

**Pole rd,
Meenmore,
Dungloe,
Co.Donegal**

Mobile Number: 087 2868411

Date: 16/08/2023

To whom It May Concern

Re: Fort Dunree Tourism Project

I have been retained Design ID Consulting Limited,23 Lisburn Road,Hillsborough, BT26 6AA to determine site suitability for the safe disposal of wastewater regarding a proposed transformational tourism project at Fort Dunree. The proposed Fort Dunree project has the potential to increase employment, attract visitors and extend the tourism season beyond the summer.

The project will physically link the 3 unique elements of Fort Dunree: Lough Swilly below the Fort; the Promontory Fort and the ‘High Guns’ Fort; provide immersive heritage and cultural touch points with a new route that opens up the site, with viewing points via modern interventions such as the proposed Funicular (the only one in Ireland) and interpretive installations, including the development of the Dunree Lighthouse.

It is expected that over the first 5 years of operation the project will generate approx. €20m in direct tourism expenditure supporting 550 jobs in the area and 12 new jobs will be created at the attraction.

Projected Visitors Numbers

Table 3.4.1 Spread of Visitors Across the Year

Projected **114000** annual visitors

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Spread of visitors across each month	4%	4%	4%	6%	10%	12%	12%	15%	11%	9%	9%	4%
Monthly visitors	4560	4560	4560	6840	11400	13680	13680	17100	12540	10260	10260	4560
Weekday visitors (assumes 40% of visitors)	1824	1824	1824	2736	4560	5472	5472	6840	5016	4104	4104	1824
Weekend visitors (assumes 60% of visitors)	2736	2736	2736	4104	6840	8208	8208	10260	7524	6156	6156	2736
Daily Weekday Visitors	92	92	92	137	228	274	274	342	251	206	206	92
Daily Weekend Visitors	342	342	342	513	855	1026	1026	1283	941	770	770	342

The above information provided shows that, potentially, 1283 visitors could visit daily at weekends during August months.

I first visited Fort Dunree on Friday 4th August 2023 carried out a visual assessment of the existing wastewater treatment systems and the proposed locations for the reception of final wastewater. It was immediately obvious that it was not possible to carryout the standard and percolation tests because of the lack of soil depth and gaining safe access for a digger to the land areas earmarked for the disposal of final wastewater. It was / is clear to me This is a case where **all materials** relating to the disposal of secondary treated effluent will have to be imported.

Because I deemed it not possible to carryout standard trial hole and percolation tests, I felt compelled to seek the advice of Barry Callaghan (Environmental Health Officer).

I met with Barry Callaghan onsite on the 15th August 2023. I explained to Barry the proposal with regards wastewater treatment is to provide 2no wastewater treatment and disposal arrangements i.e. one of the new proposed treatment & disposal arrangements is to replace the existing treatment system that serves the military museum and wildlife centre etc with the other proposed treatment & disposal arrangement to replace a septic system (not being used at present) that once served the High Fort.

Usage

- It is projected that 80% of those visiting will utilize the wastewater treatment and disposal arrangement that will serve the military museum and wildlife centre etc.
- It is projected that 20% of those visiting will utilize the wastewater treatment and disposal arrangement that will serve The High Fort

Barry Callaghan (EHO) agreed that it would not be possible to carryout the standard trial hole & percolation tests and that all materials concerning tertiary treatment and polishing would need to be imported. Mr Callaghan advised that because of a topography that strongly indicates flow paths that descend towards the shores & sea, and the close proximity of the wastewater treatment and disposal arrangement that will serve the military museum and wildlife centre etc to receiving waters. that, every effort be made to ensure the final effluent is of good quality and does not negatively impact on the environment, public health or receiving waters. Mr Callaghan informed me of the well documented growing concern about Lough Swilly's water quality.

The Initial Wastewater Treatment Process (Military Museum and Wildlife Centre etc)

Barry Callaghan advised that the wastewater treatment and disposal arrangement that will serve the military museum and wildlife centre etc should involve a suitably sized primary settlement tank or tanks so as to remove material that could interfere with or inhibit subsequent treatment stages.

The Initial Wastewater Treatment Process (High Fort)

Because of the expected volume and nature of wastewater treatment that will be generated at the High Fort, it was agreed that raw wastewater could be discharged directly to an aerobic biological treatment plant.

The current wastewater treatment arrangement serving the Military Museum and Wildlife Center etc. (Lower Treatment Plant)

Wastewater discharges to an FM Environmental Biofilter Model 3STD (PE 20). This treatment plant is not working in the manner intended, in that, the submersible pump that recirculates settled wastewater through the Biofilter where biological treatment takes place is non-operational. This means that wastewater treatment within this treatment plant consists of nothing more than basic sedimentation and a measure of anaerobic digestion.

Wastewater from this treatment plant discharges via gravity to a percolation area. There is evidence of grass enrichment within this land area – this indicates poorly or untreated wastewater.

The current wastewater treatment arrangement serving the Military Museum and Wildlife Center etc. (High Fort)

The High Fort is currently not generating any wastewater. The existing septic tank system is out of date and inadequate to treat future wastewater generation.

Site Description

The topography of Dunree consists of rocky outcrops with a very thin covering of soil that is fragmented with horizontal or sloping bedrock exposures. The shattered bedrock appears to be providing very good natural drainage. The vegetation within both of the land areas earmarked for the disposal of final wastewater consists predominately of Fern and Perennial Grasses both of which are good visual indicators of good natural drainage during all seasons.

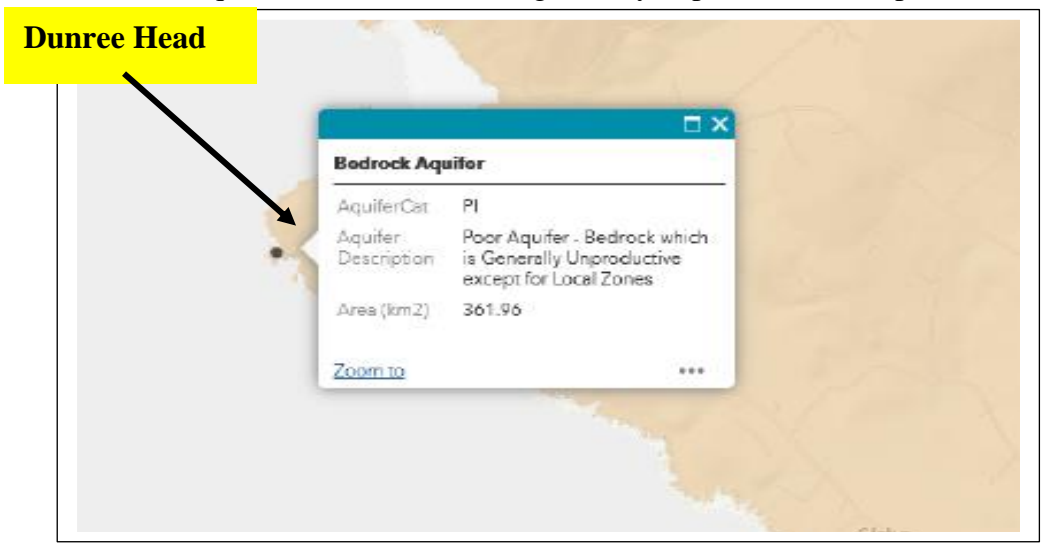
Slopes within both of the land areas earmarked for the disposal of final wastewater vary significantly, therefore it will be imperative that the imported materials that will make up the tertiary treatment filter and polishing-filter are retained effectively. I would suggest the use of gabions or GRP impermeable panels with drainage outlets.

Water Supply

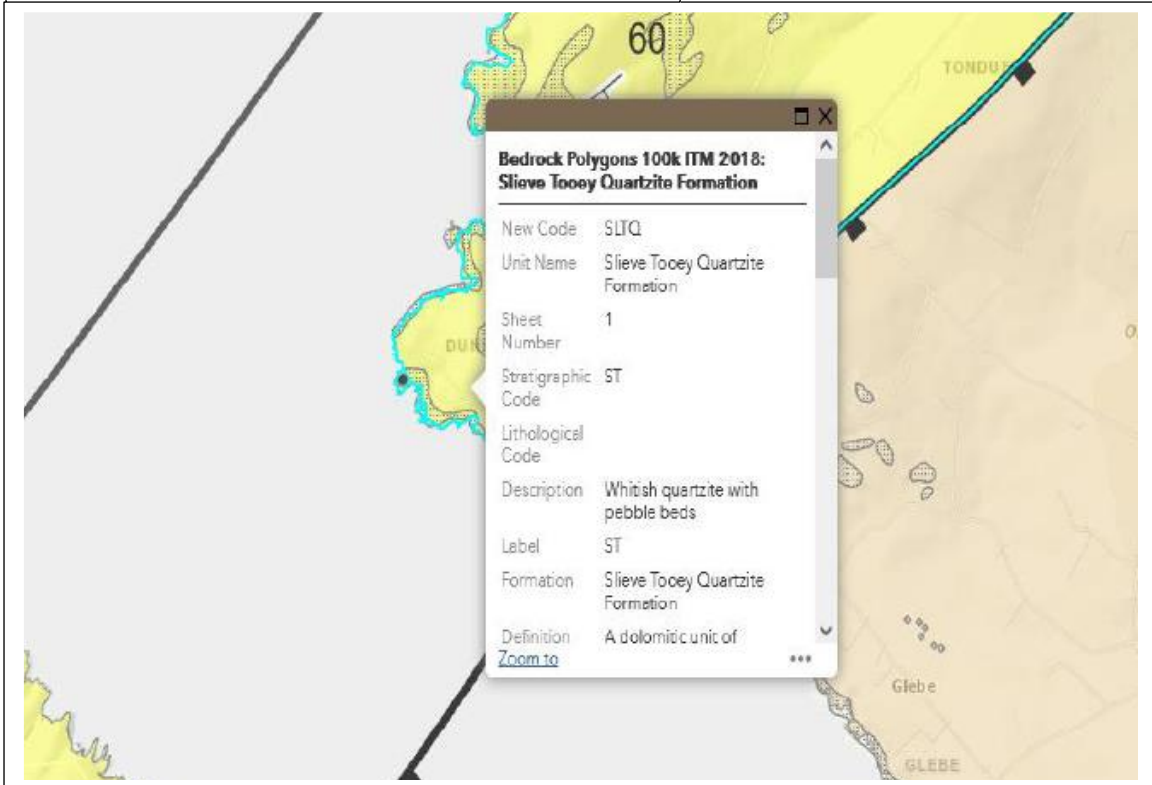
Public Mains

Bedrock Aquifer

PI – Poor Aquifer, Bedrock which is generally unproductive except in local zones.



Bedrock: Whiteish quartzite with pebble beds



Vulnerability: Extreme, Rock at or near surface



Estimated Wastewater Loadings

Based on this information received, I have calculated the loadings as follows,

Military Museum and Wildlife Centre etc. (Lower Treatment Plant)

80% of 1283 = 1026 visitors

	Total Flow litres / daily		Total BOD grams / daily
1,026 @ 15liters	15,390	1,026 @ 15grams	15.39kg
20 staff @60liters	1,200	20 staff @ 30grams	0.60kg
Totals	16,590		15.99kg

The estimated flow litres based on the information provided equates to 16.590m³, therefore the hydraulic load is that of a 110.6 Population Equivalent (PE 110.6), the daily organic loading based on the information provided equates to 15.99kg (PE 266.5)

High Fort (Treatment plant)

20% of 1,026 = 205 visitors

A Kitchen and Snack Bar are proposed to offer off-site prepared food

	Total Flow litres / daily		Total BOD grams / daily
205@ 15 litres	3,075	205@15grams	3,075grams

The estimated flow litres based on the information provided equates to 1.025m³, therefore the hydraulic load is that of a 20.5 Population Equivalent (PE 20.5), the daily organic loading based on the information provided equates to 3.075kg (PE 51.25)

Secondary Treated Wastewater Disposal

Disposal Of Secondary Treatment Plant Wastewater serving the Military Museum and Wildlife Centre etc.

(Lower Treatment Plant)

To enhance the quality of final effluent, I am recommending, that treatment plant wastewater is pumped intermittently to an Intermittent Mono-grade Sand Filter with an infiltration area of 275sqm. Intermittent Mono-grade Sand Filters are an effective form of on-site treatment and the area required for the filter is significantly less than that required for an intermittent soil filter or a soil and/or subsoil percolation area.

Sand Filter wastewater will discharge to a 900mm bed of imported soil with a percolation rate in the 5-20 range. I am recommending that when importing the soils, that tests are carried out by a qualified person.

Note: The existing topography of the land area earmarked for the disposal of secondary treated wastewater strongly indicates that Gabions or GRP impermeable panels or similar may need to be used to retain all imported materials.

Disposal Of Secondary Treatment Plant serving the High Fort.

High Fort (Treatment plant)

To enhance the quality of final effluent, I will be recommending, that treatment plant wastewater is pumped intermittently to an Intermittent Mono-grade Sand Filter with an infiltration area of 20sqm. Sand Filter wastewater will discharge to a 900mm bed of imported soil with a percolation rate in the 5-20 range. The surface area of the soil bed will be 52sqm. I will be recommending that when importing the soils, that tests are carried out by a qualified person.

Note: The sloping ground here suggests that retention of all imported materials may also be required.

To ensure all wastewater generated by the **Military Museum and Wildlife Centre etc** is disposed in a manner that safeguards the Local Environment & Public Health, I recommend,

1. That a suitability sized Grease Trap be fitted.

The correct size can be determined by two methods.

Option 1 - Type of Kitchen: This looks at the type of operation, such as café, and requires the input of average meals per day with the kitchen operational hours per day.

Option 2 - Type of Equipment: This looks at all the grease producing equipment within the kitchen which requires treating, the quantity of each particular sink or kitchen equipment is entered to calculate the required nominal size grease management system.

The grease trap should be fitted, no less than 5m from the waste source

2. That a suitability sized settlement tank be provided.

This settlement tank will allow heavier solids to sink to the bottom and lighter solids to float to the top. Once these materials have settled, they are held back while the liquid is moved onto the secondary phase of treatment. The advantage of employing a settlement tank in this case is that it allows the infiltration area of the Intermittent Monograde Sand Filter to be reduced in size significantly.

Let me explain,

Usually, the infiltration area is calculated on the population equivalent of the required treatment plant which is 266.5 x 2.5sqm -this equates to an infiltration area of 666.25sqm. Considering the topography of this location, in my opinion, it would be challenging to achieve an infiltration of such a size. Therefore, the provision of a settlement tank allows me to base the infiltration area on hydraulic loading rather than the organic loading i.e. an infiltration of 275sqm.

3. That a Certified Secondary Wastewater Treatment Plant with a minimum capacity to serve a Population Equivalent of 267 be provided.

The second stage of wastewater treatment involves aerobic breakdown. This process occurs in the aeration chamber where naturally occurring bacteria live in a filter media. These bacteria feed on air which is supplied through a compressor. As the liquid flows through the filter media, the bacteria feed on the waste and remove it from the liquid.

Note: If it is the case that wastewater from the settlement tank cannot discharge to the secondary wastewater treatment plant and that a pump has to be employed, then a stilling chamber will have to be provided so as to allow the liquid flow rate to significantly decrease prior to entering the treatment plant.

4. That a Pump-fed Intermittent Monograde Sand Filter be provided to provide Tertiary Treatment.

The infiltration area of this filter must measure a minimum 275sqm. To ensure even distribution of secondary treated wastewater over the infiltration area of the monograde sand filter, a dual pump station will have to be provided and zoned regions maybe be required. Uniform distribution of wastewater effluent over any filter bed is vital. Uneven distribution of wastewater over a filter bed is often the cause of on-site wastewater system failures, resulting in hydraulic and biological overloading in areas.

The Dual Pump Station should be equipped with a High-Level Alarm



Recommendations continued

5. **That Tertiary Treated Wastewater discharges to an underlying Soil-Polishing Filter.**
This Soil-Polishing Filter must measure a minimum 275sqm and made-up using imported soil with a percolation value in the 5-20 range.
Note: When importing soils and/or subsoils onto sites as part of either site improvement works or the construction of a Wastewater Treatment System, it is necessary to perform testing of each 300 mm layer while the process of emplacing lifts of soil progresses. After each lift is placed, percolation tests should be carried out. A 150 mm square hole is excavated to a depth of 150 mm in the placed soil. After pre-soaking to completely wet the soil, 0.5 litres of water is poured into the hole and the time in minutes for the water to soak away is recorded. This time should be between 10 minutes and 2 hours.
6. That all surface water runoff and seepage be collected and diverted away from the land area earmarked for the reception of secondary treated wastewater
7. That two observation/monitoring ports be installed within the sand filter. One observation port /monitoring port be installed to the bottom of the sand medium. A second observation / monitoring port be installed to the bottom of the underlying polishing material.
8. The sides of the Intermittent Sand Filter should be enclosed by an impervious liner so as to prevent possible bypass of secondary treated wastewater to the surrounding environment. A geotextile fabric should be placed on top of the entire filter bed so as to prevent the entry of silt.
9. That the existing Septic System is retired and that the system and its contents are handled by a contractor with the correct equipment and facilities for their safe disposal. The contractor must also hold a Waste Collection Permit.

Quality Assurance: Installation & Commissioning

10. **That a suitably qualified person with appropriate Insurance** be invited to supervise the installation of the Treatment Plant & Dual Pump Station, plan & supervise the construction of the Intermittent Sand Filter and Soil-Polishing Filter and provide an Ancillary Cert so as to support a Certificate of Compliance.

Legal obligations regarding maintenance of wastewater treatment systems

11. **That a Maintenance Service Agreement be attained.**
Part 4 of the Water Services Act, 2007 (as amended) and associated Regulations established a system for registration, inspection and enforcement of DWWTS and placed duties on owners, water service authorities and the EPA: 'A person who owns, has in his or her charge or otherwise has control over a wastewater works shall cause it to be properly maintained'. The property owner has, therefore, a legal responsibility to ensure that the system does not cause pollution, a health hazard, or a nuisance.

To ensure all wastewater generated at the **High Fort** is disposed in a manner that safeguards the Local Environment & Public Health, I recommend,

1. **That a suitability sized Grease Trap be fitted.**

The correct size can be determined by two methods.

Option 1 - Type of Kitchen: This looks at the type of operation, such as café, and requires the input of average meals per day with the kitchen operational hours per day.

Option 2 - Type of Equipment: This looks at all the grease producing equipment within the kitchen which requires treating, the quantity of each particular sink or kitchen equipment is entered to calculate the required nominal size grease management system.

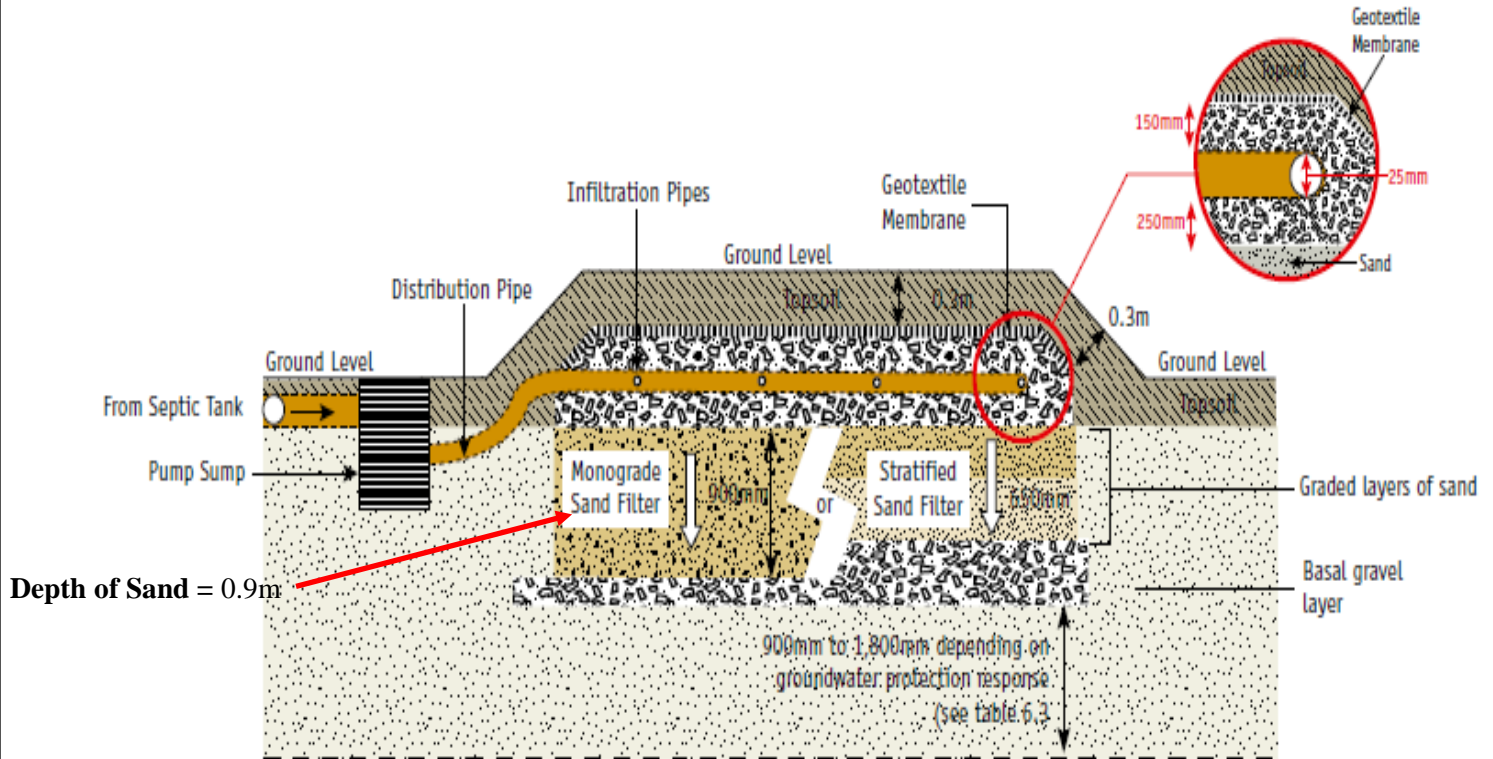
The grease trap should be fitted, no less than 5m from the waste source

2. That a Certified Secondary Wastewater Treatment Plant with a minimum capacity to serve a Population Equivalent of 52 be provided
3. That a Pump-fed Intermittent Monograde Sand Filter be provided to provide Tertiary Treatment. The infiltration area of this filter must measure a minimum 52sqm. The Pump Station should be equipped with a High-Level Alarm
4. That Tertiary Treated Wastewater discharges to an underlying Soil-Polishing Filter. This Soil-Polishing Filter must measure a minimum 52sqm and made-up using imported soil with a percolation value in the 5-20 range.
Note: When importing soils and/or subsoils onto sites as part of either site improvement works or the construction of a Wastewater Treatment System, it is necessary to perform testing of each 300 mm layer while the process of emplacing lifts of soil progresses. After each lift is placed, percolation tests should be carried out. A 150 mm square hole is excavated to a depth of 150 mm in the placed soil. After pre-soaking to completely wet the soil, 0.5 litres of water is poured into the hole and the time in minutes for the water to soak away is recorded. This time should be between 10 minutes and 2 hours.
5. That all surface water runoff and seepage be collected and diverted away from the land area earmarked for the reception of secondary treated wastewater
6. That two observation/monitoring ports be installed within the sand filter. One observation port /monitoring port be installed to the bottom of the sand medium. A second observation / monitoring port be installed to the bottom of the underlying polishing material.
7. The sides of the Intermittent Sand Filter should be enclosed by an impervious liner so as to prevent possible bypass of secondary treated wastewater to the surrounding environment. A geotextile fabric should be placed on top of the entire filter bed so as to prevent the entry of silt.
8. That the existing Septic System is retired and that the system and its contents are handled by a contractor with the correct equipment and facilities for their safe disposal. The contractor must also hold a Waste Collection Permit.
9. That a suitably qualified person with appropriate Insurance be invited to supervise the installation of the Treatment Plant & Dual Pump Station, plan & supervise the construction of the Intermittent Sand Filter and Soil-Polishing Filter and provide an Ancillary Cert so as to support a Certificate of Compliance.
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The property owner has, therefore, a legal responsibility to ensure that the system does not cause pollution, a health hazard, or a nuisance.

Sand Media

The ideal sand media for an intermittent mono-grade sand filter is a coarse sand with an effective size between 0.3 mm and 0.5 mm. The media sand grains should be relatively uniform in size having a low U_c value (less than 4.0) to promote movement of water and prevent clogging

Example of typical Pumped/Pressurised Mono-grade & Stratified Sand Filters



The infiltration pipes should be laid with the holes facing downwards

Note: Monograde Sand Filters are what is recommended in this report.

How to take care of sewage treatment plants – A few important tips

1. Things that will block the treatment plant

Any items that could block pumps, pipes or filter material should be kept out of the sewage system. These include:

- Nappies
- Sanitary material
- Wet wipes/face wipes
- Rags/cloths
- Soft toys

2. Things that will kill or harm bacteria

Material and liquids that could be damaging to bacteria should not be put down the drains. Harming the bacteria will have a negative impact on the treatment quality and can cause the system to smell, some of these include:

- Motor oil, grease, anti-freeze, brake fluid, etc.
- Weed-killers, insecticides, fungicides and other gardening chemicals.
- Medicines – all should be taken to your nearest pharmacy for safe disposal
- Paint, thinners, white spirit, turpentine, creosote, etc.
- Photographic developing fluids.
- Large quantities of bleach
- Large quantities of washing detergent

It must be noted that small quantities of bleach and detergent won't have a huge impact on the system. Furthermore, if you are using bleach it is advised to spread the usage over a few days rather than use it all on one day. This is also true for washing detergent. Most systems can handle it with no problem, unless you are doing a lot of washing (and cleaning) all on the same day.

3. Things that will overload the plant biologically

In a normal situation your treatment plant should be more than capable of dealing with the wastewater from your house. However, organic material places a demand on the water (and bacteria) and systems are sized for average amounts of organic material. The main things that overload a treatment plant are as follows:

- Cooking oil and fat.
- Food waste
- Too many people

Adding food (which hasn't been broken down by us humans first) could be the equivalent of adding another 4-5 peoples waste into your system. Also, as food breaks down it can smell rather pungent.

SCHEDULE

POLICY NUMBER	PI/D/12417/23/1
INSURED	Tecsoil Site Assessment Ltd
ADDRESS	Pole Road, Meenmore, Dungloe, Donegal
Description of Activities	Site Suitability Assessments/Percolation Testing and Design & Installation of Wastewater Treatment Systems
PERIOD OF INSURANCE	11th March 2023 (00:01hrs) to 10th March 2024 (23:59hrs)
RENEWAL DATE	11th March 2024
LIMIT OF INDEMNITY	€1,300,000 aggregate any one PERIOD OF INSURANCE, DEFENCE COSTS included
EXCESS	€2,500 each and every CLAIM. The EXCESS applies to DEFENCE COSTS
RETROACTIVE DATE	10th March 2006
JURISDICTION	Ireland/UK/loM/EU
TERRITORIAL LIMITS	Worldwide excluding USA/Canada
CONDITIONS	As per DC AGG 0422 RLU policy wording plus the following endorsements:- BESPOKE ENDT Indemnity in respect of Site Suitability Assessments/Percolation Testing and Design & Installation of Wastewater Treatment Systems only BESPOKE ENDT Consumer Insurance Contracts Act 2019
DATE OF PROPOSAL FORM or STATEMENT OF FACT	This insurance is based on the proposal form or statement of fact, the dates of which are noted below and supporting documentation (if any accompanying the proposal form): Proposal form date: 07 February 2023 No Claims Material Changes Declaration Date (if applicable): 10 March 2023
NOTICE OF any CLAIM or CIRCUMSTANCE is to be given to:	RL Underwriting 10 The Courtyard, Kilcarbery Park, Nangor Road, Dublin 22 Tel: (01) 9131 155 Email: piclaims@rlunderwriting.com
This Schedule of Insurance outlines the basis of the insurance policy. This insurance is underwritten by Chaucer Insurance Company DAC. Registered in Ireland no. 587682. Registered office: 38 & 39 Baggot Street Lower, Dublin 2. Chaucer Insurance Company DAC is regulated by the Central Bank of Ireland. This policy is administered by Aston Lark Europe Limited t/a RL Underwriting under Binding Authority contract B1855E220002. Aston Lark Europe Limited t/a RL Underwriting, is regulated by the Central Bank of Ireland. Registered Ireland No. 338916. Registered office: 10 The Courtyard, Kilcarbery Park, Nangor Road, Dublin 22, Ireland.	

Level 6 Specific Purpose Certificate
Teastas Cuspóra Shainiúil Leibhéal 6

Site Suitability On-Site Wastewater Treatment

Awarded to
Bronnta ar

Hugh Boyle

21/08/2007

David O'Rourke

Chair/Cathaoirleach FETAC

Stan Uile Hough

Chief Executive/Príomhfhéidhmeannach FETAC



Signed: _



Hugh Boyle

Address: Tecsoil, Pole Rd., Dungloe, Co. Donegal

Qualifications/Experience: FAS/EPA Site Suitability Assessment for On-Site Wastewater Treatment Systems course (FETAC)

Professional Indemnity Insurance Policy Number: PI/D/12417/23/1. (ARB Underwriting Ltd)