site Treatment Systems

VULNERABILITY RATING	SOURCE PROTECTION AREA *		RESOURCE PROTECTION Aquifer Category					
			Regionally Important		Locally Important		Poor Aquifers	
	Inner (SI)	Outer (SO)	Rk	RDWg	Lm/Lg	Ll	Pl	Pu
Extreme (E)	R3[1]	R3[1]	R2[3]	R2[3]	R2[1]	R2[1]	R2[1]	R2[1]
High (H)	R2[4]	R2[2]	R2[1]	R1	R1	R1	R1	R1
Moderate (M)	R2[4]	R2[2]	R1	R1	R1	R1	R1	R1
Low (L)	R2[4]	R1	R1	R1	R1	R1	R1	R1

** For public, group scheme or industrial water supply sources where protection zones have not been delineated, the arbitrary distances given in DELG/EPA/GSI (1999) of 300 m for the Inner Protection Area (SI) and 1000 m for the Outer Protection Area (SO) should be used as a guide up-gradient of the source.*

R1 Acceptable subject to normal good practice (i.e. system selection, construction, operation and maintenance in accordance with EPA (2000)).

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 (EPA, 2000) are met and that the likelihood of microbial pollution is minimised.

R2[2] Acceptable subject to normal good practice and the following additional condition:
1) There is a minimum thickness of 2 m unsaturated soil/subsoil beneath the invert of the percolation trench of a conventional septic tank system;

OR

1) A treatment system other than a conventional septic tank system as described in EPA (2000) is installed, with a minimum thickness of 0.6 m unsaturated soil/subsoil with P/T values[1] from 1 to 50 (in addition to the polishing filter which should be a minimum depth of 0.6 m), beneath the invert of the polishing filter (i.e. 1.2 m in total for a soil polishing filter).

R2[3] Acceptable subject to normal good practice, condition 1 above and the following additional condition:
2) The authority must be satisfied that, on the evidence of the groundwater quality of the source and the number of existing houses, the accumulation of significant nitrate and/or microbiological contamination is unlikely.

R2[4] Acceptable subject to normal good practice, conditions 1 and 2 above and the following additional condition:
3) No on-site treatment system should be located within 60 m of the public, group scheme or industrial water supply source.

R3[1] Not generally acceptable, unless: A conventional septic tank system is installed with a minimum thickness of 2 m unsaturated soil/subsoil beneath the invert of the percolation trench (i.e. an increase of 0.8 m from the EPA manual);

OR

A treatment system other than a conventional septic tank system, as described in EPA (2000), is installed with a minimum thickness of 0.6 m unsaturated soil/subsoil with P/T values from 1 to 50 (in addition to the polishing filter which should be a minimum depth of 0.6 m), beneath the invert of the polishing filter (i.e. 1.2 m in total for a soil polishing filter);

APPENDIX A: SITE CHARACTERISATION FORM

File Reference: MKES 2021-104

1.0 GENERAL DETAILS (From planning application)

Prefix: First Name: Sarah Jane Surname: Kearney

Address:

Site Location and Townland: Cruagh Lane, Rockbrook, Rathfarnham, Dublin 16.

Number of Bedrooms: 4 Maximum Number of Residents: 6

Comments on population equivalent

Proposed site subdivision to allow for a new 4 bedroom domestic dwelling with proposed mains water connection. This report and design solution is also proposed for the new treatment system and sand filter to be installed within the revised site boundaries to allow for the replacement of the applicant's parents old septic system.

Proposed Water Supply:

Mains ☑ Private Well/Borehole ☐ _____ Group Well/Borehole ☐

2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type): Renzinas, Lithosols. Shallow well drained mineral.

Subsoil, (Specify Type): GGr - gravels derived from granite.

Bedrock Type: Type 2e equigranular. Pale, grey fine to coarse grained granite.

Aquifer Category: Regionally Important | Locally Important _____ Poor Pl

Vulnerability: Extreme ☐ High ☑ Moderate ☐ Low ☐

Groundwater Body: Kilcullen Status Poor

Name of Public/Group Scheme Water Supply within 1 km: Mains water locally - no wells identified at desk study stage.

Source Protection Area: ZOC ☐ SI ☐ SO ☐ Groundwater Protection Response: R1

Presence of Significant Sites (Archaeological, Natural & Historical): Graveyard and church ruins located North of the site.

Past experience in the area: Generally well drained soil and subsoil.

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).

Based on the desk study information there are no obvious signs of poor drainage. All the desk study data indicates that the site in question could be well drained. It may be possible to achieve ground water disposal of liquid effluent. The main targets at risk in this instance are the underlying Pl aquifer and any streams/watercourses locally. Wells & septic tanks/treatment systems locally to be located and marked on the site sketch. New dwelling proposed on the existing lawn area of the applicant's parents house.

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: Middle reaches of a shallow valley landscape - river located within 100mts West - see OS Map.

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

Slope Comment

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

Houses:

The site sketch clearly shows the location of the nearest adjoining dwellings - mains water connection locally. The nearest dwellings are located to the E across the local road as per the OS Map attached.

Existing Land Use:

Existing lawn area belonging to the applicant's parents.

Vegetation Indicators:

None.

Groundwater Flow Direction: Generally W and N.

Ground Condition:

Dry, firm and trafficable.

Site Boundaries:

Road E. Existing site boundary fence N, W and S to the open field aspects.

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Roads:

Parallel to the E boundary as clearly shown on the site layout map attached.

Outcrops (Bedrock And/Or Subsoil):

None locally.

Surface Water Ponding:

None visible at the time of testing.

Lakes:

None locally.

Beaches/Shellfish Areas:

None.

Wetlands:

None.

Karst Features:

None.

Watercourses/Streams:*

Jamestown river located approx. 80 or so meters from the nearest part of the proposed site, again as clearly outlined on the attached OS Map.

*Note and record water level

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Drainage Ditches:*

None - all local drainage goes to ground.

Springs:*

No identified on any of the site boundaries.

Wells:*

None locally - mains water supply available along the road boundary E.

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).

No obvious signs of poor drainage. The area tested is the the Nw part of the proposed site as per site sketch.

All of the minimum separation distance requirements are achievable, however a tertiary level system will be required to achieve this. The main target looks to be the PI aquifer and watercourse to the West. Site overall looks suitable for groundwater discharge, the fall on site will most likely require a pumped system as the test area is slightly upslope of the proposed house location within the site.

The new proposed house has a large footprint on the site so a small compact perc area / polishing filter will be required in this instance to meet all separation distance requirements.
Space is also to be left on site for the applicant's parents to relocate their septic tank and percolation area to allow for this proposed new build.

*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): 2.1

Depth from ground surface to bedrock (m) (if present): 2.1

Depth from ground surface to water table (m) (if present): 2.1

Depth of water ingress: 2.1

Rock type (if present): None encountered.

Date and time of excavation: 10-May-2021 10:00

Date and time of examination: 11-May-2021 10:00

Depth of Surface and Subsurface Percolation Tests	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m 0.2 m 0.3 m 0.4 m	Loam, with mix of fines <10%.	2 T, R of 50-60mm	Crumb & friable.	Uncompact.	Light brown	Shallow roots
0.5 m 0.6 m 0.7 m 0.8 m 0.9 m 1.0 m	Gravelly Silt with widespread fines - well drained profile to 900mm minimum. Quite compact with occasional cobbles.	2 T, R of 75mm.	Friable and loose.	Quite compact and firm	Strong brown colour.	No flow paths - ideally tests done within this layer.
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 2.5 m 2.6 m 2.7 m 2.8 m 2.9 m 3.0 m 3.1 m 3.2 m 3.3 m 3.4 m 3.5 m	Very gravelly Clay with widespread sandy pockets. Well drained material to base of the trial hole @2.1mts deep.	2t, 50mm r	Quite friable and granular structure in parts.	Loose and uncompact layer ideal for percolation.	Pale olive to yellowish brown	No flow paths but well drained till material.

Likely Subsurface Percolation Value: 20

Likely Surface Percolation Value: 20

Note: *Depth of percolation test holes should be indicated on log above. ('Enter Surface or Subsurface at depths 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:

Approx. 2100mm of well drained soil and shallow subsoil which is suitable for hydraulic dispersal of effluent. Insufficient space on site for a conventional septic tank/percolation area. Likely that a tertiary level treatment system will be required on site to keep the system as small and compact as possible. See full design spec to follow.

3.3(a) Subsurface Percolation Test for Subsoil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	800	600	700
Depth from ground surface to base of hole (mm) (B)	1,200	1,000	1,100
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

		1	2	3
Pre-soak start	Date	10-May-2021	10-May-2021	10-May-2021
	Time	10:00	10:00	10:00
2nd pre-soak start	Date	10-May-2021	10-May-2021	10-May-2021
	Time	17:00	17:00	17:00

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

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	11-05-2021	11-05-2021	11-05-2021
Time filled to 400 mm	08:12	08:02	08:08
Time water level at 300 mm	09:00	09:01	08:51
Time (min.) to drop 100 mm (T_{100})	48.00	59.00	43.00
Average T_{100}			50.00

If T_{100} > 300 minutes then Subsurface Percolation value >120 – 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	09:00	09:54	54.00	09:01	10:07	66.00	08:51	09:40	49.00
2	09:56	10:58	62.00	10:10	11:24	74.00	09:42	10:38	56.00
3	11:00	12:14	74.00	11:30	13:01	91.00	10:40	11:48	68.00
Average Δt Value			63.33			77.00			57.67
	Average Δt/4 = [Hole No.1]		15.83 (t_1)	Average Δt/4 = [Hole No.2]		19.25 (t_2)	Average Δt/4 = [Hole No.3]		14.42 (t_3)

Result of Test: Subsurface Percolation Value = 16.50 (min/25 mm)

Comments:

T value of 16.5 - Suitable for hydraulic dispersal of secondary treated effluent. Design proposal based on a treatment system and in-situ SAND filter to minimise the land take for the percolation area and maximise the treatment quality of the as disposed effluent. Base of stone pad under SAND filter below 900mm. Filter will be finished flush with ground level once complete - see design sketch to follow.

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

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{Ts} = T_f / T_m$	T – Value = 4.45 / K_{Ts}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)		0.00	

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{Ts} = T_f / T_m$	T – Value = 4.45 / K_{Ts}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)		0.00	

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{Ts} = T_f / T_m$	T – Value = 4.45 / K_{Ts}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_3)		0.00	

Result of Test: Subsurface Percolation Value = 0.00 (min/25 mm)

Comments:

3.3(b) Surface Percolation Test for Soil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)			
Depth from ground surface to base of hole (mm)			
Depth of hole (mm)	0	0	0
Dimensions of hole [length x breadth (mm)]	x	x	x

Step 2: Pre-Soaking Test Holes

Pre-soak start	Date			
	Time			
2nd pre-soak start	Date			
	Time			

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

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 Surface Percolation 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: Surface Percolation Value = 0.00 (min/25 mm)

Comments:

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

Percolation Test Hole No.	1					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No.	2					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Percolation Test Hole No.	3					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Result of Test: Surface Percolation Value = 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, subsoil, bedrock.
3. North point should always be included.
4. (a) Scaled 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. Site specific cross sectional drawing of the site and the proposed layout[1] should be submitted.
6. Photographs of the trial hole, test holes and site including landmarks (date and time referenced).
7. Pumped design must be designed by a suitably qualified person.

[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.

Slope of proposed infiltration / treatment area: 1.20

Are all minimum separation distances met? ✓

Depth of unsaturated soil and/or subsoil beneath invert of gravel (or drip tubing in the case of drip dispersal system) 0.90

Percolation test result: Surface: Sub-surface: 16.50

Not Suitable for Development ☐ **Suitable for Development** ✓

Identify all suitable options

1. Septic tank system (septic tank and percolation area) **(Chapter 7)** ☐
2. Secondary Treatment System **(Chapters 8 and 9)** and soil polishing filter **(Section 10.1)** Yes
3. Tertiary Treatment System and Infiltration / treatment area **(Section 10.2)** Yes

Discharge Route [1]

Groundwaters - Propose to install a Tricel Novo P6 pumped treatment system OR similar EN approved treatment system followed by an in-situ tertiary SAND filter.

See full design spec to follow.

5.0 SELECTED DWWTS

Propose to install: Tertiary Treatment System and Infiltration /treatment area

and discharge to: Ground Water

Invert level of the trench/bed gravel or drip tubing (m) 0.90

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

- Propose to install a Tricel Novo pumped wastewater treatment system with pumped discharge into a subsurface in-situ packaged tertiary filtration system Sandcel 15m2 from Tricel.
- The sandcel filter will be cited on a 22.5sq mt stone pad 250-300mm thick at a depth of 900mm below ground level to the top of the stone layer.
- The tertiary filter stone pad must extend for a minimum of 1 meter on all sides of the proposed SANDCEL unit on site 36mt sq to be speced by MKES Ltd in this instance.
- The installation of the tank and polishing filter should be supervised by a suitably qualified environmental engineer as listed on the list of Registered Agents with South Dublin County Council. This condition should be enforced on any subsequent planning grant.
- The Tricel system to be installed on site has an overall capacity of 4 cubic meters with a large primary settlement chamber reducing the de-sludging frequencies. SEE SITE SPECIFIC TERTIARY FILTER DRAWING ATTACHED.

[1] 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 2.4.

6.0 TREATMENT SYSTEM DETAILS

SYSTEM TYPE: Septic Tank Systems (Chapter 7)

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 (Chapters 8 and 9) and polishing filter (Section 10.1)

Secondary Treatment Systems receiving septic tank effluent (Chapter 8)

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

Packaged Secondary Treatment Systems receiving raw wastewater (Chapter 9)

Type: Tricel Novo P6 or SIMILAR

Capacity PE: 6

Sizing of Primary Compartment: 2.40 m^3

Polishing Filter*: (Section 10.1)

Surface Area (m^2)*

Option 1 - Direct Discharge
Surface area (m^2)

Option 2 - Pumped Discharge
Surface area (m^2)

Option 3 - Gravity Discharge
Trench length (m)

Option 4 - Low Pressure
Pipe Distribution
Trench length (m)

Option 5 - Drip Dispersal
Surface area (m^2)

SYSTEM TYPE: Tertiary Treatment System and infiltration / treatment area (Section 10.2)

Identify purpose of tertiary treatment	Provide performance information demonstrating system will provide required treatment levels	Provide design information
SANDCEL 900l = 6pe unit sized at 15mts sq. To ensure a high standard of effluent treatment and a smaller footprint polishing filter. Excellent depths of well drained subsoil on site.	See Tricel and SANDCEL EN cert attached.	T16.5 x PE (6) x 3.5mt sq / person = Stone pad as per table 10.1 Pg. 62 EPA CoP is 22.5mts sq (min) 36sq mts needed as per Tricel spec. SANDCEL will be fully below ground as per the recommendations outlined above.

DISCHARGE ROUTE:

Groundwater	✓	Hydraulic Loading Rate * ($l/m^2.d$)	60.00	Surface area (m^2)	22.50
Surface Water **		Discharge Rate (m^3/hr)			

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

** Water Pollution Act discharge licence required

6.0 TREATMENT SYSTEM DETAILS

QUALITY ASSURANCE:

Installation & Commissioning

The tank will be installed in accordance with the recommendations made by Tricel and MK Environmental Solutions Limited. MKES or similar approved engineer will be on site during installation to supervise the construction of the tertiary filtration system.

Note: Approved stone pad as per EPA CoP 2021 must be a minimum of 22.5mt sq - based on the Tricel specs using the SANDCEL 900 (6 PE) the minimum stone pad size must be 36mt sq.

On-going Maintenance

Maintenance by Tricel approved service engineer. A maintenance contract is required annually after for a period decided by the Local Authority.

7.0 SITE ASSESSOR DETAILS

Company: MK Environmental Solutions Ltd

Prefix: Mr First Name: Michael Surname: Kehoe

Address: Ballingale, Ferns, Enniscorthy, Co. Wexford.

Qualifications/Experience: Bsc Env. Mgmt (Hons)

Date of Report: 28-Jun-2021

Phone: 086-3364102 E-mail michaelmkes@gmail.com

Indemnity Insurance Number: PI/D/12390/20/1

Signature: Michael Kehoe MK June 2021.

POLICY NUMBER:	PI/D/12390/20/1
SECURITY PROVIDED BY:	ARB facility with Chaucer Insurance Co. DAC t/a Chaucer Dublin
THE INSURED:	MK Environmental Solutions Ltd.
ADDRESS OF THE INSURED:	Ballingale, Ferns, Enniscorthy, Co.Wexford.
BUSINESS DESCRIPTION:	On site waste water treatment design & installation, percolation testing and as described in the proposal form dated 20/10/20.
PERIOD OF INSURANCE:	11/11/20 to 10/11/21, both dates inclusive
LIMIT OF INDEMNITY:	€1,000,000 any one claim, defence costs in addition
EXCESS:	€1,000 each and every claim. The excess does not apply to defence costs
RETROACTIVE DATE:	11/11/2005
JURISDICTION:	Ireland/UK/IOM/EU
TERRITORIAL LIMITS:	Worldwide excluding USA/Canada
WORDING:	ARB D&C1 AOC
CONDITIONS/ ENDORSEMENTS:	ENDT02 – Consultants professional indemnity requirement equivalent to limit of indemnity, the wording of which is attached.
PROPOSAL FORM DATE:	20/10/20

p.e. kelly insurances ltd.

slaney place,
enniscorthy,
co. wexford.
Y21 F6K0

telephone:
+353 (0) 53 92 35440

email:
info@pekelly.com

website:
www.pekelly.com

- liability risks
- manufacturing risks
- industrial risks
- commercial risks
- shops
- offices
- public houses
- private motor
- commercial motor
- motor fleet
- house
- farm
- travel
- professional indemnity
- claims management

providing solutions
for your insurance
needs since 1985

DUBLIN INSTITUTE of TECHNOLOGY · INSTITIÚID TEICNEOLAÍOCHTA ÁTHA CLIATH ·

D·I·T

In the exercise of its statutory powers and on the recommendation of the Academic Council, the Institute has conferred the degree of

BACHELOR OF SCIENCE (ENVIRONMENTAL MANAGEMENT)

Second Class Honours, Upper Division

on

Michael Kehoe

Mar fheidhmiú ar a cumhachtaí reachtúla agus ar mholadh na Comhairle Acadúla, tá an Institiúid tar éis an chéim seo a bhronnadh ar an duine thuasluaite

I bhfianaise air sin cuireadh séala na hInstitiúide ar an bpár seo

In witness whereof the seal of the Institute is impressed upon this parchment

President / Uachtarán

Director / Stiúrthóir

FETAC
Further Education and Training Awards Council
Comhairle na nDámhachtaini Breisoideachais agus Oiliúna

National Skills Certificate

(FÁS)

Awarded to
Bronnta ar

Michael Kehoe

who has achieved the National Standards for
a bhain Caighdeáin Náisiúnta amach maidir le

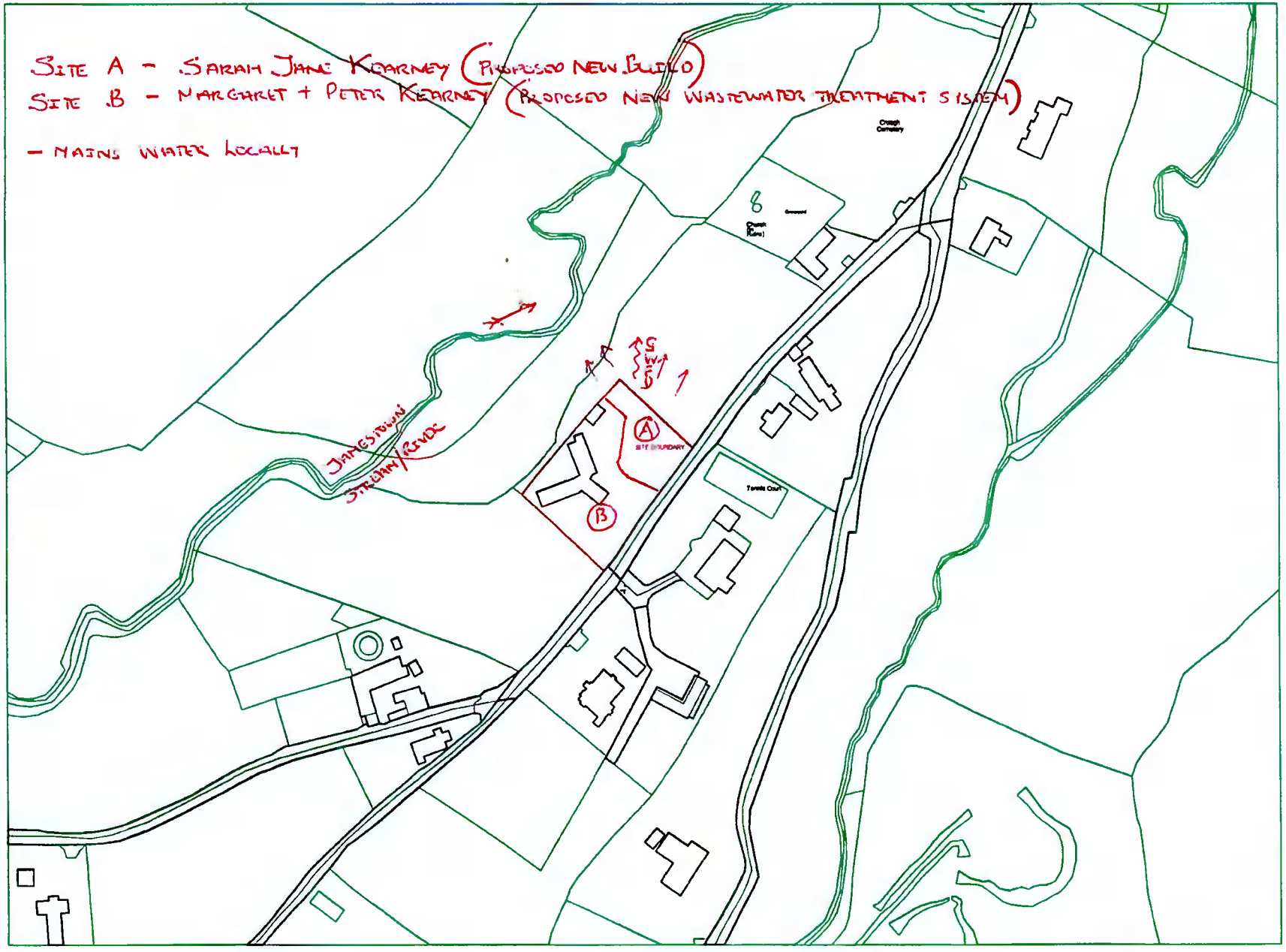
Site Suitability Assessment

Awarded on:04/07/2005 722383

Chair, FETAC

Chief Executive, FETAC

EF039044



Proposed Development at Crough Lane
Sarah-Jane Kearney
SITE LOCATION MAP 1:2,500

Description:
Digital Cartographic Model (DCM)

Publisher / Source
Ordnance Survey Ireland (OSi)

Data Source / Reference:
PRIME2

File Format:
Autodesk AutoCAD (DWG_R2013)

File Name:
v_50156345_1.dwg

Clip Extent / Area of Interest (AOI):
LLX,LLY= 712967.5,724028.0
LRX,LRY= 713550.5,724028.0
ULX,ULY= 712967.5,724458.0
URX,URY= 713550.5,724458.0

Projection / Spatial Reference:
Projection= IRENET95_Irish_Transverse_Mercator

Centre Point Coordinates:
X,Y= 713259.0,724243.0

Reference Index:
Map Series | Map Sheets
1:2,500 | 3454-C

Data Extraction Date:
Date= 19-Nov-2020

Source Data Release:
DCLMS Release V1.134.111

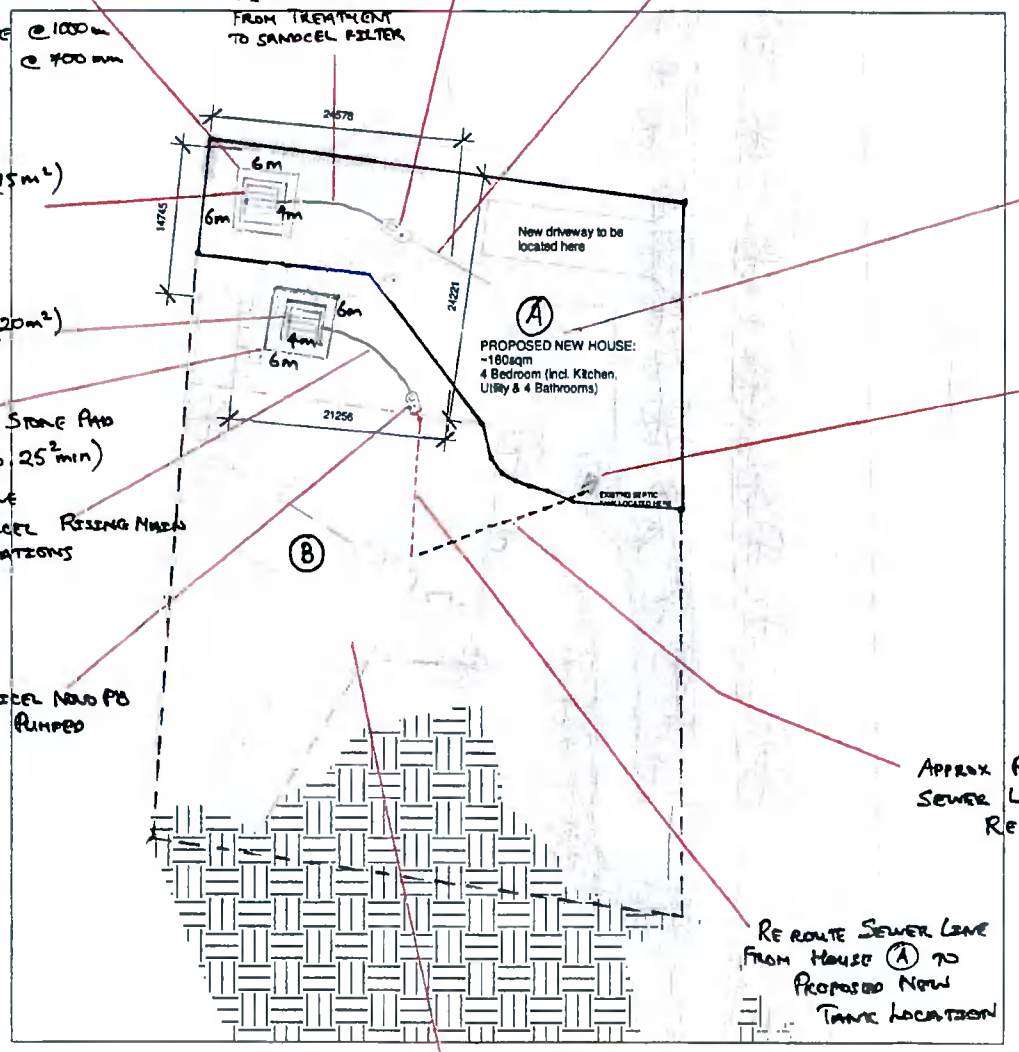
Product Version:
Version= 1.3

TABLE 10.1 EPA CoP 2021
Pg62 (T<20)(PE 6) = 3.75m²/person
= 22.5 (min) Tricel Spec
Requires 36m² 6 x 6
Stone Pad
Bottom of Stone @1000mm
Top of Stone @ 900mm
BGL

TRICEL NOVO PB PUMPED

1:60 FALL ON NEW PIPEWORK AROUND THE HOUSE - TANK LOCATION >7 MTS (MIN)

1½ RISING MAIN FROM TREATMENT TO SANDCEL FILTER



SANDCEL 900 (15m²) SYSTEM

SANDCEL 1200 (20m²) SYSTEM

(T<20)(PE 6) STONE PAD MIN SIZE *(26.25² min)

36m² STONE PAD AS PER TRICEL RISING MAIN SPECIFICATIONS

TRICEL NOVO PB PUMPED

PROPOSED NEW DWELLING FOOTPRINT

DECOMMISSION + FILL THE OLD SEPTIC TANK SERVING DWELLING MARKED (B) EXISTING FAMILY DWELLING

APPROX ROUTE OF THE OLD SEWER LINE TO BE MADE REDUNDENT

RE ROUTE SEWER LINE FROM HOUSE (A) TO PROPOSED NEW TANK LOCATION

EXISTING 5 BED FAMILY HOUSE ON SITE

d x b _ Dublin + London
contact@dxb.ie
Seosamh Ó Maonaigh RIAI/RIBA
DXB
41 Nutgrove Park
Rathfarnham
Dublin D14 X625

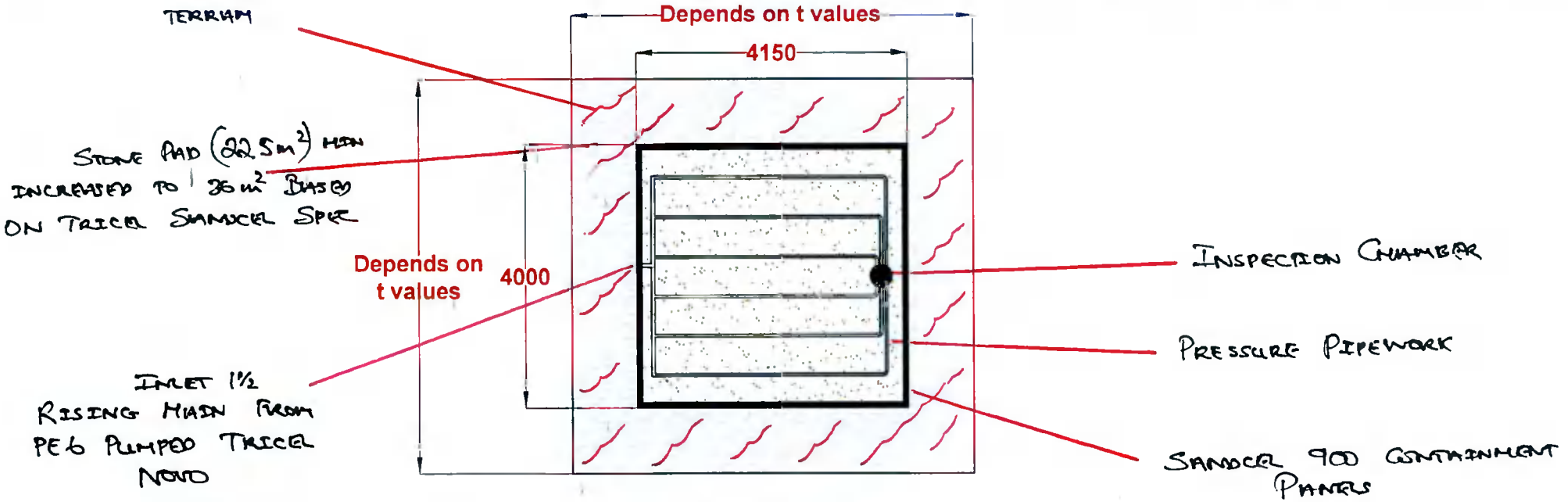
Project	SKCR_New build House
Address	Cruagh Lane
Client	Sarah-Jane Kearney &
Drawn By	Author
Date	28-03-2021

Status	Planning st.3
Scale	1 : 500 @A1
Drawing	Site Plan - percolation area
drawing number	203

Sarah Jane Kearney

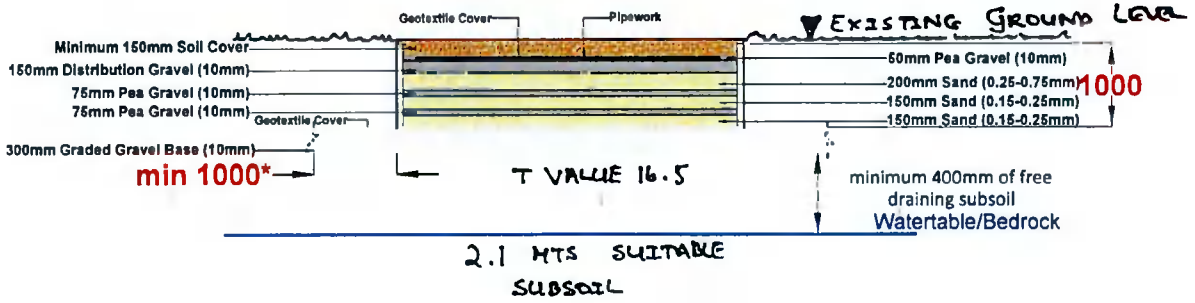
SITE SPECIFIC: Cruagh Lane, Rockbrook, Rath farnham, Dublin

PLAN:



*Gravel base should be minimum 1m longer and wider than the Sandcel on all sides i.e. 6000 x 6150

SECTION VIEW:



	BY	DATE	PRODUCT NAME:	WEIGHT:	SCALE	PART NO:	SIZE
DRAWN:	TH	15/11/2018	SANDCEL 900L		NOT TO SCALE	221725A	N/A
TOLERANCE:	+/-5		COUNTRY: IRELAND		REV. NO. 00.00		
MATERIAL:	GRP		UNITS: MILLIMETERS		TANK REVISION:	DRWG NO:	

TRICEL (KILLARNEY) UNLIMITED COMPANY RESERVES THE RIGHT TO CHANGE THE SPECIFICATION WITHOUT PRIOR NOTIFICATION. PRINTED COPIES OF THIS DOCUMENT ARE UNCONTROLLED UNLESS STATED OTHERWISE

ISSUE DATE:: 5/12/18

TRICEL

Tricel Site Recommendation Report
Tricel Novo Package Plant and Sandcel Sand Polishing Filter

TRICEL

Date	28/06/2021
Report No:	SA4_D_9521
Client Name	Sarah Jane Kearney
Site Location & Townland	Cruagh Lane, Rockbrook, Rathfarnham, Dublin Tel: 0863364102 | Email: michaelmkes@gmail.com

Thank you for choosing Tricel for your wastewater treatment requirements. This report contains the following information for your site and is based on a population of 6 and a P/T value of between 3-20.

Please see outlined below the accompanying documents:

Section 1: Information on the Tricel Novo Package Plant

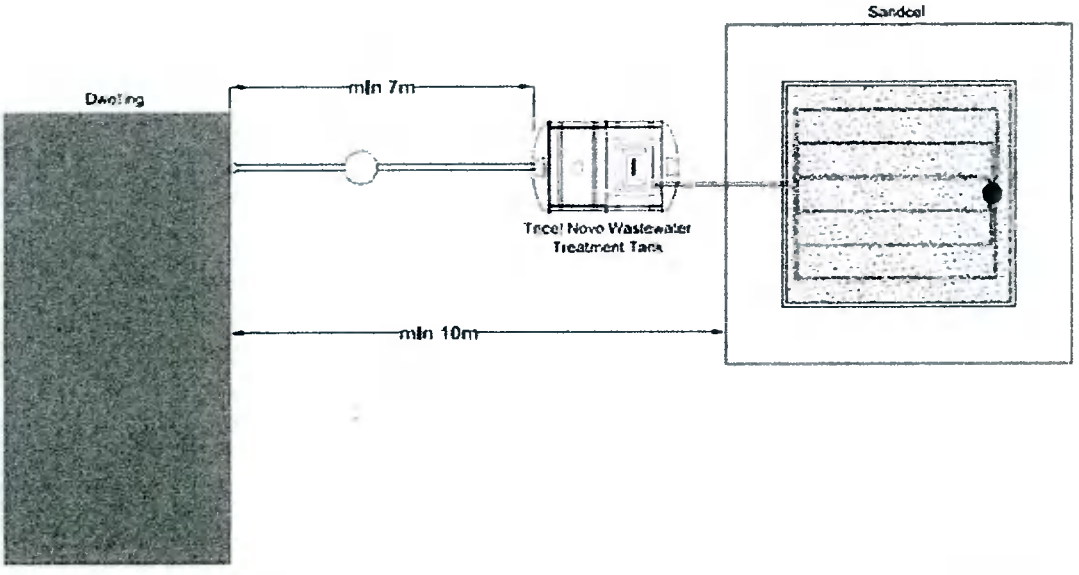
- Manufacturers report and sizing of the Tricel Novo Package Plant
- Drawing of the Tricel Novo Package Plant
- Certification of the selected Tricel Novo Package Plant
- Technical information on the Tricel Novo Package Plant
- Pump selection and technical data
- Optional Novo maintenance agreement

Section 2: Information on the percolation area

- Separation Distances
- Sandcel Sand Polishing Filter drawing
- Sandcel Technical Specification
- Optional Sandcel Maintenance Agreement
- Technical information on the Sandcel sand polishing filter

Based on the information provided to us, using SR66 and the EPA Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. ≤ 10), the appropriate solution for treating wastewater on your site is a Tricel Novo wastewater treatment plant followed by a Sandcel sand polishing filter. The Tricel Novo provides secondary treatment using submerged aeration filter technology. The Sandcel sand polishing filter, providing tertiary treatment, consists of a series of pipe work designed to distribute the effluent for treatment over stratified layers of certified sands according to the EPA Code of Practice. They are enclosed in GRP impermeable panels which will not rot or decay, ensuring the structure of the filter will hold for many years. These filters can be installed in above or below ground applications with all pipe work accessible from a service pod.

Typical layout of a Tricel Novo Package Plant and Sandcel Sand Polishing Filter:



For your site we recommend a Tricel Novo IRL6+ wastewater treatment plant which is designed to treat a maximum of 900 litres of wastewater per day. This recommendation is based on the EPA Code of Practice which states the plant selection should be based on a hydraulic loading of 150l/per person /per day. The Novo IRL6+ has a capacity of 4000 litres, of which 2400 are in the primary chamber, this ensures a long desludging interval. The Tricel Novo range of wastewater treatment plants is fully in conformance with EN12566-3 and complies with SR66.

The Tricel Novo pumped plant contains a DOMO 15 pump based on an the Length of Rising Main 25.0 metres and Difference in Height of Rising Main 2.0 metres. The plant outlet is fitted with a 38mm compression fitting for connection to a rising main of 38mm internal bore pipework. Details and pump specifications are contained in Section 1.

The proposed solution for the tertiary treatment on the site is a Sandcel 900, a 15m^2 sand polishing filter. This is designed to treat the hydraulic load from a Tricel Novo IRL6+ plant. The size of the Sandcel is based on the EPA Code of practice which recommends a maximum hydraulic loading rate of 60l/m2/d.

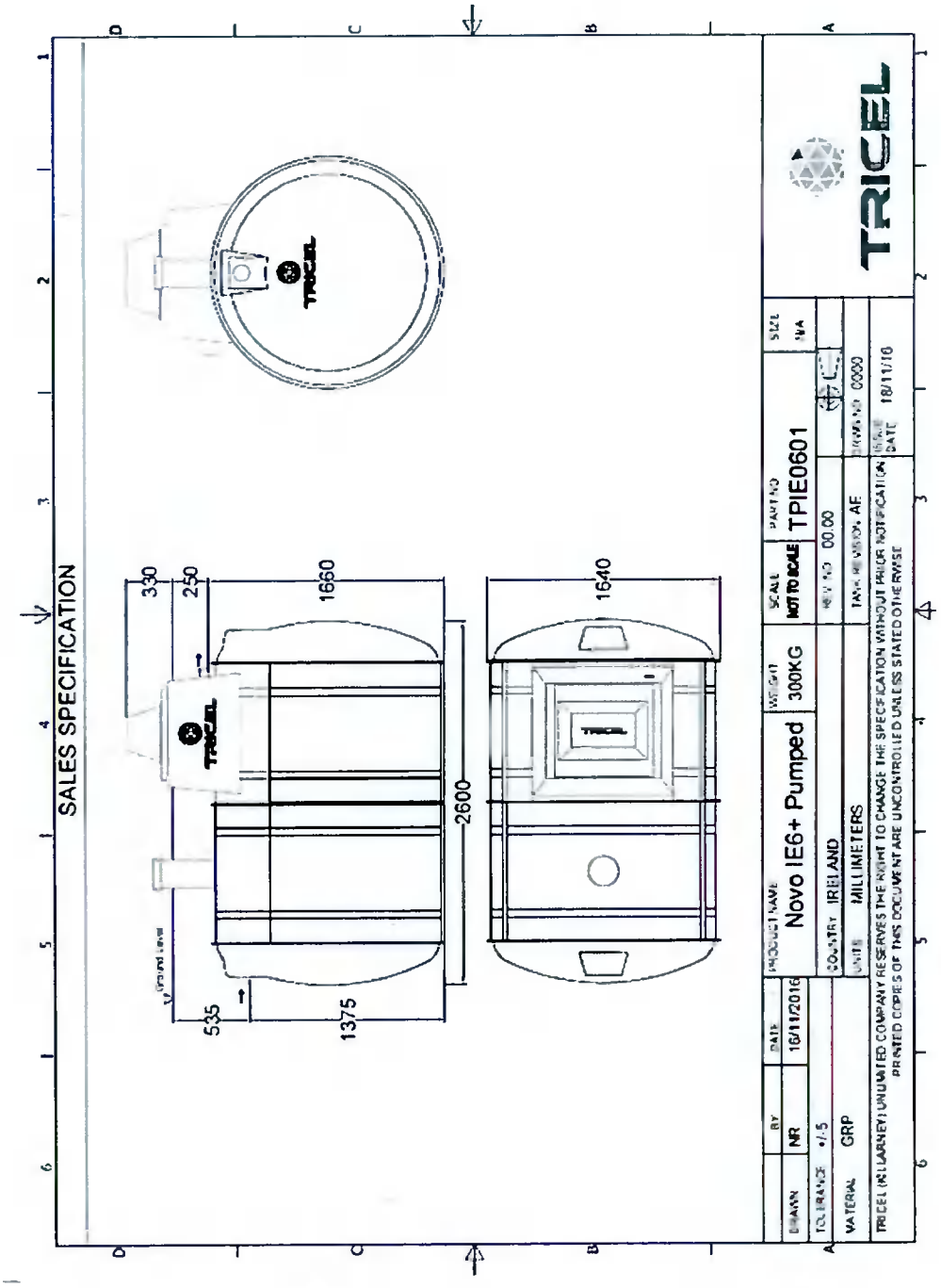
Note:

In the above named site, a substitute wastewater treatment system may not be put in place of the Tricel wastewater treatment system.

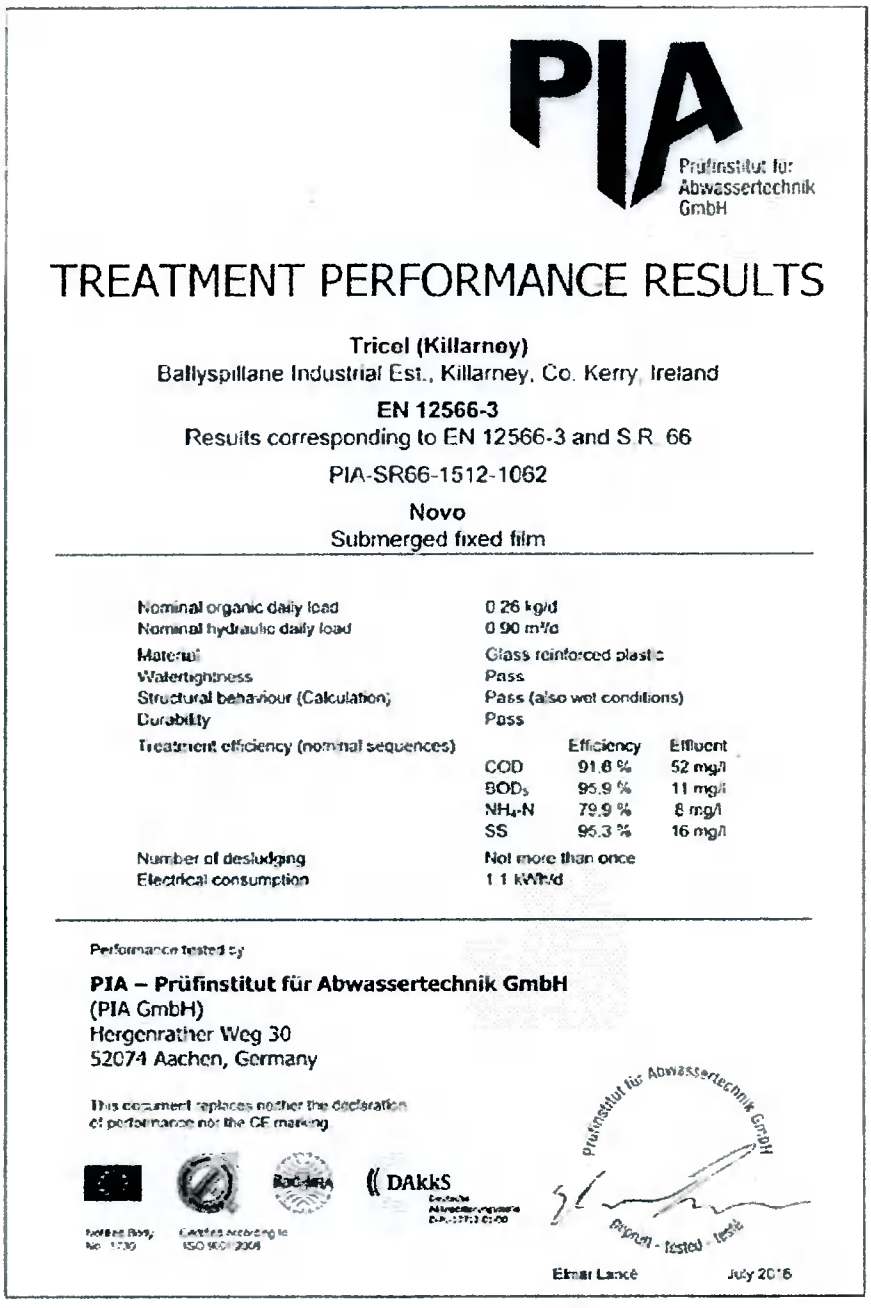
This recommendation only applies to the above named site based on the information supplied to Tricel. A Site Characterisation Form should accompany this report. Tricel cannot be responsible for misinformation due to misleading information being received by us from clients.

Please see attached the accompanying documents in Section 1 for the Tricel Novo wastewater treatment plant and Section 2 for the percolation area.

Section 1


SALES SPECIFICATION
330
250
1660
1640
2600
535
1375
Novo IE6+ Pumped
300KG
TPIE0601
IRELAND
MILLIMETERS
GRP
TRICEL

Certificate in accordance with SR66 for EN12566-Part 3



PIA
Prüfinstitut für Abwassertechnik GmbH

TREATMENT PERFORMANCE RESULTS

Tricel (Killarney)
Ballyspillane Industrial Est., Killarney, Co. Kerry, Ireland

EN 12566-3
Results corresponding to EN 12566-3 and S.R. 66

PIA-SR66-1512-1062

Novo
Submerged fixed film

Nominal organic daily load	0.26 kg/d		
Nominal hydraulic daily load	0.90 m³/d		
Material	Glass reinforced plastic		
Watertightness	Pass		
Structural behaviour (Calculation)	Pass (also wet conditions)		
Durability	Pass		
Treatment efficiency (nominal sequences)		Efficiency	Effluent
	COD	91.6 %	52 mg/l
	BOD_5	95.9 %	11 mg/l
	NH_4-N	79.9 %	8 mg/l
	SS	95.3 %	16 mg/l
Number of desludging	Not more than once		
Electrical consumption	1.1 kWh/d		

Performance tested by

PIA – Prüfinstitut für Abwassertechnik GmbH
(PIA GmbH)
Hergenrather Weg 30
52074 Aachen, Germany

This document replaces neither the declaration of performance nor the CE marking.

DAkkS

Prüfinstitut für Abwassertechnik GmbH
Aachen - tested - tested

Elmar Lancé July 2016

The Sandcel is available in 2 options:

- As a complete supply and fit product including a detailed report containing photographic evidence of works carried out, certification of sands used, testing of pipe network and sign off by a certified engineer.
- As a kit comprising of components and assembly instruction.

The Sandcel comprises of three layers, an upper layer of coarse sand and two lower layers of fine sand separated from each other by a thin layer of gravel as per **Fig. 1.0.**

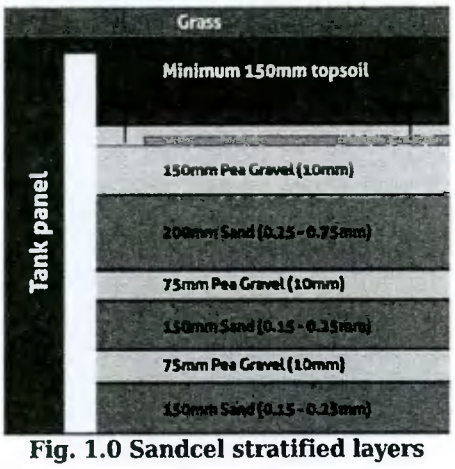


Fig. 1.0 Sandcel stratified layers

The sands used throughout are provided with certification to ensure compliance with the EPA Code of Practice. This washed and graded sands ensure little or no binding of sand particles during use. A sample copy of the certs are contained in Fig 2.0

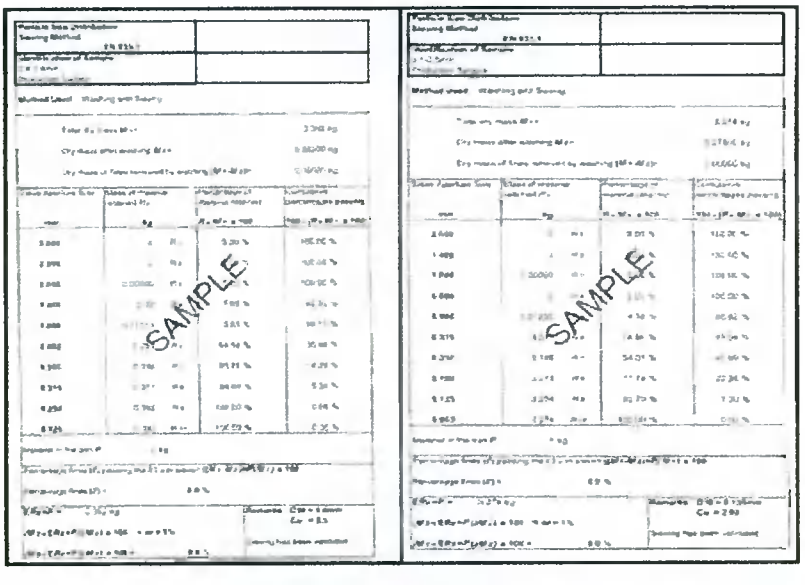


Fig 2.0 Examples of sand grading certificates supplied with Sandcel

The Sandcel must be placed on a gravel distribution bed to disperse the treated effluent. As outlined below in table 10.1 option 6 the area required per person of this distribution bed is dependent on the Subsurface value of the receiving subsoil. It is compulsory that the percolation test is carried out at the infiltration level which is located at the base of the proposed Sandcel. This distribution bed should comprise of a 300mm layer of 10mm pea gravel as in Fig 3.0.

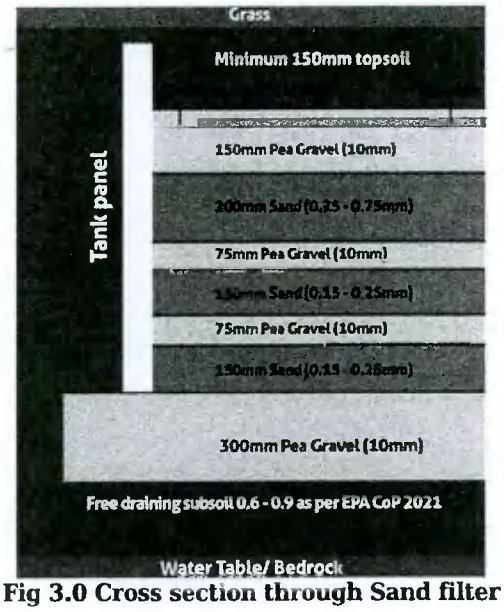


Fig 3.0 Cross section through Sand filter

Critical to the life of the sand filter is the impermeable liner as dictated in the EPA CoP.
Tricel use a unique panel liner manufactured from a hybrid material known as Sheet Moulding Compound, SMC, which is a form of Glass Reinforced Plastic. These panels are used to form a durable, chemically and impact resistant, watertight, long lasting structure.

Table 10.1: Infiltration/treatment area and trench length design for tertiary treatment, per PE

Percolation values (PVs)	Pumped or underlying gravity discharge (Options 1 and 2)	Gravity discharge into 500 mm wide trenches (Option 3)	Low-pressure pipe distribution into 300 mm wide trenches (Option 4)	Drip dispersal system (Option 5)	Tertiary infiltration area (Option 6)
	Area required per person (m^2)	Trench length required per person (m)	Trench length required per person (m)	Area required per person (m^2)	Area required per person (m^2)
3 ≤ PV ≤ 20	≥7.5	≥6	≥6	≥5	≥3.75
21 < PV ≤ 40	≥15	≥12	≥12	≥14	≥7.5
41 < PV ≤ 50	≥30	≥17	≥17	≥16	≥15
51 < PV ≤ 75	≥50	≥19	≥19	≥22	≥25
76 < PV ≤ 90	–	–	≥28	≥34	–
91 < PV ≤ 120	–	–	–	≥54	–

Table 10.1 from EPA CoP 2021 - Loading rates for gravity fed soil polishing filter

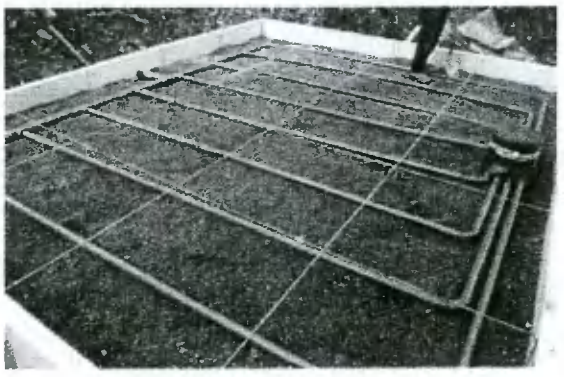


Fig 4.0 Completed pipe network on a Sandcel before placement of final gravel layer

All Sandcel filters have a service pod which is designed to provide access to the complete pipe network. All laterals terminate in the pod and are capped and sealed to maintain the pressure within the network. This ensures access to the pipe network for service and rodding if required.

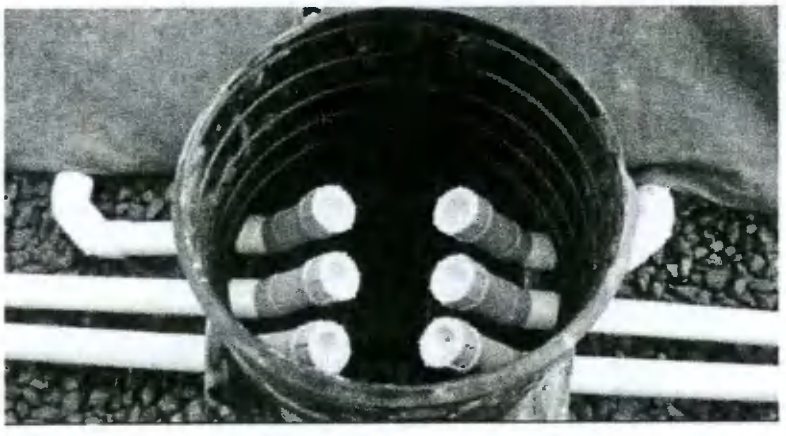


Fig. 5.0 Servicing pod

A layer of geotextile is placed on top of the final layer of gravel to protect the filter from silt being washed down. On this geotextile a layer of topsoil can be placed to blend the entire unit in with its surroundings.

Terms and conditions:

Tricel cannot accept responsibility for incorrect site details or calculations as these are based on user inputs which are outside of Tricel control.
Full terms of website use are available at www.tricelsiteassessor.ie/TermsOfWebsiteUse

POLICY NUMBER:	PI/D/12390/21/1
SECURITY PROVIDED BY:	RL Underwriting facility with Chaucer Insurance Co. DAC t/a Chaucer Dublin
THE INSURED:	MK Environmental Solutions Ltd.
ADDRESS OF THE INSURED:	Ballingale, Ferns, Enniscorthy, Co.Wexford.
BUSINESS DESCRIPTION:	On site waste water treatment design & installation, percolation testing and as described in the proposal form dated 18/10/21.
PERIOD OF INSURANCE:	11/11/21 to 10/11/22, both dates inclusive
LIMIT OF INDEMNITY:	€1,000,000 aggregate any one period of insurance, defence costs included.
EXCESS:	€1,000 each and every claim. The excess apply to defence costs
RETROACTIVE DATE:	11/11/2005
JURISDICTION:	Ireland/UK/IOM/EU
TERRITORIAL LIMITS:	Worldwide excluding USA/Canada
WORDING:	DC AGG 0921 RLU
CONDITIONS/ ENDORSEMENTS:	As per policy/schedule wording

p.e. kelly insurances ltd.

slaney place,
enniscorthy,
co. wexford.
Y21 F6K0

telephone:
+353 (0) 53 92 35440

email:
info@pekelly.com

website:
www.pekelly.com

- liability risks
- manufacturing risks
- industrial risks
- commercial risks
- shops
- offices
- public houses
- private motor
- commercial motor
- motor fleet
- house
- farm
- property owners
- professional indemnity
- claims management

providing solutions
for your insurance
needs since 1985

BROKERS IRELAND

BROKERLINE DIRECT

MK Environmental Solutions Ltd.

Job Description:
Surface water attenuation.

Re: Sarah Jane Kearney – Attenuation design for proposed new domestic dwelling.

Site Location: Cruagh Lane, Cruagh, Rathfarnahm, Dublin 16.

Surface Water Attenuation Proposals:

Having reviewed the proposed planning application and the results of the percolation tests done in May 2021, which deemed the site suitable for groundwater discharge of treated wastewater into the soil and subsoil on site, now find attached a detailed set of simple recommendations for surface water attenuation and disposal.

Given the results of the percolation tests and information gathered during the trial pit assessment, MKES Ltd recommends that a number of standard soak-away areas be located on site. The trial pit showed a free draining gravelly sand based material in the subsoil, if the soak-pits are constructed on top of this free draining material there will be no issue with drainage as all clean water will discharge directly to ground through the stone filled pits.

In terms of construction MKES Ltd recommends that at least three separate on site soak pits be located on site. Two should be designed and sized to take storm water runoff from the roof structures of the dwelling on site. Access points should be left for future connections if the properties are ever to be paved, concreted or tarmacademed.

The third soak-pit should be located adjacent to the mouth of the driveway. This pit will be used to catch clean water runoff from the lower half of the driveway by means of a set of heavy duty steel Eco-drains. These drains will span the driveway preventing any discharge of storm water onto the local road thus having no impact on the existing roadside drainage network.

Recommended soak pit construction: Trench style.

These should be constructed as follows:

- Surface area of 4 mts X 1mts to a depth of 2 meters.
- A sheet of teram/geotextile should be wrapped on the bottom and sides of the excavation.
- Clean 2-4 inch stone should then be filled into the excavation below the invert of the storm line.
- The storm line should be T'd down into the stone and T'd up to ground level to provide access for scouring / rodding if required.
- Another fill of clean stone should then be placed on top of the invert pipe.
- The terram / geotextile material should then be wrapped around the top of the soak pit prior to backfilling the area with soil.
- Each soak pit will require between 10-12 tonne of clean stone.
- My client also wishes to install a simple rain-water harvesting tank which can be used for car washing/gardening purposes at various times throughout the year as required – noting this tank is to be fitted with a saran particle filter and outlet pump. An overflow 4inch drain should lead from this 4,000litre chamber to one of the proposed soak-pits on site, ensuring that if the tank fills during periods of excessive heavy rainfall it has an overflow point.

These proposals should be read in conjunction with the site layout map prepared by Mr. Seosamh O'Muircheartaight my client's architect.

Signed: Michael Kehoe

Date: 18th of January 2022.

0863364102 michaelmkes@gmail.com

Bsc Env. Mgmt, Fas Certified Site Suitability Agent, IEI, Member of the IOWA 2010.
MK Environmental Solutions Ltd.

MK Environmental Solutions Ltd.
Ballingale,
Ferns,
Enniscorthy,
Co. Wexford
Y21KX39.

18/01/2022

To whom it may concern,

The attached site suitability report has been produced to allow for my client Ms. Sarah Jane Kearney apply for planning permission for a new domestic dwelling on part of an existing site (garden area) currently in the ownership of her parent's. The existing site is to be subdivided to allow for this development. MKES Ltd was contracted to undertake a percolation test for the new sewage system location for the proposed dwelling (Sarah Jane Kearney) and to undertake an additional trial hole inspection adjacent to that location for the proposed upgrade and relocation of the existing septic tank on site (Margaret & Peter Kearney).

The existing tank must be relocated and upgraded to allow for the site subdivision and to that end the report to follow outlines identical upgrade proposals for both the proposed new dwelling and the existing domestic dwelling. I can confirm that ground condition's at both test locations are identical with only 10mts or so between to two test areas on site. The map work and sketches in the report show two system locations for approval.

Trusting all in now in order to allow the supervising engineer from South Dublin County Council make an informed decision in due course. If any questions or clarification is needed in relation to the sewage design proposals put forward by MKES Ltd please contact the undersigned at any time.

Kind Regards,

Michael Kehoe

Bsc. Env Mgmt.
0863364102

MK.
ENVIRONMENTAL
SOLUTIONS LIMITED.

Ballingale ,
Ferns,
Enniscorthy,
Co. Wexford.

Phone: 086 3364102

Fax: 053 93 88333

E-mail: michaelmkes@gmail.com

Website: www.mkes.ie

Percolation Testing.

Sewage Installation.
- Supply, Fit, Certify.
- Septic Tanks.
- Treatment Systems.
- Percolation pipes, stone and soil.
- Pressure Kits supplied and fitted.
- New builds and system upgrades.

C2 Registered.

Full Professional Indemnity
Public Liability Insurance.

County Council Registered
Test Agent.

Member of the IOWA & IEI.

Bsc. Env. Mgmt (Hons).

Director:
Michael Kehoe.

VAT NO: IE6430807B -

GRP Sectional Cold Water Storage Tanks

Manufacturing Tanks Since 1973

TRICEL

WATER STORAGE

One Piece Tank Brochure

www.tricel.ie

Many local authorities, consultants, engineers and contractors specify and use our fibreglass insulated F30 tanks, secure in the knowledge that both they and their clients are in safe hands, and helping them meet their health and safety obligations. In order to comply with health and safety directives, which states that water, that may be consumed by humans, must be held in Insulated tanks, and that all tanks must meet the following criteria.

- Factory insulated with CFC Free Foam on all sides
- Fibreglass in construction
- Lids must be sealed and insulated
- Suitable for Potable (drinking) water
- Tanks must have screened inlet and overflows
- Tanks to be insulated to reduce the risk of freezing in winter and assist in keeping the water temperature low in summer time
- Have suitable fibreglass condensation trays, plumbed to an overflow

Also from Tricel (Killarney)

- Sectional water storage tanks
- Custom moulding, access chambers, safety products
- Underground and overground storage tanks
- Tricel Novo - wastewater treatment systems
- Kiosks
- Insulated housings
- Metering cabinets (electrical and gas)

		Non - Insulated			Insulated		
Litres	Gallons	Length	Width	Height	Length	Width	Height
45	10	495	370	345	495	370	345
114	25	1180	505	340	1210	540	350
182	40	1030	510	457	1055	550	480
182	40	670	530	565	700	575	575
227	50	1142	500	465	1240	535	480
318	70	1230	575	584	1240	585	585
454	100	1425	725	585	1448	737	599
454	100	1040	761	766	1040	761	766
682	150	1630	1045	535	1725	1120	535
909	200	1620	1040	685	1725	1120	690
909	200	1243	964	969	1243	964	969
1136	250	1670	1075	845	1725	1120	845
1363	300	1665	1235	845	1690	1270	935
1818	400	2520	1290	610	2520	1390	775
2275	500	1880	1380	1125	1910	1405	1230
2700	600	—	—	—	2030	1500	1290
3637	800	2665	1775	965	2715	1800	1015
4546	1000	2665	1715	1245	2665	1715	1320

Please note: Insulation slows down, but does not prevent heat loss or heat gain, over protracted periods. Additional information is available in BS 7491 & BS 6700.

Doc 10613772

ISO 9001:2015 FDA QUALITY ASSURED COMPANY

TRICEL
GENERATIONS OF INNOVATION

Tricel (Killarney) Unlimited Company, Ballyspillane Industrial Estate, Killarney, Co. Kerry, Ireland.
Tel: +353 (0) 64 6632421 | Email: sales@ie.tricel.eu | www.tricel.ie