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Project Title	Extension at Slade, Saggart, Co Dublin
Document Title	Engineering Planning Report
Client	Dave Thompson
File No.	T23_DRPL_001
Author	Peter Brunner
Date	13 September 2021
Revision	P1

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INTRODUCTION:

This report outlines the proposals for the provision of surface- and foul water drainage services to the proposed extension to the dwelling at Slade, Saggart, Co Dublin.

The report should be read in conjunction with all other drawings and documents as part of this submission.

LOCATION:

The applicant site is located on the L2005 road at Slade, Saggart, Co Dublin with Eircode D24 CA36.

Fig. 1: Map location of Applicant site at Slade, Saggart

PROJECT SCALE:

The development will consist of a 9m x 4m swimming pool, gym, sauna and associated welfare- & plant facilities, basement home theatre room and provision of dormer windows in lieu of existing rooflights.

The development will also comprise of all associated site works above and below ground.

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SWIMMING POOL :

The proposed swimming pool measures 9m in length and 4m in width and will be located within the extension, as indicated on the architectural drawings. The proposed extension will also house associated plant, gym, welfare facilities and changing room.

As the applicant house is not connected to any public drainage or water supplies, the swimming pool water will be filled, treated and disposed of on site in a controlled fashion.

Water Supply

The site is currently serviced from a private well with a water treatment and filtration system. This will service the swimming pool as described in Appendix A. The pool is filled once from the well and remains full through its lifetime. The pool volume is 43.2m^3, which is changed every 3 years by progressive dilution through backwashing.

Backwashing

Backwashing is a method to thoroughly clean the swimming pool filter. The backwashing process reverses the flow of water through the swimming pool filter, to flush out contaminants. Backwashing of the pool is carried out every 2 weeks by an automated process. The backwash discharge volume for the proposed pool is 585 litres. The contaminated backwashed water is dechlorinated and stored in an attenuation tank of 1000L capacity, to be discharged at a rate 0.5 litres per second to a soakaway. The soakaway has been sized to accommodate a 1 in 30 year storm event with 20% allowance for climate change and will provide additional capacity for the 585 litre backwash water.

Please refer to the swimming pool specification included in **Appendix A.**

STORM WATER DRAINAGE:

South Dublin City Council (SDCC) guidelines for the design of surface water require the incorporation of Sustainable Drainage Systems as per the Greater Dublin Strategic Drainage Study. This is good practice and we propose to use as many sustainable urban drainage systems (SUDS) as possible and recharge any precipitation to ground through permeable surface finishes or soakaway.

The systems we propose at different stages are as follows:

1. Rainwater from roof of extension to be discharged to attenuation trench sized for a 60minute, 1 in 30 year return storm + 20% for climate change. Rainfall data has been used from Met Eireann records.

2. Proposed hard standings to receive fully permeable surfaces to allow direct percolation of rainfall to ground.

The soakaway has been sized following a site percolation test and calculated as per attached design to BRE365, indicated in Fig. 2.

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Soakaway				1	
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
PB/	10/09/2021				

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **175.0** m²
Return period	Period = **30** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.286**
5-year return period rainfall of 60 minutes duration	M5_60min = **17.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1000** mm
Width of pit	w = **1200** mm
Length of pit	l = **22829** mm
Percentage free volume	V_{free} = **95** %
Soil infiltration rate	f = **2.30*10⁻⁶** m/s
Wetted area of pit 50% full	a_{s50} = l * d + w * d = **24028784** mm²

Table equations

Inflow (cl 3.3.1)	I = M30 * A
Outflow (cl 3.3.2)	O = a_{s50} * f * D
Storage (cl 3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfall (mm)	Growth factor Z2	30 year rainfall M30 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
5	0.34;	6.8;	1.46	10.0;	1.75;	0.02;	1.73
10	0.49;	9.9;	1.49	14.7;	2.58;	0.03;	2.55
15	0.59;	11.9	1.49	17.8;	3.12	0.05;	3.07
30	0.77;	15.6	1.49	23.3;	4.07;	0.10;	3.97
60	1.00;	20.4;	1.47	30.0;	5.26;	0.20;	5.06
120	1.26;	25.7;	1.46	37.4;	6.55;	0.40;	6.16
240	1.60;	32.7;	1.44	46.9;	8.21	0.80;	7.42
360	1.83;	37.3;	1.42	53.0;	9.27;	1.19;	8.08
600	2.18;	44.4	1.40;	62.0;	10.84;	1.99;	8.85
1440	2.96;	60.4;	1.36;	81.9;	14.33;	4.78;	9.55

Required storage volume — S_{req} = **9.55** m³

Soakaway storage volume — S_{soil} = l * d * w * V_{free} = **26.02** m³

PASS - Soakaway storage volume

Time for emptying soakaway to half volume — t_{s50} = S_{req} * 0.5 / (a_{s50} * f) = 24hr

PASS - Soakaway discharge time less than or equal to 24 hours

Fig. 2: Infiltration trench calculation to BRE365 for extension roof

The surface water drainage layout is indicated on our drawing T23-P-001 in **Appendix B**.

FOUL WATER DRAINAGE:

There is no increase in the population of the property as a result of the development. The existing treatment plant is being replaced with a designed Treatment Plant, Coconut Filter and percolation area to facilitate offsets from the proposed extension. Some of the existing foul drain runs will need to be relaid and diverted around the extension, which will not affect the operation of the treatment system.

Please refer to Site Assessors report for details on the Waste Water Treatment Plant and associated works. The foul water drainage layout is indicated on our drawing T23-P-001 in **Appendix B**.

FLOOD RISK ASSESSMENT:

The risk of flooding is considered under five headings as follows:

1. Coastal flooding
2. Fluvial flooding
3. Pluvial flooding
4. Ground water flooding

Coastal Flooding

The applicant site is located outside the area affected by coastal flooding, being 12km from the flooding affected zone of the River Liffey and 150m above sea level.

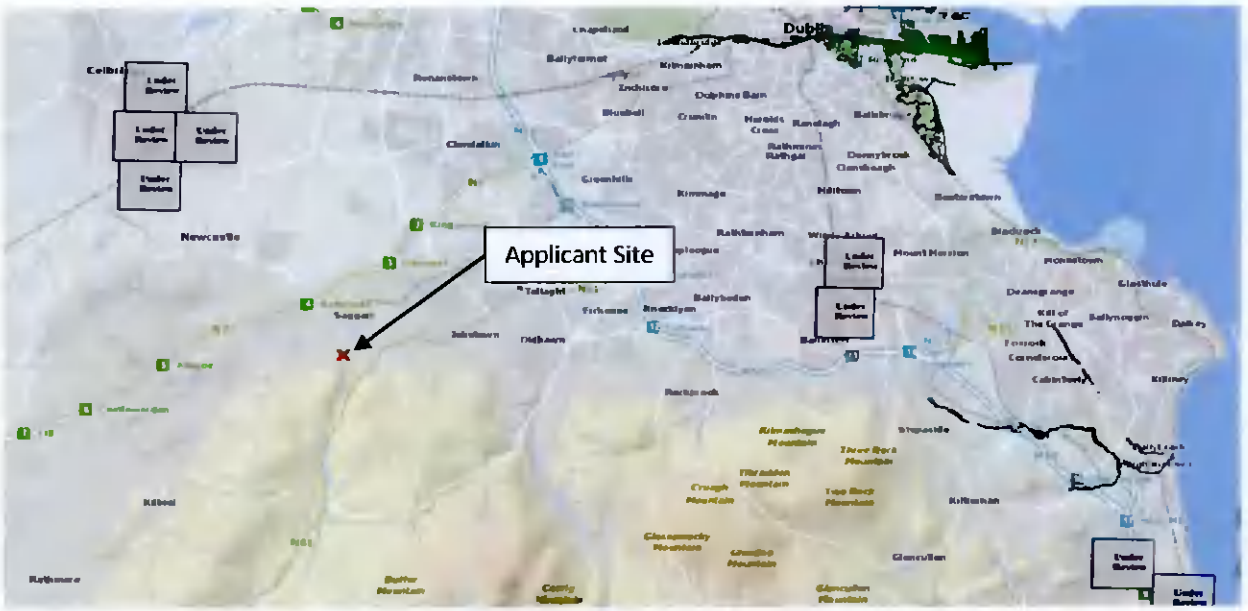

Fig. 3 CFRAM map for coastal flooding – General Risk indicating 0.1% – 10% AEP exposure

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Fluvial Flooding / Justification Test

Under the South Dublin County Council (SDCC) Development Plan, it is directed to carry out a justification test for sites in flood zones A & B, as per the Strategic Flood Risk Assessment (SFRA). The applicant site does not fall within a zone requiring a Justification Test.

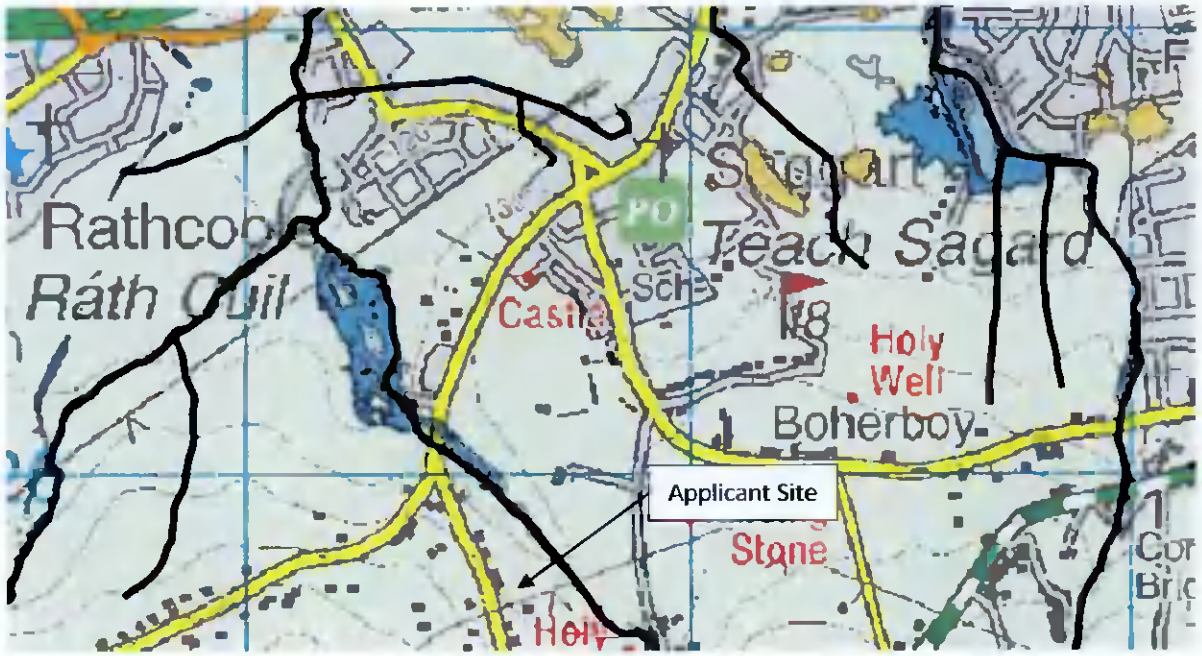


Figure 6.10 Fluvial & indicative pluvial flood zones in Rathcoole & Saggart

Fig. 4 – extract from SDCC strategic flood risk assessment indicating flood extents in Slade, Saggart

Pluvial Flooding

Pluvial flooding arises from high intensity rainfall increasing surface water flows overland. Review of historical records on the Office of Public Works (OPW) online database www.floodmaps.ie indicates some flooding in the vicinity of the applicant property – primarily associated with fluvial flooding, addressed above.

We have carried out a flood history review referring to the OPW flood maps. The OPW flood database has indicated flooding incidents within a 2.5km radius. None of the events have any effect on the applicant property.

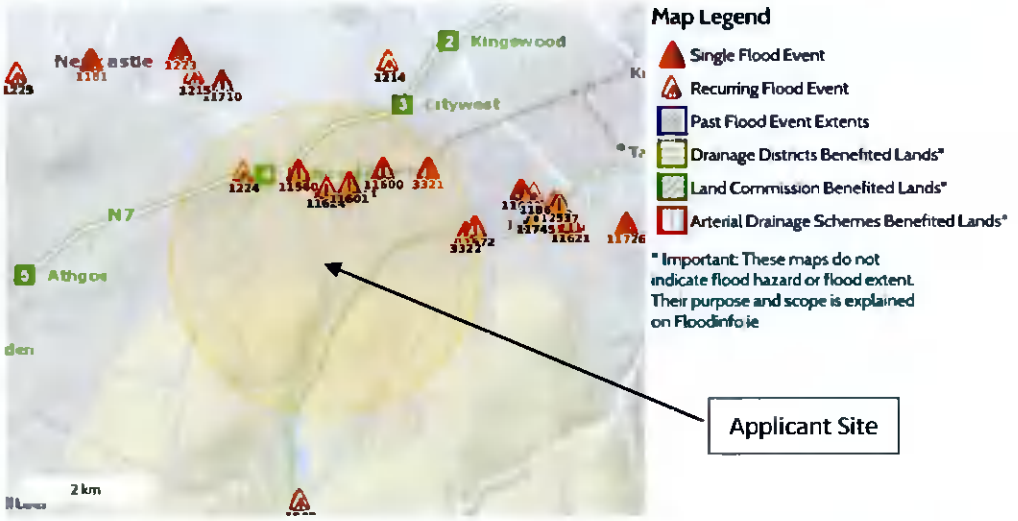
Past Flood Event Local Area Summary Report

OPW

Report Produced: 4/8/2021 8:21

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



8 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Rathcoole Bridge recurring (ID-1224)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (4)		
2.	Jobstown N81 Nov 2000 (ID-3322)	05/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (2)		
3.	Fortunestown Lane Nov 2000 (ID-3321)	06/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
4.	Flooding at Avoca Road, Saggart on 24th Oct 2011 (ID-11560)	24/10/2011	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
5.	Flooding at Fortunestown Lane, Citywest, Co. Dublin on 24th Oct 2011 (ID-11600)	24/10/2011	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Flooding at Garter Lane, Saggart, Co. Dublin on 24th Oct 2011 (ID-11601)	24/10/2011	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

Fig. 5 CFRAM map for historic flood events

Ground water flooding

Site specific data could not be sourced for ground water flooding at Slade, Saggart. We have extracted data in relation to the groundwater resources & vulnerability.

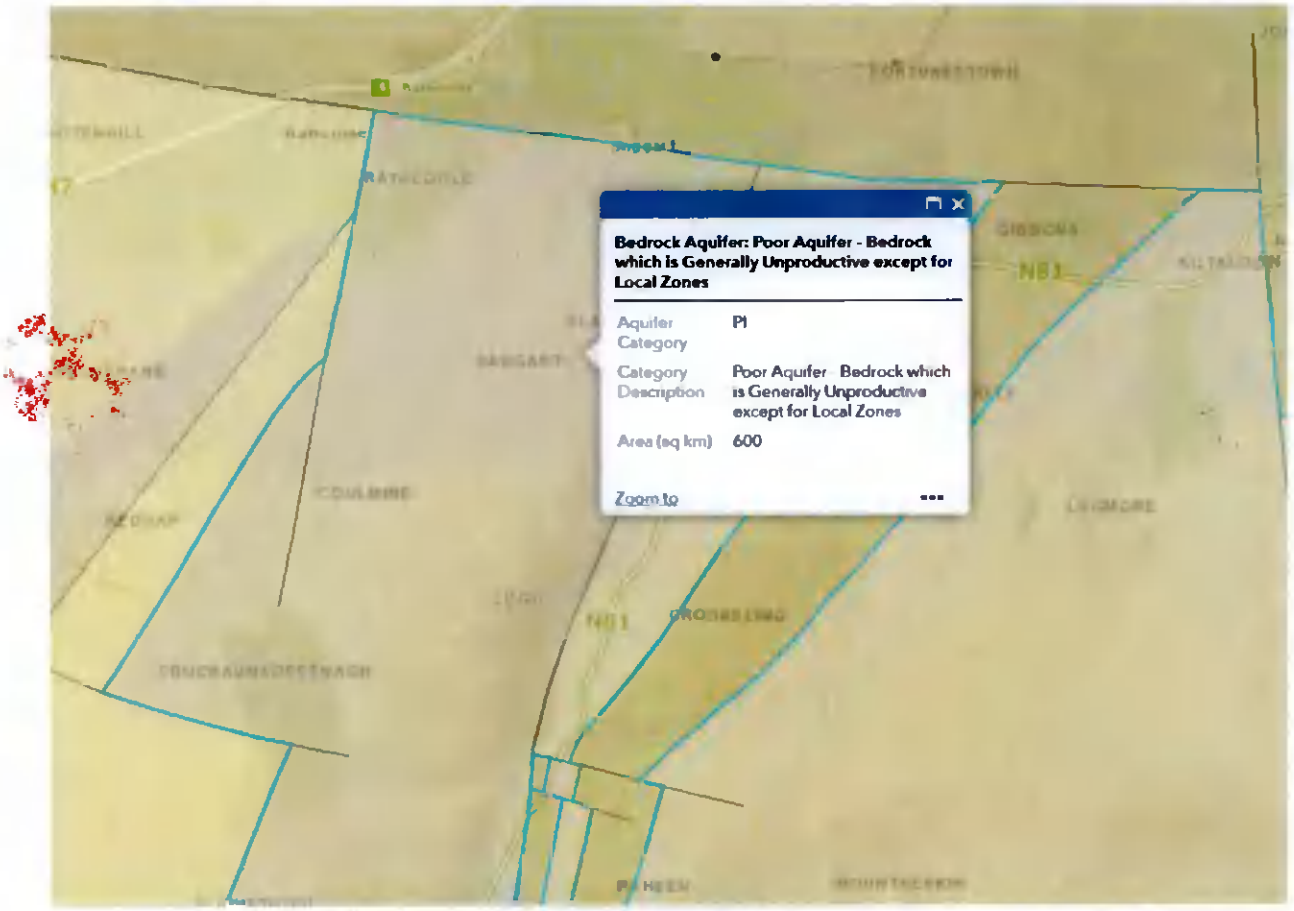


Fig. 6 GSI mapping information for "Groundwater Resources (Aquifers)"

An aquifer is an underground body of water bearing rock or unconsolidated materials (gravel or sand) from which groundwater can be extracted in useful amounts.

The applicant site is located on an a Poor Aquifer which is generally unproductive.

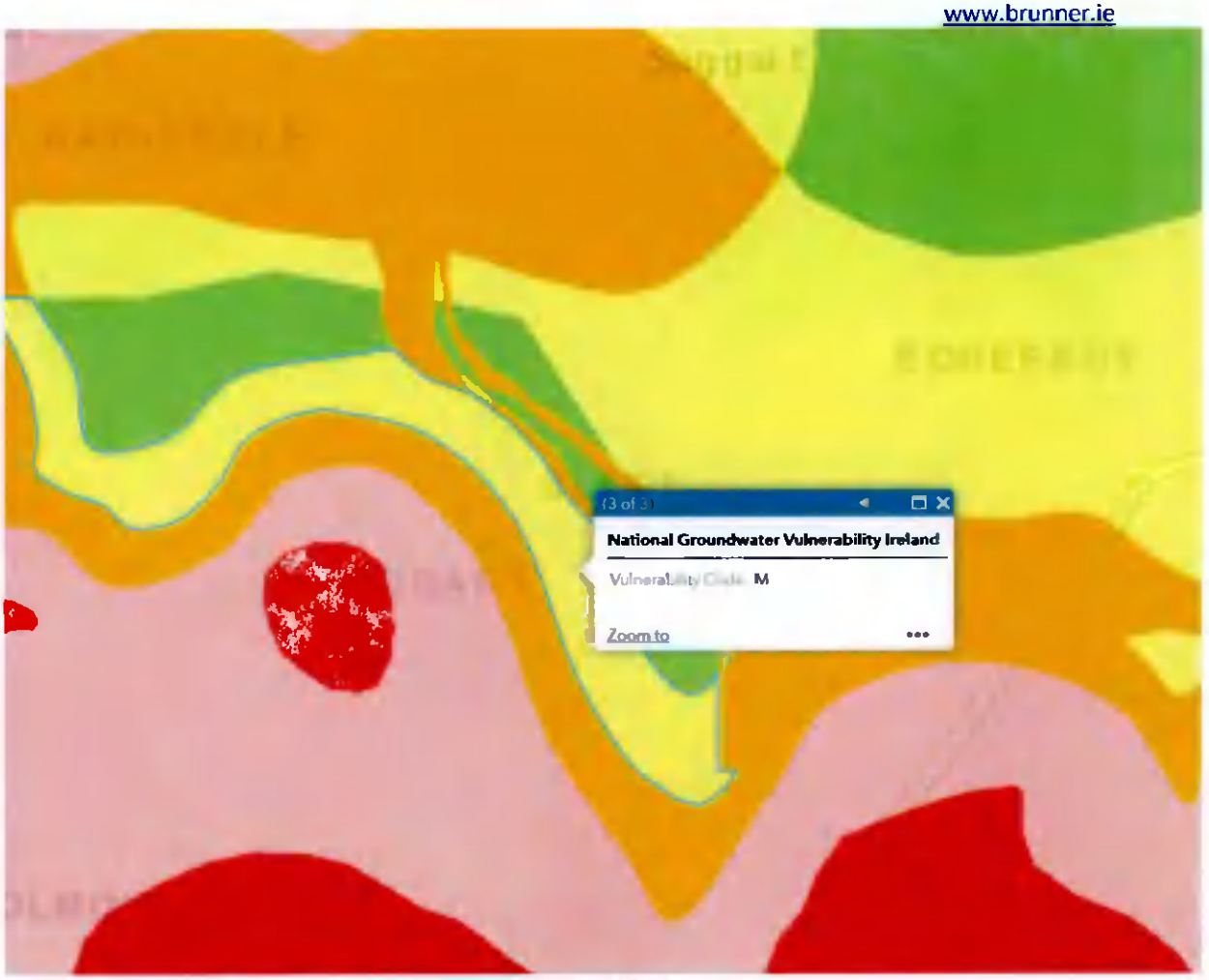


Fig. 7 GSI mapping information for "Groundwater Vulnerability"

Groundwater is most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes.

Groundwater vulnerability maps are based on the type and thicknesses of subsoils (sands, gravels, glacial tills (or boulder clays), peat, lake and alluvial silts and clays), and the presence of karst features.

All land area is assigned one of the following groundwater vulnerability categories: Rock near surface or karst (X) Extreme (E) High (H) Moderate (M) Low (L).

The applicant site is located in an area with a Vulnerability Code M – moderate risk.

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Appendix A

Swimming pool specification

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13 September 2021
Job No.: T23

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Castle
Swimming Pools

Ballybrack. Kilcock. Co. Kildare
Ph 01 6287990 Fax 01 6287936
info@castlepools.ie

19/07/2021
Mr. David Thompson
Slade
Saggart
Dublin 24

Proposed Pool at Slade Saggart Dublin 24

Dear Mr. Thompson

Further to our discussions please find herewith our specifications and recommendations regarding Filling Backwashing & Emptying the proposed Pool at Slade Saggart Dublin 24.

Pool Specifications		
Pool Type:	Residential	
Shape:	Rectangular	
Length	9	Meters
Width	4	Meters
Pool Surface Area:	36	Meters
Water Depth: *Shallow End*	1.2	Meters
Water Depth: *Deep End*	1.2	Meters
Water Depth: *Average*	1.2	Meters
Pool Volume:	43.2	Cu Mtrs
Turn Over Time:	3.50	Hours
Turnover Rate:	12.342857	Cu Mtrs / Hour
Turnover Circulation Rate:	165.00	Ltrs Min
Pump Flow rate:	12.342857	Cu Mtrs / Hour
Number. of Filters:	1 x Sand filter.640mmØ	
Backwash Cycle	Every 14 Days	
Backwash Discharge Time	3 Min & 30 Sec	
Backwash Discharge Volume	585	Ltrs
Sanitizer 1	Ozone	
Sanitizer 2	Chlorine	
Attenuation Tank	1000 Lts	

Water Balance	
CHLORINE	0.5ppm To 1.0ppm
TOTAL CHLORINE	0.5ppm To 1.0ppm
pH VALUE	7.4
ALKALINITY	80 to 120
CYANURIC ACID	30 to 100
IRON	Less than 0.5ppm
CALCIUM HARDNESS	200ppm To 400ppm
TOTAL DISSOLVED SOLIDS	Less than 1000ppm
SULPHATE	Less than 360ppm

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Re: Thompson David slade Saggart D24

(1).

REF.: Water Cycle for Residential Pools

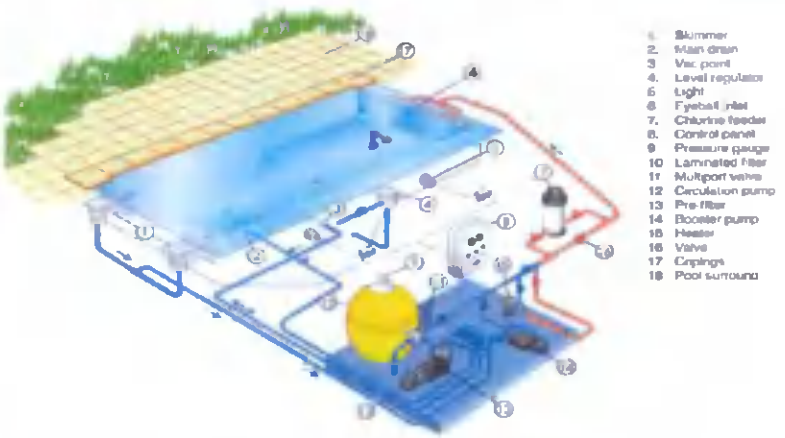
Filling.

The pool shall be filled from a local water source, *i.* e. Mains water supply, Well water, or by water Tanker from a local river. When the pool is full it remains full through its lifetime unless requiring repair or maintenance. The average family pool holds approximately 65,000 Litres of water, this water is changed about every 3 years by progressive dilution through backwashing. If the pool is to be filled from mains water or well water an above ground reservoir is erected when tiling or Lining commences, the above ground reservoirs are then filled over a period of 1-2 weeks. Each reservoir holds 23,000Litres of water and filling is carried out at not more than 7,500 litres per day.

Photos show temporary above ground pools to store water when Filling or carrying out repairs

Filtration.

The pool water is continuously filtering and will be sanitised using Ozone with bromine, or chlorine as backup. The complete volume of pool water is turned over every 3-6hours. Filter consists of 640mmø. high rate sand filter which must be backwashed regularly.



Sanitization.

The proposed method of sanitization for the above proposed pool is to be a combination of Ozone & Chlorine. This method of sanitization allows chlorine levels to be kept to a minimum 0.5mgl. For backwashing of the pool it is proposed to discharge the water into a attenuation tank. When the attenuation tank has reached its capacity, an automatic dosing pump shall administer the correct level of sodium Thiosulphate (chlorine neutraliser) to the capacity of the holding tank. In addition it is also proposed to fit an inline carbon filter on the tank discharge as a back up to the dosing pump.
This will achieve a total chlorine free discharge.

Re: Thompson David slade Saggart D24

(2).

Backwashed Water.

Water from the backwash is taken directly from the pool, this water is continuously monitored and a perfect chemical water balance is maintained at all times, therefore this water is not considered corrosive. The chlorine level in the pool shall be maintained at 0.5 ppm and not greater than 1.0ppm. The backwash water is pumped through an active carbon filter to an attenuation tank to allow for slow discharge to the foul sewer, this will ensure a total chlorinre free discharge.

Backwash water from the pool will not be discharged into the septic tank it will be discharged through percolation via an attenuation tank subject to the engineers site survey as outlined in this documentation.

Backwashing.

Backwashing is carried out every 2 weeks by an automated process. Backwashing can also be carried out manualy, this involves turning a six way multi-port valve to its backwash position & running the pump for 3 mins, this reverse's the water flow through the filter removing all dirt & solids from the filter sand. After backwashing it is necessary to rinse the filter. The filter is rinsed for 30 seconds, after rinsing the filter multi-port valve is returned to filter cycle. In backwash & rinse mode the pump discharges approximately 500.Lts to 600.Lts.

Water Replacement.

After backwashing the pool is toped up with an automatic top -up unit, this means that the correct amount of water is replaced. The use of a hose is not recommended as this may lead to over filling in event of the hose not been switched off.

Emptying The Pool.

When a Swimming Pool is filled it is generally never emptied. In the unlikely event of the Swimming Pool ever having to be emptied the water need not necessarily be dumped. The Pool water is clean purified and heated and it would not be desirable to dump this water in the event of a small repair been necessary. Therefore the water may be pumped into an above ground pool/s where the water may be stored while the repair work is been carried out. In the event of a liner having to be replaced the pool maybe emptied and new lining fitted and refilled from the above ground pool /s in a period of 2 days
If a pool requires emptying and no storage space is available for the above ground pools than the contractor carrying our the repair work should have the water removed by road tanker to a location where it may be stored.

Photos show temporary above ground pools to store water when Filling or carrying out repairs

Re: Thompson David slade Saggart D24

Water Balance.

Although there is automated chemical control water balance will be checked on a regular basis to ensure that the water chemistry is kept within it set parameters

Listed below is the recommended water balance which is given to the pool owner as a guideline. Not all off these tests are carried out by the owner the owner is given a 4 in 1 test kit which consist of 50 test strips each strip shows 4 off the most important tests. Castle swimming pools offer the pool owner an 11 point water analysis which is carried out on site and chemical ajustments are made if requires

We recommend that this test should be carried out every 6-8 weeks for the comfort of bathers and for the protection of their pool equipment. The Pool owner may forward a water sample in a special container supplied by Castle Swimming Pools for analysis. Their results are returned along with the appropriate chemicals if required and a replacement container for their next water test

C.S.P. Water Test	
CHLORINE	0.5ppm To 1.0ppm
TOTAL CHLORINE	0.5ppm To 1.0ppm
pH VALUE	7.4
ALKALINITY	80 to 120
CYANURIC ACID	30 to 100
IRON	Less than 0.5ppm
CALCIUM HARDNESS	200ppm To 400ppm
TOTAL DISSOLVED SOLIDS	Less than 1000ppm
SULPHATE	Less than 360ppm
FREE COPPER	Less than 1000ppm
TOTAL COPPER	Less than 360ppm

Pool Owner Test	
CHLORINE	0.5ppm To 1.0ppm
TOTAL CHLORINE	0.5ppm To 1.0ppm
pH VALUE	7.4
ALKALINITY	80 to 120

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Appendix B

Surface water and Foul water drainage plan

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