

**MWP**

# **Wastewater Treatment System Design Report**

## **Magherabeg Beach Facility Centre for Water Sports Activities**

**Client: Kerry County Council**

**25609-ZZ-ZZZ-RP-MWP-CE-6001**

**August 2025**

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Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Acceptance Code / Status
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25609	ZZ-ZZZ-RP-MWP-CE-6001	P01	08/08/2025	DT	MOS	IB	DRAFT
25609	ZZ-ZZZ-RP-MWP-CE-6001	P02	26/08/2025	DT	MOS	IB	FINAL

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## 1. Introduction

Kerry County Council are currently progressing the provision of a Beach Facility Centre for Water Sports Activities at Magherabeg Beach in West Kerry.

The requirement for enhanced beach facilities at Kerry's Blue Flag Beaches has been identified in the County Kerry Tourism Strategy and Action Plan 2016 -2022 which was prepared following extensive engagement with multiple stakeholders. Magherabeg beach has held "Blue Flag" status since 2010 with most recent 4-year testing cycle (2020 to 2024) yielding an "Excellent Quality" Rating. The existing water activity providers in the area have identified the absence of a modern facility as a limiting factor to their business and they feel they could attract a larger number and more diverse range of customers with the provision of such a facility. Following the submission of a funding application to Fáilte Ireland under Platforms for Growth 2019-2025: Platform 2 – Facility Centres for Water Sports Activities, Kerry County Council were successful in securing funding from Fáilte Ireland to develop a facility in Magherabeg.

Fáilte Ireland commissioned the preparation of an 'Exemplar Design' for a number of proposed similar facilities to be developed at locations across the Country where water-based activities are a key visitor attraction. The final detailed design for Magherabeg facility was based on the suite of Design Documents for the Exemplar Building prepared on behalf of Fáilte Ireland.

A critical element of this facility is the requirement for universal accessibility.

This report outlines the engineering design philosophy employed for the proposed foul drainage system serving the development. This proposal was previously detailed within the planning application for the facility. It is herein being further detailed and revised on foot of a request for additional information by An Bord Pleanála dated 10<sup>th</sup> February 2025.

### 1.1 Existing Site

The existing site currently provides toilet facilities to beach users in the form of a portable structure on a concrete base housing free-to-use male and female toilets (WCs), male urinals and wash hand basins (WHBs). These toilet facilities are connected to an existing septic tank with percolation area. Kerry County Council provide and maintain these facilities on a year round basis.

The existing toilet facilities consist of a maximum of eight WCs, four urinals and associated WHBs. There are no existing showers.

Potable water records are available for this facility for the years 2006 to 2025. Refer to Appendix 3 Existing Site Water Usage Table. These readings show an increasing use of the facilities until they plateaued around 2014. As might be expected, the months of July and August are the peak usage months. These show an average daily water usage of 2.06 m<sup>3</sup> to a maximum of 2.8 m<sup>3</sup> per day during those months. Since the maximum water usage happened during a brief respite from restrictions during COVID 19, it is proposed to use the average summer (July/August) water for this design.

Of the water usage 0.48 m<sup>3</sup> is due to automatically flushing urinals which operate whether they are used or not. In addition, the amount of water used by the wash-hand basins does not add to pollution load. It is reasonable to assume that the volume of water used by the wash-hand basins at least equals the volume used by the urinals. Therefore, for load calculation purposes, the average water usage is reduced by 0.48 m<sup>3</sup> per day. This reduces the average daily water usage to 1.58 m<sup>3</sup> per day during those months.

These figures suggest an average number of uses of 158 nr. per WC (excluding urinals) per day.

These records have been used, as a guide, to project the average annual and peak wastewater load which will be generated by the proposed facilities.

Existing potable water is provided via a Uisce Eireann watermain on the main road and as noted, is metered.

## 2. Wastewater Treatment System

It is proposed to retain the provision of the free-to-use facilities for general beachgoers and provide the new facilities on a cost-per-use basis. A new Wastewater Treatment System is required to cater for both. Previously it was not envisaged that the existing toilets were to be retained but it is deemed necessary to continue to provide free to use facilities. Therefore, the previously proposed new treatment system is now reviewed in more detail with a view to cater for existing and proposed facilities.

### 2.1 Design Criteria

The new Facilities will include seven shower/changing rooms, five WCs and four free outdoor cold washdown showers. Since these facilities will be pay-per-use, it is expected that they will only be used by persons taking part in prolonged water-based activities e.g. Wind Surfing, Scuba Diving or similar. It is not expected that casual beachgoers who need only toilet facilities will use them since there will be free toilet facilities available immediately adjacent.

Therefore, while the volumes of water used per use will be higher than the existing facility, the number of uses will be much less. In addition, each user is likely to take significantly longer (a factor of four is used) to use the facility. For that reason, the projected water usage is expected to be pro rata to the existing use i.e. 60%.

The following table gives the estimated daily loads in terms of BOD5, N and P.

Combined New Facility and retained toilets	Water @ 40 l/use m <sup>3</sup>	Number of uses	BOD5 Kgs	Total N @ Kgs	Total P @ Kgs
New Facility – Pay-for-use 5 showers, WC, Changing Rms	1.8	45	0.855	0.11	0.02
Existing and retained free-to-use toilet facilities	1.6	158	1.9	0.4	.07
Total Estimated daily load	3.4	203	2.785	0.51	0.09

These loads are based on the Flow & Loads 4 – Sizing Criteria, Treatment Capacity for Sewage Treatment Systems (showers per use) published by British Water in 2013.

It is noted that there is no estimate for P in those tables so the published daily P load for a person (1.4 grammes P/person) is used. This loading is less than that usually taken for a person in a domestic dwelling but the reason for this is that the remainder of the P load is generated by laundry and similar sources.

When designing the Wastewater Treatment Plant a maximum daily load of 3.4 m<sup>3</sup>/day plus 10% of estimated daily load (additional 0.34m<sup>3</sup>/day = 3.74m<sup>3</sup>/day) is taken to give a conservative design. It is again noted that the

beach has held “Blue Flag” status since 2010, and this has achieved “Excellent Quality” rating in the last 4-year cycle.

The above estimated BOD5 load is equivalent to 46 population equivalent (p.e.) at 60 g/head/day as per the EU UWWT Directive. The 10% safety margin will increase this load to **50 p.e.**

The previous proposal (Molloy Environmental Systems Proposal for wastewater treatment using SBR technology for Maherabeg Beach, Date: 09/02/2023, File Reference: MES3152, Report 090223 was designed for a daily loading of;

- Hydraulic load 4,500 litres 30 PE (@150 l/p/d)
- Organic load 1,800g BOD5 30 PE (@60g BOD5/d)

These loadings are therefore insufficient given the detailed review above and provide additional capacity for future growth in numbers using the facility. The technical treatment solution proposals of the previously proposed system will therefore be retained but with increased capacity.

New Proposed Design Loadings;

loadings of;

- Hydraulic load 4,000 litres
- Organic load 3,000g BOD5 50 PE (@60g BOD5/d)

## 2.2 Proposed Sewage Treatment System.

The proposed treatment system will be capable of treating the design loading as described above. The proposed system will include 2 streams for 25-30 p.e. each to give maximum flexibility of operation. The proposed system will consist of the following components:

- 1 no. new precast concrete primary/buffer tank (7,500 litres),
- 1 no. new precast concrete reactor tank (4,500 litres) and
- 1 no. 200m<sup>2</sup> soil polishing filter with 2 no. closed cell percolation modules (2 streams).

### 2.2.1 Primary/Secondary Treatment

A Sequencing Batch Reactor (SBR) package treatment plant followed by a Tertiary Polishing Filter is proposed to cater for the peak use months. Because an SBR is a batch treatment process it requires a buffer tank upstream to hold inflow for the next treatment cycle. This has the advantage of acting as a Primary Settling Tank. Desludging takes place from this tank. The treated wastewater will discharge to a new raised percolation area within the site (please refer to Site Drainage Layout Drawing 23173-MWP-00-001-DR-0105-P09).

While the p.e. requirement for the proposed SBR is nominally for 50 p.e, the fact that it includes a Primary Chamber as well as the Flow Buffer Tank means that it will settle out the gross solids before they enter the SBR section of the process thereby reducing the pollution load to the SBR. This gives an extra safety factor to the system.

The tank will be capable of handling fats, oils and greases (FOG) but is not expected to need to do so.

The frequency of desludging of the primary tank is dependent on actual sludge build-up which will vary at different times of year. The primary buffer tank will act as a septic tank anaerobically during periods of low or nonexistent flow.

### 2.2.2 Secondary Treatment standard

An SBR of this type may be expected to produce an effluent of less than 25 mgs/l BOD5, 35mgs/L SS and 125 mgs/l COD. The SBR treatment process will fully nitrify and de-nitrify the wastewater so that Nitrate is expected to be less than 5 mg/l and ammonia between 2 -5 mg/l. and Phosphorus, as P, < 3 mg/l.

SBR technology treats wastewater in batches and hence buffer tanks are required to buffer flow as a batch is being treated. This is important in this application where the load can be concentrated over a short number of hours each day.

Flow into this chamber is by gravity from the primary settlement chamber. Flow to the Reaction tanks is via a standard submersible pump. The buffer tank is equipped with 1 no. submersible feed pump and 3 no. float switches.

### 2.2.3 Tertiary Treatment

Tertiary Treatment is proposed to follow the secondary Treatment stage in the form of dual closed cell modules. These will reduce the effluent quality to a maximum of 5 mgs/l BOD5, 5mgs/L SS and 25 mgs/l COD or better before percolation and it is expected that the Tertiary effluent will be significantly better than the above standard as provided by the specialist design and build contractor.

### 2.2.4 Discharge

The ultimate discharge from the new Facility will be locally to ground, via a raised gravel/sand bed and distribution pipework network. The overall area of percolation is designed in accordance with The EPA Code of Practice for Domestic Waste Water Treatment Systems 2021 to match the site's percolation characteristics during full capacity discharge.

The Infiltration testing to BRE 365 (see Appendix 2), previously submitted indicates an infiltration rate of 4 – 4.8 x 10<sup>-5</sup> m/s which shows a slightly silty slightly clayey sand which is suitable for infiltration of the tertiary effluent. These results equate to a percolation value of between 3 and 20 (observed sandy soil on site) in the EPA Code of Practice for Domestic Waste Water Treatment Systems 2021. While the Infiltration test has been done to BRE 365, that test is the same as that required by BS EN 6297: 2008 Code of practice for the design and installation of drainage fields for use in wastewater treatment and the equivalent EPA Code of Practice for Domestic Waste Water Treatment Systems 2021 percolation test.

The reason the Percolation area is raised is to ensure that the percolation pipes and media are above Astronomical High Tide, by the depth required under the EPA Code of Practice for Domestic Waste Water Treatment Systems 2021, thus ensuring full treatment at all times. The use of a raised percolation area means that there will be no direct discharge to the beach or tide. This percolation area is designed with reference to the EPA Code of Practice for Domestic Waste Water Treatment Systems 2021, Table 10.1. The current rudimentary system (septic tank and soakpit) has shown no detrimental effects on the quality of bathing water. It is therefore considered reasonable to expect that the proposed superior treatment system, which will significantly reduce the pollutant concentrations in effluent, will likewise not affect the adjacent Tralee Bay waters. Please refer to the MWP Water Directive Framework Assessment Report referenced hereunder.

From values received from the P and T tests with a percolation value of between 3 and 20 (observed sandy soil on site) the surface area of the filter bed can be calculated using the EPA clarifications 2012. MWP are

proposing this to be 200m<sup>2</sup>, which in excess of requirements. Based on a loading rate of 3.75m<sup>2</sup>/PE 187.5m<sup>2</sup> is sufficient (3.75\*50 = 187.5).

Two Secondary and Tertiary Wastewater Treatment units are proposed to give flexibility to best match treatment capacity to demand. Each unit will include a distribution zone fed by its own feed pump from the reactor. A distribution box and pipework matrix, in accordance with the EPA Code of Practice for Domestic Waste Water Treatment Systems 2021, is provided for the filter percolation beds to ensure optimal operation. These filter beds disperses directly to the soil below.

Geological data shows that there is a locally important aquifer in this area. This aquifer is in the underlying bedrock and is considered to be sealed from the overlying groundwater, which would be saline in nature given its proximity to the open sea.

The groundwater underlying the percolation site fluctuates with the tides due to its proximity. The percolation area is entirely above the highest Astronomical tide (HAT) level. The percolated tertiary treated effluent will meet and mix with this saline water providing for maximum diffusion.

### **2.2.5 Construction**

All wastewater treatment system underground chambers, tanks, sumps and infrastructure to be watertight, vented and checked for flotation as required.

Design, installation, maintenance, servicing and administration to specialist system providers specification and design.

Confirmation of all treatment standards achieved will be by appointed specialist systems provider(s).

## **3. Water Framework Directive Assessment**

Refer to MWP WFD Site Assessment Report 25609-MWP-ZZ-ZZZ-GE-D-6002-P01 for associated detailed Assessment.

Assessment Conclusion:

The WFD assessment indicates that, based on the current understanding of the Proposed Development and the mitigation measures proposed, it is unlikely that the development will cause a significant deterioration or change in waterbody status or prevent attainment, or potential to achieve, future 'Good' status.

No further assessment (scoping or detailed impact assessment) of the WFD is recommended given that no discernible deterioration or change in water body status is anticipated due to the implementation of mitigation measures.

## **4. Conclusion**

The proposed wastewater treatment system is designed for the site physical and usage parameters and is considered sufficient to achieve a very high level of treatment of the proposed wastewater and to safeguard the receiving environment.



## **Appendix 1**

### **Drawings**

- 23173-MWP-00-00-DR-C-0100-P02 – Site Layout
- 23173-MWP-00-01-DR-C-0105-P09 - Site Drainage Layout
- 23173-MWP-00-01-DR-C-1204-P02 – Drainage Longitudinal Section
- 23173-MWP-00-00-DR-C-0103-P01 – Percolation Area Layout and Sections



- NOTES:**
1. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, BILLS OF QUANTITIES, ARCHITECTURAL, SERVICES AND ENGINEERING DRAWINGS.
  2. ALL LEVELS ARE IN METRES RELATED TO ORDNANCE DATUM MALIN HEAD.
  3. ANY DISCREPANCIES BETWEEN THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
  4. DRAWINGS ARE NOT TO BE SCALED.
  5. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

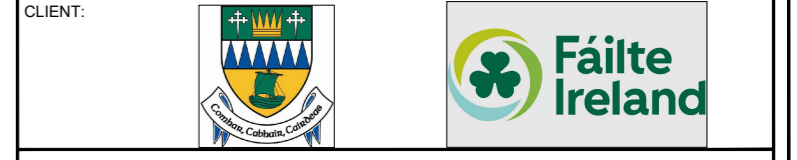
**LEGEND:**

	BOUNDARY LINE
	PROPOSED TIMBER FENCE
	PROPOSED ACCESSIBLE PARKING SPACES (2.4m X 6m, WITH 1.2m CLEARANCE EITHER SIDE)
	PROPOSED CONCRETE SURFACE
	PROPOSED TIMBER BOARDWALK
	BITUMEN MACADAM SURFACE
	GRASS AREA
	GRASSCRETE PAVING
	EXISTING GROUND LEVEL (mOD)
	PROPOSED GROUND LEVEL (mOD)

P02	21/08/25	ISSUED FOR PART 8 PLANNING	S.R.	I.B.
P01	05/10/23	ISSUED FOR PLANNING	S.S.	I.B.
REV	DATE	DESCRIPTION	BY	APP

PROJECT: **MAGHERABEG BEACH FACILITY CENTRE FOR WATER SPORTS ACTIVITIES**

TITLE: **PROPOSED SITE LAYOUT**



DRAWN:	S.R.	CHECKED:	D.T.	APPROVED:	D.T.
PROJECT NUMBER:	23173	DATE:	OCT '23	SCALE @ A1:	1:200
STATUS DESCRIPTION:	FOR INFORMATION			STATUS:	S2
DRAWING NUMBER:	23173 - MWP - 00 - 01 - DR - C - 0100			REV:	P02

DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS IN ALL CASES. VERIFY DIMENSIONS ON SITE AND REPORT ANY DISCREPANCIES TO THE DESIGNERS IMMEDIATELY.  
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE DESIGNERS SPECIFICATION.  
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LEGEND:

	PROPOSED HDPE WATERMAIN
	PROPOSED UPVC STORM PIPE
	PROPOSED UPVC FOUL PIPE
	BIGT WITH SAND TRAPS
	DRAINAGE CHANNEL WITH SAND TRAPS
	BOUNDARY LINE

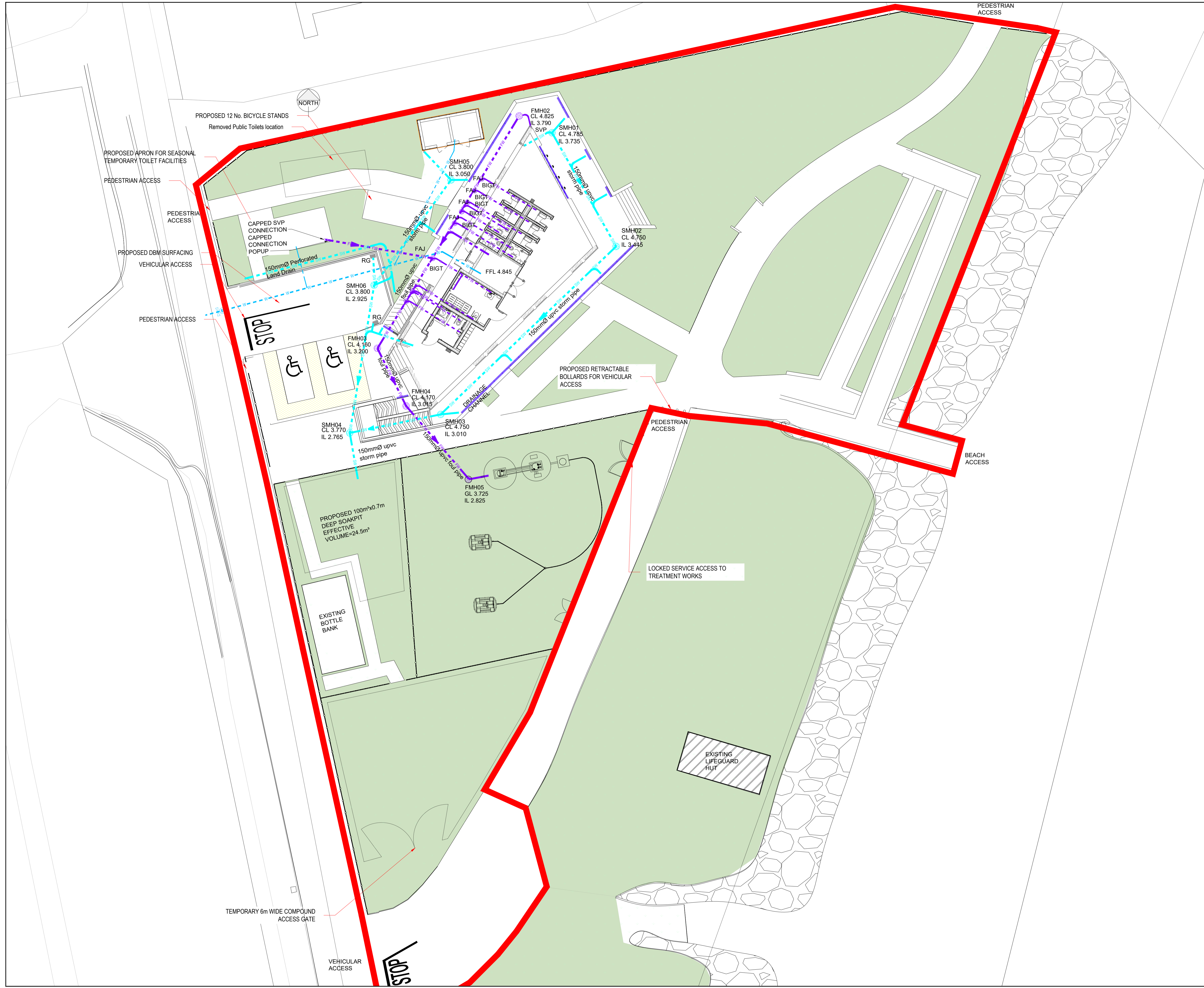
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P08	23/05/24	ISSUED FOR PART 8 PLANNING	R.H.	I.B.
P07	17/05/24	ISSUED FOR PART 8 PLANNING	R.H.	I.B.
P06	17/05/23	ISSUED FOR PART 8 PLANNING	S.S.	I.B.
P05	29/05/23	ISSUED FOR PART 8 PLANNING	J.F.	I.B.
P04	15/05/23	ISSUED FOR INFORMATION	J.F.	I.B.
P03	08/02/23	ISSUED FOR INFORMATION	R.H.	I.B.
P02	14/12/22	ISSUED FOR INFORMATION	J.F.	I.B.
P01	12/08/22	ISSUED FOR INFORMATION	R.H.	I.B.
REV	DATE	DESCRIPTION	BY	APP

PROJECT: MAGHERABEG BEACH FACILITY CENTRE FOR WATER SPORTS ACTIVITIES

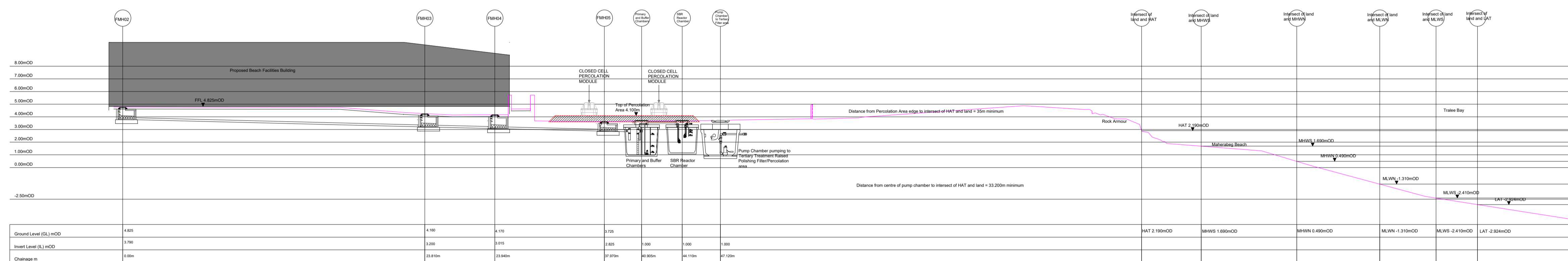
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DRAWING NUMBER:	23173 - MWP - 00 - 01 - DR - C - 0105			REV:	P09



- NOTES:
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  3. ANY DISCREPANCIES BETWEEN THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
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**FOUL DRAINAGE SYSTEM LONGITUDINAL SECTION**  
All Levels are to OD Malin Head

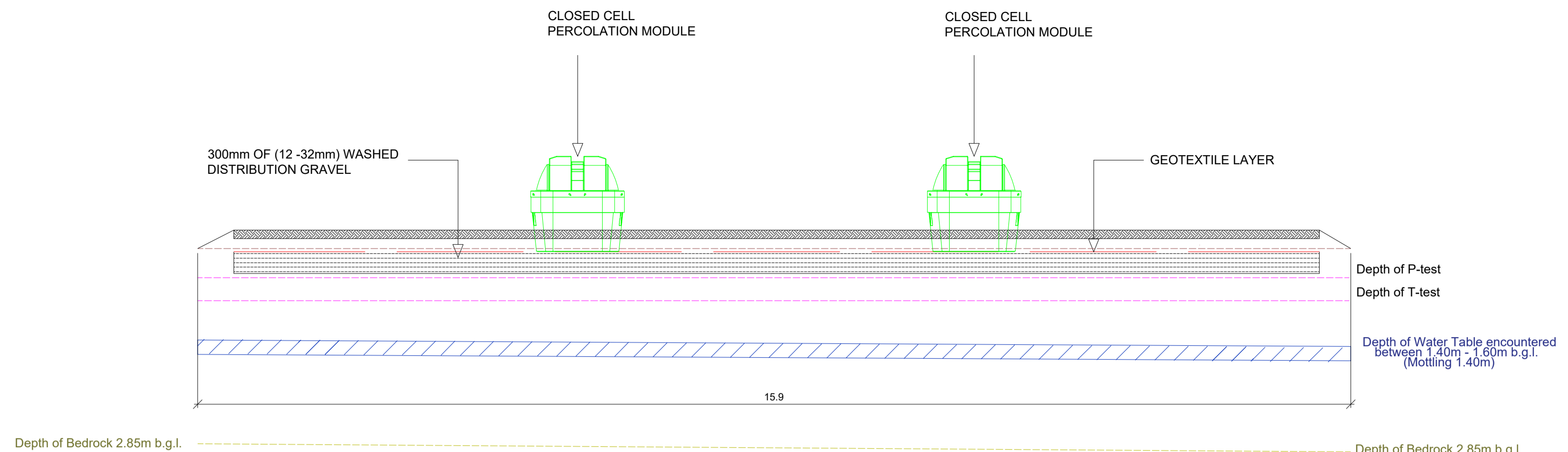
PO2	21/08/25	ISSUED FOR PART 8 PLANNING	S.R.	I.B.
PO1	05/10/23	ISSUED FOR PLANNING	S.S.	I.B.
REV	DATE	DESCRIPTION	BY	APP

PROJECT:  
**MAGHERABEG BEACH FACILITY CENTRE FOR WATER SPORTS ACTIVITIES**

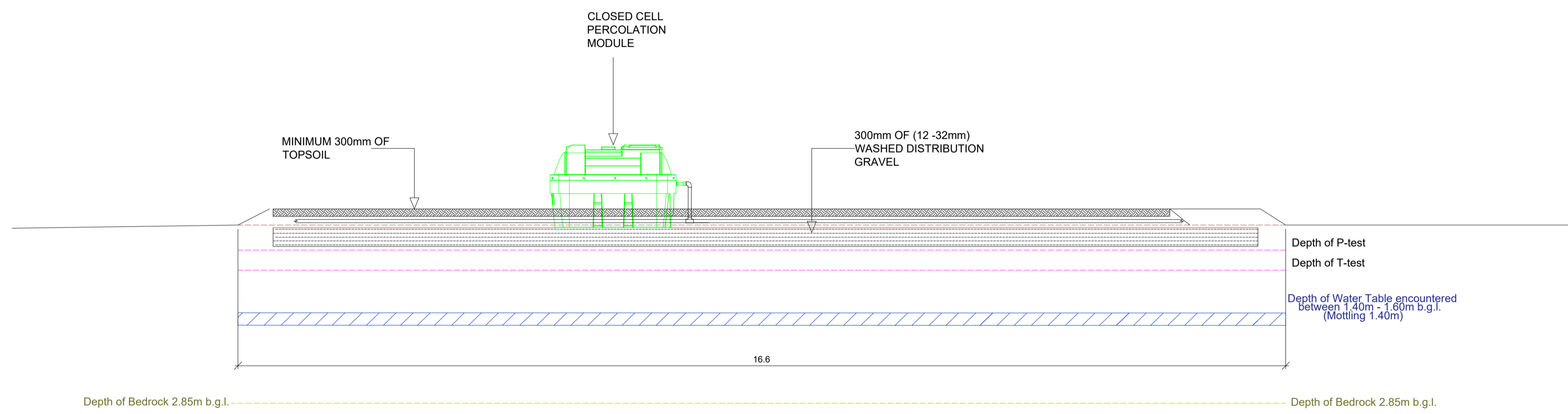
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**PROPOSED TREATMENT SYSTEM SECTION**



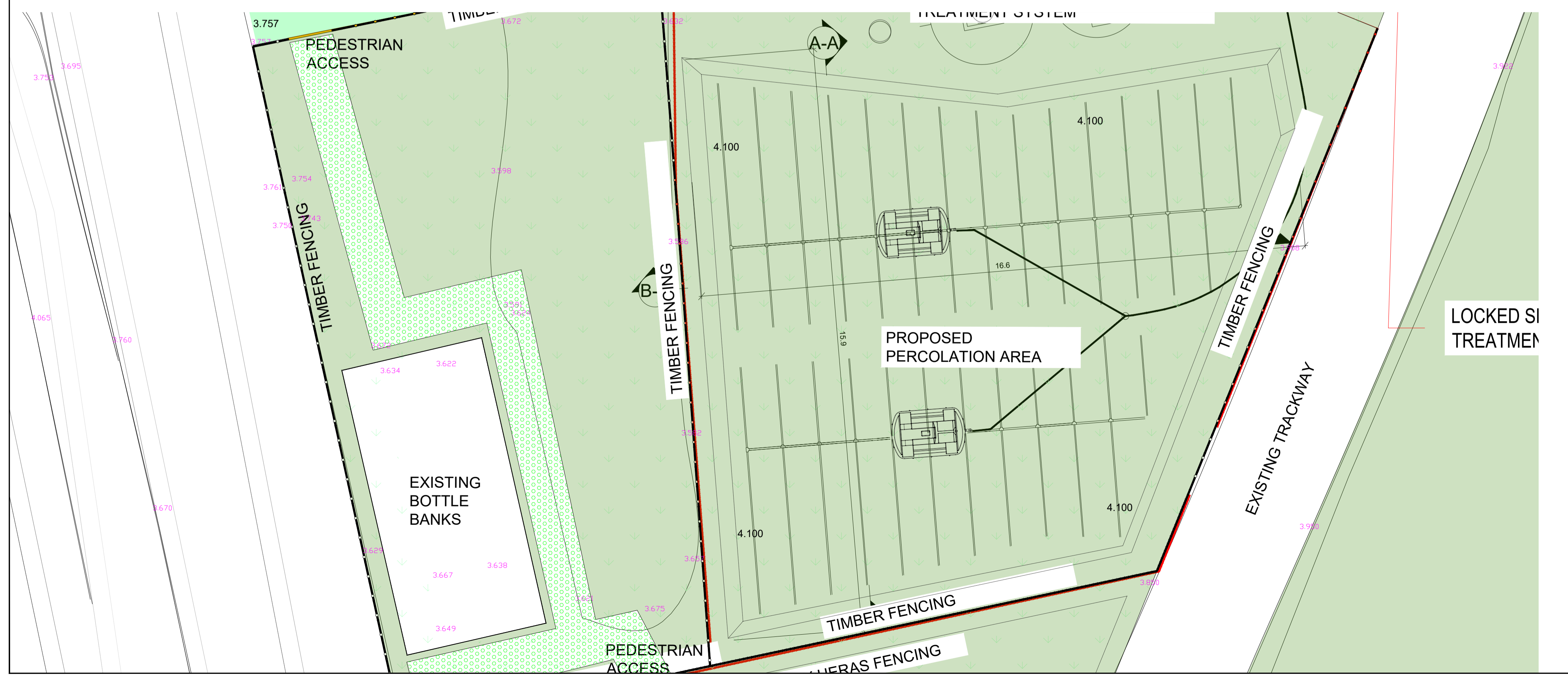
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STATUS DESCRIPTION:	FOR INFORMATION			STATUS:	S2
DRAWING NUMBER:	23173 - MWP - 00 - 01 - DR - C - 1204			REV:	P02



**Cross Section A - A**

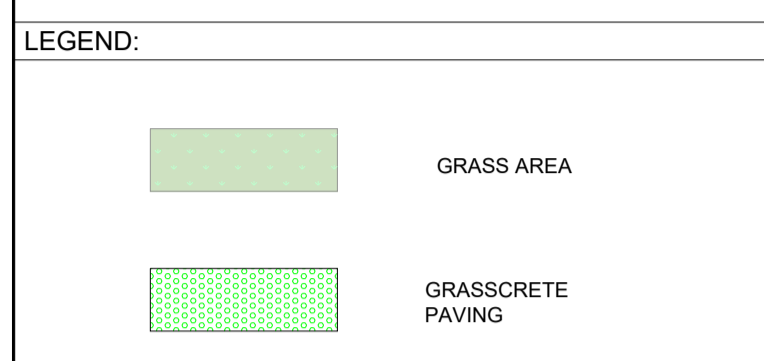


**Cross Section B - B**



REFER TO P & T TESTS RESULTS IN APPENDIX 2.

- NOTES:**
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PO1	21/08/25	ISSUED FOR PART 8 PLANNING	S.R.	I.B.
REV	DATE	DESCRIPTION	BY	APP
PROJECT: MAGHERABEG BEACH FACILITY CENTRE FOR WATER SPORTS ACTIVITIES				
TITLE: PROPOSED PERCOLATION AREA				
CLIENT:				
 CORK   TRALEE   LONDON   LIMERICK mwp.ie				
DRAWN: S.R.	CHECKED: D.T.	APPROVED: D.T.		
PROJECT NUMBER: 23173	DATE: JUNE 25	SCALE @ A1: NTS		
STATUS DESCRIPTION: FOR INFORMATION			STATUS: S2	
DRAWING NUMBER: 23173 - MWP - 00 - 00 - DR - C - 0103				REV: P01

## **Appendix 2**

### **Test Results**

- P&T Tests 1,
- P&T Tests 2 and
- MWP Infiltration Test Report



# APPENDIX A: SITE CHARACTERISATION FORM

1

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 **As per loading information supplied by the client & their agent.**

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  LI  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).

Note: Only information available at the desk study stage should be used in this section.

### System Loading Sheet

### Maherabeg Beach

Load information for toilet and shower block supplied by M.W.P      Total Hydraulic Load  
3,480 Litres

Total      3480 litres

**3480 litres      divided by 150 litres (load per person) = 23.2 P.E. Say (24 P.E.)**

150 litres

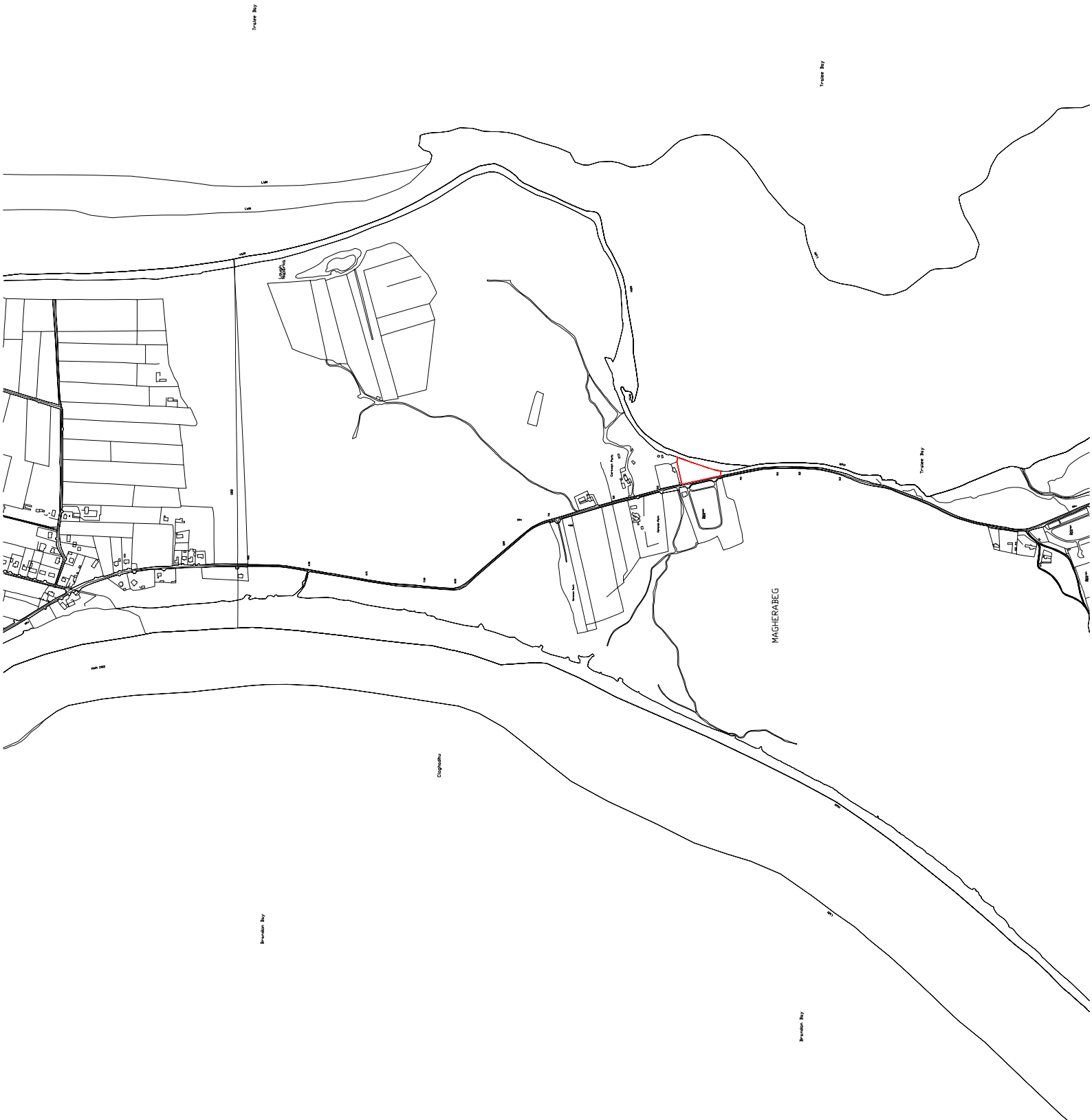
The client has decided to propose a 30pe unit so in order to have extra capacity.

**These figures are supplied by the client based on their good research and allow for a situation where the visitor numbers may increase over time and allow for slightly extra busy periods.**

**Figures sheet supplied by client and their agent.**

HOUR	NO. OF PERSONS (wc & shower)	LITRES USED			TOTAL (litres)
		WC	WHB	SHOWER	
08:00-09:00	5 & 0	25	5	0	30
09:00-10:00	15 & 2	75	15	90	180
10:00-11:00	25 & 3	125	25	135	285
12:00-13:00	35 & 5	175	35	225	435
13:00-14:00	45 & 6	225	45	270	540
14:00-15:00	35 & 4	175	35	180	390
15:00-16:00	25 & 2	125	25	90	240
16:00-17:00	25 & 3	125	25	135	345
17:00-18:00	25 & 6	125	25	270	420
18:00-19:00	20 & 6	100	20	270	390
19:00-20:00	10 & 2	50	10	90	150
20:00-21:00	5 & 1	25	5	45	75
<b>TOTAL DAILY LOADING ON SYSTEM</b>					

N.B. - Sizing of effluent system is based on usage figures supplied by the client and their agent .



Trillick Bay

Trillick Bay

Trillick Bay

MAGHERBEG

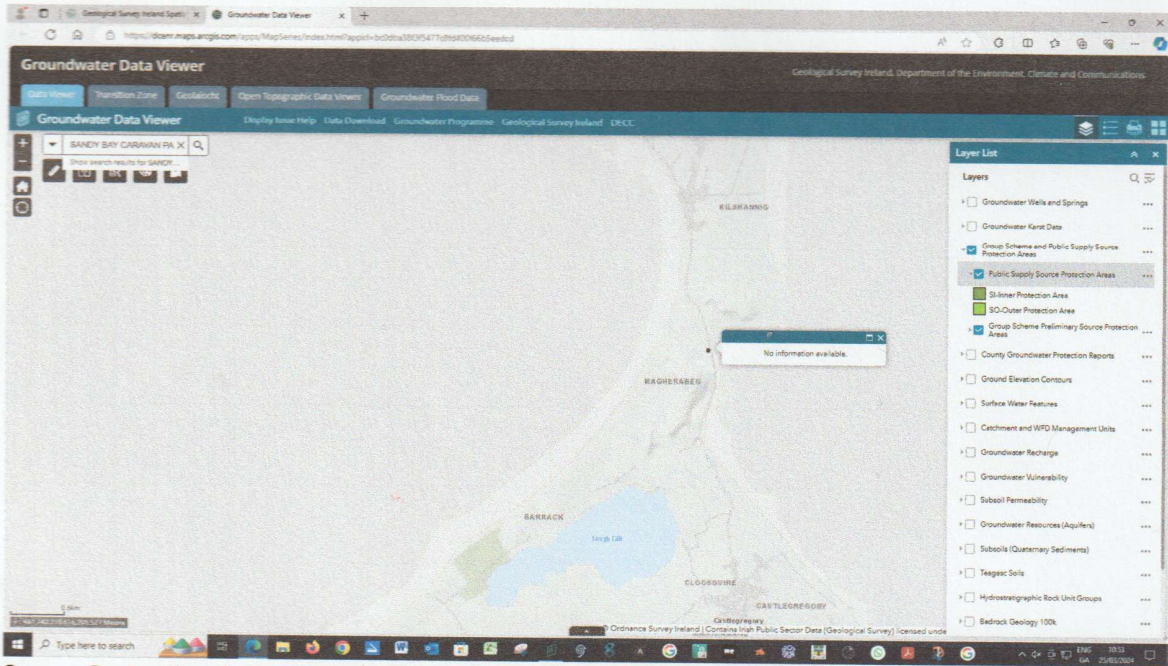
Cloghan

Brumpton Bay

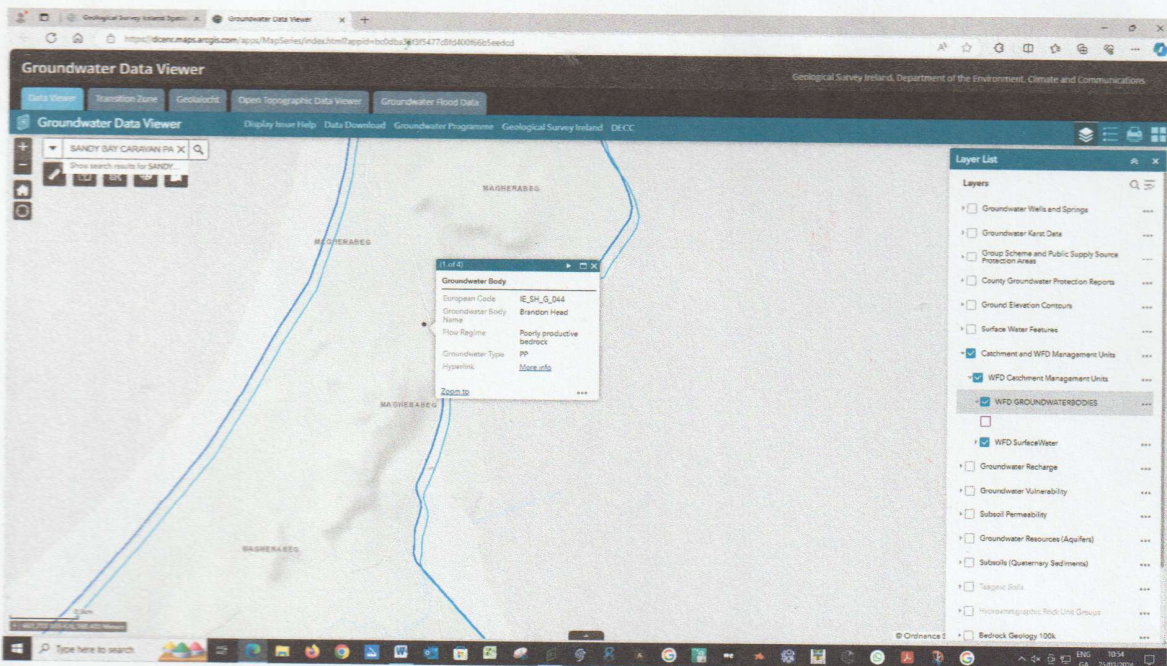
Brumpton Bay

4

# Maherbeg

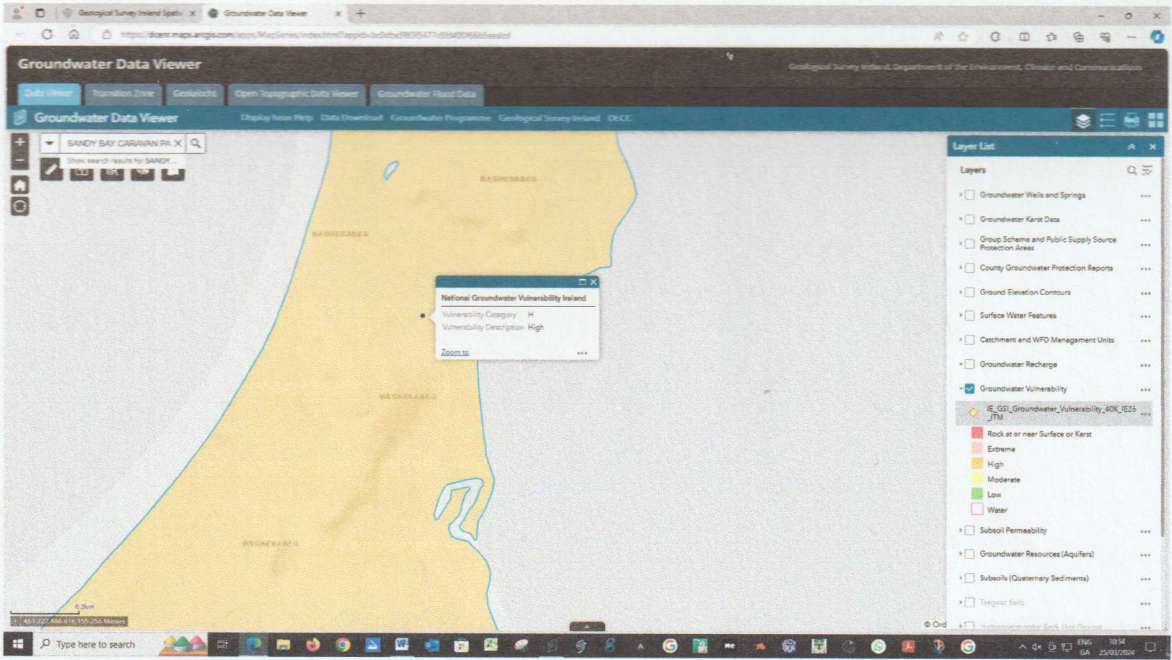


Source Protection Area : SI – n/a, SO – n/a.

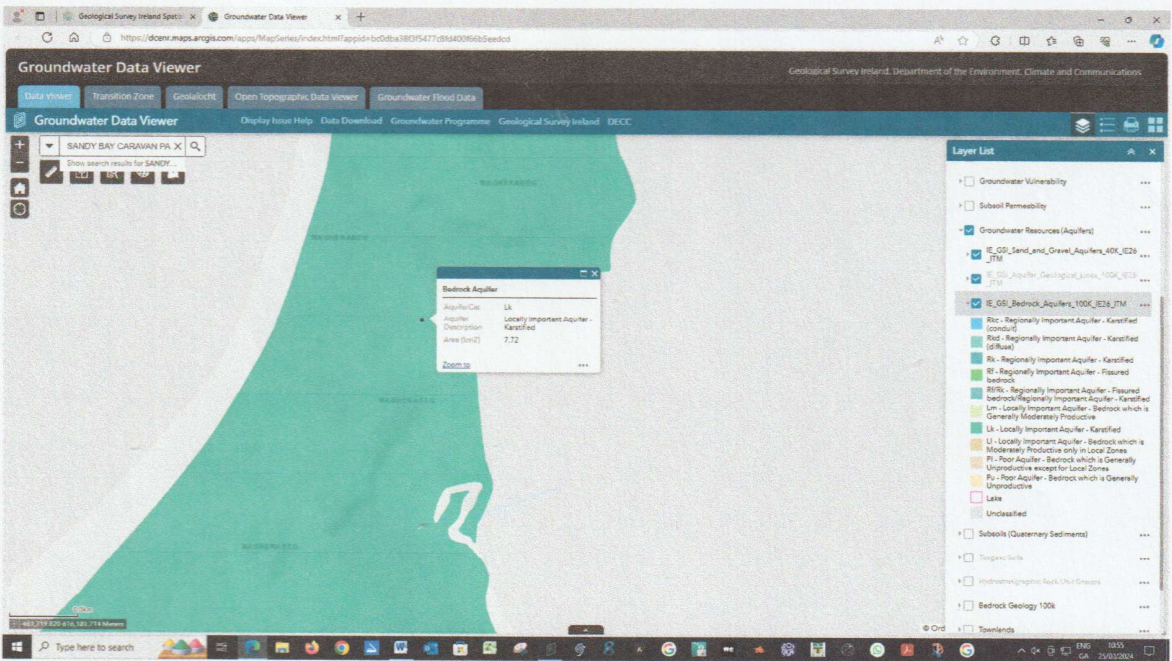


Groundwater Body Name : Brandon Head

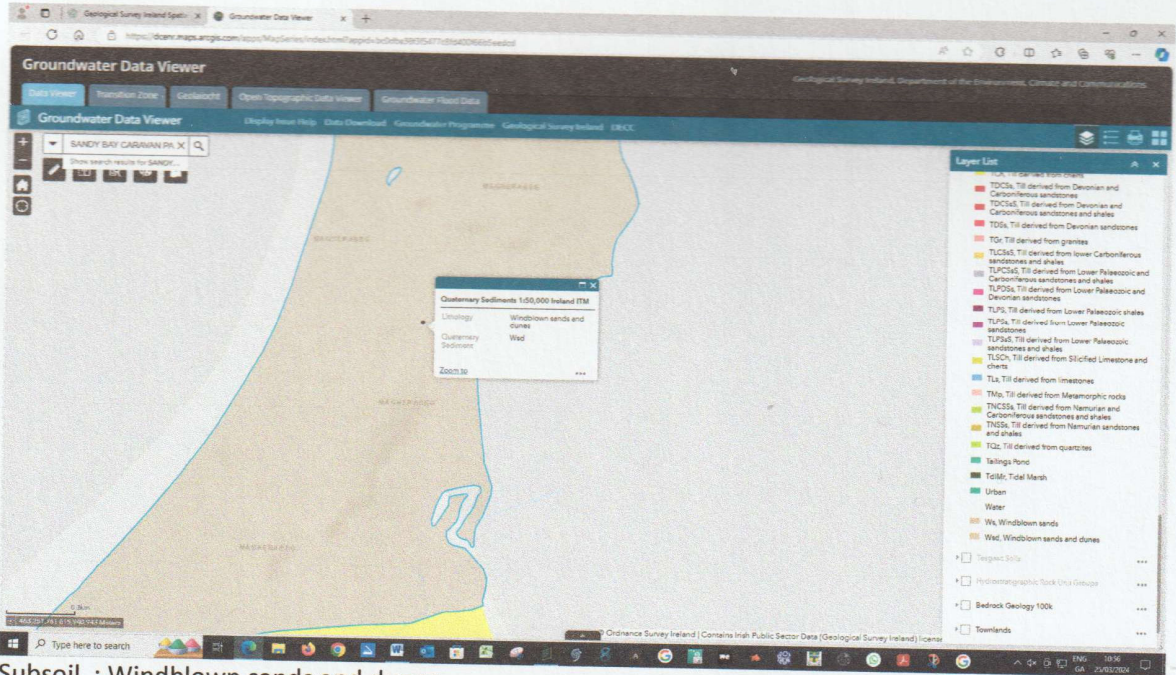
5



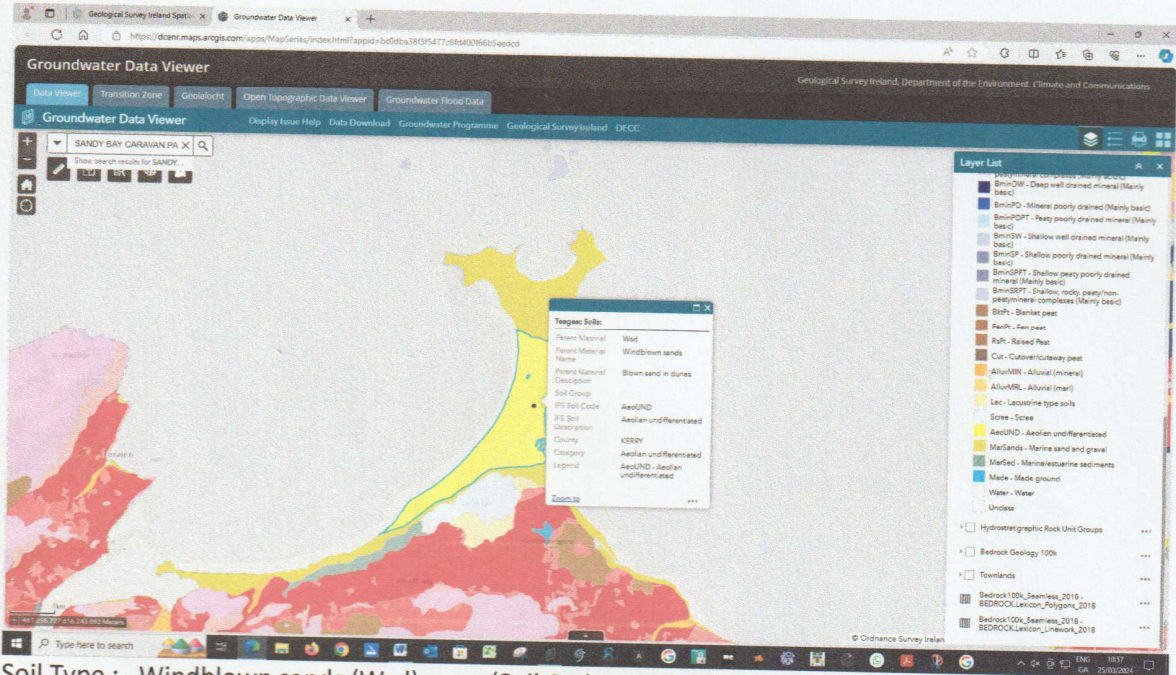
Vulnerability : High



Aquifer : Locally Important (LI)

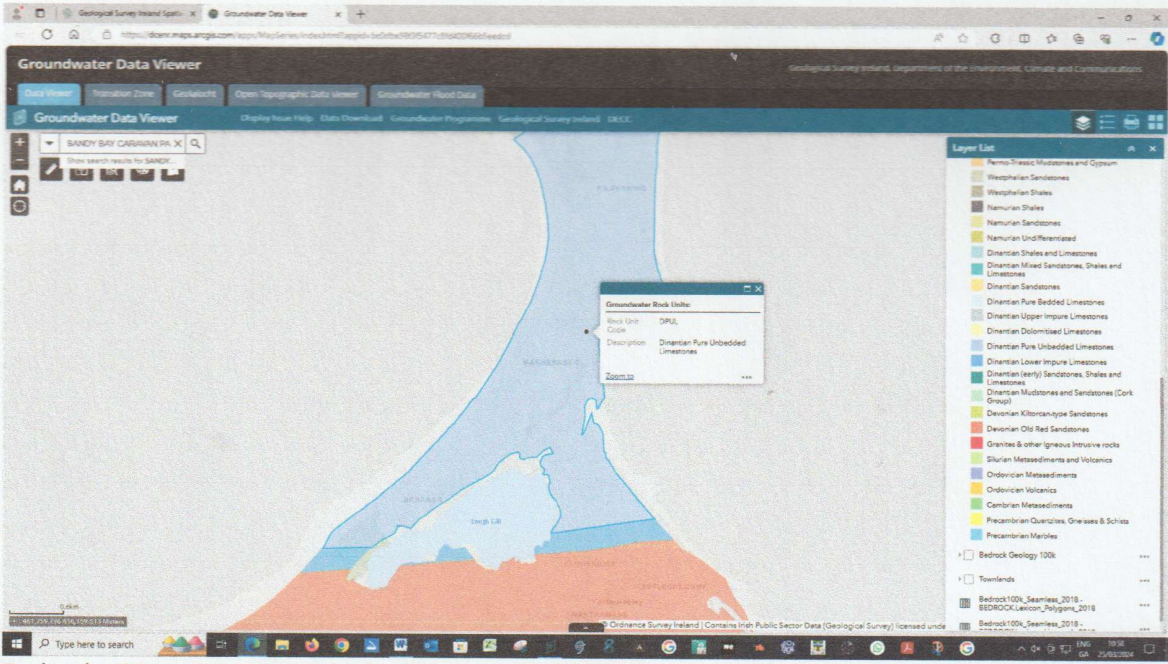


Subsoil : Windblown sands and dunes

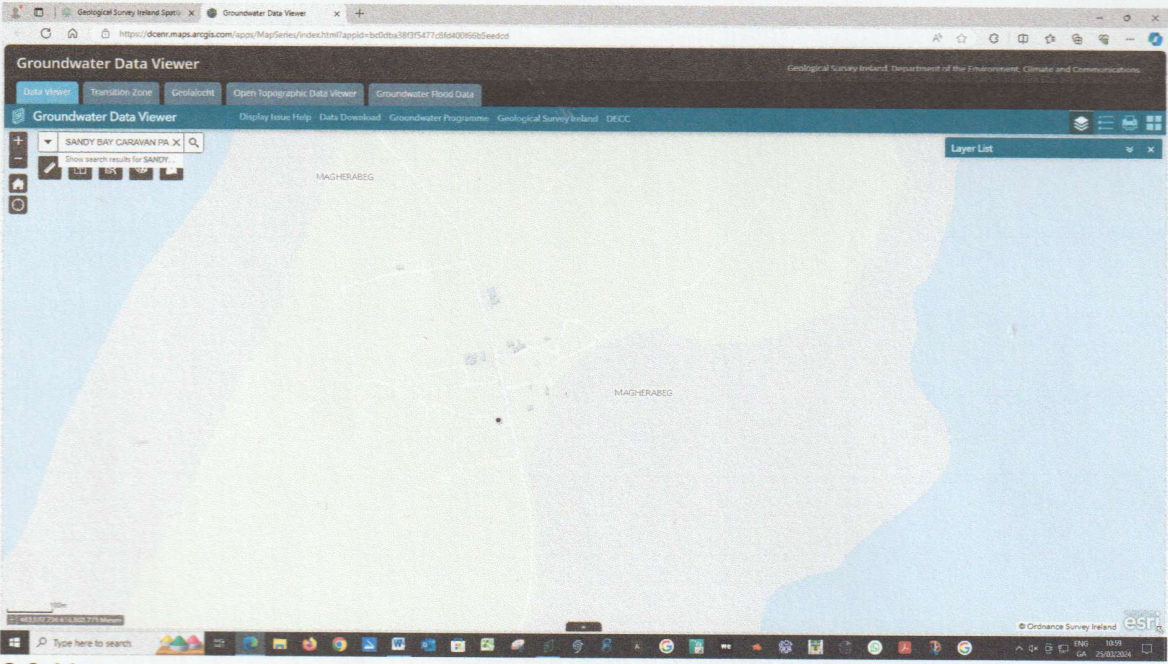


Soil Type : Windblown sands (Wsd) (Soil Code : AeoUND)

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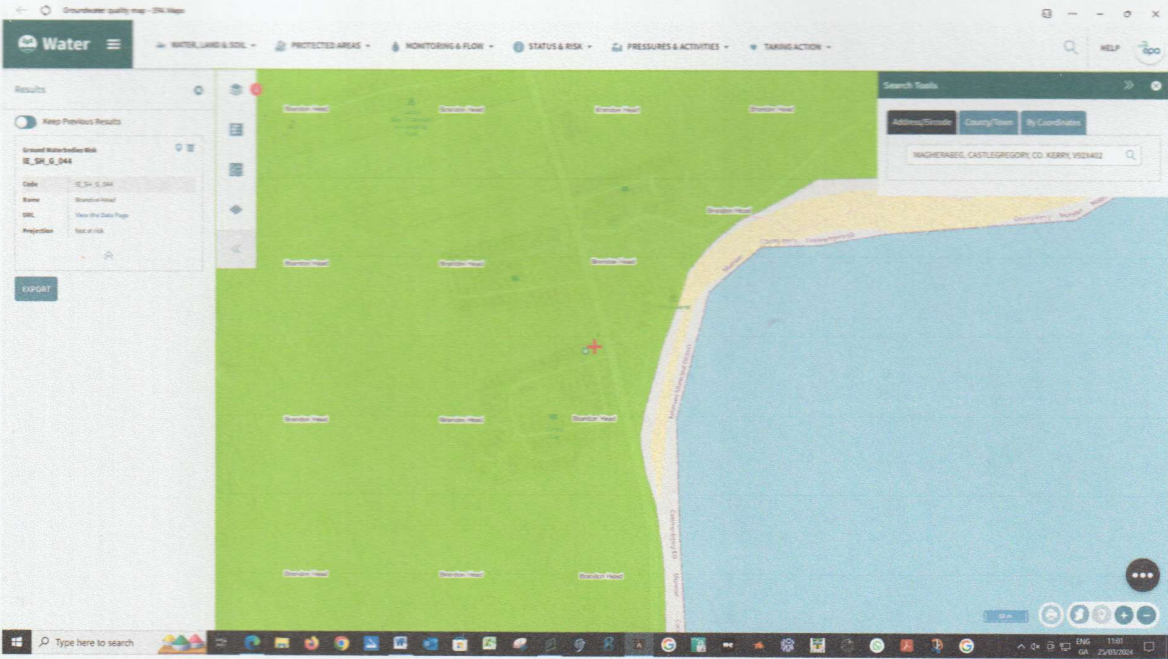
Bedrock : Dinantian Pure Unbedded Limestones (DPUL)



O.S. Map

G.P.R. is R2<sup>1</sup>

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Groundwater Quality Map : Not at Risk

### 3.0 ON-SITE ASSESSMENT

#### 3.1 Visual Assessment

Landscape Position: Almost flat site, with some minor bumps and humps

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

Slope Comment: 0.7m over 45m approx in zone

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

Houses:

Some nearby, Caravan park across road, Sports business to one side, and 9 houses within 250m

Existing Land Use:

Toilet & shower block and parking area on site at present.

Vegetation Indicators:

Grasses and plants in test area (existing green)

Groundwater Flow Direction: West to East

Ground Condition:

Mostly firm during testing (wet weather)

Site Boundaries:

2 x fences, 1 x coast / wall

### 3.0 ON-SITE ASSESSMENT

#### 3.1 Visual Assessment (contd.)

Roads:

By road to front of site

Outcrops (Bedrock And/Or Subsoil):

None evident during testing

Surface Water Ponding:

None visible during testing in test zone (wet weather)

Lakes:

None within 150m

Beaches/Shellfish Areas:

Magherbeg beach is adjacent to site (see layout)

Wetlands:

None within 250m

Karst Features:

None within 250m

Watercourses/Streams:\*

None within 250m

\*Note and record water level

### 3.0 ON-SITE ASSESSMENT

#### 3.1 Visual Assessment (contd.)

Drainage Ditches:\*

Existing storm water drain 22.8m to the South (see layout)

Springs:\*

None evident within 100m (confirmed by client / agent)

Wells:\*

None evident within 100m (confirmed by client / agent)

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).

Magherbeg Beach is adjacent to site  
Existing storm water drain 22.8m to the South (see layout)  
E.P.A set back distances will be achieved with our proposal

\*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	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m <input type="text"/>	SAND	0 Threads 5 mm Ribbons Dilatant	Granular	Low (uncompact)	Brown	Roots and Small stones
0.2 m <input type="text"/>						
0.3 m <input type="text"/>						
0.4 m <input type="text" value="P"/>						
0.5 m <input type="text"/>						
0.6 m <input type="text"/>						
0.7 m <input type="text"/>						
0.8 m <input type="text" value="t"/>						
0.9 m <input type="text"/>						
1.0 m <input type="text"/>						
1.1 m <input type="text"/>						
1.2 m <input type="text"/>						
1.3 m <input type="text"/>						
1.4 m <input type="text"/>						
1.5 m <input type="text"/>						
1.6 m <input type="text" value="WT"/>	Water Table 1.6m					
1.7 m <input type="text"/>						
1.8 m <input type="text"/>						
1.9 m <input type="text"/>						
2.0 m <input type="text"/>						
2.1 m <input type="text"/>						
2.2 m <input type="text"/>						
2.3 m <input type="text"/>						
2.4 m <input type="text"/>						
2.5 m <input type="text"/>						
2.6 m <input type="text"/>						
2.7 m <input type="text"/>						
2.8 m <input type="text"/>	Bedrock 2.85m					
2.9 m <input type="text" value="BR"/>						
3.0 m <input type="text"/>						
3.1 m <input type="text"/>						
3.2 m <input type="text"/>						
3.3 m <input type="text"/>						
3.4 m <input type="text"/>						
3.5 m <input type="text"/>						

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.

BS5930 Tests (TH )

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SAND

0 threads

6mm ribbons

Dilatant

0 threads

5mm ribbons

dilatant

0 threads

4mm ribbons

dilatant

**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	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m <input type="text"/>	SAND	0 Threads 6 mm Ribbons Dilatant	Granular	Low (uncompact)	Brown	Roots and Small stones
0.2 m <input type="text"/>						
0.3 m <input type="text"/>						
0.4 m <input type="text" value="P"/>						
0.5 m <input type="text"/>						
0.6 m <input type="text"/>						
0.7 m <input type="text"/>						
0.8 m <input type="text" value="t"/>						
0.9 m <input type="text"/>						
1.0 m <input type="text"/>						
1.1 m <input type="text"/>						
1.2 m <input type="text"/>						
1.3 m <input type="text"/>						
1.4 m <input type="text" value="WT"/>	Water Table 1.4m					
1.5 m <input type="text"/>						
1.6 m <input type="text"/>						
1.7 m <input type="text"/>						
1.8 m <input type="text"/>						
1.9 m <input type="text"/>						
2.0 m <input type="text"/>						
2.1 m <input type="text"/>						
2.2 m <input type="text"/>						
2.3 m <input type="text"/>						
2.4 m <input type="text"/>						
2.5 m <input type="text"/>						
2.6 m <input type="text"/>						
2.7 m <input type="text"/>						
2.8 m <input type="text" value="BR"/>	Bedrock 2.8m					
2.9 m <input type="text"/>						
3.0 m <input type="text"/>						
3.1 m <input type="text"/>						
3.2 m <input type="text"/>						
3.3 m <input type="text"/>						
3.4 m <input type="text"/>						
3.5 m <input type="text"/>						

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.

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BS5930 Tests (TH )

SAND

0 threads

7mm ribbons

Dilatant

0 threads

6mm ribbons

dilatant

0 threads

5mm ribbons

dilatant

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# T & P Tests

## Set 1

3.2 Trial Hole (contd.) Evaluation:

This type of soil should be able to treat wastewater

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)	320	320	320
Depth from ground surface to base of hole (mm) (B)	720	720	720
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	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	10:20	10:21	10:22
2nd pre-soak start	Date	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	16:07	16:08	16:09

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

Step 3: Measuring T<sub>100</sub>

Percolation Test Hole No.

	1	2	3
Date of test	26-03-2024	26-03-2024	26-03-2024
Time filled to 400 mm	09:30	09:31	09:32
Time water level at 300 mm	10:02	10:03	10:04
Time (min.) to drop 100 mm (T <sub>100</sub> )	32.00	32.00	32.00
Average T <sub>100</sub>			32.00

If T<sub>100</sub> > 480 minutes then Subsurface Percolation value >120 – site unsuitable for discharge to ground

If T<sub>100</sub> ≤ 210 minutes then go to Step 4;

If T<sub>100</sub> > 210 minutes then go to Step 5;

**Step 4: Standard Method (where  $T_{100} \leq 210$  minutes)**

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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	10:02	10:43	41.00	10:03	10:45	42.00	10:04	10:47	43.00
2	10:44	11:29	45.00	10:46	11:31	45.00	10:48	11:33	45.00
3	11:30	12:25	55.00	11:32	12:27	55.00	11:34	12:29	55.00
Average $\Delta t$ Value	47.00			47.33			47.67		
	Average $\Delta t/4 =$ [Hole No.1] <span style="border: 1px solid black; padding: 2px;">11.75</span> ( $t_1$ )			Average $\Delta t/4 =$ [Hole No.2] <span style="border: 1px solid black; padding: 2px;">11.83</span> ( $t_2$ )			Average $\Delta t/4 =$ [Hole No.3] <span style="border: 1px solid black; padding: 2px;">11.92</span> ( $t_3$ )		

Result of Test: Subsurface Percolation Value = 11.83 (min/25 mm)

Comments:

This is an acceptable T value in the subsoil layer.

**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 = ( $T_1$ )		<span style="border: 1px solid black; padding: 2px;">0.00</span>		

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 = ( $T_2$ )		<span style="border: 1px solid black; padding: 2px;">0.00</span>		

Result of Test: Subsurface Percolation Value = 0.00 (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 = ( $T_3$ )		<span style="border: 1px solid black; padding: 2px;">0.00</span>		

Comments:

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### 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)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

#### Step 2: Pre-Soaking Test Holes

Pre-soak start	Date	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	10:26	10:27	10:28
2nd pre-soak start	Date	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	16:10	16:11	16:12

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	26-Mar-24	26-Mar-24	26-Mar-2024
Time filled to 400 mm	09:36	09:37	09:38
Time water level at 300 mm	10:08	10:09	10:10
Time to drop 100 mm ( $T_{100}$ )	32.00	32.00	32.00
Average $T_{100}$			32.00

If  $T_{100} > 480$  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;

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**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	10:08	10:55	47.00	10:09	10:57	48.00	10:10	10:59	49.00
2	10:56	11:45	49.00	10:58	11:47	49.00	11:00	11:49	49.00
3	11:46	12:36	50.00	11:48	12:38	50.00	11:50	12:40	50.00
Average $\Delta T$ Value			48.67			49.00			49.33
	Average $\Delta T/4 =$ [Hole No.1] <input type="text" value="12.17"/> ( $T_1$ )			Average $\Delta T/4 =$ [Hole No.2] <input type="text" value="12.25"/> ( $T_2$ )			Average $\Delta T/4 =$ [Hole No.3] <input type="text" value="12.33"/> ( $T_3$ )		

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

Comments:

This is an acceptable P value in this layer

**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:

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# T & P Tests

## Set 2

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

Uphill / Downhill  
 This type of soil should be able to treat wastewater

**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)	320	320	320
Depth from ground surface to base of hole (mm) (B)	720	720	720
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	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	10:29	10:30	10:31
2nd pre-soak start	Date	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	16:13	16:14	16:15

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	26-03-2024	26-03-2024	26-03-2024
Time filled to 400 mm	09:33	09:34	09:35
Time water level at 300 mm	10:05	10:06	10:07
Time (min.) to drop 100 mm ( $T_{100}$ )	32.00	32.00	32.00
Average $T_{100}$			32.00

If  $T_{100} > 480$  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)

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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	10:05	10:49	44.00	10:06	10:51	45.00	10:07	10:53	46.00
2	10:50	11:35	45.00	10:52	11:37	45.00	10:54	11:40	46.00
3	11:36	12:30	54.00	11:38	12:33	55.00	11:40	12:35	55.00
Average $\Delta t$ Value	47.67			48.33			49.00		
	Average $\Delta t/4 =$ [Hole No.1] <input type="text" value="11.92"/> ( $t_1$ )			Average $\Delta t/4 =$ [Hole No.2] <input type="text" value="12.08"/> ( $t_2$ )			Average $\Delta t/4 =$ [Hole No.3] <input type="text" value="12.25"/> ( $t_3$ )		

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

Comments:

This is an acceptable T value in the subsoil layer.

**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: Subsurface 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:

This is an acceptable T value in the subsoil layer.

### 3.3(b) Surface Percolation Test for Soil

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#### Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

#### Step 2: Pre-Soaking Test Holes

Pre-soak start	Date	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	10:32	10:33	10:34
2nd pre-soak start	Date	25-Mar-2024	25-Mar-2024	25-Mar-2024
	Time	16:17	16:18	16:19

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	26-Mar-24	26-Mar-24	26-Mar-2024
Time filled to 400 mm	09:39	09:40	09:41
Time water level at 300 mm	10:11	10:12	10:13
Time to drop 100 mm ( $T_{100}$ )	32.00	32.00	32.00
Average $T_{100}$			32.00

If  $T_{100} > 480$  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;

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**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	10:11	11:01	50.00	10:12	11:03	51.00	10:13	11:05	52.00
2	11:02	11:52	50.00	11:04	11:55	51.00	11:06	11:58	52.00
3	11:52	12:43	51.00	11:55	12:47	52.00	11:58	12:51	53.00
Average $\Delta T$ Value	50.33			51.33			52.33		
	Average $\Delta T/4 =$ [Hole No.1] 12.58 ( $T_1$ )			Average $\Delta T/4 =$ [Hole No.2] 12.83 ( $T_2$ )			Average $\Delta T/4 =$ [Hole No.3] 13.08 ( $T_3$ )		

Result of Test: Surface Percolation Value = 12.83 (min/25 mm)

Comments:

This is an acceptable P value in this layer

**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		

Result of Test: Surface Percolation Value =

0.00 (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 = ( $T_3$ )		0.00		

Comments:

**3.4 The following associated Maps, Drawings and Photographs should be appended to this site characterisation form.**

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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:

Are all minimum separation distances met? (Upgrade)

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

Percolation test result: Surface:  Sub-surface:

Not Suitable for Development

Suitable for Development   
NB - as upgrade.

- 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>**

Discharge to Groundwater

### 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.

This system should be built and located as shown on the attached planning drawings: Key Levels:  
 Inlet into Malloy Chieftan M.A.U. is 3.350m (approx) Inlet into Ecoflo modules is 4.633m (approx)  
 Top of distribution stone is 3.953m (approx) Trench invert level is 3.653m (approx)  
 Contact OSC prior to construction. all relevant issues must be re-verified prior to installation. All works must be in strict compliance with E.P.A C.O.P guidelines and K.C.C. conditions. Layout & levels supplied by client & agent. Prior to commencement of installation a qualified engineer must determine and instruct the installer regarding issues such as if a retaining wall is required for the polishing filter. etc. We are not liable for any issues that arise with upgrades of old in situ systems being done to improve the situation while not fully E.P.A. compliant. Responsibility for this rests with the client. Clients and their agents are responsible for information supplied to us such as flood plain verification, well location, drains, local features identification etc. We asked about these issues during testing. All pipework and equipment being used in this system is the responsibility of the client and their installer to ensure that they are fit for purpose and not carrying roof water and surface water. Clients must ensure that all products used in this system are properly certified and correctly sized. Suppliers instructions should be read and followed.

<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 style="width: 80%;" type="text"/>	Percolation Area	Mounded Percolation Area
	No. of Trenches <input style="width: 80%;" type="text"/>	No. of Trenches <input style="width: 80%;" type="text"/>
	Length of Trenches (m) <input style="width: 80%;" type="text"/>	Length of Trenches (m) <input style="width: 80%;" type="text"/>
	Invert Level (m) <input style="width: 80%;" type="text"/>	Invert Level (m) <input style="width: 80%;" type="text"/>

**SYSTEM TYPE: Secondary Treatment System (Chapters 8 and 9) and polishing filter (Section 10.1)**

Secondary Treatment Systems receiving septic tank effluent (Chapter 8)				Packaged Secondary Treatment Systems receiving raw wastewater (Chapter 9)	
Media Type	Area (m <sup>2</sup> )*	Depth of Filter	Invert Level	Type	
Sand/Soil	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text" value="Malloy Chieftan"/>	
Soil	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	Capacity PE <input style="width: 80%;" type="text" value="30"/>	
Constructed Wetland	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	Sizing of Primary Compartment	
Other	<input style="width: 80%;" type="text" value="5.6"/>	<input style="width: 80%;" type="text" value="1.3"/>	<input style="width: 80%;" type="text" value="4.633"/>	<input style="width: 80%;" type="text"/>	m <sup>3</sup>

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

Surface Area (m <sup>2</sup> )*	<input style="width: 80%;" type="text" value="120.01"/>	Option 3 - Gravity Discharge Trench length (m)	<input style="width: 80%;" type="text"/>
Option 1 - Direct Discharge Surface area (m <sup>2</sup> )	<input style="width: 80%;" type="text"/>	Option 4 - Low Pressure Pipe Distribution Trench length (m)	<input style="width: 80%;" type="text"/>
Option 2 - Pumped Discharge Surface area (m <sup>2</sup> )	<input style="width: 80%;" type="text"/>	Option 5 - Drip Dispersal Surface area (m <sup>2</sup> )	<input style="width: 80%;" type="text"/>

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

Identify purpose of tertiary treatment  <input style="width: 95%; height: 80%;" type="text" value="To treat the effluent from the facility to a better standard."/>	Provide performance information demonstrating system will provide required treatment levels  <input style="width: 95%; height: 80%;" type="text" value="As per suppliers P.I.A cert (attached)"/>	Provide design information  <input style="width: 95%; height: 80%;" type="text" value="As per table 10.1 in E.P.A. manual 2021 ."/>
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**DISCHARGE ROUTE:**

Groundwater	<input checked="" type="checkbox"/>	Hydraulic Loading Rate * (l/m <sup>2</sup> .d)	<input style="width: 80%;" type="text"/>		Surface area (m <sup>2</sup> )	<input style="width: 80%;" type="text" value="120.01"/>
Surface Water **	<input type="checkbox"/>	Discharge Rate (m <sup>3</sup> /hr)	<input style="width: 80%;" type="text"/>			

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

\*\* Water Pollution Act discharge licence required



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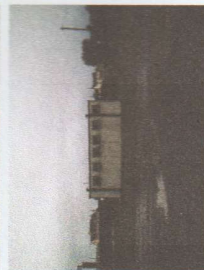
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**MWP**

## **Magherabeg Beach Facilities**

**Infiltration Testing to BRE 365**

**Kerry County Council**

**January 2023**



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Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
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**MWP, Engineering and Environmental Consultants**  
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**www.mwp.ie**



## 1. Introduction

Malachy Walsh and Partners (MWP) have been commissioned by Kerry County Council to act as Civil and Structural Engineering design consultants for the proposed beach facilities development in Magherabeg beach on the Magharees peninsula. Magherabeg beach is a blue flag beach located near the village of Castlegregory County Kerry.

This report outlines the results of infiltration testing carried out on the 6<sup>th</sup> of December 2022. The philosophy was prepared taking understanding of Section 3.2 of the BRE 365 document.

## 2. Trial Pit Location

The infiltration test was carried out in the center of the site near the proposed wastewater percolation area see figure 1.

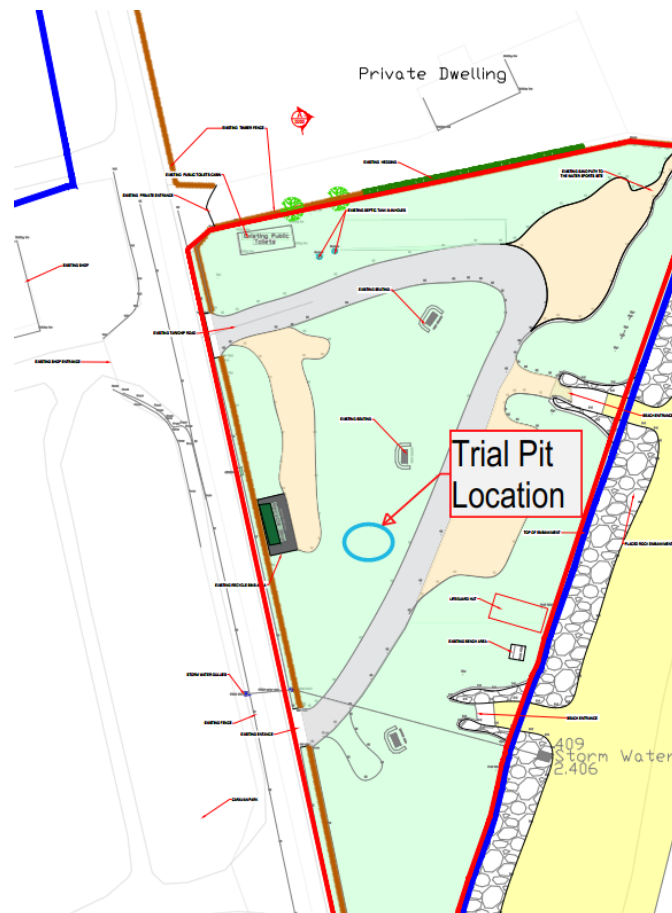


Fig 1: Trial Pit Location

### 3. Results

The infiltration tests were measured 2.1mx0.9m and dug to a depth of 1.05m. The soil at the beach consisted of 100mm of sandy/topsoil and sand beneath. The trial pit was filled with water and testing was carried out according to section 3.2 of the BRE 365 document. The results were taken and the soil infiltration rate  $f$  was calculated for Cycle 1 as  $4.8 \times 10^{-5}$  meters per second. The soil infiltration rate for Cycle no. 2 was  $4 \times 10^{-5}$ . The results for the 2 cycles can be seen on the graph below. Note the graphs are slight skewed due to sections of the side walls collapsing during testing. It is noted that a second trial pit was dug to the same dimensions near the existing toilets, however the walls collapsed due to the instability of the sandy side walls, therefore the results were discarded.

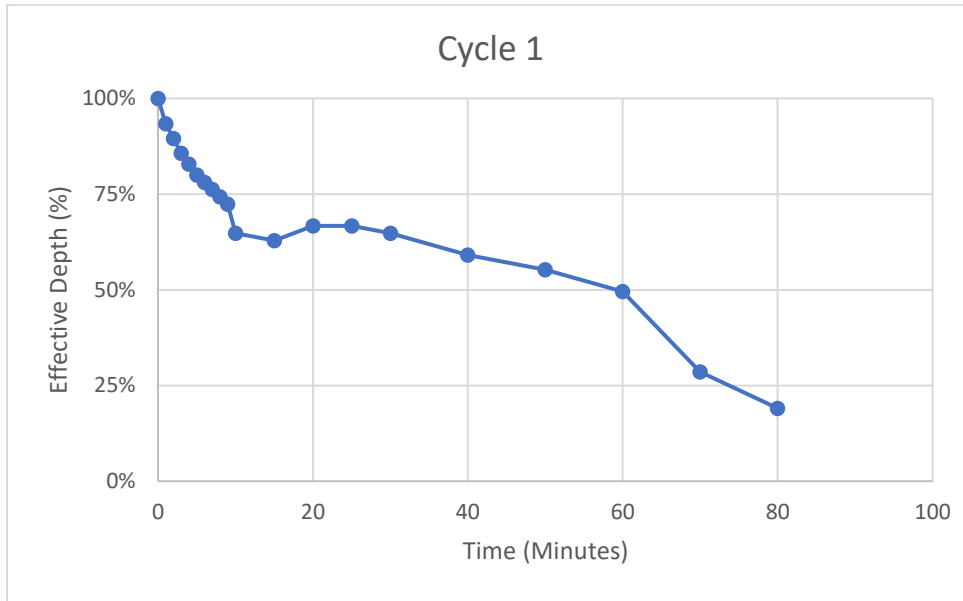
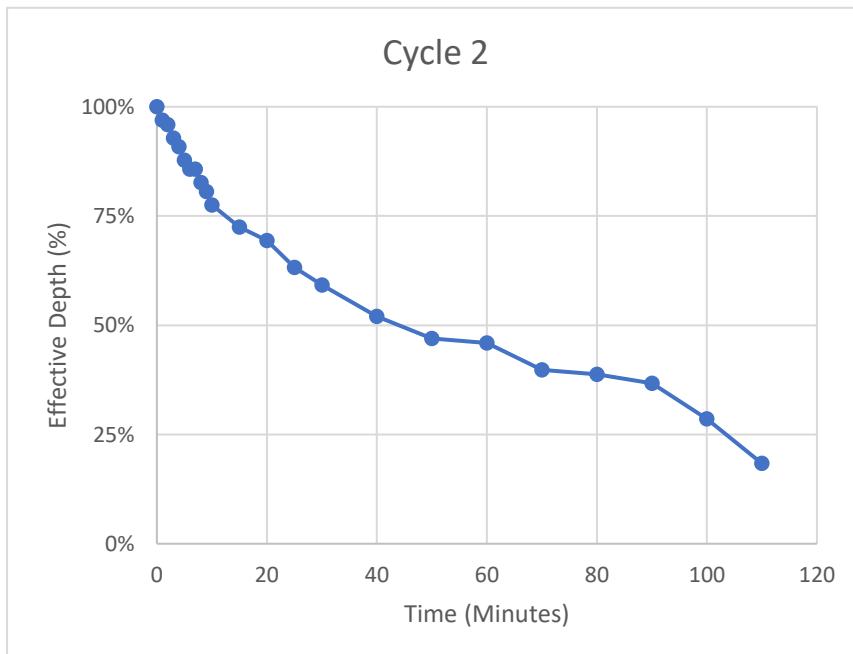


Fig 3.1: Field observations from Soakaway 1 Cycle 1



**Fig 3.2: Field observations from Soakaway 1 Cycle**

Typical infiltration coefficients based on soil texture are shown in table 1 below. The results from the trial pit fall into the soil type sand/slightly silty slightly clayey SAND category of  $1 \times 10^{-5}$ - $5 \times 10^{-5}$  which is consistent with the soil description.

Table 3.1: Typical infiltration coefficients based on soil texture

<b>TABLE 25.1 Typical infiltration coefficients based on soil texture (after Bettess, 1996)</b>		
<b>Soil type/texture</b>	<b>ISO 14688-1 description (after Blake, 2010)</b>	<b>Typical infiltration coefficients (m/s)</b>
<b>Good infiltration media</b> <ul style="list-style-type: none"> <li>• gravel</li> <li>• sand</li> <li>• loamy sand</li> <li>• sandy loam</li> </ul>	Sandy GRAVEL Slightly silty slightly clayey SAND Silty slightly clayey SAND Silty clayey SAND	$3 \times 10^{-4} - 3 \times 10^{-2}$ $1 \times 10^{-5} - 5 \times 10^{-5}$ $1 \times 10^{-4} - 3 \times 10^{-5}$ $1 \times 10^{-7} - 1 \times 10^{-5}$
<b>Poor infiltration media</b> <ul style="list-style-type: none"> <li>• loam</li> <li>• silt loam</li> <li>• chalk (structureless)</li> <li>• sandy clay loam</li> </ul>	Very silty clayey SAND Very sandy clayey SILT N/A Very clayey silty SAND	$1 \times 10^{-7} - 5 \times 10^{-6}$ $1 \times 10^{-7} - 1 \times 10^{-5}$ $3 \times 10^{-8} - 3 \times 10^{-6}$ $3 \times 10^{-10} - 3 \times 10^{-7}$
<b>Very poor infiltration media</b> <ul style="list-style-type: none"> <li>• silty clay loam</li> <li>• clay</li> <li>• till</li> </ul>	– – Can be any texture of soil described above	$1 \times 10^{-8} - 1 \times 10^{-6}$ $< 3 \times 10^{-8}$ $3 \times 10^{-9} - 3 \times 10^{-6}$
<b>Other</b> <ul style="list-style-type: none"> <li>• rock* (note mass infiltration capacity will depend on the type of rock and the extent and nature of discontinuities and any infill)</li> </ul>	N/A	$3 \times 10^{-9} - 3 \times 10^{-5}$

## 4. Conclusion

The infiltration rate calculated from the testing was  $4 \times 10^{-5}$  meters/second and  $4.8 \times 10^{-5}$  meters/second. The proposed treatment unit is a Molloy Environmental System’s 30PE Chieftain SBR wastewater treatment system. The proposed treatment unit has been designed to incorporate the soil description and infiltration testing.

# Appendix 3

## Existing Site Water Usage Table



READTIME	INDEX m3	CONSUMPTION m3	READ TYPE	SERIAL
12/05/2025 16:00	5235		Manual	06LU817577
26/08/2024 09:10	5235		1 Manual	06LU817577
17/05/2024 09:59	5234		0 Manual	06LU817577
26/02/2024 09:28	5234		0 Manual	06LU817577
15/11/2023 09:07	5234		0 Manual	06LU817577
16/08/2023 09:16	5234		2 Manual	06LU817577
15/05/2023 12:23	5232		0 Manual	06LU817577
24/02/2023 10:02	5232		1 Manual	06LU817577
22/11/2022 09:36	5231		0 Manual	06LU817577
17/08/2022 08:53	5231		2 Manual	06LU817577
18/05/2022 09:06	5229		0 Manual	06LU817577
16/02/2022 12:13	5229		0 Manual	06LU817577
23/11/2021 12:57	5229		0 Manual	06LU817577
19/08/2021 09:57	5229		142 Manual	06LU817577
25/05/2021 09:59	5087		8 Manual	06LU817577
18/02/2021 10:20	5079		2.54 Manual	06LU817577
18/11/2020 09:39	5076		1.258 Wireless	06LU817577
01/11/2020 00:00	5075		1.398 FDR	06LU817577
01/10/2020 01:00	5073		20.976 FDR	06LU817577
01/09/2020 01:00	5052		19.828 FDR	06LU817577
20/08/2020 09:22	5033		81.379 Manual	06LU817577
01/08/2020 01:00	4951		84.688 FDR	06LU817577
01/07/2020 01:00	4866		12.265 FDR	06LU817577
01/06/2020 01:00	4854		0.001 FDR	06LU817577
26/05/2020 09:28	4854		4.177 Wireless	06LU817577
01/05/2020 01:00	4850		2.763 FDR	06LU817577
01/04/2020 01:00	4847		2.505 FDR	06LU817577
01/03/2020 00:00	4845		0.32 FDR	06LU817577
19/02/2020 09:38	4844		0.659 Wireless	06LU817577
01/02/2020 00:00	4844		1.184 FDR	06LU817577
01/01/2020 00:00	4843		17.385 FDR	06LU817577
01/12/2019 00:00	4825		0.349 FDR	06LU817577
22/11/2019 12:10	4825		0.357 Wireless	06LU817577
01/11/2019 00:00	4824		0.439 FDR	06LU817577
01/10/2019 01:00	4824		7.475 FDR	06LU817577
01/09/2019 01:00	4817		11.173 FDR	06LU817577
20/08/2019 13:51	4805		38.911 Wireless	06LU817577
01/08/2019 01:00	4766		70.478 FDR	06LU817577
01/07/2019 01:00	4696		36.016 FDR	06LU817577
01/06/2019 01:00	4660		1.092 FDR	06LU817577
28/05/2019 11:49	4659		10.132 Wireless	06LU817577
01/05/2019 01:00	4649		4.239 FDR	06LU817577
01/04/2019 01:00	4645		0.213 FDR	06LU817577

01/03/2019 00:00	4644	0 FDR	06LU817577
15/02/2019 09:28	4644	0 Wireless	06LU817577
01/02/2019 00:00	4644	0 FDR	06LU817577
01/01/2019 00:00	4644	0 FDR	06LU817577
01/12/2018 00:00	4644	0 FDR	06LU817577
21/11/2018 09:12	4644	0 Wireless	06LU817577
01/11/2018 00:00	4644	0.173 FDR	06LU817577
01/10/2018 01:00	4644	7.696 FDR	06LU817577
01/09/2018 01:00	4636	0.208 FDR	06LU817577
31/08/2018 09:29	4636	57.91 Wireless	06LU817577
01/08/2018 01:00	4578	76.1 FDR	06LU817577
01/07/2018 01:00	4502	51.542 FDR	06LU817577
01/06/2018 01:00	4451	10.533 FDR	06LU817577
16/05/2018 13:34	4440	10.884 Wireless	06LU817577
01/05/2018 01:00	4429	9.526 FDR	06LU817577
01/04/2018 01:00	4420	28.977 FDR	06LU817577
01/03/2018 00:00	4391	0.003 FDR	06LU817577
19/02/2018 12:10	4391	0.007 Wireless	06LU817577
01/02/2018 00:00	4391	2.536 FDR	06LU817577
01/01/2018 00:00	4388	5.605 FDR	06LU817577
01/12/2017 00:00	4383	0.974 FDR	06LU817577
16/11/2017 09:24	4382	0.852 Wireless	06LU817577
01/11/2017 00:00	4381	0.976 FDR	06LU817577
01/10/2017 01:00	4380	8.288 FDR	06LU817577
01/09/2017 01:00	4372	19.91 FDR	06LU817577
17/08/2017 09:21	4352	43.809 Wireless	06LU817577
01/08/2017 01:00	4308	82.944 FDR	06LU817577
01/07/2017 01:00	4225	27.555 FDR	06LU817577
01/06/2017 01:00	4197	9.323 FDR	06LU817577
16/05/2017 13:48	4188	2.382 Wireless	06LU817577
01/05/2017 01:00	4186	26.705 FDR	06LU817577
01/04/2017 01:00	4159	4.199 FDR	06LU817577
01/03/2017 00:00	4155	0.669 FDR	06LU817577
20/02/2017 09:07	4154	1.478 Wireless	06LU817577
01/02/2017 00:00	4153	2.402 FDR	06LU817577
01/01/2017 00:00	4150	1.972 FDR	06LU817577
01/12/2016 00:00	4148	0 FDR	06LU817577
16/11/2016 11:55	4148	0.604 Wireless	06LU817577
01/11/2016 00:00	4148	0.127 FDR	06LU817577
01/10/2016 01:00	4147	12.559 FDR	06LU817577
01/09/2016 01:00	4135	12.397 FDR	06LU817577
22/08/2016 12:44	4122	51.466 Wireless	06LU817577
01/08/2016 01:00	4071	61.856 FDR	06LU817577
01/07/2016 01:00	4009	28.874 FDR	06LU817577

01/06/2016 01:00	3980	6.945 FDR	06LU817577
16/05/2016 08:09	3973	3.554 Wireless	06LU817577
01/05/2016 01:00	3970	2.894 FDR	06LU817577
01/04/2016 01:00	3967	3.454 FDR	06LU817577
01/03/2016 00:00	3963	0 FDR	06LU817577
17/02/2016 10:59	3963	0 Wireless	06LU817577
01/02/2016 00:00	3963	0 FDR	06LU817577
01/01/2016 00:00	3963	0 FDR	06LU817577
01/12/2015 00:00	3963	0 FDR	06LU817577
12/11/2015 14:47	3963	0 Wireless	06LU817577
01/11/2015 00:00	3963	0 FDR	06LU817577
01/10/2015 01:00	3963	13.115 FDR	06LU817577
01/09/2015 01:00	3950	25.341 FDR	06LU817577
18/08/2015 14:40	3925	50.714 Wireless	06LU817577
01/08/2015 01:00	3874	62.424 FDR	06LU817577
01/07/2015 01:00	3812	24.185 FDR	06LU817577
01/06/2015 01:00	3788	5.747 FDR	06LU817577
25/05/2015 09:11	3782	17.516 Wireless	06LU817577
01/05/2015 01:00	3764	7.089 FDR	06LU817577
01/04/2015 01:00	3757	2.385 FDR	06LU817577
01/03/2015 00:00	3755	0.241 FDR	06LU817577
11/02/2015 15:22	3755	0.143 Wireless	06LU817577
01/02/2015 00:00	3755	0.405 FDR	06LU817577
01/01/2015 00:00	3754	0.626 FDR	06LU817577
01/12/2014 00:00	3754	0.383 FDR	06LU817577
19/11/2014 10:00	3753	0.604 Wireless	06LU817577
01/11/2014 00:00	3753	0.836 FDR	06LU817577
01/10/2014 01:00	3752	25.86 FDR	06LU817577
01/09/2014 01:00	3726	15.208 FDR	06LU817577
18/08/2014 16:11	3711	46.455 Wireless	06LU817577
01/08/2014 01:00	3664	79.515 FDR	06LU817577
01/07/2014 01:00	3585	32.461 FDR	06LU817577
01/06/2014 01:00	3552	3.05 FDR	06LU817577
16/05/2014 14:22	3549	2.127 Wireless	06LU817577
01/05/2014 01:00	3547	5.035 FDR	06LU817577
01/04/2014 01:00	3542	0.896 FDR	06LU817577
01/03/2014 00:00	3541	0.112 FDR	06LU817577
01/02/2014 00:00	3541	0.029 FDR	06LU817577
21/01/2014 11:03	3541	0.247 Wireless	06LU817577
01/01/2014 00:00	3541	6.231 Fixed Read	06LU817577
01/01/2014 00:00	3541	6.231 FDR	06LU817577
01/12/2013 00:00	3534	9.938 FDR	06LU817577
05/11/2013 14:40	3525	0.068 Wireless	06LU817577
01/11/2013 00:00	3524	12.916 FDR	06LU817577

01/10/2013 01:00	3512	23.237 FDR	06LU817577
01/09/2013 01:00	3488	21.859 FDR	06LU817577
14/08/2013 15:08	3466	33.394 Wireless	06LU817577
01/08/2013 01:00	3433	87.008 FDR	06LU817577
01/07/2013 01:00	3346	24.779 FDR	06LU817577
01/06/2013 01:00	3321	3.394 FDR	06LU817577
10/05/2013 14:44	3318	1.817 Wireless	06LU817577
01/05/2013 01:00	3316	10.897 FDR	06LU817577
01/04/2013 01:00	3305	1.415 FDR	06LU817577
01/03/2013 00:00	3304	0 FDR	06LU817577
18/02/2013 14:58	3304	0 Wireless	06LU817577
01/02/2013 00:00	3304	14.441 FDR	06LU817577
01/01/2013 00:00	3289	1.617 FDR	06LU817577
01/12/2012 00:00	3288	0.071 FDR	06LU817577
06/11/2012 15:03	3288	0.052 Wireless	06LU817577
01/11/2012 00:00	3288	0.995 FDR	06LU817577
01/10/2012 01:00	3287	8.96 FDR	06LU817577
01/09/2012 01:00	3278	18.007 FDR	06LU817577
15/08/2012 13:34	3260	28.762 Wireless	06LU817577
01/08/2012 01:00	3231	40.165 FDR	06LU817577
01/07/2012 01:00	3191	11.265 FDR	06LU817577
01/06/2012 01:00	3179	2.585 FDR	06LU817577
11/05/2012 11:48	3177	3.391 Wireless	06LU817577
01/05/2012 01:00	3173	3.365 FDR	06LU817577
01/04/2012 01:00	3170	1.579 FDR	06LU817577
01/03/2012 00:00	3168	0.111 FDR	06LU817577
13/02/2012 09:10	3168	0.021 Wireless	06LU817577
01/02/2012 00:00	3168	0.102 FDR	06LU817577
01/01/2012 00:00	3168	0.036 FDR	06LU817577
01/12/2011 00:00	3168	0.228 FDR	06LU817577
11/11/2011 13:31	3168	0.045 Wireless	06LU817577
01/11/2011 00:00	3168	0.696 FDR	06LU817577
01/10/2011 01:00	3167	2.862 FDR	06LU817577
01/09/2011 01:00	3164	36.04 FDR	06LU817577
10/08/2011 10:04	3128	20.195 Wireless	06LU817577
01/08/2011 01:00	3108	80.056 FDR	06LU817577
01/07/2011 01:00	3028	17.118 FDR	06LU817577
01/06/2011 01:00	3011	0.489 FDR	06LU817577
24/05/2011 11:39	3010	2.671 Wireless	06LU817577
01/05/2011 01:00	3008	15.653 FDR	06LU817577
01/04/2011 01:00	2992	4.249 FDR	06LU817577
01/03/2011 00:00	2988	511.378 FDR	06LU817577
10/02/2011 09:34	2477	342.497 Wireless	06LU817577
01/02/2011 00:00	2134	1114.419 FDR	06LU817577

01/01/2011 00:00	1020	137.411 FDR	06LU817577
01/12/2010 00:00	882	0.08 FDR	06LU817577
12/11/2010 09:44	882	0.197 Wireless	06LU817577
01/11/2010 00:00	882	1.269 FDR	06LU817577
01/10/2010 01:00	881	6.813 FDR	06LU817577
01/09/2010 01:00	874	32.776 FDR	06LU817577
16/08/2010 15:03	841	50.292 Wireless	06LU817577
01/08/2010 01:00	791	52.849 FDR	06LU817577
01/07/2010 01:00	738	30.153 FDR	06LU817577
01/06/2010 01:00	708	3.841 FDR	06LU817577
13/05/2010 11:01	704	1.888 Wireless	06LU817577
01/05/2010 01:00	702	3.626 FDR	06LU817577
01/04/2010 01:00	698	1.029 FDR	06LU817577
01/03/2010 00:00	697	0.006 FDR	06LU817577
15/02/2010 14:26	697	0 Wireless	06LU817577
01/02/2010 00:00	697	19.248 FDR	06LU817577
01/01/2010 00:00	678	0.025 Fixed Read	06LU817577
01/01/2010 00:00	678	0.025 FDR	06LU817577
01/12/2009 00:00	678	0.133 FDR	06LU817577
04/11/2009 13:56	678	0.007 Wireless	06LU817577
01/11/2009 00:00	678	1.058 FDR	06LU817577
01/10/2009 01:00	677	13.059 FDR	06LU817577
01/09/2009 01:00	664	29.336 FDR	06LU817577
11/08/2009 14:42	635	32.786 Wireless	06LU817577
01/08/2009 01:00	602	41.427 FDR	06LU817577
01/07/2009 01:00	560	28.806 FDR	06LU817577
01/06/2009 01:00	531	9.914 FDR	06LU817577
18/05/2009 15:23	522	1.728 Wireless	06LU817577
01/05/2009 01:00	520	5.067 FDR	06LU817577
01/04/2009 01:00	515	1.063 FDR	06LU817577
01/03/2009 00:00	514	0.025 FDR	06LU817577
17/02/2009 09:19	514	0.073 Wireless	06LU817577
01/02/2009 00:00	514	0.027 FDR	06LU817577
01/01/2009 00:00	514	0.014 Fixed Read	06LU817577
01/01/2009 00:00	514	0.014 FDR	06LU817577
01/12/2008 00:00	514	0.021 FDR	06LU817577
13/11/2008 11:23	514	5.053 Wireless	06LU817577
01/11/2008 00:00	509	0.463 FDR	06LU817577
01/10/2008 01:00	508	5.627 FDR	06LU817577
01/09/2008 01:00	502	14.331 FDR	06LU817577
20/08/2008 11:25	488	54.709 Wireless	06LU817577
01/08/2008 01:00	433	51.521 FDR	06LU817577
01/07/2008 01:00	382	20.927 FDR	06LU817577
01/06/2008 01:00	361	1.369 FDR	06LU817577

27/05/2008 10:37	360	3.272 Wireless	06LU817577
01/05/2008 01:00	356	0.038 FDR	06LU817577
01/04/2008 01:00	356	2.317 FDR	06LU817577
01/03/2008 00:00	354	0.023 FDR	06LU817577
01/02/2008 00:00	354	0.001 FDR	06LU817577
30/01/2008 12:18	354	0.02 Wireless	06LU817577
01/01/2008 00:00	354	0.003 Fixed Read	06LU817577
01/01/2008 00:00	354	0.003 FDR	06LU817577
01/12/2007 00:00	354	1.381 FDR	06LU817577
12/11/2007 14:25	353	0.016 Wireless	06LU817577
01/11/2007 00:00	352	0.317 FDR	06LU817577
01/10/2007 01:00	352	11.043 FDR	06LU817577
01/09/2007 01:00	341	71.521 FDR	06LU817577
01/08/2007 01:00	270	54.339 FDR	06LU817577
01/07/2007 01:00	215	2.771 FDR	06LU817577
26/06/2007 10:26	213	17 Wireless	06LU817577
01/06/2007 01:00	196	6.059 FDR	06LU817577
01/05/2007 01:00	189	9.111 FDR	06LU817577
01/04/2007 01:00	180	0.83 FDR	06LU817577
28/03/2007 12:37	180	6.188 Wireless	06LU817577
01/03/2007 00:00	173	5.812 FDR	06LU817577
01/02/2007 00:00	168	0 FDR	06LU817577
15/01/2007 09:53	168	0 Wireless	06LU817577
01/01/2007 00:00	168	0 FDR	06LU817577
01/12/2006 00:00	168	0 FDR	06LU817577
24/11/2006 15:51	168	0 Wireless	06LU817577
01/11/2006 00:00	168	0 FDR	06LU817577
01/10/2006 01:00	168	0.397 FDR	06LU817577
21/09/2006 15:04	167	167.603 Wireless	06LU817577
13/06/2006 12:00	0	0 Installation (A)	06LU817577