TECHNICAL NOTE:

Discharge Risk Assessment

Prepared for:	Anglesey Outdoors
Date issued	23/06/2023
Prepared by:	Lewis Miles
Approved by:	James Dodds
Reference:	3490617 Anglesey Out Discharge \ TN Discharge Permit Application
Revision:	R0 (Draft for client review)
Contents	13 pages, including 4 figures

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1 INTRODUCTION

1.1 Background

Anglesey Outdoors is submitting an application to Natural Resources Wales (NRW) to regularise the regulatory position in tandem with a groundwater risk assessment for their effluent discharge from the Anglesey Outdoors activity Centre, Holyhead, Anglesey ("the Site").

The Site was constructed around 1990 and has always been serviced by a package treatment plant (PTP) to treat effluent. The initial PTP was replaced in 2014 keeping the same discharge location. The package treatment plant is a Anua Platinum Wastewater Treatment Commercial System capable of accommodating a population equivalent of 100 with a max design flow 15m³/d and an organic load of 6kgBOD/d. The existing discharge is a single piped discharge into a water filled ditch at the approximate National Grid Reference (NGR) SH 23941 80757 as shown on Figure 1 and Figure 2. The effluent discharge point is approximately 55m from the package treatment plant and drains approximately 180m solely into the pond.

In July 2022 Anglesey Outdoors submitted a Discharge Permit Application to Natural Resources Wales (NRW). On reviewing the application NRW raised concerns and questions regarding groundwater pathways, and unable to answer the questions, Anglesey Outdoor withdrew the application.

In April 2023, Envireau Water was engaged by Anglesey Outdoor to prepare a risk assessment for the discharge, to support a new Discharge Permit Application.

1.2 Objectives

This technical note presents a risk assessment based on a robust conceptual model for the Site, and has been prepared by Envireau Water to support a discharge permit application. The assessment has been conducted following the principals laid out for risk assessment set out by DEFRA in Green Leaves III (GL III) (DEFRA, 2011).

Due to the small scale of the discharge, and the fixed discharge quality by virtue of the PTP, an H1 risk assessment has not been undertaken.

1.3 Data Sources

The above assessments have been prepared using data from (but not limited to) the following sources:

- Discharge designs provided by Anglesey Outdoor Activity Centre;
- British Geological Survey (BGS) mapping;
- Hydrogeological data published by the BGS/NRW
- Ordnance Survey mapping;
- Private Water Supply (PWS) Data from Isle of Anglesey County Council;
- Data on designated sites from Natural England.
- Scalgo modelling software

2 ENVIRONMENTAL SETTING

2.1 Site Location and Topography

The Site is located approximately 1km south west of the town of Holyhead in Anglesey and approximately 0.7km north east of Porth Dafarch. The centre of the site has an approximate NGR SH 23867 80673.

The Site lies within a small depression, with the land rising to the north west. The discharge point sits at an approximate elevation of 18.1m Above Ordnance Datum (AOD) and drains into a pond at an approximate elevation of 16.2mAOD

The approximate NGRs and elevation for the existing discharge and pond are presented in Table 1 and the locations are shown on Figure 1 and Figure 2.

Table 1 Existing Discharge and Locations

Reference on Figure 1	Name	National Grid Reference	Elevation (mAOD)
1	Existing Discharge	SH 23941 80757	~18.1
2	Pond	SH 24045 80594	~16.2

2.2 Hydrology

The discharge location is located in the headwaters of a catchment which drains south into a pond, and onward in a north easterly direction towards the town of Holyhead (Pond Catchment - Figure 3). The catchment also drains surface water collecting over a small (approximately 0.11km^2) area to the west of the Site. Additionally, 40m downstream of the pond a secondary catchment to the south west of the Site (South West Catchment – Figure 3) with an approximate area of 0.17km^2 confluences with the Pond Catchment. The total area of the two catchments is approximately 0.28km^2.

The catchment areas and surface water flow pathways have been mapped based on available LiDAR data and are shown on Figure 3.

2.3 Soils

The soil type at the Site has been assessed using LandIS Soilscapes website, developed by Cranfield University which was accessed in May 2023 (Institute, Soilscapes (Cranfield University) Cranfield Soil and AgriFood, 2016). The soils are classified as: '*Freely draining slightly acid loamy soils*'.

2.4 Geology

The following data has been used to assess the geological setting at the Site: BGS borehole records (BGS, 2023);BGS Geoindex (BGS, 2023); and, the geological memoir for Anglesey (Greenly, 1919).

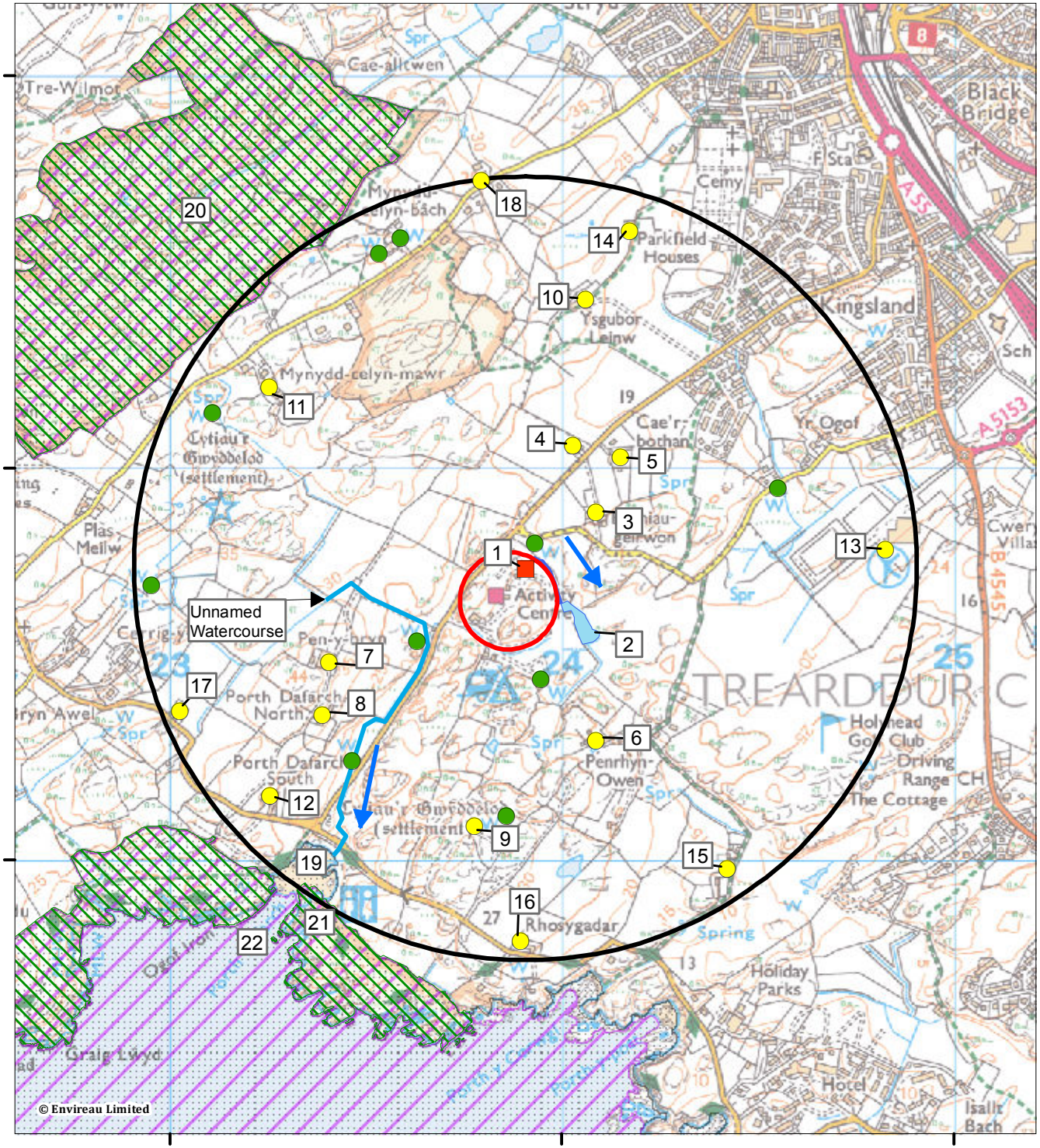
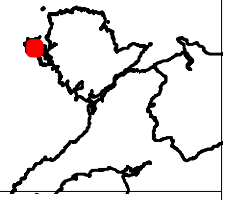


Figure 1: Site Location and Setting

Holyhead,Anglesey

- Site Location
- Discharge Point
- 1km Buffer
- Pond
- Discharge Ditch
- Watercourse
- Direction of Flow
- OS Map Wells
- Potential Private Water Supplies
- SSSI
- SPA
- SAC

Notes:



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09 June 2023

NGR: 223,907 E / 380,744 N

Project No. 3490617

Client: Envireau Water

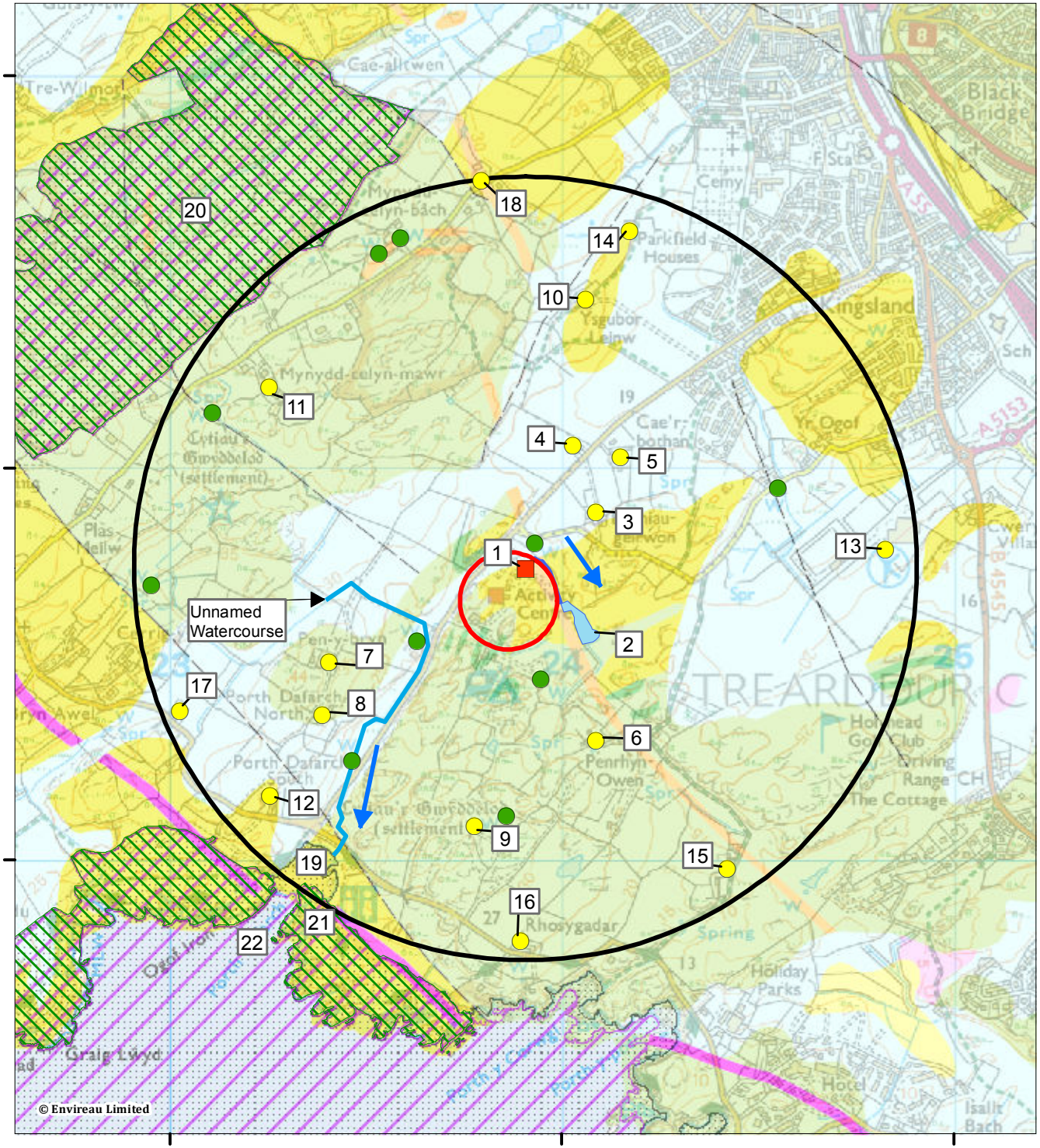
Drawn by: LMM

Ref: FIG Site Location and Setting

envireau WATER

Figure 2: Geoloy and Environmental Setting

Holyhead, Anglesey



- Site Location
- Discharge Point
- 1km Buffer
- Pond
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- Watercourse
- Direction of Flow
- OS Map Wells
- Potential Private Water Supplies
- SSSI
- SPA
- SAC

Superficial Geology

- Alluvium
- Glacio Fluvial Deposits
- Tidal Flat Deposits
- Coastal Zone Deposits
- Till

Bedrock Geology

- New Harbour Group - Lava
- Igneous Intrusion - Garbbro, Microgabbro and Diorite
- Dyke - Microgabbro
- New Harbour Group - Mica, Schist and Psmamite
- South Stack Formation - Psammite and Pelite
- Holyhead Formation - Quartzite
- Fault

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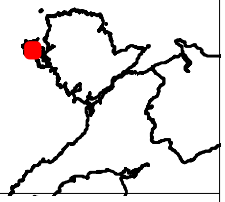

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Drawn by:	LMM
Ref:	FIG Geology and Environmental Setting

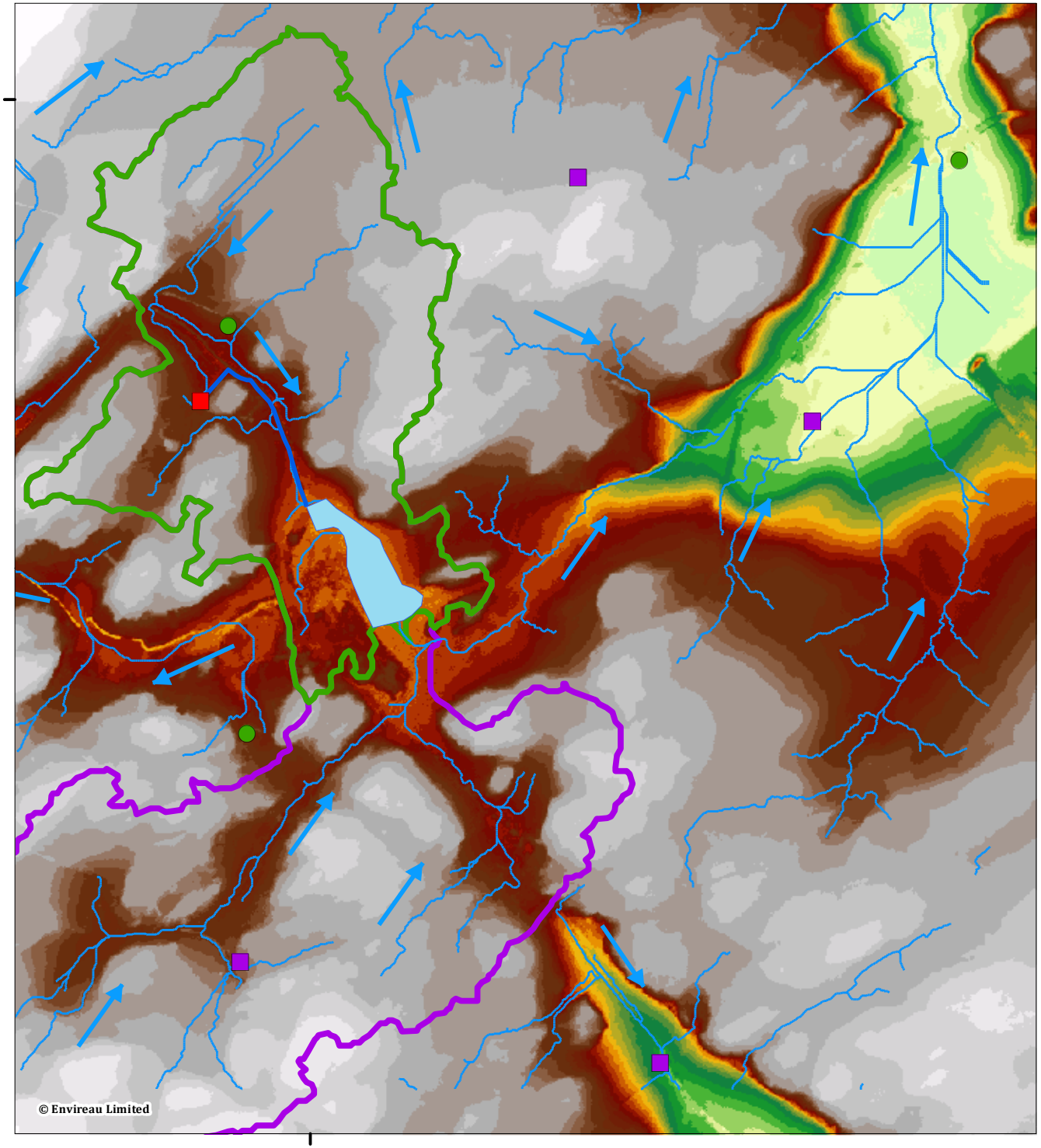

Figure 3: Surface Water Drainage and LiDAR

Holyhead, Anglesey

- Discharge Point
- Pond
- Discharge Ditch
- Flow Pathways
- Flow Direction
- OS Map Wells
- OS Map Springs
- Pond Catchment
- South West Catchment

LiDAR Data (mAOD)

- 7.88 - 8.95
- 8.96 - 10
- 10.01 - 11
- 11.01 - 12
- 12.01 - 12.5
- 12.51 - 13
- 13.01 - 13.5
- 13.51 - 14
- 14.01 - 14.5
- 14.51 - 15
- 15.01 - 15.25
- 15.26 - 15.5
- 15.51 - 15.75
- 15.76 - 16
- 16.01 - 16.25
- 16.26 - 16.5
- 16.51 - 16.75
- 16.76 - 17
- 17.01 - 17.25
- 17.26 - 17.5
- 17.51 - 17.75
- 17.76 - 18
- 18.01 - 18.5
- 18.51 - 19
- 19.01 - 19.5
- 19.51 - 20
- 20.01 - 22.5
- 22.51 - 25
- 25.01 - 27.5
- 27.51 - 30
- 30.01 - 35
- 35.01 - 42.07

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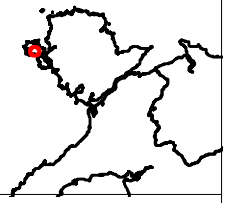

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09 June 2023

NGR: 224,183 E / 380,601 N

Project No.	3490617
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Drawn by:	LMM
Ref:	FIG SW Drainage LiDAR

envireau WATER

A ribbon of Till, likely comprising clay with subordinate, silt, sand and gravel is present in the north of the site and beyond the northern site boundary along Porthdafarch Road. No superficial deposits are mapped in the centre and south area of the Site.

The bedrock geology beneath the site comprises Cambrian age mica schist and psammite of the New Harbour Group and psammite and pelite of the South Stack Formation. A north – south dyke striking through the centre of the site comprises hard, crystalline gabbro, microgabbro and diorite. New Harbour Group lavas are present in the south west area of the Site.

The closest fault is mapped approximately 0.25km north of the Site.

2.5 Hydrogeology

The groundwater systems at the Site have been assessed using the geological information presented in Section 2.4 and with reference to BGS Publication – Hydrogeology of Wales (Robins & Davies, 2015).

Where present, the Till is expected to be of low permeability due to the high clay contact, and may contain thin saturated zones in gritty, moderately permeable horizons. While the Till deposits may contain some groundwater, the unit is discontinuous and is highly unlikely to represent a continuously transmissive system.

Regionally, the low permeability of the clays within the till inhibit rainfall recharge to bedrock, and springs are common at the base of the unconsolidated till over the bedrock. Spring discharges from the Till-Cambrian boundary across Anglesey typically yield less than $8m^3/h$.

The Cambrian strata can be considered a very low permeability system, although groundwater is present in small quantities at shallow depth associated with near surface weathering and isolated fractures. The Cambrian strata beneath the Site are classified as Secondary B Aquifers by NRW although the unit is not exploited for abstraction locally.

2.6 Summary

The setting of the Site shows that:

- No superficial deposits are present along the flow path associated with the discharge.
- The bedrock geology associated with the flow path comprises hard crystalline low permeability strata with little or no groundwater storage.
- The surface water system is made up of two catchments, the Pond Catchment and the South West Catchment, which with a combined area of $0.28km^2$.

3 POTENTIAL RECEPTORS

3.1 Private Water Supplies

A search of Isle of Anglesey County Council's register of Private Water Supplies (PWS) has been undertaken. There are no recorded PWS within a 1km radius of the Site.

It is recognised that the local authority's register of PWS may be incomplete. Based on a review of Ordnance Survey data there are 13 outlying properties within a 1km radius where an unrecorded PWS could potentially be present. These locations are presented on Figure 1 and Figure 2 and details are summarised in Table 2.

Table 2 Potential Private Water Supplies within 1km

Source No. on Figures 1 and 2	Location	Easting	Northing	Distance from Site
3	Bryniau-geirwon	224081	380895	0.23km
4	Houses north of Porthdafarch Road	224047	381040	0.34km
5	Houses south of Porthdafarch Road	224124	381056	0.38km
6	Penrhyn-Owen	224079	380320	0.47km
7	Pen-y-bryn	223404	380510	0.56km
8	Porth Dafarch North	223409	380397	0.61km
9	Cytiau'r Bwyddelod	223765	380098	0.67km
10	Ysgubor Leinw	224016	381407	0.71km
11	Mynydd-celyn-mawr	223264	381196	0.79km
12	Porth Dafarch South	223256	380177	0.87km
13	Holyhead Leisure Centre	224832	380802	0.91km
14	Parkfield Houses	224163	381618	0.91km
15	Houses off of Lon Isallt Road	224409	379971	0.93km
16	Rhosygadar	223910	379799	0.95km
17	Houses south of Cerrig-y-Ddraenog	223020	380377	0.96km
18	Mynydd-celyn-bach	223789	381742	1km

3.2 BGS Water Wells Records

A search of the BGS borehole and water wells database has been undertaken. There are no BGS Water Well records within a 1km radius of the Site.

3.3 Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

A search of Natural England's MAGiC database has been undertaken, which has identified four protected sites, comprising Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Ramsar or other designated areas within a 1km radius of the site.

The sites are presented on Figure 1 and Figure 2 and their details are summarised in Table 3.

Table 3 Protected Sites Within 1km

Source No. on Figures 1 and 2	Name	Description	Designation	Groundwater Reliant	Distance From Site
19	Anglesey Terns	An area between the high water mark and 10-20 km from the shore to protect breeding tern colonies.	SAC, SPA	NO	0.88 km
20	Tre Wilmot	Rock ridges and intervening marshy ground support wet heath and mire.	SSSI	YES	0.96 km
21	Holy Island Coast	Hard rock acidic cliffs supporting coastal cliff heathland vegetation.	SSSI, SAC, SPA	NO	1.00 km
22	North Anglesey Marine	An area from the coast into the Irish Sea for harbour porpoise.	SAC	NO	1.00 km

Of the four sites, three (19, 21 & 22) can be ruled out as they are not dependent on groundwater and not downstream of the discharge; and one (20) can be ruled out as it is not downstream of the discharge.

3.4 Summary

Based on the above data review, the following conclusions can be drawn from water dependent receptors which could be influenced by the Site:

- The Isle of Anglesey County Council has no registered PWS within 1km of the Site.
- No BGS water well records are present within 1km of the Site.
- The four protected sites are not at risk of being influenced by the discharge from the Site.
- Surface water flow pathways are influenced by the discharge from the Site.

4 RISK ASSESSMENT

4.1 Methodology

The groundwater risk assessment undertaken in Section 2 and Section 3 identify no risk to groundwater receptors from the Site, either because there is no pathway or that features are upstream. Therefore the only potential risk from the discharge is associated with the surface water system.

The drainage route has been mapped on the modelled flow pathways and the watercourses on the OS mapping, and is shown on Figure 4.

The package treatment plant (PTP) comprises a Anua Platinum system, which meets the requirements of BS 6297 and Buildings Regulations Part H2, as well as EN 12566-Part 3. Details are provided in Appendix A.

To understand the influence the discharge has on this surface water system, a numerical approach has been used to assess the dilution of the effluent. The following assumptions were made for the dilution calculations:

- The Package Treatment Plant is operating at maximum volume year round. This is an ultra conservative approach, as the site comprises a seasonal activity centre;
- The Pond is continuously discharging at a minimum rate year round;
- Standard Annual Average Rainfall (SAAR) is equally distributed across the year.

4.2 Dilution Calculations

The effluent from the treatment plant is diluted within the water discharging through the catchment. Our assessment assumes that the discharge from the catchment is even through the year, which is a reasonable assumption given the balancing effect of the pond, and the conservative assumption that the PTP discharges constantly at the full rate. On that basis the Total Annual Discharge can be calculated by:

$$Total\ Annual\ Discarge\ (TAD) = Area(m^2)\ \times SAAR(m)\ \times SPR\ Host$$

Max Flow of PTP = 15m³/d

SAAR = 817mm

SPR Host = 36.28%

Two catchment areas have been considered, the first associated with the Pond and the second with the discharge from the pond which incorporates the South West catchment too.

Area of Pond Catchment = 113,439m²

Treatment Pond + South West Catchment = 282,849m²

TAD (Pond Catchment) = 113,439m² X 0.817m x 0.3628 = 33,624m³/y = **92m³/d**

TAD Pond + South West Catchments = 282,849m² X 0.817m x 0.3628 = 83,839m³/y = **230m³/d**

Cross checking the average discharge rates with annual discharge calculated by the software package LowFlows2 provides confidence in the estimates.

On this basis, using the simple ratio between the maximum effluent discharge rate and the catchment discharge, the dilution factors are:

Pond Catchment = 6.1

Pond + South West Catchment = 15.3

4.3 Impact Analysis

Following the dilution calculations of the discharge within the corresponding catchments

The package treatment plant comprises a Anua Platinum system, which meets the requirements of BS 6297 and Buildings Regulations Part H2, as well as EN 12566-Part 3. Details are provided in Appendix A. On this basis, we have assumed that the effluent quality is:

BOD 10mg/l

SS 10mg/l

NH4 5mg/l

Flow 15 m^3/day

Applying the dilution factors, the concentration of the effluent in the receiving water leaving the pond (assuming no attenuation in the pond) and 40m downstream at the confluence with the South West catchment are:

	Pond Discharge	**Confluence**
Dilution	6.1	15.3
BOD (mg/l)	1.64	0.65
SS (mg/l)	1.64	0.65
NH4 (mg/l)	0.82	0.33

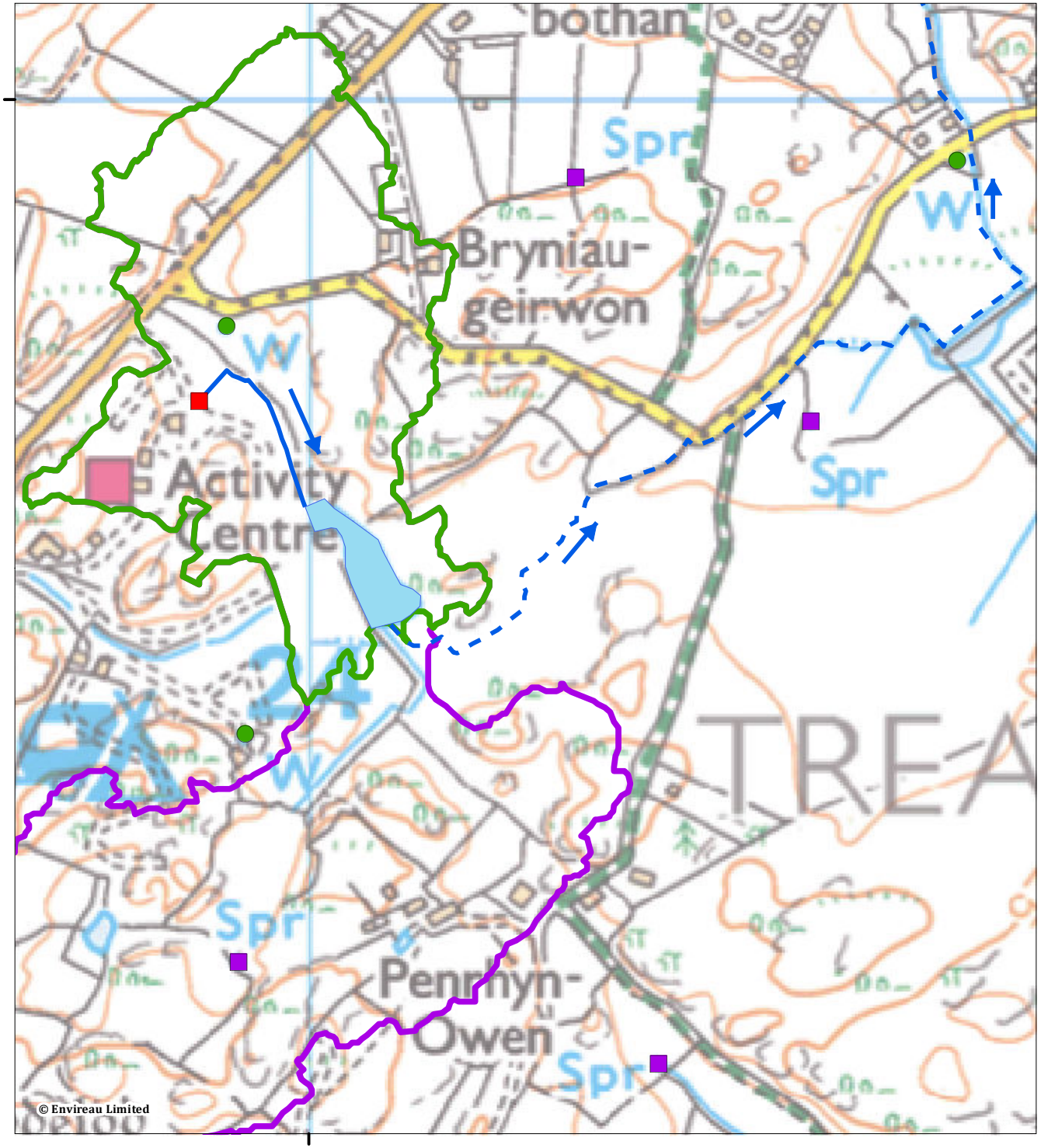
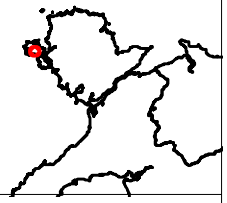


Figure 4: Conceptual Model

Holyhead, Anglesey

- Discharge Point
- Pond
- Discharge Ditch
- Potential Drainage Route
- Direction of Flow
- OS Map Wells
- OS Map Springs
- Pond Catchment
- South West Catchment

Notes:



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NGR: 224,185 E / 380,601 N

Project No.	3490617
Client:	Envireau Water
Drawn by:	LMM
Ref:	FIG Conceptual Model

envireau WATER

4.4 Management

NRW guidance on Water Discharge and Groundwater (NRW, 2014) and (HM Government, 2015) should be followed to maintain wastewater treatment systems. Maintenance of the package treatment plant is required in order to ensure the quality and efficiency of the system. The system will be serviced by a professional service engineer once per year as a minimum and will include but will not be limited to:

- Sludge Removal. Three or four times a year by a registered contractor.
- Monthly checking, cleaning of air diffusers, pipework and air blower inlet filters.
- Annual electrical testing of equipment.
- Annual effluent sampling and analysis.

5 CONCLUSIONS

The information present in this risk assessment indicates that there is no risk of the discharge will having an adverse impact on the groundwater systems or on nearby potential receptors due to the absence of superficial deposits and the low permeability of the underlying bedrock.

Of the potential receptors identified in the desk study, it was determined that the only receptor at risk from the discharge were the surface water flow pathways from the catchment area. The dilution factor of the combined catchments is 15.3.

The analysis indicates that with appropriate management and maintenance of the PTP, that there is a low risk to the surface water features in the area.

Due to the small scale of the discharge, and the fixed discharge quality by virtue of the PTP, a H1 risk assessment has not been undertaken.

REFERENCES

BGS. (2023, June 08). *GeoIndex*. Retrieved from GeoIndex: https://mapapps2.bgs.ac.uk/geoindex/home.html

DEFRA. (2011). *Green Leaves III - Guidelines for Environmental Risk Assessment and Management: Green Leaves III. Revised Departmental Guidance Prepared by Defra and the Collaborative Centre of Excellence in Understanding and Managing Natural and Environmental Risks.*

Greenly, E. (1919). *The Geology of Anglesey.* London: Jas Truscott and Son Ltd.

HM Government. (2015). *The Building Regulations 2010: Drainage and Waste Disposal.* NBS.

NRW. (2014). *Water Discharge and Groundwater (from point source) Activity Permits EPR 7.01).* National Resource Wales.

Robins, N., & Davies, J. (2015). *Hydrogeology of Wales.* British Geological Survey.

Appendix A Anua Platinum Wastewater Treatment Commercial System Specification

Meeting the Highest Standards

Anua is committed to meeting and surpassing the highest quality standards required for each of its products. That's why you will always see national and/or international standards, accreditations for all Anua products.

Free
pre-planning and site reports

Free
no obligation quotations

Nationwide maintenance call-out service

Expert customer support

The Anua Guarantee

Every Platinum Commercial System comes with a 12-month parts and labour warranty, but Anua's commitment to you goes far beyond this.

We have a national network of approved agents and installers, who will provide you with:

- **Free Pre-Planning and Site Reports**
- **Free No Obligation Quotations**
- **Expert Customer Support**
- **Nationwide Maintenance Call-out Service**

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Simple Installation, Minimum Maintenance

While an Anua Platinum Commercial System is made up of a number of separate components, we understand the pressures to minimise installation costs while maintaining quality. Therefore we design and manufacture the system with ease of installation and maintenance in mind. Our in-house manufacturing and fitting capabilities ensure that all tank pipe inverts / positions meet with your exact requirements for a quick, simple installation. Anua's systems do not have any internal moving parts which means no requirement to enter the tank, reducing Health and Safety risks.

Complementary Products for the Platinum Commercial System

- Plant Alarm Systems
- Telemetry
- Sample Chambers
- Weatherproof GRP Enclosures & Kiosks
- Deep Invert / Above Ground Applications
- Forward Feed or Final Effluent Pump Stations
- Nutrient removal – P Removal / Denitrification
- Tertiary treatment for enhanced treatment levels

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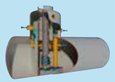
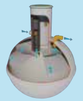
					
Wastewater Treatment	Rainwater Harvesting	Pumps	SUDS	Odour Abatement	Holding Tanks

In keeping with company policy of continuing research and development and in order to offer our clients the most advanced products, Anua reserves the right to alter specifications and drawings without prior notice.

Platinum

Wastewater Treatment for the Commercial Market

ANUA

Technology That Serves Customers and the Environment

Anua means 'to renew'. It describes our renewed contract with nature and our renewed focus on the development of innovative environmental solutions. We continue to develop and produce the sustainable technologies that our customers demand.
Anua is part of Bord na Móna, a highly successful organisation and Ireland's leading resources company for over 75 years, which has a unique heritage and understanding of the natural environment. Bord na Móna has used its expert insights into natural processes, allied to its excellent in-house research facilities, to develop sustainable solutions across a wide range of environmental challenges – wastewater treatment, odour abatement, land reclamation, power generation, resource recovery and renewable energy. This is both Anua's history and our mission for the future.
Our customers range from homeowners to major commercial, municipal and utility clients, united in seeking cost-effective solutions based on environmentally sound principles. Anua exists to serve both our customers and the natural environment.
Across a broad range of sectors in countries around the world, our customers trust us to deliver the best sustainable solutions, backed by superior customer service. That is why we work with our clients throughout every project to achieve the best possible result, one that will build both our reputations.
Anua enjoys the benefit of the support of a highly respected parent company with over 20 years experience in developing sustainable clean air and clean water solutions. As part of this wider organisation, we adhere to their world-class standards and values for both the technology we provide and the service we give our customers.

Complete Solutions

We don't just sell technologies. With our extensive laboratories and Innovation Centres located in Europe and the USA, we understand new challenges, pioneer research and create new processes. We work with you to create the systems you require, ensure correct installation and offer the full services of our nationwide network of support agents and technicians. From pre-planning to installation, service and maintenance, as well as the offer of monitoring and laboratory services, Anua stands by its technology and its customers.

Customised for Customers

Customers need a partner – and products – they can trust. Like nature itself, Anua must be adaptable and responsive to change. That means developing the solutions that best suit each individual project.
For Anua staff, understanding their customers' world is their business. That depth of understanding is matched by the depth of our customer support and focus. We work with clients to design solutions that are technically superior and cost-effective. We're with you every step of the way.

The Environmental Advantages of Platinum
Protection of groundwaters
Low power usage
No chemical additives
No noise pollution
Designed for minimal visual impact

The Platinum Advantages for You
Simple minimal maintenance
No moving internal parts
Ease of installation
Complete underground installation
Lockable covers
Low energy consumption
Low sludge production
Automatic sludge / effluent recycle system
Highly effective certified performance – BS EN 12566-3 up to 50 PE
Proven reliability

The Platinum Commercial System at Work

For developments involving a number of buildings, the Anua Platinum Commercial System offers everything that you need. It's highly effective, low maintenance and with proven reliability. Just as importantly, as the demand for sustainability grows, the processes it uses are 100% natural, utilising no chemical additives.
Naturally occurring micro-organisms present in the sewage remove the biological (organic) content and nutrients which cause water pollution. Our system provides the conditions for these micro-organisms (biofilm) to grow providing highly efficient treatment to achieve high standard final effluent quality.

Stage One: Primary Settlement - Physical Treatment

1. The wastewater flows into the first primary chamber section where initial settlement occurs.
2. The gross solids and inorganic material settle to form a sludge layer at bottom of the tank. This sludge is stored in the first phase primary section and requires removal on a periodical basis.
3. The settled liquid effluent passes through the effluent filter system for treatment in the aeration zone. (Not included in all models)

Stage Two: Submerged Aerated Filtration - Biological Treatment

4. The aeration stage utilises plastic media. The lightweight durable filter media in the aeration zone provides a large surface area to aid development of the naturally occurring micro-organisms (biofilm) which reduce the levels of BOD and NH_4 when in contact with the wastewater.

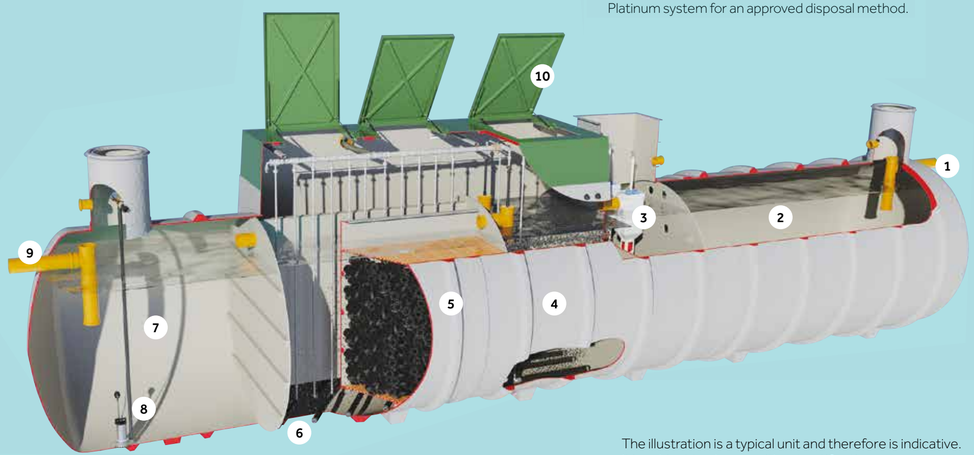
BS EN 12566-3

When a dual stage system is provided, the first phase utilises a moving bed biological process combined with a packed media second stage for enhanced treatment of the effluent. In a single stage system, the packed media provides the submerged aerated filter.

5. In conjunction with the media, oxygen is pumped into the liquid effluent by a highly efficient air blower via a diffuser grid. Located at base level in the tank, the diffusers provide fine bubble air diffusion for greater oxygen transfer efficiency, hence ensuring optimum treatment. The air system also ensures that mature outer biofilm layers are removed from the media.

Stage Three: Final Settlement - Physical Treatment

6. As the micro-organisms are regenerated, the oldest layer of the biofilm is removed from the media and passes with the effluent into the final chamber. Here settlement of this layer and any remaining solids occurs, reducing the levels of the SS (Suspended Solids) in the final effluent to the required standards.
7. When these solids settle as secondary sludge, they are returned via the sludge return system to the primary settlement chamber for storage. This application also allows enhanced treatment of the effluent as it is recycled through the system.
8. The clarified liquid effluent then emerges from the Platinum system for an approved disposal method.



The illustration is a typical unit and therefore is indicative. It is subject to change without notification.

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Detailed Design Approach

Our dedicated technical design team provides individual attention to each project to build the optimum solution around your project's needs. Utilising our extensive experience in wastewater treatment design, we work with you and focus on:

Application Type – School, hotel, offices, new or existing build, specific design needs.

Flows & Loads – Calculation of potential hydraulic flows and organic loads in accordance with EPA or British Water Code of Practice Flows & Loads.

Treatment Levels – Level of treatment required and disposal methods.

Installation – Civil, Mechanical & Electrical installation requirements for your solution.

Efficiencies & Savings – selection of system designs to provide optimum life cycle costs.

Regulation / Legislation – How you project will fit with these requirements.

The Correct Solution for You

Anua's chambers are manufactured at our dedicated facility from GRP (Glass Reinforced Plastic) to the highest standard in accordance with BS EN 4994. We have developed rigorous control procedures at all stages of manufacture to ensure that your product is built to the highest possible standards in accordance with quality procedures of ISO 9001:2000 Quality Assurance system and the ISO 14001 Environmental system.

Our flexible manufacturing process allows us to tailor the solution to best fit your project requirements with units built to suit deep or shallow inverts, above ground installations, high strength influent applications and higher rate effluent quality. Utilising our process design experience, bespoke systems can be produced to achieve final effluent levels of 10:10:5 mg/l BOD:SS:NH_4 with denitrification and P removal options also available.

The Platinum Commercial System is designed in accordance with BS 6297 and Building Regulations Part H2. The systems up to 50 population equivalent are certified to the highest standards required by the new European standard for treatment plants to BS EN 12566 – Part 3. The Typical Specification table is a guide in selecting the best treatment solution for your needs. If you have any specific requirements, the Anua sales team will assist and guide you along from enquiry stage through to after-sales service.

Typical Specification*

Model Reference	Population Equivalent (PE)	Maximum Design Flow (m^3/day)	Maximum Organic Load (kg BOD/day)	Diameter (metres)	Length (metres)	Total Height (metres)	Standard Inlet Diameter (mm)	Standard Depth Below Inlet (m)
2015	15	2.25	0.9	1.8	3.3	2.7	110	1.7
2018	18	2.7	1.08	1.8	3.3	2.7	110	1.7
2020	20	3	1.2	1.8	3.3	2.7	110	1.7
2025	25	3.75	1.5	1.8	4.1	2.7	110	1.7
2030	30	4.5	1.8	1.8	4.9	2.7	160	1.7
2035	35	5.25	2.1	1.8	4.9	2.7	160	1.7
2040	40	6	2.4	2.5	3.6	3.35	160	2.35
2045	45	6.75	2.7	2.5	4.4	3.35	160	2.35
2050	50	7.5	3	2.5	4.4	3.35	160	2.35
2060	60	9	3.6	2.5	4.4	3.35	160	2.35
2070	70	10.5	4.2	2.5	5.2	3.35	160	2.35
2080	80	12	4.8	2.5	6	3.35	160	2.35
2090	90	13.5	5.4	2.5	6.8	3.35	160	2.35
2100	100	15	6	2.5	6.8	3.35	160	2.35
2120	120	18	7.2	2.5	7.6	3.35	160	2.35
2140	140	21	8.4	2.5	9.2	3.35	160	2.35
2160	160	24	9.6	2.5	10	3.35	160	2.35
2180	180	27	10.8	2.5	11.6	3.35	160	2.35
2200	200	30	12	2.5	12.4	3.35	160	2.35

Inverts can be modified to suit specific site requirements on request. The details in the above table are for guidance only and are subject to change without notification