

Proposal: 48 Unit Housing Development

Address: Incline Fields, Bangor LL57 4HP, Gwynedd

Initial Drainage Strategy for PAC_Rev E

Existing drainage

1. The site has no former usage other than agricultural land thus there is no existing drainage serving the site itself. However, it is understood that Incline Cottage does have a septic tank that lies within the proposal site.
2. There is no public sewer network adjacent the site with the nearest sewer lying to the northwest of the site (fronting the terrace row of housing above Penrhyn Avenue) at the entrance to Maesgeirchen.
3. There are multiple drainage utilities between the proposal site and the existing sewer including a watermain, surface water drain and two rising mains.
4. The natural ground profile of the site slopes from southeast to northwest towards Afon Cegin and with infiltration testing having indicated poor/zero permeability for all of the extent of the developed site, existing runoff is directed overland toward the northern boundary.
5. The lowest most northern part of the site was determined to have capacity for infiltration and this cellular tank will be designed as a soakaway.
6. There are highway gullies within the existing highway (A5 Llandegai Road) which are assumed to connect to a highway drain located in the footway fronting the site with the outfall presumably into the Afon Cegin.

Foul

1. A PPA application (**PPA0008765**) was made to DCWW in May 2024 relative to a proposed development of 51 units. The response received 13/06/24 stated that there were no concerns relative to the sewerage network nor treatment works to receive the flows from the development. A preferred connection point was suggested at chamber SH59721303 located approximately 350m north of the proposed development. A subsequent enquiry concluded with DCWW accepting in principle a connection to chamber SH59721108 which lies immediately east of nr.7 Llys Geraint in Maesgeirchen. Further information is required in terms of depth and the internal configuration of the chamber for DCWW to advise further.
2. The onsite foul will be drained from the south to north of the site and will be offered for s104 adoption following detailed design.
3. Given the low level of the site and A5 carriageway relative to the location of the proposed connection to the existing sewer, a pump and associated type 3 compound will be required onsite which will be constructed to meet DCWW adoption standards. A swept path has been undertaken for a tanker accessing the compound and has been accepted by DCWW.

4. The proposals will look to intercept the existing drainage from Incline Cottage and direct it into the proposed foul pipework, making the existing septic tank redundant and will be removed.

Surface Water

Disposal of surface water is summarised as follows:

1. Infiltration testing was undertaken on site and ascertained that there was no permeability for the majority of the site. The only area which facilitated a successful porosity test was in the lower part of the site where the proposed retention pond is located. Three test cycles were undertaken in the lowest part of the site with a slow rate of 3.57×10^{-6} m/s being identified and is to be utilised for design purposes.
2. The retention basin will be unlined offering the opportunity for infiltration and is to be designed as such but given the limited space available for infiltration and the steep variation in levels relative to this vicinity, a connection into the open ditch in the northern-most corner is intended via use of Erosaweb Geocell for erosion control. This ditch connects to Afon Cegin and the proposed discharge rate will look to match the greenfield rate (Qbar) to reflect and improve upon the existing scenario where possible.
3. The findings from the porosity testing has indicated that the soil index mapping suggestion of soil type 2 is not reflective to the site characteristics and consequently an edited value of 4 has been used for ascertaining the existing runoff rates.
4. An existing discharge rate of 10.9l/s for Qbar has been determined with runoff rates reaching 23.8l/s for the 1 in 100year event.
5. Utilising a flow rate of 10.9l/s, a preliminary modelling exercise has ascertained that a volume of approximately 733m³ is required to be accommodated on site. Calculations for detailed design will include for climate change and an allowance for urban creep.
6. A SAB pre-application will be submitted in order to agree the approach in advance of full planning application and subsequent SAB application.
7. A combination of an infiltration/retention basin and cellular soakaway will be located on the lower part of the site whilst further attenuation will also be incorporated higher up the site. Flow control devices will enable storage to be maximised in the upper site. They will be designed in sequence to avoid excessive excavations that would be associated with a single tank.
8. The steep ground profile makes it difficult to achieve surface storage higher up the site but the proposals will look to incorporate various SUDS features for conveyance purposes. In order to meet the water quality, amenity and biodiversity requirements, a mixture of raingardens and raised planters will be included, in conjunction with incorporating porous paving where possible. Re-use of rainwater will be promoted through provision of above ground water butts at the base of rainwater pipes to provide the ability to re-use some rainwater.

Supporting Information

- DCWW PPA application (PPA0008765)
- Infiltration Testing (by Egeo)
- Greenfield Runoff Estimation
- Proposed Drainage Layout

Mr Phillip Evans
Datrys
Broncoed House 4a
Broncoed Business Park
Wrexham Rd
Mold
Flintshire
CH7 1HP

Date: 12/06/2024
Our Ref: PPA0008765

Dear Mr Evans,

Grid Ref: 259274 371917
Site Address: HD Incline Fields, Bangor
Development: Residential Housing Development

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

APPRAISAL

Firstly, we note that the proposal relates to a residential development comprising of 51 units on/at HD Incline Fields, Llandygai Road, Bangor and acknowledge that the site is allocated within the Local Development Plan (LDP). We offer the following comments as part of our appraisal of this development.

PUBLIC SEWERAGE NETWORK

The proposed development site is located in the vicinity of a separate sewerage system, comprising combined, foul and surface water public sewers, which drains to Treborth Wastewater Treatment Works (WwTW) via Bangor Beach Road Sewerage Pumping Station (SPS).

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

SURFACE WATER DRAINAGE

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Cyngor Gwynedd, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note and our Developer Services website at <https://developers.dwrcymru.com/en/help-advice/regulation-to-be-aware-of/sustainable-drainage-systems>.

Please be advised that due to capacity constraints with the downstream public combined sewerage system, under no circumstances would we allow surface water runoff from the proposed development to be discharged directly/indirectly into the public combined sewerage network.

In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

FOUL WATER DRAINAGE – SEWERAGE NETWORK

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the 300mm combined sewer at or downstream of chamber SH59721303 located approximately 350m to the north of the site in Ffordd Llandygai.

Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water Industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer



Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
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We welcome correspondence in
Welsh and English

Dŵr Cymru Cyf, a limited company registered in
Wales no 2366777. Registered office: Pentwyn Road,
Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

(i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

SEWAGE TREATMENT

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.

WATER SUPPLY

Capacity is currently available in the water supply system to accommodate the development. Initial indications are that a connection can be made from the '250mm' diameter watermain in '259217,371940' location. We reserve the right however to reassess our position as part of the formal application for the provision of new water mains under Section 41 and Section 51 of the Water Industry Act (1991) to ensure there is sufficient capacity available to serve the development without causing detriment to existing customers' supply as demands upon our water systems change continually.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at developer.services@dwrcymru.com

Please quote our reference number in all communications and correspondence.

Yours faithfully,



Owain George
Planning Liaison Manager
Developer Services

Please Note that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.



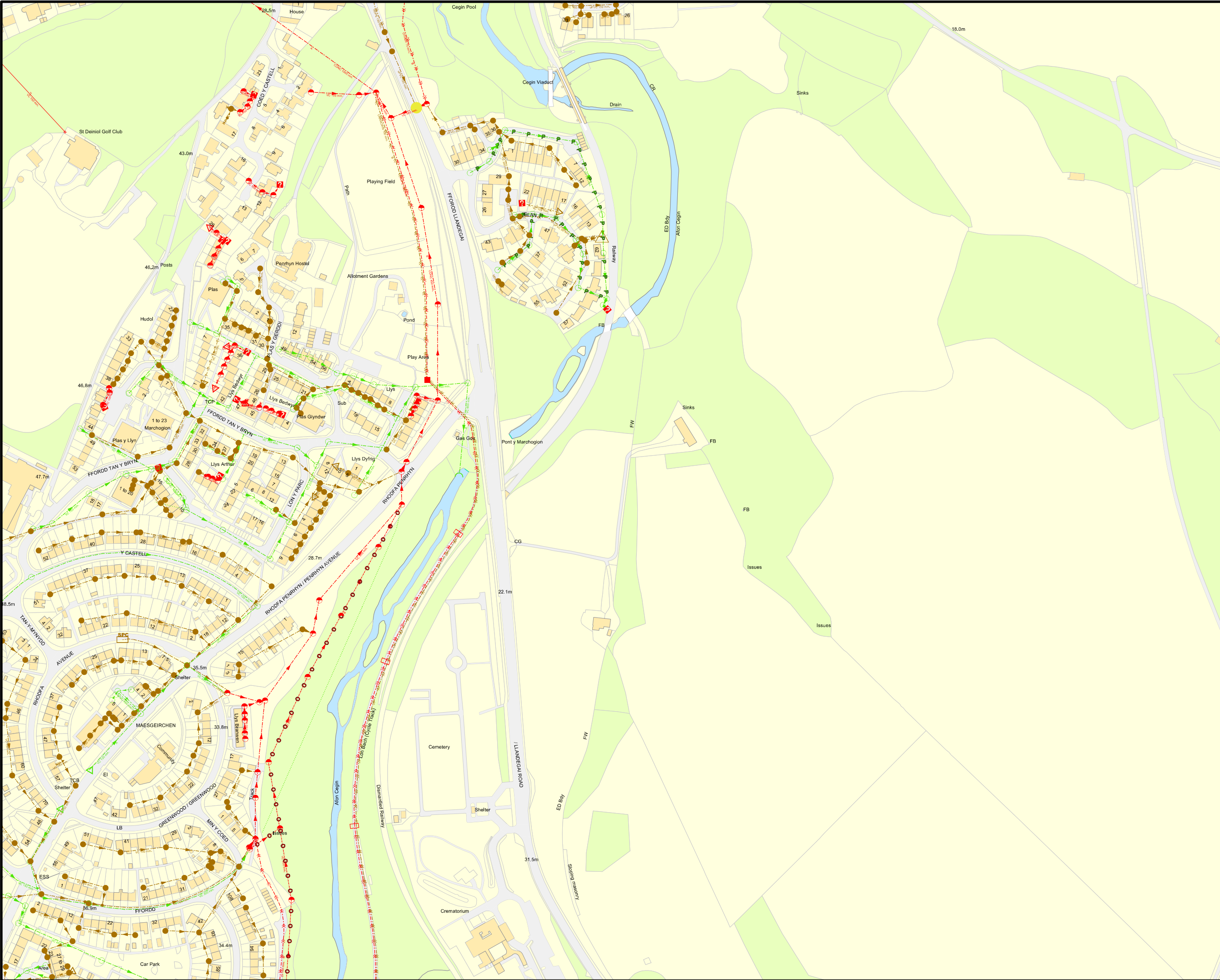
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PPA0008765



LEGEND(Representative of most common features)

| | | | |
|--|---|--|--|
| | Manhole | | Outfall |
| | Surface water chamber | | Lamphead |
| | Combined chamber | | Storm Overflow |
| | Combined sewer overflow | | Rising main |
| | Special purpose chamber | | Gravity sewer |
| | Treatment works | | Private sewer |
| | Pumping station | | Private sewer subject to Sew. S&S inspection agreement |
| | Ab. Sewer symbol colour indicates the type | | Private Sewer Transfer |
| | RED - Combined | | Lateral Drain |
| | GREEN - Surface Water | | Inspection Chamber |
| | BLACK - Road | | |
| | Blue - Power S&S consent (for indicative purposes only) | | |

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyf (the Company) gives this information as to the position of the underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is made even in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company is given as in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1981 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or if they do, the particular threat indicating their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provisions of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS
TO BE DETERMINED ON SITE.

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WILLIAMS HOMES (BALA) LTD

LAND AT INCLINE FIELDS, LLANDEGAI ROAD, BANGOR, LL57 4HP

GEOTECHNICAL, GROUND PERMEABILITY AND CONTAMINATION INVESTIGATION REPORT

REPORT No. E1819.GGPCI.R1

NOVEMBER 2024



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Figure 4 – Window Sample Boreholes (WS1 to WS12), Trial Pit Locations (TP1 to TP3), CBR Locations (CBR1 to CBR10)

4. GROUND CONDITIONS AND GEOLOGY.

4.1 General

4.1.1 Details of the ground strata and depths are presented on the trial pit records in Appendix 1 and window sample boreholes in Appendix 2. A summary of the findings is presented below.

4.1.2 The results of in-situ standard penetration tests (SPTs) undertaken in the boreholes are presented in Appendix 2.

4.2 Stratigraphy

4.2.1 The strata and depths encountered during the investigation was:

| Stratum | Description | Depth to base m range (average) |
|---------------------------|---|---------------------------------|
| TOPSOIL | Dark brown clayey TOPSOIL | 0.30 |
| CLAY 1 | Soft to firm dark brown slightly sandy silty CLAY | 1.20 to 2.20 (1.70) |
| SILT 1 | Firm light brown, medium brown to grey brown clayey SILT (slightly sandy in parts) | 2.50 to 4.50 (3.50) |
| SILT 2 | Firm medium grey clayey SILT | 4.50+ |
| SAND and GRAVEL (TP1,WS2) | Dark brown to dark greyish brown clayey silty fine to coarse SAND and GRAVEL (medium dense) | 3.45+ |

4.3 Groundwater

4.3.1 No groundwater was recorded in the trial pits. Groundwater was encountered in boreholes WS4 at 1.30m bgl, WS6 at 1.80m bgl, WS7 at 1.10m bgl

4.4 Contamination Observations

4.4.1 During the examination of the ground strata no obvious indications of contamination were noted. There was no indication of hydrocarbons, vapours or unusual odours.

4.5 Geotechnical Properties

4.5.1 The results of standard penetration tests (SPTs) are presented in Appendix 2. The following SPT N values were obtained in the various strata.

| Stratum | Description | Depth (m) | SPT 'N' value |
|---------|--|------------------------|---|
| CLAY 1 | Soft to firm dark brown slightly sandy silty CLAY | 1.00-1.45 | 9,14,7,8,11,9,12,9,10,8,8,9 |
| SILT 1 | Firm light brown, medium brown to grey brown clayey SILT (slightly sandy in parts) | 2.00-2.45 | 11,17,9,8,8,14,8,8,9,10,10,11 |
| SILT 2 | Firm medium grey clayey SILT | 3.00-3.45 4.00-4.45 | 15,5,6,8,4,6,7,9,7,13,12 8,3,8,9,8,3,10,12 |

4.5.2 The results of the insitu SPTs indicate N values in the soft to firm dark brown slightly sandy silty CLAY at a depth of 1.0 to 1.5 in the range 8 to 14 and an average of 9.5. Using a correlation factor for the CLAY of 5 (Stroud, Sowers and Sivrikaya&E. Togrol) this gives a shear strength of 47 kN/m². Foundations at this depth could be designed for an allowable bearing capacity of 88kN/m² for a standard strip footing at standard depth.

4.5.3 At a depth of 2.0 to 2.5 results of the in situ SPTs indicate N values in the range 8 to 14 and an average of 10.25. Using a correlation factor for the CLAY of 5 (Stroud, Sowers and Sivrikaya&E. Togrol) this gives a shear strength of 51 kN/m² Foundations at this depth could be designed for an allowable bearing capacity of 115kN/m² for a standard strip footing at standard depth.

4.6 Permeability Test Results

- 4.6.1 The results of the permeability tests are presented on the Field Test Results sheets in Appendix 3.

4.7 Soil Infiltration Rate Calculations

- 4.7.1 The Soil Infiltration Rate (f) is based on the method described in the BRE Digest and is calculated from the time taken for the water level to fall from 75% to 25% of the actual water depth in the trial hole.

- 4.7.2 The Soil Infiltration Rate (f) is calculated by the equation:

$$f = V_{p75-25} / a_{p50} \times t_{p75-25}$$

Where - V_{p75-25} is the storage volume in the hole from 75% to 25% effective depth,
 a_{p50} is the internal surface area of the hole to 50% effective depth plus the base area,
 t_{p75-25} the time taken for water to fall from 75% to 25% effective depth.

- 4.7.3 In TP1 the following results were obtained:

TP1.1

$$V_{p75-25} = 1.80 \times 0.70 \times (1.65 - 0.55) = 1.386 \text{ cu.m}$$

$$A_{p50} = \text{Base} + (\text{Int surface area to 50\% eff depth})$$

$$A_{p50} = (1.80 \times 0.70) + (2 \times 1.80 \times 2.21/2 + 2 \times 0.70 \times 2.21/2) = 6.785 \text{ sq.m}$$

$$t_{p75-25} = 912 - 132 = 780 \text{ min}$$

$$\text{Soil Infiltration Rate TP1.1} = V_{p75-25} / a_{p50} \times t_{p75-25} = 1.386 / 6.785 \times 780 \times 60 = 4.36 \times 10^{-6} \text{ m/sec}$$

TP1.2

$$V_{p75-25} = 1.80 \times 0.70 \times (1.69 - 0.56) = 1.4238 \text{ cu.m}$$

$$A_{p50} = \text{Base} + (\text{Int surface area to 50\% eff depth})$$

$$A_{p50} = (1.80 \times 0.70) + (2 \times 1.80 \times 2.26/2 + 2 \times 0.70 \times 2.26/2) = 6.91 \text{ sq.m}$$

$$t_{p75-25} = 1100 - 140 = 960 \text{ min}$$

$$\text{Soil Infiltration Rate TP1.2} = V_{p75-25} / a_{p50} \times t_{p75-25} = 1.4238 / 6.91 \times 960 \times 60 = 3.57 \times 10^{-6} \text{ m/sec}$$

TP1.3

$$V_{p75-25} = 1.80 \times 0.70 \times (1.65 - 0.55) = 1.386 \text{ cu.m}$$

$$A_{p50} = \text{Base} + (\text{Int surface area to 50\% eff depth})$$

$$A_{p50} = (1.80 \times 0.70) + (2 \times 1.80 \times 2.20/2 + 2 \times 0.70 \times 2.20/2) = 6.76 \text{ sq.m}$$

$$t_{p75-25} = 1077 - 130 = 947 \text{ min}$$

$$\text{Soil Infiltration Rate TP1.3} = V_{p75-25} / a_{p50} \times t_{p75-25} = 1.386 / 6.76 \times 947 \times 60 = 3.60 \times 10^{-6} \text{ m/sec}$$

- 4.7.4 The average soil infiltration rate at TP1 is 3.84×10^{-6} m/sec

- 4.7.5 In TP2 the following results were obtained:

The permeability test failed. The water level dropped only 7 cm in 5.5 hours and was static for an hour when the test was terminated.

- 4.7.6 In TP3 the following results were obtained:

The permeability test failed. The water level dropped only 25 cm in 6 hours but was dropping at 1cm/hour and 34cm above the test start point when the test was terminated.

4.8 CBR (California Bearing Ratio) Results

- 4.8.1 The results of the Dynamic Cone Penetrometer (DCP) tests to determination of Penetration Value / CBR Value and Subgrade Surface Modulus of Unbound Soils are presented in Appendix 4.

6 DEVELOPMENT CONSIDERATIONS.

6.1 Foundations

- 6.1.1 The ground conditions encountered across the site are relatively uniform. Below the 0.30m thick layer of topsoil is soft to firm dark brown slightly sandy silty CLAY to a depth of 1.20m bgl to 2.20m bgl. Underlying the CLAY is firm light brown, medium brown to grey brown clayey SILT which is slightly sandy in parts and a firm medium grey clayey SILT.
- 6.1.2 At the lowest point of the site at TP1 and WS2 a dark brown to dark greyish brown clayey silty fine to coarse SAND and GRAVEL was encountered from 1.60m bgl.
- 6.1.3 Standard strip foundations will be suitable and if placed at standard depth within the CLAY can be designed for an allowable bearing capacity of 88kN/m² at standard depth. If foundations extend deeper to 2.0m they can be designed for an allowable bearing capacity of up to 115 kN/m².
- 6.1.4 Alternatively for raft foundations founding in or on the soft to firm dark brown slightly sandy silty CLAY can be designed for an allowable bearing capacity of 88kN/m².

6.2 Floor Slabs

- 6.2.1 Floor slabs can be ground bearing following removal of the topsoil.

6.3 Earthworks

- 6.3.1 The natural ground strata of soft to firm dark brown slightly sandy silty CLAY and firm light brown, medium brown to grey brown clayey SILT can be excavated with normal groundworks excavation plant.
- 6.3.2 Seepages of groundwater were recorded from 1.10m bgl at the higher elevations of the site (WS4, WS6, WS7) and deeper excavations in this area will require some groundwater control, although groundwater inflows are not expected to be significant.

6.4 Concrete

- 6.4.1 The results of laboratory pH and sulphate content indicate that ACEC Class AC1 and sulphate class DS-1 conditions prevail at the site, in accordance with BRE Special Digest 1 'Concrete in Aggressive Ground 2005'

6.5 Surface-Water Soakaways

- 6.5.1 The results of in-situ permeability tests indicate that the soft to firm dark brown slightly sandy silty CLAY and firm light brown, medium brown to grey brown clayey SILT across most of the site area is not suitable for surface water soakaways. The fine to coarse SAND and GRAVEL found in TP1 is suitable for soakaways.

6.6 Ground Contamination

- 6.6.1 The shallow ground strata do not contain any significant concentrations of contaminants above available respective trigger concentrations and there are no contamination risks to the proposed development.

Appendix 3 - Permeability Test Results

POROSITY/PERMEABILITY TEST

| | |
|--------------------------|--|
| SITE: | LAND AT INCLINE FIELDS, LLANDEGAI ROAD, BANGOR, LL57 4HP |
| PROJECT No: | E1819 |
| CLIENT: | WILLIAMS HOMES (BALA) LTD |
| DATE: | 22.10.24 |
| WEATHER: | Dry but overcast |
| PIT No: TP1 2.70m | |

| GMT | TIME ELAPSED (min) | DEPTH TO WATER | WATER DEPTH | FALL | WDx0.75 | WDx0.25 |
|-----------------|--------------------|----------------|-------------|------|---------|---------|
| Test TP1.1 | | | | | | |
| 10.25 | 0 | 0.49 | 2.21 | | | |
| 10.30 | 5 | 0.55 | 2.15 | | | |
| 10.55 | 30 | 0.71 | 1.99 | | | |
| 11.55 | 90 | 0.92 | 1.78 | | | |
| 12.55 | 150 | 1.10 | 1.60 | | 1.65 | |
| 13.25 | 180 | 1.19 | 1.51 | | | |
| 13.55 | 210 | 1.25 | 1.45 | | | |
| 14.55 | 270 | 1.36 | 1.34 | | | |
| 15.55 | 330 | 1.46 | 1.24 | | | |
| 16.55 | 390 | 1.54 | 1.16 | | | 0.55 |
| 07.55 | 1290 | 1.60 | 0.10 | | | |
| Test TP1.2/2.60 | | | | | | |
| 8.40 | 0 | 0.34 | 2.26 | | | |
| 9.40 | 60 | 0.68 | 1.92 | | | |
| 10.40 | 120 | 0.86 | 1.74 | | 1.69 | |
| 11.40 | 180 | 1.01 | 1.59 | | | |
| 12.40 | 240 | 1.14 | 1.46 | | | |
| 13.40 | 300 | 1.23 | 1.37 | | | |
| 14.40 | 360 | 1.31 | 1.29 | | | |
| 15.40 | 420 | 1.38 | 1.22 | | | |
| 8.40 | 1440 | 2.36 | 0.24 | | | 0.56 |
| Test TP1.3/2.70 | | | | | | |
| 9.00 | 0 | 0.50 | 2.20 | | | |
| 10.00 | 60 | 0.85 | 1.85 | | | |
| 11.00 | 120 | 1.02 | 1.68 | | 1.65 | |
| 12.00 | 180 | 1.17 | 1.53 | | | |
| 14.00 | 300 | 1.38 | 1.32 | | | |
| 16.00 | 420 | 1.53 | 1.17 | | | 0.55 |
| 9.00 | 1440 | 2.49 | 0.21 | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | | | |
|--------------------------|--------------------------|------|--|
| Pit Dimensions: | 1.80 L x 0.70 W x 2.70 D | | |
| Soil Description: | 0.00 | 0.35 | Dark brown sandy clayey TOPSOIL |
| | 0.35 | 1.60 | Soft to firm dark brown slightly sandy silty CLAY |
| | 1.60 | 2.70 | Dark brown to dark greyish brown clayey silty fine to coarse SAND and GRAVEL |

POROSITY/PERMEABILITY TEST

| | |
|--------------------------|--|
| SITE: | LAND AT INCLINE FIELDS, LLANDEGAI ROAD, BANGOR, LL57 4HP |
| PROJECT No: | E1819 |
| CLIENT: | WILLIAMS HOMES (BALA) LTD |
| DATE: | 22.10.24 |
| WEATHER: | Dry but overcast |
| PIT No: TP2 2.70m | |

[illegible]

| | | | |
|--------------------------|--------------------------|-------|--|
| Pit Dimensions: | 1.90 L x 0.70 W x 2.70 D | | |
| Soil Description: | 0.00 | 0.35 | Dark brown sandy clayey TOPSOIL |
| | 0.35 | 1.90 | Soft to firm light brown slightly sandy silty CLAY becoming dark brown |
| | 1.90 | 2.50 | Soft light brown SILT |
| | 2.50 | 2.80+ | Firm medium grey silty CLAY |

POROSITY/PERMEABILITY TEST

| | |
|--------------------------|--|
| SITE: | LAND AT INCLINE FIELDS, LLANDEGAI ROAD, BANGOR, LL57 4HP |
| PROJECT No: | E1819 |
| CLIENT: | WILLIAMS HOMES (BALA) LTD |
| DATE: | 22.10.24 |
| WEATHER: | Dry but overcast |
| PIT No: TP3 2.80m | |

[illegible]

| | | | |
|--------------------------|--------------------------|-------|--|
| Pit Dimensions: | 1.90 L x 0.70 W x 2.80 D | | |
| Soil Description: | 0.00 | 0.30 | Dark brown sandy clayey TOPSOIL |
| | 0.30 | 2.20 | Soft to firm light brown slightly sandy silty CLAY becoming dark brown |
| | | | seepage at 2.00m bgl |
| | 2.20 | 2.80+ | Soft light brown SILT |

| | |
|----------------|----------------|
| Calculated by: | Phillip Evans |
| Site name: | Incline Fields |
| Site location: | |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

| | |
|------------|-------------------|
| Latitude: | 53.22561° N |
| Longitude: | 4.10962° W |
| Reference: | 3058558635 |
| Date: | Dec 12 2024 11:27 |

Runoff estimation approach

IH124

Site characteristics

| | |
|-----------------------|-------|
| Total site area (ha): | 1.286 |
|-----------------------|-------|

Methodology

| | |
|-------------------------------------|-----------------------------|
| Q _{BAR} estimation method: | Calculate from SPR and SAAR |
| SPR estimation method: | Calculate from SOIL type |

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

| | Default | Edited |
|--------------|---------|--------|
| SOIL type: | 2 | 4 |
| HOST class: | N/A | N/A |
| SPR/SPRHOST: | 0.3 | 0.47 |

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

| | Default | Edited |
|--------------------------------|---------|--------|
| SAAR (mm): | 1133 | 1133 |
| Hydrological region: | 9 | 9 |
| Growth curve factor 1 year: | 0.88 | 0.88 |
| Growth curve factor 30 years: | 1.78 | 1.78 |
| Growth curve factor 100 years: | 2.18 | 2.18 |
| Growth curve factor 200 years: | 2.46 | 2.46 |

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default

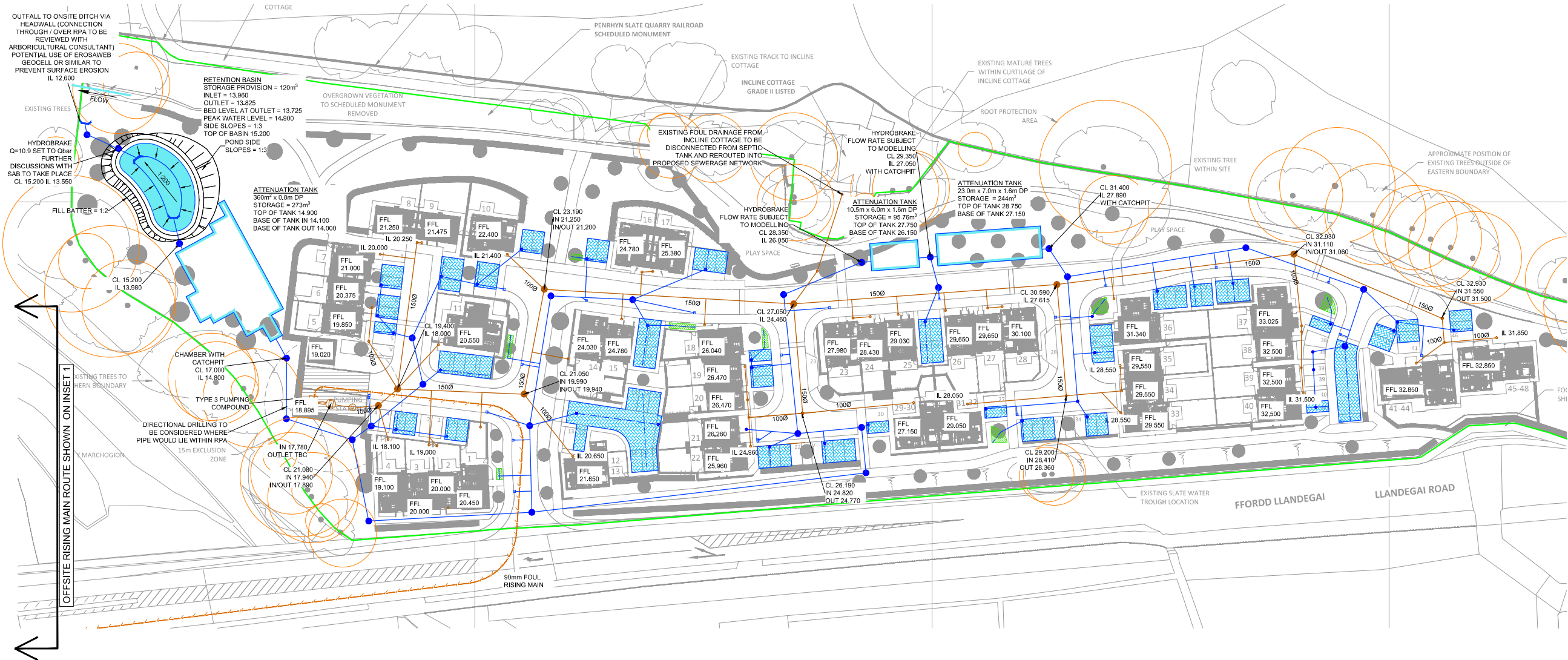
Edited

| | | |
|-------------------------------|-------|-------|
| Q_{BAR} (l/s): | 4.12 | 10.91 |
| 1 in 1 year (l/s): | 3.62 | 9.6 |
| 1 in 30 years (l/s): | 7.33 | 19.41 |
| 1 in 100 year (l/s): | 8.98 | 23.78 |
| 1 in 200 years (l/s): | 10.13 | 26.83 |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.



INDIVIDUAL PLOTS TO HAVE
WATERBUTTS AND SuDS FEATURES -
SUBJECT TO LEVELS AND DETAIL DESIGN



- NOTES
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND OTHER SPECIALISTS' DRAWINGS.
 2. PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION
 3. REFER TO DATRYS DRAWING 24139/401-404 FOR LEVELS INFORMATION.

- KEY
- SITE BOUNDARY
 - EXISTING COMBINED PIPE
 - PROPOSED FOUL CHAMBER AND PIPE
 - PROPOSED FOUL RISING MAIN
 - PROPOSED SURFACE WATER CHAMBER AND PIPE
 - PROPOSED PERFORATED PIPE
 - PROPOSED SURFACE WATER GULLY
 - PROPOSED INDICATIVE POROUS PAVING
 - PROPOSED CELLULAR ATTENUATION TANK
 - PROPOSED DETENTION BASIN
 - PROPOSED RAINGARDEN/TREE PIT
 - EXISTING TREE RPA EXTENT

| REV | DATE | DESCRIPTION | BY | CHK | APP |
|-----|----------|--|----|-----|-----|
| P06 | 12.05.25 | ARCH LAYOUT UPDATED | IR | AC | AC |
| P05 | 05.03.25 | BASIN VOLUME CORRECTED | PE | IR | AC |
| P04 | 28.02.25 | BASIN POSITION & SHAPE AMENDED FOR PAC | PE | IR | AC |
| P03 | 18.12.24 | BASIN POSITION AMENDED FOR PAC | PE | AC | AC |
| P02 | 18.12.24 | BASIN POSITION AMENDED | PE | AC | AC |
| P01 | 17.12.24 | FIRST ITERATION | PE | AC | AC |

REVISIONS

INFORMATION

CLIENT



PROJECT

Incline Fields, Bangor

TITLE

Proposed Drainage Scheme



| | | | | | |
|-------------|--------------------------|--------------|-----------|--------|----|
| DRAWN | PE | CHECKED | AC | PASSED | AC |
| DATE | 08.08.24 | CLIENTS REF. | | | |
| SCALE AT A1 | 1:500 | AUTOCAD REF. | 24139/501 | | |
| DRAWING No. | 24139-DAT-XX-XX-DR-C-501 | REVISION | P06 | | |