

# MK Environmental Solutions Ltd.

*Ballingale,  
Ferns,  
Enniscorthy,  
Co. Wexford.*



*Percolation Test Report*  
*For on-site waste water treatment*

*On behalf of*  
*Carlow County Council.*

*Site @,*  
*Duffery,*  
*Hacketstown,*  
*Co. Carlow.*

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Director: M. Kehoe.

VAS NO: JE6430807B

The following documentation has been produced solely for the purpose of a planning application for a new dwelling @ Duffery, Hacketstown, Co. Carlow and should not be used or copied for any other purpose without the written consent of the author. It is an explicit condition of all work undertaken by MKES and should hereby be acknowledged by the client that MKES has made no warranties or provides no guarantees as to planning permission and no liability for any claims arising from the failure of the site to attract planning permission (should such event occur) or any actions of MKES or its staff in the normal performance of its operations shall attach to MKES.

Date of Report: 02<sup>nd</sup> of August 2021

**SITE PICTURES:**

TRIAL HOLE



SUBSOIL PROFILE.



TRIAL PIT SPOIL.



SOIL SAMPLES



T TEST T1.



T TEST T2



T TEST T3.



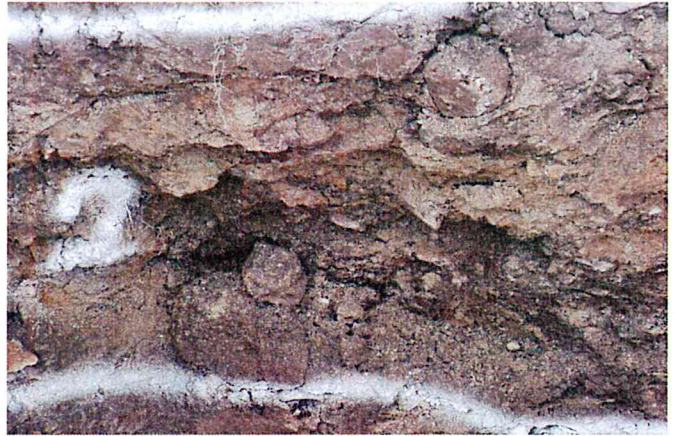
TEST HOLES AS DUG ON SITE.



TOPSOIL –



SUBSOIL NO:2 –



SUBSOIL NO.3



TOPSOIL SAMPLE



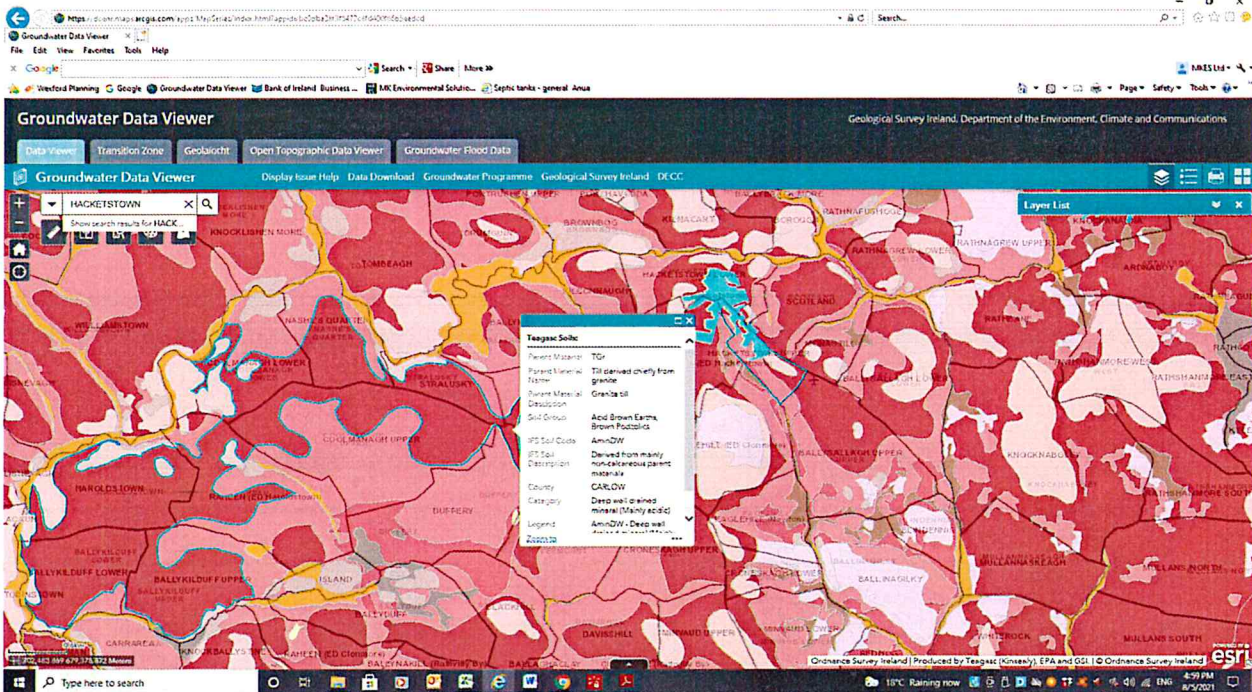
SUBSOIL NO:2 SAMPLE.



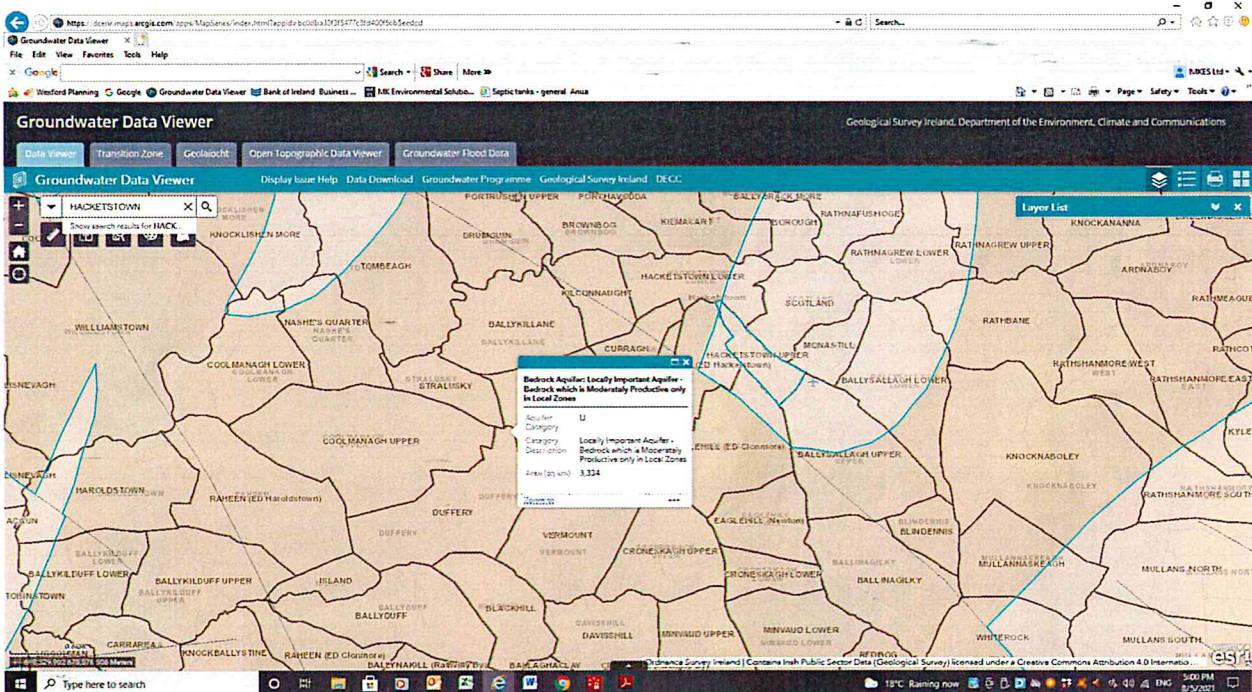
SUBSOIL NO.3 SAMPLE



**Teagasc subsoil map of the site:  
Till derived chiefly from granite, Acid Brown Earths, Brown Podzolics.**

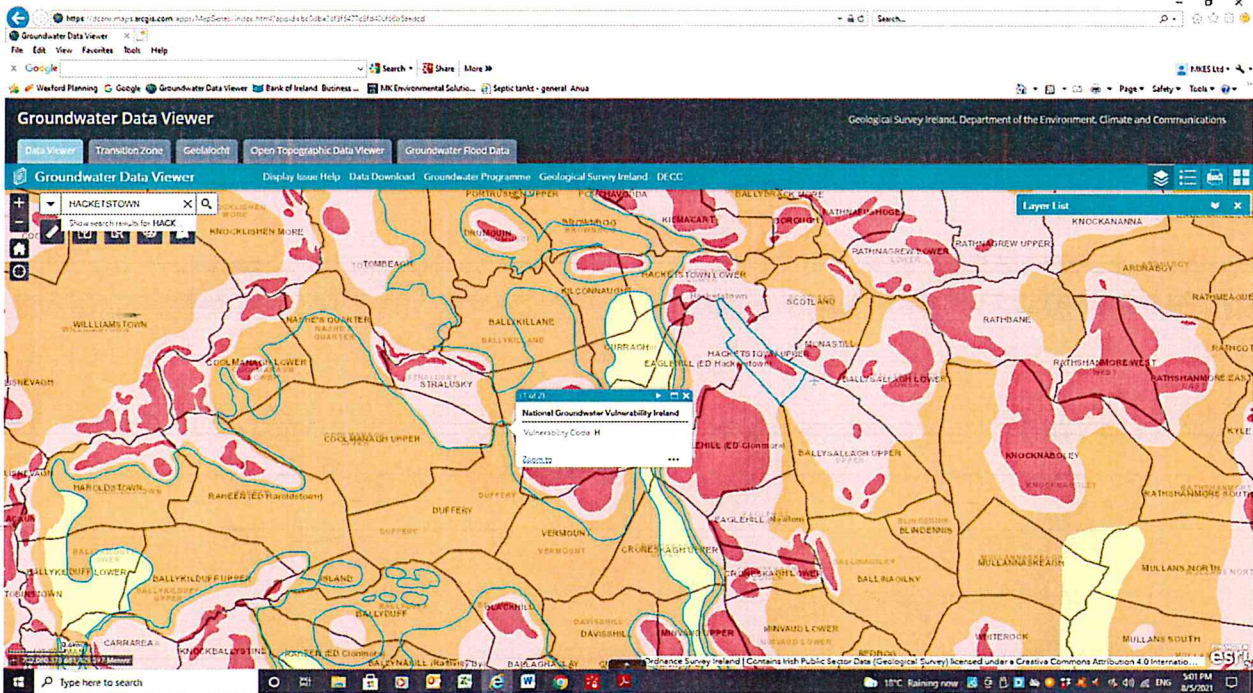


**Aquifer Map of the proposed site: Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones.**

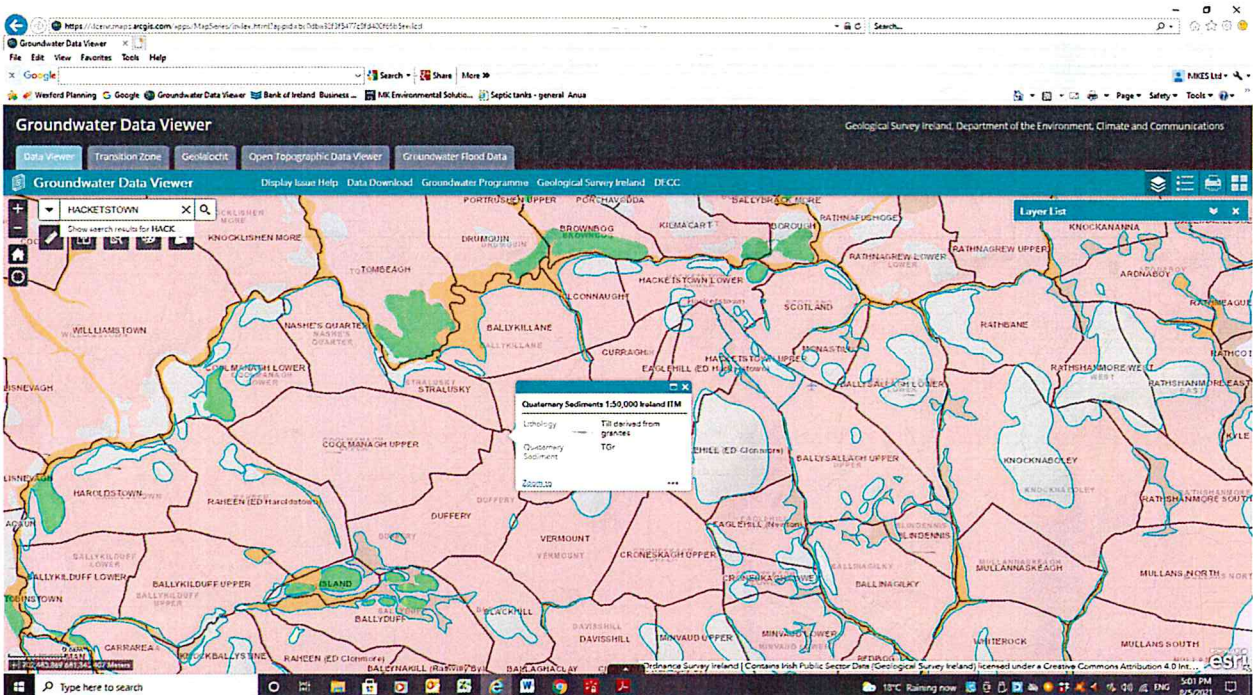


### Vulnerability Map of the proposed site:

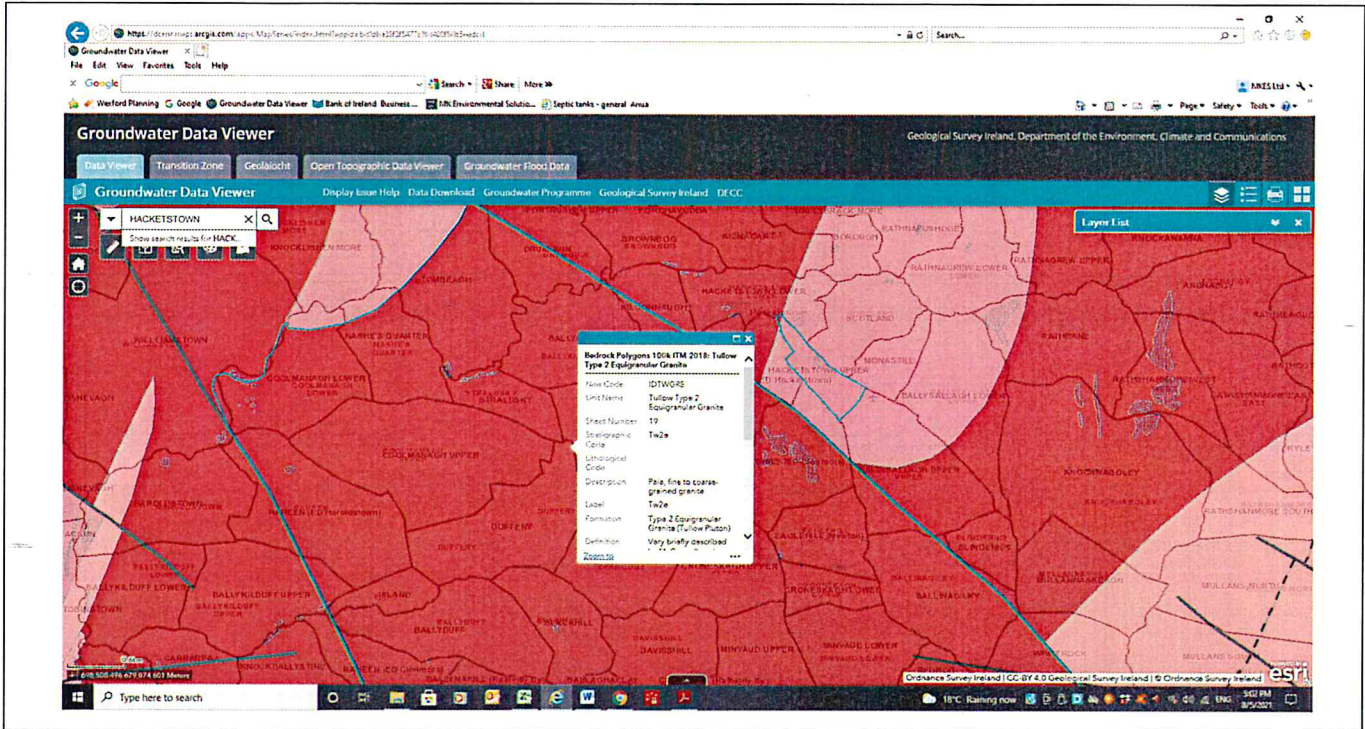
High Vulnerability Rating.



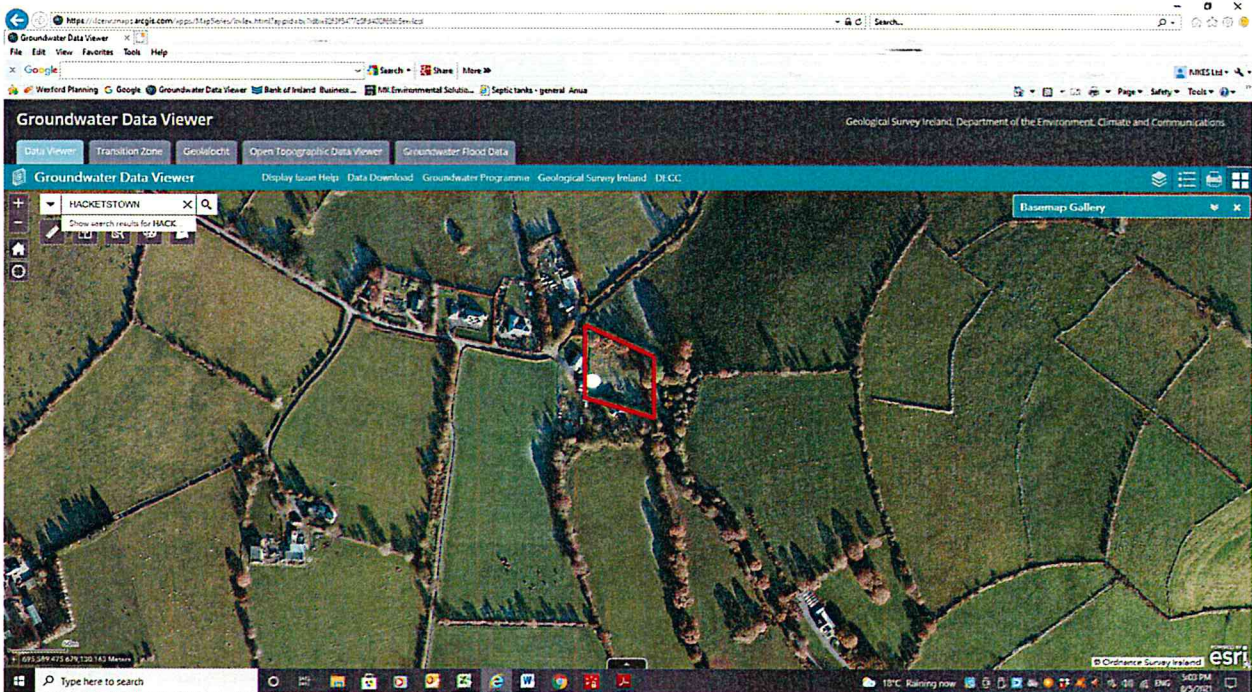
I.G.I.S. Web Browser Subsoil map of the site: - Till derived from granites.



**Bedrock Map of the proposed site: Tullow Type 2 Equigranular Granite, Pale, fine to coarse-grained granite.**



Site Location Map –Site outlined below in red – test area marked 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					
	Inner (SI)	Outer (SO)	Regionally Important		Locally Important		Poor Aquifers	
			Rk	RORg	Lo/Ls	Lj	Pl	Pa
High (H)	R3 <sup>1</sup>	R3 <sup>1</sup>	R2 <sup>1</sup>	R2 <sup>2</sup>	R2 <sup>1</sup>	R2 <sup>2</sup>	R2 <sup>1</sup>	R2 <sup>2</sup>
Moderate (M)	R2 <sup>1</sup>	R2 <sup>2</sup>	R2 <sup>1</sup>	R1	R1	R1	R1	R1
Low (L)	R2 <sup>1</sup>	R1	R1	R1	R1	R1	R1	R1

<sup>1</sup> 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<sup>1</sup>** 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<sup>2</sup>** 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<sup>1</sup> 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<sup>2</sup>** 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<sup>4</sup>** 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<sup>1</sup>** 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);

<sup>1</sup>The T value (expressed as min/25mm) is the time taken for the water level to drop a specified distance in a percolation test hole. For shallow subsoils the test hole requirements are different and hence the test results are called P values. For further advice see page 25 of the EPA Manual (2000)

# APPENDIX A: SITE CHARACTERISATION FORM

File Reference:

## 1.0 GENERAL DETAILS (From planning application)

Prefix:  First Name:  Surname:

Address:   
Site Location and Townland:

Number of Bedrooms:  Maximum Number of Residents:

Comments on population equivalent

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

## 2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type):

Subsoil, (Specify Type):

Bedrock Type:

Aquifer Category: Regionally Important  Locally Important  Poor

Vulnerability: Extreme  High  Moderate  Low

Groundwater Body:  Status

Name of Public/Group Scheme Water Supply within 1 km:

Source Protection Area: ZOC  SI  SO  Groundwater Protection Response:

Presence of Significant Sites (Archaeological, Natural & Historical):

Past experience in the area:   
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 Li aquifer and any streams/wells. Wells & septic tanks/treatment systems locally to be located and marked on the site sketch.

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:

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 map clearly shows the locations of the nearest adjoining dwellings and their sewage system locations - wells locally. The proposed site is an infill plot between two existing dwellings to the West and South. See site map for details.

Existing Land Use:

Disused plot in the ownership of Carlow County Council.

Vegetation Indicators:

None - native field boundary species.

Groundwater Flow Direction:

Ground Condition:

Dry, firm and trafficable.

Site Boundaries:

Road N and E - site on a bend, fence to adjoining houses W and S.

### 3.0 ON-SITE ASSESSMENT

#### 3.1 Visual Assessment (contd.)

Roads:

Local road runs along the N and E boundaries as the site is located on a bend in the local road.

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 - uncommon locally.

Watercourses/Streams:\*

Nearest stream is located >250mts away from the site to the N.

\*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:\*

Spring rises shown on the OS Map to the N >100mts.

Wells:\*

Proposed well on site as clearly marked on the site sketch attached - the other two nearest wells on the adjoining dwellings are also clearly marked on the site sketch attached. All necessary minimum separation distances are achievable. Table 6.2 Pg 28 of the EPA CoP 2021 requires a minimum separation distance of between 30 and 60mts (subject to T values and depth of soil /subsoil) to a down gradient well, in this instance we will have in excess of 45mts with the following additional points of note: a) Proposed tertiary level system to be specified here. b) using a SAND filter over in-situ topsoils will mean in excess of 2 mts of material is available for polishing above the base of the gravel distribution layer. c) As part of the permission a full installation supervision should be conditioned by Carlow Co Co.

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 Sw corner of the proposed site as per site sketch to maximise the separation distance from the down gradient well to the North.

It is almost certain that the best case scenario for the client here is the installation of a secondary treatment system with large raised pressure fed soil polishing filter and or tertiary SAND/COCO/PEAT filter. If this is the case then a full design and spec on this system will be included in the Site Suitability Report to follow.

\*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):

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):

Date and time of excavation:   Date and time of examination:

Depth of Surface and Subsurface Percolation Tests

Depth of Surface and Subsurface Percolation Tests	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
<input type="checkbox"/> 0.1 m	Light loam, with mix of fines <10%.	2 T, R of 50-60mm	Crumb & friable.	Uncompact.	Light brown	Numerous shallow root structures.
<input type="checkbox"/> 0.2 m						
<input type="checkbox"/> 0.3 m						
<input type="checkbox"/> 0.4 m						
<input type="checkbox"/> 0.5 m						
<input type="checkbox"/> 0.6 m	Very deep gravelly Clay with coarse granite sandy till to 1200mm	2 T, R of 65mm.	Friable, granular material.	Uncompact and loose.	Light orange brown	Well drained - no flow paths visible.
<input type="checkbox"/> 0.7 m						
<input type="checkbox"/> 0.8 m						
<input type="checkbox"/> 0.9 m						
<input type="checkbox"/> 1.0 m						
<input type="checkbox"/> 1.1 m	Higher Clay content granite till - very compact and firm with signs of water ingress and perched water at about 1.6mts.	3, 100mm r	Compact and sticky mostly  Tightly bedded.	Dense and compact	Pale yellow	No flow paths.
<input type="checkbox"/> 1.2 m						
<input type="checkbox"/> 1.3 m						
<input type="checkbox"/> 1.4 m						
<input type="checkbox"/> 1.5 m						
<input type="checkbox"/> 1.6 m						
<input type="checkbox"/> 1.7 m						
<input type="checkbox"/> 1.8 m						
<input type="checkbox"/> 1.9 m						
<input type="checkbox"/> 2.0 m						
<input type="checkbox"/> 2.1 m						
<input type="checkbox"/> 2.2 m						
<input type="checkbox"/> 2.3 m						
<input type="checkbox"/> 2.4 m						
<input type="checkbox"/> 2.5 m						
<input type="checkbox"/> 2.6 m						
<input type="checkbox"/> 2.7 m						
<input type="checkbox"/> 2.8 m						
<input type="checkbox"/> 2.9 m						
<input type="checkbox"/> 3.0 m						
<input type="checkbox"/> 3.1 m						
<input type="checkbox"/> 3.2 m						
<input type="checkbox"/> 3.3 m						
<input type="checkbox"/> 3.4 m						
<input type="checkbox"/> 3.5 m						

Likely Subsurface Percolation Value:

Likely Surface Percolation Value:

**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. 1200mm of well drained soil and shallow subsoil which is suitable for hydraulic dispersal of effluent. Insufficient depths of subsoil for a conventional septic tank/percolation area. Likely that a tertiary level treatment system will be required on site. See full design spec to follow.  
 Presence of a down gradient well means a high end sewage system is required to ensure a smaller footprint and cleaner as discharged effluent to ground.

### 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)	350	300	400
Depth from ground surface to base of hole (mm) (B)	750	700	800
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

Pre-soak start	Date	01-Aug-2021	01-Aug-2021	01-Aug-2021
	Time	10:00	10:00	10:00
2nd pre-soak start	Date	01-Aug-2021	01-Aug-2021	01-Aug-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	02-08-2021	02-08-2021	02-08-2021
Time filled to 400 mm	09:20	09:22	09:24
Time water level at 300 mm	10:38	10:34	10:53
Time (min.) to drop 100 mm ( $T_{100}$ )	78.00	72.00	89.00
Average $T_{100}$			79.67

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		
	Start Time (at 300 mm)	Finish Time (at 200 mm)	$\Delta t$ (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	$\Delta t$ (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	$\Delta t$ (min)
1	10:38	12:01	83.00	09:34	10:58	84.00	10:53	12:38	105.00
2	12:04	13:34	90.00	11:00	12:38	98.00	12:40	14:49	129.00
3	13:35	15:22	107.00	12:40	14:41	121.00	14:50	17:24	154.00
Average $\Delta t$ Value			93.33			101.00			129.33
	Average $\Delta t/4 =$ [Hole No.1] <input type="text" value="23.33"/> ( $t_1$ )			Average $\Delta t/4 =$ [Hole No.2] <input type="text" value="25.25"/> ( $t_2$ )			Average $\Delta t/4 =$ [Hole No.3] <input type="text" value="32.33"/> ( $t_3$ )		

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

**Comments:**

Shallow T value of 27 - Suitable for hydraulic dispersal of tertiary treated effluent. Design proposal based on a treatment system and partially raised SAND filter to minimise the land take for the percolation area and maximise the treatment quality of the as disposed effluent.

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

Percolation Test Hole No.	1					
	Time Factor = $T_f$	Start Time $t_i$ 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 = ( $T_1$ )		<input type="text" value="0.00"/>		

Percolation Test Hole No.	2					
	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 = ( $T_2$ )		<input type="text" value="0.00"/>		

Result of Test: Subsurface Percolation Value =

(min/25 mm)

Percolation Test Hole No.	3					
	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 = ( $T_3$ )		<input type="text" value="0.00"/>		

**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)	$\Delta T$ (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	$\Delta T$ (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	$\Delta T$ (min)
1			0.00			0.00			0.00
2			0.00			0.00			0.00
3			0.00			0.00			0.00
Average $\Delta T$ Value			0.00			0.00			0.00
	Average $\Delta T/4 =$ [Hole No.1] <input type="text" value="0.00"/> ( $T_1$ )			Average $\Delta T/4 =$ [Hole No.2] <input type="text" value="0.00"/> ( $T_2$ )			Average $\Delta T/4 =$ [Hole No.3] <input type="text" value="0.00"/> ( $T_3$ )		

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

Comments:

NOTE T TESTING DONE IN THE TOPSOIL ZONES ON SITE - TOSPOIL TESTS ALL IN THE RANGE 5-20. GRAVEL INVERT @300mm SO AS TESTED ON SITE.

**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 = ( $T_1$ )		<input type="text" value="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 = ( $T_2$ )		<input type="text" value="0.00"/>		

Result of Test: Surface Percolation Value =

(min/25 mm)

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 = ( $T_3$ )		<input type="text" value="0.00"/>		

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<sup>1</sup> 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.

<sup>1</sup> 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: 20.00

Sub-surface: 27.00

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)
3. Tertiary Treatment System and Infiltration / treatment area (Section 10.2)

### Discharge Route <sup>1</sup>

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

See full design spec to follow.

## 5.0 SELECTED DWWTS

Propose to install:

and discharge to:

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

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 raised and engineered packaged tertiary filtration system Sandcel 15m2 from Tricel.
- The sandcel filter will be cited on a 45sq mt stone pad (MINIMUM) 300mm thick at a depth of 300mm below existing ground level.
- The tertiary filter stone pad must extend for a minimum of 1 meter on all sides of the proposed SANDCEL unit on site therefore in accordance with the Tricel specs the stone (45mt sq) will allow for this.
- 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 Carlow County Council. This condition should be enforced on any subsequent planning grant from Carlow County Council.
- 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.

<sup>1</sup> 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 <sup>3</sup> )	<input type="text"/>	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 <sup>2</sup> )*	Depth of Filter	Invert Level
Sand/Soil	<input type="text"/>	<input type="text"/>	<input type="text"/>
Soil	<input type="text"/>	<input type="text"/>	<input type="text"/>
Constructed Wetland	<input type="text"/>	<input type="text"/>	<input type="text"/>
Other	<input type="text"/>	<input type="text"/>	<input type="text"/>

#### Packaged Secondary Treatment Systems receiving raw wastewater (Chapter 9)

Type	<input type="text" value="Tricel Novo P6 or SIMILAR"/>
Capacity PE	<input type="text" value="6"/>
Sizing of Primary Compartment	<input type="text" value="2.40"/> m <sup>3</sup>

#### Polishing Filter\*: (Section 10.1)

Surface Area (m <sup>2</sup> )*	<input type="text"/>	Option 3 - Gravity Discharge	<input type="text"/>
Option 1 - Direct Discharge	<input type="text"/>	Trench length (m)	
Option 2 - Pumped Discharge	<input type="text"/>	Option 4 - Low Pressure	<input type="text"/>
Surface area (m <sup>2</sup> )		Pipe Distribution	
		Trench length (m)	
		Option 5 - Drip Dispersal	<input type="text"/>
		Surface area (m <sup>2</sup> )	

### 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 900I = 6pe unit sized at 15mts sq. To ensure a high standard of effluent treatment and a smaller footprint polishing filter. Limited depths of suitable soil and subsoil on site - distances to an adjoining well.

See Tricel and SANDCEL EN cert attached.

See site specific design spec attached. Table 10.1 Pg 62 - T value range 21-40 - PE 6 = 7.5mt sq / person = 45 mt sq stone pad minimum as per Tricel requirements.

#### DISCHARGE ROUTE:

Groundwater	<input checked="" type="checkbox"/>	Hydraulic Loading Rate * (l/m <sup>2</sup> .d)	<input type="text" value="60.00"/>	Surface area (m <sup>2</sup> )	<input type="text" value="45.00"/>
Surface Water **	<input type="checkbox"/>	Discharge Rate (m <sup>3</sup> /hr)	<input type="text"/>		

\* 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.

#### 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:

Prefix:  First Name:  Surname:

Address:

Qualifications/Experience:

Date of Report:

Phone:  E-mail:

Indemnity Insurance Number:

Signature: Michael Kehoe *CKW* Sept 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



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
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- farm
- travel
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p.e. kelly insurances limited  
is regulated by the Central Bank  
of Ireland

directors:  
p.e. kelly (managing)  
a.m. chapman

Company Registration Number  
420696



**NOTES**

1. This drawing is the property of Carlow County Council. It is a confidential document and must not be copied, reproduced, or disseminated without the consent of the Council.
2. DO NOT SCALE. Use figured dimensions only, if in doubt ask.



Centre Of Site Coordinates  
(ITM)

X=694945  
Y=679010



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No.	Date	Amendment Issue	App.
A	25/07/2015	Planning Stage	LS



**CARLOW COUNTY COUNCIL**  
HOUSING DEPARTMENT  
Director of Services: Michael Brennan  
Tullow Civic Office, River Hill Road, Tullow, Co. Carlow  
Phone: (051) 8715256 Fax: (051) 8715256  
Email: housing@carlowcoco.ie

Carlow Local Authority, a CPTA Accredited Company

**Project:**  
NEW FULLY SERVICED BUNGALOW  
DWELLING AND ALL ASSOCIATED  
SITE WORKS AT CONSTABLE HILL,  
HACKETSTOWN, CO. CARLOW.

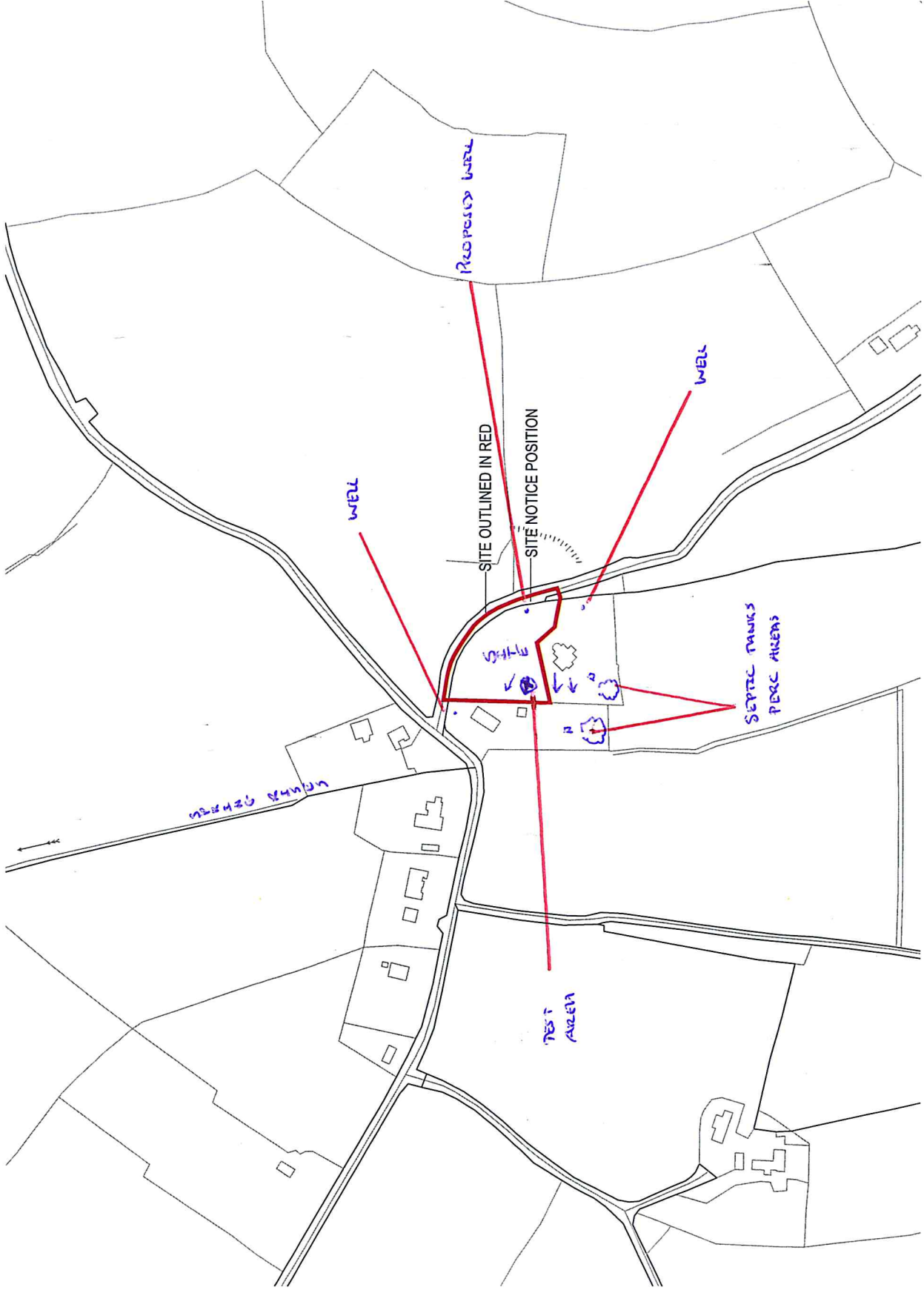
**Title:**

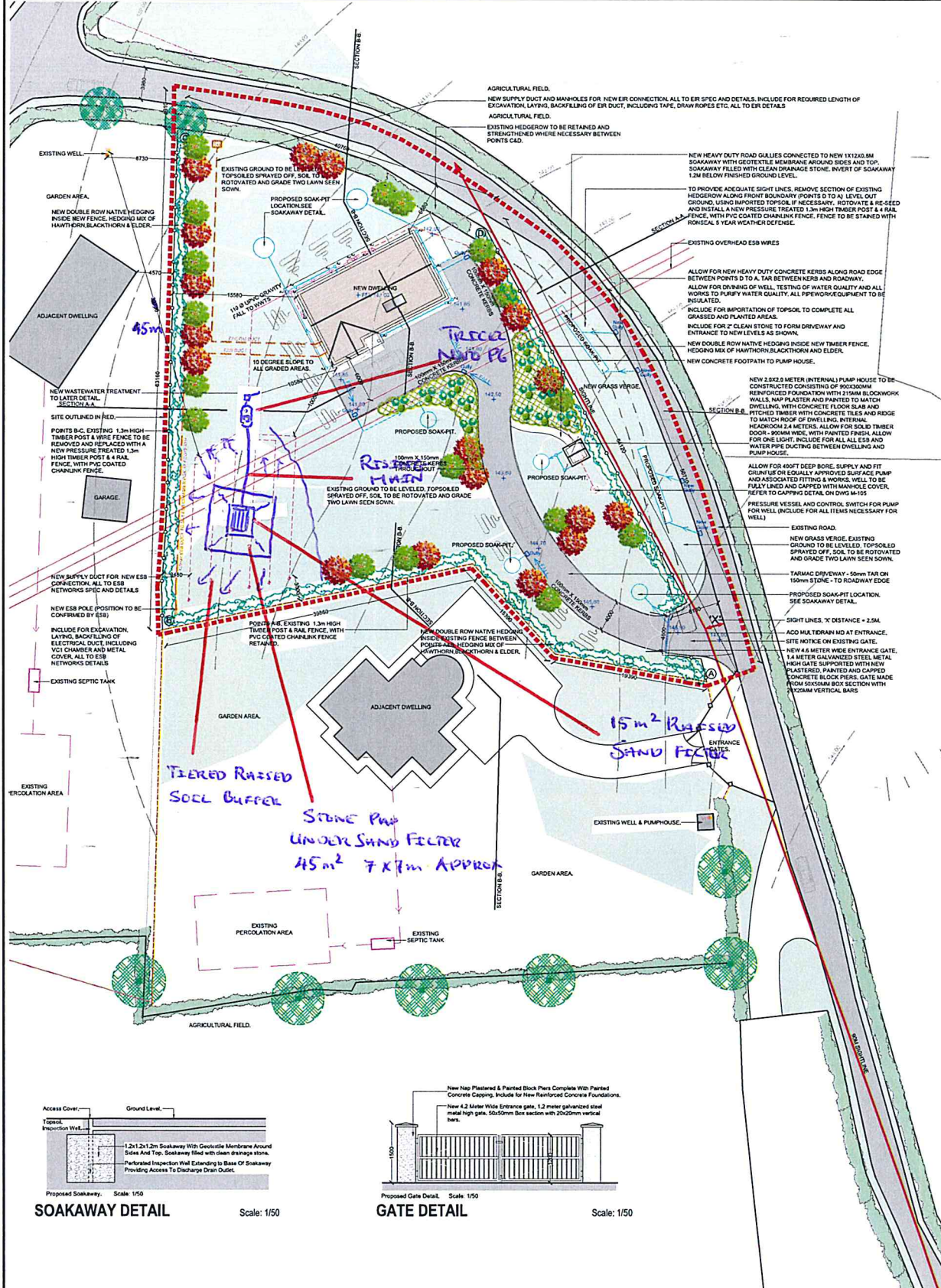
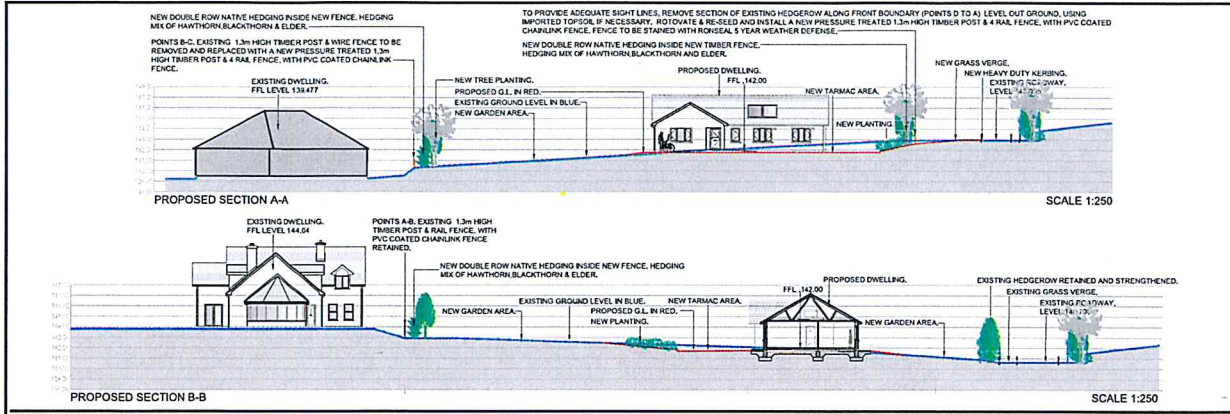
**SITE LOCATION MAP**

Drawn by:	R.S.	Job No:	
Checked by:	L.S.	Rev. Loc:	
Approved by:	LS	Dir. No:	L-101
Scale:	1:2,500 @ A3	Rev:	A
Date:	06/07/2015		

Scale 1:2,500

Site Location Map





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- DO NOT SCALE. Use figured dimensions only, if in doubt ask.

**PROPOSED LEGEND**

- Site Boundary
- Existing Contours
- Existing Levels
- Proposed Levels
- Existing ESB Pole
- Existing ESB Wires
- Proposed ESB Pole
- Proposed 15mm ESB Duct
- 150L ESB Chamber Box
- Existing Telecom Line
- Existing Telecom Pole
- New Telecom Manhole
- Proposed EIR/Telecom Duct
- Proposed Surface Water Pipes
- Proposed Surface Water Cully
- Proposed Surface Water A.I.
- Proposed Foul Drainage
- Proposed Foul A.I.
- Existing Bored Well
- Proposed Bored Well
- Proposed Waterman

**LANDSCAPING LEGEND**

- Existing Trees To Be Retained
- Existing Hedgerow Retained
- Proposed New Native Hedgerow, Mixture of Hawthorn, Blackthorn and Elder
- Proposed Silver Birch Tree (Same Mature)
- Proposed Ash Tree (Same Mature)
- Proposed Planted Area

**GENERAL LEGEND**

Internal Drainage  
New drainage to consist of a tarmac finish.

ESB & Euron  
All ESB & Euron services to be laid underground in accordance with their relevant specifications.

Drainage  
All Drainage works should comply generally with the requirements of BS 8005 Part 1, BS 8301 and the "Specification for Roadworks".

Landscaping  
General Guiding Principles: Because the site is set in a rural setting which supports a valuable small number of trees and old hedgerows the species assemblage will comprise the landscape design.  
Landscape: To be Retained, Disturbed, Harvested, sown with no. 2 lawn seed and rolled.  
Existing Hedgerows: To be retained.  
New Hedgerows: To be planted with mixture of Native Hedging, Hawthorn, Blackthorn and Elder, Shrubbery and Barbs. To be planted with Ecological Budging, Grass, Furze, Thicket Juniper, Heather, Carnation, Coltsfoot, Virginia Creeper, 1 mature tree 1 adult per square meter. Group of trees: Ash and Silver Birch.  
Trees: Trees to be planted are to be 4 to 5 years old and to a minimum of 80 high at the time of planting. Tree height and spread depends on the species, quality of the soil and care given during the early years.  
Shrubbery: To be mixed of evergreen and deciduous.  
To be 18" to 24" at time of planting or 2-3 years old. Mature height again depends on the species but only one that are suited for each area at time of planting will be selected, none of which will grow more than 4-6ft high and 3-4ft wide.

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No.	Date	Amendment / Issue	App.
A	05/07/21	Planning Stage	L.S.

**CARLOW COUNTY COUNCIL**  
HOUSING DEPARTMENT  
Director of Services: Michael Brennan  
Tulow Civic Office, New Retail Road, Tulow, Co. Carlow  
Phone: (051) 8135296 Fax: (051) 8132155  
Email: secstar@carlowoco.ie

Carlow Local Authorities, A CPD Accredited Company

Project: **NEW FULLY SERVICED BUNGALOW DWELLING & ALL ASSOCIATED SITE WORKS AT CONSTABLE HILL, HACKETSTOWN, CO. CARLOW.**

Title: **PROPOSED SITE LAYOUT PLAN**

Drawn by:	R.S.	Job No:
Checked by:	L.S.	Drw Loc:
Approved by:	L.S.	Dir. No:
Scale:	1 to 250 @ A1	Rev:
Date:	05/07/2021	

**L-103**  
**A**

Carlow County Council

SITE SPECIFIC

Duffery, Hacketstown Co. Carlow

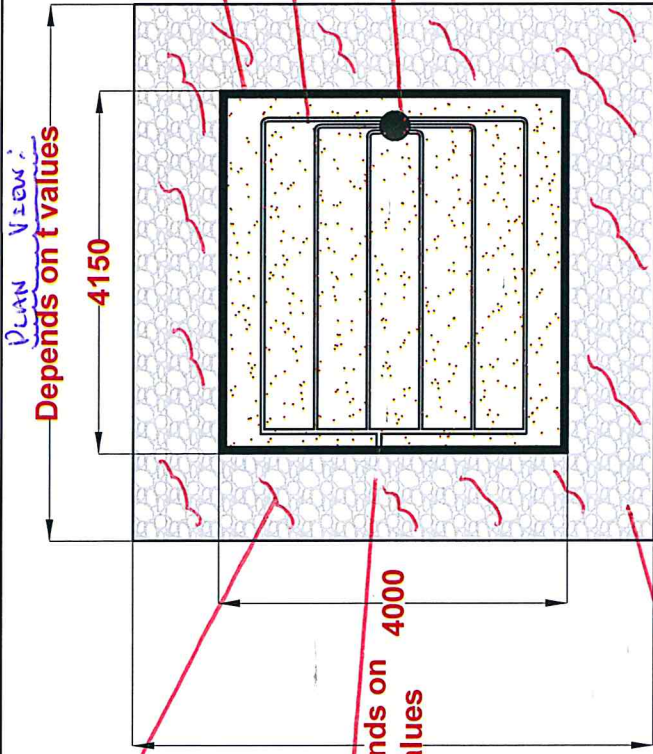
TOWNHALL  
HERMISTONE

TRINET FROM TRINCO  
NEW PG TANK  
RESERVE TANK

STONE PAD AS PER TABLE 10.1  
Pg 62 EPA CAP 2004  
T 21-40 (27) = 45 m<sup>2</sup>

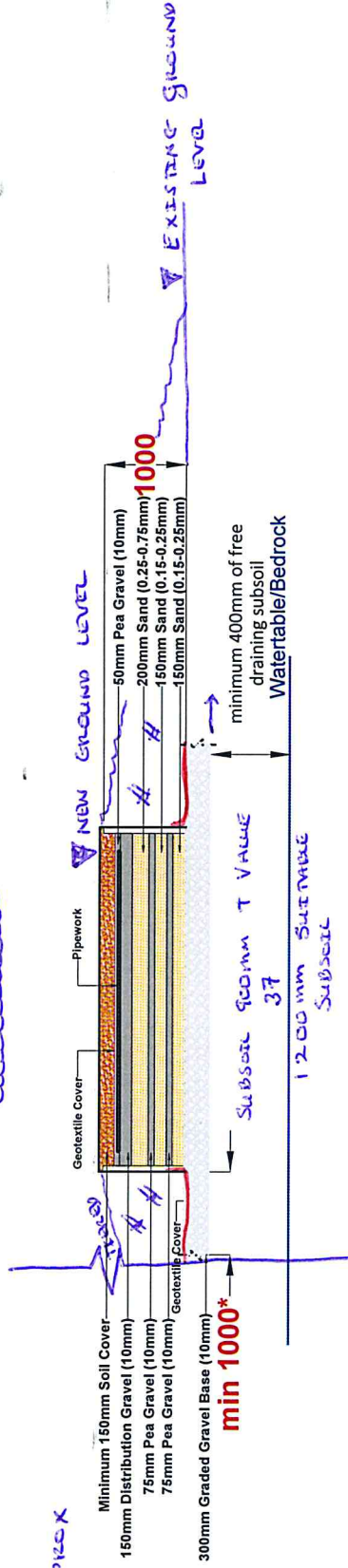
\*Gravel base should be  
minimum 1m longer and  
wider than the Sandcel on  
all sides i.e. 6000 x 6150

7 X 7 m APPROX



SANDCEL CONTAINMENT  
PANELS  
PRESSURE PIPEWORK  
INSPECTION CHIMNEL

CROSS SECTION:



BY	DATE	PRODUCT NAME:	WEIGHT:	SCALE	PART NO:	SIZE
TH	15/11/2018	<b>SANDCEL 900L</b>		NOT TO SCALE	<b>221725A</b>	N/A
TOLERANCE: +/-		COUNTRY: IRELAND		REV. NO. 00.00		
MATERIAL: GRP		UNITS: MILLIMETERS		TANK REVISION:		
TRICEL (KILLARNEY) UNLIMITED COMPANY RESERVES THE RIGHT TO CHANGE THE SPECIFICATION WITHOUT PRIOR NOTIFICATION. PRINTED COPIES OF THIS DOCUMENT ARE UNCONTROLLED UNLESS STATED OTHERWISE			DRWG NO:		ISSUE DATE: 5/12/18	





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<b>Date</b>	22/09/2021
<b>Report No:</b>	SA4_CW_10113
<b>Client Name</b>	Carlow County Council
<b>Site Location &amp; Townland</b>	Duffery , Hacketstown, Carlow

---

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 21-40.

Please see outlined below the accompanying documents:

### **Section 1: Information on the Tricel Novo Package Plant**

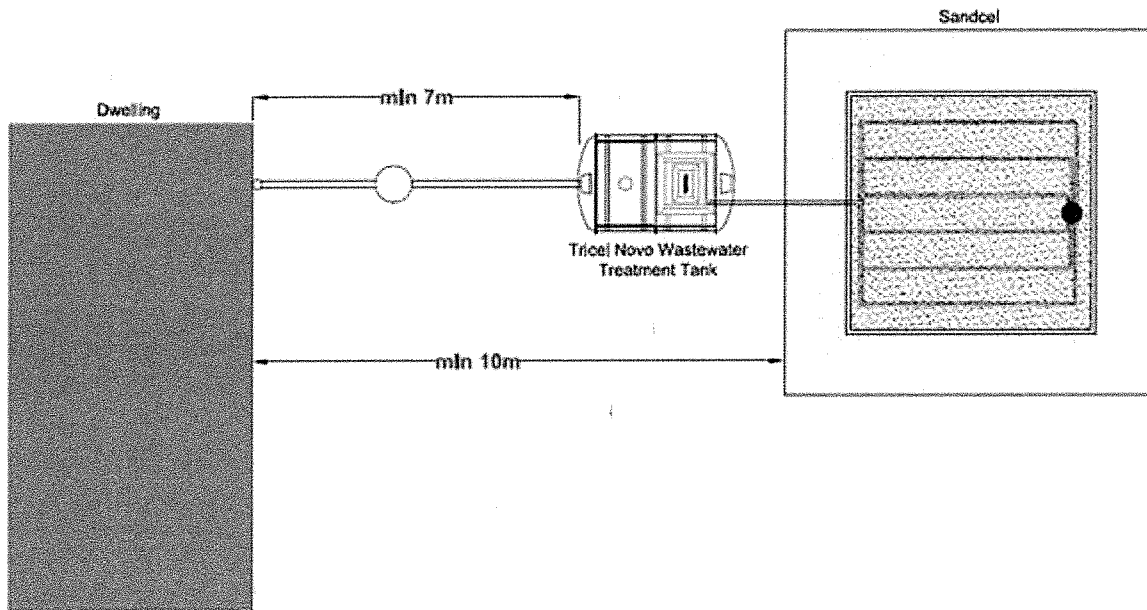
- Manufacturers report and sizing of the Tricel Novo Package Plant
- Drawing of the Tricel Novo Package Plant
- Certification of the selected Tricel Novo Package Plant
- Technical information on the Tricel Novo Package Plant
- Pump selection and technical data
- Optional Novo maintenance agreement

### **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.  $\leq 10$ ), 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 20.0 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<sup>2</sup> 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/m<sup>2</sup>/d.

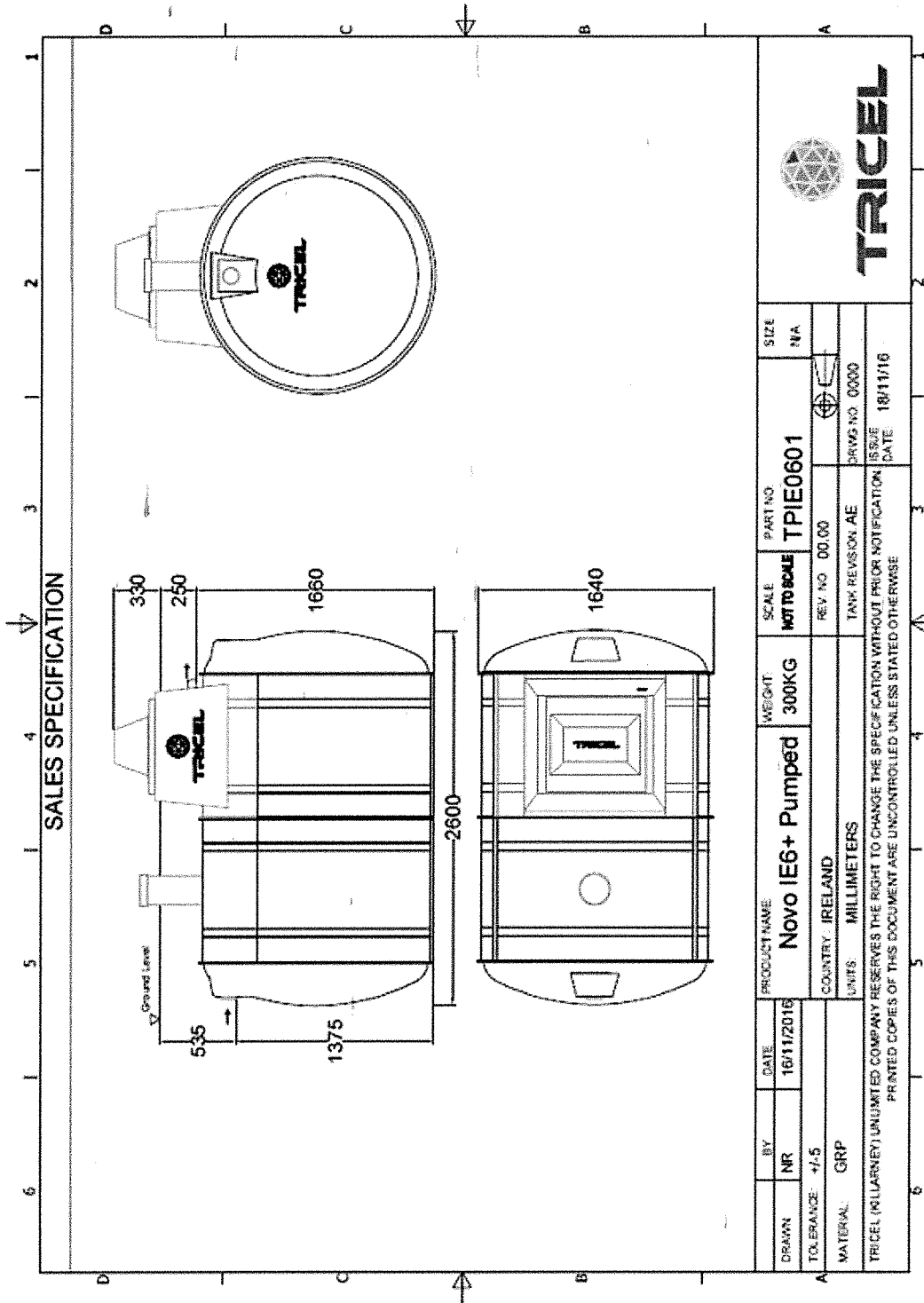
**Note:**


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



DRAWN: NR		DATE: 16/11/2016	PROJECT NAME: Novo IE6+ Pumped		WEIGHT: 300KG	SCALE: NOT TO SCALE	PART NO: TPIE0601	SIZE: N/A
TOLERANCE: +/-5			COUNTRY: IRELAND		REV NO: 00.000			
MATERIAL: GRP			UNITS: MILLIMETERS		TANK REVISION: AE		DRWS NO: 00000	
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: 18/11/16	 <b>TRICEL</b>		

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 m <sup>3</sup> /d		
<b>Material</b>	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 <sub>5</sub>	95.9 %	11 mg/l
	NH <sub>4</sub> -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		


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Performance tested by:


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

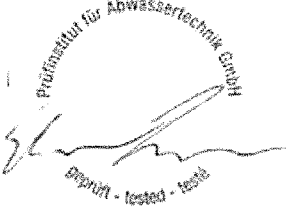
This document replaces neither the declaration of performance nor the CE marking.

  
Notified Body  
No. 1730

  
Certified according to  
ISO 9001:2008

  
ISO 9001

  
Deutsche  
 Akkreditierungsstelle  
 D-PC-17713-01-00

  
Prüfinstitut für Abwassertechnik GmbH  
 geprüft - tested - tested

Eömar Lencé      July 2016

## Section 2

The location and construction of the sand polishing filter is the responsibility of the site engineer. A full site layout drawing should accompany this report.

The EPA CoP 2021 outlines the design, siting and construction requirements for sand polishing filters.

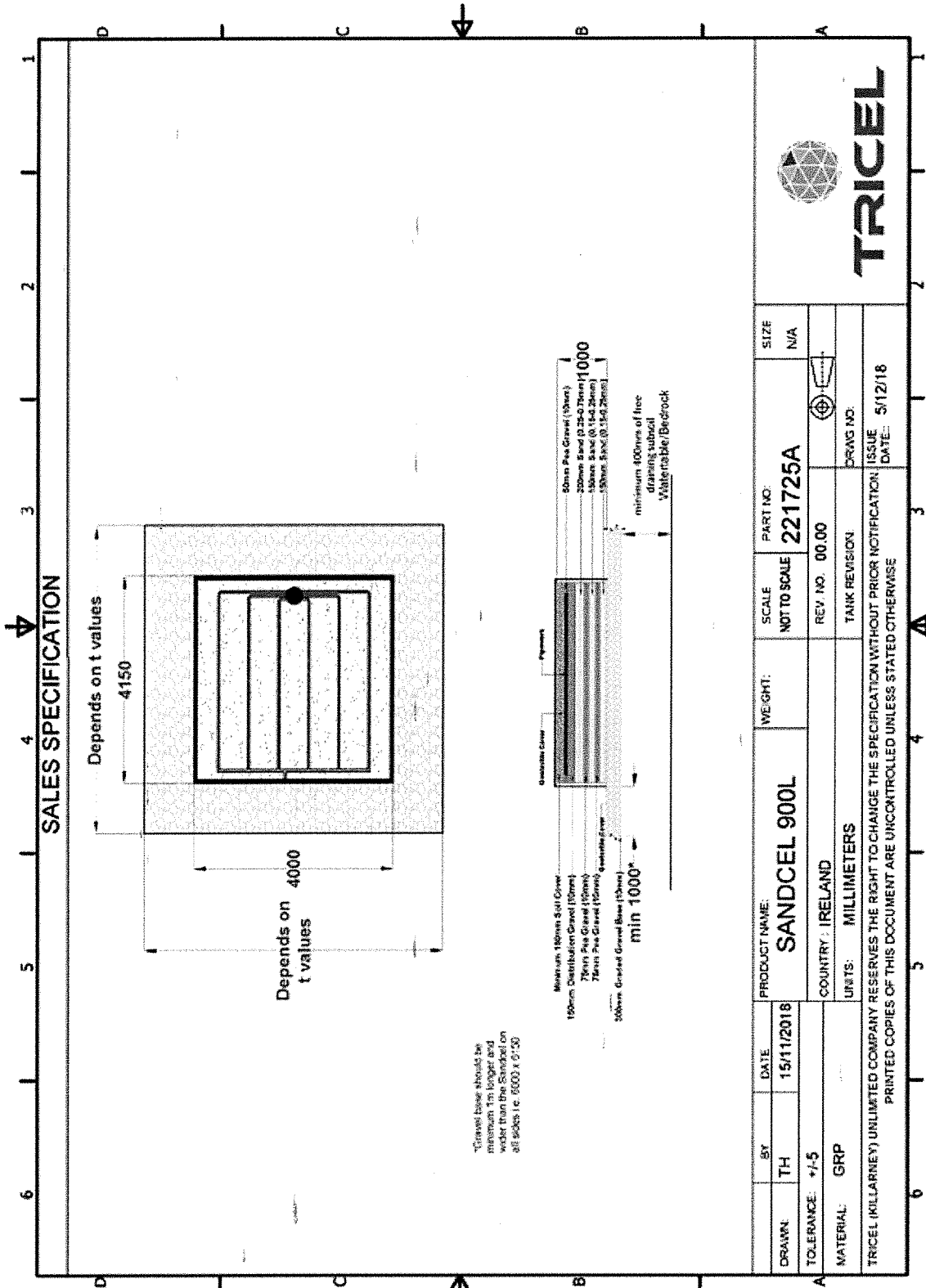
The tables below outline some of the key factors to take into consideration when designing and locating a sand polishing filter.

**Table 6.2: Minimum separation distances from the entire DWWTS**

Features	DWWTS – periphery of tank/plant and infiltration/ treatment area (m)
Karst feature	15
Lake or foreshore	50
Watercourse/stream	10
Open drain or drainage ditch	10
Adjacent tank/plant and percolation area, polishing filter or infiltration area	10
On-site dwelling house	7 (tank/plant)
	10 (free water surface constructed wetland)
	10 (infiltration/ treatment area)
Neighbouring dwelling house	7 (tank/plant)
	25 (free water surface constructed wetland)
	10 (infiltration/ treatment area)
Surface water soakaway <sup>a</sup>	5
Road	4
Slope break/cuts	4
Trees <sup>b</sup>	3
Site boundary	3
Heritage features, NHA/SAC/SPA <sup>c</sup>	See note
PV, percolation value. <sup>a</sup> The soakaway for surface water drainage should be located down-gradient of the infiltration/treatment area; it should also be ensured that this distance is maintained from neighbouring storm water disposal areas or soakaways. <sup>b</sup> Tree roots may lead to PFPs developing. The canopy spread indicates potential root coverage. <sup>c</sup> The distances required depend on the importance of the feature. Therefore, advice should be sought from the local authority and/or from the Department of Housing, Local Government and Heritage, specifically the National Monuments Service and the National Parks and Wildlife Service.	

Table 6.2 EPA CoP 2021- Minimum separation distances

The Sandcel sand polishing filter is a tertiary filter designed to the EPA CoP. It can be located above or below ground depending on the existing bedrock or subsoil. According to the EPA CoP the treated effluent which passes through a sand polishing filter is treated to a high enough standard to be allowed to discharge to groundwater through a distribution bed of gravel.



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.

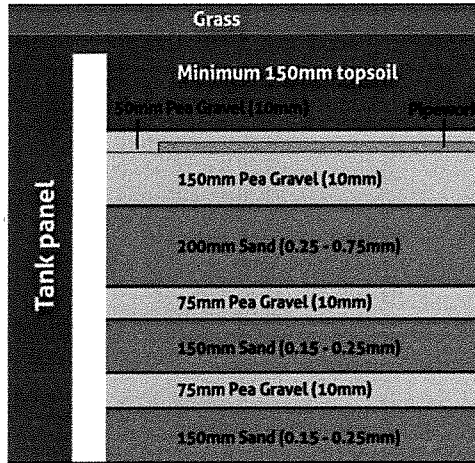


Fig. 1.0 Sandcel stratified layers

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

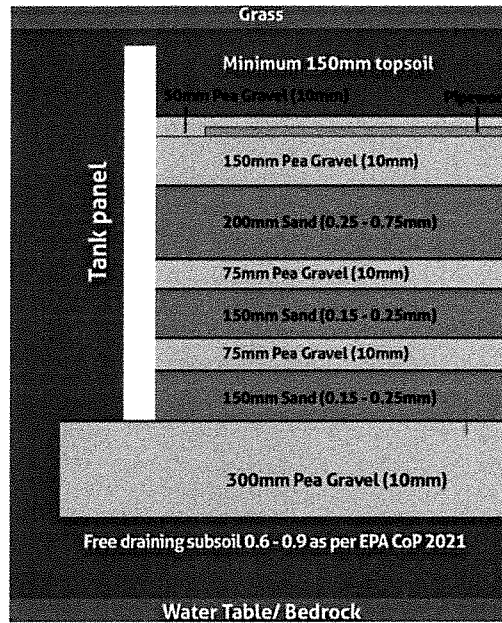
Particle Size Distribution, Sieving Method: EN 933-1			
Identification of Sample: 0 + 0.075mm			
Method Used: Washing and Sieving			
Total dry mass M <sub>10</sub>	0.297 kg		
Dry mass after washing M <sub>10</sub>	0.26299 kg		
Dry mass of fines removed by washing (M <sub>10</sub> - M <sub>15</sub> )	0.00059 kg		
Sieve Aperture Size (mm)	Mass of material retained (kg)	Percentage of material retained (M <sub>i</sub> / M <sub>10</sub> × 100)	Cumulative percentage passing (100 - M <sub>i</sub> / M <sub>10</sub> × 100)
3.000	0	0.00 %	100.00 %
2.500	0	0.00 %	100.00 %
2.000	0.00059	0.20 %	100.00 %
1.400	0.00	0.00 %	100.00 %
1.000	0.01910	6.43 %	93.57 %
0.600	0.2270	76.43 %	23.57 %
0.500	0.371	124.92 %	5.21 %
0.250	0.263	88.52 %	10.00 %
0.150	0.263	88.52 %	10.00 %
Material on the pan P	0 kg		
Percentage fines (F) passing the 0.075 mm sieve (M <sub>10</sub> - M <sub>15</sub> ) / M <sub>10</sub> × 100	0.0 %		
Remarks: D <sub>10</sub> = 0.075mm, C <sub>u</sub> = 2.5	Sieving has been completed		

Particle Size Distribution, Sieving Method: EN 933-1			
Identification of Sample: 0 + 0.075mm			
Method Used: Washing and Sieving			
Total dry mass M <sub>10</sub>	0.274 kg		
Dry mass after washing M <sub>10</sub>	0.21630 kg		
Dry mass of fines removed by washing (M <sub>10</sub> - M <sub>15</sub> )	0.00500 kg		
Sieve Aperture Size (mm)	Mass of material retained (kg)	Percentage of material retained (M <sub>i</sub> / M <sub>10</sub> × 100)	Cumulative percentage passing (100 - M <sub>i</sub> / M <sub>10</sub> × 100)
3.000	0	0.00 %	100.00 %
2.500	0	0.00 %	100.00 %
2.000	0.00059	0.22 %	100.00 %
1.400	0	0.00 %	100.00 %
1.000	0.01290	4.71 %	95.29 %
0.600	0.149	54.38 %	45.99 %
0.500	0.213	77.70 %	22.26 %
0.250	0.216	78.83 %	21.17 %
0.150	0.216	78.83 %	21.17 %
Material on the pan P	0 kg		
Percentage fines (F) passing the 0.075 mm sieve (M <sub>10</sub> - M <sub>15</sub> ) / M <sub>10</sub> × 100	0.0 %		
Remarks: D <sub>10</sub> = 0.075mm, C <sub>u</sub> = 2.99	Sieving has been completed		

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**

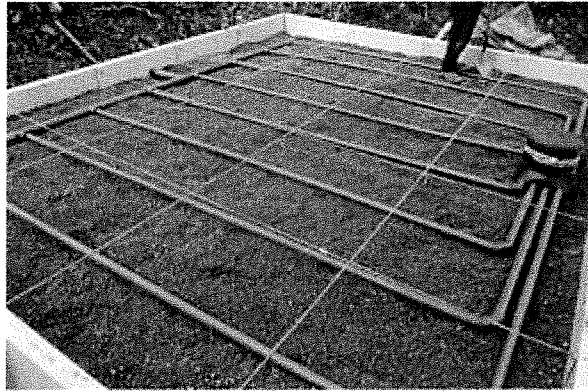
Critical to the life of the sand filter is the impermeable liner as dictated in the EPA CoP. Tricel use a unique panel liner manufactured from a hybrid material known as Sheet Moulding Compound, SMC, which is a form of Glass Reinforced Plastic. These panels are used to form a durable, chemically and 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 <sup>2</sup> )	Trench length required per person (m)	Trench length required per person (m)	Area required per person (m <sup>2</sup> )	Area required per person (m <sup>2</sup> )
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	-

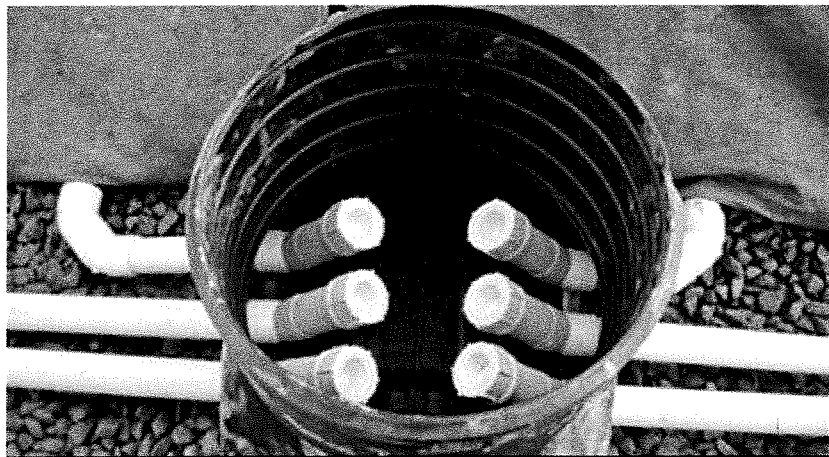
Table 10.1 from EPA CoP 2021 - Loading rates for gravity fed soil polishing filter





**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.

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