Butterfly Farm Solar DNS

Wrexham

Flood Consequences Assessment & Drainage Strategy

September 2025



Waterco

Assessment | Modelling | Design

Project Information	
Project:	Butterfly Farm Solar DNS
Report Title:	Flood Consequences Assessment & Drainage Strategy
Client:	Axis P.E.D Ltd
Instruction:	The instruction to undertake this Flood Consequences Assessment & Drainage Strategy was received from Laura Mackey of Axis P.E.D.
File Ref:	14825-FCA & Drainage Strategy-06.docx

Approval Record	
Author:	Megan Williams BSc(Hons) MSc MCIWEM
Checker:	Aled Williams BSc (Hons) MCIWEM C.WEM
Approver:	Nigel Jones BEng (Hons) CEng MICE

Document History		
Revision	**Date**	**Comment**
01	18/02/2025	Draft issue
02	14/03/2025	First issue
03	27/03/2025	Second issue – updated following Client review
04	14/08/2025	Third issue – updated with revised site boundary
05	09/09/2025	Fourth issue - updated following Client review
06	16/09/2025	Fifth issue – updated following Client review

The copyright in this document (including its electronic form) shall remain vested in Waterco Limited (Waterco) but the Client shall have a licence to copy and use the document for the purpose for which it was provided. Waterco shall not be liable for the use by any person of the document for any purpose other than that for which the same was provided by Waterco. This document shall not be reproduced in whole or in part or relied upon by third parties for any use whatsoever without the express written authority of Waterco.

This report will remain valid for a period of twelve months (from the date of last issue) after which the source data should be reviewed in order to reassess the findings and conclusions on the basis of latest available information.

Contents

Introduction 1
Existing Conditions 1
Development Proposals 4
Flood Zone Category and Policy Context.....4
Consultation 5
Sources of Flooding and Probability.....6
Surface Water Management 9
Maintenance 12
Other Considerations 13
Conclusions 14
Recommendations.....14

Appendices

Appendix A Location Plan & Aerial Image
Appendix B Topographical Data
Appendix C BGS Borehole Records
Appendix D Sewer Records
Appendix E Site Visit Plan
Appendix F Proposed Site Layout
Appendix G NRW Flood Mapping & Correspondence
Appendix H Greenfield Runoff Rates
Appendix I MicroDrainage Simulations
Appendix J Concept Drainage Sketches
Appendix K Maintenance Schedule
Appendix L Concept Designers Risk Assessment

Tables

Table 1 – Pollution Hazard Indices 12
Table 2 – SuDS Mitigation Indices 12

Introduction

Waterco has been instructed to prepare a Flood Consequences Assessment (FCA) and Drainage Strategy in respect of a proposed new solar energy generating station and an associated on-site substation and Battery Energy Storage System (BESS) on land to the north of the B5426, Wrexham.

The purpose of this report is to outline the potential flood risk to the site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified flood risk (if any). This report has been prepared in accordance with the guidance contained in Planning Policy Wales (PPW) and Technical Advice Note 15 (TAN15): Development, Flooding and Coastal Erosion.

This report also includes a Drainage Strategy. The aim of the Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

This report has been prepared in accordance with the Welsh Government 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems' (2018) – herein referred to as 'the Statutory Standards for SuDS'.

The development will be capable of generating 100MW of electricity and as such, it will be a Development of National Significance (DNS). Applications for DNS are exempt from requiring a Sustainable Drainage Approval Body (SAB) application.

Existing Conditions

The site covers an area of approximately 146 hectares (ha) and is split into 3no. land parcels, namely the Western Array Area, Central Array Area and Eastern Array Area. The 3no. land parcels are centred at National Grid Reference (NGR): 331692, 346263 (western), NGR: 333959, 345629 (central), NGR: 336679, 346129 (eastern) respectively. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed August 2025) shows that the site comprises undeveloped agricultural land. The Western Array Area is bordered by agricultural land to the north, east and south with the A483 dual carriageway to the west. Access to the Western Array Area is provided from the B5426 to the south.

The Central Array Area is surrounded by agricultural land on all sides with some scattered residential settlements towards the west and south. Access is provided from an unnamed road intersecting the site.

The Eastern Array Area is bordered by agricultural land on all sides, with residential settlements and farmsteads to the south, west and north. Access to the site is provided from Kiln Lane (B5130) to the north and the B5426 to the south.

Local Topography

A topographical survey has been undertaken by Tir 3D Surveys Ltd in June 2022. The topographical survey shows that the Western Array Area slopes from 99.95 metres Above Ordnance Datum (m AOD) in the centre to approximately 90.63m AOD in the south-east.

The Central Array Area generally slopes from west to east with a level of 94.2m AOD in the west and a low point of 54.6m AOD in the north-east. However, the gradient is not uniform and there are a series of undulations and valleys surrounding river corridors within and adjacent to the site.

The Eastern Array Area slopes in a south-easterly direction, with a topographical high point of 50.7m AOD identified in the western extent and a low point of 30m AOD in the south-east.

Topographic levels to m AOD have also been derived from a 1m resolution NRW composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data generally corroborates the topographical survey.

Topographical information is provided as Appendix B.

Ground Conditions

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the Western, Central and Eastern Array Areas are underlain by superficial deposits of Devensian Till, generally comprising Diamicton.

The superficial deposits are identified as being underlain by the Etruria Formation consisting of mudstone in the Western Array Area, the Salop Formation comprising mudstone, sandstone and conglomerate in the Central Array Area and the north-western portion of the Eastern Array Area, and the Kinnerton Sandstone Formation for the remainder of the Eastern Array Area.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

Historical BGS borehole record SJ34NW545 is located in the Western Array Area at NGR: 331590, 346380. The borehole record identified topsoil from ground level to approximately 0.37metres below ground level (m.bgl). The topsoil is underlain by stiff brown silty sandy clay with occasional gravel up to 3.66m.bgl. Brown silty sand with coarse medium and fine gravel is observed between 3.66m.bgl to the end of the borehole at 5.18m.bgl. Water was encountered at 3.81m.bgl.

Historical BGS borehole record SJ34NW40 is located in the Central Array Area at NGR: 333800, 345980. The borehole record identifies clayey soil with rare stones from ground level to 0.4m.bgl. Red-brown, stiff, slightly sandy clay, with rare stones is recorded between 0.4m.bgl and 18m.bgl. No water was encountered within the borehole.

Historical BGS borehole record SJ34NE24 is located approximately 335m south of the Eastern Array Area at NGR: 337320, 345560. The borehole record identifies very sandy soil from ground level to 0.3m.bgl. Gravel consisting of coarse to fine, subrounded grey mudstone, and greywacke with quartzite and igneous rock and

sand consisting of coarse, mostly subangular quartzite with minor quartz and sandstone, medium quarts an quartzite is identified between 0.3m.bgl and 5.3m.bgl. This is underlain by silty and sandy, soft, red-brown clay up to 7.5m.bgl. Very clayey sand is observed up to 13m.bgl, with it becoming mainly fine up to 17m.bgl. Between 17m.bgl and the end of the borehole (19.2m.bgl) very sandy, mainly soft, red-brown clay with coal fragments are identified. Water was encountered at 14m.bgl.

Borehole records together with a borehole location plan are included as Appendix C.

According to NRW's Aquifer Designation data, obtained from the BGS GeoIndex online mapping [accessed August 2025], the Devensian Till deposits are classified as a Secondary Undifferentiated Aquifer, which are assigned in *'cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.*

The underlying Etruria and Salop Formations are classified as Secondary A Aquifer. Secondary A Aquifers are *'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.*

The Kinnerton Sandstone Formation bedrock is classified as a Principal Aquifer, which is defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The Cranfield University 'Soilscapes' map [accessed August 2025] indicates that the Western, Central and Eastern Array Areas are underlain by '*Slowly permeable seasonally wet loamy and clayey soils'.*

Local Drainage

Public sewer records have been obtained from Dwr Cymru Welsh Water (DCWW) and are included in Appendix D. The DCWW sewer records show that there is a 675mm public combined sewer crossing the Western Array Area flowing north-east. There is also a 110mm foul rising main and 300mm foul gravity sewer connecting into the combined sewer. There are no public sewers crossing the Eastern Array Area.

A minimum 3m undeveloped easement will be required from the centreline of the public sewers crossing the site.

Site Visit

A site visit was undertaken by Waterco in February 2025 to map any watercourses and inspect any potential access road crossing points. The annotated plans from the site visit, together with a photographic record, are included in Appendix E.

Development Proposals

The proposed development is for a solar farm development, comprising in-field solar arrays with associated on-site Battery Energy Storage System, access tracks, and a substation. The proposed development also includes infrastructure for a connection to the Legacy National Grid substation. The development is separated into 3no. land parcels; the Eastern, Central and Western Array Areas. The substation grid compound is located in the Western Array Area.

Proposed development plans are included in Appendix F.

The majority of the site will remain permeable, with land beneath the solar panels retained as grassland. Access tracks will be formed from permeable material (compacted stone). The proposed substation compound will cover an area of approximately 0.24ha and will be formally drained. Each individual hybrid-inverter battery station will cover an area of approximately 235m^2 (0.0235ha) and will be formally drained.

Flood Zone Category and Policy Context

Flood Zone Category

The NRW 'Flood Map for Planning' (Appendix G) shows that the site is located within an area outside of the extreme flood extent (Flood Zone 1), meaning it has a less than 0.1% annual probability of flooding, including the effects of climate change.

Development Vulnerability Classification

Figure 4 of the Welsh Government's Technical Advice Note 15 (TAN15) classifies renewable energy generation facilities as 'less vulnerable' development. Section 10.12 of TAN15 states that in Flood Zone 1, applications for all types of development are acceptable in principle.

Local Policy

The Wrexham Unitary Development Plan 1996 - 2011 is the current development plan for the county and contains the following policies relating to flood risk & drainage:

*'**Policy GDP1***

All new development should…

i) Ensure that development does not result in, or is subject to, flooding, soil erosion, landslides, contamination, either on or off the site.

Policy EC12

Development (including the raising of land) within defined flood plains will only be permitted if it:

a) would not be subject to an unacceptable risk of flooding on-site; and/or

b) does not result in an unacceptable risk of flooding on or off-site; and/or

c) does not adversely affect flood management or maintenance schemes

Policy EC13

Development which would result in an unacceptable adverse impact on the water environment due to additional surface water run-off will not be permitted.'

Local guidance documents including the Wrexham County Borough Council (WCBC) Preliminary Flood Risk Assessment (PFRA) (June 2011 and its 2017 addendum) have been reviewed and inform this report.

Consultation

A pre-planning opinion request was submitted to NRW in February 2025. In their response (Appendix G) NRW have stated that:

'…The planning application proposes less vulnerable development (solar farm). The application site is within Zone A and the easternmost part is slightly within Zone C2 of the Development Advice Map (DAM) contained in Technical Advice Note (TAN) 15: Development and Flood Risk (2004). Our Flood Map for Planning (FMfP) identifies the easternmost part of the application site to be at risk of flooding and is partially within Flood Zones 2 and 3 (Rivers).

As confirmed in the letter from Welsh Government dated 15 December 2021, the FMfP represents better and more up-to-date information on areas at flood risk than the DAM. Therefore, we advise that you produce a Flood Consequences Assessment (FCA), to demonstrate that the consequences of flooding can be acceptably managed over the lifetime of development.

Section 6 of TAN15 requires the Local Planning Authority (LPA) to determine whether the development at this location is justified. Therefore, we refer you to the tests set out in section 6.2 of TAN15. If the LPA consider the proposal meets the tests set out in criteria (i) to (iii), then the final test (iv) is for the applicant to demonstrate through the submission of an FCA that the potential consequences of flooding can be managed to an acceptable level.

The criteria for the FCA, which should normally be undertaken by a suitably qualified person carrying an appropriate professional indemnity, are given in Section 7 and Appendix 1 of TAN15 (2004). The FCA should be proportionate to the development proposed. You may also refer to our website, which contains technical advice and recommendations.

There could be a minor fluvial flood risk impact in the proposed eastern parcel from the Sesswick Brook main river, which borders the site. Whilst the proposed panels appear to be located primarily in FMfP Zone 2, flood risk impacts will need further consideration in the FCA. This should include ensuring that there is no ground raising, that panels are set a suitable distance above the existing ground level and that boundary fencing will not affect flood flow routes...'

It is noted that the site boundary has been revised since receipt of the NRW correspondence and that development is no longer proposed within Flood Zones 2 or 3.

A consultation request was submitted to the LLFA in February 2025. A response is awaited.

Sources of Flooding and Probability

Fluvial

Western Array Area

The Western Array Area is intersected by 2no. ditches (ordinary watercourses) which flow in an easterly direction through the site. The ditches join Black Brook which is located approximately 165m east of the Western Array Area at its nearest point. Black Brook flows in a northerly direction in this location.

Fluvial flooding could occur if the ditches on site overtopped their banks during or following an extreme rainfall event. The ditches on site convey minimal flow and serve limited catchment areas, generally originating on, or directly adjacent to the site. The risk of flooding from small watercourses such as the ditches on site is identified on the NRW 'Flood Risk from Surface Water and Small Watercourses' map (Appendix G). The NRW surface water and small watercourses map shows that all developable areas are outside of the flood extents associated with the ditches on or adjacent to the site. The flood extent is constrained to land immediately adjacent to the ditches.

The Western Array Area is situated a minimum of 4m above the Black Brook and is outside of the extreme 0.1% annual probability flood extent associated with Black Brook.

The NRW 'Recorded Flood Extent' map (Appendix G) indicates that there are no records of fluvial flooding affecting the site.

Central Array Area

The Central Array Area is intersected by several ditches (ordinary watercourses). The ditches generally flow in an easterly direction and are shown on the location plan in Appendix A. Other watercourses in the area include Gefeiliau Brook which is located approximately 175m west of the Central Array Area.

The risk of flooding from Gefeiliau Brook is considered to be very low. The developable area of the site is situated approximately 10m above Gefeiliau Brook and is outside of the 0.1% annual probability flood extent associated with Gefeiliau Brook.

The ditches on site convey minimal flow and serve limited catchment areas, generally originating on, or directly adjacent to the site. The risk of flooding from small watercourses such as the ditches on site is identified on the NRW 'Flood Risk from Surface Water and Small Watercourses' map (Appendix G). The NRW surface water and small watercourses map shows that all developable areas are outside of the flood extents associated with the small watercourses on or adjacent to the site. The flood extent is constrained to land immediately adjacent to the ditches.

The NRW 'Recorded Flood Extent' map (Appendix G) indicates that there are no records of fluvial flooding affecting the site.

Eastern Array Area

The Eastern Array Area is intersected by a ditch (ordinary watercourses). The ditch generally flows in a south-easterly direction.

Sesswick Brook (watercourse) is located approximately 520m south-east of the Eastern Array Area and flows north-east to join the River Dee approximately 1.4km east of the Eastern Array Area. Sesswick Brook is situated a minimum of 10m below the site and as such any potential flooding of this watercourse would not affect the site.

The ditch on site conveys minimal flow and serve limited catchment areas, generally originating on, or directly adjacent to the site. The risk of flooding from small watercourses such as the ditch on site is identified on the NRW 'Flood Risk from Surface Water and Small Watercourses' map (Appendix G). The NRW surface water and small watercourses map shows that the majority of the developable areas are outside of the flood extents associated with the ditch on site. Minimal flooding is shown to encroach in the location of the solar panels near to the ditch location. The panels will be raised on supports elevated above ground levels and would not be impacted by any potential flooding.

It can therefore be concluded that the risk of fluvial flooding is very low.

Tidal

The site is situated at a minimum of approximately 30m AOD and is significantly above sea level. The site is therefore not at risk of tidal flooding.

Surface Water

Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Surface water flooding can occur anywhere without warning. However, flow paths can be determined by consideration of contours and relative levels.

Western Array Area

The NRW 'Flood Risk from Surface Water and Small Watercourses' map (Appendix G) indicates that the majority of the Western Array Area is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding. There are areas shown to be within surface water Flood Zone 2 and 3. Flood Zone 2 is defined as having between a 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change. Flood Zone 3 is defined as areas with a greater than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.

No development is proposed within the surface water Flood Zone 2 and 3 extents. It can therefore be concluded that the risk of surface water flooding is very low. The Flood Zone 2 and 3 extents are constrained

to the land directly adjacent to the ditches on site.

Central Array Area

The NRW 'Flood Risk from Surface Water and Small Watercourses' map (Appendix G) indicates that the majority of the Central Array Area is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding. There are areas shown to be within surface water Flood Zones 2 and 3, generally constrained to the locations of the ditches.

All developable areas are outside of the flood extents associated with surface water and small watercourses. There are no distinct flow routes in the area which would direct any potential surface water flooding towards the developable areas of the site.

It can therefore be concluded that the risk of surface water flooding is very low.

Eastern Array Area

The NRW 'Flood Risk from Surface Water and Small Watercourses' map (Appendix G) indicates that the majority of the Eastern Array Area is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding. There are areas shown to be within surface water Flood Zones 2 and 3, generally constrained to the locations of a ditch. Isolated topographical low points in the Eastern Array Area are also shown within surface water Flood Zones 2 and 3.

There are no distinct flow routes originating off-site which would direct any potential surface water flooding towards the site.

It can be concluded that the risk of surface water flooding is very low across the majority of developable area of the Eastern Array Area. Minimal flooding is shown to encroach in the location of the solar panels near to the ditch location in the northern extent of the Eastern Array Area. The panels will be raised on supports elevated above ground levels and would not be impacted by any potential flooding

Sewer

Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged, or is of inadequate capacity. Flooding is mostly applicable to combined and surface water sewers.

The DCWW sewer records show that there is a 675mm public combined sewer crossing the Western Array Area flowing north-east. There is also a 110mm foul rising main and a 300mm foul gravity sewer connecting into the combined sewer. There are no public sewers crossing the Central and Eastern Array Areas.

There are no records of sewer flooding at or near to the site(s). The site is in a rural area and there are no inflows into the 675mm public combined sewer or the 300mm public foul sewer in the vicinity of the site. As such, the likelihood of an exceedance event of the public sewers on site is very low.

It can be concluded that the risk of sewer flooding is very low.

Groundwater

Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

BGS borehole records indicate that the Western, Central and Eastern Array Areas are underlain by clay. The impervious nature of the underlying deposits will limit the vertical migration of groundwater.

The PFRA states *'There is no local information available which provides evidence on future groundwater flood risks across WCBC. This information was ascertained from assessing the information on the British Geological Survey (BGS) website, as well as GIS layers from the EA which showed the WCBC area is not susceptible to groundwater flooding due to its geology'.*

There are no records of groundwater flooding affecting the site. It can therefore be concluded that the risk of groundwater flooding is low.

Artificial Sources

There are no canals in the immediate vicinity of the site. The NRW online 'Flood Risk from Reservoirs' map (Appendix G) shows that the site is not at risk of flooding from reservoirs.

It can therefore be concluded that the risk of flooding from artificial sources is very low.

Summary of Potential Flooding

It can be concluded that the risk of flooding from all sources is very low, with flood risk constrained to landscaped areas adjacent to ditches within the site. As such, no flood risk mitigation measures are required, and the development is considered to comply with TAN15.

Surface Water Management

Solar Panels

The proposed ground-mounted solar arrays will be laid on ram mounted posts ensuring the ground beneath each panel remains permeable. The rows of panels will be spaced with a 'rainwater gap' between each row of panels. Rainfall runoff from the solar arrays will infiltrate to the land beneath and between the panels. It is therefore considered that the solar arrays will not result in an increase in the surface water runoff rates and volumes and betterment will be provided by the conversion of arable land to permanent grassland.

Runoff from the panels will likely result in negligible erosion at the base of each panel due to proposed land use comprising permanent grassland.

Access Roads

All access tracks will be formed from permeable stone surfacing and will have infrequent use (minimising compaction). Rainfall on the access roads will infiltrate through the permeable surface. Whilst the underlying

geology is clay, which will have limited infiltration potential, G1.15 of the Welsh Government 'Statutory standards for sustainable drainage systems' states that: '*Disposal of significant events using solutions such as soakaway units or infiltration basins usually requires infiltration rates of the order of 1 x 10-5 m/s or higher. However, effective infiltration can be achieved with lower rates under units such as permeable pavements due to the large storage and infiltrating surface area available and the removal of sediment which would otherwise blind the infiltration surface'.*

Substation Compound & Hybrid-Inverter Battery Stations

The substation compound and hybrid-inverter battery stations (which will include Battery Energy Storage Systems) will be formally drained. The substation compound covers an area of approximately 0.24ha. Each individual hybrid-inverter battery station covers an area of approximately 0.023ha.

Discharge Method

Standard S1 of the Statutory Standards for SuDS sets out the following hierarchy of drainage options:

> *Priority Level 1: Surface water runoff is collected for use;*
>
> *Priority Level 2: Surface water runoff is infiltrated to ground;*
>
> *Priority Level 3: Surface water runoff is discharged to a surface water body;*
>
> *Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;*
>
> *Priority Level 5: Surface water runoff is discharged to a combined sewer.*

Priority Level 1: Surface water runoff collected for use

In line with section G1.4 of the Statutory Standards for SuDS, rainwater harvesting is not proposed for this site as there is no foreseeable demand for non-potable water on the site throughout its design life.

Priority Level 2: Surface water runoff is infiltrated to ground

As described above, the site is underlain by clay. Given the impermeable nature of the underlying strata, it is unlikely that infiltration techniques are feasible.

Priority Level 3: Surface water runoff is discharged to a surface water body

Where infiltration is not suitable, a connection to watercourse is the next consideration.

Western Array Area

There are 2no. ditches (ordinary watercourses) intersecting the Western Array Area. Discharge of surface water to the ditches which cross the Western Array Area appears to be feasible from the substation compound and all hybrid-inverter battery stations.

Central Array Area

The Central Array Area is intersected by several ditches (ordinary watercourses). Each hybrid-inverter battery

station will discharge to the ditches.

Eastern Array Area

The Eastern Array Area is intersected by a ditch. Each hybrid-inverter battery station will discharge to the ditch.

Discharge to watercourse from the substation and each hybrid-inverter battery station will be made at a limited greenfield discharge rate.

Discharge Rate

In order to establish the proposed limited discharge rate, the existing greenfield runoff rates have been estimated using the ICP SUDS method within MicroDrainage. A summary of the greenfield runoff rates is included as Appendix H.

The 1 in 1 year greenfield runoff rate for the 0.24ha substation compound area is 0.5 l/s. The discharge rate for the substation compound will therefore be limited to 1 l/s to ensure the drainage system is self-cleansing.

The 1 in 1 year greenfield runoff rate for each of the 0.023ha hybrid-inverter battery stations is less than 0.1 l/s. The discharge rate for each hybrid-inverter battery stations will therefore be limited to 1 l/s to ensure the drainage system is self-cleansing.

Attenuation Storage

Attenuation storage for the substation compound and the hybrid-inverter battery stations can be provided within the lined stone sub-grade of the compounds. Attenuation storage will be provided to accommodate the 1 in 100 year plus 40% climate change event.

Attenuation storage estimates have been provided using MicroDrainage software and are included in Appendix I.

Substation Compound

An estimated storage volume of 249m³ will be required to accommodate the 1 in 100 year plus 40% CC event. The storage estimate is based on a discharge rate of 1 l/s, storage within a stone sub-grade, an impermeable drainage area of 0.24ha and hydro-brake flow control.

Based on a compound area of 0.24ha and a void ratio of 30% (applicable to stone aggregate), a sub-grade depth of 350mm will be sufficient to provide the 249m^3 of storage required to accommodate the 1 in 100 year plus 40% CC event.

Hybrid-Inverter Battery Stations

An estimated storage volume of 14m³ will be required to accommodate the 1 in 100 year plus 40% CC event. The storage estimate is based on a discharge rate of 1 l/s, storage within a stone sub-grade, an impermeable drainage area of 0.023ha and hydro-brake flow control.

Based on a hybrid-inverter battery station area of 234m^2 and a void ratio of 30% (applicable to stone

aggregate), a sub-grade depth of 200mm will be sufficient to provide the 14m^3 of storage required to accommodate the 1 in 100 year plus 40% CC event.

Perforated pipes will be laid within the stone sub-grade as to direct water towards the flow control device.

Concept drainage sketches detailing the proposed surface water discharge location for the substation compound and hybrid-inverter battery stations are included in Appendix J.

Surface Water Treatment

The Statutory Standards for SuDS sets out the following guidance for surface water treatment:

S3 - Surface water quality management

Treatment for surface water runoff should be provided to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems, including sewers.

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), other roofs (applicable to the substation compound & hybrid-inverter battery stations) have a 'low' pollution hazard level, with low traffic roads (applicable to access roads) also classified as having a 'low' pollution hazard level. Table 1 shows the pollution hazard indices for each land use.

Table 1 – Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other Roofs	Low	0.3	0.2	0.05
Low Traffic Roads	Low	0.5	0.4	0.4

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2

* Indices values range from 0-1.

The substation compound, hybrid-inverter battery stations and the site access road will be formed from permeable stone surfacing. Table 2 demonstrates that permeable surfacing will provide sufficient treatment.

Table 2 – SuDS Mitigation Indices

	Mitigation Indices		
Type of SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Surfacing	0.7	0.6	0.7

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.3

Maintenance

All drainage systems will be readily accessible for maintenance access.

Maintenance of drainage features such as permeable surfacing will be the responsibility of the site owner. A maintenance schedule for permeable surfacing is included in Appendix K. The area beneath the solar panels will be grassland once operational.

Other Considerations

Maintenance Access

Maintenance access to the watercourses on and bordering the site will be provided by incorporating a suitable buffer either side of the watercourses, which is to be agreed with the LLFA.

Access Crossings

New access road crossings over watercourses will be required. The access crossings will be in the form of open space structures (bridges) as to avoid altering or disturbing the river channel**.** An Ordinary Watercourse Consent will be required for any works which could lead to obstruction to the flow, for example construction of the bridge crossings.

Public Sewers

The DCWW sewer records show that there is a 675mm public combined sewer crossing the Western Array Area flowing north-east. There is also a 110mm foul rising main and 300mm foul gravity sewer connecting into the combined sewer. A minimum 3m undeveloped easement will be required from the centreline of the public sewers crossing the site.

Conclusions

The proposed development is for in-field solar arrays with associated access tracks, hybrid-inverter battery stations and a substation.

Flood Risk

The NRW 'Flood Map for Planning' shows that the site is located within an area outside of the extreme flood extent (Flood Zone 1), meaning it has a less than 0.1% annual probability of flooding, including the effects of climate change.

The risk of flooding from all sources has been reviewed and is considered to be very low, with flood risk constrained to landscaped areas adjacent to ditches within the site. As such, no flood risk mitigation measures are required, and the development is considered to comply with TAN15.

Drainage

Solar Panels

The proposed ground-mounted solar arrays will be laid on ram mounted posts ensuring the ground beneath each panel remains permeable. The rows of panels will be spaced with a 'rainwater gap' between each row of panels. Rainfall runoff from the solar arrays will infiltrate to the land beneath and between the panels. It is therefore considered that the solar arrays will not result in an increase in the surface water runoff rates and volumes and betterment will be provided by the conversion of arable land to permanent grassland.

Supporting Infrastructure

All access tracks will be formed from permeable stone surfacing and will have infrequent use (minimising compaction). Rainfall on the access tracks will infiltrate through the permeable surface.

The substation compound and hybrid-inverter battery stations will be formally drained with storm water managed to accommodate the 1 in 100 year plus 40% CC event.

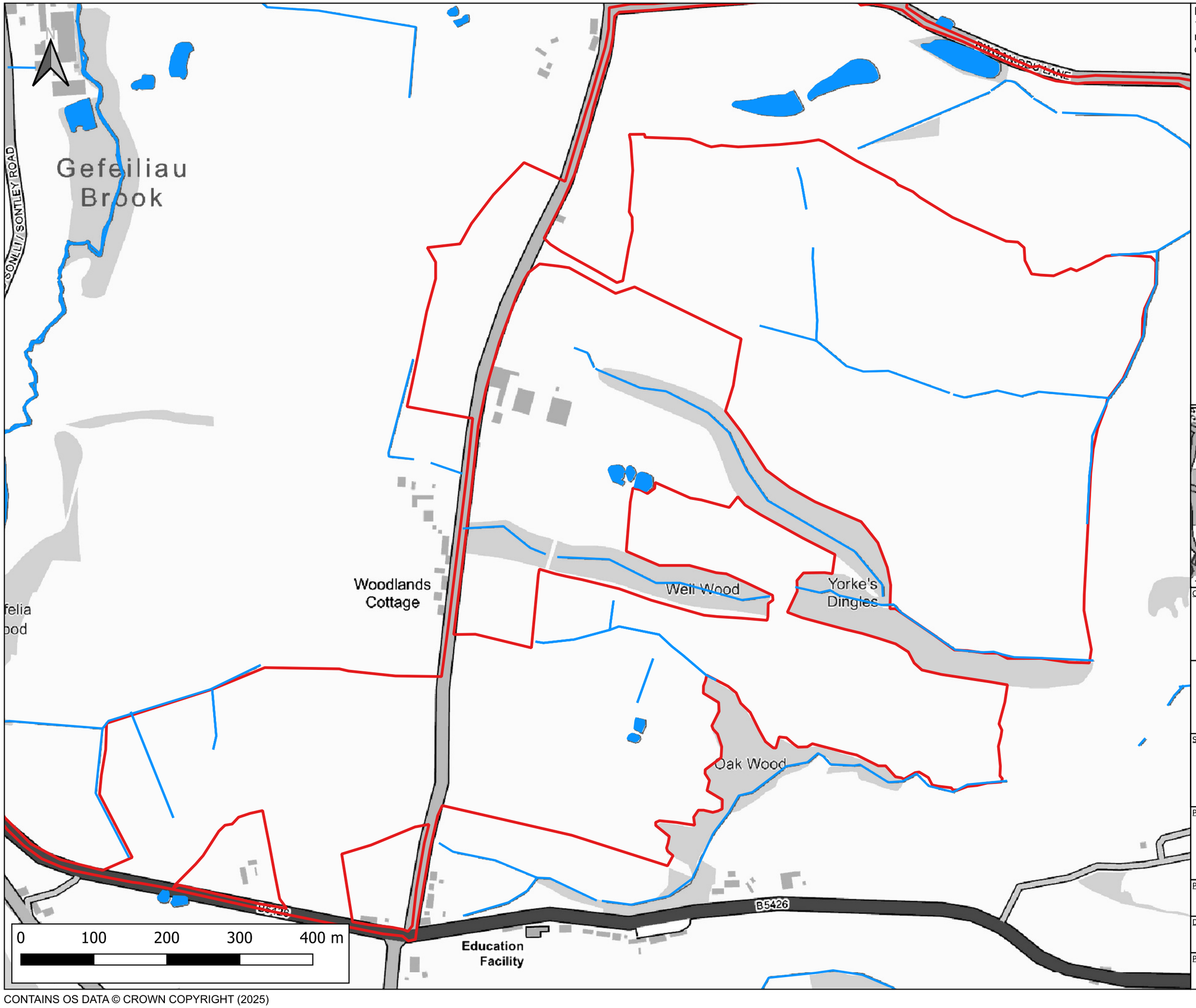
Discharge of surface water from the substation and hybrid-inverter battery stations will be made to the ditches which intersect the site. Discharge will be made at a limited rate of 1 l/s for each of the hybrid-inverter battery stations and also the substation compound. Attenuation storage will be provided within the stone sub-grade of the compound's stone surfacing.

A Concept Designers Risk Assessment (CDRA) has been prepared to inform the designers of any potential hazards associated with this scheme. The CDRA is included in Appendix L.

Recommendations

- Verify attenuation storage volumes at detailed design stage
- Allow a suitable buffer either side of the watercourses and 3m easement either side of public sewers.

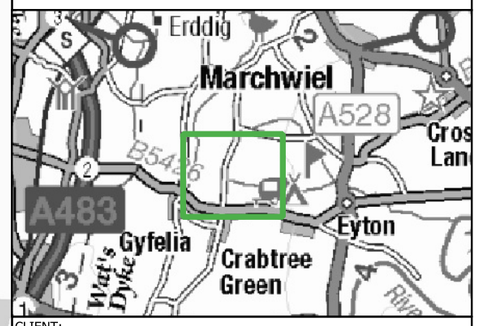
Appendix A Location Plan & Aerial Image



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies



CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Location Plan- Central Array Area

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5000

PLOT NAME:	REVISION:
14825_Location_Plan	-

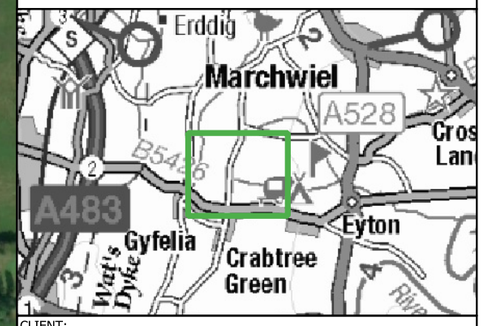
CONTAINS OS DATA © CROWN COPYRIGHT (2025)



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary



CLIENT:

Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:

Butterfly Farm Solar DNS

PLOT TITLE:

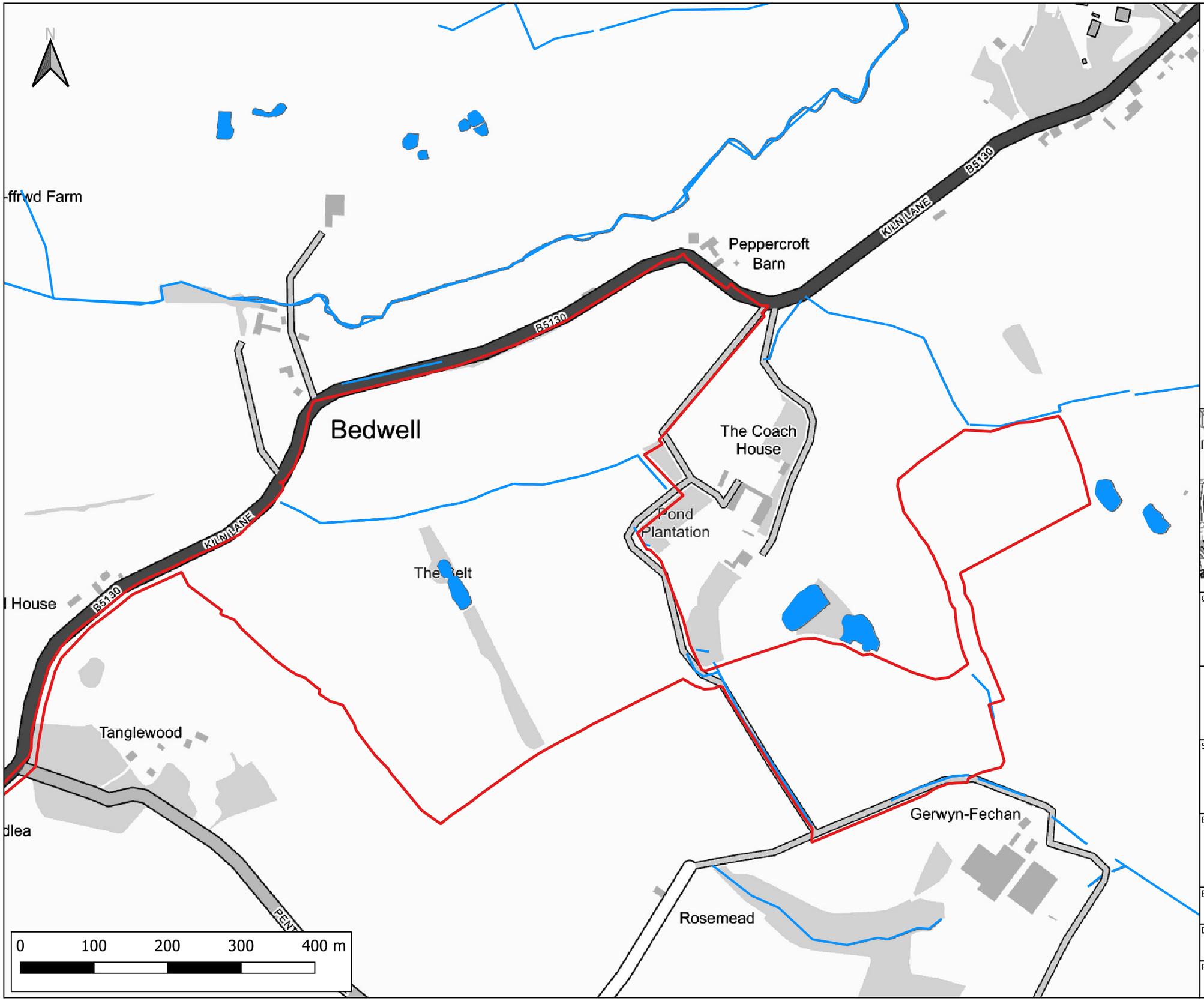
Aerial Plan- Central Array Area

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5000

PLOT NAME:	REVISION:
14825_Aerial_Plan	-

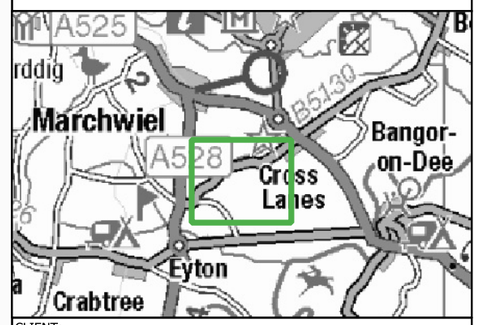
CONTAINS OS DATA © CROWN COPYRIGHT (2025)
BASEMAP: WORLD IMAGERY. SOURCES: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, GIS USER COMMUNITY



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies



CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Location Plan- Eastern Array Area

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5000

PLOT NAME:	REVISION:
14825_Location_Plan	-

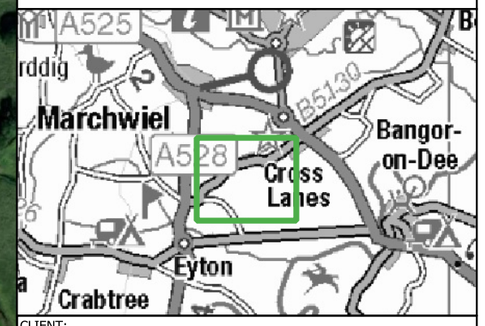
CONTAINS OS DATA © CROWN COPYRIGHT (2025)



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary



CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Aerial Plan- Eastern Array Area

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5000

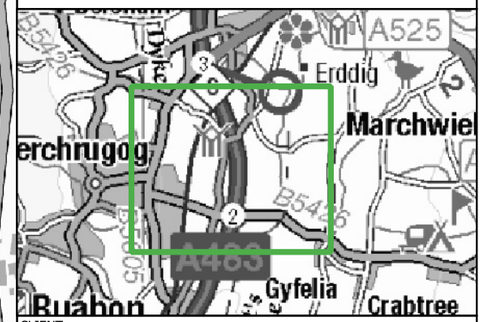
PLOT NAME:	REVISION:
14825_Aerial_Plan	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
BASEMAP: WORLD IMAGERY. SOURCES: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, GIS USER COMMUNITY

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies



CLIENT:	Axis P.E.D Ltd
	www.waterco.co.uk
SCHEME:	Butterfly Farm Solar DNS
PLOT TITLE:	Location Plan - Western Array Area
PLOT STATUS: FINAL	DATE: 09-09-2025
DRAWN: HW / CHECKED: AW / APPROVED: NJ	PLOT SCALE AT A3: 1:10000
PLOT NAME: 14825_Location_Plan	REVISION: -

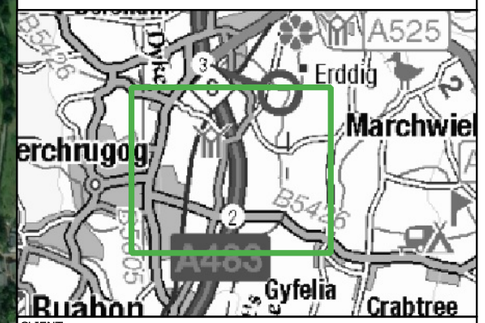
CONTAINS OS DATA © CROWN COPYRIGHT (2025)



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary



CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Aerial Plan- Western Array Area

PLOT STATUS:	DATE:
FINAL	09-09-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:10000

PLOT NAME:	REVISION:
14825_Aerial_Plan	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
BASEMAP: WORLD IMAGERY. SOURCES: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, GIS USER COMMUNITY

Appendix B Topographical Data

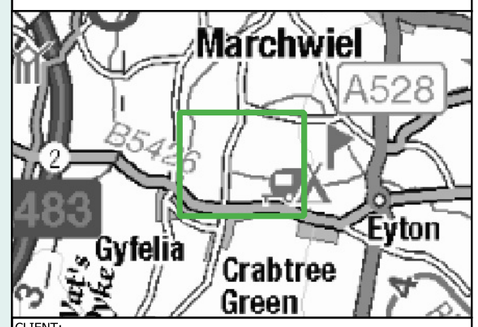
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site boundary
- 5m Contour
- Site levels (m AOD)

Ground Elevations (m AOD)

- <= 60.0
- 60.0 - 70.0
- 70.0 - 80.0
- 80.0 - 90.0
- > 90.0



CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
LiDAR Plan - Central Array Area
1m Resolution
Data from Natural Resources Wales

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:5000

PLOT NAME:	REVISION:
14825_LiDAR_Plan	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)

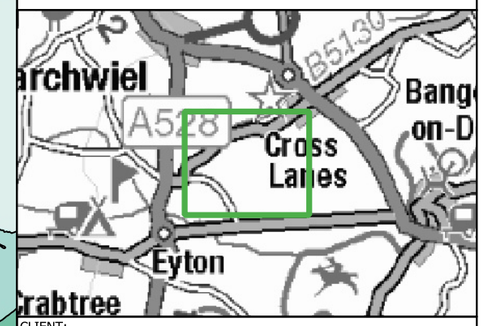
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site boundary
- 5m Contour
- Site Levels (m AOD)

Ground Elevations (m AOD)

- 0.0 - 25.0
- 25.0 - 30.0
- 30.0 - 35.0
- 35.0 - 40.0
- 40.0 - 45.0
- 45.0 - 50.0
- > 50.0



CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

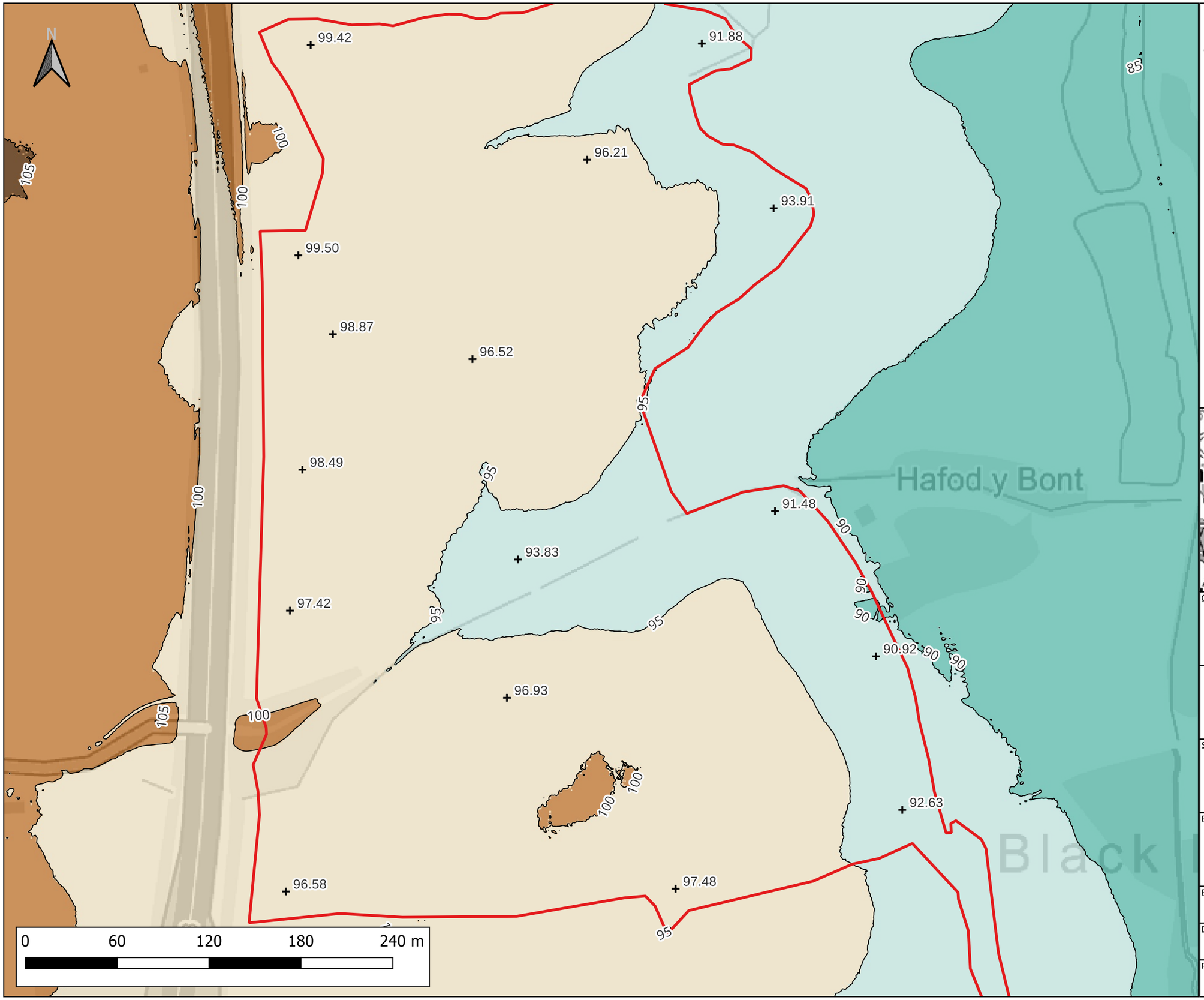
SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
LiDAR Plan - Eastern Array Area
1m Resolution
Data from Natural Resources Wales

PLOT STATUS:			DATE:
FINAL			13-08-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:5000

PLOT NAME:	REVISION:
14825_LiDAR_Plan	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)



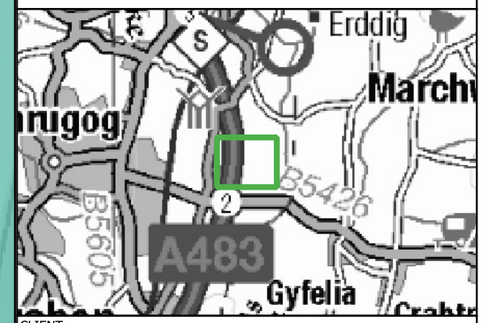
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site boundary
- 5m Contour
- Site Levels (m AOD)

Ground Elevations (m AOD)

- <= 90.0
- 90.0 - 95.0
- 95.0 - 100.0
- 100.0 - 105.0
- > 105.0



CLIENT:
Axis P.E.D Ltd

www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

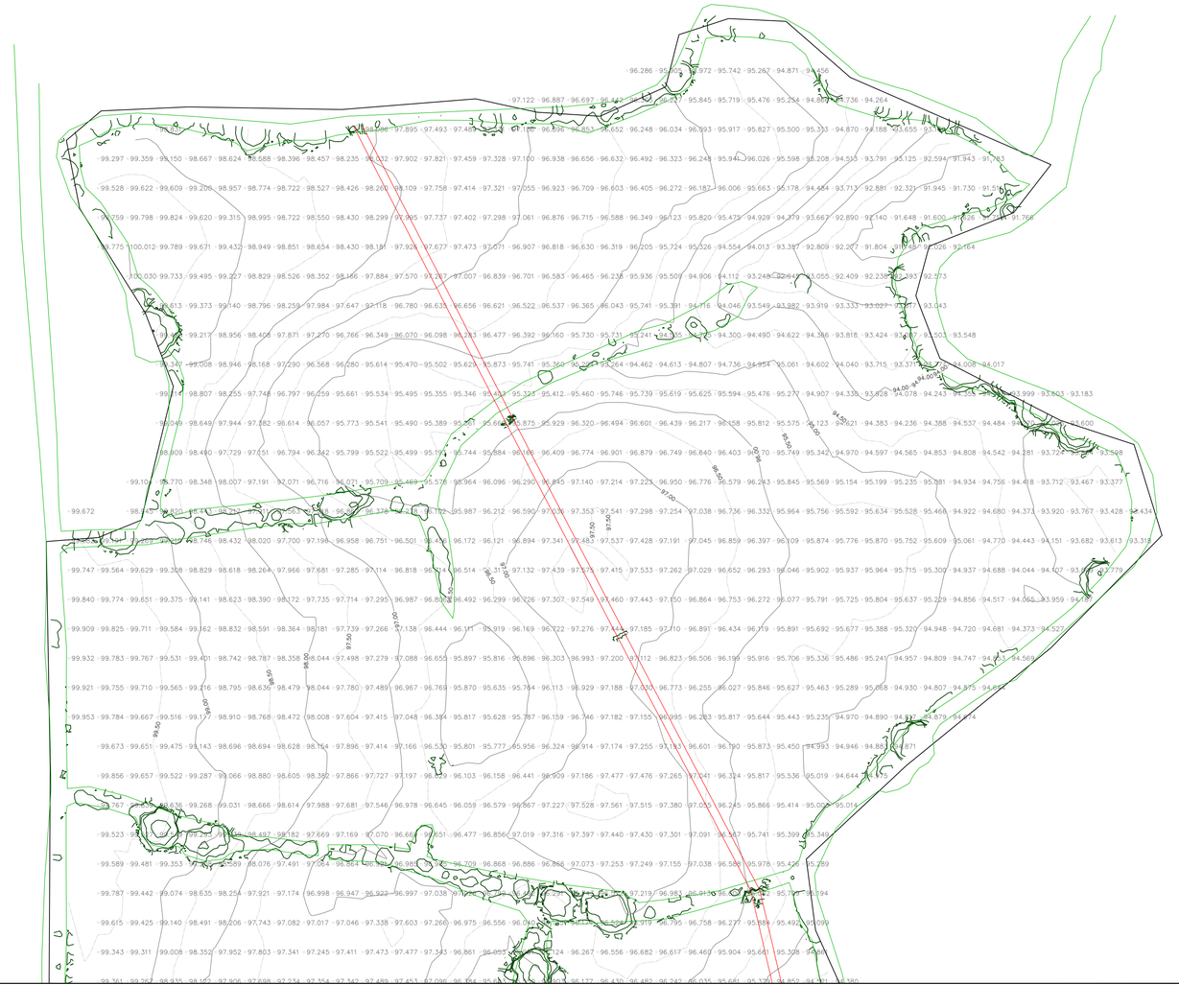
PLOT TITLE:
LiDAR Plan - Western Array Area
1m Resolution
Data from Natural Resources Wales

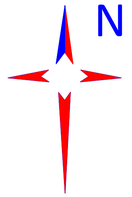
PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:2400

PLOT NAME:	REVISION:
14825_LiDAR_Plan	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)





Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
	Manhole Cover (Square)
	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
RI	Ridge
	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

OBC	Overhead Cables
	Pipe
	Power Inspection Cover
	Power Pole
	Stay
	ESB Box (Pylon)
	Fire Hydrant
	Flower box
	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
	Telecom Control Panel (Pillar)
	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
	Cable TV Inspection Cover
	Water Valve
	Water Meter
	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

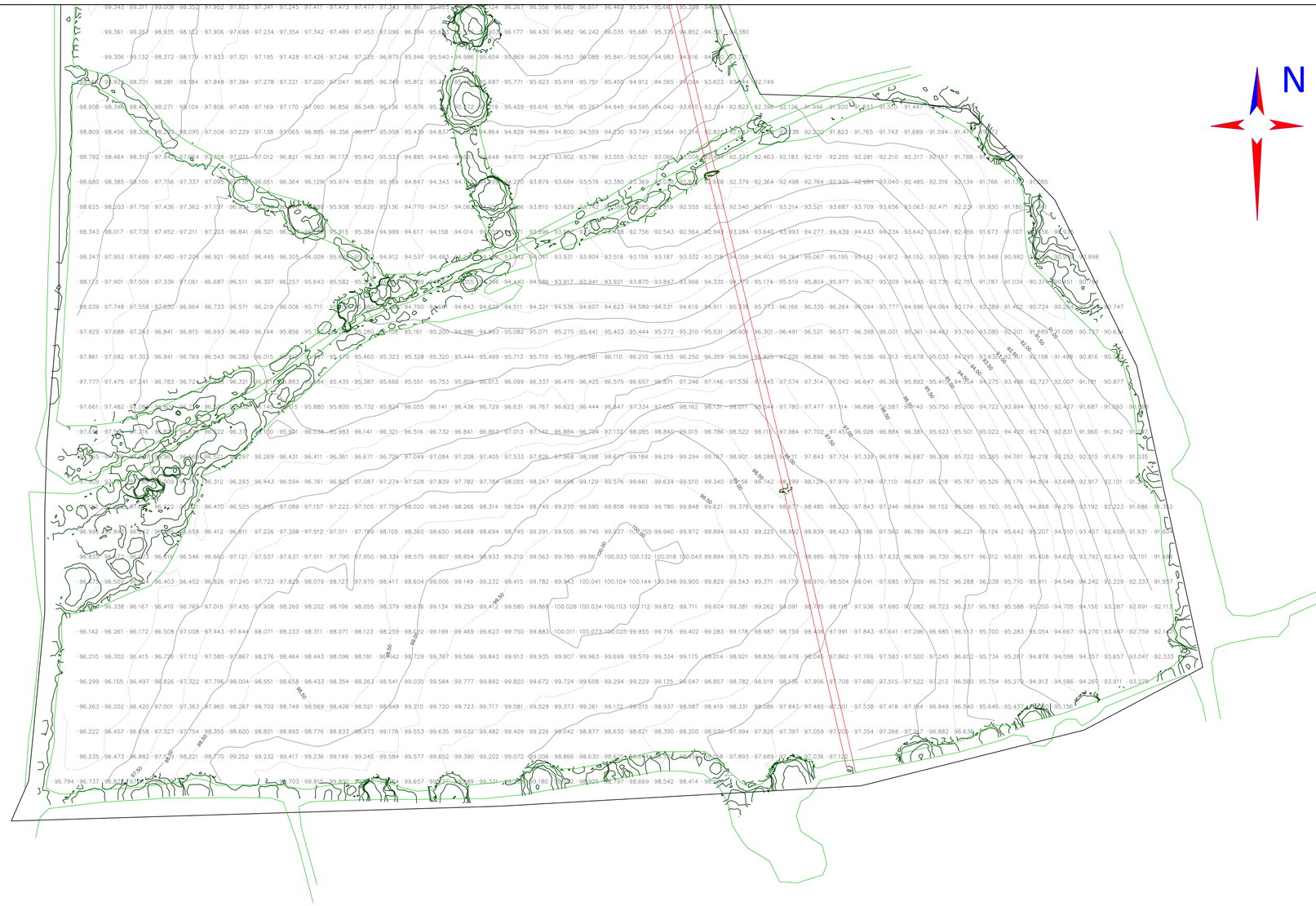
Tír3D
the Survey people

Head Office: **www.tír3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone,
Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client: JBM Solar	
Location: Legacy Farm	
Job: Topographical Survey	
Drawing Number: 22104-A	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

- WBL — Water Bed Level
- WTL — Water level
- WAT — Water Edge
- POND — Pond
- WEIR — Weir
- WELL — Well
- ACO — Aco Drain
- GL — Long gully
- GU — Gully
- MH — Manhole Cover (Square)
- MH — Manhole Cover (Round)

Legend - Roads - Rail

- RD — Road Carriageway
- RC — Road Centre
- Road Markings White
- Road Markings Yellow
- CUL — Culvert
- DTC — Ditch
- KT — Kerb Top
- KB — Kerb Bottom
- KBAC — Kerb Back
- BS — Bus Stop
- SR — Speed Ramp
- TRK — Tracks
- VE — Verge
- RTRK — Rail Track
- RS — Road Sign
- Bollard

Legend - Roads Markings

- SWLD — Single White Line Dashed
- SWL — Single White Line
- SYLD — Single Yellow Line Dashed
- SYL — Single Yellow Line
- DWLD — Double White Line Dashed
- DWL — Double White Line
- DYLD — Double Yellow Line Dashed
- DYL — Double Yellow Line
- YB — Yellow Box

Legend - Buildings / Structures

- BGF — Building Footprint
- BGL — Building Line
- Apex
- RI — Ridge
- Eaves
- Parapet
- SOF — Soffit
- FON — Foundations
- CAN — Canopy - Overhead Features
- Container
- PF — Prefab - Building
- Ruins
- GH — Greenhouse
- Shed
- Steps
- Door
- WIN — Windows
- CEL — Cellars
- CAB — Cabin
- COL — Column
- BRG — Bridge
- LDR — Ladder
- Tank
- Platform
- MONU — Monument

Legend - Ground Features

- Gate
- FE — Fences
- Pillars
- WL — Wall
- WT — Walls top
- RLG — Railing
- BT — Bank Top
- BB — Bank Bottom
- RWB — Retaining Wall Base
- RWT — Retaining Wall Top
- PATH — Pathway
- HR — Handrail
- RAMP — Ramps, loading bays
- BR — Barrier
- Armco Barrier
- Rock
- SC — Surface Change
- Tarmac
- Trench
- CH — Channel
- CHAM — Chamber
- LDR — Ladder
- Cattle Grid
- CONC — Concrete
- Bench / Seat
- Survey Station
- Contours (Major)
- Contours (Minor)

Legend -Vegetation

- GRASS — Grass partitions
- HE — Hedges
- VL — Vegetation Line
- Tree Stump
- Tree

Legend - Services

- OHC — Overhead Cables
- Pipe
- Elec — Power Inspection Cover
- Power Pole
- Stay
- Elec — ESB Box (Pylon)
- Fire Hydrant
- Flower box
- GV — Gas Valve
- Lamp Post
- Litter Bin
- Mast / Pylon
- Post Box
- Telecom — Telecom Control Panel (Pillar)
- Telecom — Telecom Cover
- Telecom Pole
- Traffic Lights
- Telephone box
- IC — Cable TV Inspection Cover
- Water Valve
- Water Meter
- AJ — Armstrong Junction

Legend - Services - Underground

- CODE
- UA — Underground Anomaly
- UCOM — Underground Combined
- UF — Underground Foul
- UG — Underground Gas
- UP — Underground Power
- US — Underground Storm
- UT — Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

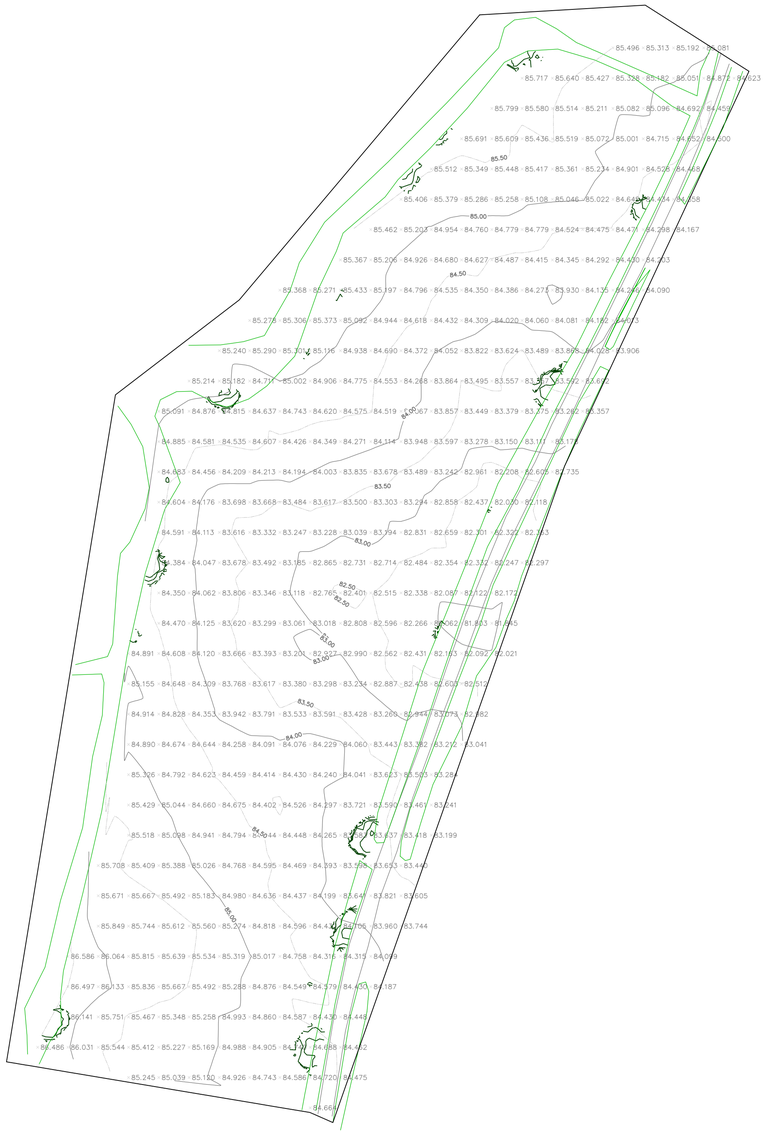
Tír3D
the Survey people

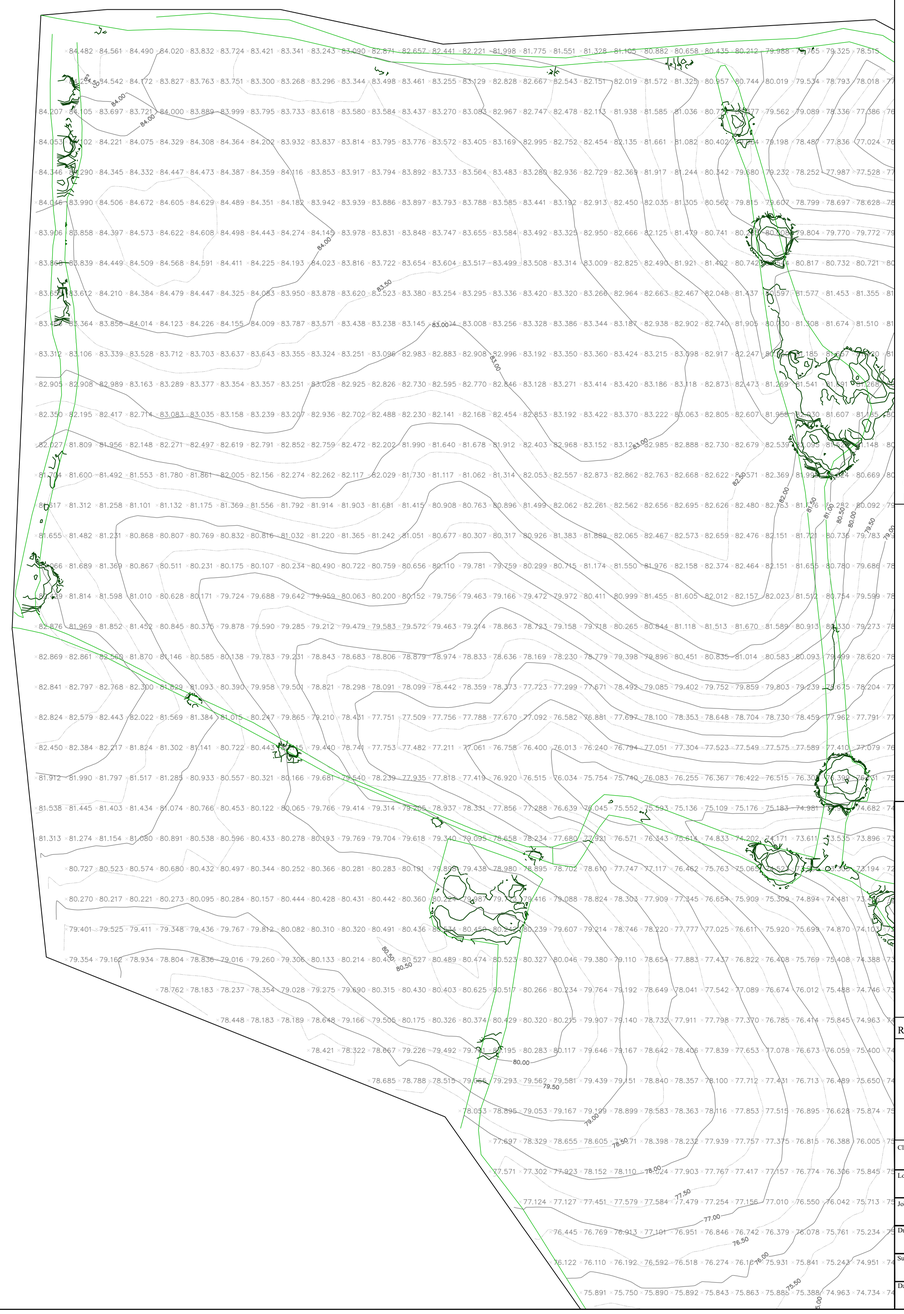
Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone,
Co.Kildare. R14 RF67

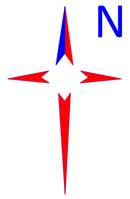
Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-B	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH







Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
MH	Manhole Cover (Square)
MH	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
	Ridge
RI	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

OHC	Overhead Cables
	Pipe
	Power Inspection Cover
	Power Pole
	Stay
	ESB Box (Pylon)
	Fire Hydrant
	Flower box
GV	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
	Telecom Control Panel (Pillar)
	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
IC	Cable TV Inspection Cover
	Water Valve
	Water Meter
AJ	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN SCALE: NTS



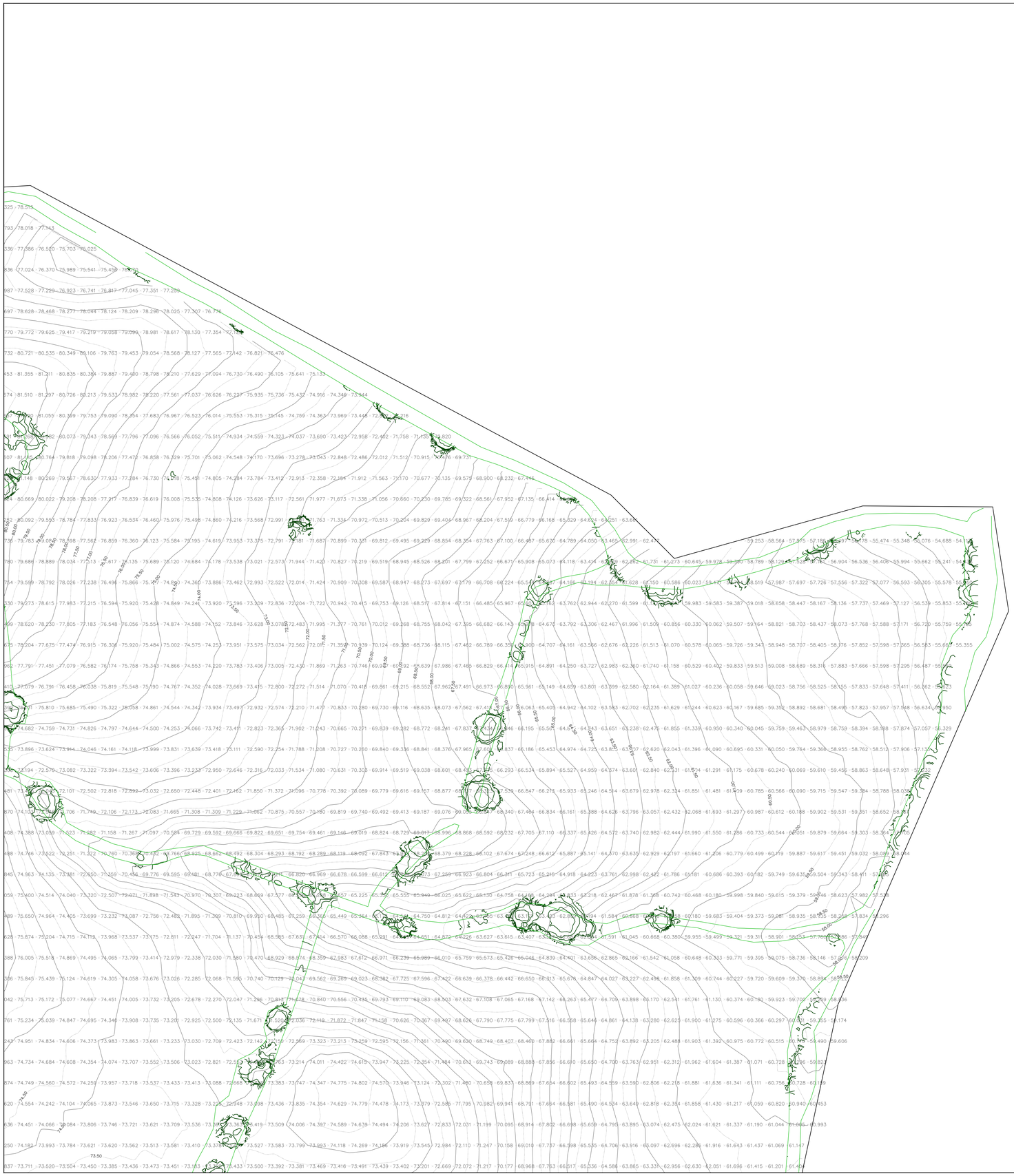
Tír 3D
the Survey people

Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone, Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-C	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
MH	Manhole Cover (Square)
MH	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
RI	Ridge
	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

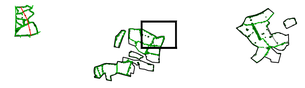
OHC	Overhead Cables
	Pipe
	Power Inspection Cover
	Power Pole
	Stay
	ESB Box (Pylon)
	Fire Hydrant
	Flower box
GV	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
Telecom	Telecom Control Panel (Pillar)
	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
IC	Cable TV Inspection Cover
	Water Valve
	Water Meter
AJ	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

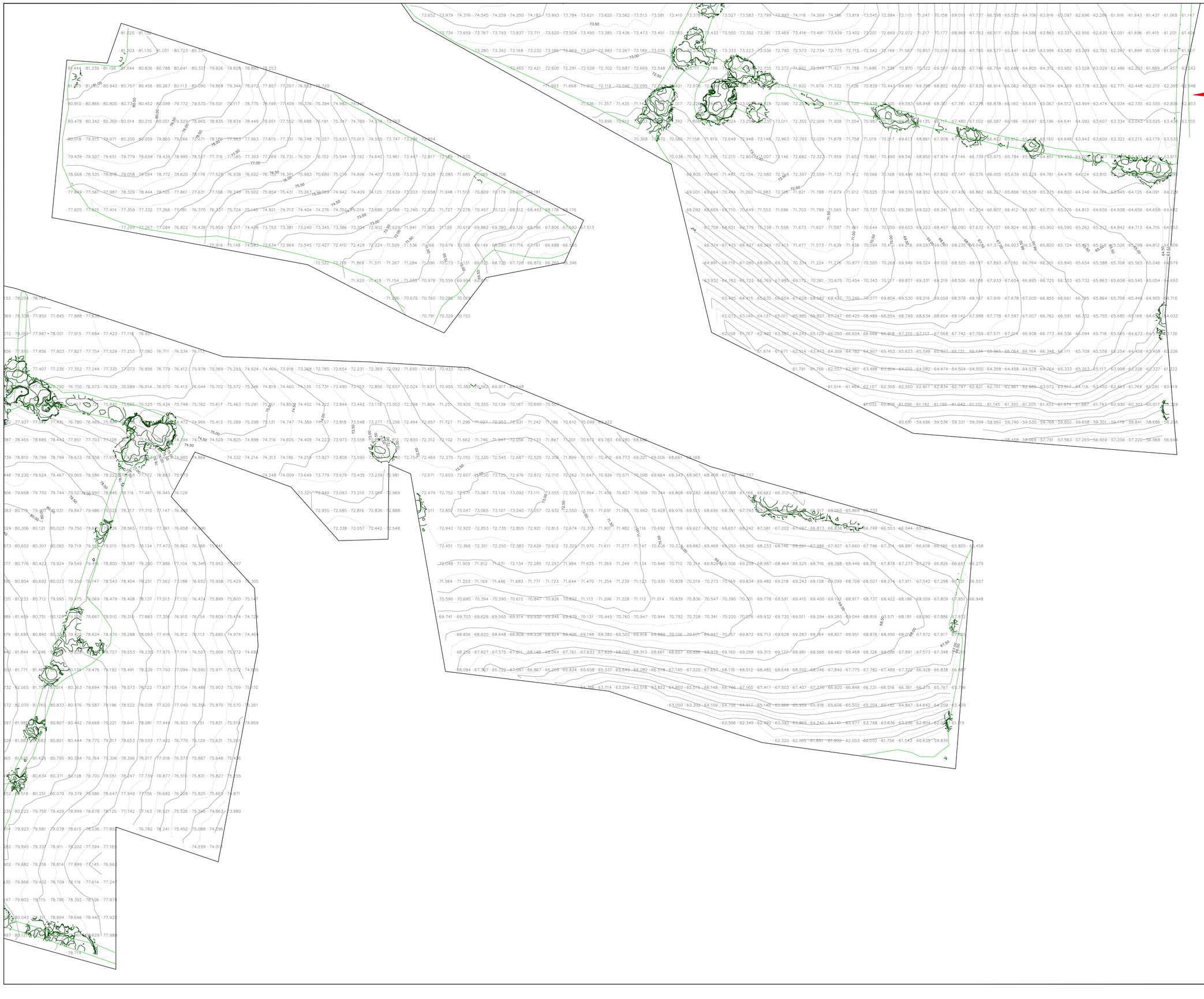
Tír3D
the Survey people

Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone, Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-D	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

- WBL — Water Bed Level
- WTL — Water level
- WAT — Water Edge
- POND — Pond
- WEIR — Weir
- WELL — Well
- ACO — Aco Drain
- GL — Long gully
- GU — Gully
- MH — Manhole Cover (Square)
- MH — Manhole Cover (Round)

Legend - Roads - Rail

- RD — Road Carriageway
- RC — Road Centre
- Road Markings White
- Road Markings Yellow
- CUL — Culvert
- DTC — Ditch
- KT — Kerb Top
- KB — Kerb Bottom
- KBAC — Kerb Back
- BS — Bus Stop
- SR — Speed Ramp
- TRK — Tracks
- VE — Verge
- RTRK — Rail Track
- RS — Road Sign
- Bollard

Legend - Roads Markings

- SWLD — Single White Line Dashed
- SWL — Single White Line
- SYLD — Single Yellow Line Dashed
- SYL — Single Yellow Line
- DWLD — Double White Line Dashed
- DWL — Double White Line
- DYLD — Double Yellow Line Dashed
- DYL — Double Yellow Line
- YB — Yellow Box

Legend - Buildings / Structures

- BGF — Building Footprint
- BGL — Building Line
- Apex
- Ridge
- RI — Eaves
- Parapet
- SOF — Soffit
- FON — Foundations
- CAN — Canopy - Overhead Features
- Container
- PF — Prefab - Building
- Ruins
- GH — Greenhouse
- Shed
- Steps
- Door
- WIN — Windows
- CEL — Cellars
- CAB — Cabin
- COL — Column
- BRG — Bridge
- LDR — Ladder
- Tank
- Platform
- MONU — Monument

Legend - Ground Features

- Gate
- FE — Fences
- Pillars
- WL — Wall
- WT — Walls top
- RLG — Railing
- BT — Bank Top
- BB — Bank Bottom
- RWB — Retaining Wall Base
- RWT — Retaining Wall Top
- PATH — Pathway
- HR — Handrail
- RAMP — Ramps, loading bays
- BR — Barrier
- Armco Barrier
- Rock
- SC — Surface Change
- Tarmac
- Trench
- CH — Channel
- CHAM — Chamber
- LDR — Ladder
- Cattle Grid
- CONC — Concrete
- Bench / Seat
- Survey Station
- Contours (Major)
- Contours (Minor)

Legend -Vegetation

- GRASS — Grass partitions
- HE — Hedges
- VL — Vegetation Line
- Tree Stump
- Tree

Legend - Services

- OHC — Overhead Cables
- Pipe
- Elec — Power Inspection Cover
- Power Pole
- Stay
- Elec — ESB Box (Pylon)
- Fire Hydrant
- Flower box
- GV — Gas Valve
- Lamp Post
- Litter Bin
- Mast / Pylon
- Post Box
- Telecom — Telecom Control Panel (Pillar)
- Telecom Cover
- Telecom Pole
- Traffic Lights
- Telephone box
- IC — Cable TV Inspection Cover
- Water Valve
- Water Meter
- AJ — Armstrong Junction

Legend - Services - Underground

- CODE
- UA — Underground Anomaly
- UCOM — Underground Combined
- UF — Underground Foul
- UG — Underground Gas
- UP — Underground Power
- US — Underground Storm
- UT — Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

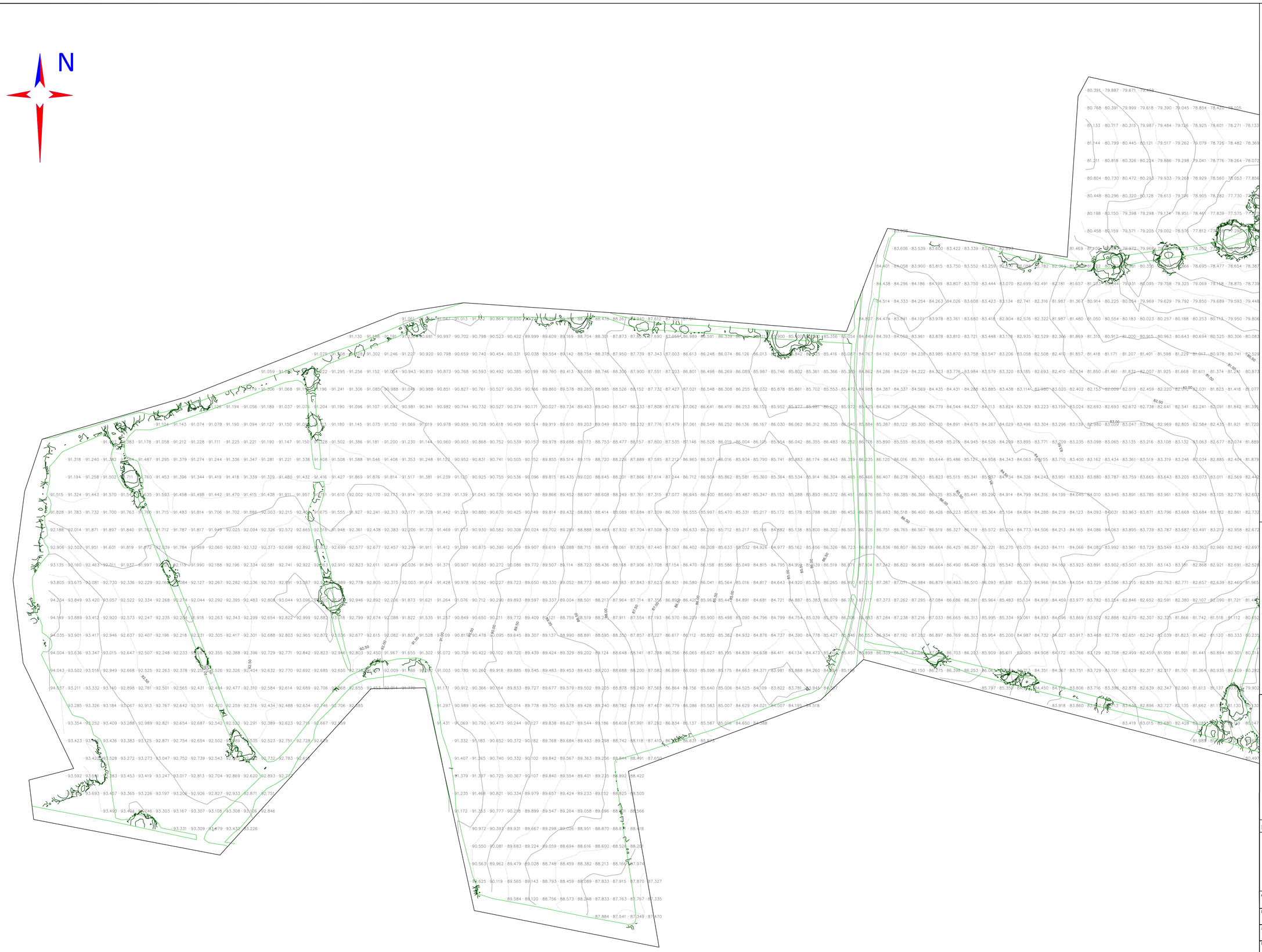
Tír3D
the Survey people

Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone,
Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-E	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
MH	Manhole Cover (Square)
MH	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
RI	Ridge
	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

OHC	Overhead Cables
	Pipe
	Power Inspection Cover
	Power Pole
	Stay
	ESB Box (Pylon)
	Fire Hydrant
	Flower box
GV	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
Telecom	Telecom Control Panel (Pillar)
Telecom	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
IC	Cable TV Inspection Cover
	Water Valve
	Water Meter
AJ	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

Tír3D
the Survey people

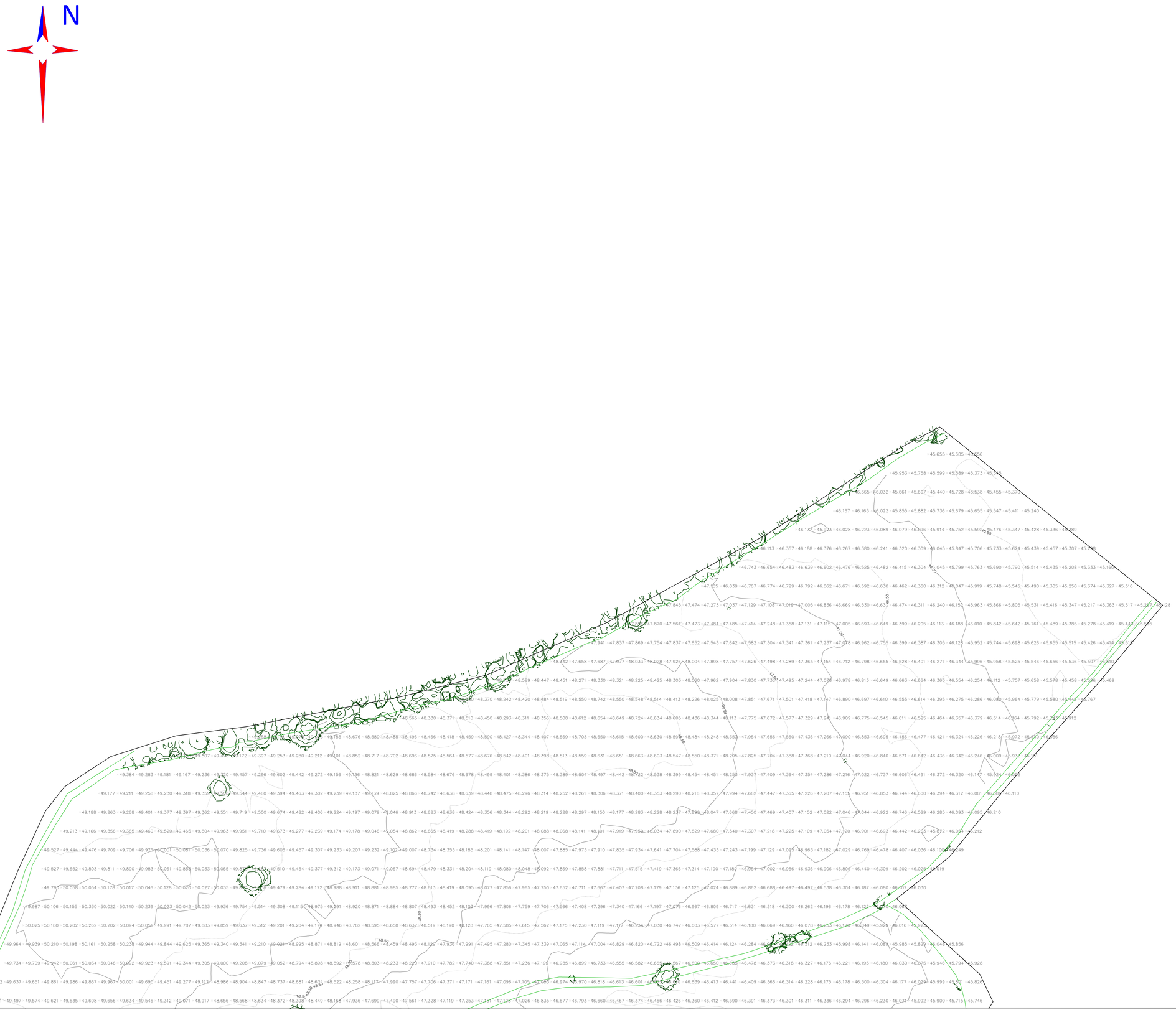
Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone,
Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey

Drawing Number: 22104-F	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
MH	Manhole Cover (Square)
MH	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
RI	Ridge
	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

OHC	Overhead Cables
	Pipe
	Power Inspection Cover
	Power Pole
	Stay
	ESB Box (Pylon)
	Fire Hydrant
	Flower box
GV	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
	Telecom Control Panel (Pillar)
	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
IC	Cable TV Inspection Cover
	Water Valve
	Water Meter
AJ	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN

SCALE: NTS



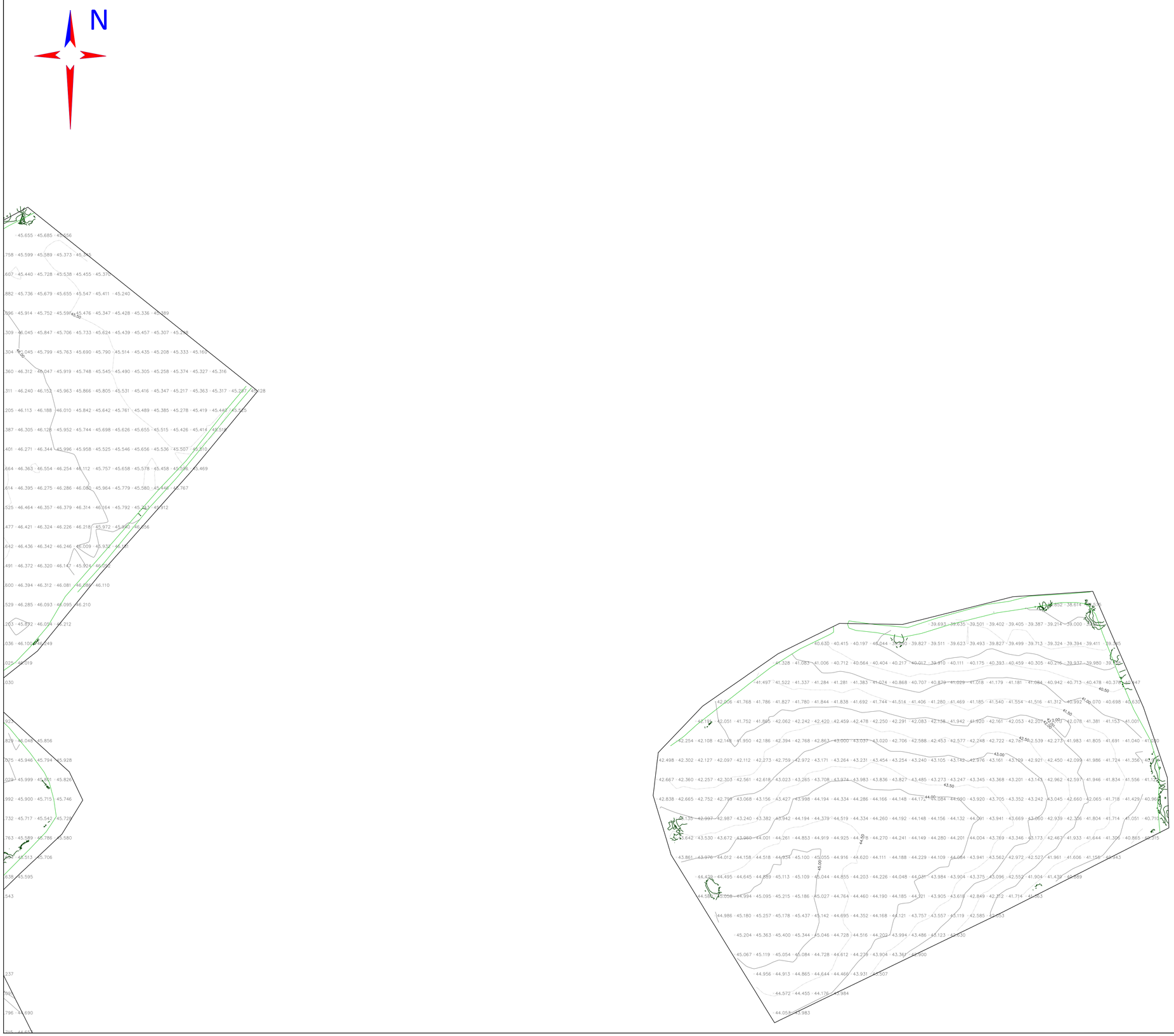
Tír3D
the Survey people

Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone,
Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-G	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
MH	Manhole Cover (Square)
MH	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
RI	Ridge
	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

OHC	Overhead Cables
	Pipe
	Power Inspection Cover
	Power Pole
	Stay
	ESB Box (Pylon)
	Fire Hydrant
	Flower box
GV	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
Telecom	Telecom Control Panel (Pillar)
Telecom	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
IC	Cable TV Inspection Cover
	Water Valve
	Water Meter
AJ	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

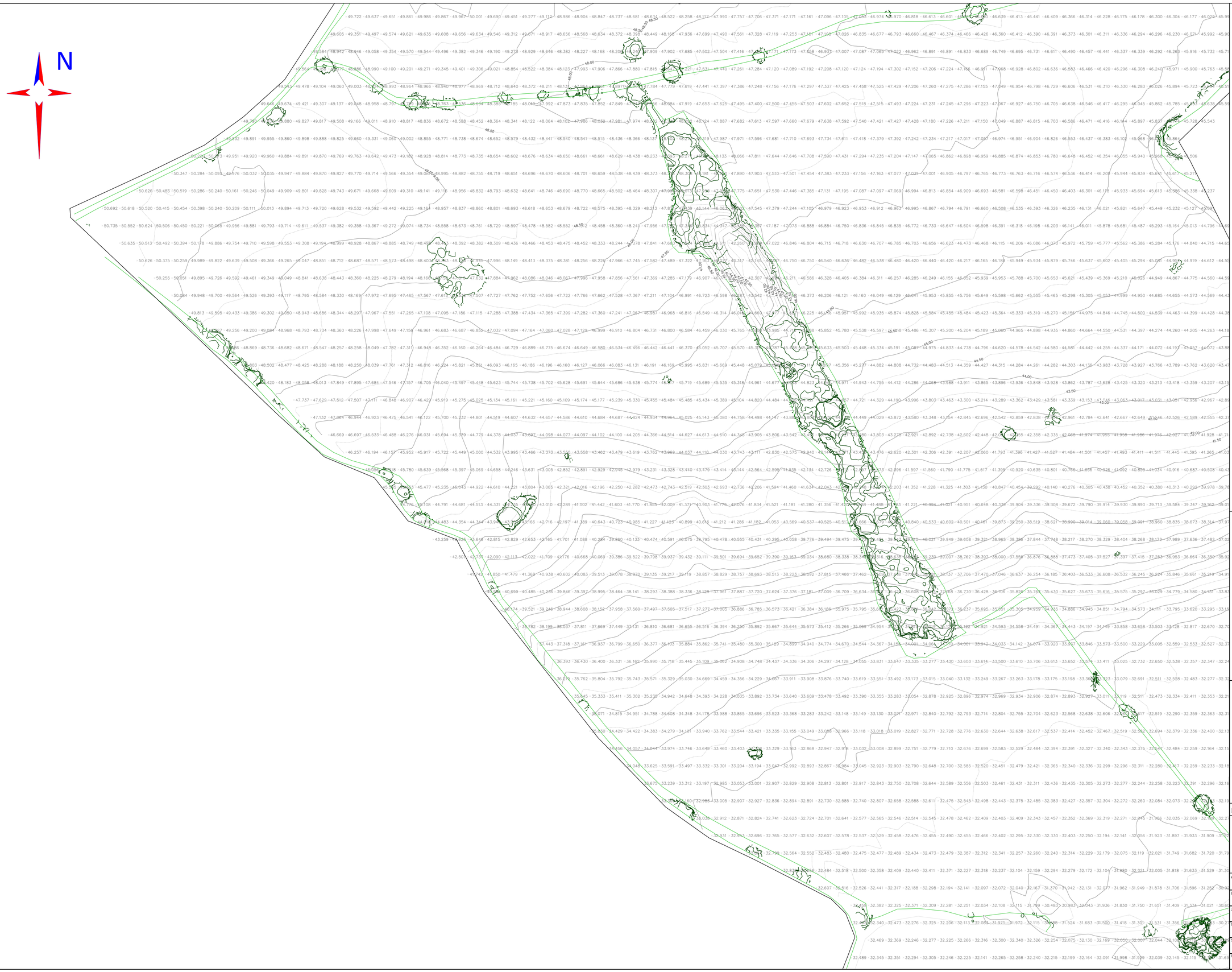
Tír 3D
the Survey people

Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone, Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-H	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

- WBL — Water Bed Level
- WTL — Water level
- WAT — Water Edge
- POND — Pond
- WEIR — Weir
- WELL — Well
- ACO — Aco Drain
- GL — Long gully
- GU — Gully
- MH — Manhole Cover (Square)
- MH — Manhole Cover (Round)

Legend - Roads - Rail

- RD — Road Carriageway
- RC — Road Centre
- Road Markings White
- Road Markings Yellow
- CUL — Culvert
- DTC — Ditch
- KT — Kerb Top
- KB — Kerb Bottom
- KBAC — Kerb Back
- BS — Bus Stop
- SR — Speed Ramp
- TRK — Tracks
- VE — Verge
- RTRK — Rail Track
- RS — Road Sign
- Bollard

Legend - Roads Markings

- SWLD — Single White Line Dashed
- SWL — Single White Line
- SYLD — Single Yellow Line Dashed
- SYL — Single Yellow Line
- DWLD — Double White Line Dashed
- DWL — Double White Line
- DYLD — Double Yellow Line Dashed
- DYL — Double Yellow Line
- YB — Yellow Box

Legend - Buildings / Structures

- BGF — Building Footprint
- BGL — Building Line
- Apex
- RI — Ridge
- Eaves
- Parapet
- SOF — Soffit
- FON — Foundations
- CAN — Canopy - Overhead Features
- Container
- PF — Prefab - Building
- Ruins
- GH — Greenhouse
- Shed
- Steps
- Door
- WIN — Windows
- CEL — Cellars
- CAB — Cabin
- COL — Column
- BRG — Bridge
- LDR — Ladder
- Tank
- Platform
- MONU — Monument

Legend - Ground Features

- Gate
- FE — Fences
- Pillars
- WL — Wall
- WT — Walls top
- RLG — Railing
- BT — Bank Top
- BB — Bank Bottom
- RWB — Retaining Wall Base
- RWT — Retaining Wall Top
- PATH — Pathway
- HR — Handrail
- RAMP — Ramps, loading bays
- BR — Barrier
- Armco Barrier
- Rock
- SC — Surface Change
- Tarmac
- Trench
- CH — Channel
- CHAM — Chamber
- LDR — Ladder
- Cattle Grid
- CONC — Concrete
- SR — Bench / Seat
- Survey Station
- Contours (Major)
- Contours (Minor)

Legend -Vegetation

- GRASS — Grass partitions
- HE — Hedges
- VL — Vegetation Line
- Tree Stump
- Tree

Legend - Services

- OHC — Overhead Cables
- Pipe
- Elec — Power Inspection Cover
- Power Pole
- Stay
- Elec — ESB Box (Pylon)
- Fire Hydrant
- Flower box
- Gas — Gas Valve
- Lamp Post
- Litter Bin
- Mast / Pylon
- Post Box
- Telecom — Telecom Control Panel (Pillar)
- Telecom — Telecom Cover
- Telecom Pole
- Traffic Lights
- Telephone box
- IC — Cable TV Inspection Cover
- Water Valve
- Water Meter
- AJ — Armstrong Junction

Legend - Services - Underground

- CODE
- UA — Underground Anomaly
- UCOM — Underground Combined
- UF — Underground Foul
- UG — Underground Gas
- UP — Underground Power
- US — Underground Storm
- UT — Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

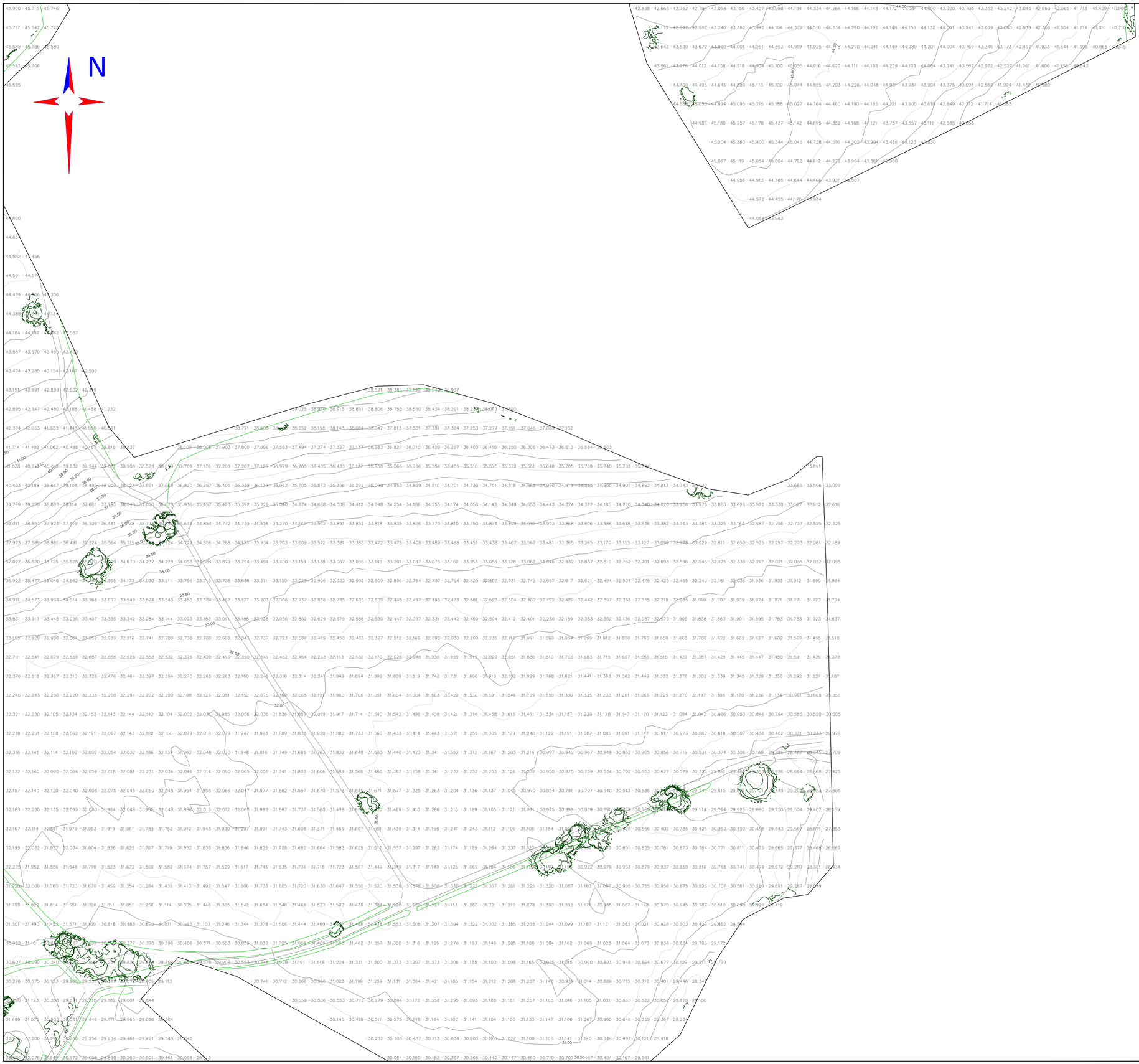
Tír 3D
the Survey people

Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone,
Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-I	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
MH	Manhole Cover (Square)
MP	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
RI	Ridge
	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

OHC	Overhead Cables
	Pipe
	Power Inspection Cover
	Power Pole
	Stay
ESB	ESB Box (Pylon)
	Fire Hydrant
	Flower box
GV	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
Telecom	Telecom Control Panel (Pillar)
	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
IC	Cable TV Inspection Cover
	Water Valve
	Water Meter
AJ	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN



SCALE: NTS

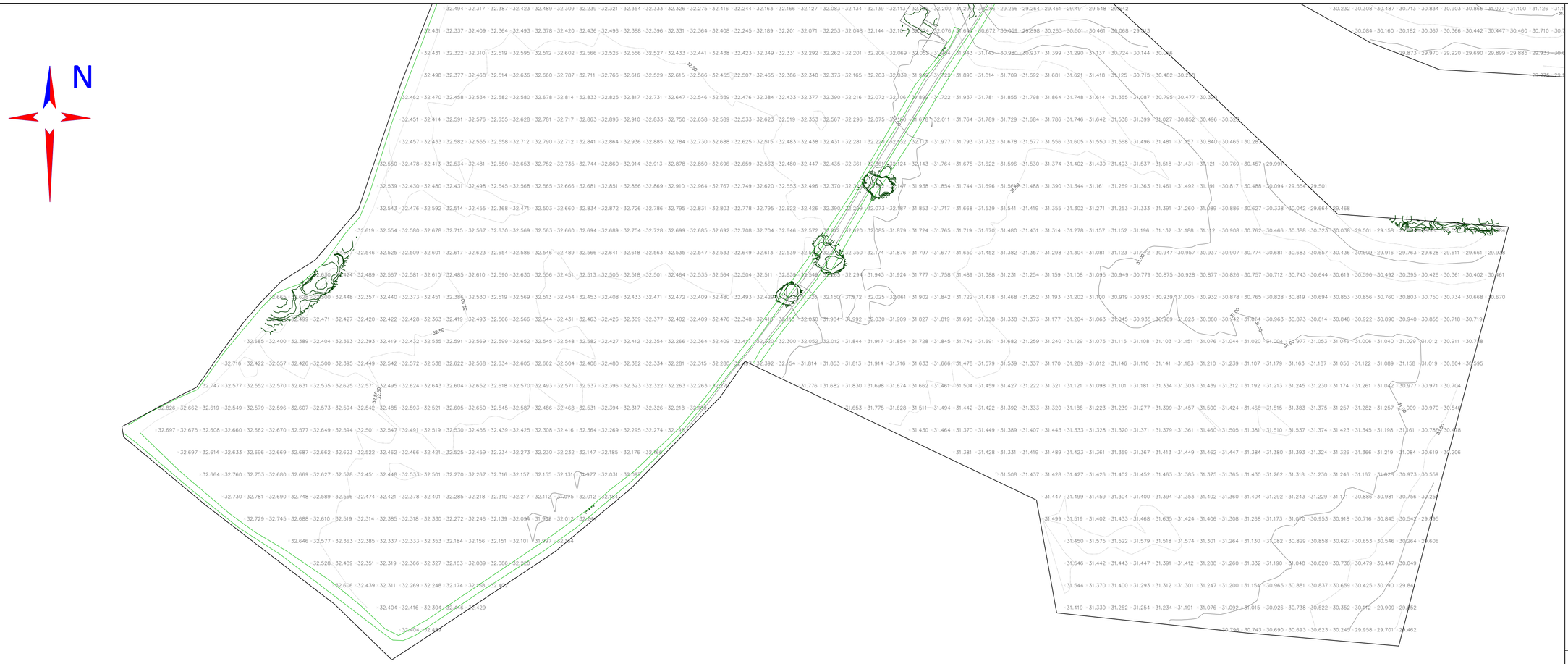
Tír3D
the Survey people

Head Office: **www.tir3d.ie**
The Survey Studio, Ceaderwood Lodge, Moone,
Co.Kildare. R14 RF67

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-J	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH



Legend - Water / Drainage

WBL	Water Bed Level
WTL	Water level
WAT	Water Edge
POND	Pond
WEIR	Weir
WELL	Well
ACO	Aco Drain
GL	Long gully
GU	Gully
MH	Manhole Cover (Square)
MH	Manhole Cover (Round)

Legend - Roads - Rail

RD	Road Carriageway
RC	Road Centre
	Road Markings White
	Road Markings Yellow
CUL	Culvert
DTC	Ditch
KT	Kerb Top
KB	Kerb Bottom
KBAC	Kerb Back
BS	Bus Stop
SR	Speed Ramp
TRK	Tracks
VE	Verge
RTRK	Rail Track
RS	Road Sign
	Bollard

Legend - Roads Markings

SWLD	Single White Line Dashed
SWL	Single White Line
SYLD	Single Yellow Line Dashed
SYL	Single Yellow Line
DWLD	Double White Line Dashed
DWL	Double White Line
DYLD	Double Yellow Line Dashed
DYL	Double Yellow Line
YB	Yellow Box

Legend - Buildings / Structures

BGF	Building Footprint
BGL	Building Line
	Apex
RI	Ridge
	Eaves
	Parapet
SOF	Soffit
FON	Foundations
CAN	Canopy - Overhead Features
	Container
PF	Prefab - Building
	Ruins
GH	Greenhouse
	Shed
	Steps
	Door
WIN	Windows
CEL	Cellars
CAB	Cabin
COL	Column
BRG	Bridge
LDR	Ladder
	Tank
	Platform
MONU	Monument

Legend - Ground Features

	Gate
FE	Fences
	Pillars
WL	Wall
WT	Walls top
RLG	Railing
BT	Bank Top
BB	Bank Bottom
RWB	Retaining Wall Base
RWT	Retaining Wall Top
PATH	Pathway
HR	Handrail
RAMP	Ramps, loading bays
BR	Barrier
	Armco Barrier
	Rock
SC	Surface Change
	Tarmac
	Trench
CH	Channel
CHAM	Chamber
LDR	Ladder
	Cattle Grid
CONC	Concrete
	Bench / Seat
	Survey Station
	Contours (Major)
	Contours (Minor)

Legend -Vegetation

GRASS	Grass partitions
HE	Hedges
VL	Vegetation Line
	Tree Stump
	Tree

Legend - Services

OHC	Overhead Cables
	Pipe
Elec	Power Inspection Cover
	Power Pole
	Stay
Elec	ESB Box (Pylon)
	Fire Hydrant
	Flower box
GV	Gas Valve
	Lamp Post
	Litter Bin
	Mast / Pylon
	Post Box
Telecom	Telecom Control Panel (Pillar)
Telecom	Telecom Cover
	Telecom Pole
	Traffic Lights
	Telephone box
IC	Cable TV Inspection Cover
	Water Valve
	Water Meter
AJ	Armstrong Junction

Legend - Services - Underground

CODE	
UA	Underground Anomaly
UCOM	Underground Combined
UF	Underground Foul
UG	Underground Gas
UP	Underground Power
US	Underground Storm
UT	Underground Telecom

Co-ordinate system is Irish Transverse Mercator (ITM)
Levels are GPS Derived Malin Hd. Datum on the 2015 Geoid

KEY PLAN

SCALE: NTS



Tír3D
the Survey people

Head Office:
The Survey Studio, Ceaderwood Lodge, Moone, Co.Kildare. R14 RF67

www.tir3d.ie

Tel: +353 (0)59 97 23337 **Email:** info@tir3d.ie

REVISION	DESCRIPTION	DATE

Client:	JBM Solar
Location:	Legacy Farm
Job:	Topographical Survey
Drawing Number: 22104-K	Scale: 1:1,000 / A1
Surveyed By: LiDAR	Drawn By: JH
Date: Issue 20 06 22	Checked By: JH

Appendix C BGS Borehole Records

British Geological Survey

BGS ID: 153130 : BGS Reference: SJ34NE24
British National Grid (27700) : 337320,345560

SJ 34 NE 24 **3732 4556** **Gerwynfechan, Sesswick** **Block C**

Surface level +17.2 m
Water struck at +14.0 m
Shell and auger 152 mm diameter
September 1977

Overburden	0.3 m
Mineral	5.0 m
Waste	2.2 m
Mineral	9.5 m
Waste	2.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very sandy	0.3	0.3
River Terrace Deposits	a Gravel Gravel: coarse to fine, subrounded, grey mudstone and greywacke with quartzite and igneous rock Sand: coarse, mostly subangular quartzite with minor quartz and sandstone; medium quartz and quartzite	5.0	5.3
	Clay, silty and sandy, soft, red-brown	2.2	7.5
Glacial Sand and Gravel	b Sand, 'very clayey' to 13.0 m; mainly fine	9.5	17.0
Boulder Clay	Clay, very sandy, mainly soft, red-brown, coal fragments	2.2+	19.2

SJ 34 NE 24

GRADING

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					-$\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
a	3	28	69	0.3-1.3	1	0	4	11	25	59	0
				1.3-2.3	3	5	15	23	25	29	0
				2.3-3.3	4	4	12	15	29	36	0
				3.3-4.3	3	1	11	15	33	37	0
				4.3-5.3	2	10	10	7	30	41	0
				Mean	3	4	10	14	28	41	0
b	21	77	2	7.5-13.0	30	44	22	1	2	1	0
				13.0-14.0	8	62	29	1	0	0	0
				14.0-15.0	8	74	17	1	0	0	0
				15.0-17.0	7	75	18	0	0	0	0
				Mean	21	55	21	1	1	1	0
a+b	14	61	25	Mean	14	38	18	5	11	14	0

COMPOSITION

	Depth below surface (m)	percentages by weight in +8 mm fraction						
		Quartzite	Sandstone	Limestone	Siltstone/ Greywacke	Igneous Rock	Quartz	Chert/ Flint
a	0.3-2.3	25	1	0	51	19	4	trace
	2.3-5.3	36	1	0	45	15	3	0

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 153130 : BGS Reference: SJ34NE24
British National Grid (27700) : 337320,345560

Institute of Geological Sciences

MAU Sand and Gravel Borehole Log Form

SJ 34 NE/24

SJ34 NE 24	3732 4556	GERWYNFECHAN	SESSWICK	Block A

Surface level	+ 17·2m
Water struck at	+ 14·0m
Shell and auger	152mm diameter
September 1977	

Overburden	0·3	
Mineral	5·0	
Waste	2·2	
Mineral	9·5	
Waste	2·2+	

LOG

Geological Classification	Lithology	Thickness m	Thickness ft	Depth m	Depth ft
	Soil, very sandy	0·3		0·3	
River Terrace Deposits	a Gravel, Gravel: coarse to fine, subrounded grey mudstone and greywacke with quartzite and igneous, mostly coarse in upper metre. Sand: coarse to fine, coarse is mostly grey subangular quartzite with minor quartz and sandstone, medium has equal quartz and quartzite.	5·0		5·3	
	Clay, soft, silty, sandy, red-brown, 5YR 4/5, becoming sandier with depth	2·2		7·5	
Glacial Sand	b 'Very clayey' sand, very clayey to 13·0m, fine to medium, becoming finer with depth.	9·5		17·0	
Boulder Clay	Clay, soft, very sandy with coal fragments.	2·1		19·1	
	Clay, stiff, red-brown, sandy, stoney, poorly sorted.	0·1		19·2	

Contact BGS: ngdc@bgs.ac.uk

[illegible] Geological [illegible]

[illegible] Minerals Assessment Unit

OREHOLE RECORD SHEET

6 in. quarter sheet Accn. No. Suffix

SJ34NE 24

Temp No. SJ34NE 6

orehole diam. 152 mm.

ater struck Perched Level at 3.02 m b.g.l.

emarks: DRILLING STOPPED AT 19.2 m, 0.1m INTO BOULDER CLAY DUE TO WATER ENTERING B.H. FROM OVERLYING RUNNING SAND.

NGR 3732 4556

Classification	Thickness (m)	Lithology
OVERBURDEN	0.3	SOIL
MINERAL	5.2	SANDY GRAVEL
WASTE	2.0	SANDY CLAY
MINERAL	9.5	SAND
WASTE	2.2+	CLAY + SAND

Lithostrat. Code	Description	Thick^n (m)	Depth to base(m)	Sample No.
SOIL	SOIL - DRY, VERY SANDY.	0.3	0.3	
RTSG	SANDY GRAVEL - TERRACE DEPOSIT. SLIGHTLY CLAYEY. GRAVEL - 2/3's COARSE. MOSTLY TABULAR, ESP. COARSE FRACTION. SUB-ROUNDED QTZITES & VOLCS. SAND - MOSTLY COARSE SA/SR. 60-30-10	1.0	1.3	WS 35 0.3-1.3
	CLAYEY GRAVEL - LIGHT GREY. SOME CLAY WASHED OUT IN BAILING. GRAVEL - 2/3's COARSE SA/SR. MOSTLY QTZITES & VOLCS. WITH SOME VEIN QTZ. SAND - COARSE, ANGULAR. 60-25-15	1.0	2.3	WS 36 1.3-2.3
	CLAYEY GRAVEL - DARK GREY CLAY. GRAVEL - AS ABOVE. SAND - AS ABOVE. 50-30-20	1.0	3.3	WSS 14 WS 37 2.3-3.3
	SANDY GRAVEL GRAVEL - 1/2 COARSE. MOSTLY SR/ROUNDED. QTZITE & QTZ. SAND - COARSE, ANGULAR. 60-35-5	1.0	4.3	WS 38 3.3-4.3

British Geological Survey

SJ 34 NE /24

Strat. Code	Description	Thick^{n} (m)	Depth to base(m)	Sampl No.
RTSG	CLAYEY GRAVEL - COMPOSITION OF GRAVEL AS PREVIOUS. WITH RED/BROWN CLAY MATRIX. 40-40-20	1.0	4.3 5.3	WS 39 4.3 - 5.3
	CLAYEY GRAVEL - AS ABOVE	0.2	5.5	
FGD	SILTY SANDY CLAY - SOFT. RED-BROWN 5YR 4/5 BECOMING SANDIER WITH DEPTH TO CLAYEY SAND AFTER ABOUT 2 METRES. NO PEBBLES. PRODUCED AS A SLURRY. BELOW WATER TABLE.	2.0	7.5	WSS 15 5.8m
FGD	CLAYEY SAND - LIGHT BROWN - RUNNING. SAND IS FINE/MED. WELL-ROUNDED & SUB-ROUNDED. NO PEBBLES. VERY UNIFORM OVER SAMPLE DEPTH RANGE	5.5	13.0	WS 40 7.5 - 13.
	SAND - MED./COARSE GRAIN. LOW CLAY CONTENT. COAL FRAGS. PRESENT. NO PEBBLES.	1.0	14.0	WSS 1 13.0 WS 41
	SAND - SLIGHTLY CLAYEY. BLOWING 3M INSIDE CASING. COAL FRAGS. SAND IS FINE/MED. FINE - SUB-ROUNDED. MED. ARE WELL-ROUNDED MILKY QTZ. LIGHT BROWN	1.0	15.0	WS 42
	SAND - AS ABOVE	2.0	17.0	WS 43
FGD	CLAYEY SAND - NON-MINERAL. HIGH CLAY CONTENT. COAL FRAGS.	2.1	19.1	
BOC	PEBBLY CLAY - BOULDER CLAY. ANGULAR VOLCANICS IN RED-BROWN SANDY CLAY MATRIX. BADLY-SORTED.	0.1	19.2	WSS 17
	T.D. 19.2m. 23/9/74. DRILLING UNABLE TO PROCEED FURTHER DUE TO WATER ENTERING BH. FROM OVERLYING SAND AS CASING COULD NOT SEAL OFF PROPERLY.			

Contact BGS: ngdc@bgs.ac.uk

SJ 34 NW 40 **3380 4598** **The Grove, Marchwiel** **Block B**

Surface level +83.5 m
Water not encountered
Shell and auger 203 mm diameter
February 1978

Waste 18.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey, rare stones	0.4	0.4
Boulder Clay	Clay, stiff, slightly sandy, red-brown, rare stones	17.6+	18.0

British Geological Survey

BGS ID: 153431 : BGS Reference: SJ34NW40
British National Grid (27700) : 333800,345980

Institute of Geological Sciences

Industrial Minerals Assessment Unit

BOREHOLE RECORD SHEET

Registration Number

6 in. quarter sheet: SJ34NW (6) | Accn. no.: 40 (10) | Suffix: (14)

Temp. No. 12

Borehole diam. 203 mm.

Water struck Not struck, but some water seepage into hole over weekend.

Remarks:

NGR 3380 4598

Classification	Thickness (m)	Lithology
WASTE	0-4	SOIL
WASTE	8-1	TILL
WASTE	9-5	CLAY

Lithostrat. Code	Description	Thickn (m)	Depth to base (m)	Sample No
SOIL	Top Soil - dark brown clay with a few pebbles.	0-4	0-4	
	Till - very light yellow brown clay with ochreous patches. very sparse pebbles which include SR volcanics.		0·5	WSS 135
	Becoming light orange brown at 0·6. traces of coal.			
	Darker in colour more reddish brown at 0·8 metres medium stiff		1·0	WSS 136
	Tiny intercalations of reddish sand in the clay at 1·1 metres.			
	Soft slightly sandy silty red brown clay at 1·3 metres		1·5	WSS 13

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

Lithostrat. Code	Description SJ 34 NW/40	Thick^{n} (m)	Depth to base (m)	Sa
	Deepened at 1-7 metres			
	Red-brown silty clay with calcareous nodules and swirls. mainly 1-9 metres.			
	Less reddish with grey silty non calcareous nodules within calcareous clay. Reduction nodules. Shell fragments in the clay. occasional SR-R grey glysites		2·6	WSS 13
	At 7·3 metres silty reddish brown-grey brown clay. Less silty at 8·0 metres		6·1	WSS 14
	Reddish brown clay with intercalations of silt and sand down to 8·5 metres		7·5	WSS 14
	Appears to be a transition zone between overlying till and underlying clay.		8·3	WSS 14
			8·5	WSS 14
			8·5	
	More homogeneous light chocolate brown silty clay. Slightly reddish in places with silty partings		9·0	WSS 14
	Traces of coal SR pieces. occasional R-SR sandstone pebbles (red)		11·3	WSS 14
	Clay is calcareous. Would appear to be a lake clay. Very plastic clay Pebbles SR relatively sparse generally small. Though some larger red SRT pebbles. Reddish brown streaks in places.		17·0	WSS 14
			18·0	

IGS 2008 1000 9/77

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 153431 : BGS Reference: SJ34NW40
British National Grid (27700) : 333800,345980

Institute of Geological Sciences
IMAU Sand and Gravel Borehole Log Form

SJ 34 NW/40

SJ 34 NW 40	3380 4598	THE GROVES	MARCHWIEL

Surface level	+ 83·5 M
Water not struck	
Shell and auger 203mm diameter	
February 1978	

Waste	18·0+	

LOG

Geological Classification	Lithology	Thickness m	Thickness ft	Depth m	Depth ft
	Soil, clay, rare stones	0·4		0·4	
Boulder clay	Clay, stiff, yellow-brown, becoming red-brown at 1m, slightly sandy, rare stones.	17·6+		18·0	

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 17087493 : BGS Reference: SJ34NW545
British National Grid (27700) : 331590,346380

RECORD OF BOREHOLE No: 18

Location : WREXHAM SEWERAGE
Contract No. : F69/336
Type of Boring : Shell and Auger
Date (started) : 28th November, 1968.

Borehole Dia : 6 ins.
Casing : 6 ins. to 17ft.
Ground Level : 322.0 ft. A.O.D.

Depth of Casing	Water Level	SAMPLES Depth	SAMPLES Type	SAMPLES No.	STRATA Legend	STRATA Depth	STRATA Thickness	DESCRIPTION OF STRATA
						0'-0"		
						1'-3"	1'-3"	TOPSOIL.
		2'-6"	D	1				
		5'-0"	D	2			10'-9"	Stiff brown silty sandy CLAY with occasional GRAVEL.
		7'-6"	D	3				
		10'-0"	D	4				
		12'-6"	D	5		12'-0"		
							5'-0"	Brown silty SAND with coarse, medium and fine GRAVEL.
		15'-0"	D	6				
		17'-0"	D W	7		17'-0"		
						End of Borehole.		

REMARKS:

Water first encountered at 12ft. 6 ins.

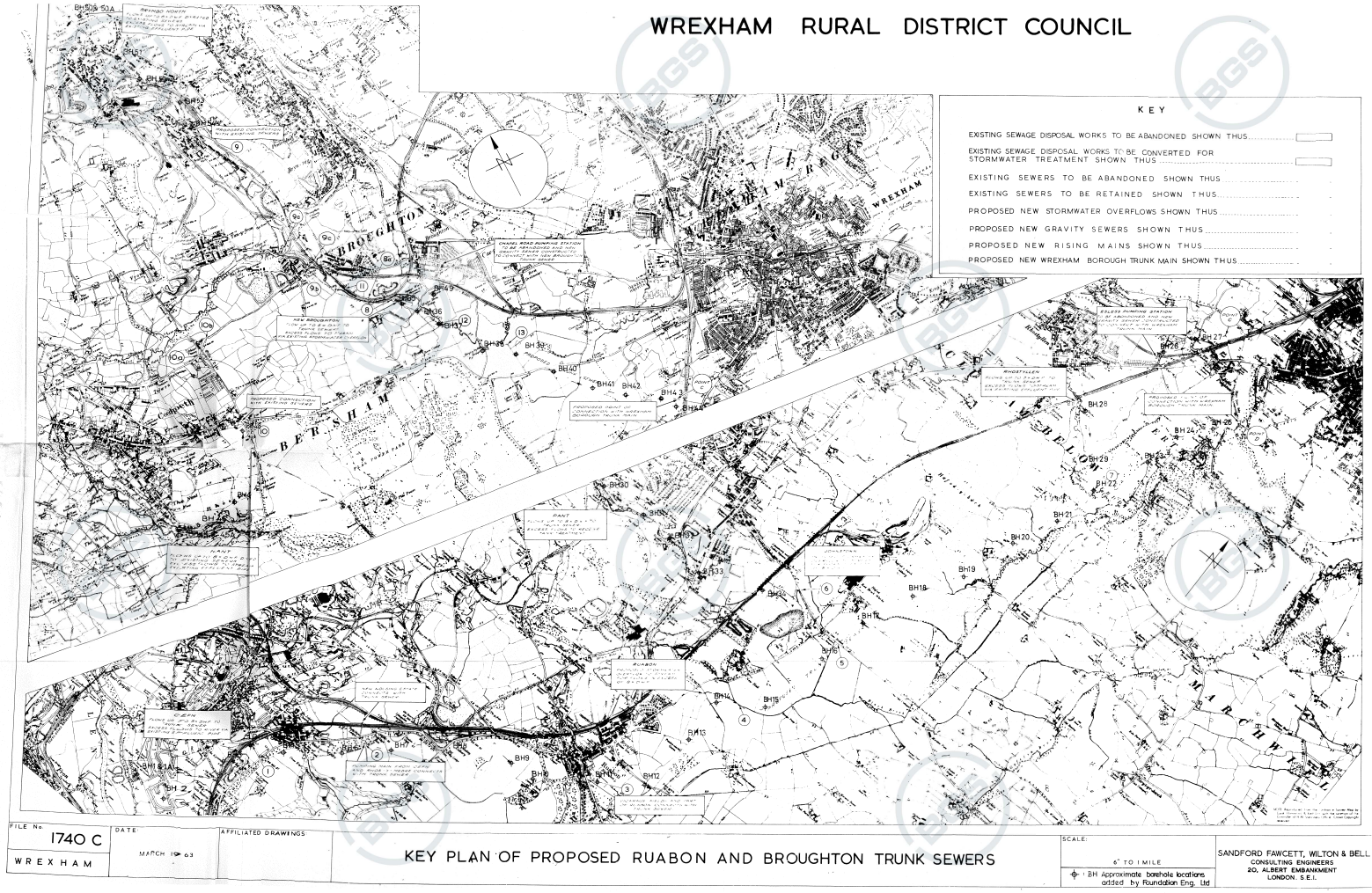
SCALE 1" 5'

Foundation Engineering Ltd.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 17087493 : BGS Reference: SJ34NW545
British National Grid (27700) : 331590,346380



FILE No. 1740 C
WREXHAM

DATE: MARCH 1963

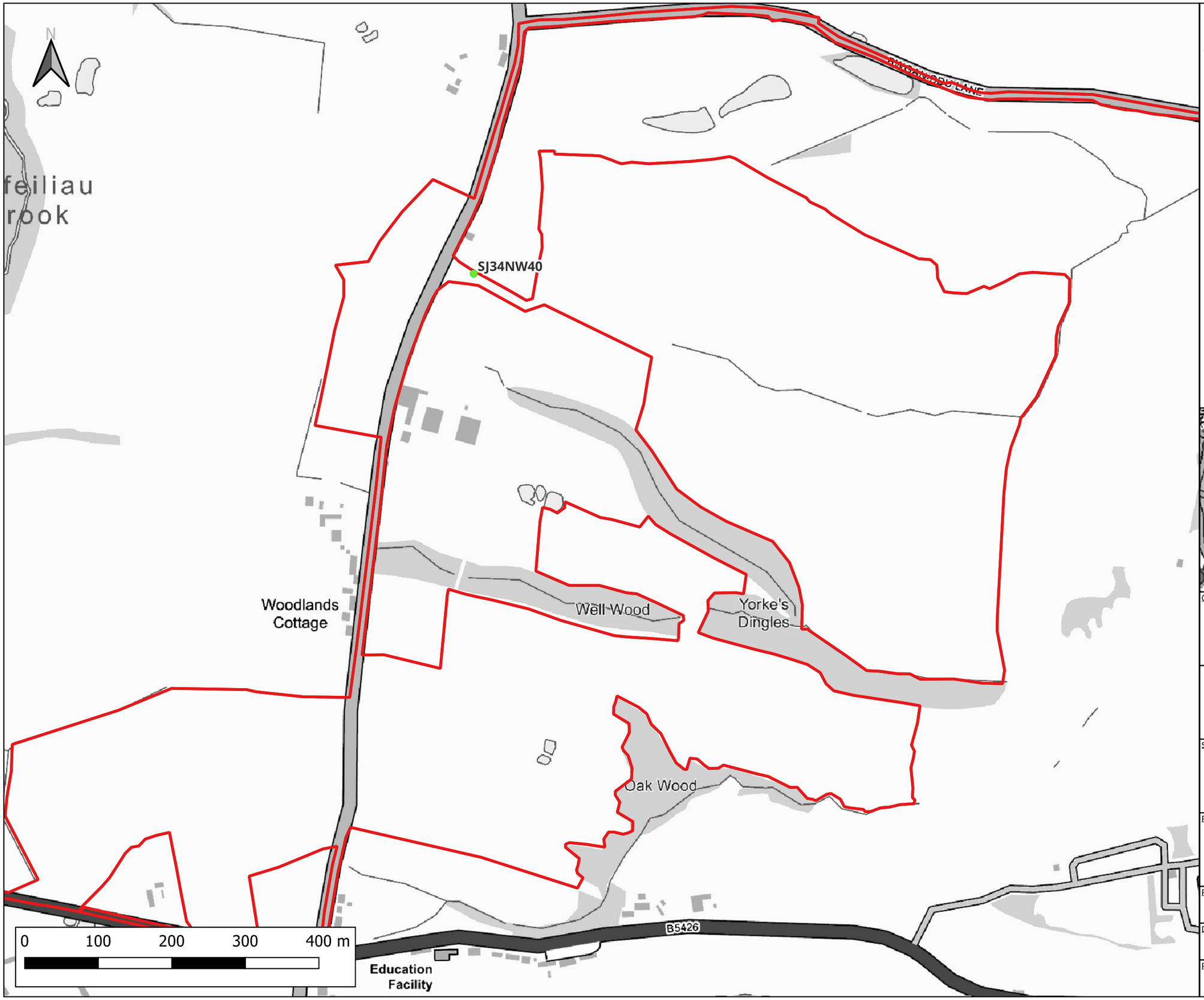
AFFILIATED DRAWINGS

KEY PLAN OF PROPOSED RUABON AND BROUGHTON TRUNK SEWERS

SCALE: 6" TO 1 MILE
BH Approximate borehole locations added by Foundation Eng. Ltd

SANDFORD FAWCETT, WILTON & BELL
CONSULTING ENGINEERS
20, ALBERT EMBANKMENT
LONDON, S.E.1.

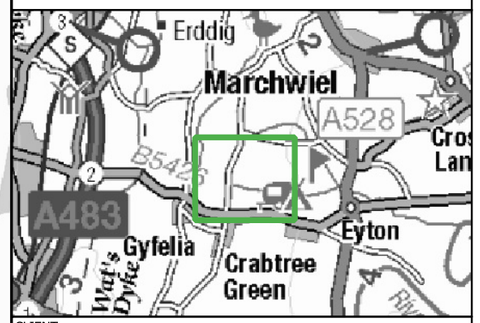
Contact BGS: ngdc@bgs.ac.uk



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

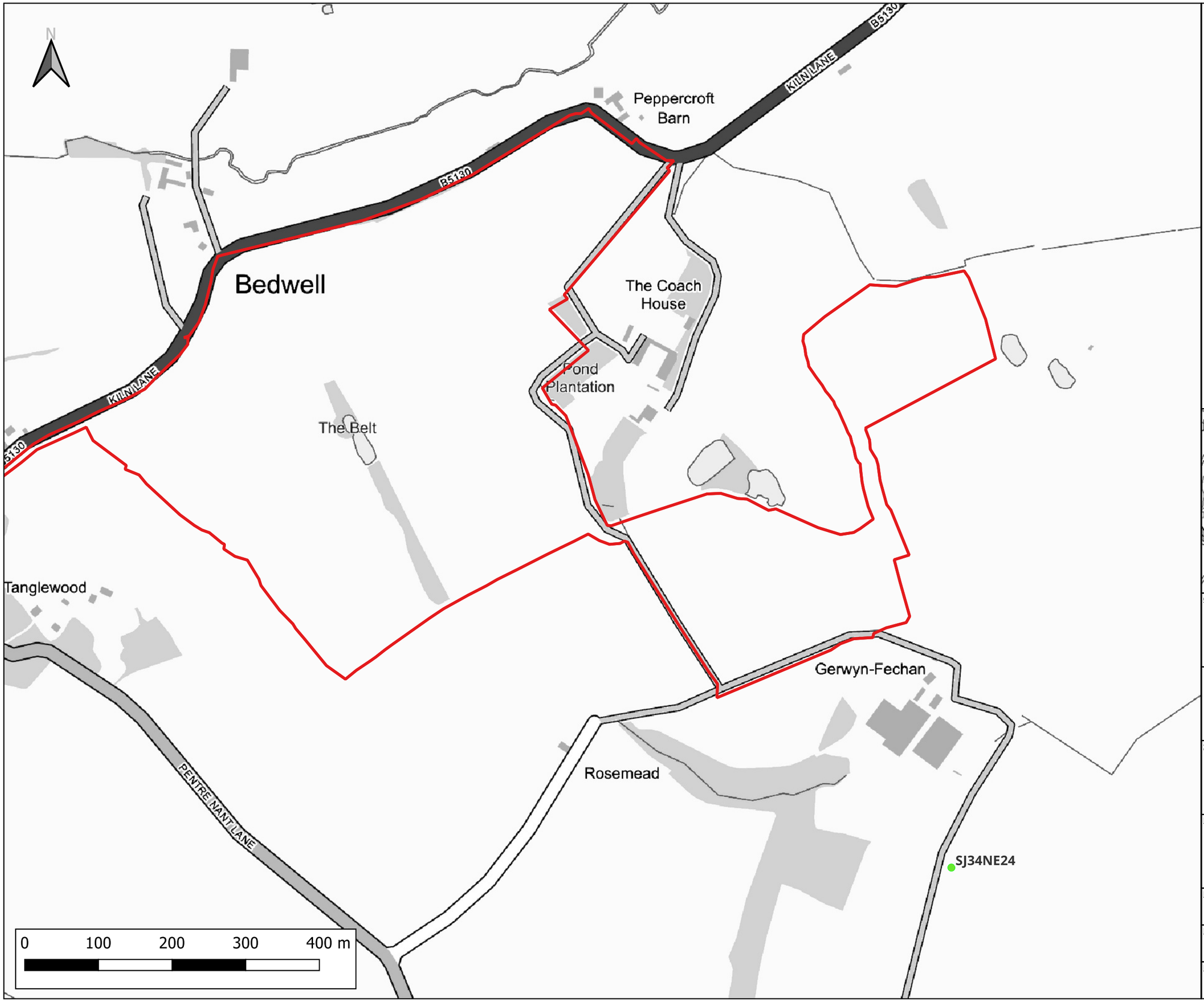
LEGEND

- Site boundary
- BGS Historical Borehole Record



CLIENT:	Axis P.E.D Ltd
	www.waterco.co.uk
SCHEME:	Legacy Farm Solar DNS
PLOT TITLE:	Historical BGS Borehole Location Plan Data from British Geological Survey (BGS) Central Array Area
PLOT STATUS:	FINAL
DATE:	13-08-2025
DRAWN:	MJW
CHECKED:	AW
APPROVED:	NJ
PLOT SCALE AT A3:	1:5000
PLOT NAME:	14825_BGS_Borehole_Location_Plan
REVISION:	-

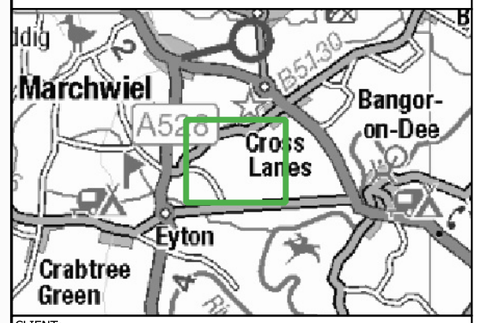
CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS BRITISH GEOLOGICAL SURVEY MATERIALS © UKRI (2025).



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site boundary
- BGS Historical Borehole Record



CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

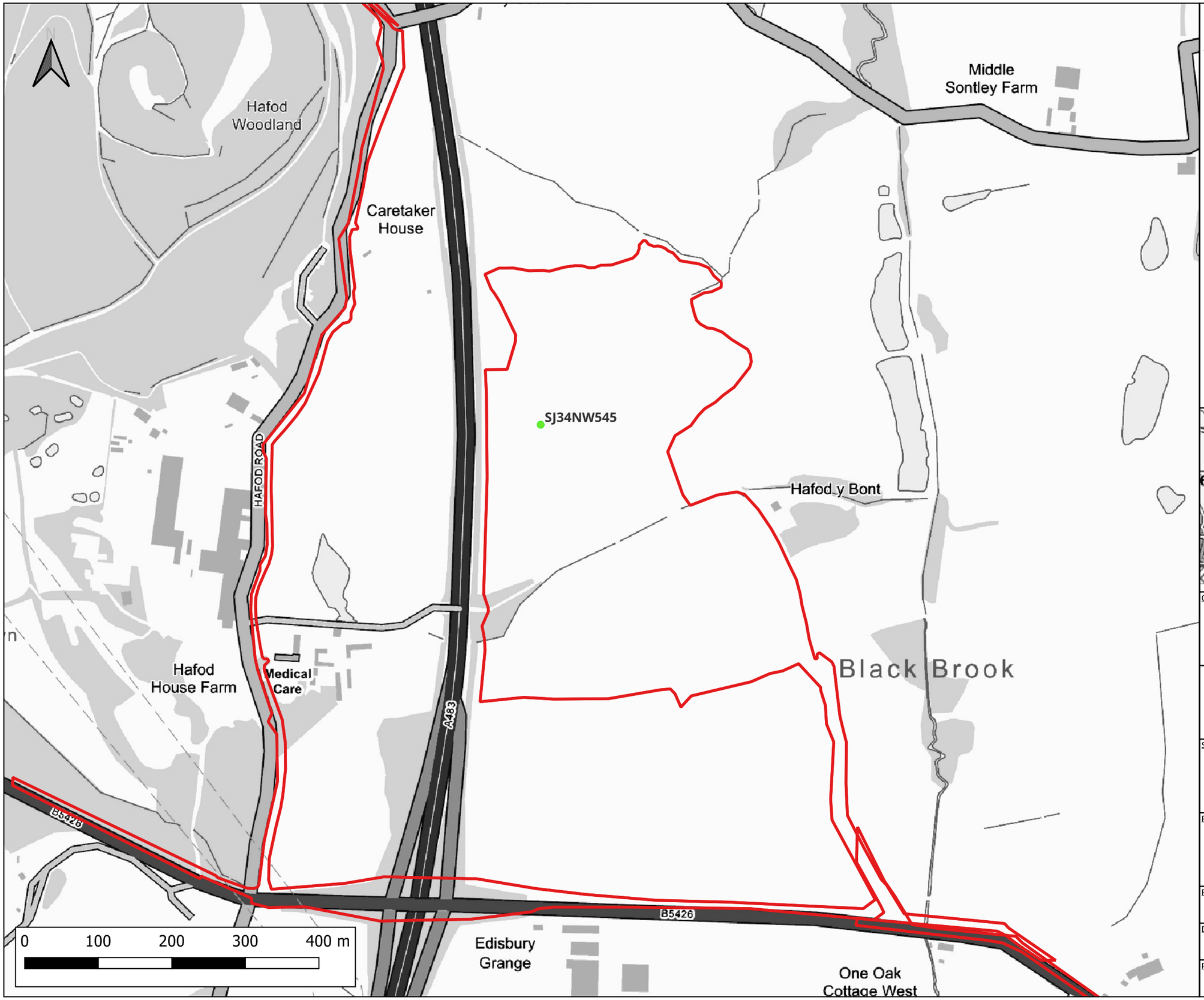
SCHEME:
Legacy Farm Solar DNS

PLOT TITLE:
Historical BGS Borehole Location Plan
Data from British Geological Survey (BGS)
Eastern Array Area

PLOT STATUS:			DATE:
FINAL			14-08-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:5000

PLOT NAME:	REVISION:
14825_BGS_Borehole_Location_Plan	-

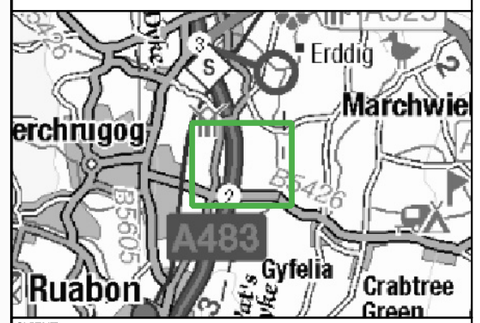
CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS BRITISH GEOLOGICAL SURVEY MATERIALS © UKRI (2025).



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site boundary
- BGS Historical Borehole Record



CLIENT:
Axis P.E.D Ltd

Waterco
www.waterco.co.uk

SCHEME:
Legacy Farm Solar DNS

PLOT TITLE:
Historical BGS Borehole Location Plan
Data from British Geological Survey (BGS)
Western Array Area

PLOT STATUS:	DATE:
FINAL	14-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:5000

PLOT NAME:	REVISION:
14825_BGS_Borehole_Location_Plan	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS BRITISH GEOLOGICAL SURVEY MATERIALS © UKRI (2025).

Appendix D Sewer Records

Dŵr Cymru
Welsh Water

14825 - Butterfly Farm Solar DNS, Marchwiel
LL13 0AY

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former 524 sewers (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 Cyfyngedig ('the Company') gives this information as to the position of its 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 relied upon 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 done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 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 particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision 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.

Reproduced by permission of the Ordnance Survey on behalf of HMSO. © Crown copyright and database rights right 2017. All rights reserved. Ordnance Survey Licence number 100019534

Map Ref:	334158,345758
Map scale:	1:2500
Printed by:	Emily Marsden
Printed on:	19 Feb 2025

Dŵr Cymru
Welsh Water

14825 - Butterfly Farm Solar DNS, Marchwiel
LL13 0AY

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement (S 104)
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former 524 sewers (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 Cyfyngedig ("the Company") gives this information as to the position of its 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 relied upon 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 done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 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 actual locations thereof including their position underground may not be accurate. It must be understood that the furnishing of this information does not entirely without prejudice to the provision 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.

Reproduced by permission of the Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2017.
All rights reserved.
Ordnance Survey Licence number 100019534

Map Ref:	336818,346351
Map scale:	1:2500
Printed by:	Emily Marsden
Printed on:	17 Feb 2025

Dŵr Cymru
Welsh Water

14825 - Butterfly Farm Solar DNS, Marchwiel
LL13 0AY

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement (S 104)
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former 524 sewers (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 Cyfyngedig ("the Company") gives this information as to the position of its 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 relied upon 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 done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it does not include the location of any service pipe, service line, lateral drain or lateral culvert, distributing water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision 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.

Reproduced by permission of the Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2017. All rights reserved. Ordnance Survey Licence number 100019534

Map Ref:	331692,346292
Map scale:	1:2500
Printed by:	Emily Marsden
Printed on:	17 Feb 2025

Appendix E Site Visit Plan

PHOTOGRAPHIC LOG

Photo No.1	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025 **Description:** <u>Western Array Area</u>. Watercourse along the southern edge of the access track. Watercourse along farm track. Photo taken at approximate NGR: 331800, 346276 Photo Ref 1 on the corresponding Site Visit Sketch.	

Photo No. 2	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025 **Description:** <u>Western Array Area</u> Existing culvert at approximate NGR: 331701, 346224 Photo Ref 2 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.3	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Western Array Area</u> Proposed access track location. No ditch present. Approximate NGR: 331739 , 346337 Photo Ref 3 on the corresponding Site Visit Sketch.	

Photo No. 4	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Western Array Area</u> Ditch identified on site walkover at approximate NGR: 331721, 346529. Feeding wetland depression area. Photo Ref 4 on the corresponding Site Visit Sketch.	

	PHOTOGRAPHIC LOG
Photo No.5	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Western Array Area</u> Wetland Depression Area at approximate NGR: 331755 , 346543 Photo Ref 5 on the corresponding Site Visit Sketch.	

	PHOTOGRAPHIC LOG
Photo No.6	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Western Array Area</u> Wetland Depression Area	

PHOTOGRAPHIC LOG

Photo No.7	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Existing crossing. Culvert diameter ~600mm. Heavily overgrown. Photo Ref 1 on the corresponding Site Visit Sketch	

PHOTOGRAPHIC LOG

Photo No.8	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Existing culvert beneath farmers track. Limited flow but ditch was wet. Approximate NGR: 337419 , 345775 Photo Ref 2 on the corresponding Site Visit Sketch	

PHOTOGRAPHIC LOG

Photo No.9	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Land drain at approximate NGR: 337173, 345877	

Photo No. 10	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> No watercourse channel present here. Approximate NGR: 336998, 345814	

PHOTOGRAPHIC LOG

Photo No.11	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Culvert inlet structure with man-made trash screen. Photo Ref 3 on the corresponding Site Visit Sketch	

Photo No. 12	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Excavated channel & Culvert inlet structure downstream. Several land drains feeding into excavated channel. Photo Ref 4 on the corresponding Site Visit Sketch	

PHOTOGRAPHIC LOG

Photo No.13	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Excavated channel at approximate NGR: 336864, 346024 Photo Ref 4 on the corresponding Site Visit Sketch.	

Photo No. 14	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Ditch identified along eastern field boundary. Excavated channel. Becomes culverted under access track Approximate NGR: 336793, 346294 Photo Ref 5 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.15	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Ditch identified along northern field boundary. Excavated channel. Approximate NGR: 336633, 346277 Photo Ref 6 on the corresponding Site Visit Sketch.	

Photo No. 16	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Existing crossing. Culvert diameter 600mm. Water present. Photo Ref 7 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.17	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Existing crossing. Culvert diameter 600mm. Water present Photo Ref 8 on the corresponding Site Visit Sketch.	

Photo No. 18	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Access track location. No ditch present. Photo Ref 9 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

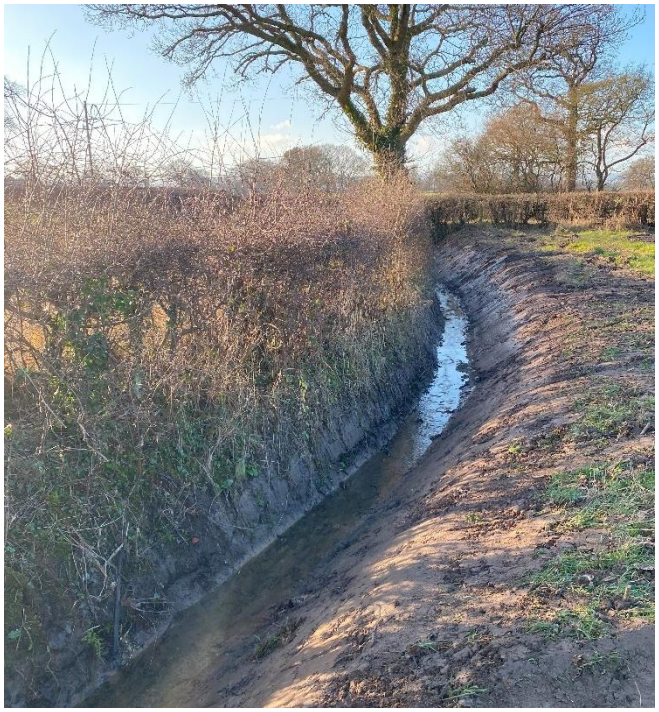
Photo No.19	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Excavated channel. Proposed crossing here. Photo Ref 10 on the corresponding Site Visit Sketch.	

Photo No. 20	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Eastern Array Area</u> Culvert beneath road (outlet) at approximate NGR: 336271 , 346255	

PHOTOGRAPHIC LOG

Photo No.21	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Ditch present on the other side of hedgerow. Not in this field. Photo Ref 1 on the corresponding Site Visit Sketch.	

Photo No. 22	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Ditch receiving runoff from field. Originates at approximate NGR: 334064 , 345891 Photo Ref 2 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.23	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Ditch receiving runoff from field. Originates at approximate NGR: 334064 , 345891 Photo Ref 2 on the corresponding Site Visit Sketch.	

Photo No. 24	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Pond at approximate NGR: 334027 , 345861	

PHOTOGRAPHIC LOG

Photo No.25	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Proposed crossing here. Approximate NGR: 334307, 345806 Channel is heavily vegetated. Photo Ref 3 on the corresponding Site Visit Sketch.	

Photo No. 26	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Proposed crossing here. Approximate NGR: 334307, 345806 Channel becomes very wide and is heavily vegetated. No significant flows but channel was wet. Photo Ref 3 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.27	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Slightly downstream of the proposed crossing at NGR: 334248, 345824. Channel remains heavily vegetated. No significant flows but channel was wet.	

Photo No. 28	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Watercourse along eastern field boundary flowing north to merge with the watercourse immediately north of the site Photo Ref 6 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.29	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Watercourse along the eastern field boundary flowing north. Approximate NGR: 334589, 345885	

Photo No. 30	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Watercourse along the eastern field boundary (photo taken facing south) Photo Ref 5 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.31	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Watercourse is heavily overgrown. Approximate NGR: 334511, 345791 Photo Ref 4 on the corresponding Site Visit Sketch.	

Photo No. 32	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Watercourse flowing through the center of the site. Continues east off-site Photo Ref 7 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

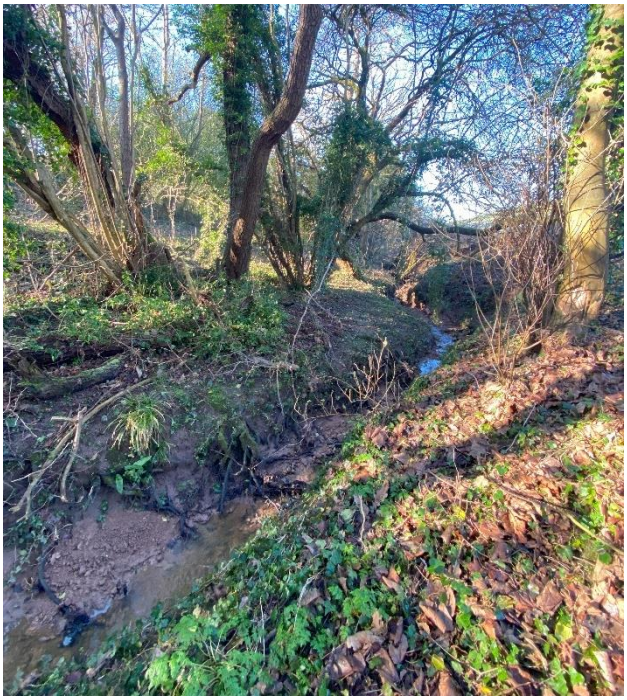
Photo No.33	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Watercourse flowing through the center of the site (Photo taken facing west) Photo Ref 7 on the corresponding Site Visit Sketch.	

Photo No. 34	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> An existing crossing over the watercourse flowing east through the center of the site. Photo Ref 8 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.35	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Identified ditch on site walkover. Photo Ref 9 on the corresponding Site Visit Sketch.	

Photo No. 36	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Existing culvert at approximate NGR: 333950, 345442 Debris accumulation. Photo Ref 9 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.37	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Proposed crossing here. Shallow ditch with minimal flow identified on site walkover. Photo Ref 10 on the corresponding Site Visit Sketch.	

Photo No. 38	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Ditches identified on site walkover Photo Ref 11 on the corresponding Site Visit Sketch.	

PHOTOGRAPHIC LOG

Photo No.39	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Excavated channel along hedgerow identified on site walkover. Photo Ref 12 on the corresponding Site Visit Sketch.	

Photo No.40	14825 – Butterfly Farm Solar DNS
Date: 6/02/2025	
Description: <u>Central Array Area</u> Excavated channel along hedgerow, identified on site walkover. Photo Ref 13 on the corresponding Site Visit Sketch.	

Dry ditch

Existing crossing

Proposed crossing.
Watercourse dimensions:
Bank to bank width: 3m
Channel bed width = 1.3m
Depth = 0.6m

1

Watercourse channel becomes difficult to define here. Heavily vegetated - collapsed hedgerow. Tree in middle of channel.
Watercourse dimensions (a):
Bank to bank width = 8.1m
Channel bed width = 7.3m
Depth = 1.6m

Channel gets lost here. Heavily vegatated -collapsed hedgerow? Some water flow still present - ground was wet.

Overspill from pond to this ditch

2

Watercourse dimensions (b):

Bank to bank width = 8.5m
Channel bed width = 5.5m
Depth = 1.45m

No watercourse along this hedgerow

Ditch is dry here. Becomes more of a depression

Existing crossing over watercourse. Watercourse at bottom of steep valley.

Ditch terminates here i.e does not continue beneath the track.

Yorke's Dingles

3

Existing culvert. 600mm diameter. Partially blocked with vegetation

4

No watercourse along this hedgerow

Shallow ditch along hedgerow. Limited flow - water is stagnant. Ditch dimensions:

Bank to bank width: 2.1m
Channel bed width: 0.8m
Depth:0.7m

5

No ponds present on site visit

Proposed crossing. Excavated man-made channel. Watercourse dimensions:

Bank to bank width:2.2m
Channel bed width: 0.9m
Depth: 0.85m

Woodlands Cottage

Proposed crossing. Watercourse dimensions:

Bank to bank width: 2.7m
Channel bed width: 0.84m
Depth: 0.5m

7

6

B5426

0 90 180 270 360 450 m

CONTAINS OS DATA © CROWN COPYRIGHT (2025)

Notes:
1) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.

LEGEND

- Site boundary
- Watercourses
- Waterbodies
- 1 Photograph Locations

CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Site Visit Notes - Central Array Area

PLOT STATUS:	DATE:
SKETCH	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:4500

PLOT NAME:	REVISION:
14825_Site_Visit_Sketch	-

Barn

B5130

KILN LANE

New proposed crossing. Man-made excavated channel. Watercourse dimensions: Bank to bank width =3m In-channel width = 0.5m Gradient = 2.1m

Existing crossing over watercoruse. Culvert diameter ~600mm. No access track proposed here.

Existing crossing. Man-made excavated channel. Culvert diameter ~600mm. Water present in channel

Existing track here. No ditch identified.

9

7

8

6

5

4

The Belt

The Coach House

Pond Plantation

Excavated channel. Watercorouse dimensions:

Bank to bank width = 4m
In-channel width = 0.5m
Gradient = 3.1m

Existing culvert here facing a southerly direction. Pipe diameter ~200mm

3

2

This area was not surveyd due to time constraints. From a desktop review crossing 8 is propsoed and crosses a small ditch.

Dimensions from SCALGO:

Bank to bank = 1.65m
In-channel width = 1.04m
Depth = 0.42m

Existing crossing. culvert here. Ditch was wet, become dry further downstream

1

Gerwyn-Fechan

No watercourse channel present here. Believed to be culverted based on inlet structure identified further upstream.

Rosemead

PENTRE NANT LANE

0 80 160 240 320 400 m

Notes:
1) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.

LEGEND

- Site boundary
- Watercourses
- Waterbodies
- 1 Photograph Locations

CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Site Visit Notes - Eastern Array Area

PLOT STATUS:	DATE:
SKETCH	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:4000

PLOT NAME:	REVISION:
14825_Site_Visit_Sketch	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)

Ditch identified here with water flowing in an easterly direction

Wetland depression here. Flows assumed to feed into the ditch on the eastern boundary.

3

No ditch along this hedgerow

2

Existing crossing/access Culvert diameter ~600mm. 300mm between WL and top of pipe (sediment and vegeation build up)

1

Hafod y Bont

0 50 100 150 200 250 m

Notes:
1) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.

LEGEND

- Site boundary
- Waterbodies
- Watercourses
- 1 Photograph Locations

CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Site Visit Notes - Western Array Area

PLOT STATUS:	DATE:
SKETCH	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:2500

PLOT NAME:	REVISION:
14825_Site_Visit_Sketch	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)

Appendix F Proposed Site Layout

NOTES

1. All details are indicative only.
2. Dimensions are in metres unless stated otherwise.
3. Refer to HSE document "Avoiding danger from overhead power lines – Guidance Note GS6" to ensure safe operation of machinery in proximity to overhead power lines.

LEGEND

- Planning Red Line
- Road
- No-dig Road
- Solar panels
- Fence
- Hedges
- Trees
- Ancient Woodland
- Hybrid Inverter Container
- Spares Container
- Customer Switch Gear Container
- Indicative CCTV Locations
- Access Gate
- Construction compound
- Rivers/Ponds
- Public Rights Of Way
- Permissive Path
- Acoustic Fencing
- Grassland
- Wildflower Meadow
- Tree Belt

REF. NORTH

0 300m 600m

1:10000

RWE

DETAILS

TITLE	Gloyn Byw Solar Farm – General Layout – Clean
LOCATION	Near LL13 0YA
DATE	7 August 2025
CONFIGURATION	Typical fixed design
REVISION	12

Appendix G NRW Flood Mapping & Correspondence

Cyfoeth Naturiol Cymru
Natural Resources Wales

Ein cyf/Our ref: CAS-273956-R5Z7
Eich cyf/Your ref: 14825

Waterco
By email: megan.williams@waterco.co.uk

Date: 18 February 2025

Dear Sir/Madam,

PROPOSAL: Solar farm development

LOCATION: Butterfly Solar Farm, Land to the North of the B5426, Wrexham

Thank you for consulting Cyfoeth Naturiol Cymru (CNC)/Natural Resources Wales (NRW) about the above, which we received on 03 February 2025.

We have considered your enquiry in relation to our Development Planning Consultations Topics document (September 2018). We advise the following matters are relevant to your site / proposed development and suggest you consider these further prior to the submission of any planning application.

Flood Risk

The planning application proposes less vulnerable development (solar farm). The application site is within Zone A and the easternmost part is slightly within Zone C2 of the Development Advice Map (DAM) contained in Technical Advice Note (TAN) 15: Development and Flood Risk (2004). Our Flood Map for Planning (FMfP) identifies the easternmost part of the application site to be at risk of flooding and is partially within Flood Zones 2 and 3 (Rivers).

As confirmed in the letter from Welsh Government dated 15 December 2021, the FMfP represents better and more up-to-date information on areas at flood risk than the DAM. Therefore, we advise that you produce a Flood Consequences Assessment (FCA), to demonstrate that the consequences of flooding can be acceptably managed over the lifetime of development.

Section 6 of TAN15 requires the Local Planning Authority (LPA) to determine whether the development at this location is justified. Therefore, we refer you to the tests set out in section 6.2 of TAN15. If the LPA consider the proposal meets the tests set out in criteria (i) to (iii), then the final test (iv) is for the applicant to demonstrate through the submission of an FCA that the potential consequences of flooding can be managed to an acceptable level.

The criteria for the FCA, which should normally be undertaken by a suitably qualified person carrying an appropriate professional indemnity, are given in Section 7 and Appendix 1 of

TAN15 (2004). The FCA should be proportionate to the development proposed. You may also refer to our website, which contains technical advice and recommendations.

There could be a minor fluvial flood risk impact in the proposed eastern parcel from the Sesswick Brook main river, which borders the site. Whilst the proposed panels appear to be located primarily in FMfP Zone 2, flood risk impacts will need further consideration in the FCA. This should include ensuring that there is no ground raising, that panels are set a suitable distance above the existing ground level and that boundary fencing will not affect flood flow routes.

Flood Risk Activity Permit

There are a number of main rivers within the highlighted sites. It should be noted that any works on, under or over a main river will require a separate Flood Risk Activity Permit (FRAP) under the Environmental Permitting Regulations (EPR) (2016). We refer you to our website for further advice.

Lead Local Flood Authority

For the western and central parcels of the proposals, Wrexham County Borough Council drainage department in their capacity as lead local flood authority may be able to advise on any local problems in relation to surface water disposal and any associated flood risk.

Protected Species

Our records show there are protected species on the site (great crested newts and bats). We advise liaison with the Local Planning Authority's ecologist to discuss and agree the scope of any surveys required. We refer you to our website for further advice.

Foul Drainage

Before deciding a planning application, the Local Planning Authority needs to be satisfied that any foul drainage arrangements for the proposed development are suitable. We recommend you provide details regarding foul drainage arrangements with any planning application.

We refer you to Welsh Government Circular 008/2018 on private drainage, and specifically paragraphs 2.3-2.5, which stress the first presumption must be to provide a system of foul drainage discharging into a public sewer.

We note the site is within the catchment of the River Dee and Bala Lake Special Area of Conservation (SAC). In line with our *Advice to Planning Authorities for Planning Applications Affecting Nutrient Sensitive River Special Areas of Conservation* (June 2024), under the Habitats Regulations, Planning Authorities must consider the impact of proposed developments on water quality within SAC river catchments.

The suitability of foul drainage arrangements for the proposed development is a matter for the LPA to determine. We therefore advise that as part of any future planning application submission, you provide the LPA with sufficient details of the proposed method of foul drainage to inform their Habitats Regulations Assessment (HRA) or to confirm whether or not any additional wastewater would be discharged from the site. If additional wastewater is

to be discharged, it is likely the LPA will require further information from you to inform their HRA.

Source Protection Zones (SPZ)

The site lies partially within SPZ 3. Source Protection Zones are designated zones around public water supply abstractions and other sensitive receptors and are intended to highlight the areas in which certain activities may pose an unacceptable risk of pollution. We refer you to our website for further advice.

Groundwater Protection and Land Contamination

Advice on environmental considerations and the assessments needed to support your planning application can be found on our external website.

- For advice on how to deal with possible land contamination on your development visit: http://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/advice-for-developers/land-contamination/?lang=en
- For advice on how to protect groundwater at your development visit: http://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/advice-for-developers/protecting-groundwater/?lang=en

Historic Landfill

The proposal site is located adjacent to a historic landfill site (Hafod Quarry). The Environment Agency provided the Local Authority with Historic Landfill data in 2007. You may wish to consult the Local Authority's Environmental Health department with regard to this aspect.

Landscape

The site is located within 850m of the Clwydian Range and Dee Valley National Landscape (the name for legally designated Areas of Outstanding Natural Beauty (AONBs)). You are advised to consult with the Local Planning Authority and consider the need for Landscape Assessments in accordance with published best practice guidance. We refer you to our website for further advice.

Protected Sites

The site is:

- within / adjacent to Stryt Las a'r Hafod Site of Special Scientific Interest (SSSI) and Johnstown Newt Sites Special Area of Conservation (SAC)
- 860m from River Dee and Bala Lake SAC / River Dee SSSI
- 2.6km from Berwyn Mountains and South Clwyd Mountains SAC / Llantysilio Mountains and Minera SSSI
- 6.2km from Shell Brook Pastures SSSI
- 7.8km from Llandegla Moor SSSI

Special Areas of Conservation

The Local Planning Authority (LPA) is the Competent Authority for the purposes of the Conservation of Habitats and Species Regulations 2017 (as amended). As such, they must

not agree to any plan or project unless they are certain it will not adversely affect the integrity of a Special Area of Conservation (SAC).

The LPA should carry out a test of likely significant effects (TLSE) for the SACs, which is required under Regulation 63 of the Conservation of Habitats and Species Regulations 2017. This test applies to impacts on the SACs from the proposed works, either alone or in combination with other plans and projects.

If the test concludes there is likely to be a significant effect then an Appropriate Assessment of the impacts on the SACs from the proposed works, either alone or in combination with other plans and projects, will be required. We would be able to assist with that assessment in our role as the Statutory Nature Conservation Body under the above Regulations.

Sites of Special Scientific Interest

The Wildlife and Countryside Act 1981 (as amended) places a duty on public authorities in exercising their functions, so far as this is likely to affect the flora, fauna, geological or physiographical features of a SSSI, to take reasonable steps consistent with the proper exercise of their functions to further the conservation and enhancement of those features.

We refer you to our website for further advice.

Ancient Woodland

The application site is partially within Ancient Semi Natural Woodland. Please refer to our advice to planning authorities considering proposals affecting ancient woodland (published 26 Nov 2021) for further information Natural Resources Wales / Advice to planning authorities considering proposals affecting ancient woodland.

Provision of Data

In addition to the above, please note, we can also provide certain data free of charge, as set out in our Open Data Policy. Customers can access our data via our website.

Other Matters

Please note, the view expressed in this letter is a response to a pre-planning enquiry only. We trust these comments will prove helpful, but they should not set a precedent for any future Natural Resources Wales' response to any formal application for planning permission or other legal consent. Such applications shall be assessed on the information submitted and regulations of relevance at that time. The details contained in this letter are based on the information available to date.

As part of our discretionary advice service we can provide further advice relating to land contamination, groundwater and flood risk prior to your planning application being submitted. There is a charge for this service. Further details are available on our website.

If you have any queries on the above, please do not hesitate to contact us.

Yours faithfully,

Tristan Williams
Cynghorydd - Cynllunio Datblygu/Advisor - Development Planning
Cyfoeth Naturiol Cymru/Natural Resources Wales

E-bost/E-mail: northplanning@cyfoethnaturiolcymru.gov.uk

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi./Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

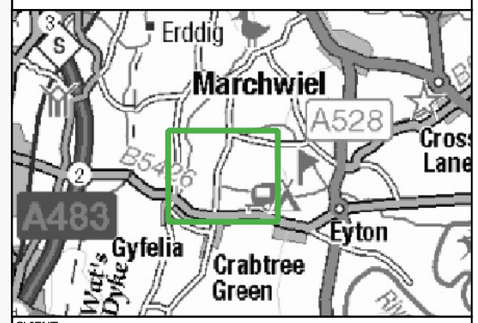
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise
2) Flood Zone 3 displays the extent of flooding from rivers with a 1% AEP or greater of flooding in a given year including and allowance for climate change and the sea with a 0.5% AEP or greater of flooding in a given year including and allowance for climate change
3) Flood Zone 2 displays the extent of flooding from rivers with a less than 1% AEP but greater than or equal to 0.1% AEP of flooding in a given year including and allowance for climate change and the sea with a less than 0.5% AEP but greater than or equal to 0.1% AEP of flooding in a given year including an allowance for climate change

LEGEND

- Site Boundary
- TAN15 Defended Zones

Flood Map for Planning

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Map for Planning (Rivers and Sea)
Central Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

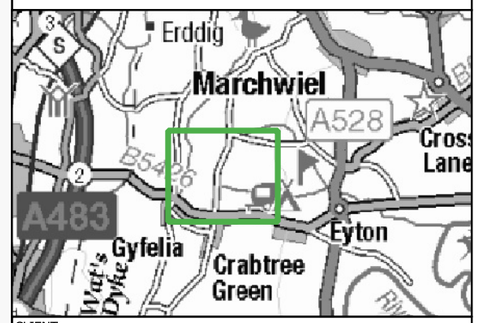
PLOT NAME:	REVISION:
14825_NRW_FMfP	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Flood Zones - Rivers
  - Flood Zone 1
  - Flood Zone 2
  - Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Zones - Rivers
Central Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Rivers	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

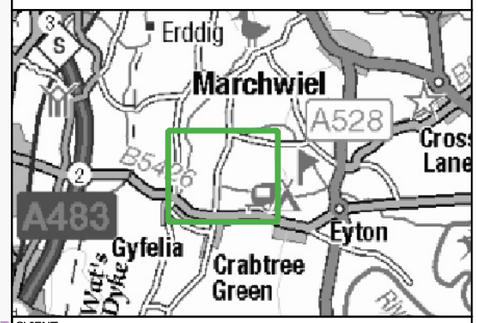
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary

Flood Zones - Surface Water & Small Watercourses

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Zones - Surface Water & Small Watercourses
Central Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Surface_Water	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

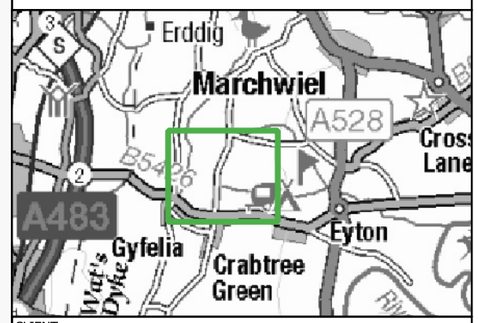
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary

Flood Zones - Sea

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:

Axis P.E.D

waterco

www.waterco.co.uk

SCHEME:

Butterfly Farm Solar DNS

PLOT TITLE:

NRW Flood Risk from the Sea
Central Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

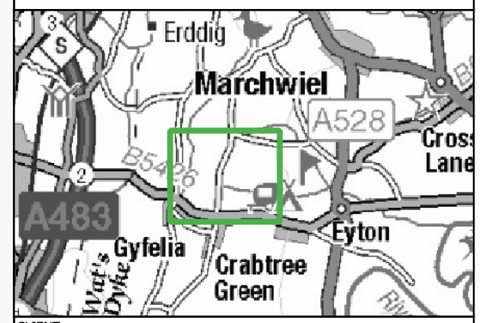
PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Sea	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- NRW Recorded Flood Extents



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Recorded Flood Extents
Central Array Area
Data published May 2025

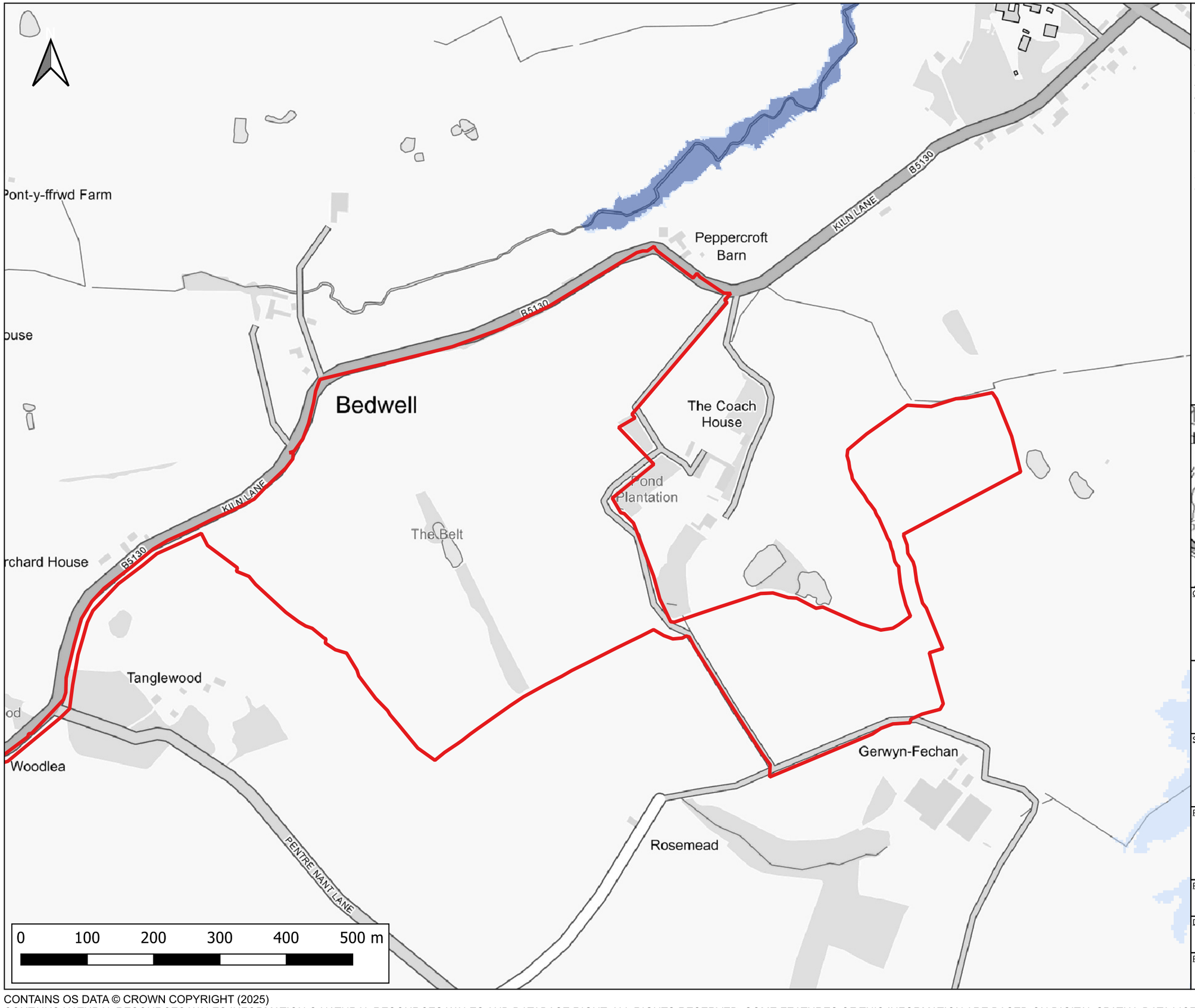
PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Recorded_Flood_Extents	-

0 100 200 300 400 500 m

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED.



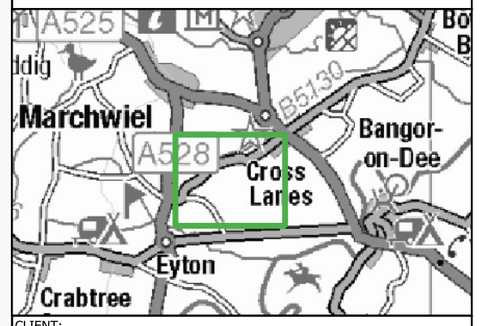
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise
2) Flood Zone 3 displays the extent of flooding from rivers with a 1% AEP or greater of flooding in a given year including and allowance for climate change and the sea with a 0.5% AEP or greater of flooding in a given year including and allowance for climate change
3) Flood Zone 2 displays the extent of flooding from rivers with a less than 1% AEP but greater than or equal to 0.1% AEP of flooding in a given year including and allowance for climate change and the sea with a less than 0.5% AEP but greater than or equal to 0.1% AEP of flooding in a given year including an allowance for climate change

LEGEND

- Site Boundary
- TAN15 Defended Zones

Flood Map for Planning

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:
Axis P.E.D

www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Map for Planning (Rivers and Sea)
Eastern Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

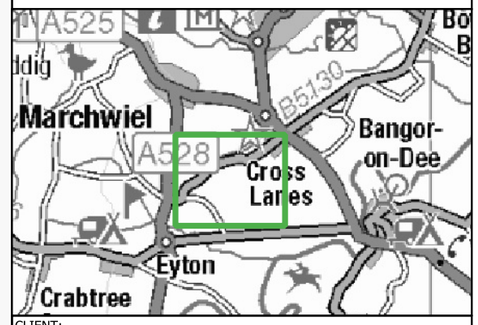
PLOT NAME:	REVISION:
14825_NRW_FMfP	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Flood Zones - Rivers
  - Flood Zone 1
  - Flood Zone 2
  - Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Zones - Rivers
Eastern Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Rivers	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

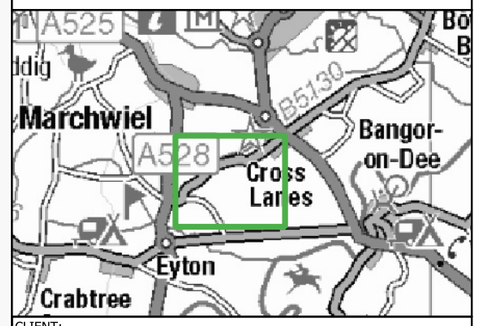
Site Boundary

Flood Zones - Surface Water & Small Watercourses

Flood Zone 1

Flood Zone 2

Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Zones - Surface Water & Small Watercourses
Eastern Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Surface_Water	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

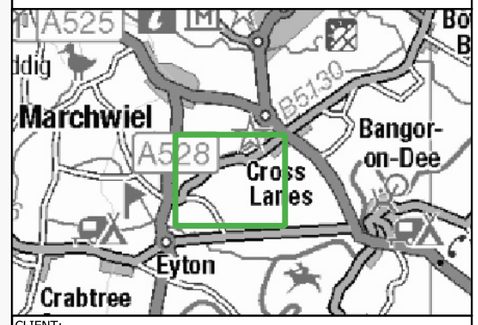
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary

Flood Zones - Sea

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:

Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:

Butterfly Farm Solar DNS

PLOT TITLE:

NRW Flood Risk from the Sea
Eastern Array Area
Data published May 2025

PLOT STATUS:			DATE:
FINAL			13-08-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

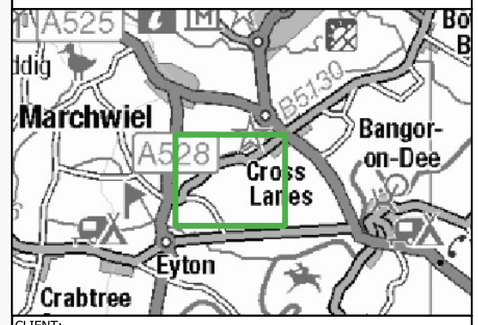
PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Sea	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- NRW Recorded Flood Extents



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

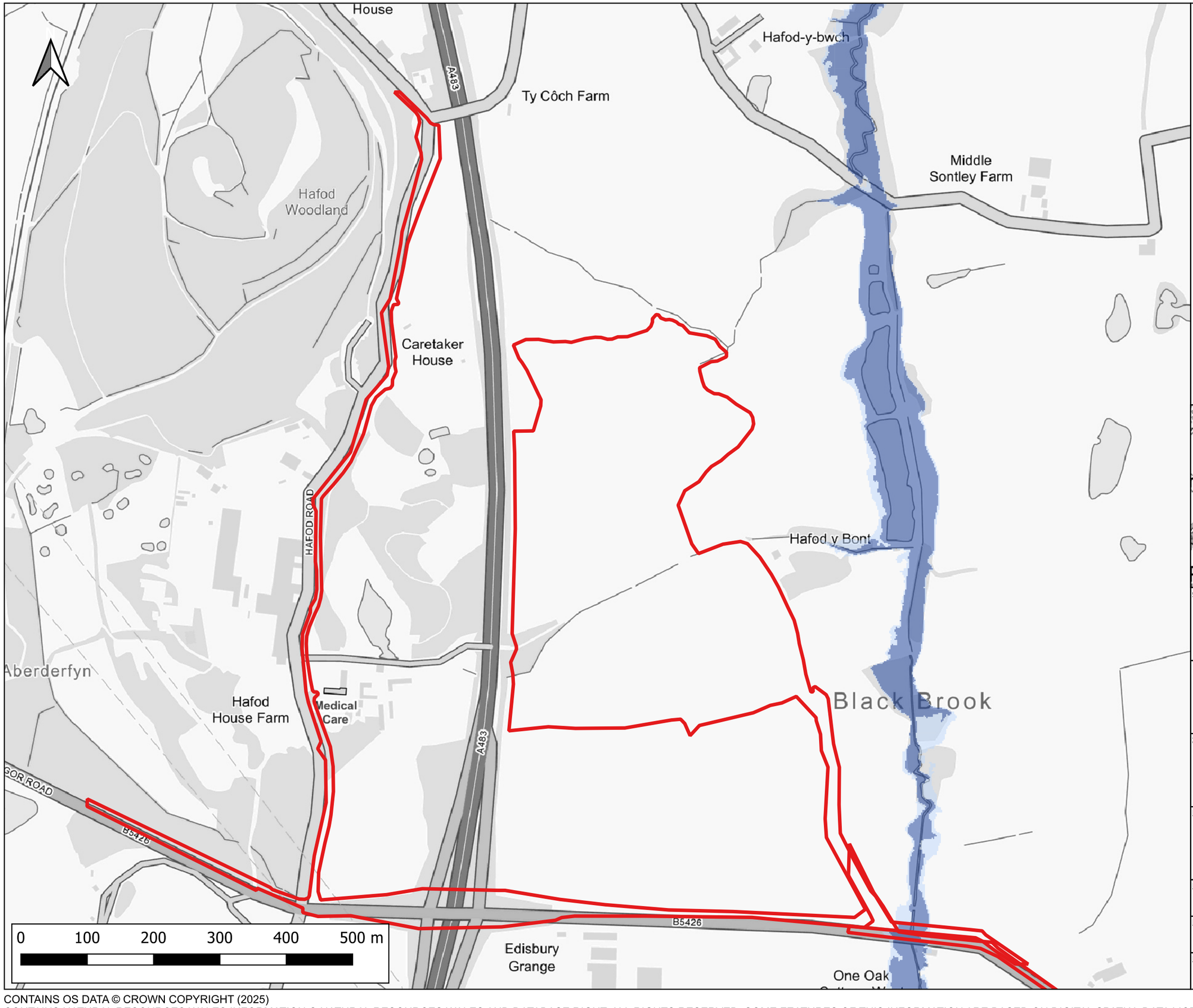
PLOT TITLE:
NRW Recorded Flood Extents
Eastern Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Recorded_Flood_Extents	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED.



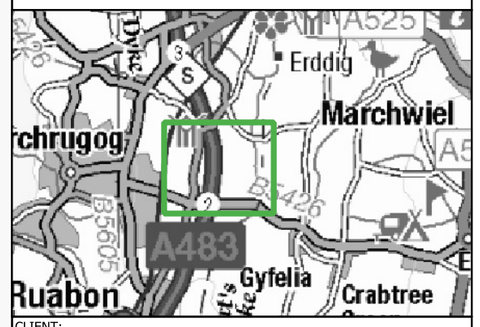
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise
2) Flood Zone 3 displays the extent of flooding from rivers with a 1% AEP or greater of flooding in a given year including and allowance for climate change and the sea with a 0.5% AEP or greater of flooding in a given year including and allowance for climate change
3) Flood Zone 2 displays the extent of flooding from rivers with a less than 1% AEP but greater than or equal to 0.1% AEP of flooding in a given year including and allowance for climate change and the sea with a less than 0.5% AEP but greater than or equal to 0.1% AEP of flooding in a given year including an allowance for climate change

LEGEND

- Site Boundary
- TAN15 Defended Zones

Flood Map for Planning

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

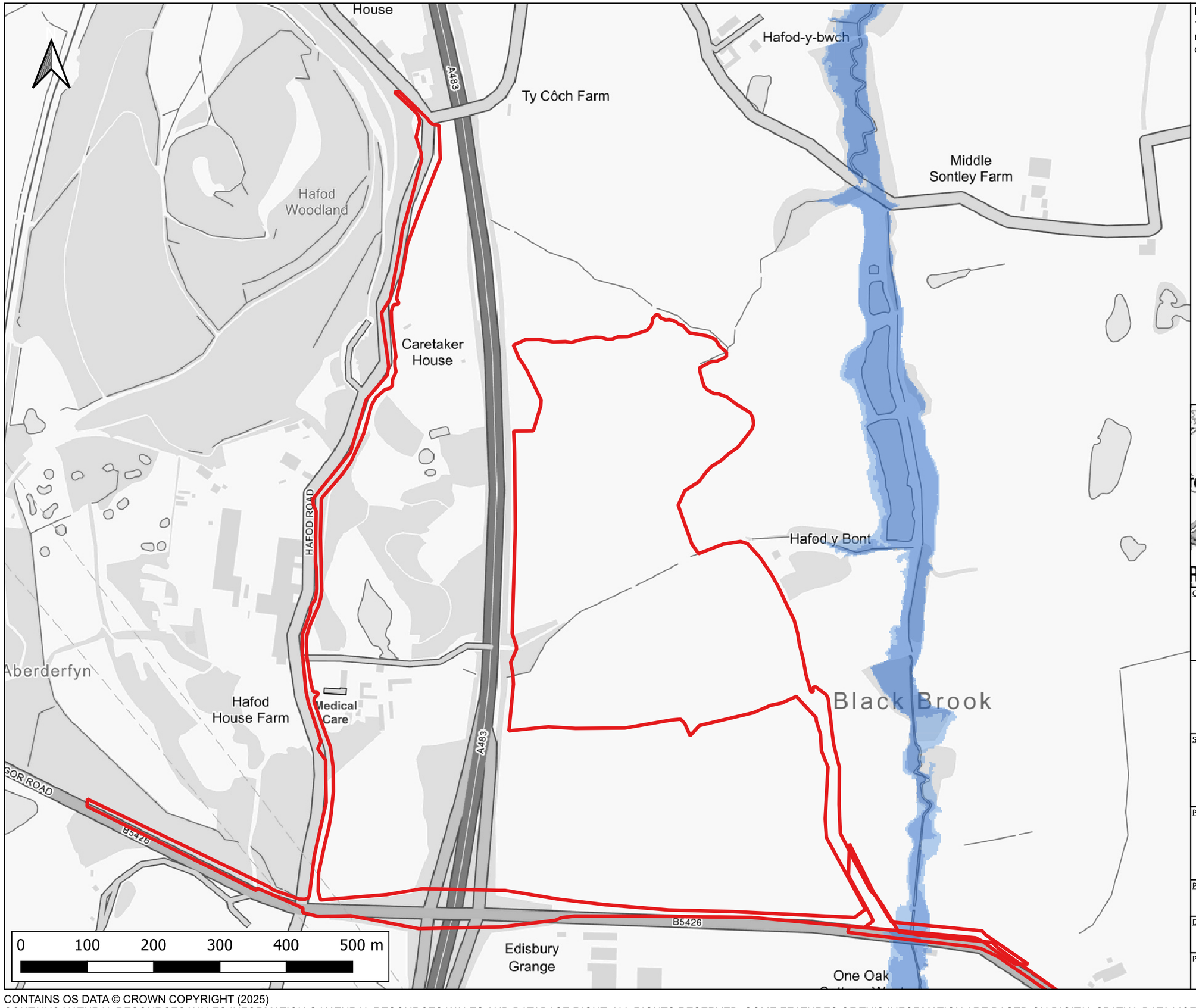
PLOT TITLE:
NRW Flood Map for Planning (Rivers and Sea)
Western Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_FMfP	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.



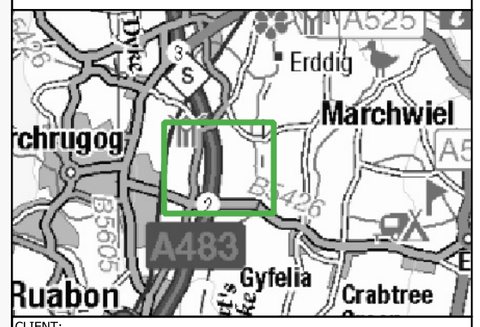
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary

Flood Zones - Rivers

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

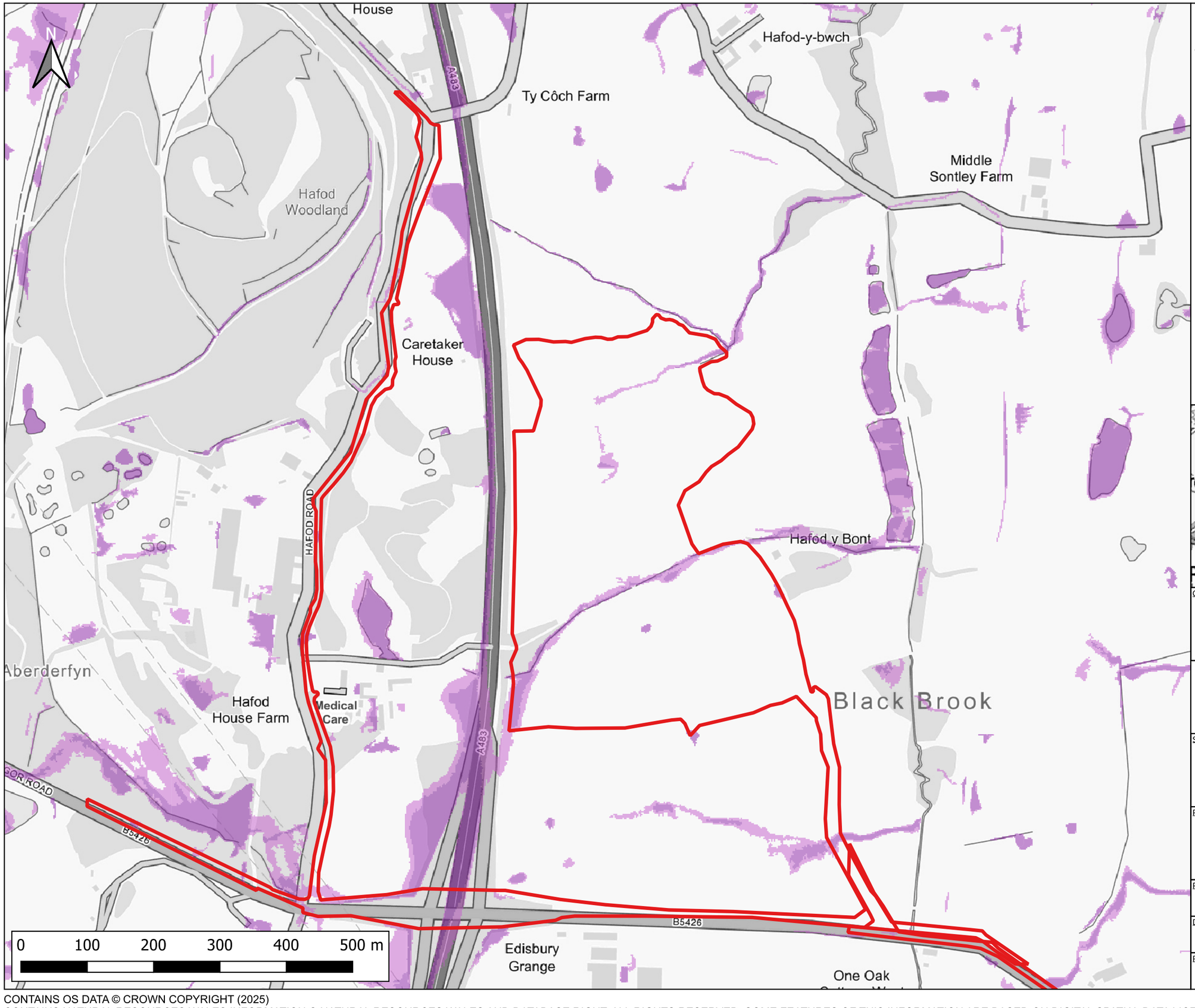
SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Zones - Rivers
Western Array Area
Data published May 2025

PLOT STATUS:			DATE:
FINAL			13-08-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Rivers	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.



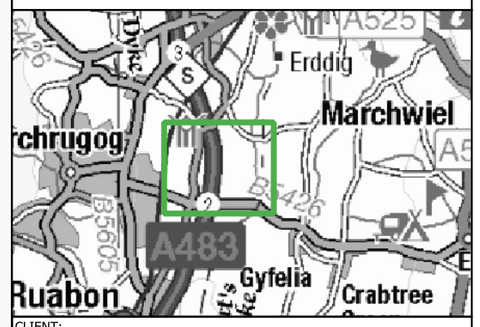
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary

Flood Zones - Surface Water & Small Watercourses

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

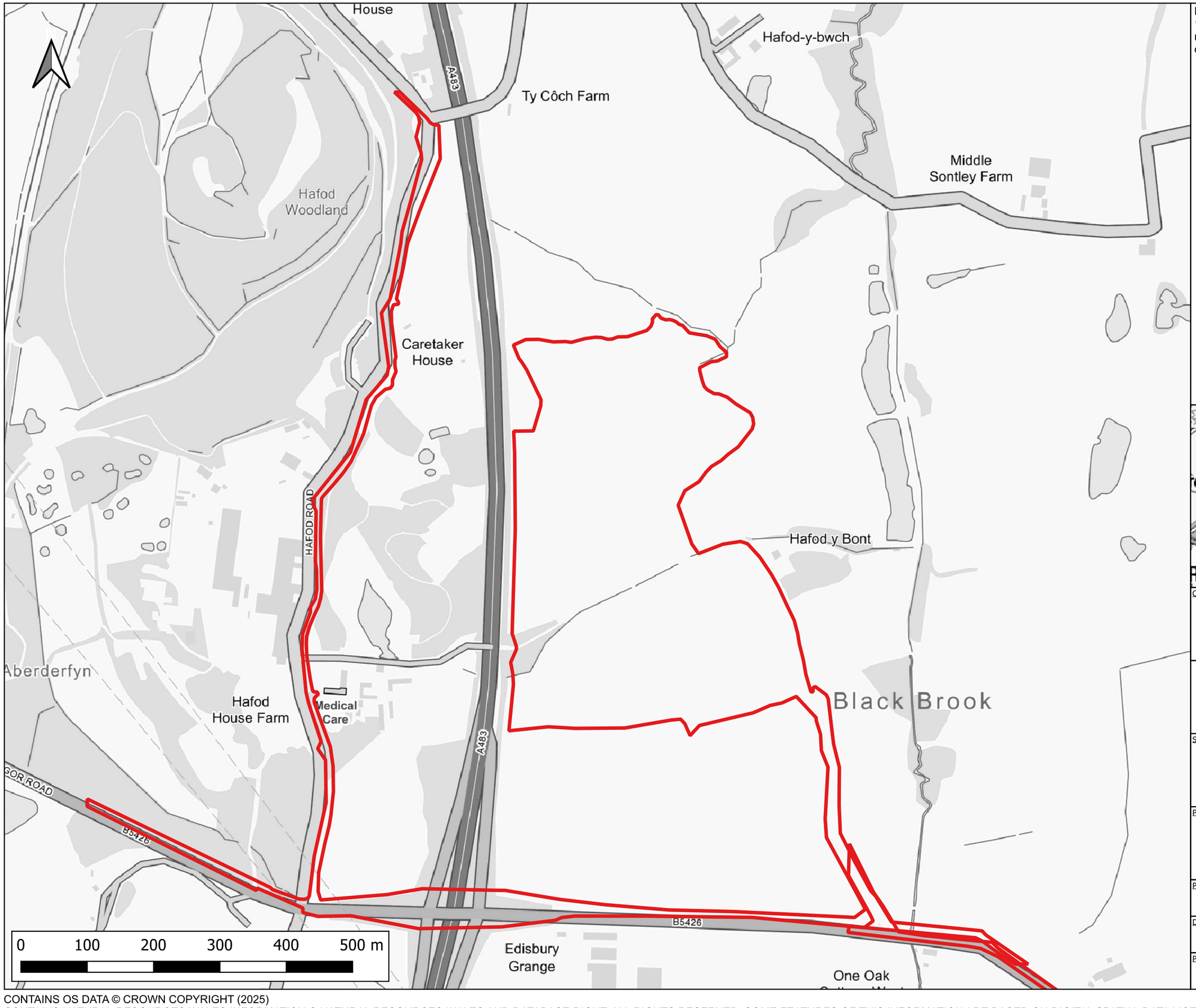
SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Zones - Surface Water & Small Watercourses
Western Array Area
Data published May 2025

PLOT STATUS:			DATE:
FINAL			13-08-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Flood_Zones_Surface_Water	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.



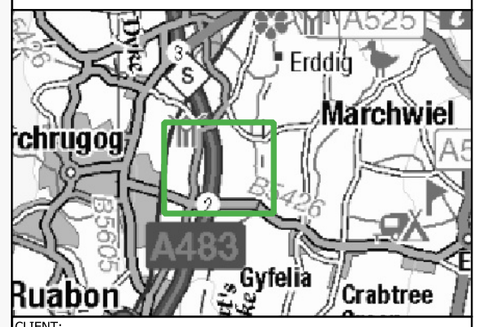
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary

Flood Zones - Sea

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Flood Risk from the Sea
Western Array Area
Data published May 2025

PLOT STATUS:			DATE:
FINAL			13-08-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME: 14825_NRW_Flood_Zones_Sea
REVISION: -

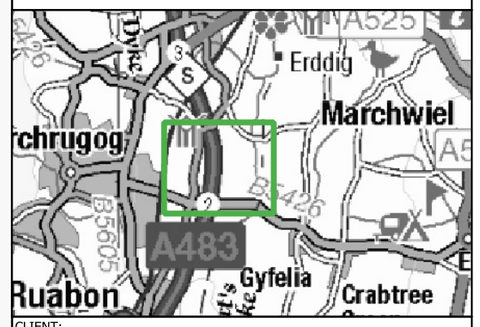
CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED. SOME FEATURES OF THIS INFORMATION ARE BASED ON DIGITAL SPATIAL DATA LICENSED FROM THE UK CENTRE FOR ECOLOGY & HYDROLOGY © UKCEH. DEFRA, MET OFFICE AND DARD RIVERS AGENCY © CROWN COPYRIGHT. © CRANFIELD UNIVERSITY. © JAMES HUTTON INSTITUTE. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT.

House
A483
Ty Côch Farm
Hafod-y-bwch
Middle
Sontley Farm
Hafod
Woodland
Caretaker
House
HAFOD ROAD
Hafod y Bont
Aberderfyn
Hafod
House Farm
Medical
Care
Black Brook
A483
B5426
Edisbury
Grange
One Oak
0 100 200 300 400 500 m

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- NRW Recorded Flood Extents



CLIENT:
Axis P.E.D

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
NRW Recorded Flood Extents
Western Array Area
Data published May 2025

PLOT STATUS:	DATE:
FINAL	13-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
HW	AW	NJ	1:5500

PLOT NAME:	REVISION:
14825_NRW_Recorded_Flood_Extents	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)
CONTAINS NATURAL RESOURCES WALES INFORMATION © NATURAL RESOURCES WALES AND DATABASE RIGHT. ALL RIGHTS RESERVED.

Appendix H Greenfield Runoff Rates

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.023	Urban	0.000
SAAR (mm)	899	Region Number	Region 9

Results l/s

QBAR Rural	0.1
QBAR Urban	0.1
Q100 years	0.1
Q1 year	0.0
Q30 years	0.1
Q100 years	0.1

©1982-2020 Innovyze

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.240	Urban	0.000
SAAR (mm)	900	Region Number	Region 9

Results l/s

QBAR Rural	0.6
QBAR Urban	0.6
Q100 years	1.3
Q1 year	0.5
Q30 years	1.0
Q100 years	1.3

©1982-2020 Innovyze

Appendix I MicroDrainage Simulations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 119 minutes.

	Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15	min Summer	9.903	0.103	0.0	1.0	1.0	7.2	Flood Risk
30	min Summer	9.944	0.144	0.0	1.0	1.0	10.0	Flood Risk
60	min Summer	9.983	0.183	0.0	1.0	1.0	12.8	Flood Risk
120	min Summer	9.995	0.195	0.0	1.0	1.0	13.6	Flood Risk
180	min Summer	9.994	0.194	0.0	1.0	1.0	13.6	Flood Risk
240	min Summer	9.991	0.191	0.0	1.0	1.0	13.3	Flood Risk
360	min Summer	9.980	0.180	0.0	1.0	1.0	12.5	Flood Risk
480	min Summer	9.967	0.167	0.0	1.0	1.0	11.7	Flood Risk
600	min Summer	9.954	0.154	0.0	1.0	1.0	10.8	Flood Risk
720	min Summer	9.940	0.140	0.0	1.0	1.0	9.8	Flood Risk
960	min Summer	9.914	0.114	0.0	1.0	1.0	7.9	Flood Risk
1440	min Summer	9.877	0.077	0.0	1.0	1.0	5.4	Flood Risk
2160	min Summer	9.856	0.056	0.0	0.9	0.9	3.9	Flood Risk
2880	min Summer	9.846	0.046	0.0	0.7	0.7	3.2	Flood Risk
4320	min Summer	9.836	0.036	0.0	0.5	0.5	2.4	Flood Risk
5760	min Summer	9.830	0.030	0.0	0.4	0.4	2.1	Flood Risk
7200	min Summer	9.827	0.027	0.0	0.4	0.4	1.8	Flood Risk
8640	min Summer	9.825	0.025	0.0	0.3	0.3	1.7	Flood Risk

	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15	min Summer	158.828	0.0	7.9	24
30	min Summer	108.536	0.0	11.3	38
60	min Summer	71.014	0.0	15.1	64
120	min Summer	42.055	0.0	18.1	114
180	min Summer	30.660	0.0	19.9	144
240	min Summer	24.414	0.0	21.2	176
360	min Summer	17.629	0.0	23.0	244
480	min Summer	14.006	0.0	24.4	312
600	min Summer	11.703	0.0	25.4	382
720	min Summer	10.093	0.0	26.3	444
960	min Summer	7.957	0.0	27.6	566
1440	min Summer	5.669	0.0	29.4	788
2160	min Summer	4.020	0.0	31.1	1132
2880	min Summer	3.148	0.0	32.2	1496
4320	min Summer	2.228	0.0	33.6	2208
5760	min Summer	1.758	0.0	34.8	2944
7200	min Summer	1.490	0.0	36.4	3672
8640	min Summer	1.318	0.0	38.3	4408

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	9.824	0.024	0.0	0.3	0.3	1.6	Flood Risk
15 min Winter	9.903	0.103	0.0	1.0	1.0	7.2	Flood Risk
30 min Winter	9.944	0.144	0.0	1.0	1.0	10.0	Flood Risk
60 min Winter	9.983	0.183	0.0	1.0	1.0	12.8	Flood Risk
120 min Winter	9.994	0.194	0.0	1.0	1.0	13.6	Flood Risk
180 min Winter	9.991	0.191	0.0	1.0	1.0	13.4	Flood Risk
240 min Winter	9.986	0.186	0.0	1.0	1.0	13.0	Flood Risk
360 min Winter	9.969	0.169	0.0	1.0	1.0	11.8	Flood Risk
480 min Winter	9.950	0.150	0.0	1.0	1.0	10.4	Flood Risk
600 min Winter	9.928	0.128	0.0	1.0	1.0	8.9	Flood Risk
720 min Winter	9.909	0.109	0.0	1.0	1.0	7.6	Flood Risk
960 min Winter	9.878	0.078	0.0	1.0	1.0	5.4	Flood Risk
1440 min Winter	9.855	0.055	0.0	0.8	0.8	3.8	Flood Risk
2160 min Winter	9.841	0.041	0.0	0.6	0.6	2.8	Flood Risk
2880 min Winter	9.834	0.034	0.0	0.5	0.5	2.3	Flood Risk
4320 min Winter	9.827	0.027	0.0	0.4	0.4	1.8	Flood Risk
5760 min Winter	9.823	0.023	0.0	0.3	0.3	1.5	Flood Risk
7200 min Winter	9.820	0.020	0.0	0.2	0.2	1.3	Flood Risk
8640 min Winter	9.818	0.018	0.0	0.2	0.2	1.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.204	0.0	40.4	5136
15 min Winter	158.828	0.0	7.9	24
30 min Winter	108.536	0.0	11.3	37
60 min Winter	71.014	0.0	15.1	64
120 min Winter	42.055	0.0	18.1	118
180 min Winter	30.660	0.0	19.9	148
240 min Winter	24.414	0.0	21.2	186
360 min Winter	17.629	0.0	23.0	262
480 min Winter	14.006	0.0	24.4	336
600 min Winter	11.703	0.0	25.4	400
720 min Winter	10.093	0.0	26.3	460
960 min Winter	7.957	0.0	27.6	568
1440 min Winter	5.669	0.0	29.4	784
2160 min Winter	4.020	0.0	31.1	1132
2880 min Winter	3.148	0.0	32.2	1504
4320 min Winter	2.228	0.0	33.6	2196
5760 min Winter	1.758	0.0	34.9	3000
7200 min Winter	1.490	0.0	36.5	3720
8640 min Winter	1.318	0.0	38.3	4408

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Winter	9.817	0.017	0.0	0.2	0.2	1.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	1.204	0.0	40.5	5008

©1982-2020 Innovyze

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 331692 346291 SJ 31692 46291
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.023

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.008	4	8	0.008	8	12	0.008

©1982-2020 Innovyze

Model Details

Storage is Online Cover Level (m) 10.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000
Membrane Percolation (mm/hr)	1000
Max Percolation (l/s)	65.0
Safety Factor	2.0
Porosity	0.30
Invert Level (m)	9.800
Width (m)	12.0
Length (m)	19.5
Slope (1:X)	10000.0
Depression Storage (mm)	5
Evaporation (mm/day)	3
Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0057-1000-0200-1000
Design Head (m)	0.200
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	57
Invert Level (m)	9.795
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.200	1.0
Flush-Flo™	0.078	1.0
Kick-Flo®	0.155	0.9
Mean Flow over Head Range	-	0.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	0.500	1.5	1.200	2.2
0.200	1.0	0.600	1.6	1.400	2.4
0.300	1.2	0.800	1.9	1.600	2.6
0.400	1.4	1.000	2.1	1.800	2.7

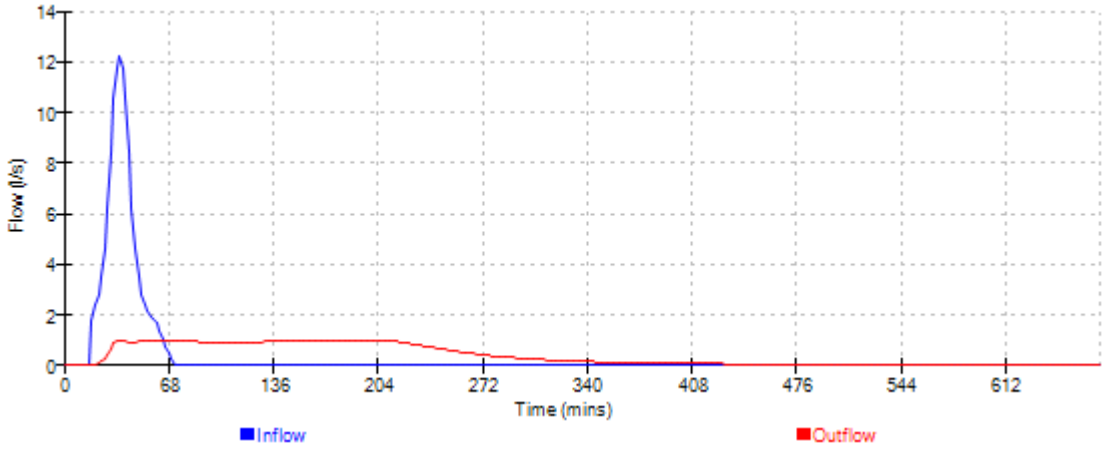
©1982-2020 Innovyze

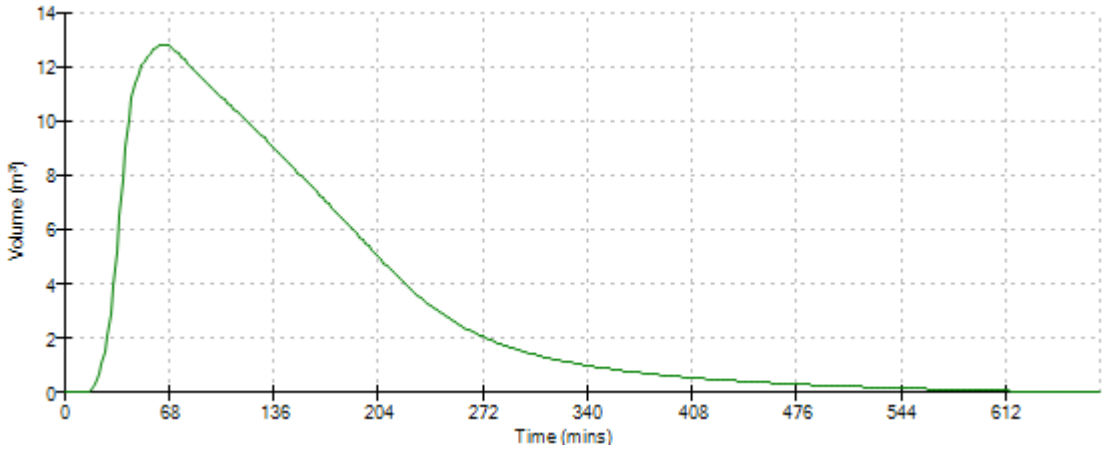
Hydro-Brake® Optimum Outflow Control

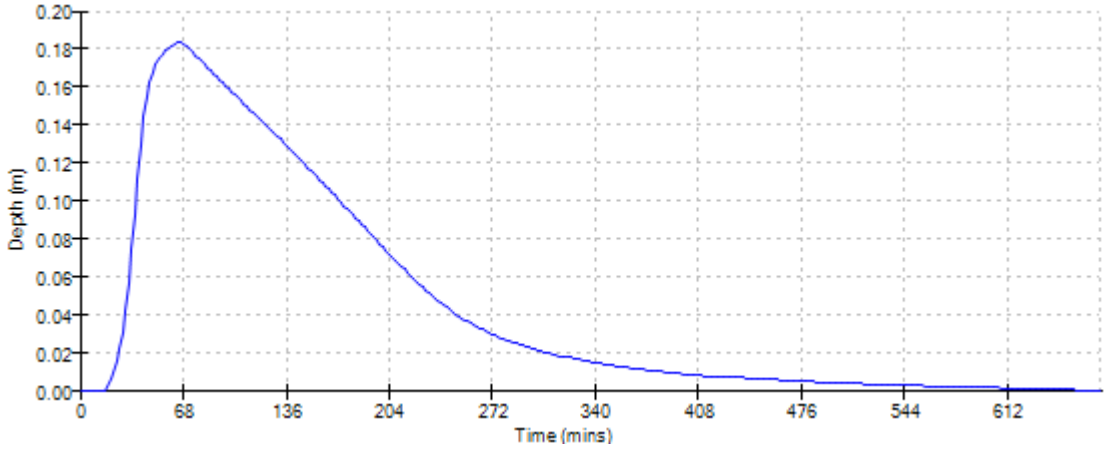
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.000	2.8	4.000	4.0	7.000	5.3
2.200	3.0	4.500	4.2	7.500	5.5
2.400	3.1	5.000	4.5	8.000	5.7
2.600	3.2	5.500	4.7	8.500	5.8
3.000	3.5	6.000	4.9	9.000	6.0
3.500	3.7	6.500	5.1	9.500	6.2

©1982-2020 Innovyze

Event: 60 min Summer

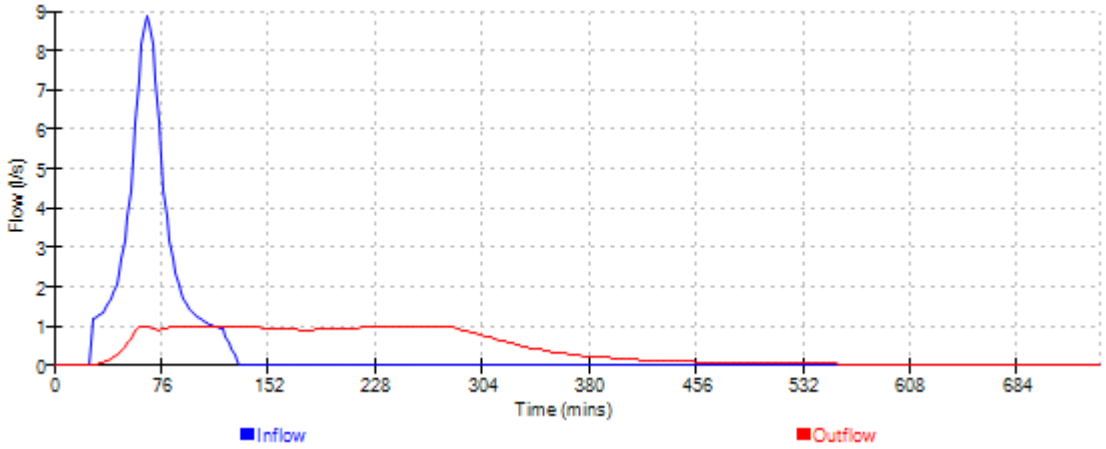


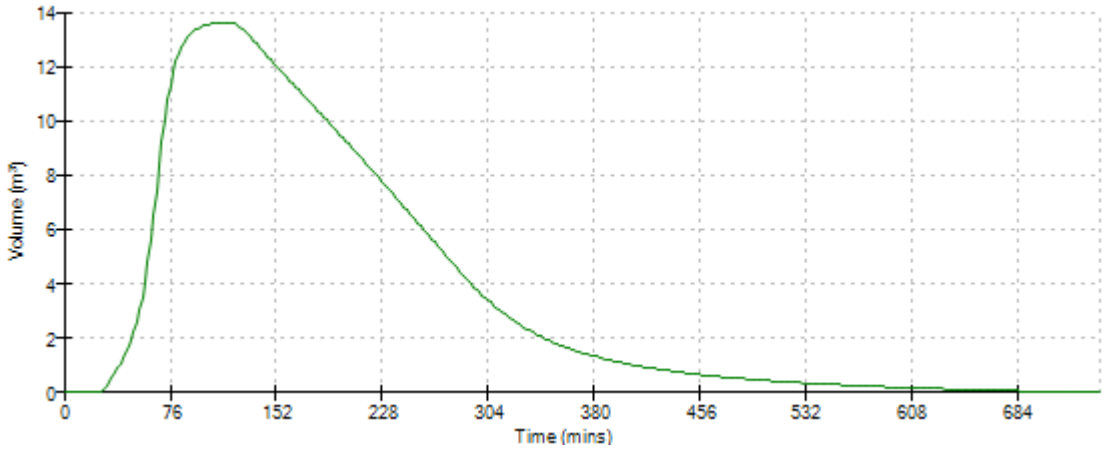


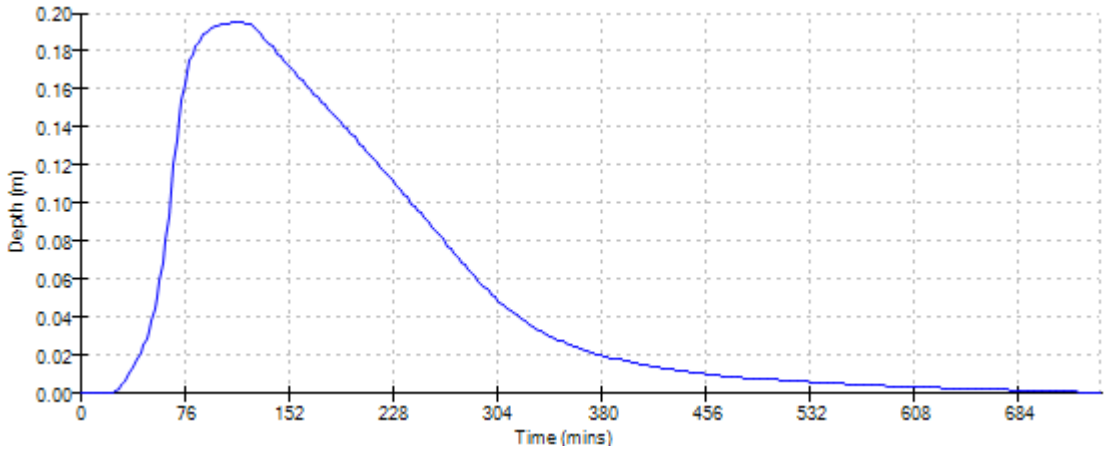


©1982-2020 Innovyze

Event: 120 min Summer

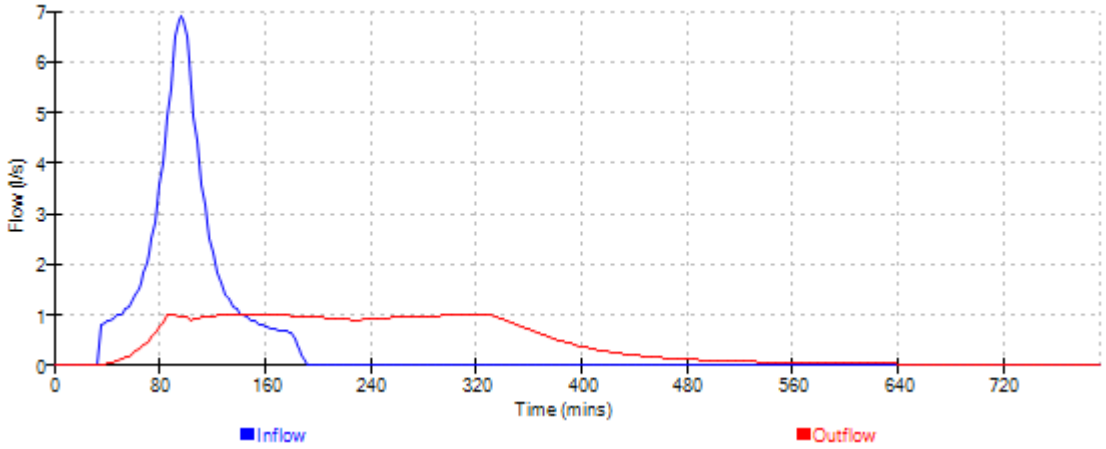


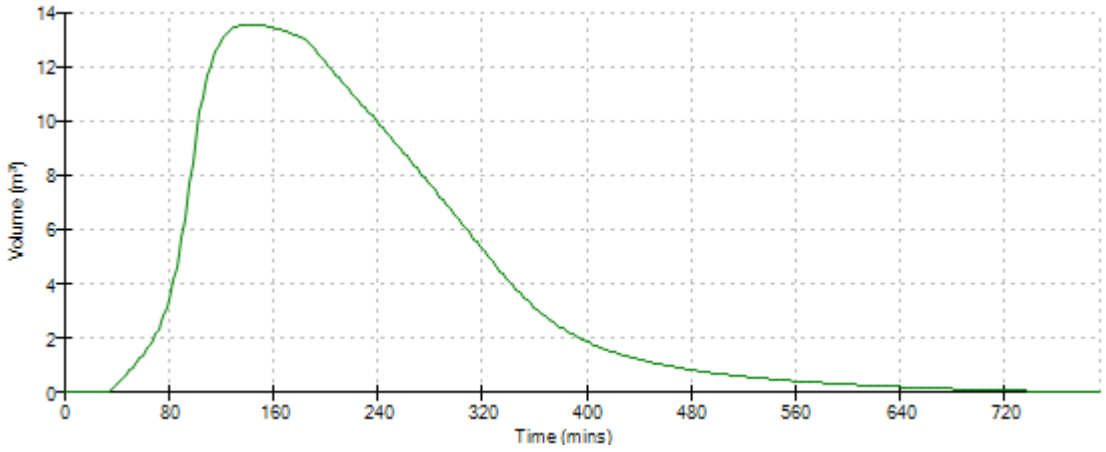


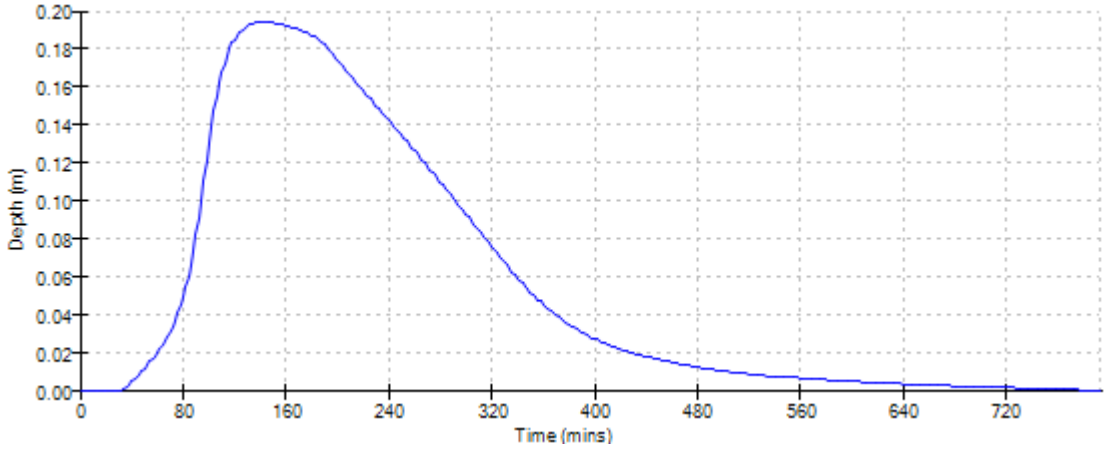


©1982-2020 Innovyze

Event: 180 min Summer







©1982-2020 Innovyze

Summary of Results for 30 year Return Period (+40%)

Half Drain Time : 1597 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	9.782	0.082	0.0	1.0	1.0	56.3	Flood Risk
30 min Summer	9.815	0.115	0.0	1.0	1.0	79.8	Flood Risk
60 min Summer	9.851	0.151	0.0	1.0	1.0	106.3	Flood Risk
120 min Summer	9.884	0.184	0.0	1.0	1.0	129.9	Flood Risk
180 min Summer	9.904	0.204	0.0	1.0	1.0	143.8	Flood Risk
240 min Summer	9.917	0.217	0.0	1.0	1.0	153.5	Flood Risk
360 min Summer	9.934	0.234	0.0	1.0	1.0	166.1	Flood Risk
480 min Summer	9.946	0.246	0.0	1.0	1.0	174.5	Flood Risk
600 min Summer	9.954	0.254	0.0	1.0	1.0	180.2	Flood Risk
720 min Summer	9.959	0.259	0.0	1.0	1.0	183.9	Flood Risk
960 min Summer	9.964	0.264	0.0	1.0	1.0	187.2	Flood Risk
1440 min Summer	9.962	0.262	0.0	1.0	1.0	186.0	Flood Risk
2160 min Summer	9.954	0.254	0.0	1.0	1.0	180.0	Flood Risk
2880 min Summer	9.945	0.245	0.0	1.0	1.0	173.7	Flood Risk
4320 min Summer	9.927	0.227	0.0	1.0	1.0	160.6	Flood Risk
5760 min Summer	9.910	0.210	0.0	1.0	1.0	148.8	Flood Risk
7200 min Summer	9.898	0.198	0.0	1.0	1.0	139.8	Flood Risk
8640 min Summer	9.889	0.189	0.0	1.0	1.0	133.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	114.750	0.0	47.5	16
30 min Summer	77.501	0.0	65.8	31
60 min Summer	50.273	0.0	103.4	62
120 min Summer	30.571	0.0	125.5	122
180 min Summer	22.660	0.0	137.8	182
240 min Summer	18.258	0.0	145.3	242
360 min Summer	13.398	0.0	152.2	362
480 min Summer	10.763	0.0	153.2	482
600 min Summer	9.069	0.0	151.0	600
720 min Summer	7.875	0.0	148.5	720
960 min Summer	6.274	0.0	143.7	960
1440 min Summer	4.533	0.0	135.0	1370
2160 min Summer	3.254	0.0	249.8	1708
2880 min Summer	2.573	0.0	255.5	2076
4320 min Summer	1.850	0.0	244.5	2900
5760 min Summer	1.478	0.0	299.8	3744
7200 min Summer	1.262	0.0	315.5	4536
8640 min Summer	1.122	0.0	332.8	5352

©1982-2020 Innovyze

Summary of Results for 30 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	9.883	0.183	0.0	1.0	1.0	129.4	Flood Risk
15 min Winter	9.782	0.082	0.0	1.0	1.0	56.3	Flood Risk
30 min Winter	9.815	0.115	0.0	1.0	1.0	79.8	Flood Risk
60 min Winter	9.851	0.151	0.0	1.0	1.0	106.2	Flood Risk
120 min Winter	9.884	0.184	0.0	1.0	1.0	129.8	Flood Risk
180 min Winter	9.903	0.203	0.0	1.0	1.0	143.7	Flood Risk
240 min Winter	9.917	0.217	0.0	1.0	1.0	153.3	Flood Risk
360 min Winter	9.934	0.234	0.0	1.0	1.0	165.8	Flood Risk
480 min Winter	9.946	0.246	0.0	1.0	1.0	174.2	Flood Risk
600 min Winter	9.954	0.254	0.0	1.0	1.0	179.9	Flood Risk
720 min Winter	9.959	0.259	0.0	1.0	1.0	183.7	Flood Risk
960 min Winter	9.964	0.264	0.0	1.0	1.0	187.1	Flood Risk
1440 min Winter	9.963	0.263	0.0	1.0	1.0	186.4	Flood Risk
2160 min Winter	9.951	0.251	0.0	1.0	1.0	177.8	Flood Risk
2880 min Winter	9.939	0.239	0.0	1.0	1.0	169.6	Flood Risk
4320 min Winter	9.913	0.213	0.0	1.0	1.0	150.7	Flood Risk
5760 min Winter	9.886	0.186	0.0	1.0	1.0	131.3	Flood Risk
7200 min Winter	9.866	0.166	0.0	1.0	1.0	116.8	Flood Risk
8640 min Winter	9.850	0.150	0.0	1.0	1.0	105.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.028	0.0	349.9	6152
15 min Winter	114.750	0.0	47.5	16
30 min Winter	77.501	0.0	65.8	31
60 min Winter	50.273	0.0	103.4	62
120 min Winter	30.571	0.0	125.6	120
180 min Winter	22.660	0.0	137.9	180
240 min Winter	18.258	0.0	145.4	238
360 min Winter	13.398	0.0	152.5	356
480 min Winter	10.763	0.0	153.7	472
600 min Winter	9.069	0.0	151.8	588
720 min Winter	7.875	0.0	149.3	706
960 min Winter	6.274	0.0	144.8	932
1440 min Winter	4.533	0.0	136.4	1370
2160 min Winter	3.254	0.0	250.2	1752
2880 min Winter	2.573	0.0	256.5	2192
4320 min Winter	1.850	0.0	250.6	3112
5760 min Winter	1.478	0.0	300.1	3976
7200 min Winter	1.262	0.0	316.0	4760
8640 min Winter	1.122	0.0	333.4	5544

©1982-2020 Innovyze

Summary of Results for 30 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Winter	9.837	0.137	0.0	1.0	1.0	96.3	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	1.028	0.0	351.4	6352

©1982-2020 Innovyze

Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 331692 346291 SJ 31692 46291
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.240

Time (mins) From:	To:	Area (ha)
0	1	0.240

©1982-2020 Innovyze

Model Details

Storage is Online Cover Level (m) 10.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000
Membrane Percolation (mm/hr)	1000
Max Percolation (l/s)	666.7
Safety Factor	2.0
Porosity	0.30
Invert Level (m)	9.700
Width (m)	32.0
Length (m)	75.0
Slope (1:X)	10000.0
Depression Storage (mm)	5
Evaporation (mm/day)	3
Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0056-1000-0300-1000
Design Head (m)	0.300
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	56
Invert Level (m)	9.695
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.300	1.0
Flush-Flo™	0.089	1.0
Kick-Flo®	0.214	0.9
Mean Flow over Head Range	-	0.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	0.500	1.3	1.200	1.9
0.200	0.9	0.600	1.4	1.400	2.0
0.300	1.0	0.800	1.5	1.600	2.1
0.400	1.1	1.000	1.7	1.800	2.2

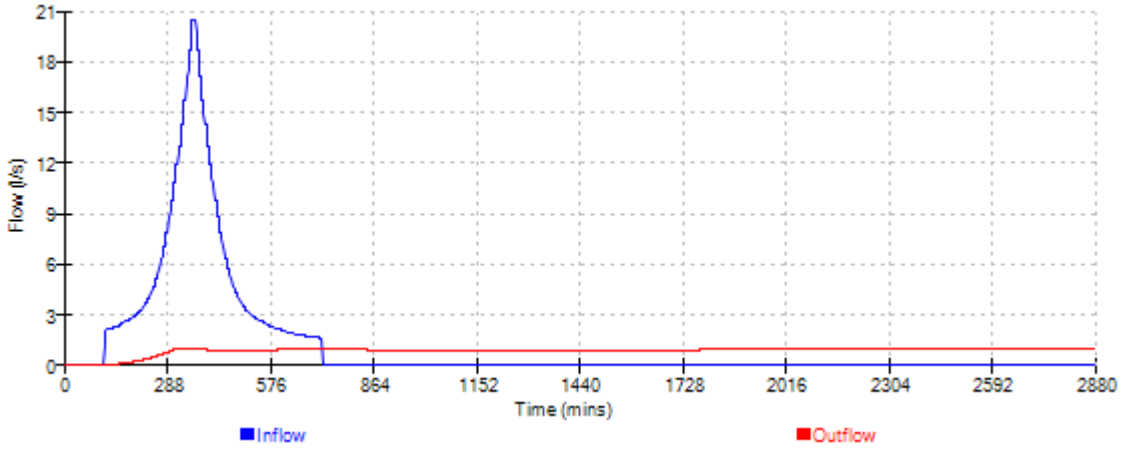
©1982-2020 Innovyze

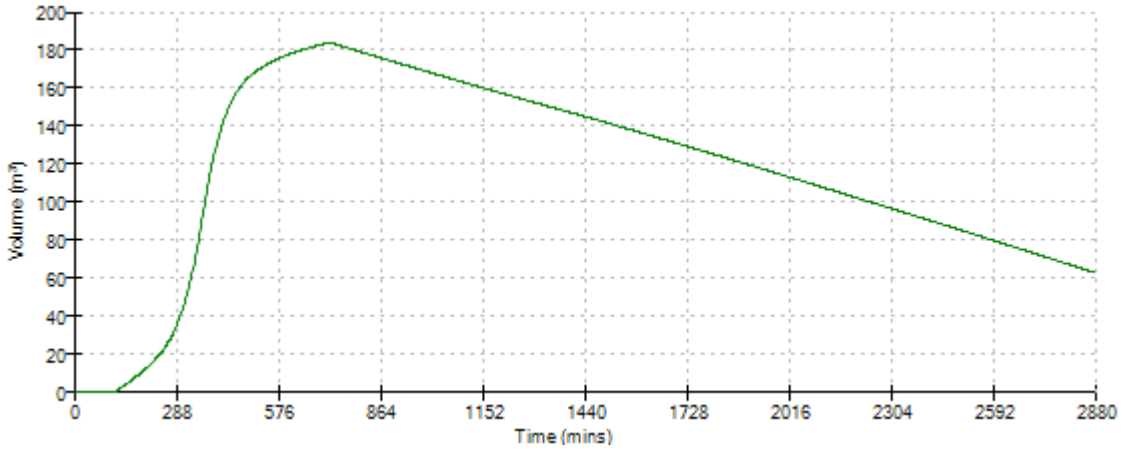
Hydro-Brake® Optimum Outflow Control

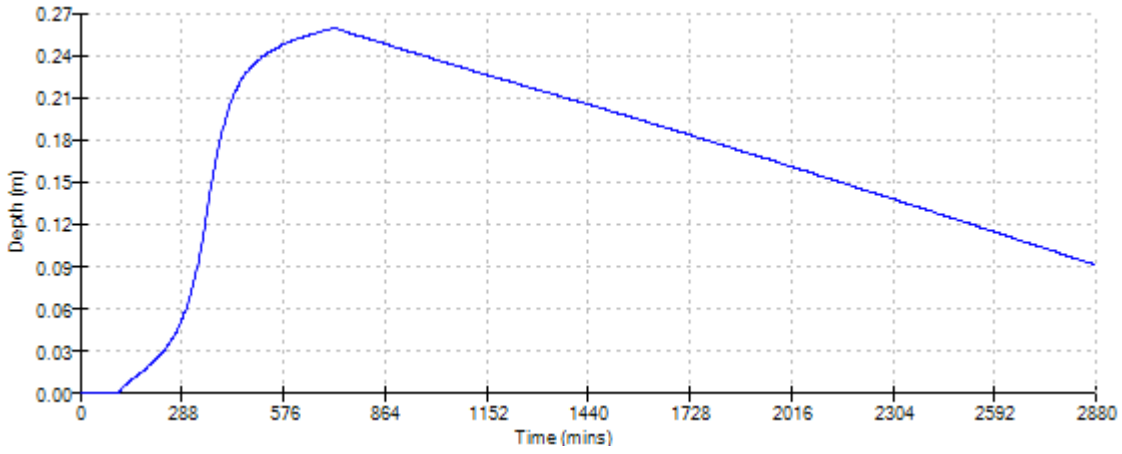
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.000	2.4	4.000	3.3	7.000	4.3
2.200	2.5	4.500	3.5	7.500	4.5
2.400	2.6	5.000	3.7	8.000	4.6
2.600	2.7	5.500	3.8	8.500	4.8
3.000	2.8	6.000	4.0	9.000	4.9
3.500	3.1	6.500	4.2	9.500	5.0

©1982-2020 Innovyze

Event: 720 min Summer

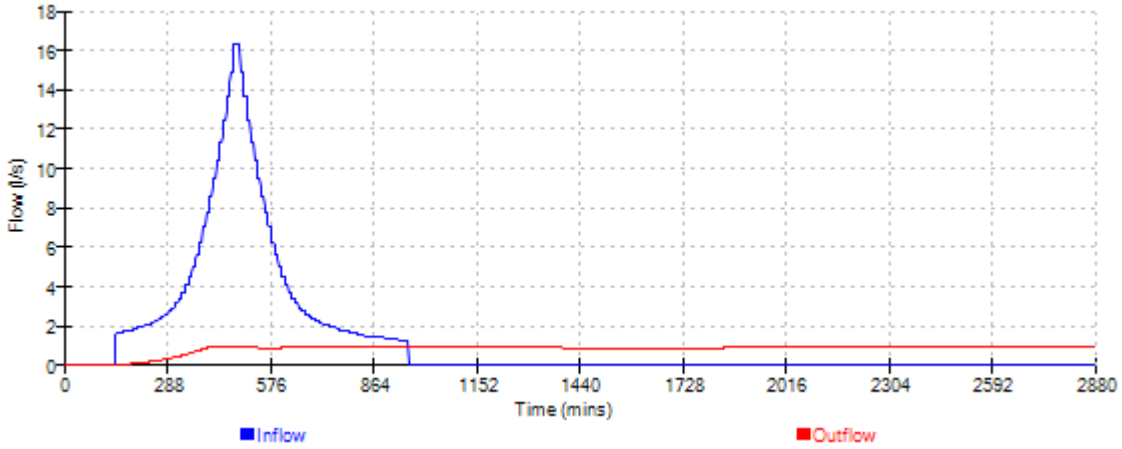


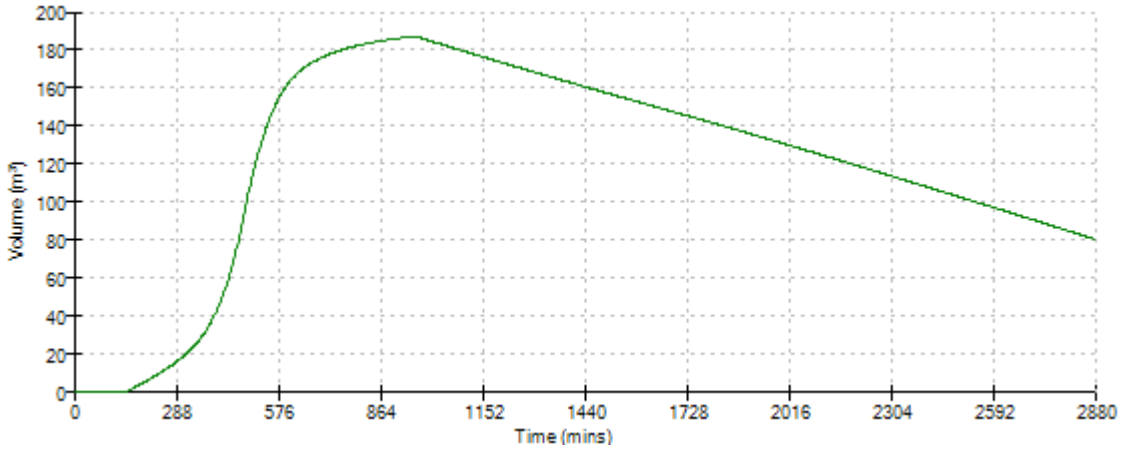


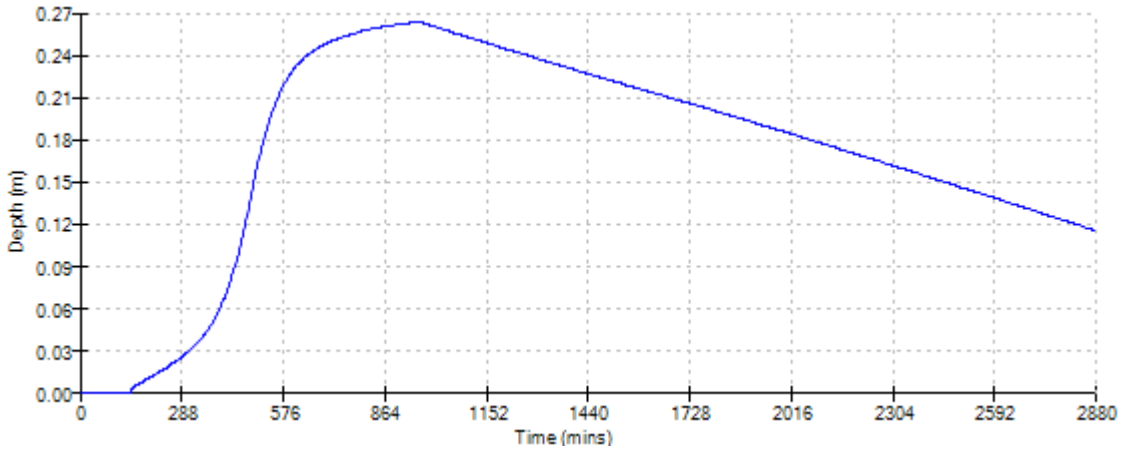


©1982-2020 Innovyze

Event: 960 min Summer

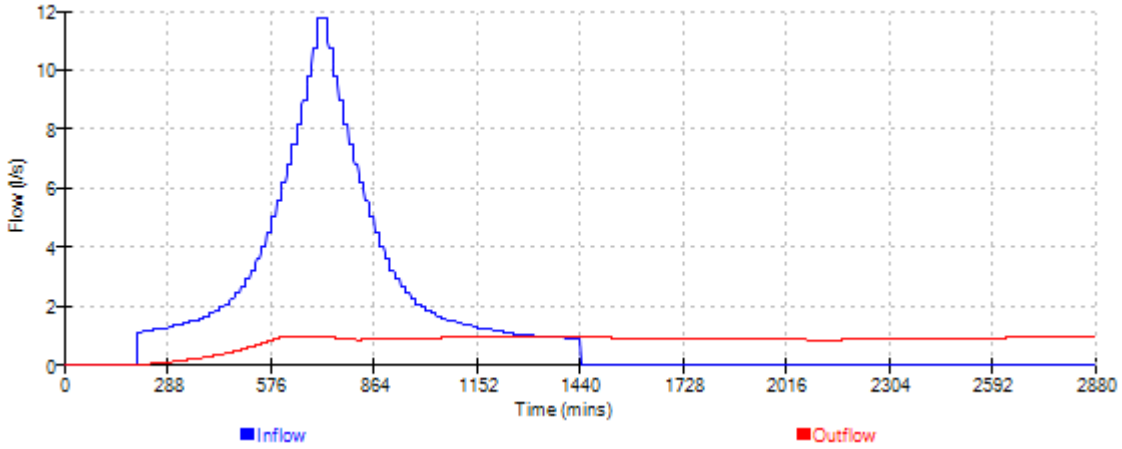


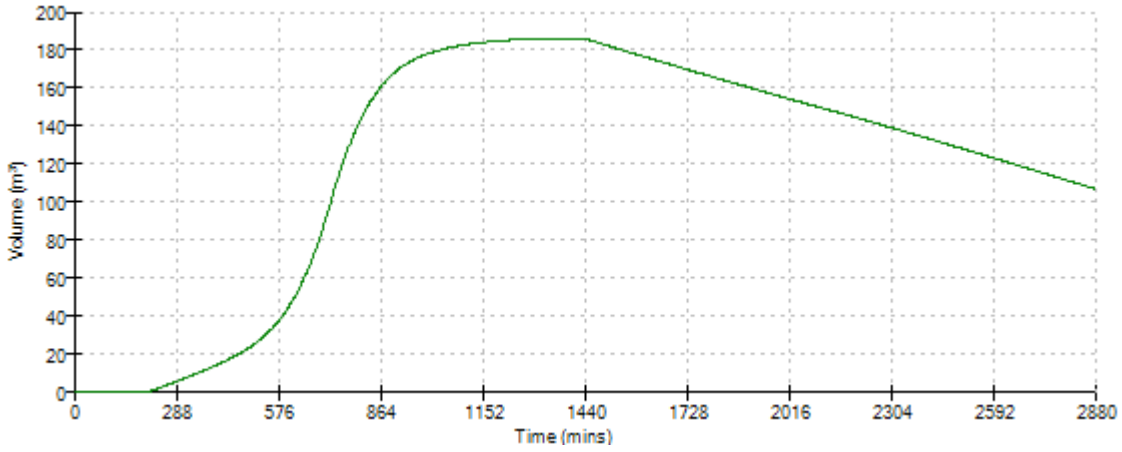


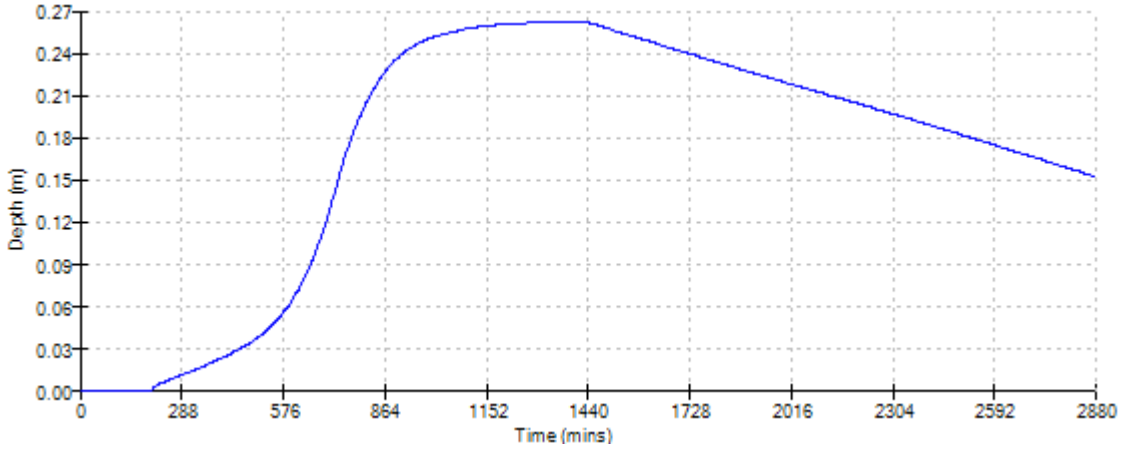


©1982-2020 Innovyze

Event: 1440 min Summer







©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 2134 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	9.769	0.119	0.0	1.0	1.0	82.7	Flood Risk
30 min Summer	9.816	0.166	0.0	1.0	1.0	117.0	Flood Risk
60 min Summer	9.870	0.220	0.0	1.0	1.0	155.9	Flood Risk
120 min Summer	9.910	0.260	0.0	1.0	1.0	184.8	Flood Risk
180 min Summer	9.933	0.283	0.0	1.0	1.0	201.0	Flood Risk
240 min Summer	9.948	0.298	0.0	1.0	1.0	211.9	Flood Risk
360 min Summer	9.967	0.317	0.0	1.0	1.0	225.8	Flood Risk
480 min Summer	9.980	0.330	0.0	1.0	1.0	235.1	Flood Risk
600 min Summer	9.989	0.339	0.0	1.0	1.0	241.2	Flood Risk
720 min Summer	9.994	0.344	0.0	1.0	1.0	245.2	Flood Risk
960 min Summer	9.999	0.349	0.0	1.0	1.0	248.5	Flood Risk
1440 min Summer	9.996	0.346	0.0	1.0	1.0	246.5	Flood Risk
2160 min Summer	9.981	0.331	0.0	1.0	1.0	236.0	Flood Risk
2880 min Summer	9.968	0.318	0.0	1.0	1.0	226.3	Flood Risk
4320 min Summer	9.943	0.293	0.0	1.0	1.0	208.1	Flood Risk
5760 min Summer	9.922	0.272	0.0	1.0	1.0	193.2	Flood Risk
7200 min Summer	9.909	0.259	0.0	1.0	1.0	183.6	Flood Risk
8640 min Summer	9.900	0.250	0.0	1.0	1.0	177.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	158.828	0.0	67.4	16
30 min Summer	108.536	0.0	83.0	31
60 min Summer	71.014	0.0	144.5	62
120 min Summer	42.055	0.0	159.1	122
180 min Summer	30.660	0.0	159.6	182
240 min Summer	24.414	0.0	157.7	242
360 min Summer	17.629	0.0	154.9	362
480 min Summer	14.006	0.0	152.9	482
600 min Summer	11.703	0.0	151.2	602
720 min Summer	10.093	0.0	149.6	722
960 min Summer	7.957	0.0	146.6	960
1440 min Summer	5.669	0.0	140.8	1440
2160 min Summer	4.020	0.0	292.8	1856
2880 min Summer	3.148	0.0	281.5	2220
4320 min Summer	2.228	0.0	250.8	2988
5760 min Summer	1.758	0.0	364.3	3816
7200 min Summer	1.490	0.0	380.8	4680
8640 min Summer	1.318	0.0	398.4	5528

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	9.895	0.245	0.0	1.0	1.0	173.8	Flood Risk
15 min Winter	9.769	0.119	0.0	1.0	1.0	82.7	Flood Risk
30 min Winter	9.816	0.166	0.0	1.0	1.0	117.0	Flood Risk
60 min Winter	9.870	0.220	0.0	1.0	1.0	155.8	Flood Risk
120 min Winter	9.910	0.260	0.0	1.0	1.0	184.7	Flood Risk
180 min Winter	9.933	0.283	0.0	1.0	1.0	200.9	Flood Risk
240 min Winter	9.948	0.298	0.0	1.0	1.0	211.7	Flood Risk
360 min Winter	9.967	0.317	0.0	1.0	1.0	225.6	Flood Risk
480 min Winter	9.980	0.330	0.0	1.0	1.0	234.9	Flood Risk
600 min Winter	9.989	0.339	0.0	1.0	1.0	241.2	Flood Risk
720 min Winter	9.994	0.344	0.0	1.0	1.0	245.2	Flood Risk
960 min Winter	9.999	0.349	0.0	1.0	1.0	248.7	Flood Risk
1440 min Winter	9.997	0.347	0.0	1.0	1.0	247.3	Flood Risk
2160 min Winter	9.982	0.332	0.0	1.0	1.0	236.2	Flood Risk
2880 min Winter	9.965	0.315	0.0	1.0	1.0	224.1	Flood Risk
4320 min Winter	9.933	0.283	0.0	1.0	1.0	201.2	Flood Risk
5760 min Winter	9.904	0.254	0.0	1.0	1.0	180.0	Flood Risk
7200 min Winter	9.879	0.229	0.0	1.0	1.0	162.3	Flood Risk
8640 min Winter	9.860	0.210	0.0	1.0	1.0	148.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.204	0.0	416.9	6352
15 min Winter	158.828	0.0	67.4	16
30 min Winter	108.536	0.0	83.1	31
60 min Winter	71.014	0.0	144.5	62
120 min Winter	42.055	0.0	159.2	122
180 min Winter	30.660	0.0	159.8	180
240 min Winter	24.414	0.0	158.0	240
360 min Winter	17.629	0.0	155.2	358
480 min Winter	14.006	0.0	153.2	474
600 min Winter	11.703	0.0	151.6	590
720 min Winter	10.093	0.0	150.1	706
960 min Winter	7.957	0.0	147.1	940
1440 min Winter	5.669	0.0	141.5	1384
2160 min Winter	4.020	0.0	293.8	2012
2880 min Winter	3.148	0.0	283.7	2276
4320 min Winter	2.228	0.0	255.3	3200
5760 min Winter	1.758	0.0	364.6	4104
7200 min Winter	1.490	0.0	381.5	4976
8640 min Winter	1.318	0.0	400.0	5792

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Winter	9.847	0.197	0.0	1.0	1.0	138.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	1.204	0.0	420.0	6648

©1982-2020 Innovyze

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 331692 346291 SJ 31692 46291
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.240

Time (mins) From:	To:	Area (ha)
0	1	0.240

©1982-2020 Innovyze

Model Details

Storage is Online Cover Level (m) 10.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000
Membrane Percolation (mm/hr)	1000
Max Percolation (l/s)	666.7
Safety Factor	2.0
Porosity	0.30
Invert Level (m)	9.650
Width (m)	32.0
Length (m)	75.0
Slope (1:X)	10000.0
Depression Storage (mm)	5
Evaporation (mm/day)	3
Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0056-1000-0350-1000
Design Head (m)	0.350
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	56
Invert Level (m)	9.645
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.350	1.0
Flush-Flo™	0.101	1.0
Kick-Flo®	0.244	0.9
Mean Flow over Head Range	-	0.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	0.500	1.2	1.200	1.7
0.200	0.9	0.600	1.3	1.400	1.9
0.300	0.9	0.800	1.4	1.600	2.0
0.400	1.1	1.000	1.6	1.800	2.1

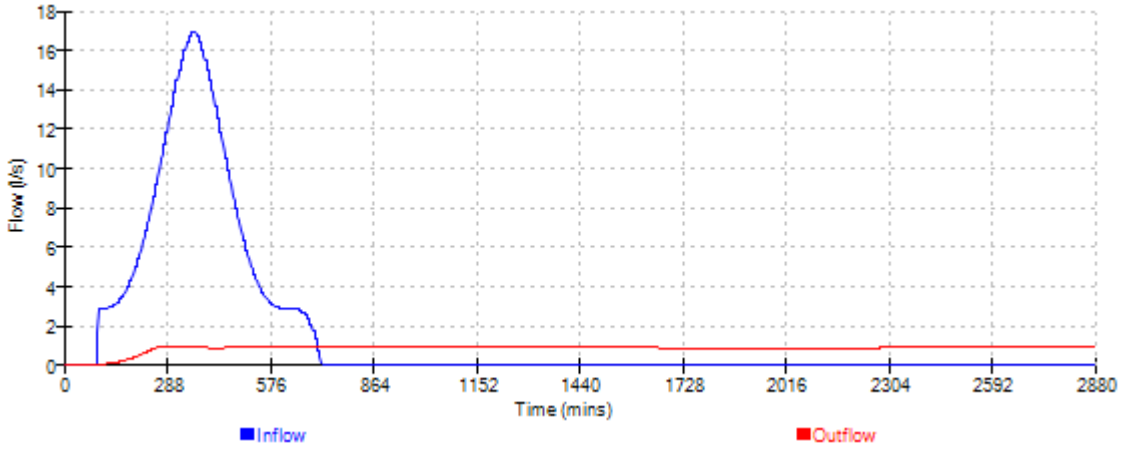
©1982-2020 Innovyze

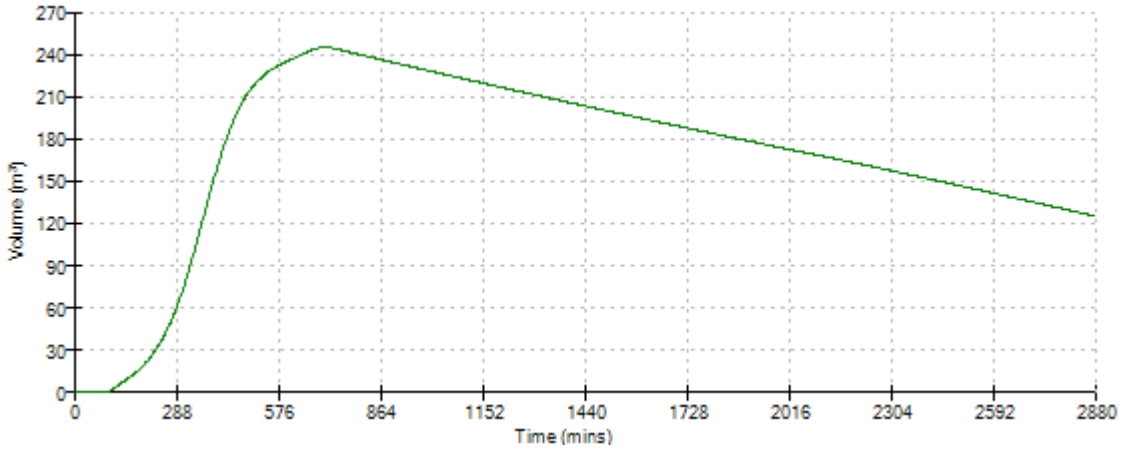
Hydro-Brake® Optimum Outflow Control

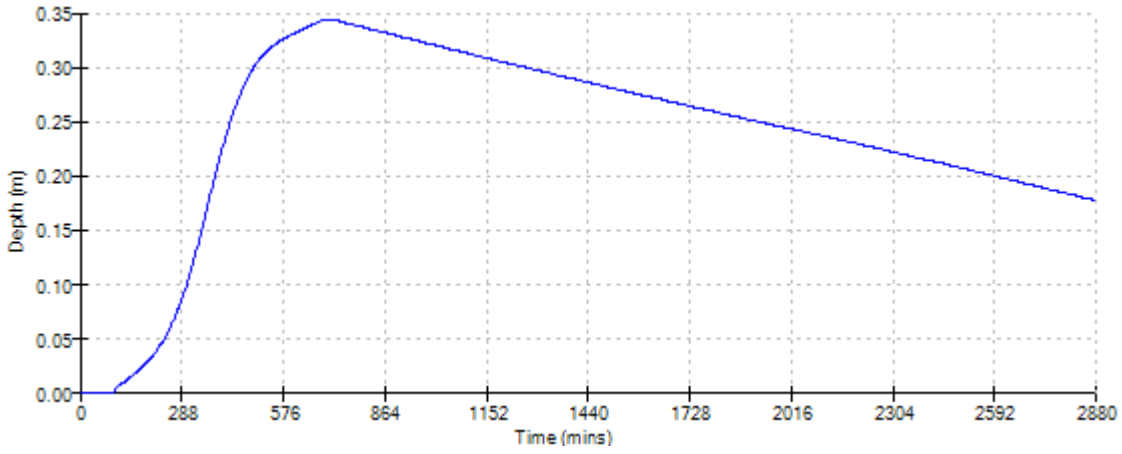
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.000	2.2	4.000	3.0	7.000	4.0
2.200	2.3	4.500	3.2	7.500	4.1
2.400	2.4	5.000	3.4	8.000	4.3
2.600	2.5	5.500	3.6	8.500	4.4
3.000	2.6	6.000	3.7	9.000	4.5
3.500	2.8	6.500	3.9	9.500	4.7

©1982-2020 Innovyze

Event: 720 min Winter

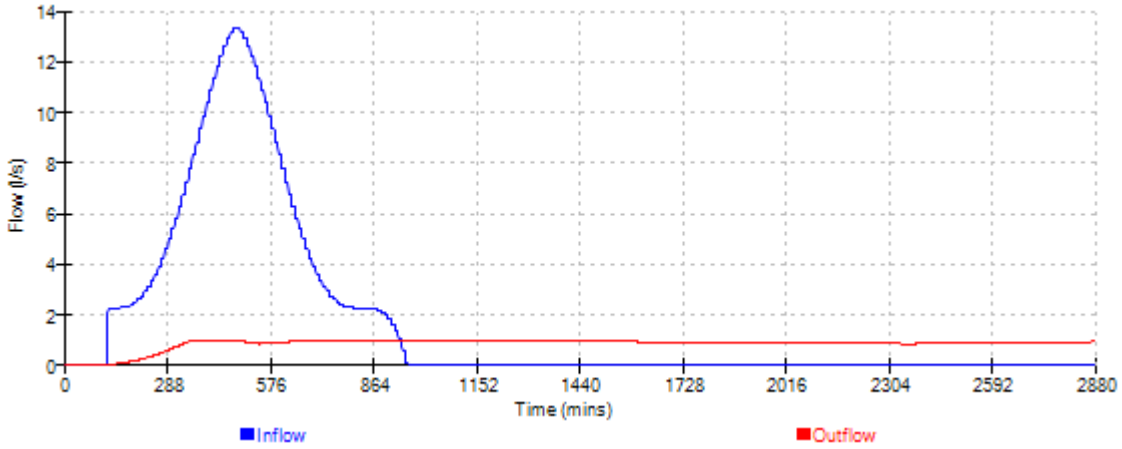


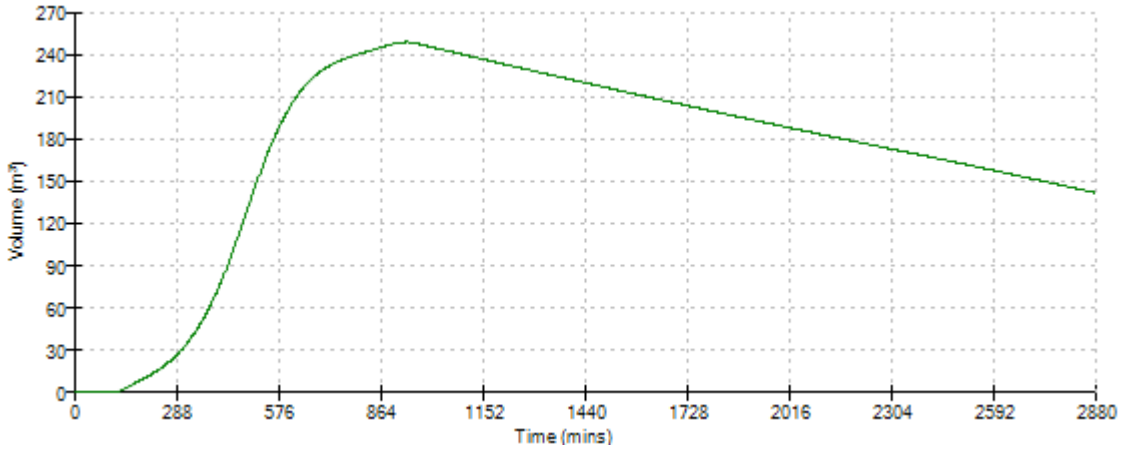


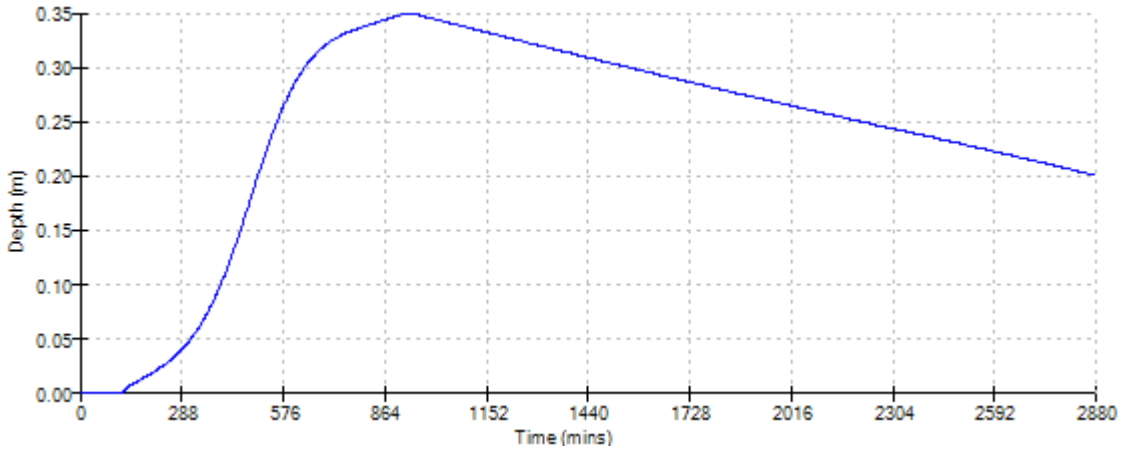


©1982-2020 Innovyze

Event: 960 min Winter

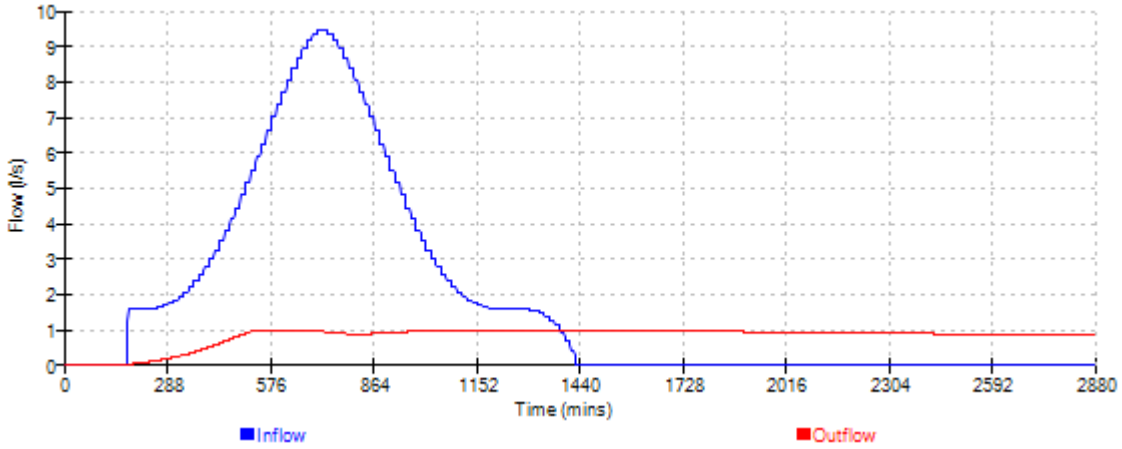


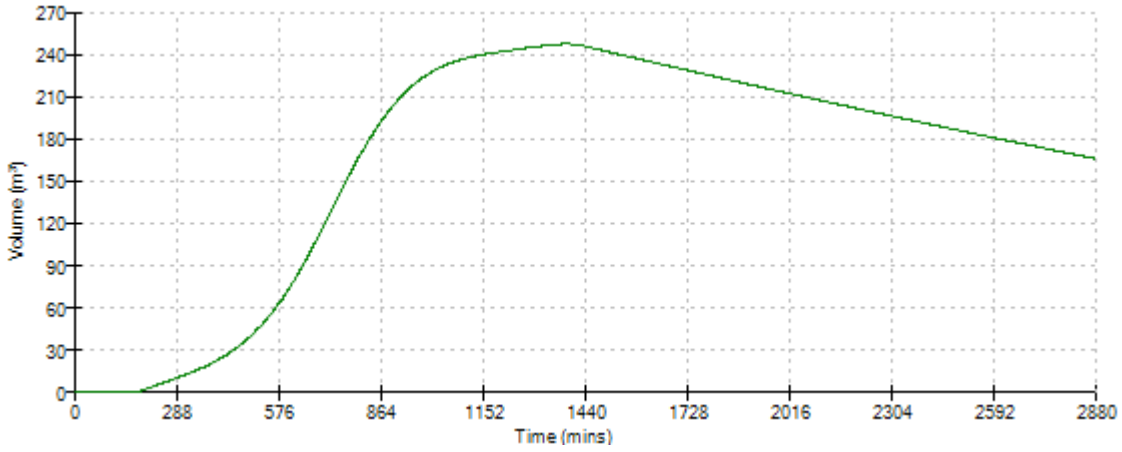


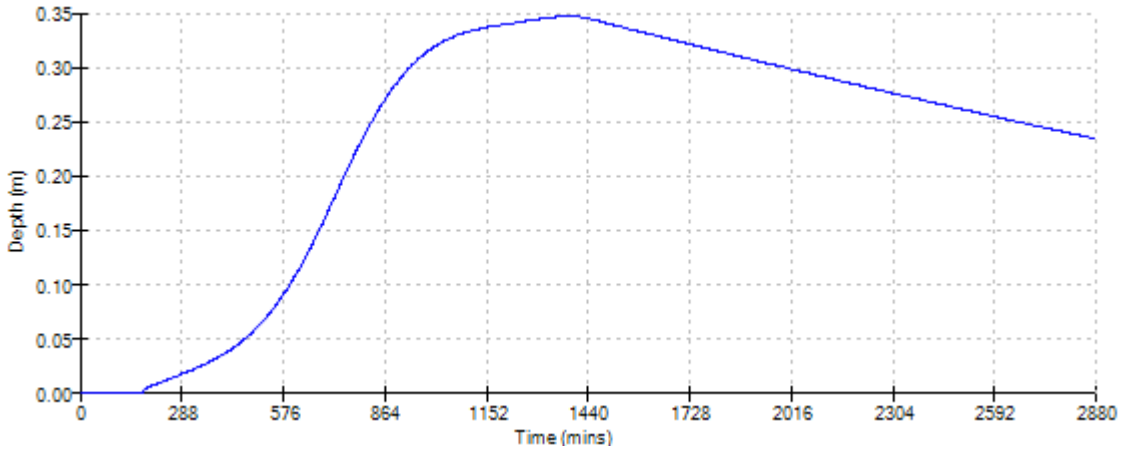


©1982-2020 Innovyze

Event: 1440 min Winter







©1982-2020 Innovyze

Appendix J Concept Drainage Sketches



Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of the 'Typical Fixed Design (Rev 08B)' by 'RWE'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Site boundary
- Flow Control Chamber
- Surface Water Drain
- Permeable stone surfacing
- Inspection Chamber
- Ground Levels (m AOD)
- Watercourses

CLIENT: Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME: Legacy Farm Solar DNS

PLOT TITLE: Concept Drainage Sketch- Central Array Area

PLOT STATUS:	DATE:
SKETCH	14-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:1800

PLOT NAME:	REVISION:
14825_Concept_Drainage_Sketch	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)

Woodlands Cottage

Discharge to ditch (ordinary watercourse) which flows east

Pipe required to cross beneath existing highway

Stone sub-grade with a depth of 200mm and a void ratio of 30%, sufficient to provide the 14m³ of storage required to accommodate the 1 in 100 year plus 40% CC event.

88.67
86.18
83.97
83.91
80.91
84.16
81.84
80.08
79.45
78.24
78.13
75.13
73.50
72.00
70.37
67.16

B5426

0 50 100 150 200 250 m

Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of the 'Typical Fixed Design (Rev 08B)' by 'RWE'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Site boundary
- Flow Control Chamber
- Surface Water Drain
- Permeable stone surfacing
- Inspection Chamber
- Ground Levels (m AOD)
- Watercourses

CLIENT: Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME: Legacy Farm Solar DNS

PLOT TITLE: Concept Drainage Sketch- Central Array Area

PLOT STATUS:	DATE:
SKETCH	14-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:2200

PLOT NAME:	REVISION:
14825_Concept_Drainage_Sketch	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)



Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of the 'Typical Fixed Design (Rev 08B)' by 'RWE'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Site boundary
- Flow Control Chamber
- Surface Water Drain
- Permeable stone surfacing
- Inspection Chamber
- Ground Levels (m AOD)
- Watercourses

CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Legacy Farm Solar DNS

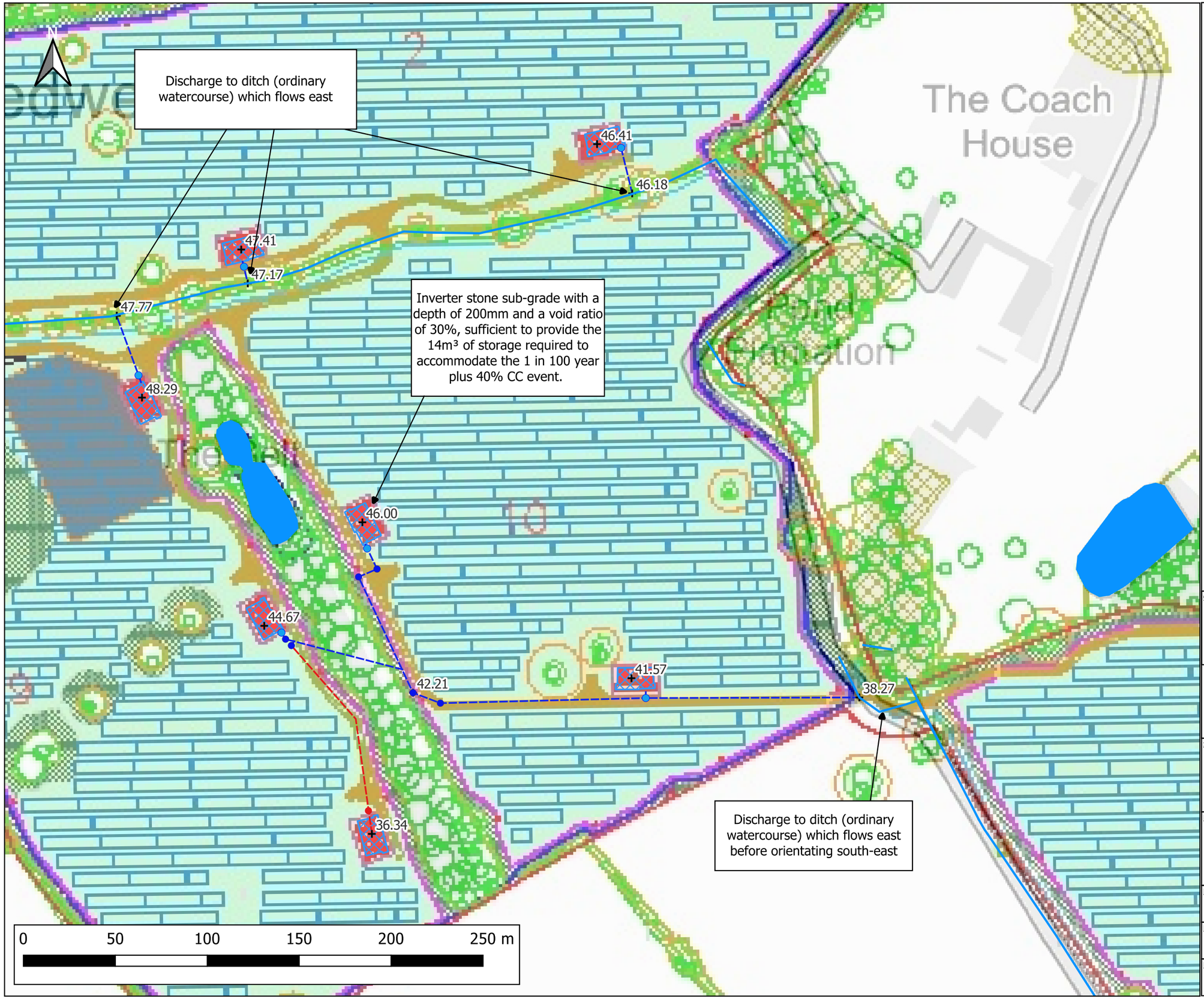
PLOT TITLE:
Concept Drainage Sketch- Central Array Area

PLOT STATUS:	DATE:
SKETCH	14-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:1000

PLOT NAME:	REVISION:
14825_Concept_Drainage_Sketch	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)



Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of the 'Typical Fixed Design (Rev 08B)' by 'RWE'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Site boundary
- Flow Control Chamber
- Rising Main
- Surface Water Drain
- Rising Main
- Permeable stone surfacing
- Inspection Chamber
- Ground Levels (m AOD)
- Watercourses

CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Legacy Farm Solar DNS

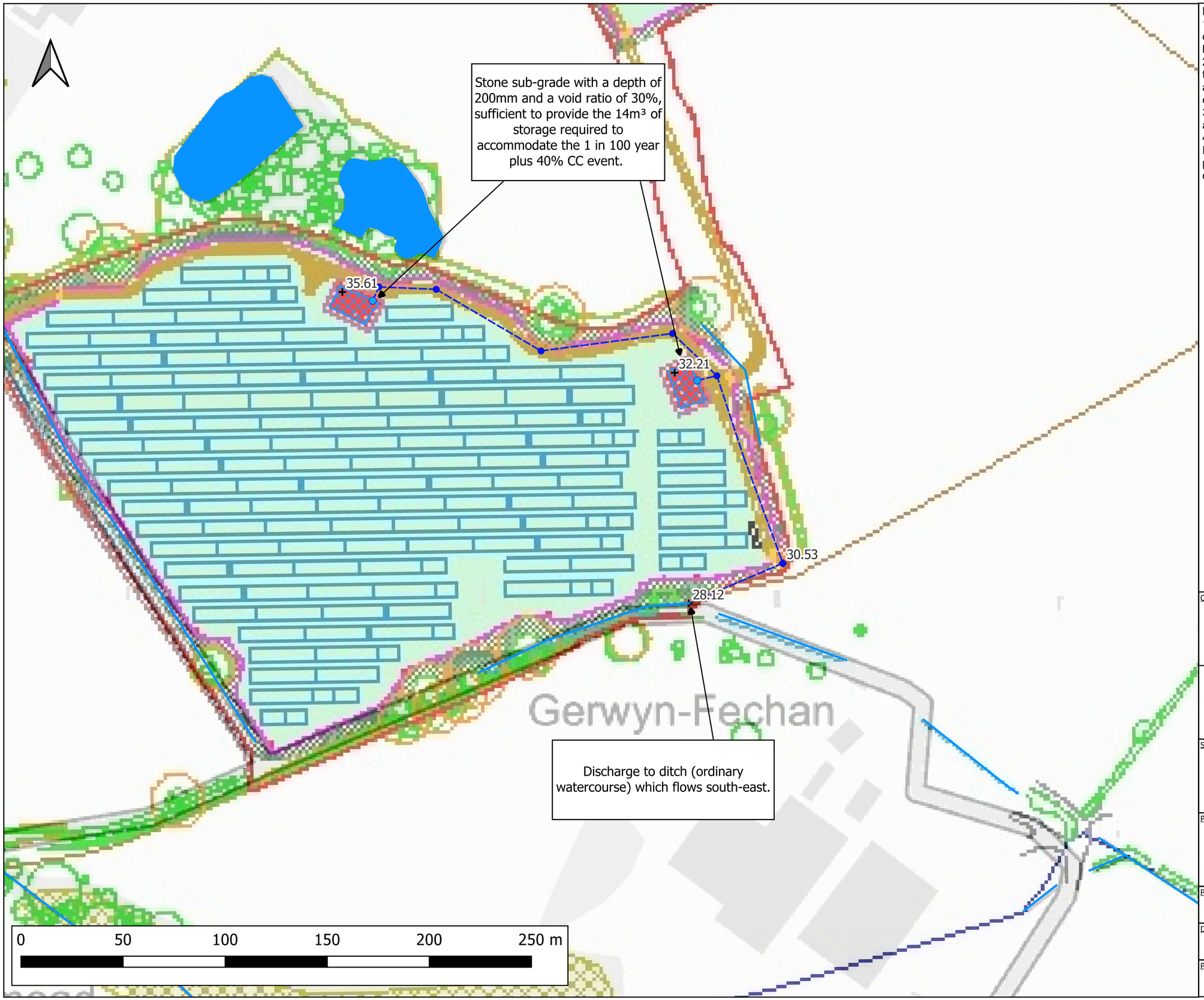
PLOT TITLE:
Concept Drainage Sketch- Eastern Array Area

PLOT STATUS:	DATE:
SKETCH	14-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:2000

PLOT NAME:	REVISION:
14825_Concept_Drainage_Sketch	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)



Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of the 'Typical Fixed Design (Rev 08B)' by 'RWE'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Site boundary
- Flow Control Chamber
- Surface Water Drain
- Permeable stone surfacing
- Inspection Chamber
- Ground Levels (m AOD)
- Watercourses

CLIENT:
Axis P.E.D Ltd

Waterco
www.waterco.co.uk

SCHEME:
Legacy Farm Solar DNS

PLOT TITLE:
Concept Drainage Sketch- Eastern Array Area

PLOT STATUS:			DATE:
SKETCH			14-08-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:1800

PLOT NAME:	REVISION:
14825_Concept_Drainage_Sketch	-

CONTAINS OS DATA © CROWN COPYRIGHT (2025)

Discharge to wetland despression which has hydrological connectivity to ditch (ordinary watercourse) downstream

92.04

94.14

Stone sub-grade with a depth of 200mm and a void ratio of 30%, sufficient to provide the 14m³ of storage required to accommodate the 1 in 100 year plus 40% CC event.

95.11

97.51

Discharge to the ditch flowing east through centre of site to merge with Black Brook

90.43

91.49

91.80

Discharge to the ditch flowing east through centre of site to merge with Black Brook

94.01

95.65

95.63

Stone sub-grade with a depth of 350mm and a void ratio of 30%, sufficient to provide the 249m³ of storage required to accommodate the 1 in 100 year plus 40% CC event.

94.69

0 50 100 150 200 250 m

CONTAINS OS DATA © CROWN COPYRIGHT (2025)

Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of the 'Typical Fixed Design (Rev 08B)' by 'RWE'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Site boundary
- Flow Control Chamber
- Surface Water Drain
- Permeable stone surfacing
- Inspection Chamber
- Ground Levels (m AOD)
- Watercourse

CLIENT:
Axis P.E.D Ltd

waterco
www.waterco.co.uk

SCHEME:
Butterfly Farm Solar DNS

PLOT TITLE:
Concept Drainage Sketch - Western Array Area

PLOT STATUS:			DATE:
SKETCH			14-08-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	NJ	1:2000

PLOT NAME:	REVISION:
14825_Concept_Drainage_Sketch	-

Appendix K Maintenance Schedule

Operation and Maintenance Requirements for Permeable Paving

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and move contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level or the paving	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and / or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Ref. Table 20.15, CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Appendix L Concept Designers Risk Assessment

CONCEPT DESIGNER'S RISK ASSESSMENT

Project:	Butterfly Farm Solar DNS	**Project No:**	14825
Client:	Axis P.E.D Ltd		
Report Reference:	14825 - FRA & Drainage Strategy-04		

Prepared by:	Megan Williams	**Date:**	13/03/2025
Checked by:	Aled Williams	**Date:**	14/03/2025
Reviewed by:	Nigel Jones	**Date:**	14/03/2025

Requirement:

The Construction (Design and Management) Regulations 2015 (CDM 2015) place an obligation on the Designer to take all reasonable steps to provide, with the design, sufficient information about the design, construction or maintenance of the structure, to adequately assist the client, other designers and contractors to comply with their duties under CDM. The Designer has undertaken this assessment to identify any extra-ordinary risks, or those that would not be expected on this particular project by an experienced and competent Contractor. The aim is to avoid needless paperwork and bureaucracy and ensure the assessment is project specific, relevant and proportionate to the risk.

DRA Summary

Each of the following risk areas has been considered using the question below. Is a risk present which is considered to be **extra-ordinary or unexpected** in this instance?

If **YES** - A detailed risk assessment is required at design stage
If **UNKNOWN** - Insufficient information has been provided at concept design stage and the risks are unknown. Further consideration must be given at design stage(s)
If **NO** - No further action is required.

Hazard Ref.	Risk Areas	YES, UNKNOWN or NO	Comments
1	Ground Conditions	Unknown	Agricultural land. To be confiremed at detailed design stage
2	Hazardous Environment	Unknown	To be confirmed at detailed design stage
3	Existing Working Environment	Unknown	The site is currently undeveloped. Further consideration required at detailed design stage
4	Existing Services	Yes	There is a 675mm public combined sewer crossing the Western Array Area flowing north-east. There is also a 110mm foul rising main and a 300mm foul gravity sewer connecting into the combined sewer. Other services to be confirmed at detailed design stage
5	Proximity to Other Structure(s)	Unknown	To be confirmed at detailed design stage
6	Near Waterbody / flood risk	Yes	Site is intersected by ditches
7	Proximity to Other Activities	Unknown	To be determined at detail design stage
8	Sequence of Construction	Unknown	To be determined at detail design stage
9	Access	Yes	Access provided from B-roads.Type of plant used should be considered at detailed design stage
10	Interfaces	Unknown	Undeveloped agricultural land. Further consideration requried at detail design stage
11	Confined Space Working	Unknown	To be determined at detail design stage
12	Maintenance Considerations	Unknown	Maintenance of drainage features required
13	Working at Height	Unknown	To be determined at detail design stage
14	Steep Slopes	No	Refer to LiDAR and topographical survey for further details
15	Demolition / Refurbishment / Repair	Unknown	To be determined at detail design stage
16	Welfare	Unknown	To be considered at detail design stage
17	Occupational Health	Unknown	To be considered at detail design stage
18	Environmental Issues	Unknown	To be considered at detail design stage
19	Other Significant Hazards not Identified Above	Unknown	To be considered at detail design stage
20	Residual Risk to Future Users	Unknown	To be considered at detail design stage