coopers

chartered consulting engineers

Our ref: 8007_FCA

Flood Consequences Assessment and Drainage Strategy

for

Midnant Farm, Gronant Road

Prestatyn

Denbighshire

For : Castle Green Homes Ltd
Unit 20, St Asaph Business Park
St Asaph
Denbighshire
LL17 0LJ

25 November 2022

Park House, Sandpiper Court,
Chester Business Park,
Chester, CH4 9QU

COOPERS is the trading name of Coopers (Chester) Limited.
Company registered in England & Wales.
Company number 09730429.

tel: 01244 684 910
web: www.coopers.co.uk
email: admin@coopers.co.uk

Document Verification

Project Title	Midnant Farm, Gronant Road, Prestatyn, Denbighshire
Project Number	8007
Document Title	Flood Consequences Assessment and Drainage Strategy
Document Number	8007_FCA_Issue 1
This document is not to be used for contractual or engineering purposes unless the document verification sheet is signed where indicated by the approver of the document.	

Prepared by

A Jones

Senior Infrastructure Engineer

Checked and Approved

P R Sykes

BSc (Hons), MSc (Eng), CGeol, FGS

THE GEOLOGICAL SOCIETY
CGeol
CHARTERED GEOLOGIST
Fellow No. 17046

Document Revision

Report Reference	Date	Description	Prepared	Checked and Approved
8007_FCA Issue 1	25/11//2022	Flood Consequences Assessment	A Jones	P R Sykes

This report has been prepared for and on behalf of our client, in accordance with the terms and conditions of the appointment agreement with Coopers. Other than where specifically allowed for in the said appointment agreement, any other party using this report for any purpose whatsoever does so at their own risk and any duty of care to that party is specifically excluded.

Contents

Figures

List of Appendices

1.0 Introduction

Coopers (Chester) Ltd, (Coopers) have been appointed by Castle Green Homes Ltd to assess the risk of flooding and to provide a Drainage Strategy for Midnant Farm located off Gronant Road, Presatyn. Castle Green Homes Ltd are proposing a new housing development, comprising of approximately 45 No. dwellings.

Castle Green Homes Ltd are planning the construction of a mixture of semi-detached and detached residential properties with associated access road, parking, vehicular access and landscaping subject to conditions. It is understood the site does not currently benefit from any planning decision.

This flood consequences assessment (FCA) evaluates the proposals with regard to flood risk, identifying and appraising potential flood risk both to and from the whole site. Coopers have carried out the following:

i. Assessment of the development potential of the site in line with the Welsh Government's Technical Advice Note 15: Development and Flood Risk (TAN15) and;
ii. An assessment of surface water runoff and drainage strategy

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 No. properties or the construction area is more than $100m^2$. The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SUDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

2.0 Site Characteristics

2.1 Site Location

The site is a parcel of agricultural land in Prestatyn. The site is situated off Gronant Road at approximate grid reference SJ077831.

Figure 1 – Site Location

2.2 Site Description

The site covers an area of 1.45 Hectares and consists of a farmhouse with associated barns, outbuildings, and hard standings.

The topography of site falls in a northerly directly and levels vary from a highpoint of 29.8m AOD at the southern end of the side along Gronant Road and a low point of 15.5m AOD to the northern end of the site. Refer to topographical survey in Appendix 1.

3.0 Sources of Flood Risk Information

3.1 The Welsh Government Development Advice Map

The Welsh Government Development Advice Map shows the site is located within Flood Zone A – an area considered to be at little or no risk of fluvial or tidal flooding, with a less than 1 in 1000 (0.1%) annual probability of flooding in any given year.

The proposed residential development is considered to be 'highly vulnerable' development in accordance with Figure 2 of the Welsh Governments Technical Advice Note 15. Highly vulnerable development is considered to be appropriate within Flood Zone A.

3.2 Natural Resources Wales

The NRW Flood Map shows the site is located within Flood Zone 1 – an area considered to have the lowest probability of fluvial flooding. It is assessed as having a less than 0.1% annual probability of flooding in any given year.

It should be noted that the Flood Map only covers flooding from rivers and the sea. Flooding can occur at any time and in any place from sources such as rising groundwater levels, burst water mains, blocked road drains, run-off from hillsides, sewer overflows, etc.

Figure 2 – Natural Resources Wales Flood Map for Planning (Rivers)

The site is located approximately 1.2km from the coastline. The nearest major watercourse is the Prestatyn Gutter which is located approximately 730m north of the site. The Prestatyn Gutter flows north-east in this location to its discharge to the sea. Other watercourses in the area include an unnamed drain located approximately 320m northeast of the site.

Figure 3 – Natural Resources Wales Flood Map for Planning (Sea)

The Natural Resources Wales long term flood risk maps indicate the site has a low risk of flooding from Surface Water.

Figure 4 – Natural Resources Wales Surface Water Flooding Map

3.3 Denbighshire LLFA

The Denbighshire Council Local Flood Risk Management Strategy (June 2014) contains no records of any flooding at or near to the site. We have contacted Denbighshire Council for confirmation of any known historical flooding within the vicinity of the site and are currently waiting for a response.

4.0 Sources of Flood Risk

4.1 Fluvial

Extreme fluvial flood events have the potential to cause rapid inundation of the site whilst posing a threat to welfare and users. As outlined in Section 3.2; the site is within Flood Zone 1 and is therefore not at risk from extreme fluvial or tidal flooding. Therefore, the risk from extreme fluvial flooding to the site is considered to be low.

4.2 Infrastructure Failure (Existing and Proposed)

The failure of infrastructure such as culverts or bridges could increase the risk of flooding at the site. The risk of flooding is considered as very low.

4.3 Overland Flow

Overland flow occurs when the infiltration capacity of the ground is exceeded in a storm event. This can result in water travelling as a sheet flow overland or excess water being conveyed from location to another via local road networks. Due to the topography of the site sloping to the northern end of the site overland flow from within the site is not considered a significant risk. Overland flows from the site will be significantly reduced post development with the incorporation of positive drainage and an internal road network.

We have reviewed the surrounding topography and drainage infrastructure for the surrounding area and note there is potential for overland flows entering the site from higher ground from the south. This includes Gronant Road which does not appear to have any obvious highway drainage.

Further investigation on Gronant Road existing drainage should be undertaken and if necessary new drainage for Gronanat Road will need to be incorporated into the design to reduce the potential of overland flows from off-site sources post development.

4.4 Sewer Flooding

If the capacity of the sewers is exceeded in an extreme event, or a blockage occurs, surcharging of the network can result in surface flooding. Welsh Water sewer plans which are included in Appendix 2, indicate that there are currently no existing adopted sewers located within the site boundary.

Welsh Water may have confirmed they have no records or any known flooding within the vicinity of the site. Refer to Appendix 5 for correspondence.

The overall risk from sewer flooding is considered as low.

4.5 Groundwater Flooding

Groundwater flooding occurs as a result of water rising up from the underlying superficial deposits, bedrock or from springs. Shallow groundwater can exacerbate the impact of other sources of flooding such as pluvial flooding, increasing the likelihood of overland flow or standing water expected to occur in the naturally low-lying areas within the site

The groundwater flooding susceptibility is categorised as potential for ground water flooding on the BGS Flood Data Map but is shown to be at Negligible Risk on the GeoSmart Information Groundwater Flood Risk Map. Refer to Appendix 3 for Envirocheck Flood Data

The overall risk from groundwater flooding is considered as low.

4.6 Coastal Flooding

The site is not located in proximity of any tidal waterway or within close proximity to the sea and is therefore not at risk from tidal inundation.

4.7 Reservoirs

The site is not located in proximity of any reservoirs. Additionally, the NRW maps indicate the site is not at risk of flooding from reservoirs.

5.0 Surface Water Drainage

5.1 General

The design for a surface water drainage system for the proposed development will be guided by the principles set out in the Welsh Government's 'Recommended non-statutory standards for sustainable drainage (SUDS) in Wales – designing, constructing, operating and maintaining surface water drainage systems' (2017)

The SUDS Standards Wales sets out the following hierarchy for surface water runoff destination:

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.

Note that Priority Level 1 is the preferred (highest priority) and that 4 and 5 should only be used in exceptional circumstances.

5.2 Existing Surface Water Drainage

We have not been able to confirm how the site currently disposes of surface water flows. We can confirm the existing buildings have rainwater pipes taking roof run-off into the ground via pipework but its unclear whether these discharge to soakaways or a piped network takes flows off-site. This will need to be confirmed via drainage surveys when the client has been permitted site access.

The utilities survey has identified a possible culvert crossing the site from east to west at a depth of 1.3m. This would potentially allow for gravity connections from all existing building roof run-off but will need confirming via drainage surveys. If this is found to be a culvert the off-site route and outfall should also be investigated before we can consider any possible re-use and liaise with relevant asset owners.

5.3 Existing Site Runoff

The greenfield run-off rates for the site has been calculated using the HR Wallingford Greenfield runoff rate estimation tool.

QBAR = **7.2 l/s** (assuming clay site – soil type 4)

Refer to Appendix 7 for calculations.

We have also calculated the existing brownfield flow rates for the site based on the existing roof measures areas. This provided much higher flow rates but will only be relevant if the drainage survey confirms all roof drainage is connected to a piped network which takes flows off-site.

Using the Modified Rational Method as described by the Wallingford Procedure:

$$Qp = C\,i\,A$$

Qp = runoff (litres /second)
C = runoff coefficient
i = intensity
A = Area

If the units are as follows, then the equation becomes *Qp = 2.78C i A;*

i = mm/hr
A = hectares

Runoff coefficient C = Cv Cr, as standard values of 0.75 and 1.30 are used for Cv and Cr respectively.

Qp = 3.61Cv i A
= 2.71 i A

Existing Roof Area 'A' is measured at 0.2ha.

Rainfall intensity 'i,' has been calculated for different storm events:

1-year = 25.8 mm/hr
30-year = 63.1 mm/hr
100-year = 81.4 mm/hr

Therefore, *Qp for the different return period is as follows:*

1-year = 2.71 x 25.8 x 0.20 = **13.98 l/s**
30-year = 2.71 x 63.1 x 0.20 = **34.20 l/s**
100-year = 2.71 x 81.4 x 0.20 = **44.12 l/s**

5.4 Proposed Surface Water Drainage and Runoff Rates

Priority Level 1

Whilst rainwater harvesting has been considered for the proposed development it should be noted that any device enabling water re-use cannot be taken into account when sizing attenuation as the storage facility may be full when a storm event occurs. Therefore, an overflow to an infiltration device (where ground conditions allow) or to a watercourse / sewer will be required.

Castle Green Ltd are not proposing to incorporate rainwater harvesting within the development; however, they are proposing to install a water butt to each dwelling which will allow for water collection for garden re-use.

Priority Level 2

No site investigation has been undertaken in advance of this report being written as the client has been unable to access the site. We have reviewed the available geology data which is presented in Appendix 4. There does look like the site can potentially drain via infiltration into underlying sands /

gravels, but this will need to be confirmed during intrusive site investigation and infiltration tests within the site.

Even if slow rates of infiltration are confirmed whilst this will not be good enough to drain the site during a 100-year storm event they will potentially provide for slow infiltration SUDS components to deal with low flow events and provide for 5mm interception. Permeable paving (partial infiltration) and bioretention components such as tree pits and raingardens can be considered appropriate.

Priority Level 3

The site is located approximately 1.2km from the coastline. The nearest major watercourse is the Prestatyn Gutter which is located approximately 730m north of the site. The Prestatyn Gutter flows north-east in this location to its discharge to the sea. Other watercourses in the area include an unnamed drain located approximately 320m northeast of the site on the northern side of Prestatyn Road

We have no level information on this watercourse, so we are unable to confirm if a gravity connection into this watercourse is achievable. This is also within third party land so consent would be required by the landowner.

Priority Level 4

A review of the Welsh Water sewer maps indicates an existing 150mm Dia surface water sewer in Rhodfa Celyn located to the west of the site. This flows north and discharges into a larger 225mm Dia surface water sewer at the junction of Nant Drive and Prestatyn Road.

Welsh Water may accept restricted flows into one of these assets but would first request a full evidence-based report exploring all other higher priority destinations (reuse, infiltration, watercourses) for their consideration.

For the purpose of this drainage strategy we are proposing a discharge into the 225mm Dia surface water sewer at the junction of Nant Drive and Prestatyn Road. Flows will be restricted to greenfield QBAR of 7.2 l/s. A full topographical and utilities survey will be required to ensure a gravity connection into this sewer is achievable.

5.5 SUDS Approval Bodies

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2No. properties or the construction area is more than 100m^2. The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SUDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

Every SUDS application should go to every attempt to satisfy the Principles and Standards of the legislation. When vetting an application, the SAB officer will look at the clear red line boundary area

of the site when considering space for SUDS and water management features and not the space that's left on the proposed site layout.

The principles are as follows:

SUDS schemes should aim to:

1. *manage water on or close to the surface and as close to the source of the runoff as possible;*
2. *treat rainfall as a valuable natural resource;*
3. *ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it;*
4. *manage rainfall to help protect people from increased flood risk, and the environment from morphological and associated ecological damage resulting from changes in flow rates, patterns and sediment movement caused by the development;*
5. *take account of likely future pressures on flood risk, the environment and water resources such as climate change and urban creep;*
6. *use the SUDS Management Train, using drainage components in series across a site to achieve a robust surface water management system (rather than using a single "end of pipe" feature, such as a pond, to serve the whole development);*
7. *maximise the delivery of benefits for amenity and biodiversity;*
8. *seek to make the best use of available land through multifunctional usage of public spaces and the public realm;*
9. *perform safely, reliably and effectively over the design life of the development taking into account the need for reasonable levels of maintenance;*
10. *avoid the need for pumping where possible; and*
11. *be affordable, taking into account both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system.*

Applicants seeking SAB Approval must demonstrate how they have complied with these principles or provide justification for any departure.

The preference is to discharge all surface water to ground via infiltration techniques such as soakaways, permeable paving and possibly an infiltration basin. However, as no site investigation has been undertaken, we have developed a surface water 'option 2' scheme with a discharge into the surface water public sewer. An indicative infiltration layout is presented in Appendix 6 (Drg No. 8007/SK02).

The surface water strategy presented in Appendix 6 (Drg No. 8007/SK03) is providing all attenuation within a SUDS basin at the end of the network with a hydro brake flow control device to restrict the flows to the greenfield QBAR rate of 7.2 l/s. This is considered to be a 'end of pipe solution' and whilst it complies with standards for quantity it provides limited compliance to other criteria such as water quality, amenity and biodiversity. Therefore, incorporation of additional source control SUDS components such as water butts, permeable paving and bio retention (tree pits and rain gardens) will need to be considered further at detailed design stage.

5.6 Foul Drainage

We are proposing to discharge all foul flows into the the 450mm Dia gravity combined public sewer in Prestatyn Road to the north of the development. This will need to be discussed with Welsh Water who may identify an alternate point of connection.

Topography and proposed site levels design will allow for a gravity network to serve the entire development without any need for a pumping station.

6.0 Conclusions and Recommendations

The site is located in Flood Zone 1 and has been shown to be at low risk of flooding from rivers, surface water, groundwater, sewers and climate change. However, there is potential of overland flows entering the site from Gronant Road at the southern end of the development. Highway drainage should be installed to intercept flows as mitigation.

All potential sources of flooding have been considered as part of this report. There are no known records of historical flooding at the site.

Further investigation on Gronant Road existing drainage should be undertaken and if necessary new drainage for Gronanat Road will need to be incorporated into the design to reduce the potential of overland flows from off-site sources post development.

Infiltration tests will need to be undertaken as part of the site investigation to determine if the underlying soils have favourable infiltration characteristics across the site for surface water flows to discharge to ground.

An ’option 2’ for disposal of surface water has been developed with a discharge into the surface water public sewer network.

The development will increase the impermeable area of the site. This results in an increase in surface water runoff rates and volumes. In order to ensure the increase in runoff will not have an impact elsewhere flow restrictions and on-site attenuation will be incorporated into the design.

All surface water run-off from highways, roof and private drives will be collected into gravity piped networks, temporarily stored in a SUDS basin and will discharge at a restricted rate into the public sewer in Prestatyn Road.

Additional on-site source control components such as permeable paving and bioretention components (tree pits and raingardens) should be considered further at detailed design stage for compliance with the 5mm interception criteria.

The provision of trapped highway gullies, the SUDS detention basin and additional source control components will provide adequate treatment to surface water flows prior to discharge to the watercourse.

All foul sewers should be designed in accordance with Sewers for Adoption 7th Edition / Welsh Ministers Standards and will be subject to S104 Agreement.

A SUDS Maintenance and Management Plan should be produced to outline the activity and frequency of inspections and maintenance works required on any SUDS components subject to SAB Approval / Adoption.

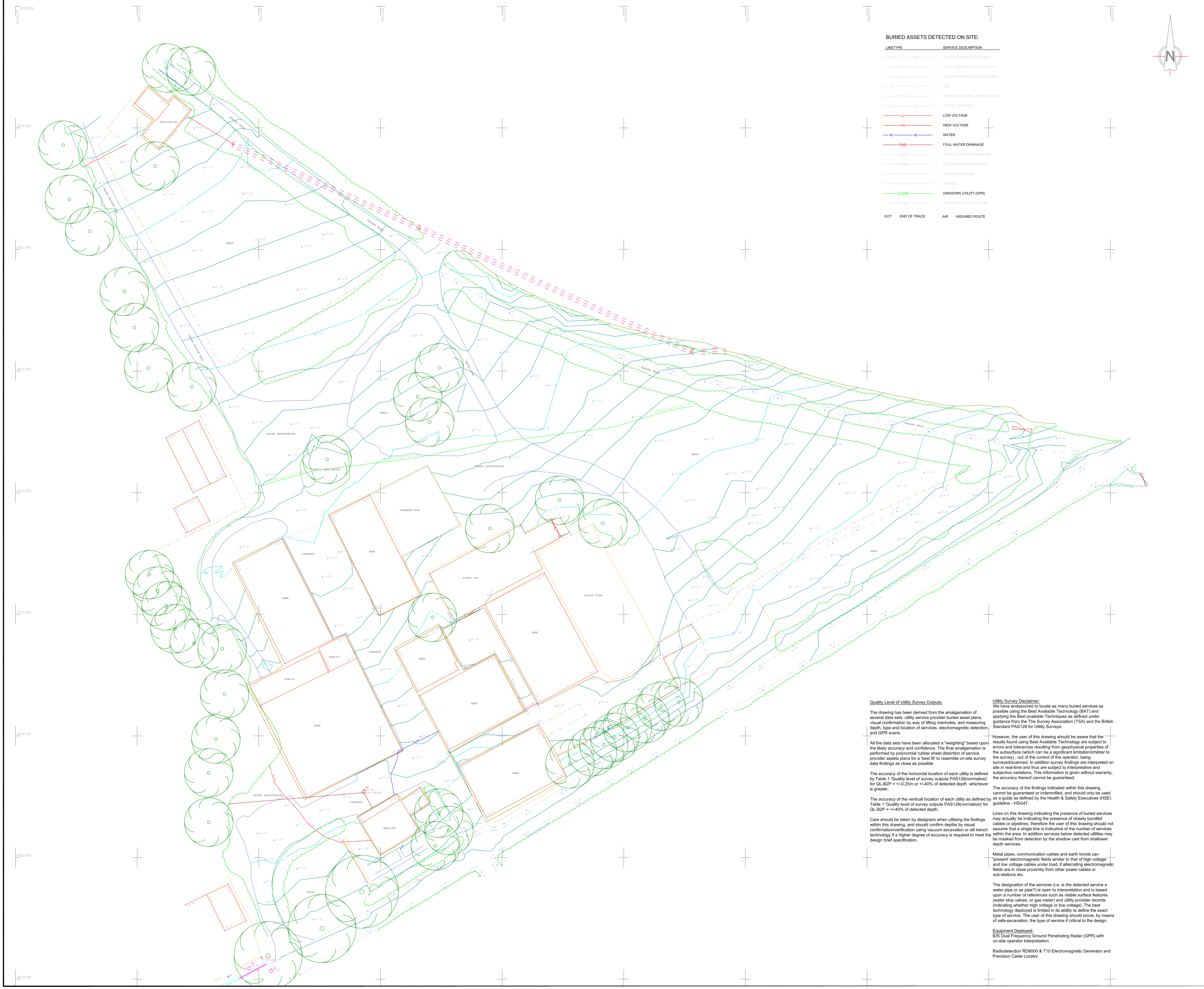
This Flood Consequences Assessment and Drainage Strategy should be submitted to the Local Planning Authority in support of the planning application.

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 No. properties or the construction area is more than $100m^2$. The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SUDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

Appendix 1

Topographical Survey



BURIED ASSETS DETECTED ON SITE:

LINETYPE	SERVICE DESCRIPTION
BT	TELECOMMUNICATIONS (BT)
CATV	TELECOMMUNICATIONS (CATV)
TELE	TELECOMMUNICATIONS (OTHER)
G	GAS
TCSU	TRAFFIC CONTROL SENSOR UNIT
SL	STREET LIGHTING
LV	LOW VOLTAGE
HV	HIGH VOLTAGE
W	WATER
FWD	FOUL WATER DRAINAGE
SWD	SURFACE WATER DRAINAGE
FWRM	FOUL WATER RISING MAIN
CS	COMBINED SEWER
OF	OIL/FUEL
U(GPR)	UNKNOWN UTILITY (GPR)
U(EML)	UNKNOWN UTILITY (RADIO)

EOT END OF TRACE   A/R ASSUMED ROUTE

Quality Level of Utility Survey Outputs:

The drawing has been derived from the amalgamation of several data sets: utility service provider buried asset plans, visual confirmation by way of lifting manholes, and measuring depth, type and location of services, electromagnetic detection, and GPR scans.

All the data sets have been allocated a "weighting" based upon the likely accuracy and confidence. The final amalgamation is performed by polynomial rubber sheet distortion of service provider assets plans for a 'best fit' to resemble on-site survey data findings as close as possible

The accuracy of the horizontal location of each utility is defined by Table 1 'Quality level of survey outputs PAS128(normative)' for QL-B2P = +/-0.25m or +/-40% of detected depth whichever is greater.

The accuracy of the verticall location of each utility as defined by Table 1 'Quality level of survey outputs PAS128(normative)' for QL-B2P = +/-40% of detected depth.

Care should be taken by designers when utilising the findings within this drawing, and should confirm depths by visual confirmation/verification using vacuum excavation or slit trench technology if a higher degree of accuracy is required to meet the design brief specification.

Utility Survey Disclaimer:

We have endeavored to locate as many buried services as possible using the Best Available Technology (BAT) and applying the Best available Techniques as defined under guidance from the The Survey Association (TSA) and the British Standard PAS128 for Utility Surveys.

However, the user of this drawing should be aware that the results found using Best Available Technology are subject to errors and tolerances resulting from geophysical properties of the subsurface (which can be a significant limitation/inhibter to the survey) , out of the control of the operator, being surveyed/scanned. In addition survey findings are interpreted on site in real-time and thus are subject to interpretative and subjective variations. This information is given without warranty, the accuracy thereof cannot be guaranteed.

The accuracy of the findings indicated within this drawing, cannot be guaranteed or indemnified, and should only be used as a guide as defined by the Health & Safety Executives (HSE) guideline - HSG47.

Lines on this drawing indicating the presence of buried services may actually be indicating the presence of closely bundled cables or pipelines, therefore the user of this drawing should not assume that a single line is indicative of the number of services within the area. In addition services below detected utilities may be masked from detection by the shadow cast from shallower depth services.

Metal pipes, communication cables and earth bonds can 'present' electromagnetic fields similar to that of high voltage and low voltage cables under load, if alternating electromagnetic fields are in close proximity from other power cables or sub-stations etc.

The designation of the services (i.e. is the detected service a water pipe or as pipe?) is open to interpretation and is based upon a number of references such as visible surface features (water stop valves, or gas meter) and utility provider records (indicating whether high voltage or low voltage). The best technology deployed is limited in its ability to define the exact type of service. The user of this drawing should prove, by means of safe-excavation, the type of service if critical to the design.

Equipment Deployed:

IDS Dual Frequency Ground Penetrating Radar (GPR) with on-site operator interpretation.

Radiodetection RD8000 & T10 Electromagnetic Generator and Precision Cable Locator.

Abbreviations/Symbols (Measured Building Surveys):

C:	Window Cill Height
H:	Window Head Height
BH:	Beam Height
DH:	Door Height
COL:	Column
SVP:	Soil Vent Pipe
FL:	Floor Level
TH:	Threshold Level
2.50	Floor to Ceiling Height
	Vaulted Ceiling

Line types

Hedge Lines
Drainage Runs
Overhead Electricity Cables
Overhead Telephone Cables

Symbols

Tree/Bush
Glass House
Control Station
Osbm
Borehole
Trial Hole

Abbreviations (Topographic Survey):

AB	AIR BRICK	OHC	OVERHEAD CABLE
AV	AIR VALVE	OS	ORDNANCE SURVEY
B	BOLLARD	OSR	OPEN STEEL RAILINGS
BB	BELISHA BEACON	P	PILE
BDY	BOUNDARY	PB	PILLAR BOX
BH	BOREHOLE	PM	PARKING METER
BL	BED LEVEL	PO	POST
BRK	BRICKWORK	PRF	POST & RAIL FENCE
BS	BUS STOP	PTM	PARKING TICKET MACHINE
BM	BENCH MARK	PWF	POST & WIRE FENCE
BW	BRICK WALL	RB	RIGHT BANK
BWF	BARBED WIRE FENCE	RE	RODDING EYE
CBF	CLOSE BOARDED FENCE	RS	ROAD SIGN
CIF	CORRUGATED IRON FENCE	RTW	RETAINING WALL
CL	COVER LEVEL	RWP	RAINWATER PIPE
CLF	CHAIN LINK FENCE	SC	STOP COCK
CONC	CONCRETE	SDP	STAND PIPE
CP	CONCRETE POST	SK	SOAKAWAY
CPF	CHESTNUT PALING FENCE	SL	SOFFIT LEVEL
CR	CYCLE RACK	SMH	SURFACE WATER MANHOLE
CTV	CABLE T.V. MANHOLE	SMP	SHEET METAL PILING
CUL	CULVERT	SP	SIGN POST
DK	DROP KERB	STN	STATION
DL	DECK LEVEL	SV	SLUICE VALVE
DP	DOWNPIPE	SVP	SOIL VENT PIPE
DPC	DAMP PROOF COURSE	SWF	SHEEP WIRE FENCE
DR	DRAIN	TBM	TEMPORARY BENCH MARK
DWB	DOG WASTE BIN	TCB/TCP	TELEPHONE BOX/POST
EA	ENVIRONMENT AGENCY	TC	TELECOM CABINET
EB	ELECTRICITY BOX	TMH	TELECOM MANHOLE
ECF	ELECTRIC CABLE FENCE	THL	THRESHOLD LEVEL
ECP	ELECTRICITY CABLE PIT	TL	TRAFFIC LIGHT
EMH	ELECTRICITY MANHOLE	TLB	TRAFFIC LIGHT BOX
EP	ELECTRICITY POLE	TP	TELEGRAPH POLE
ER	EARTHING ROD	TRS	TIMBER RUBBING STRIP
ETL	ELECT' TRANSMISSION LINE	TS	TREE STUMP
FB	FLOWER BED	TSR	TUBULAR STEEL RAILINGS
FBR	FOOTBRIDGE	VP	VENT PIPE
FH	FIRE HYDRANT	WB	WASTE BIN
FHM	FIRE HYDRANT MARKER	WL	WATER LEVEL/WATER LINE
FL	FLOOR LEVEL	WM	WATER METER
FP	FENCE POST	WMF	WIRE MESH FENCE
FWM	FOUL WATER MANHOLE	WP	WOODEN POST
G	GULLY	WPR	WOOD POST & RAIL FENCE
GL	GROUND LEVEL	WV	WATER VALVE
GP	GATE POST	YG	YARD GULLY
GM	GAS MARKER		
GV	GAS VALVE		
HW	HEAD WALL		
IC	INSPECTION CHAMBER		
IL	INVERT LEVEL		
IRF	IRON RAILING FENCE		
IWF	INTERWOVEN FENCE		
JB	JUNCTION BOX		
KIG	KERB INLET GULLY		
LB	LEFT BANK		
LFB	LIFEBUOY		
LP	LAMP POST		
MB	MOORING BOLLARD		
MF	MISCELLANEOUS FENCING		
MH	MANHOLE		
MKR	MARKER		
MP	MOORING PILE		
MRF	METAL RAILING FENCE		
MS	MILE STONE		
NB	NOTICE BOARD		

Survey Notes:

Coordinates and Levels related to Ordnance Survey Datum - GPS OSGB36 NG

Revision	Date	Description
01	06.07.22	Tree & Kerbline Added to West

Carl Williams Land Surveys Ltd
The Studio
15 Millfield
Neston
Cheshire
CH64 3TF
www.cwlandsurveys.com e:info@cwlandsurveys.com

Client

Castle Green Homes

Project

Midnant Farm, Prestatyn
Topographic & GPR Survey

Scale	Surveyed By	Date
1:250	CW	01.07.22
Drawing No.	Checked By	Date
	VW	01.07.22
B481-01	Drawn By	Date
	CW	01.07.22

Appendix 2

Welsh Water Sewer Maps

Dŵr Cymru
Welsh Water

41 Gronant Road,Prestatyn

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 S24 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

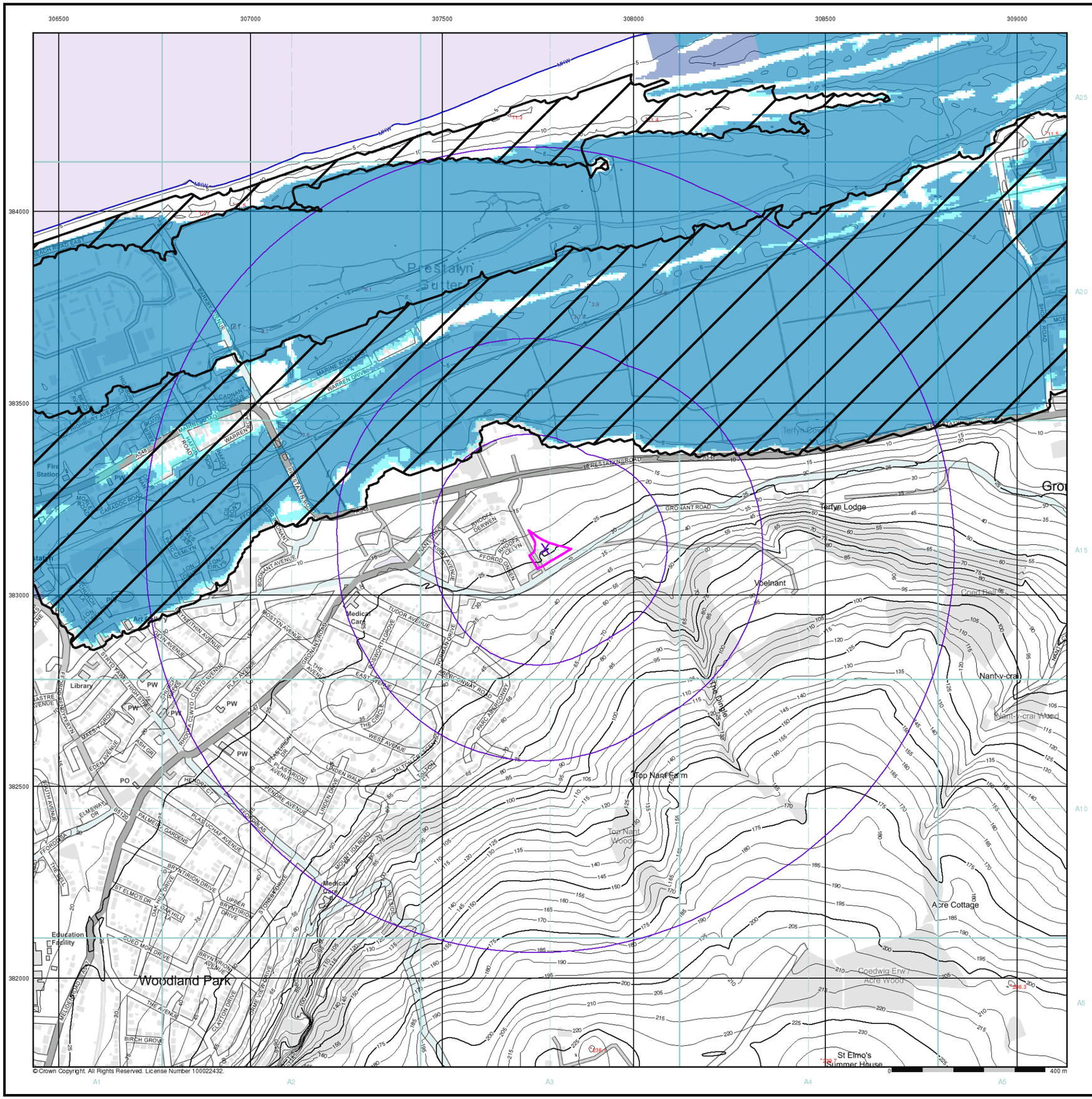
EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Map Ref:	307740,383165
Map scale:	1:1500
Printed by:	John Emma
Printed on:	25 Mar 2020

Appendix 3

Enviocheck Flood Data

Ref 8007 - Midnant Farm (24/05/2022)



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Flood Data Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Flood Data

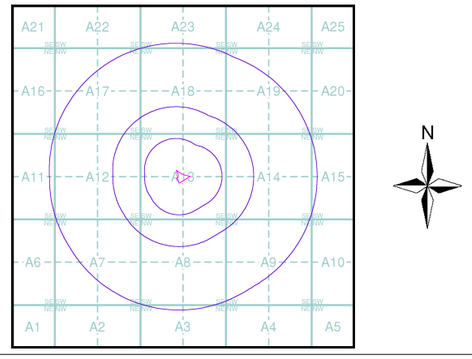
- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Contours (height in metres)

Standard Contour 105
Master Contour 100 95
Spot Height *167.8

MLW Mean Low Water
MHW Mean High Water

EA/NRW Flood Data Map - Slice A



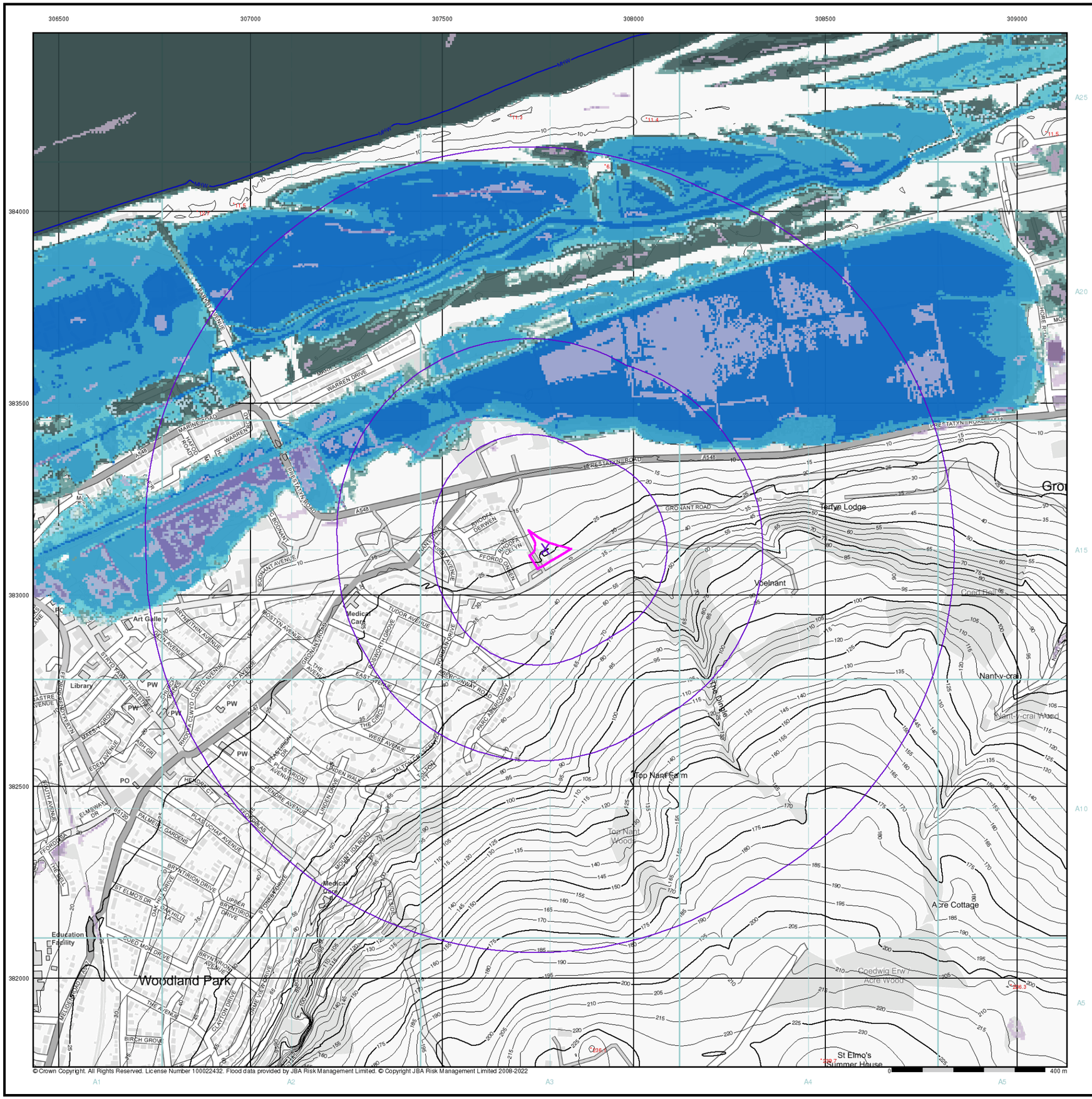
Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

JBA 75 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

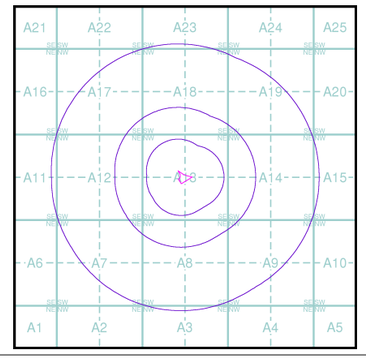
Contours (height in metres)

Standard Contour 105 100 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height 157.8

JBA 75 Year Return Flood Map (Undefended) - Slice A



Order Details

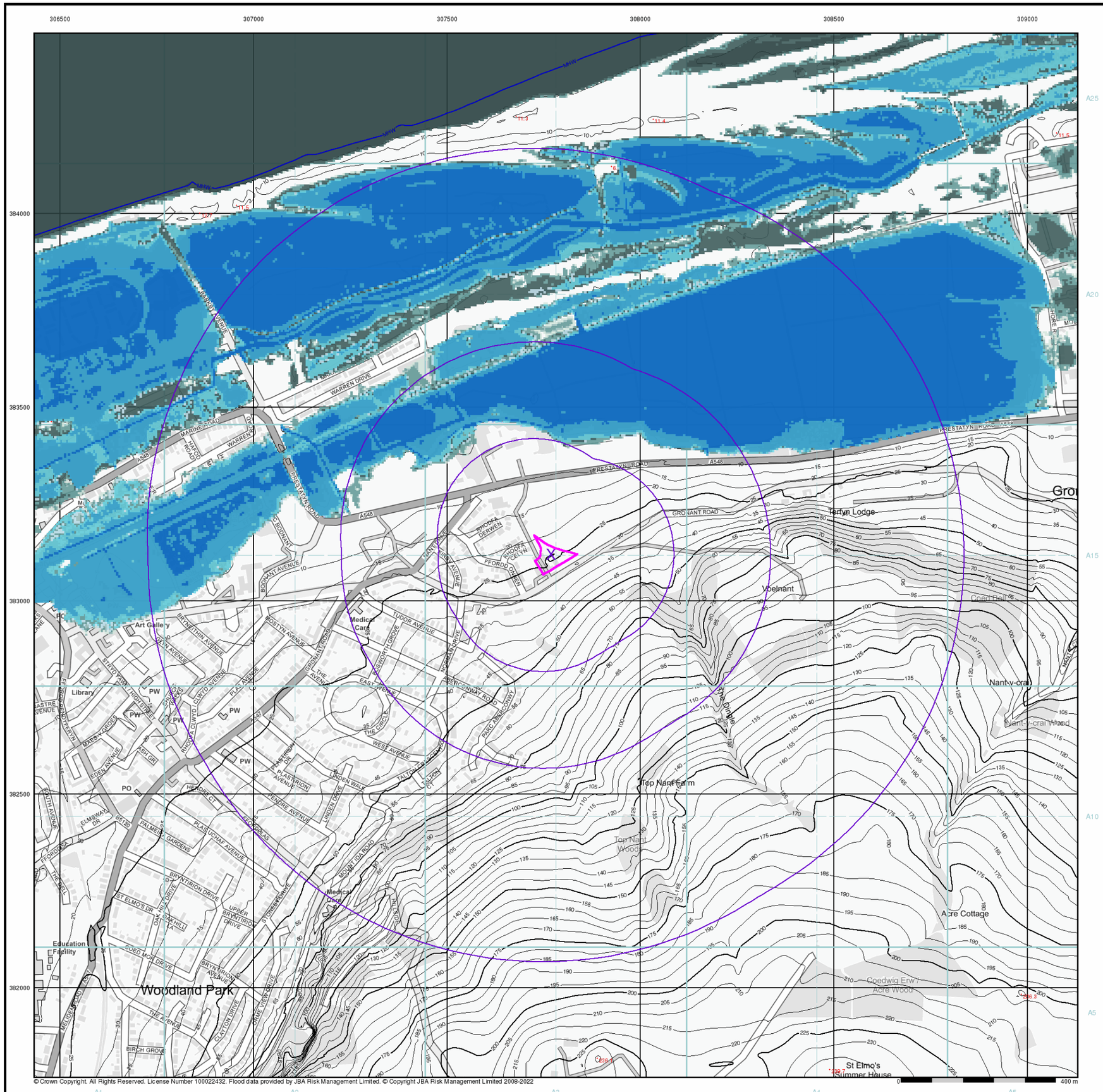
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

JBA 100 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

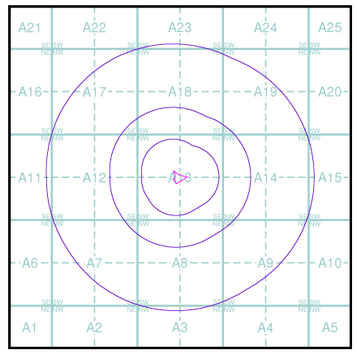
Fluvial Depth	Coastal Depth
0.01m - 0.05m	0.01m - 0.05m
0.05m - 0.1m	0.05m - 0.1m
0.1m - 0.3m	0.1m - 0.3m
0.3m - 1m	0.3m - 1m
>1m	>1m

Contours (height in metres)

Standard Contour 105
Master Contour 100 95
Spot Height 167.8

MLW Mean Low Water
MHW Mean High Water

JBA 100 Year Return Flood Map (Undefended) - Slice A



Order Details

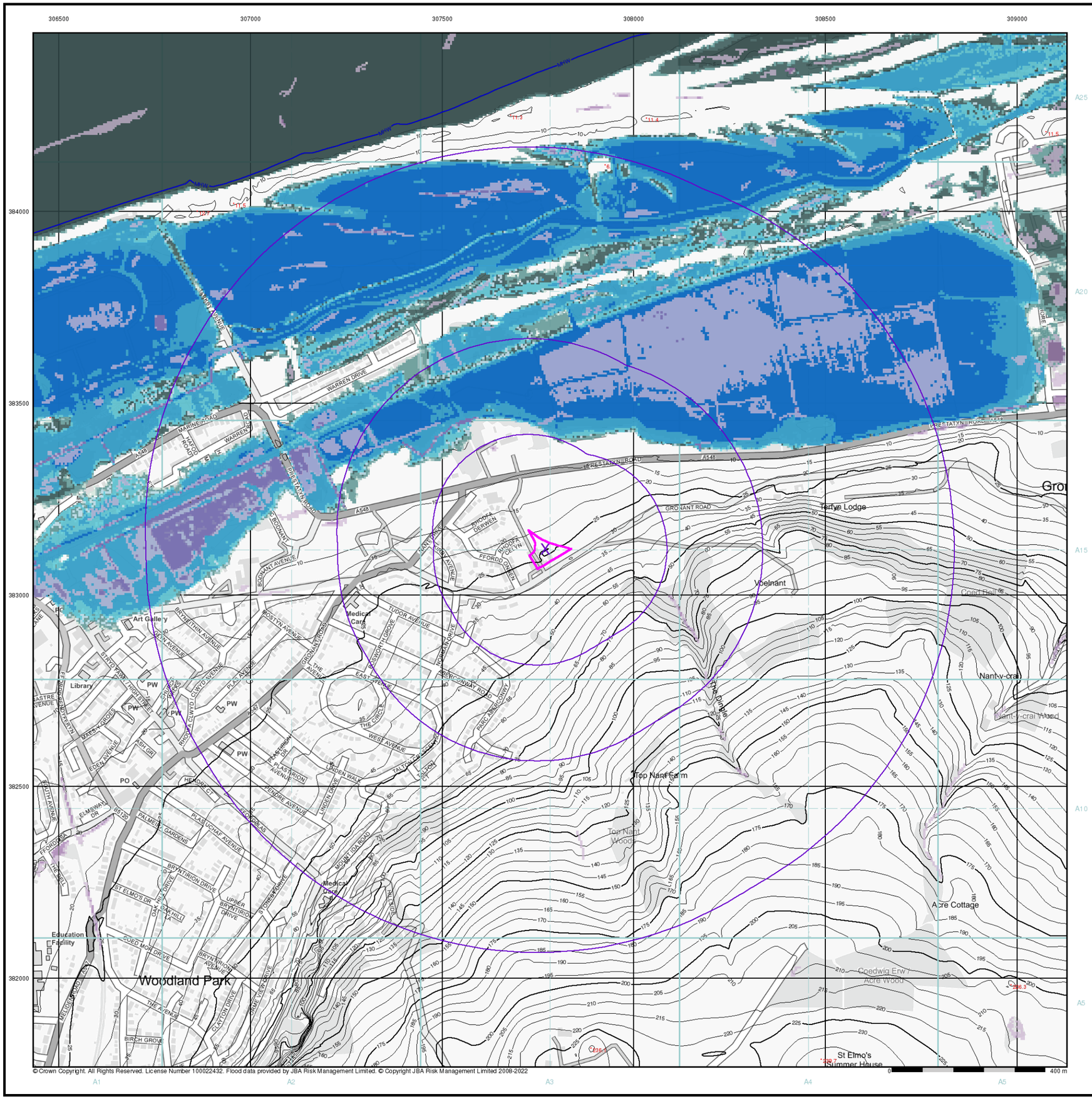
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

JBA 200 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

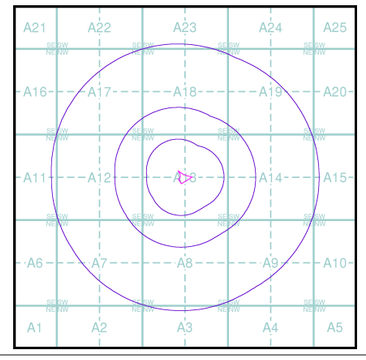
Contours (height in metres)

Standard Contour 105 100 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height 157.8

JBA 200 Year Return Flood Map (Undefended) - Slice A



Order Details

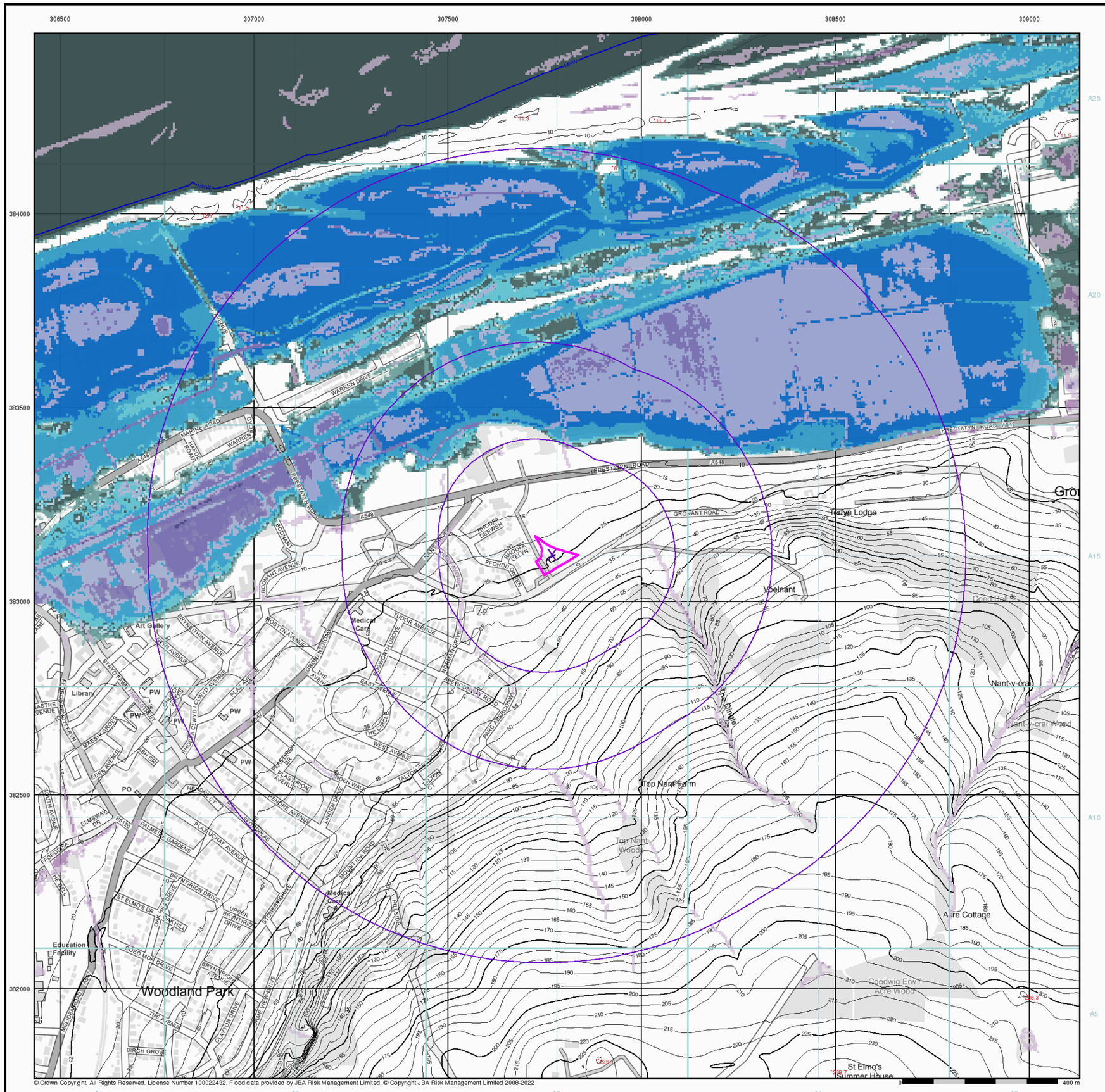
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

JBA 1000 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

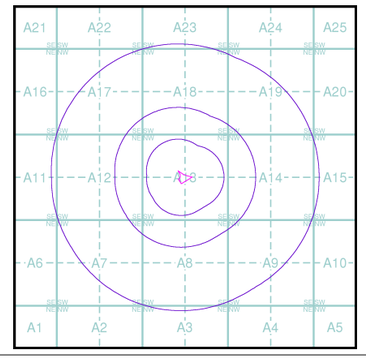
Contours (height in metres)

Standard Contour 105 100 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height 157.8

JBA 1000 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

LANDMARK INFORMATION GROUP®

JBA Canal Failure Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

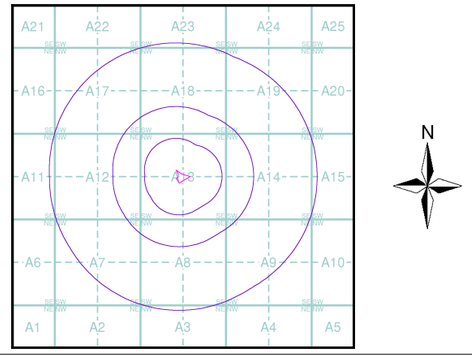
Flood Data

- Canal Failure
- Coverage

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height 167.8
- MLW Mean Low Water
- MHW Mean High Water

JBA Canal Failure Flood Map - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLWS Mean Low Water

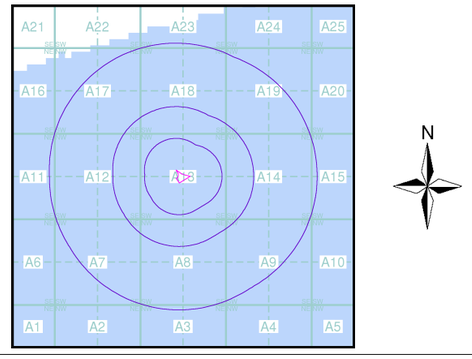
MHWS Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Depth Map

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

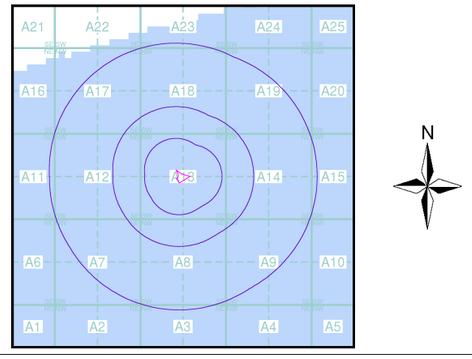
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

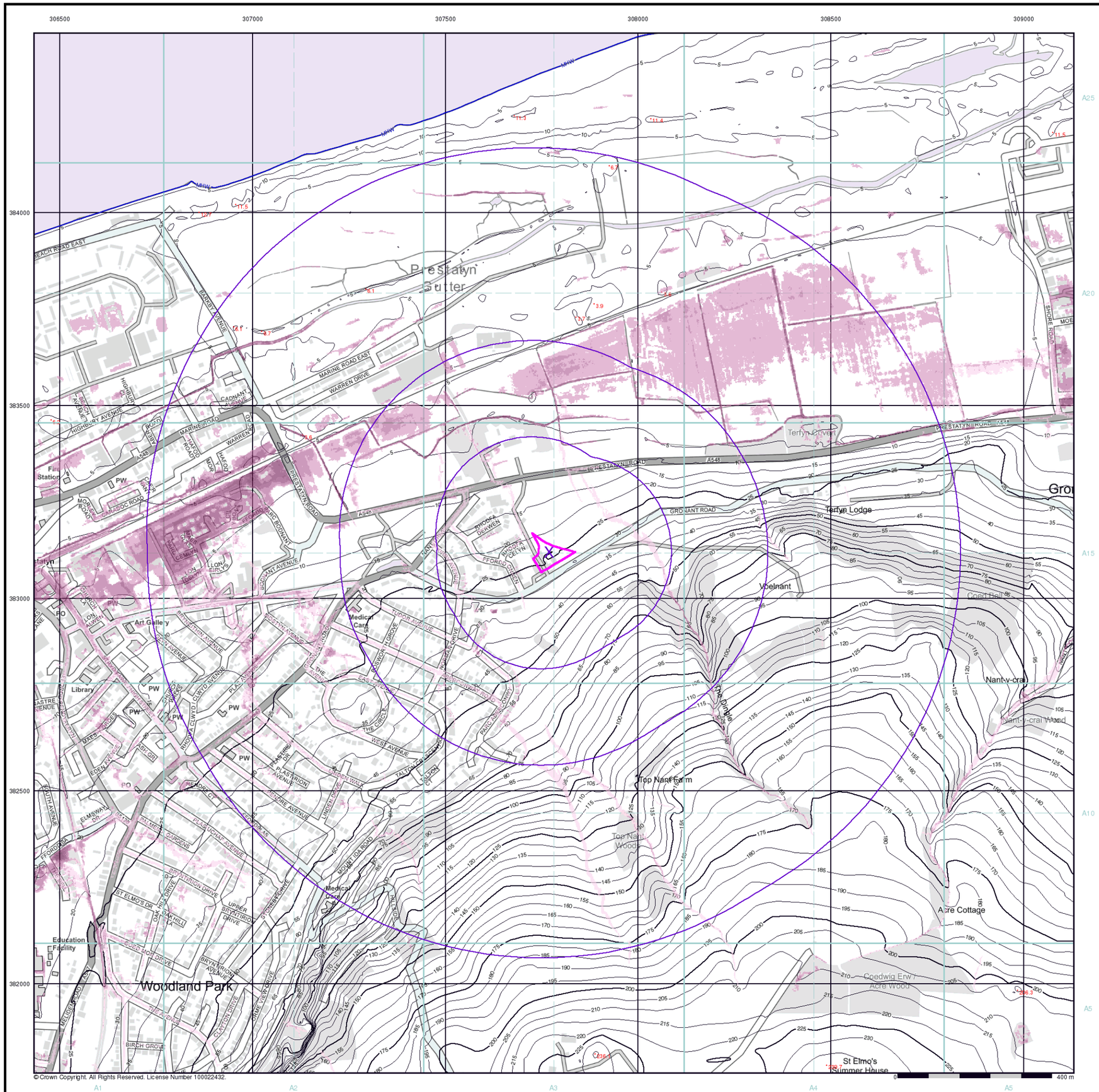
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 1000 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height 167.8

MLW Mean Low Water

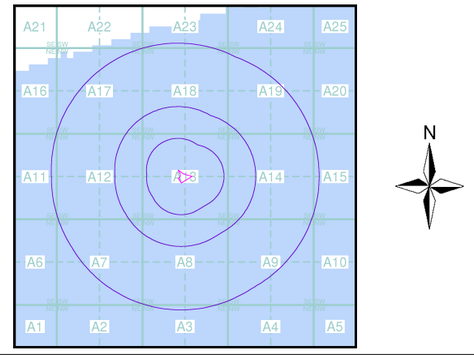
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

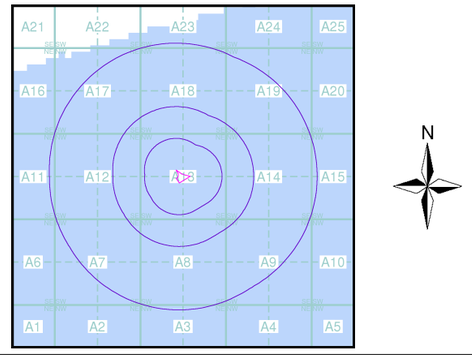
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

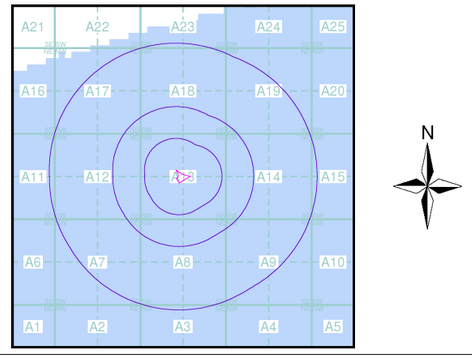
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



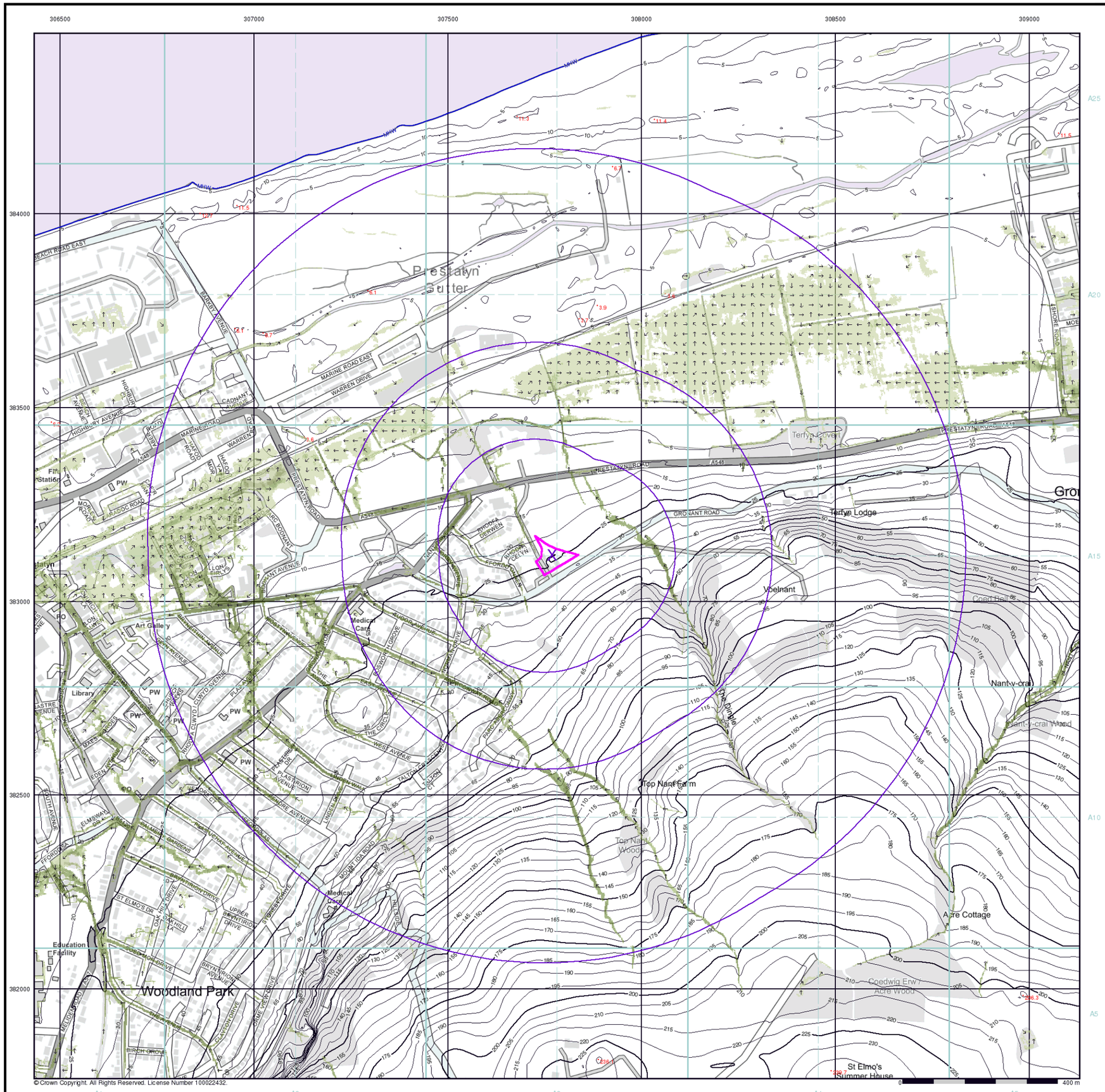
Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 1000 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

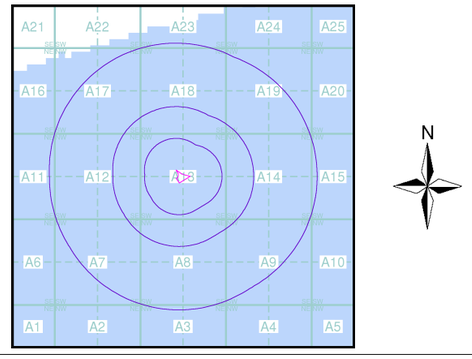
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

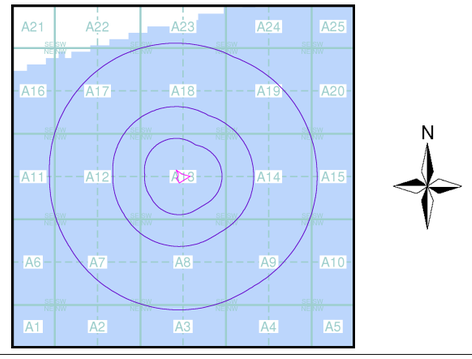
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

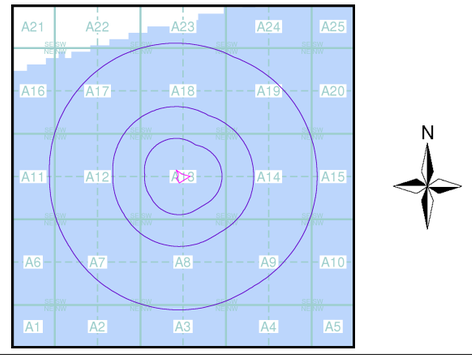
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

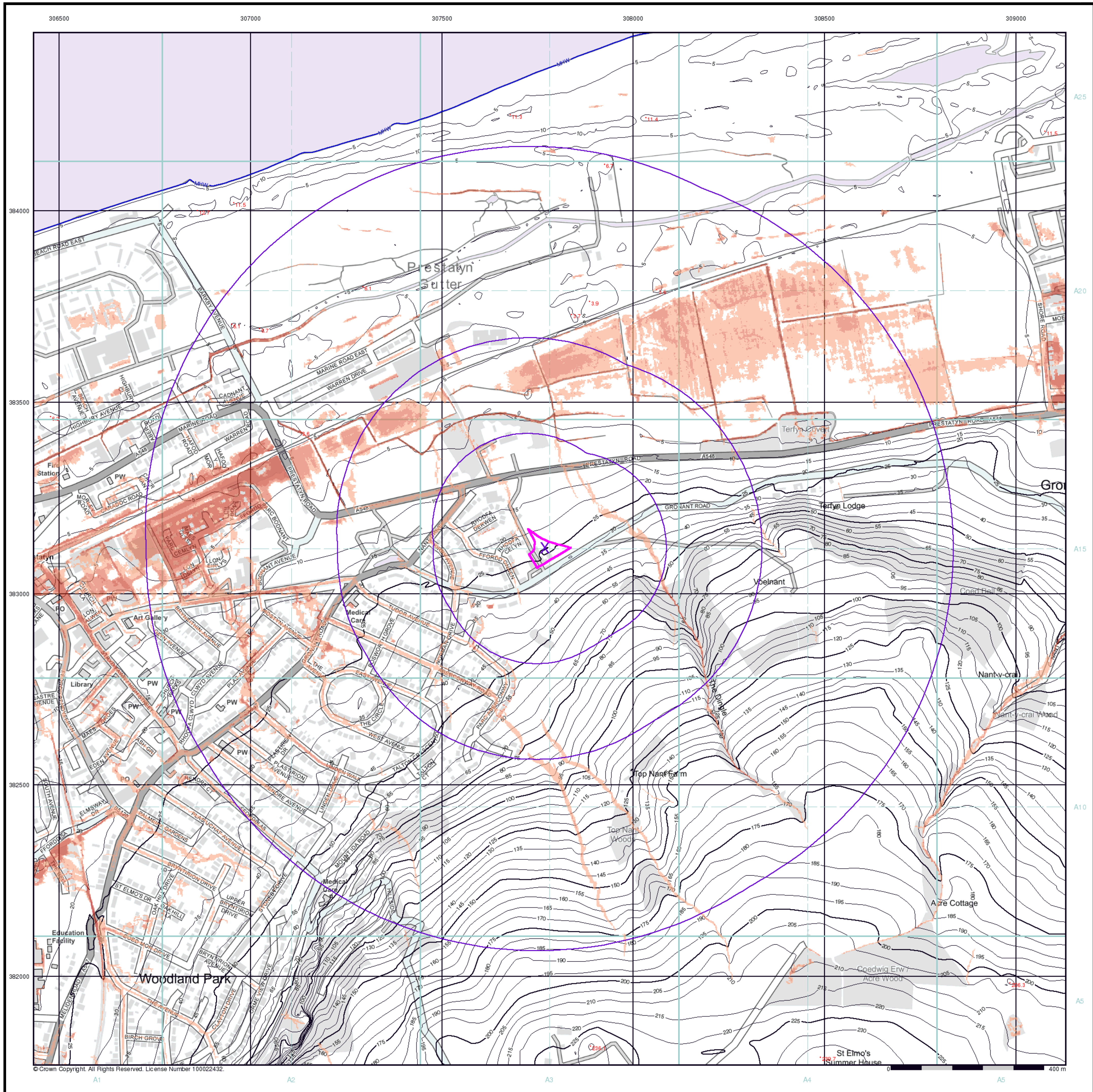
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 1000 Year Return Hazard Rating Map (1:10,000)

General

Specified Site

Specified Buffer(s)

X Bearing Reference Point

Surface Water Hazard Rating

Low (0.5 – 0.75)

Moderate (0.75 – 1.25)

Significant (1.25 – 2.0)

Extreme (>2.0)

Contours (height in metres)

Standard Contour

Master Contour

Spot Height 167.8

MLW Mean Low Water

MHW Mean High Water

Suitability

See the suitability map below

National to county

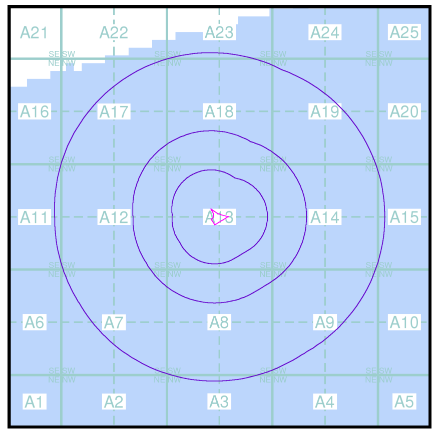
County to town

Town to street

Street to parcels of land

Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number: 295942903_1_1

Customer Ref: 8007 - Midnant Farm

National Grid Reference: 307770, 383120

Slice: A

Site Area (Ha): 0.45

Search Buffer (m): 1000

Site Details

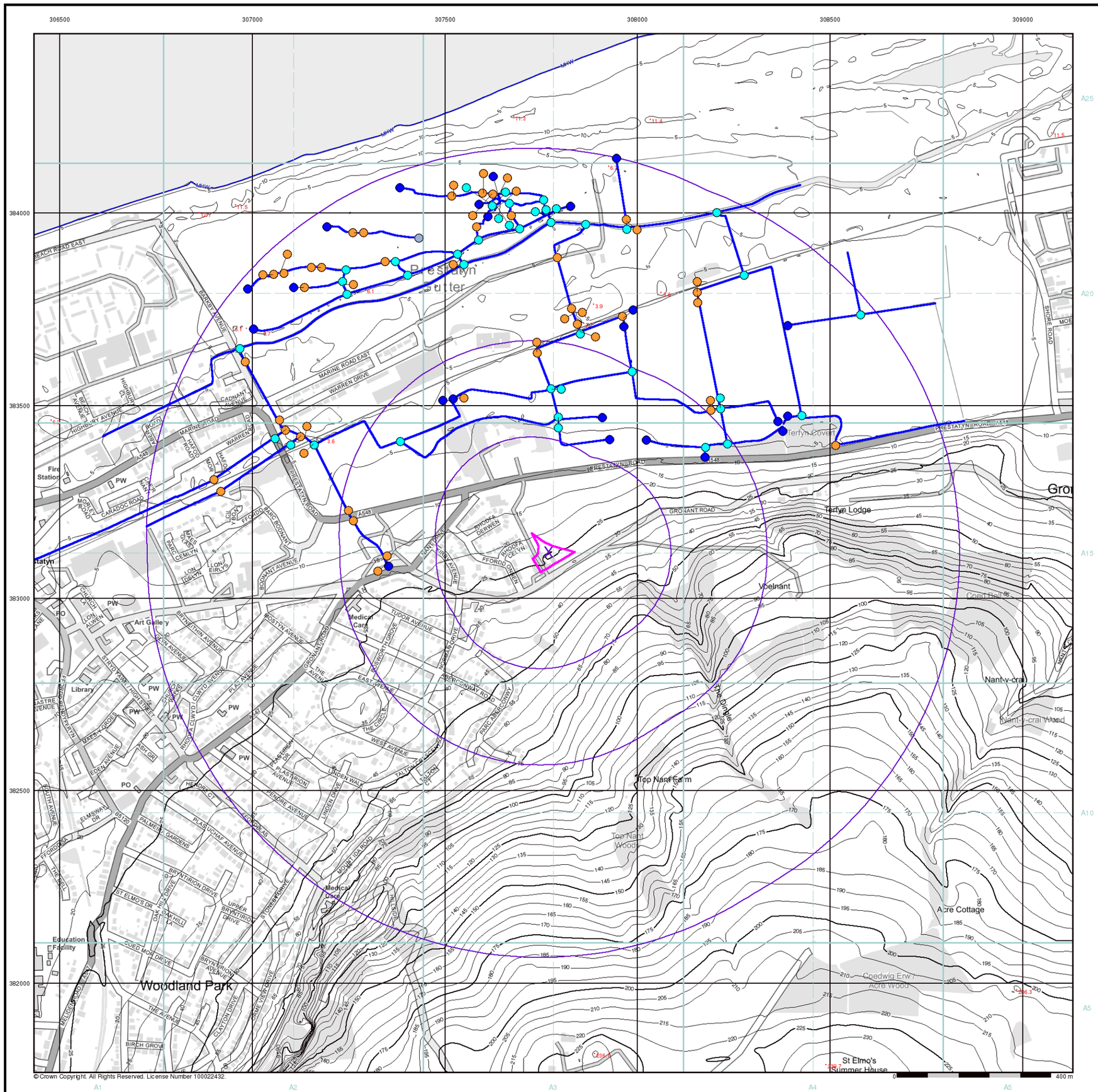
Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952

Fax: 0844 844 9951

Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

OS Water Network Lines Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

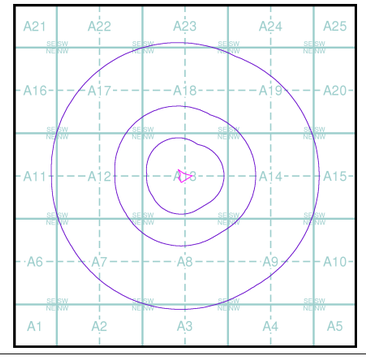
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea
- Junction
- Outlet
- Pseudo
- Source
- Other

Contours (height in meters)

- Standard Contour (105)
- Master Contour (100, 95)
- Spot Height *167.3
- MLW Mean Low Water
- MHW Mean High Water

OS Water Network Map - Slice A



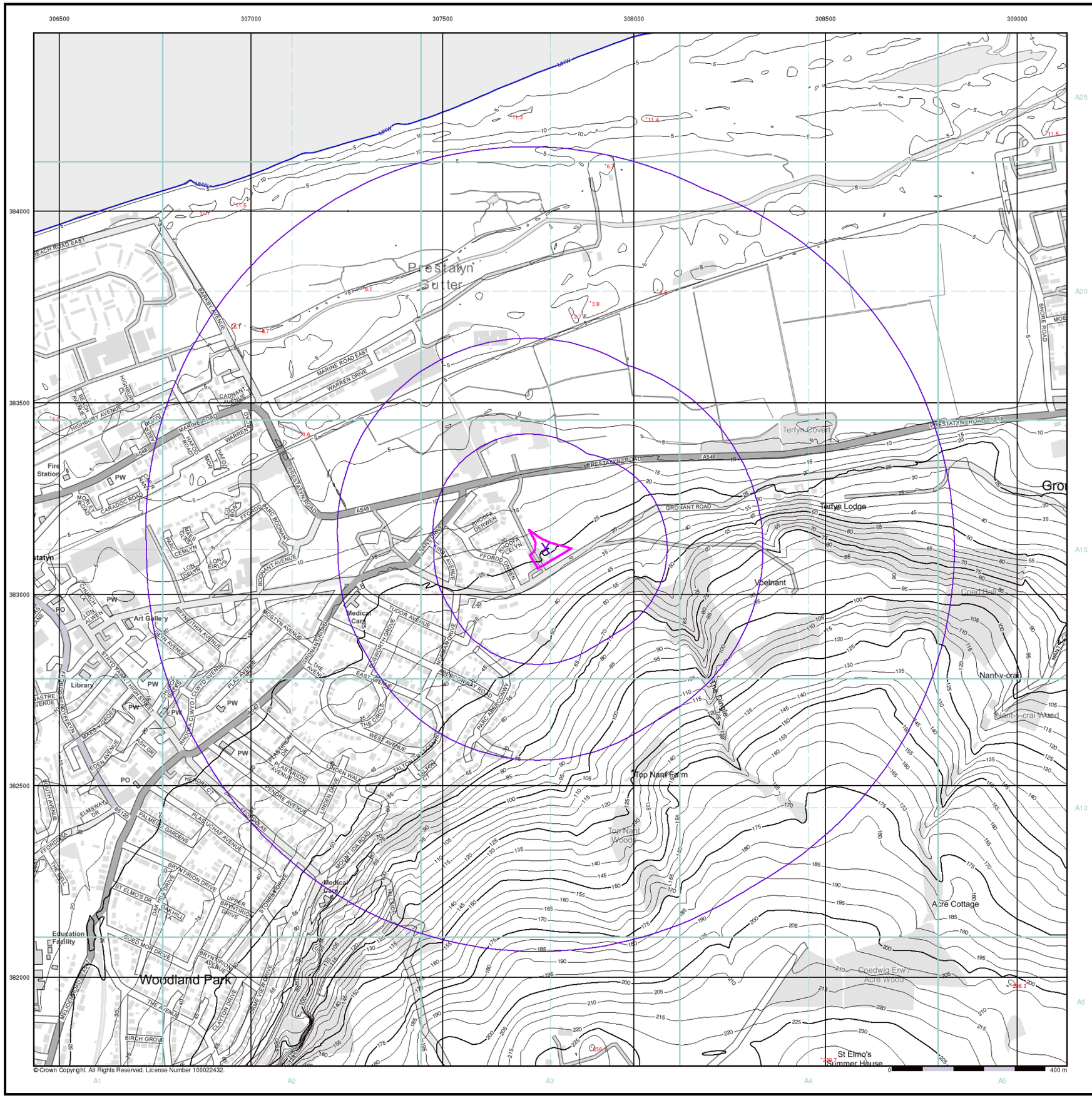
Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Historic Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

Historic Flood Events Data

- Channel Capacity Exceeded (no raised defences)
- Channel Capacity Exceeded /Surface Water
- Groundwater/High Water Table
- Local Drainage/Surface Water
- Mechanical Failure
- Obstruction/Blockage - Bridge
- Obstruction/Blockage - Channel
- Historical Flood Liabilities
- Obstruction/Blockage - Culvert
- Obstruction/Blockage - Debris Screen
- Operational Failure/ Breach of Defence
- Other
- Overtopping of Defences
- Surface Water
- Unknown

Contours (height in metres)

Standard Contour 105

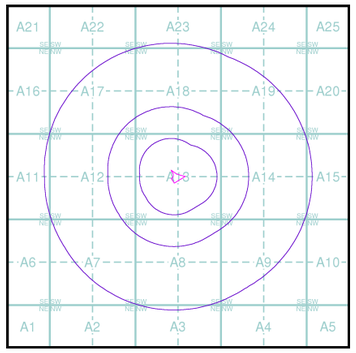
Master Contour 100 95

Spot Height *167.8

MLW Mean Low Water

MHW Mean High Water

EA/NRW Historic Flood Map - Slice A



Order Details

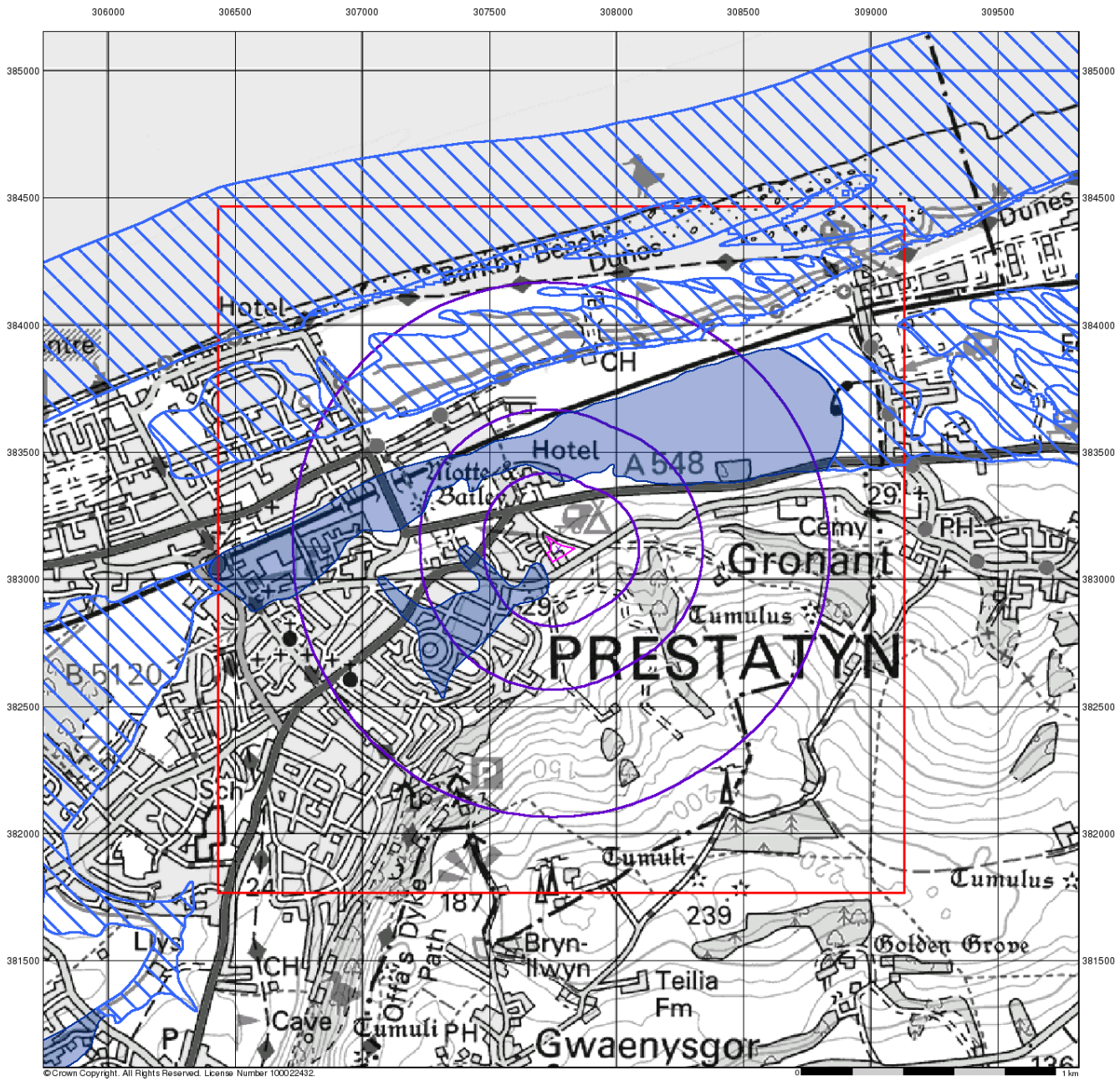
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

BGS Flood Data (1:50,000)

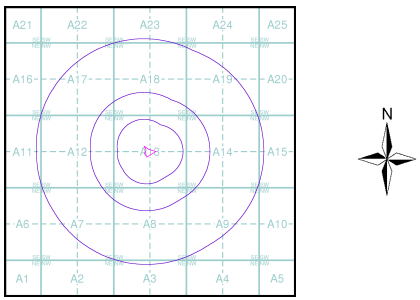
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

BGS Geological Indicators of Flooding

- Coastal
- Inland
- Bodies of Water

BGS Flood Data Map - Slice A



Order Details

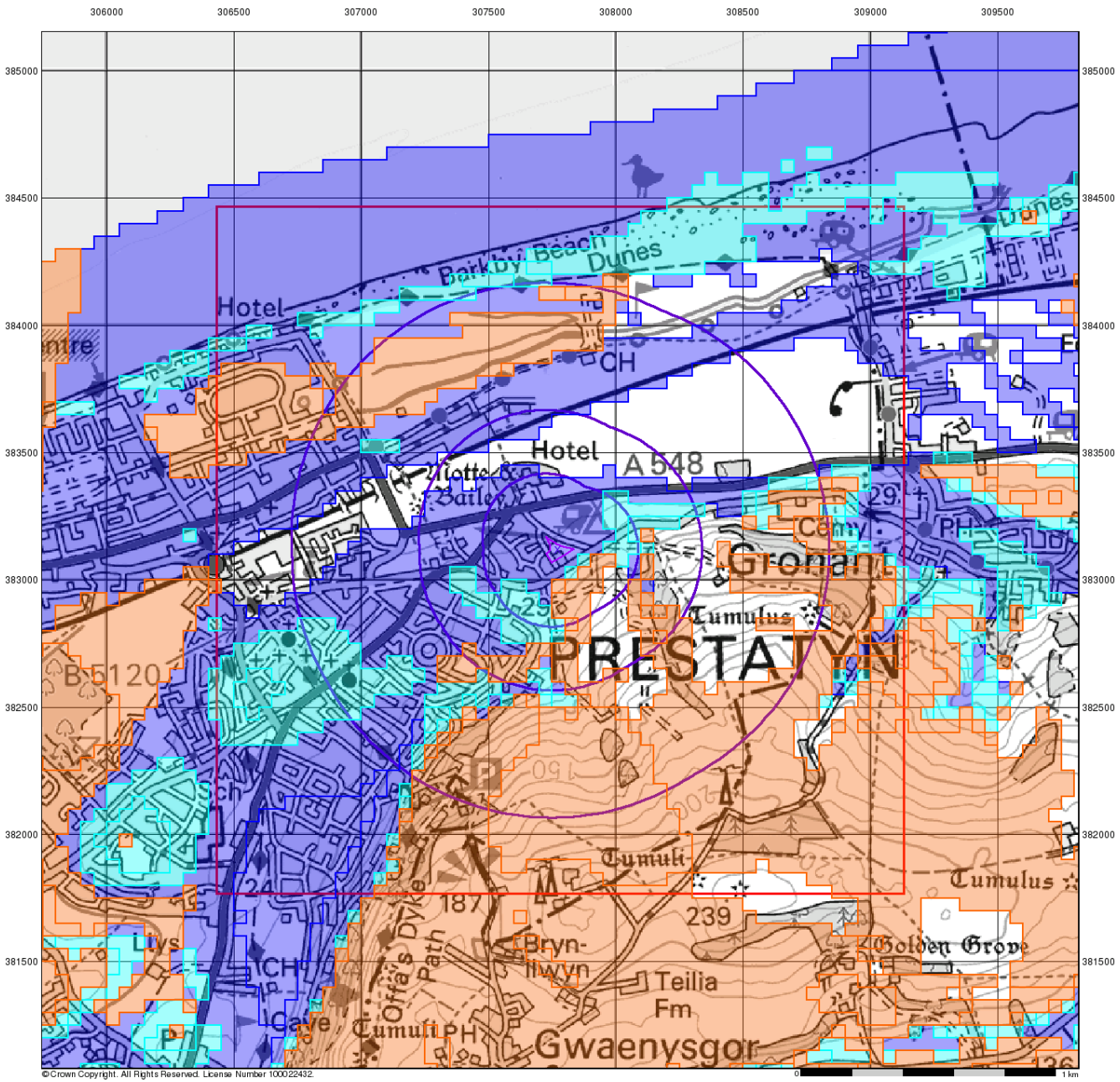
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

BGS Flood Data (1:50,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Slice | Map ID

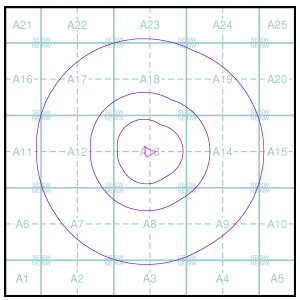
BGS Groundwater Flooding Susceptibility

Potential for Groundwater Flooding to Occur at Surface

Potential for Groundwater Flooding of Property Situated Below Ground Level

Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



Order Details

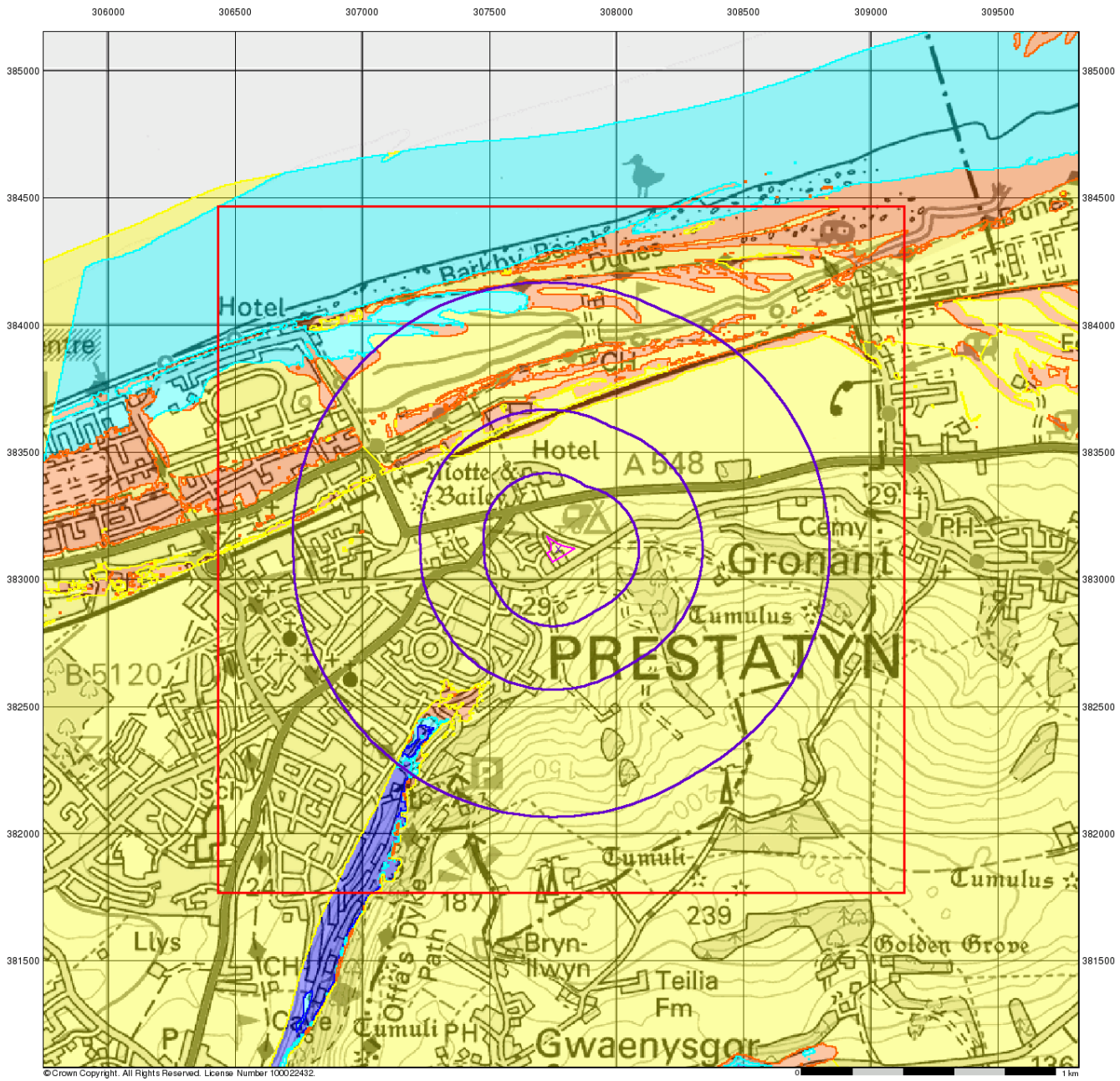
Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

GeoSmart Information Groundwater Flood Map (1:50,000)

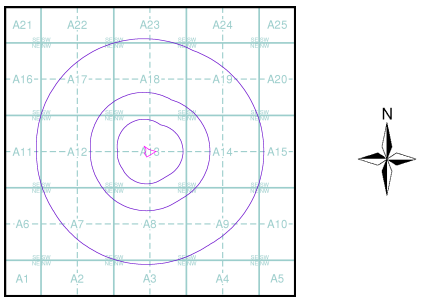
General

Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice

GeoSmart Information Groundwater Flooding Risk

High Risk
Moderate Risk
Low Risk
Negligible Risk

GeoSmart Information Groundwater Flood Map - Slice A



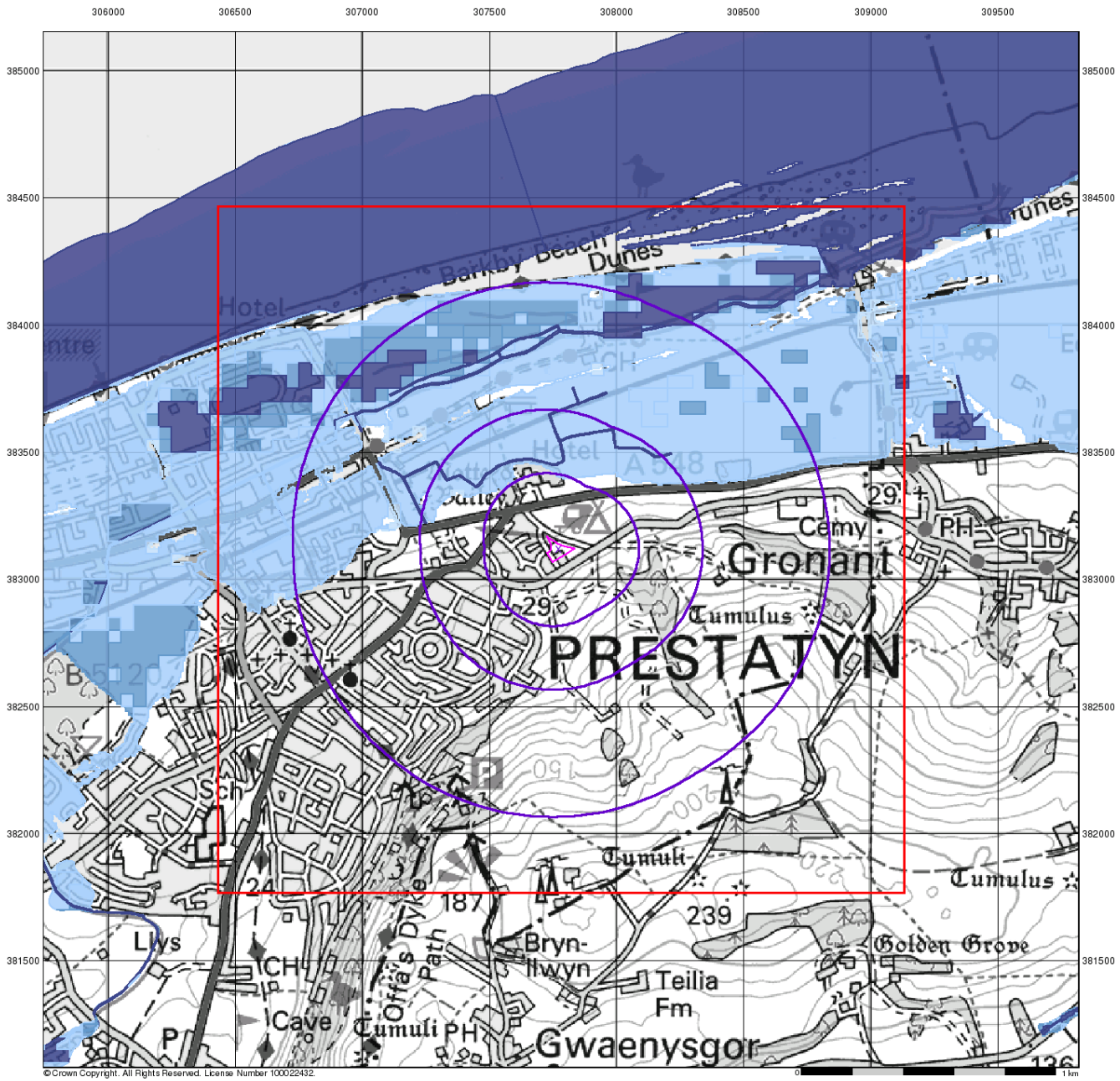
Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark® INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW RoFRS Data (1:50,000)

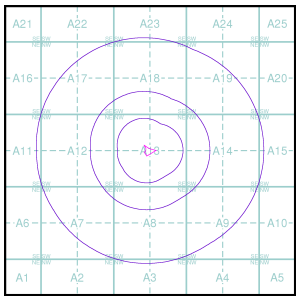
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Risk of Flooding from Rivers and Sea (RoFRS)

- High Risk
- Medium Risk
- Low Risk
- Very Low Risk

EA/NRW RoFRS Data Map - Slice A



Order Details

Order Number:	295942903_1_1
Customer Ref:	8007 - Midnant Farm
National Grid Reference:	307770, 383120
Slice:	A
Site Area (Ha):	0.45
Search Buffer (m):	1000

Site Details

Midnant Farm, Gronant Road, PRESTATYN, LL19 9SP

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix 4

Infiltration Consideration

BGS Information


Prestatyn Gutter
SJ08SE104
SJ08SE106
SJ08SE105
SJ08SE59
SJ08SE58
SJ08SE56
SJ08SE55
SJ08SE57
SJ08SE52
SJ08SE54
SJ08SE49
SJ08SE48
SJ08SE53
SJ08SE50
SJ08SE47
SJ08SE46
SJ08SE45
SJ08SE44
SJ08SE43
SJ08SE42
SJ08SE20
SJ08SE63
SJ08SE62
SJ08SE60
SJ08SE61
SJ08SE88
SJ08SE26
A548
A547
Prestatyn Rd
Gronant Rd
Nant Dr
Marine Rd East
Warren Dr
Warren Rd
Cadnant Ave
Highbury Ave
Barkby Ave
Hafod Rd
Caradoc Rd
Ffordd Parc Bodnant
Bodnant Ave
Ffordd Llys Nant / Nant Hall Rd
Kirby Ave
Ffordd Orinen
Tudor Ave
Norman Dr
Mostyn Ave
Glyn Ave
Brynmeithin Ave
Queens Way
Parc Abergonwy
Abergonwy Rd
East Ave
Christ Church
Church Walks
Plas Ave
Lon Deiyn
Lon Eirin

Holst Soil Engineering Limited

Borehole No. **18**

BOREHOLE LOG SJ08SE, 42

Contract No. SI 1727/F2974
Location Prestatyn A.548
Client Clwyd County Council
Method of Boring Shell & Augar (percussion)
Diameter of Borehole

Sheet 1 of 1
Chainage 618 m
Ground Level 8.19 m A.O.D.
Date 6.11.74 - 7.11.74
SJ07463, 83278

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOP SOIL		0.40	8.10		O 0.20		
Grey, clayey, stoney SAND		0.95	7.55		0.40 - 0.85		
Medium dense, red-brown, clayey, silty, SAND and fine GRAVEL.				1.40	1.40 - 1.85	"14"	
					● 1.40 - 2.40		
				2.40	2.40 - 2.85	"22"	
		3.40	5.10		● 2.90 - 3.40		
Medium dense, well graded GRAVEL with silty clay matrix				3.40	3.40 - 3.85	"25"	
		4.30	4.20		● 3.90 - 4.30		
Stiff, red-brown, sandy, silty, stoney CLAY.				4.40	O 4.30 4.40 - 4.85 O 4.90		6.11.
		4.90	3.60				
Dense, well graded GRAVEL with occasional thin layers of stiff, sandy, silty, stoney CLAY.				5.20	5.20 - 5.65	"28"	
					● 5.70 - 6.20		
				6.20	6.20 - 6.65 △△ 6.50	"42"	
					● 6.70 - 7.20		
				7.20	7.20 - 7.65	"50"	
					● 7.70 - 8.20		
				8.20	8.20 - 8.65	"46"	
					● 8.70 - 9.20		
				9.20	9.20 - 9.65	"56"	
		10.00	-1.50		● 9.70 - 10.00		7.11.

Type of Sample

□	Undisturbed	●	Bulk
Is	S.P.T.	X	Vane
Ic	C.P.T.	△	Water
O	Jar	◪	Piezometer

Remarks (Observations of Ground Water etc.)

Water Balance used:

Standing	4.20m	7.11.74	8.00 a.m.	Casing 5.00 m
Struck	6.50m	7.11.74	9.00 a.m.	Casing 6.50 m
Standing	6.30m	7.11.74	9.15 a.m.	
Standing	7.00m	7.11.74	2.00 a.m.	Casing 10.00 m

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Holst Soil Engineering Limited

Borehole No. **17**

BOREHOLE LOG SJ08SE, 43

Contract No. S1 1727/F2974
Location Prestatyn A.548
Client Clwyd County Council
Method of Boring Shell & Augar (Percussion)
Diameter of Borehole 0.15 m

Sheet 1 of 1
Chainage 543.00 m
Ground Level 7.17 m A.O.D.
Date 1.11.74
SJ07398, 83281

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOP SOIL		0.90	6.40				
Loose, brown, clayey, stoney SAND.		2.00	5.30	1.00	0.90 1.00 - 1.45		
Loose, well graded, silty, clayey SAND and GRAVEL.		3.40	3.90	2.50	2.50 2.50 - 2.95		
Medium dense, well graded, sandy GRAVEL		5.40	1.90	4.00	4.00 4.00 - 4.45	"10"	
Dense, brown, clayey, stoney SAND.		7.00	0.30	5.50 7.00	5.50 - 5.95 7.00 - 7.45		1.11.74

Type of Sample

□	Undisturbed	●	Bulk
Is	S.P.T.	X	Vane
Ic	C.P.T.	Δ	Water
O	Jar	◪	Piezometer

Remarks (Observations of Ground Water etc.)

Struck	3.40	1.11.74	2.30 p.m.	Casing 3.00 m
Sealed	5.00	1.11.74	3.30 p.m.	Casing 5.00 m

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Holst Soil Engineering Limited

Borehole No. 16

BOREHOLE LOG SJ08SE, 44.

Contract No. S1 1727/F2974
Location Prestatyn A.548
Client Clwyd County Council.
Method of Boring Shell & Augar (Percussion)
Diameter of Borehole 0.15 m.

Sheet 1 of 2.
Chainage 468.00 m
Ground Level 6.02 m A.O.D.
Date 30.10.74 - 31.10.74
SJ07311, 83319

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOP SOIL		1.00	5.00				
Brown, clayey, stoney SAND		1.20	4.80	0.00	1.00 - 1.45		
Loose, fine GRAVEL				2.00	2.00 - 2.45	"10"	
		3.00	3.00	3.00	3.00		
Medium dense, well graded, sandy GRAVEL					3.00 - 3.45	"11"	
				4.50	4.50	"18"	
					4.50 - 4.95		
				6.00	6.00	"21"	
					6.00 - 6.45		
		7.60	-1.60				
Medium dense, medium-coarse GRAVEL		7.90	-1.90	7.60	7.60	"22"	
					7.60 - 8.05		
Medium dense, coarse GRAVEL and SAND							
Continued:							

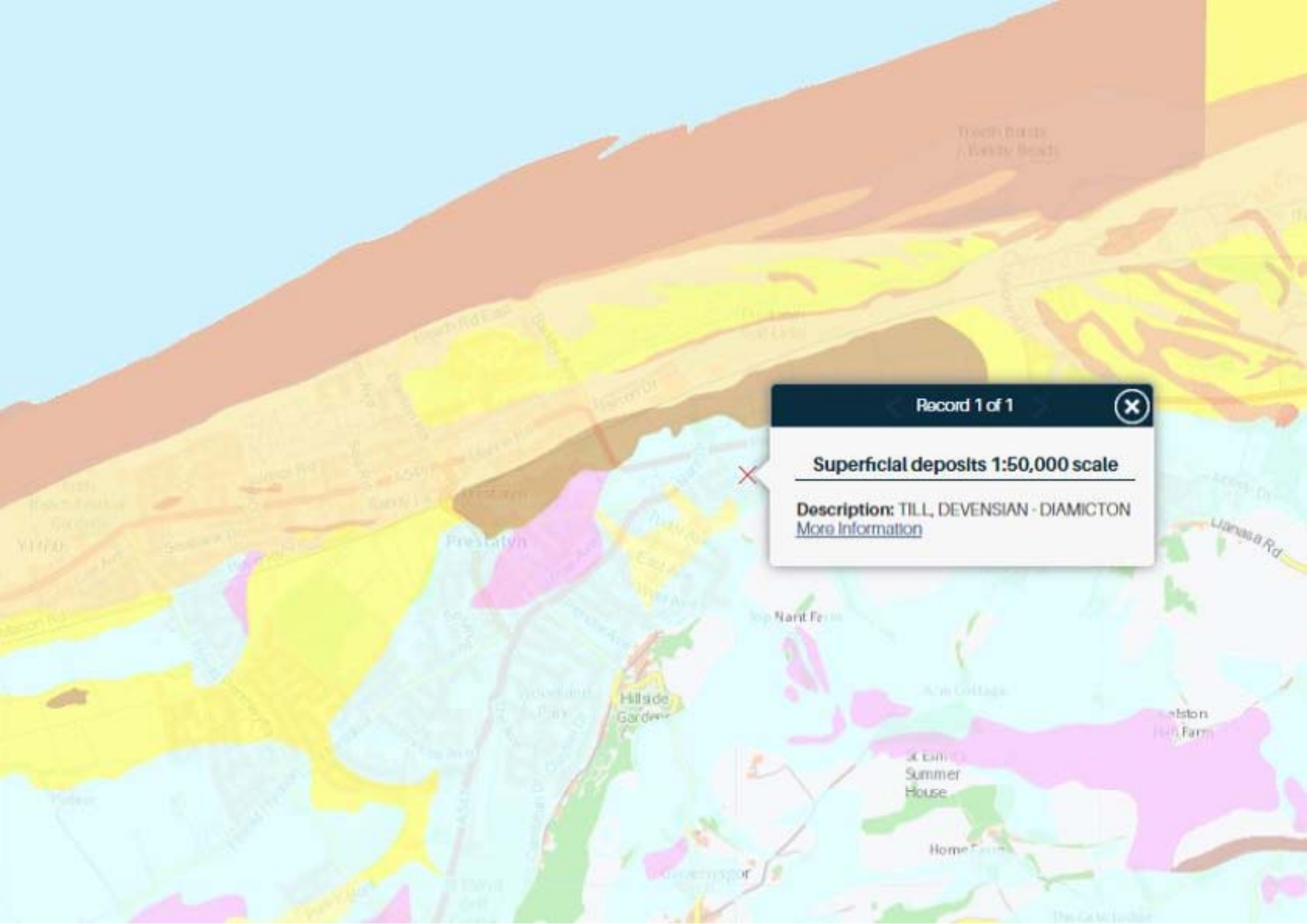
Type of Sample

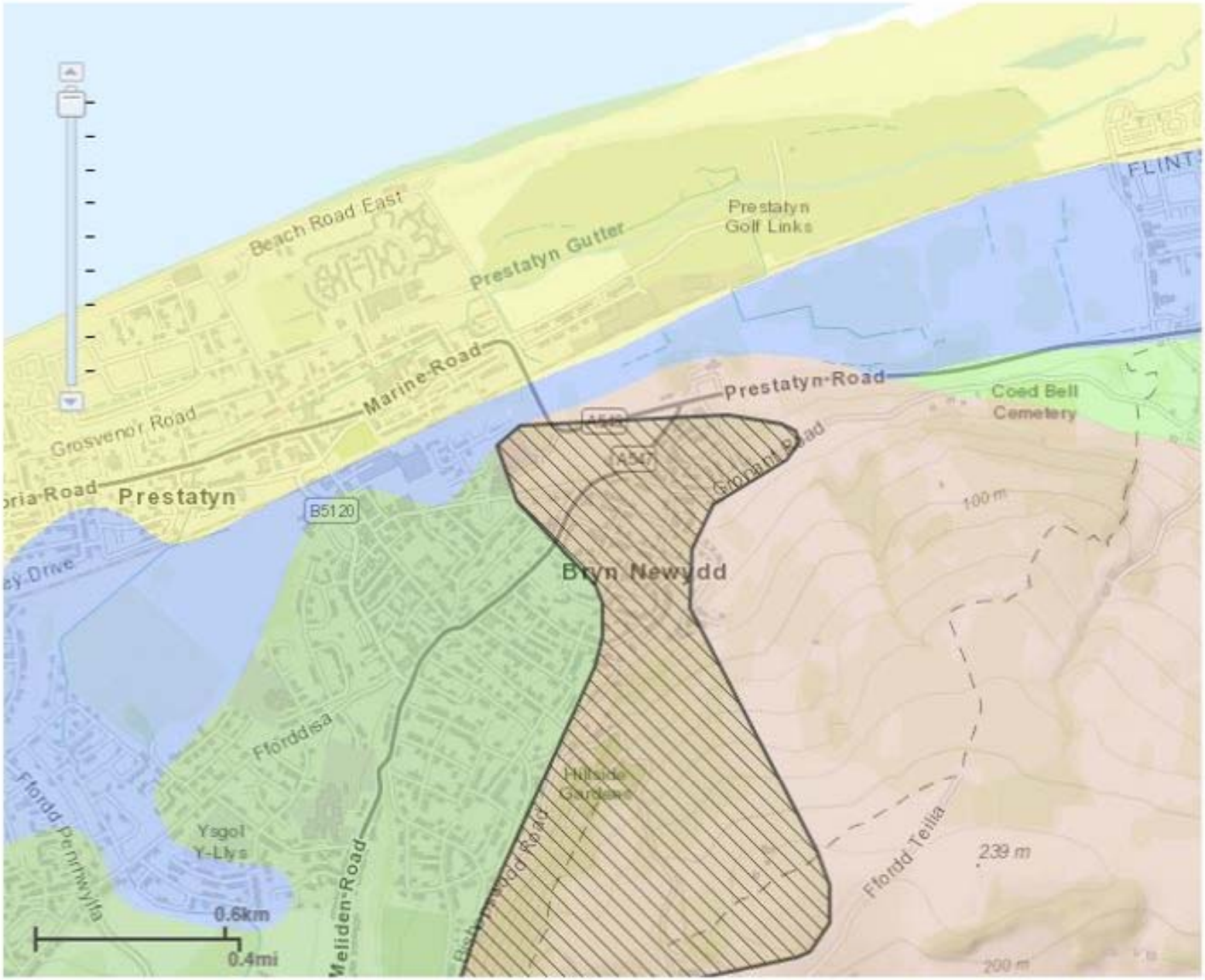
□	Undisturbed	●	Bulk
Is	S.P.T.	X	Vane
Ic	C.P.T.	Δ	Water
O	Jar	◪	Piezometer

Remarks (Observations of Ground Water etc.)

Struck	1.90 m	30.10.74	12.20 p.m.	Casing 1.50 m
Standing	1.50 m	31.10.74	8.00 p.m.	Casing 7.00 m
Standing	2.30 m	31.10.74	12.15 p.m.	

Water levels are subject to seasonal or tidal variations and should not be taken as constant


Record 1 of 1
Superficial deposits 1:50,000 scale
Description: TILL, DEVENSIAN - DIAMICTON
More Information
Hillside
Summer
House



Adjust transparency

Legend

Search

Soil information

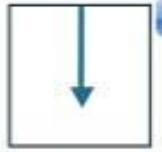
Soilscape 7:
Freely draining slightly acid but base-rich soils

Texture:
Loamy

Coverage:
England: 3.1% Wales: 3.1%
England & Wales: 3.1%

Selected area:
2.6km^2

Drainage:
Freely draining



Fertility:
High

Habitats:
Base-rich pastures and deciduous woodlands

Landcover:
Arable and grassland

Carbon:
Low

Drains to:
Groundwater

Appendix 5

Correspondence

Dwr Cymru Welsh Water Historical Flooding

Natural Resources Wales Historical Flooding

Denbighshire County Council Historical Flooding

Andy Jones

From: Environmental Information Requests <EnvironmentalInformationRequests@dwrcymru.com>
Sent: 29 June 2022 09:48
To: Andy Jones
Subject: RE: FCA Historical Flood Information

Our Reference: EIR/1169/2022

Dear Mr Jones

Request for Information
RE: 8007 Midnant Farm, Gronant Road, Prestatyn

We write further to your request for information dated 7th June 2022, which we have been considering under the Environmental Information Regulations 2004.

We can confirm that we have reviewed our flooding database and we have no flooding history within the location or vicinity of the proposed site.

Turning to your query on specific drainage requirements, we have a dedicated Planning Team within our Developer Services function that can provide advice on the capacity in our infrastructure to accommodate new development.

Our pre-planning service will review the capacity available in our sewerage network, wastewater treatment works and clean water network to accommodate the flows/demand from a proposed development. It will also raise awareness of any of our assets crossing the site which will need to be factored into the layout of your development and provide general advice on surface water drainage.
An application for pre-planning advice can be submitted online via the following address https://developers.dwrcymru.com/en/applications/planning/pre-planning.

If you wish to discuss in more detail our Planning Team are contactable on 08009172652 or alternatively by email developer.services@dwrcymru.com.

We hope that this response is clear. Should you have any questions, please contact us by email at EnvironmentalInformationRequests@dwrcymru.com.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within 40 working days of the date of receipt of this response and should be addressed to Company Secretary, Linea, Fortran Road, St Mellons, Cardiff CF3 0LT

If you are not content with the outcome of the internal review, you have the right to apply directly to the Information Commissioner for a decision.

Yours faithfully,

Dŵr Cymru Welsh Water

From: Andy Jones <ajones@coopers.co.uk>
Sent: 07 June 2022 16:17
To: Sewerage Services <Sewerage.Services@dwrcymru.com>
Subject: FCA Historical Flood Information

******** External Mail ********

8007 Midnant Farm, Gronant Road, Prestatyn
SJ077831
X=307750 , Y=383100

FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

Regards

Andy Jones

Senior Infrastructure Engineer

COOPERS

Park House, Sandpiper Court, Chester Business Park, Chester, CH4 9QU

☎: (01244) 684910 ☎: Direct Dial No. (01244) 684933

7: (01244) 684911

✉: ajones@coopers.co.uk

Web: http://www.coopers.co.uk

Andy Jones

From: Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>
Sent: 08 June 2022 09:44
To: Andy Jones
Subject: RE: FCA Historical Flood Information
Attachments: Briefing Note Flood Products - External.pdf; Flood Products FAQs V3.pdf; NRW Flood Product Descriptions.pdf

Dear Mr Jones,

Thank you for your email concerning the above.

For flood history, please see this link - Lle - Recorded Flood Extents (gov.wales)

If you require flood data, please see the attached and then let us know.

We look forward to hearing from you.

Yn gywir / Yours sincerely,

Michelle Lewis

Cyfoeth Naturiol Cymru / Natural Resources Wales
Ffôn/ Phone: 03000 653577
Symudol / Mobile: 07917243096
Office Location Llys Afon, Hwlffordd / Office Location River Court, Haverfordwest
Cwsmer, Cyfarthrebu a Masnach - Customer, Communications and Commercial
Oriau gwaith arferol/Normal working hours – Mon-Fri, 9 to 5

From: Andy Jones <ajones@coopers.co.uk>
Sent: 07 June 2022 16:18
To: Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>
Subject: Fw: FCA Historical Flood Information

8007 Midnant Farm, Gronant Road, Prestatyn
SJ077831
X=307750 , Y=383100

FCA Historical Flood Information


PRESTATYN
Beach Road East
Barkby Avenue
Bastion Road
MARINE ROAD (A548)
PRESTATYN ROAD (A548)
MOSTYN ROAD (A548)
A548
Gronant Road
Gronant Hill
Llanasa Road
VICTORIA ROAD (A548)
Sandy Lane
Ffordd Llys Nant / Nant Hall Road
GRONANT ROAD (A547)
Stryd Fawr / High Street
Ffordd Pendyffryn (B5120)
Ceg-Y-Ffordd
Ffordd Penrhwylfa
Fforddlas
Fforddisa
MELIDEN ROAD (A547)
Ffordd Ffynnon
Ffordd Penrallt

Andy Jones

From: Andy Jones
Sent: 07 June 2022 16:16
To: yourvoice@denbighshire.gov.uk
Subject: FCA Historical Flood Information
Attachments: Site Layout - Prestatyn - Rev A.pdf

8007 Midnant Farm, Gronant Road, Prestatyn
SJ077831
X=307750 , Y=383100

FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

Regards

Andy Jones
Senior Infrastructure Engineer
COOPERS
Park House, Sandpiper Court, Chester Business Park, Chester, CH4 9QU

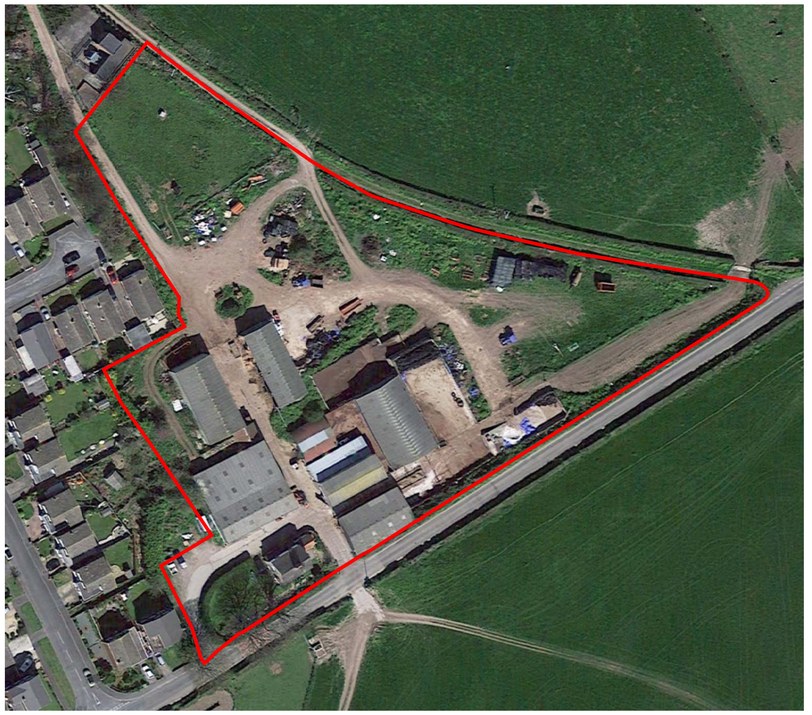
☎: (01244) 684910 ☎: Direct Dial No. (01244) 684933
7: (01244) 684911
✉: ajones@coopers.co.uk
Web: http://www.coopers.co.uk

Appendix 6

Drawings

Drawing No.	Revision	Title
8007 / SK01	-	Existing Impermeable Areas
8007 / SK02	-	SW Opion 1 - Infiltration
8007 / SK03	-	Drainage Strategy
8007 / SK04	-	Highway Longsections

DO NOT SCALE



Legend

1.6ha Site Area

2000sq.m. Roof Area

Existing Surface Water Flow Rates

Site Area = 1.45ha

Existing Brownfield Run-off Rates

(Based on 2,000sq.m. existing roof area)

1yr	= 13.98 l/s	(25.8 mm/hr rainfall)
30yr	= 34.20 l/s	(63.1 mm/hr rainfall)
100yr	= 44.12 l/s	(81.4 mm/hr rainfall)

Rev.	Date	Revision	By	Appd.
-		First Issue		

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client

Castle Green

Project

Midnant Farm
Prestatyn

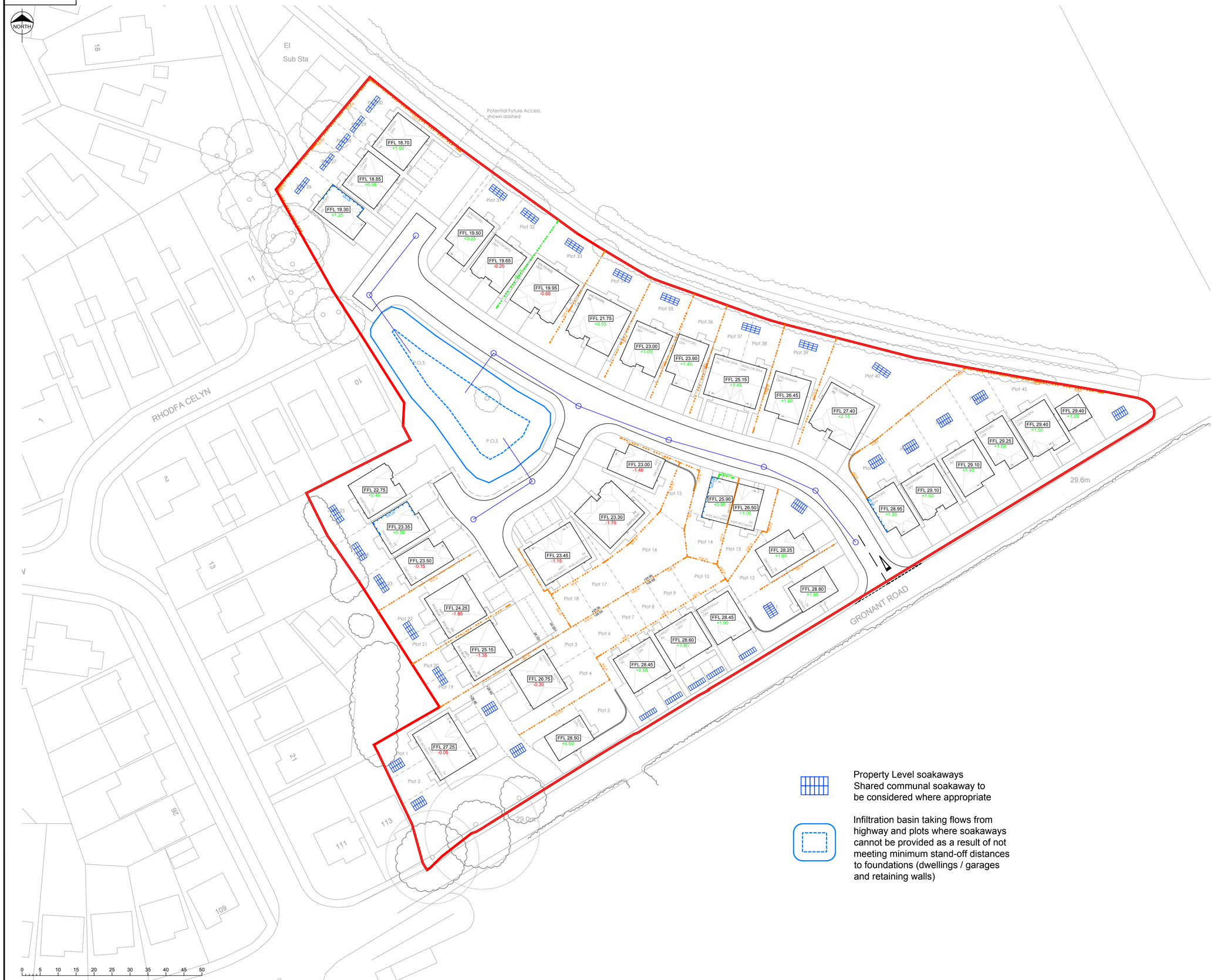
Title

Existing Impermeable Areas

SCALE at A1 1:500	DATE NOV 22	DRAWN	CHECKED

DRAWING NUMBER	REVISION
8007 / SK01	-

DO NOT SCALE



Property Level soakaways
Shared communal soakaway to be considered where appropriate

Infiltration basin taking flows from highway and plots where soakaways cannot be provided as a result of not meeting minimum stand-off distances to foundations (dwellings / garages and retaining walls)

Note:
This is an indicative surface water scheme assuming ground conditions are found to be suitable for infiltration techniques to dispose of surface water flows from the development.

Site investigation / infiltration tests will be required to confirm

PRELIMINARY

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client

Castle Green

Project

MIDNANT FARM
PRESTATYN

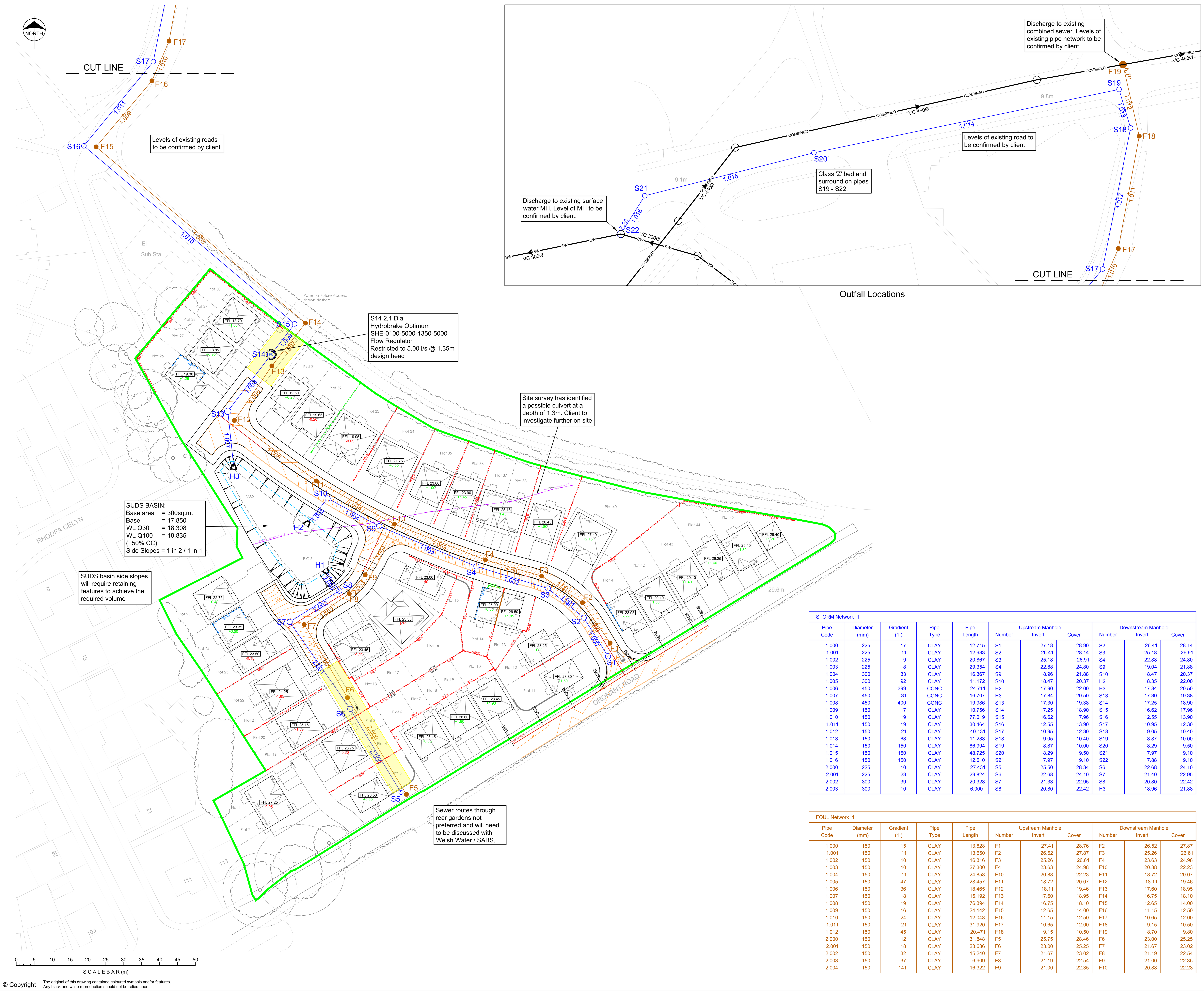
Title

Surface Water Disposal

Option 1 (Infiltration)

DRAWING NUMBER	SCALE at A1	1:500	
8007 / SK02	DATE	24.11.22	REVISION
	DRAWN	AJ	-
	CHECKED	AJ	

DO NOT SCALE



Outfall Locations

STORM Network 1										
Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	225	17	CLAY	12.715	S1	27.18	28.90	S2	26.41	28.14
1.001	225	11	CLAY	12.933	S2	26.41	28.14	S3	25.18	26.91
1.002	225	9	CLAY	20.867	S3	25.18	26.91	S4	22.88	24.80
1.003	225	8	CLAY	29.354	S4	22.88	24.80	S9	19.04	21.88
1.004	300	33	CLAY	16.367	S9	18.96	21.88	S10	18.47	20.37
1.005	300	92	CLAY	11.172	S10	18.47	20.37	H2	18.35	22.00
1.006	450	399	CONC	24.711	H2	17.90	22.00	H3	17.84	20.50
1.007	450	31	CONC	16.707	H3	17.84	20.50	S13	17.30	19.38
1.008	450	400	CONC	19.986	S13	17.30	19.38	S14	17.25	18.90
1.009	150	17	CLAY	10.756	S14	17.25	18.90	S15	16.62	17.96
1.010	150	19	CLAY	77.019	S15	16.62	17.96	S16	12.55	13.90
1.011	150	19	CLAY	30.464	S16	12.55	13.90	S17	10.95	12.30
1.012	150	21	CLAY	40.131	S17	10.95	12.30	S18	9.05	10.40
1.013	150	63	CLAY	11.238	S18	9.05	10.40	S19	8.87	10.00
1.014	150	150	CLAY	86.994	S19	8.87	10.00	S20	8.29	9.50
1.015	150	150	CLAY	48.725	S20	8.29	9.50	S21	7.97	9.10
1.016	150	150	CLAY	12.610	S21	7.97	9.10	S22	7.88	9.10
2.000	225	10	CLAY	27.431	S5	25.50	28.34	S6	22.68	24.10
2.001	225	23	CLAY	29.824	S6	22.68	24.10	S7	21.40	22.95
2.002	300	39	CLAY	20.328	S7	21.33	22.95	S8	20.80	22.42
2.003	300	10	CLAY	6.000	S8	20.80	22.42	H3	18.96	21.88

FOUL Network 1										
Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	150	15	CLAY	13.628	F1	27.41	28.76	F2	26.52	27.87
1.001	150	11	CLAY	13.650	F2	26.52	27.87	F3	25.26	26.61
1.002	150	10	CLAY	16.316	F3	25.26	26.61	F4	23.63	24.98
1.003	150	10	CLAY	27.300	F4	23.63	24.98	F10	20.88	22.23
1.004	150	11	CLAY	24.858	F10	20.88	22.23	F11	18.72	20.07
1.005	150	47	CLAY	28.457	F11	18.72	20.07	F12	18.11	19.46
1.006	150	36	CLAY	18.465	F12	18.11	19.46	F13	17.60	18.95
1.007	150	18	CLAY	15.192	F13	17.60	18.95	F14	16.75	18.10
1.008	150	19	CLAY	76.394	F14	16.75	18.10	F15	12.65	14.00
1.009	150	16	CLAY	24.142	F15	12.65	14.00	F16	11.15	12.50
1.010	150	24	CLAY	12.048	F16	11.15	12.50	F17	10.65	12.00
1.011	150	21	CLAY	31.920	F17	10.65	12.00	F18	9.15	10.50
1.012	150	45	CLAY	20.471	F18	9.15	10.50	F19	8.70	9.80
2.000	150	12	CLAY	31.848	F5	25.75	28.46	F6	23.00	25.25
2.001	150	18	CLAY	23.686	F6	23.00	25.25	F7	21.67	23.02
2.002	150	32	CLAY	15.240	F7	21.67	23.02	F8	21.19	22.54
2.003	150	37	CLAY	6.909	F8	21.19	22.54	F9	21.00	22.35
2.004	150	141	CLAY	16.322	F9	21.00	22.35	F10	20.88	22.23

Note

1. This is a preliminary design demonstrating a drainage solution is achievable to discharge flows from the proposed development.
2. The specification in all respects shall be in accordance with the Local CBC Specification and Construction publication in force in the county at the time of construction.

Legend

Site Boundary

Existing

Existing Foul Water Sewer

Existing Combined Sewer

Proposed

Adoptable Surface Water Sewer

Adoptable Foul Sewer

FFL 47.40 — Slab Level

Wall

Underbuild

Flag On Edge

+0.85 / -0.95 — Depth of fill (Existing to Proposed)

Easement

Note:
Retention of 300mm and above has been shown for strategy stage. Small retaining features and underbuild of up to 225mm will also be required at other locations and will be shown at detailed design stage

STRATEGY

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client

Castle Green

Project

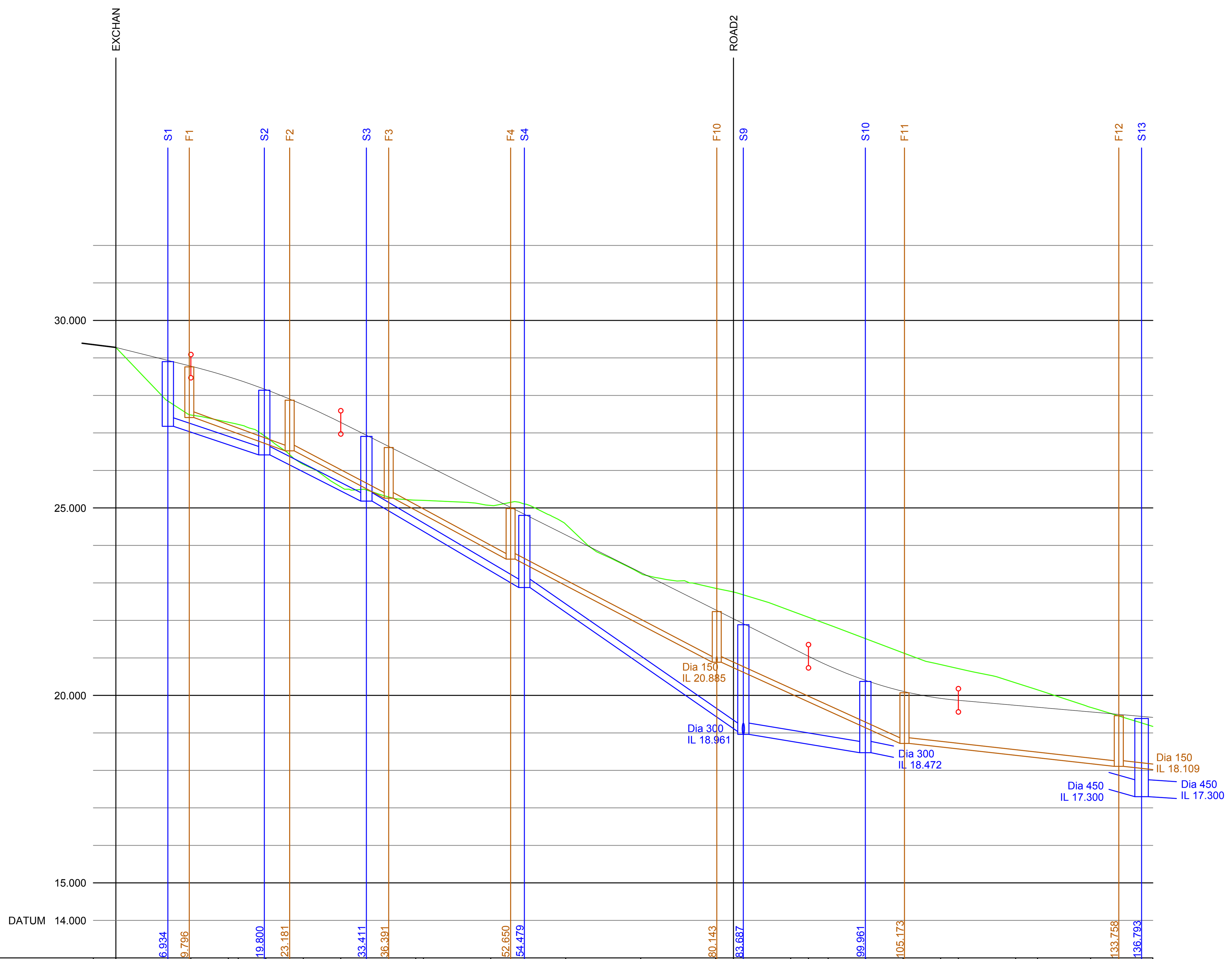
MIDNANT FARM, PRESTATYN.

Title

Drainage Strategy

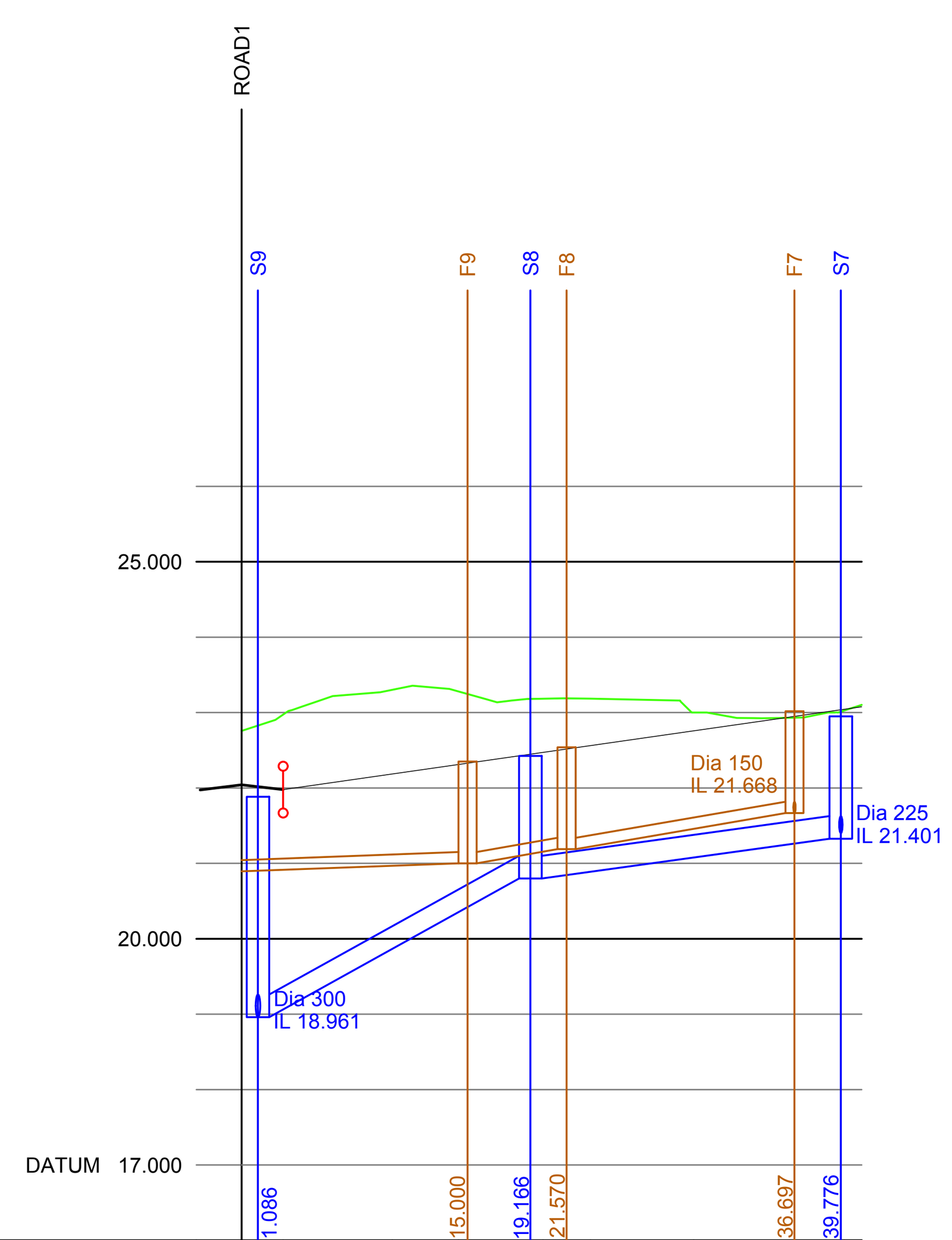
DRAWING NUMBER	SCALE at A1	1:500	REVISION
8007 / SK03	DATE	24.11.22	-
	DRAWN	PW	
	CHECKED	AJ	

DO NOT SCALE



ROAD1

CHAINAGE	0.000; 10.000; 15.000; 16.328; 20.000; 25.000; 30.000; 40.000; 41.026; 50.000; 60.000; 70.000; 80.000; 82.374; 90.000; 92.365; 95.000; 100.000; 105.000; 110.000; 112.365; 120.000; 122.921; 130.000; 138.298
EXISTING GROUND LEVEL	29.280; 27.477; 26.899; 25.561; 25.207; 25.078; 24.569; 23.255; 22.858; 22.265; 21.517; 20.823; 20.339; 19.681; 19.173
ALIGNMENT LEVEL	29.280; 28.780; 28.499; 28.155; 27.749; 27.280; 26.280; 25.280; 24.280; 23.280; 22.280; 21.280; 21.044; 20.795; 20.401; 20.110; 19.922; 19.869; 19.735; 19.560; 19.415
VERTICAL ALIGNMENT	G= -5.000% 1: -20.0; L= 20.000 KF= -4.0; G= -10.000% 1: -10.0; KF= 2.42418 L= 20.000; G= -1.750% 1: -57.2
HORIZONTAL ALIGNMENT	R= 30.000; R= 200.000
STORMWATER COVER LEVEL	28.902; 28.139; 26.908; 24.801; 21.884; 20.372; 19.384
STORMWATER INVERT	27.177 Pipe 1.000 Dia 225 CLAY 1 in 17 12.715 26.414; 26.414 Pipe 1.001 Dia 225 Circular CLAY 1 in 11 12.933 25.183; 25.183 Pipe 1.002 Dia 225 Circular CLAY 1 in 9 20.867 22.876; 22.876 Pipe 1.003 Dia 225 Circular CLAY 1 in 8 29.354 19.036; 18.961 Pipe 1.004 Dia 300 Circular CLAY 1 in 33 16.367 18.472
FOULWATER COVER LEVEL	28.761; 27.873; 26.610; 24.984; 22.235; 20.070; 19.459
FOULWATER INVERT	27.411 Pipe 1.000 Dia 150 Circular CLAY 1 in 15 13.628 26.523; 26.523 Pipe 1.001 Dia 150 Circular CLAY 1 in 11 13.650 25.260; 25.260 Pipe 1.002 Dia 150 Circular CLAY 1 in 10 16.316 23.634; 23.634 Pipe 1.003 Dia 150 Circular CLAY 1 in 10 27.300 20.885; 20.885 Pipe 1.004 Dia 150 Circular CLAY 1 in 11 24.858 18.720; 18.720 Pipe 1.005 Dia 150 Circular CLAY 1 in 47 28.457 18.109



ROAD2

CHAINAGE	0.000; 2.749; 10.000; 14.394; 20.000; 23.156; 30.000; 40.000; 41.162
EXISTING GROUND LEVEL	22.758; 23.302; 23.184; 23.000; 23.027; 23.101
ALIGNMENT LEVEL	21.978; 22.185; 22.471; 22.757; 23.043; 23.076
VERTICAL ALIGNMENT	G= 2.859% 1: 35.0
HORIZONTAL ALIGNMENT	R= 15.000
STORMWATER COVER LEVEL	21.884; 22.425; 22.951
STORMWATER INVERT	18.961 Pipe 2.003 Dia 300 Circular CLAY 1 in 10 17.721 20.800; 20.800 Pipe 2.002 Dia 300 Circular CLAY 1 in 39 20.328 21.326
FOULWATER COVER LEVEL	22.351; 22.539; 23.018
FOULWATER INVERT	Pipe 2.004 Dia 150 Circular CLAY 1 in 141 16.322 21.001; Pipe 2.003 Dia 150 CLAY 1 in 37 6.909 21.189; 21.189 Pipe 2.002 Dia 150 Circular CLAY 1 in 32 15.240 21.668

Notes

1. All dimensions are in millimetres unless otherwise shown.
2. All adoptable drainage shall be constructed in accordance with 'Sewers for Adoption' 7th Edition, Welsh Ministers Standards and Welsh Water Details and Guidelines.
3. All private drainage works are to comply fully with Part H of the Building Regulations.
4. All existing invert levels to be checked by the contractor at the start of works and any other discrepancies notified to the Engineer prior to commencing works. All levels are based on topographical survey information provided by others.
5. It is the responsibility of the Contractor to verify all information given with regards to existing services and drainage connections etc. prior to commencing the works.
6. The Contractor shall adhere to the CDM Regulations at all times.
7. Only trained personnel shall be permitted to enter confined spaces.
8. All materials to bear the relevant B.S. Kitemark and comply fully with the Sewers for Adoption 7th Specification. All concrete & concrete products must use Sulphate resistant cement (unless the site investigation report proves that sulphate attack from soils and groundwater will not occur to withstand a class 3 condition).
9. All opening notices etc. as required under Highways Acts etc. are to be obtained prior to commencement of works. All works are to be inspected by L.A., NHBC or Welsh Water as applicable.
10. Trench backfill in highways to within 1m of highway shall, as directed by the Highway Authority be a suitable granular material all in accordance with Sewers for Adoption.
11. Cover loadings shall be as detailed on the Manhole Schedule.
12. Drain trenches should not be excavated lower than the foundations of any building nearby unless either:
    a) The trench is within 1m of the foundation, the trench is filled with concrete up to the lowest level of the foundation, or
    b) Where the trench is further than 1m from the building, the trench is filled with concrete to a level bellow the lowest level for the building equal to the distance from the build, less 150mm.
13. All SVP and RWP connections are indicative and shall be confirmed by the client.
14. Pipe gradients out of the building to connecting manhole to be laid at 1:40 in accordance with Building Regulations, Part H, Table 6.
15. Where pipe sizes are not indicated :
    100Ø to be used for foul
    100Ø to be used for surface water unless stated otherwise.
16. Minimum surface water gradients shall be:
    100Ø laid at 1:100 with the exception of the first connection which shall be minimum 1:60
    150Ø laid at 1:150
17. Minimum 100Ø foul drainage gradient to be 1:80 with the exception of the first connection which shall be minimum 1:40.
18. Manhole covers to be marked FWS or SW as appropriate.
19. All manhole covers and frames shall comply with BS EN124. All adoptable manholes and chambers shall comply with Sewers for Adoption 7th Edition. Covers in roads to be grade D400 and be 150mm deep. Manhole covers in car parking areas and drives to be grade B125 and covers in landscaping areas to be grade A15. All to be sized in accordance with Building Regulations Part H, Tables 11 & 12. "In-fill" type covers should not be used. Where a cover is located in an area of block paving, the bottom of the frame should be 150mm deep.
20. Precast concrete rings to be reinforced.
21. Backdrops in private manholes / inspection chambers to be internal
22. Private drains laid under adopted / private roads to be Class S granular bed and surround with a minimum of 1.2m cover, where this cannot be achieved a Class Z concrete bed and surround shall be provided.
23. Private drains located under landscape areas or driveways / car parking bays to be Class B granular bed and surround with a minimum 0.6m cover, where this cannot be achieved a Class Z concrete bed and surround shall be provided.
24. Pipes have not been designed to accommodate construction traffic loading. The contractor is responsible for providing adequate protection to the pipes during construction.
25. Slab levels shall not be varied without reference to the Engineer for guidance.
26. The developer must self-vet and certify that the design criteria, material standards and workmanship specifications for the proposed adoptable sewers are in accordance with those set out in "Sewers for Adoption" 7th Edition (SFA 7th), The Welsh Ministers Standards and the requirement of DCWW as the Statutory Sewerage Undertaker.
27. Subject to a Section 104 Adoption Agreement being complete, a Section 106 application to connect must be made to DCWW the developer shall be given 21 days notice prior to connection. The works may only be undertaken by an SSIP Health & Safety approved contractor.

Class 'S' bed and surround to all pipes unless stated otherwise.
Class 'Z' bed and surround to pipes where cover < 1.2m as indicated on longsections.

All connections are soffit to soffit

STRATEGY

coopers
chartered consulting engineers
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU

Client
Castle Green

Project
MIDNANT FARM,
PRESTATYN.

Title
Highway Longsections

DRAWING NUMBER	SCALE at A1	1:500 H, 1:100 V	
8007 / SK04	DATE	23.11.22	REVISION
	DRAWN	PW	-
	CHECKED	AJ	

Appendix 7

MicroDrainage Calculation

Source Control Greenfield Run-off Calculation

Preliminary Surface Water Design

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Andy Jones
Site name:	Midnant Farm
Site location:	Prestatyn

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

Site Details

Latitude:	53.33681° N
Longitude:	3.38619° W
Reference:	3274103680
Date:	Jun 14 2022 16:54

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1.45

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

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

Hydrological characteristics	Default	Edited
SAAR (mm):	718	718
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	2.72	7.21
1 in 1 year (l/s):	2.4	6.35
1 in 30 years (l/s):	4.85	12.84
1 in 100 year (l/s):	5.93	15.72
1 in 200 years (l/s):	6.7	17.74

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 8007 SW01.SWS

Pipe Sizes 8007 SW01 Manhole Sizes 8007 SW01

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	17.200	Add Flow / Climate Change (%)	0
Ratio R	0.372	Minimum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	400

Designed with Level Soffits

Network Design Table for 8007 SW01.SWS

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	12.715	0.763	16.7	0.085	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	12.933	1.231	10.5	0.024	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	20.867	2.307	9.0	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	29.355	3.840	7.6	0.087	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	27.431	2.825	9.7	0.102	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	29.824	1.274	23.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	20.328	0.526	38.6	0.098	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.003	17.721	1.839	9.6	0.060	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	16.367	0.489	33.5	0.085	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	11.172	0.122	91.6	0.056	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	24.711	0.062	398.6	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	16.707	0.538	31.1	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.07	27.177	0.085	0.0	0.0	0.0	3.22	128.1	11.5
1.001	50.00	5.12	26.414	0.109	0.0	0.0	0.0	4.06	161.4	14.8
1.002	50.00	5.20	25.183	0.123	0.0	0.0	0.0	4.38	174.0	16.7
1.003	50.00	5.30	22.876	0.210	0.0	0.0	0.0	4.76	189.4	28.4
2.000	50.00	5.11	25.500	0.102	0.0	0.0	0.0	4.22	168.0	13.8
2.001	50.00	5.29	22.675	0.102	0.0	0.0	0.0	2.72	108.0	13.8
2.002	50.00	5.42	21.326	0.200	0.0	0.0	0.0	2.54	179.3	27.1
2.003	50.00	5.48	20.800	0.260	0.0	0.0	0.0	5.09	360.0	35.2
1.004	50.00	5.58	18.961	0.555	0.0	0.0	0.0	2.73	192.8	75.2
1.005	50.00	5.70	18.472	0.611	0.0	0.0	0.0	1.64	116.2	82.7
1.006	50.00	6.10	17.900	0.611	0.0	0.0	0.0	1.01	161.0	82.7
1.007	50.00	6.18	17.838	0.611	0.0	0.0	0.0	3.66	581.9	82.7

Network Design Table for 8007 SW01.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.008	19.986	0.050	399.7	0.061	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	10.756	0.635	16.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.010	77.019	4.065	18.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.011	30.464	1.600	19.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.012	40.131	1.900	21.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.013	11.238	0.177	63.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.014	86.994	0.580	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.015	48.725	0.325	149.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.016	12.610	0.084	150.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.008	50.00	6.51	17.300	0.672	0.0	0.0	0.0	1.01	160.7	91.0
1.009	50.00	6.58	17.250	0.672	0.0	0.0	0.0	2.46	43.5«	91.0
1.010	50.00	7.13	16.615	0.672	0.0	0.0	0.0	2.32	41.1«	91.0
1.011	50.00	7.35	12.550	0.672	0.0	0.0	0.0	2.32	41.0«	91.0
1.012	50.00	7.66	10.950	0.672	0.0	0.0	0.0	2.20	38.9«	91.0
1.013	50.00	7.80	9.050	0.672	0.0	0.0	0.0	1.26	22.3«	91.0
1.014	50.00	9.58	8.873	0.672	0.0	0.0	0.0	0.82	14.5«	91.0
1.015	50.00	10.57	8.293	0.672	0.0	0.0	0.0	0.82	14.5«	91.0
1.016	50.00	10.83	7.968	0.672	0.0	0.0	0.0	0.82	14.5«	91.0

Manhole Schedules for 8007 SW01.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	28.902	1.725	Open Manhole	1500	1.000	27.177	225				
2	28.139	1.725	Open Manhole	1500	1.001	26.414	225	1.000	26.414	225	
3	26.908	1.725	Open Manhole	1500	1.002	25.183	225	1.001	25.183	225	
4	24.801	1.925	Open Manhole	1500	1.003	22.876	225	1.002	22.876	225	
5	28.339	2.839	Open Manhole	1500	2.000	25.500	225				
6	24.100	1.425	Open Manhole	1500	2.001	22.675	225	2.000	22.675	225	
7	22.951	1.625	Open Manhole	1500	2.002	21.326	300	2.001	21.401	225	
8	22.425	1.625	Open Manhole	1500	2.003	20.800	300	2.002	20.800	300	
9	21.884	2.923	Open Manhole	1500	1.004	18.961	300	1.003	19.036	225	
								2.003	18.961	300	
10	20.372	1.900	Open Manhole	1500	1.005	18.472	300	1.004	18.472	300	
11	22.000	4.100	Open Manhole	1500	1.006	17.900	450	1.005	18.350	300	300
12	20.500	2.662	Open Manhole	1500	1.007	17.838	450	1.006	17.838	450	
13	19.384	2.084	Open Manhole	1800	1.008	17.300	450	1.007	17.300	450	
14	18.900	1.650	Open Manhole	2100	1.009	17.250	150	1.008	17.250	450	
15	17.965	1.350	Open Manhole	1350	1.010	16.615	150	1.009	16.615	150	
16	13.900	1.350	Open Manhole	1350	1.011	12.550	150	1.010	12.550	150	
17	12.300	1.350	Open Manhole	1350	1.012	10.950	150	1.011	10.950	150	
18	10.400	1.350	Open Manhole	1350	1.013	9.050	150	1.012	9.050	150	
19	10.000	1.127	Open Manhole	1350	1.014	8.873	150	1.013	8.873	150	
20	9.500	1.207	Open Manhole	1350	1.015	8.293	150	1.014	8.293	150	
21	9.100	1.132	Open Manhole	1350	1.016	7.968	150	1.015	7.968	150	
22	9.100	1.216	Open Manhole	0		OUTFALL		1.016	7.884	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	307824.048	383095.126	307824.048	383095.126	Required	
2	307817.283	383105.892	307817.283	383105.892	Required	
3	307807.245	383114.046	307807.245	383114.046	Required	
4	307787.305	383120.196	307787.305	383120.196	Required	
5	307767.298	383057.354	307767.298	383057.354	Required	
6	307752.648	383080.546	307752.648	383080.546	Required	

Manhole Schedules for 8007 SW01.SWS

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
7	307735.177	383104.716	307735.177	383104.716	Required	
8	307752.401	383115.511	307752.401	383115.511	Required	
9	307760.185	383131.431	307760.185	383131.431	Required	
10	307745.769	383139.180	307745.769	383139.180	Required	
11	307738.735	383130.501	307738.735	383130.501	Required	
12	307720.300	383146.957	307720.300	383146.957	Required	
13	307717.887	383163.488	307717.887	383163.488	Required	
14	307730.031	383179.362	307730.031	383179.362	Required	
15	307736.566	383187.904	307736.566	383187.904	Required	
16	307677.728	383237.603	307677.728	383237.603	Required	
17	307697.110	383261.106	307697.110	383261.106	Required	
18	307704.917	383300.470	307704.917	383300.470	Required	
19	307701.702	383311.238	307701.702	383311.238	Required	
20	307616.522	383293.564	307616.522	383293.564	Required	
21	307569.301	383281.551	307569.301	383281.551	Required	
22	307562.595	383270.873			No Entry	

PIPELINE SCHEDULES for 8007 SW01.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	28.902	27.177	1.500	Open Manhole	1500
1.001	o	225	2	28.139	26.414	1.500	Open Manhole	1500
1.002	o	225	3	26.908	25.183	1.500	Open Manhole	1500
1.003	o	225	4	24.801	22.876	1.700	Open Manhole	1500
2.000	o	225	5	28.339	25.500	2.614	Open Manhole	1500
2.001	o	225	6	24.100	22.675	1.200	Open Manhole	1500
2.002	o	300	7	22.951	21.326	1.325	Open Manhole	1500
2.003	o	300	8	22.425	20.800	1.325	Open Manhole	1500
1.004	o	300	9	21.884	18.961	2.623	Open Manhole	1500
1.005	o	300	10	20.372	18.472	1.600	Open Manhole	1500
1.006	o	450	11	22.000	17.900	3.650	Open Manhole	1500
1.007	o	450	12	20.500	17.838	2.212	Open Manhole	1500
1.008	o	450	13	19.384	17.300	1.634	Open Manhole	1800
1.009	o	150	14	18.900	17.250	1.500	Open Manhole	2100
1.010	o	150	15	17.965	16.615	1.200	Open Manhole	1350
1.011	o	150	16	13.900	12.550	1.200	Open Manhole	1350
1.012	o	150	17	12.300	10.950	1.200	Open Manhole	1350
1.013	o	150	18	10.400	9.050	1.200	Open Manhole	1350
1.014	o	150	19	10.000	8.873	0.977	Open Manhole	1350
1.015	o	150	20	9.500	8.293	1.057	Open Manhole	1350
1.016	o	150	21	9.100	7.968	0.982	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	12.715	16.7	2	28.139	26.414	1.500	Open Manhole	1500
1.001	12.933	10.5	3	26.908	25.183	1.500	Open Manhole	1500
1.002	20.867	9.0	4	24.801	22.876	1.700	Open Manhole	1500
1.003	29.355	7.6	9	21.884	19.036	2.623	Open Manhole	1500
2.000	27.431	9.7	6	24.100	22.675	1.200	Open Manhole	1500
2.001	29.824	23.4	7	22.951	21.401	1.325	Open Manhole	1500
2.002	20.328	38.6	8	22.425	20.800	1.325	Open Manhole	1500
2.003	17.721	9.6	9	21.884	18.961	2.623	Open Manhole	1500
1.004	16.367	33.5	10	20.372	18.472	1.600	Open Manhole	1500
1.005	11.172	91.6	11	22.000	18.350	3.350	Open Manhole	1500
1.006	24.711	398.6	12	20.500	17.838	2.212	Open Manhole	1500
1.007	16.707	31.1	13	19.384	17.300	1.634	Open Manhole	1800
1.008	19.986	399.7	14	18.900	17.250	1.200	Open Manhole	2100
1.009	10.756	16.9	15	17.965	16.615	1.200	Open Manhole	1350
1.010	77.019	18.9	16	13.900	12.550	1.200	Open Manhole	1350
1.011	30.464	19.0	17	12.300	10.950	1.200	Open Manhole	1350
1.012	40.131	21.1	18	10.400	9.050	1.200	Open Manhole	1350
1.013	11.238	63.5	19	10.000	8.873	0.977	Open Manhole	1350
1.014	86.994	150.0	20	9.500	8.293	1.057	Open Manhole	1350
1.015	48.725	149.9	21	9.100	7.968	0.982	Open Manhole	1350
1.016	12.610	150.1	22	9.100	7.884	1.066	Open Manhole	0

Free Flowing Outfall Details for 8007 SW01.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.016	22	9.100	7.884	0.000	0	0

Simulation Criteria for 8007 SW01.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.200	Storm Duration (mins)	30
Ratio R	0.372		

Online Controls for 8007 SW01.SWS

Hydro-Brake® Optimum Manhole: 14, DS/PN: 1.009, Volume (m³): 8.6

Unit Reference	MD-SHE-0100-5000-1350-5000
Design Head (m)	1.350
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	17.250
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	5.0	Kick-Flo®	0.829	4.0
Flush-Flo™	0.400	5.0	Mean Flow over Head Range	-	4.4

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)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.7	3.000	7.3	7.000	10.9
0.200	4.6	1.400	5.1	3.500	7.8	7.500	11.2
0.300	4.9	1.600	5.4	4.000	8.3	8.000	11.6
0.400	5.0	1.800	5.7	4.500	8.8	8.500	11.9
0.500	5.0	2.000	6.0	5.000	9.2	9.000	12.2
0.600	4.8	2.200	6.3	5.500	9.7	9.500	12.6
0.800	4.2	2.400	6.5	6.000	10.1		
1.000	4.4	2.600	6.8	6.500	10.5		

Storage Structures for 8007 SW01.SWS

Tank or Pond Manhole: 12, DS/PN: 1.007

Invert Level (m) 17.838

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	300.0	0.400	375.0	0.800	450.0	1.200	530.0

Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.000	1	3.048	0.506	0.000	3.554
1.001	2	3.048	0.514	0.000	3.563
1.002	3	3.048	0.830	0.000	3.878
1.003	4	3.402	1.167	0.000	4.569
2.000	5	5.017	1.091	0.000	6.108
2.001	6	2.518	1.186	0.000	3.704
2.002	7	2.872	1.437	0.000	4.309
2.003	8	2.872	1.253	0.000	4.124
1.004	9	5.165	1.157	0.000	6.322
1.005	10	3.358	0.790	0.000	4.147
1.006	11	7.245	3.930	0.000	11.175
1.007	12	4.704	2.657	1270.136	1277.497
1.008	13	5.303	3.179	0.000	8.482
1.009	14	5.715	0.190	0.000	5.905
1.010	15	1.932	1.361	0.000	3.293
1.011	16	1.932	0.538	0.000	2.471
1.012	17	1.932	0.709	0.000	2.642
1.013	18	1.932	0.199	0.000	2.131
1.014	19	1.613	1.537	0.000	3.150
1.015	20	1.728	0.861	0.000	2.589
1.016	21	1.620	0.223	0.000	1.843
Total		70.006	25.313	1270.136	1365.455

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 8007 SW01.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.200	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.371	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	1	15 Winter	1	+0%					27.222	-0.180
1.001	2	15 Winter	1	+0%					26.459	-0.180
1.002	3	15 Winter	1	+0%					25.228	-0.180
1.003	4	15 Winter	1	+0%					22.929	-0.172
2.000	5	15 Winter	1	+0%					25.541	-0.184
2.001	6	15 Winter	1	+0%					22.726	-0.174
2.002	7	15 Winter	1	+0%	100/15 Summer				21.400	-0.226
2.003	8	15 Winter	1	+0%	100/15 Summer				20.860	-0.240
1.004	9	15 Winter	1	+0%	30/15 Summer				19.084	-0.177
1.005	10	15 Winter	1	+0%	30/15 Summer				18.663	-0.109
1.006	11	15 Winter	1	+0%	30/15 Summer				18.116	-0.234
1.007	12	120 Winter	1	+0%	100/30 Summer				17.969	-0.319
1.008	13	120 Winter	1	+0%	1/15 Summer				17.976	0.226
1.009	14	120 Winter	1	+0%	1/15 Summer				17.976	0.576
1.010	15	1440 Summer	1	+0%					16.649	-0.116
1.011	16	1440 Summer	1	+0%					12.585	-0.115
1.012	17	1440 Summer	1	+0%					10.986	-0.114
1.013	18	1440 Summer	1	+0%					9.100	-0.100
1.014	19	1440 Summer	1	+0%					8.933	-0.090
1.015	20	1440 Summer	1	+0%					8.354	-0.089
1.016	21	1440 Summer	1	+0%					8.031	-0.087

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 8007 SW01.SWS

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.000	0.09			9.8	OK	
1.001	2	0.000	0.09			12.1	OK	
1.002	3	0.000	0.09			13.6	OK	
1.003	4	0.000	0.13			22.1	OK	
2.000	5	0.000	0.08			11.8	OK	
2.001	6	0.000	0.12			11.7	OK	
2.002	7	0.000	0.14			21.3	OK	
2.003	8	0.000	0.09			27.3	OK	
1.004	9	0.000	0.35			57.8	OK	
1.005	10	0.000	0.72			63.4	OK	
1.006	11	0.000	0.46			62.5	OK	
1.007	12	0.000	0.04			15.9	OK	
1.008	13	0.000	0.09			11.4	SURCHARGED	
1.009	14	0.000	0.12			4.9	SURCHARGED	
1.010	15	0.000	0.12			4.9	OK	
1.011	16	0.000	0.12			4.9	OK	
1.012	17	0.000	0.13			4.9	OK	
1.013	18	0.000	0.24			4.9	OK	
1.014	19	0.000	0.34			4.9	OK	
1.015	20	0.000	0.35			4.9	OK	
1.016	21	0.000	0.37			4.9	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 8007 SW01.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.200	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.371	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	1	15 Winter	30	+0%					27.248	-0.154
1.001	2	15 Winter	30	+0%					26.486	-0.153
1.002	3	15 Winter	30	+0%					25.256	-0.152
1.003	4	15 Winter	30	+0%					22.968	-0.133
2.000	5	15 Winter	30	+0%					25.566	-0.159
2.001	6	15 Winter	30	+0%					22.757	-0.143
2.002	7	15 Winter	30	+0%	100/15 Summer				21.454	-0.172
2.003	8	15 Winter	30	+0%	100/15 Summer				20.902	-0.198
1.004	9	15 Winter	30	+0%	30/15 Summer				19.607	0.346
1.005	10	15 Winter	30	+0%	30/15 Summer				19.129	0.357
1.006	11	15 Winter	30	+0%	30/15 Summer				18.369	0.019
1.007	12	240 Winter	30	+0%	100/30 Summer				18.274	-0.014
1.008	13	240 Winter	30	+0%	1/15 Summer				18.279	0.529
1.009	14	240 Winter	30	+0%	1/15 Summer				18.279	0.879
1.010	15	480 Summer	30	+0%					16.649	-0.116
1.011	16	720 Winter	30	+0%					12.585	-0.115
1.012	17	1440 Summer	30	+0%					10.986	-0.114
1.013	18	480 Summer	30	+0%					9.100	-0.100
1.014	19	720 Winter	30	+0%					8.933	-0.090
1.015	20	1440 Summer	30	+0%					8.354	-0.089
1.016	21	1440 Summer	30	+0%					8.031	-0.087

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 8007 SW01.SWS

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.000	0.22			24.1	OK	
1.001	2	0.000	0.22			31.2	OK	
1.002	3	0.000	0.22			35.2	OK	
1.003	4	0.000	0.35			61.3	OK	
2.000	5	0.000	0.19			29.0	OK	
2.001	6	0.000	0.28			28.6	OK	
2.002	7	0.000	0.37			58.1	OK	
2.003	8	0.000	0.25			76.0	OK	
1.004	9	0.000	0.97			158.6	SURCHARGED	
1.005	10	0.000	2.00			174.6	SURCHARGED	
1.006	11	0.000	1.27			171.1	SURCHARGED	
1.007	12	0.000	0.03			10.6	OK	
1.008	13	0.000	0.06			8.1	SURCHARGED	
1.009	14	0.000	0.12			4.9	SURCHARGED	
1.010	15	0.000	0.12			4.9	OK	
1.011	16	0.000	0.12			4.9	OK	
1.012	17	0.000	0.13			4.9	OK	
1.013	18	0.000	0.24			4.9	OK	
1.014	19	0.000	0.34			4.9	OK	
1.015	20	0.000	0.35			4.9	OK	
1.016	21	0.000	0.37			4.9	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 8007 SW01.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.200	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.371	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	1	15 Winter	100	+50%					27.280	-0.122
1.001	2	15 Winter	100	+50%					26.518	-0.121
1.002	3	15 Winter	100	+50%					25.287	-0.121
1.003	4	15 Winter	100	+50%					23.023	-0.078
2.000	5	15 Winter	100	+50%					25.594	-0.131
2.001	6	15 Winter	100	+50%					22.796	-0.104
2.002	7	15 Winter	100	+50%	100/15 Summer				22.019	0.393
2.003	8	15 Winter	100	+50%	100/15 Summer				21.798	0.698
1.004	9	15 Winter	100	+50%	30/15 Summer				21.356	2.095
1.005	10	15 Winter	100	+50%	30/15 Summer				20.027	1.255
1.006	11	360 Winter	100	+50%	30/15 Summer				18.770	0.420
1.007	12	360 Winter	100	+50%	100/30 Summer				18.768	0.480
1.008	13	480 Winter	100	+50%	1/15 Summer				18.816	1.066
1.009	14	480 Winter	100	+50%	1/15 Summer				18.833	1.433
1.010	15	480 Winter	100	+50%					16.651	-0.114
1.011	16	480 Winter	100	+50%					12.586	-0.114
1.012	17	480 Winter	100	+50%					10.987	-0.113
1.013	18	360 Winter	100	+50%					9.102	-0.098
1.014	19	480 Winter	100	+50%					8.936	-0.087
1.015	20	480 Winter	100	+50%					8.356	-0.087
1.016	21	480 Winter	100	+50%					8.034	-0.084

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 8007 SW01.SWS

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.000	0.42			46.7	OK	
1.001	2	0.000	0.43			60.3	OK	
1.002	3	0.000	0.43			68.1	OK	
1.003	4	0.000	0.67			118.4	OK	
2.000	5	0.000	0.36			56.1	OK	
2.001	6	0.000	0.55			55.5	OK	
2.002	7	0.000	0.66			103.8	SURCHARGED	
2.003	8	0.000	0.44			134.7	SURCHARGED	
1.004	9	0.000	1.63			266.5	SURCHARGED	
1.005	10	0.000	3.35			293.1	SURCHARGED	
1.006	11	0.000	0.38			50.8	SURCHARGED	
1.007	12	0.000	0.06			23.7	SURCHARGED	
1.008	13	0.000	0.11			14.7	SURCHARGED	
1.009	14	0.000	0.14			5.3	FLOOD RISK	
1.010	15	0.000	0.13			5.3	OK	
1.011	16	0.000	0.13			5.3	OK	
1.012	17	0.000	0.14			5.3	OK	
1.013	18	0.000	0.26			5.3	OK	
1.014	19	0.000	0.37			5.3	OK	
1.015	20	0.000	0.37			5.3	OK	
1.016	21	0.000	0.40			5.3	OK	