



Outline Drainage Strategy

Hanmer Arms, Hanmer

Carlton Holdings Ltd

MAN.244.002.HY.R.001.B



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Executive Summary

This report presents an Outline Drainage Strategy exercise for a proposed touring park development, located on land north of the Hanmer Arms, Hanmer.

The report has included an assessment of the surface water drainage requirements of the Site and details the flood risk and how this could be managed and mitigated to allow the Site to be developed in support of the outline planning application. The FRA has demonstrated the following:

- The 1.5ha wider Site comprises an agricultural land.
- The soils and geology indicate a low infiltration potential. It is assumed that drainage is primarily via overland flow, following the topography of the Site to the topographic low point (unnamed land drain). Infiltration-based SuDS should be utilised in the first instance however the infiltration potential suggests they would not be feasible on this Site (this would need confirming through soakaway testing).
- The unnamed land drain conveys flows just outside the northeast of the Site but within the wider land ownership.

The Drainage Strategy has considered the potential impact of the development on surface water runoff rates, given the increase in impermeable areas post-development. It has been demonstrated that surface water runoff will have a negligible increase, runoff will be managed through outfall to swale and, in turn, the unnamed land drain.

Foul water will discharge to the private foul sewer within Hanmer Road to the south east of the Site.

The report demonstrates that the proposed development would be operated with minimal risk from flooding and would not increase flood risk elsewhere. The development should therefore not be precluded on the grounds of flood risk, as well as surface water and foul drainage.

1.0 Introduction

1.1 Background

- 1.1.1 Enzygo Ltd was commissioned by Carlton Holdings Ltd to carry out an Outline Drainage Strategy for a touring park development located on land north of Hanmer Arms, Hanmer (the 'Site').

1.2 Purpose

- 1.2.1 The purpose of this report is to understand the baseline conditions and drainage issues, advise of additional works that may be required in support of the proposed development and identify potential constraints and opportunities when considering the wider development area.

1.3 Scope of Works

- 1.3.1 The scope of work includes:
- Site walkover to observe current land use, topography and drainage features.
 - Undertake a desktop study of OS mapping, soils and geology map, borehole records and flood/catchment mapping.
 - Review online drainage policy and guidance documents.
 - Consult with the LLFA/SAB.
 - Obtain Welsh Water asset plans [including manhole/invert levels and pipe sizes].
 - Undertake a pre-development enquiry with Welsh Water if an outfall to sewer is pursued. The pre-development enquiry is required to agree a point of outfall and allowable discharge rate.
 - Obtain catchment descriptors from the Flood Estimation Handbook [FEH] Web Service.
 - Undertake an assessment of the potential surface water and foul drainage from the proposed development that will aim to identify: an appropriate discharge rate; discharge point[s]; storage requirement; pipe sizes and Sustainable Drainage System [SuDS] options.
 - Develop an outline drainage strategy for the proposed development.

1.4 Report Structure

1.4.1 This report is structured as follows:

- Section 2 provides a summary of national, regional and local drainage policy/guidance.
- Section 3 describes the baseline conditions for the existing Site.
- Section 4 scopes the baseline surface water drainage arrangement, potential impacts of the proposed development on surface water drainage and potential mitigation for those effects; and
- Section 5 presents a summary, conclusions and recommendations.

2.0 Planning Context

2.1 Introduction

- 2.1.1 This section sets out the national, regional and local planning policy and guidance relevant to the management of surface water and flooding applicable to the proposed development.

2.2 National Policy & Guidance

- Welsh Government (2016) *Flood Consequence Assessments: Climate Change Allowances*. Making an allowance for climate change in a Flood Consequence Assessment will help to minimise vulnerability and provide resilience to flooding and coastal change in the future. The climate change allowances are produced by the Natural Resources Wales and are predictions of anticipated change for:

- peak river flow by river basin district
- peak rainfall intensity
- sea level rise
- offshore wind speed and extreme wave height

They are based on climate change projections and different scenarios of carbon dioxide (CO₂) emissions to the atmosphere. There are allowances for different periods of time over the next century.

- Welsh Government (2018) *Planning Policy Wales (PPW)*. The PPW was published in December 2018; it sets out the Government planning policies for Wales and outlines how these are expected to be applied. Paragraphs 6.6 of the PPW is relevant to flooding and drainage.

Welsh Assembly Government (2004) *Planning Policy Wales Technical Advice Note 15: Development and Flood Risk*. Technical guidance which supports policy set out in PPW and provides framework for flooding from rivers and the sea.

2.3 Regional/Local Policy and Guidance

- Wrexham County Borough Council (2013) *Local Flood Risk Management Strategy*.

2.4 Best Practice and Guidance

- *UK Sustainable Drainage Guidance*. The UK SUDS Tools website <http://www.uksuds.com/drainagecalculation-tools/greenfield-runoff-rate-estimation> provides estimation tools for the design and evaluation of surface water management systems. The website has been developed and is supported by HR Wallingford. The website provides estimates for greenfield runoff and storage analysis.
- *BS 8582:2013 Code of practice for surface water management for development sites*. The British Standard gives recommendation on the planning, design, construction and maintenance of surface water management systems for new development and redevelopment sites in minimizing and/or mitigating flooding and maximizing the social and environmental benefits.

- *Welsh Government Sustainable Drainage (SuDS) Statutory Guidance* (2019). For local authorities on the implementation of Schedule 3 to the Flood and Water Management Act 2010, the mandatory use of SuDS on new developments and approval and adoption by the SuDS approving body (the SAB).
- *CIRIA SUDS Manual (C753), 2015*. This guidance document provides comprehensive information on the all aspects of the life cycle of sustainable drainage from initial planning, design through to construction and management including landscaping, waste management and costs.
- *BRE Digest 365 (2016) Soakaway Design*. Provides guidance for designers to support planning and development applications.
- *WRc (2012) Sewers for Adoption (7th Edition)*: Contains guidance for the design and construction of sewers that are adoptable by Sewerage Undertakers in England and Wales in accordance with Section 104 of the Water Industry Act 1991. In areas covered by Water and Sewerage Companies where Section 42 of the Flood and Water Management Act has not been implemented, the existing Sewers for Adoption 6th edition is still applicable.

3.0 Site Location and Description

3.1 Location

- 3.1.1 The Site is located on land north of the Hanmer Arms, Hanmer, SY13 3DE and is centred on National Grid Reference (NGR) 345438, 339975.
- 3.1.2 The 1.5ha wider land ownership boundary (blue line) and Site boundary (red line) is shown in Figure 3.1.

3.2 Land Use

- 3.2.1 The land use is comprised of an agricultural (grazing) field, bordered by hedgerows and mature trees (Figures 3.1 and 3.2).
- 3.2.2 The Site is bounded by the A539 to the northwest, Hanmer Village Road to the northeast, a road leading to Hanmer Arms to the southeast and agricultural land to the southwest.
- 3.2.3 Access is currently via gated access off the A539 to the northwest of the Site and via the private road leading to the Hanmer Arms to the south east.
- 3.2.4 A Site walkover was undertaken during July 2019 to confirm the above observations and descriptions throughout this report.

Figure 3.1: Aerial Image of the Site



Image © 2019 Digital Globe.

Figure 3.2: General Photographs of the Site

Top: View looking north from southern Site entrance. **Bottom:** View looking south from central northern boundary

3.3 Topographic Information

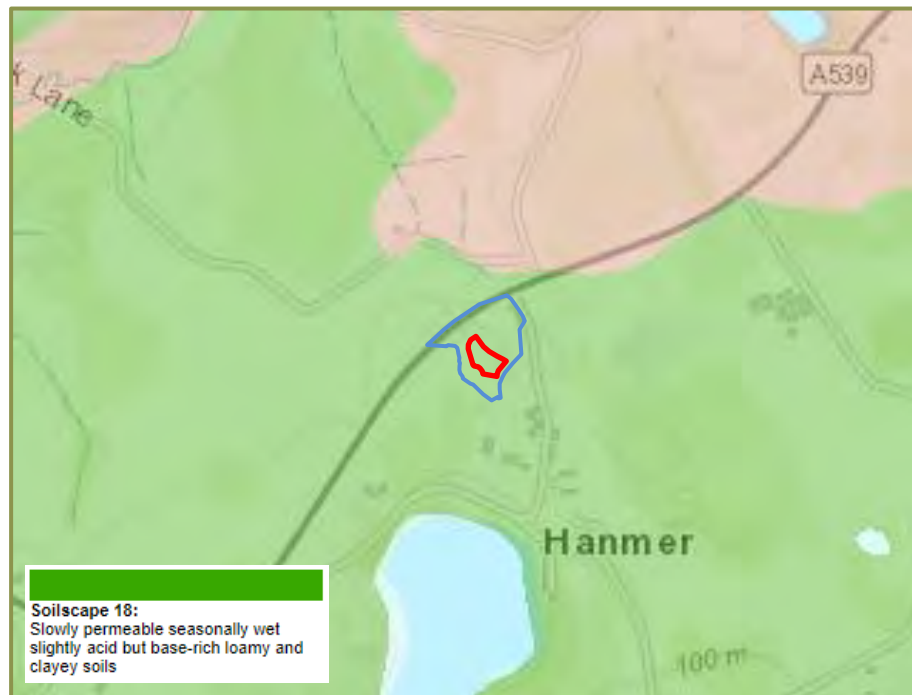
- 3.3.1 A detailed topographic survey was carried out during September 2018 and a copy is included as (Appendix 1). The wider Site has a topographical high point within the north west corner of the Site at 83.04m metres Above Ordnance Datum (m AOD) from here the Site slopes in an easterly direction to a depression within the north west of the Site at 78.95mAOD. A fall of 4.09m over 40m (1:10). The wider Site climbs to a second peak of 82.18m within the north centre of the Site.
- 3.3.2 The Site slopes west, east and south from the peak. Overall the Site slopes east from here to a low point of 75.45 mAOD (north east corner) The fall of 6.73m over 90m gives a gradient of 1:13.

3.4 Soils and Geology

Soils Mapping

- 3.4.1 The Soilscape online soils map viewer (Figure 3.3) shows the Site is underlain by slowly permeable, seasonally wet loamy and clayey soils. The soils are indicative of low infiltration potential.

Figure 3.3: Soils Mapping

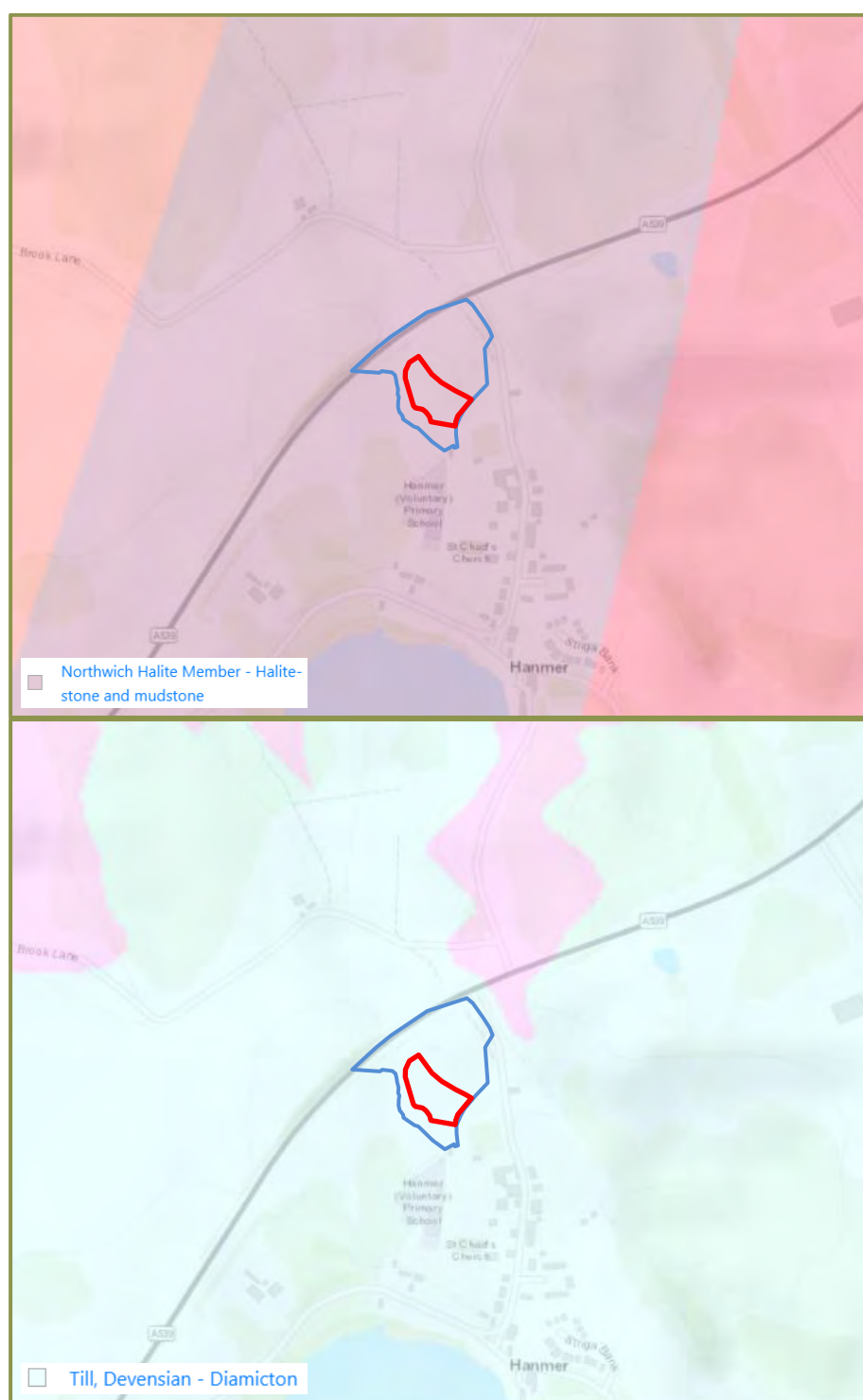


Soils Data © Cranfield University (NSRI) and for the Controller of HMSO [2019].

Geology Mapping

- 3.4.2 The Geology of Britain online map viewer (Figure 3.4) shows the Site is underlain by Till, Devensian - Diamicton superficial deposits.
- 3.4.3 The bedrock beneath the Site (Figure 3.4) is Northwich Halite Member - Halite-stone and mudstone.
- 3.4.4 It is recommended that trial pits and geology logging is undertaken as part of any onsite soakaway testing to confirm the onsite geology.

Figure 3.4: Geology Mapping



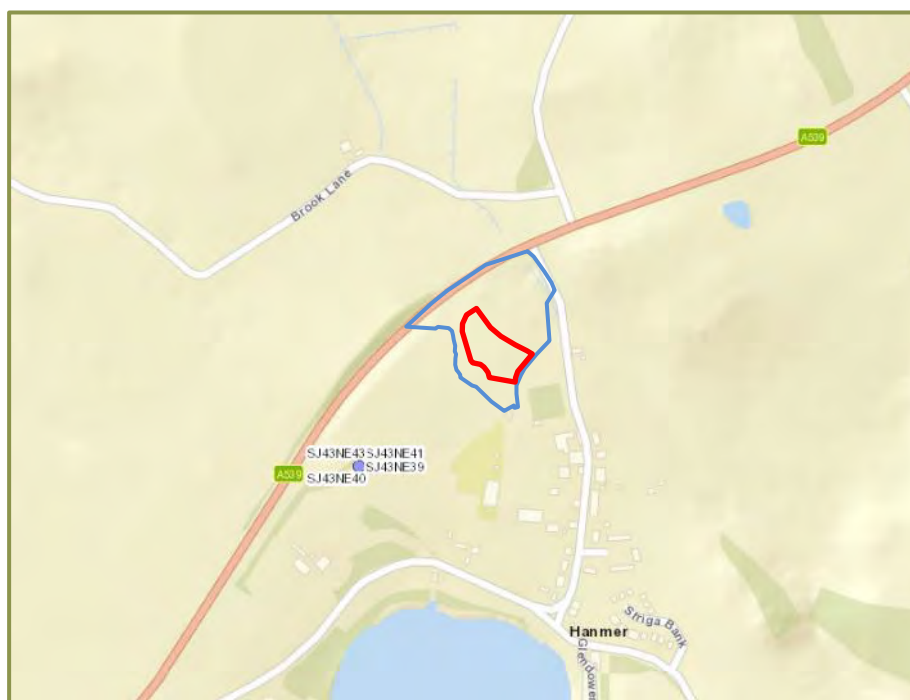
Top: Bedrock Geology Bottom: Superficial Deposits. Contains British Geological Survey materials © NERC [2019].

BGS Borehole Logs

- 3.4.5 The Geology of Britain online map viewer (Figure 3.5) shows there are no records of boreholes within the Site boundary.
- 3.4.6 The nearest five boreholes are located to the southwest of the Site, within the same mapped superficial deposits and bedrock as the Site. A summary of the borehole logs is included in

Table 3.1 and a copy of the logs are included in Appendix 2. The mudstone bedrock was not encountered any of the boreholes to depths of 3.66mbgl.

Figure 3.5: Borehole Mapping



Contains British Geological Survey materials © NERC [2019].

Table 3.1: BGS Borehole Data

Reference	Summary of Strata	Depth (m bgl)	Groundwater Depth (m bgl)
SJ43NE39	0.00 - 0.56m = topsoil. 0.56 - 3.66m = sand.	3.66	Not encountered
SJ43NE40	0.00 - 0.41m = topsoil. 0.41 - 3.66m = sand and gravel.	3.66	Not encountered
SJ43NE41	0.00 - 0.15m = topsoil. 0.15 - 3.66m = sand.	3.66	Not encountered
SJ43NE42	0.00 - 0.18m = topsoil. 0.18 - 3.66m = sand.	3.66	Not encountered
SJ43NE43	0.00 - 0.25m = topsoil. 0.25 - 3.66m = sand.	3.66	Not encountered

Contains British Geological Survey materials © NERC [2019].

3.5 Hydrogeology

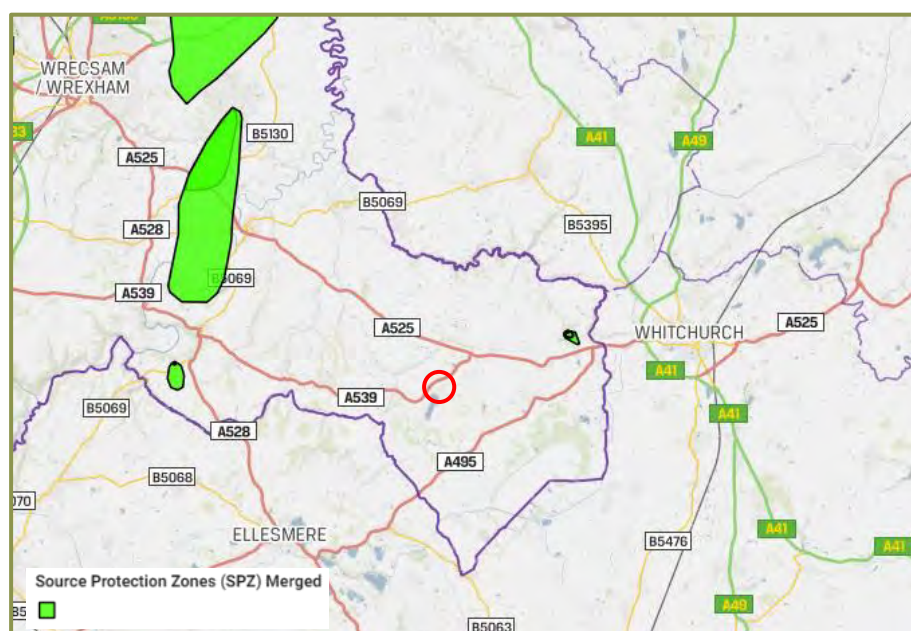
Borehole Logs

- 3.5.1 Groundwater ingress was not encountered in the nearest five borehole logs (Figure 3.5 and Table 3.1).
- 3.5.2 The infiltration potential of the soils and geology is likely to be low given the mudstone bedrock and till superficial deposits, however this would need to be confirmed through soakaway testing.

Defra Magic Map

- 3.5.3 Natural Resources Wales online mapping (Figure 3.6) shows the Site is not located in a groundwater Source Protection Zone (SPZ). These zones show the risk of contamination to public water supply (PWS) from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The risk to any PWS is assessed as negligible.

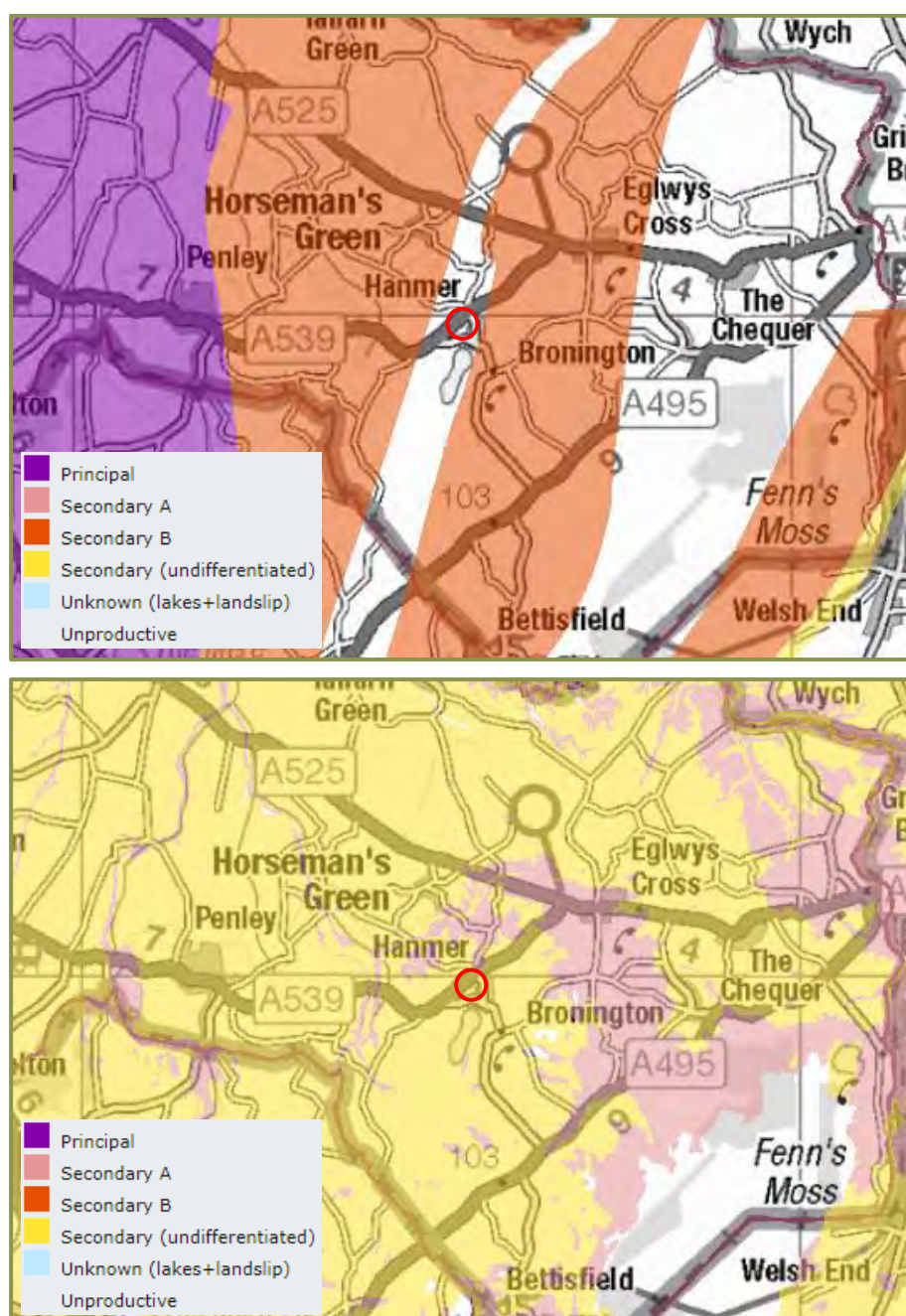
Figure 3.6: Source Protection Zone Map



Contains Natural Resources Wales information © Natural Resources Wales and database right.

- 3.5.4 Defra Magic Map online mapping (Figure 3.7) shows the Site is located above a Secondary Undifferentiated aquifer (superficial deposits).

Figure 3.7: Aquifer Designation Map



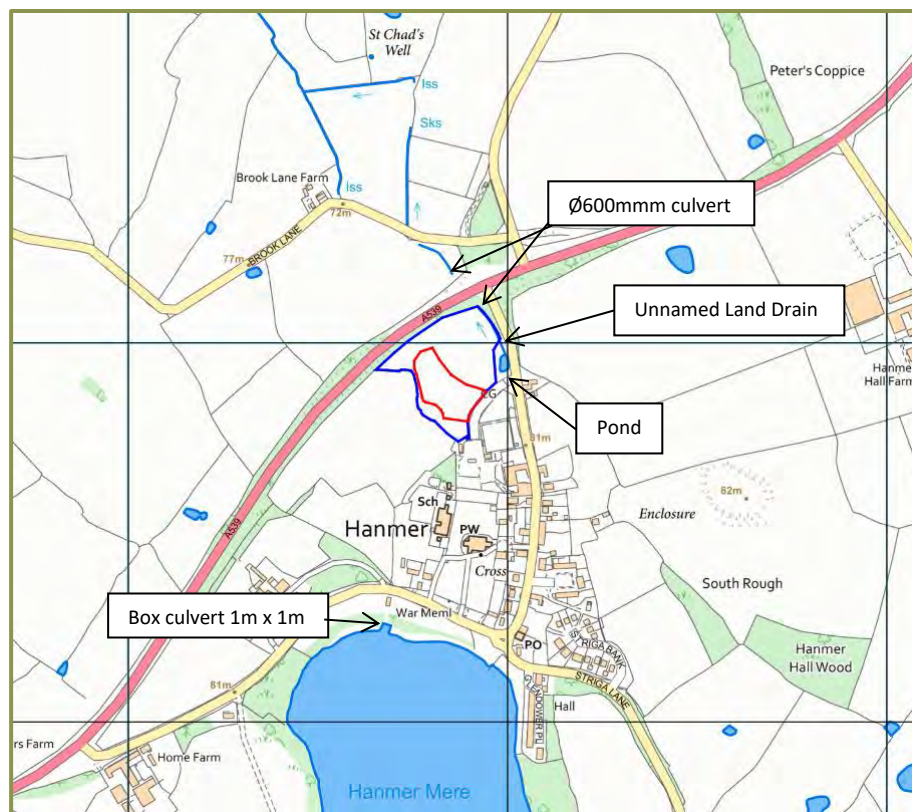
Top: Aquifer Designation (bedrock). Bottom: Aquifer Designation (superficial deposits). From Magic Map. Contains Natural Resources Wales information © Natural Resources Wales and database right [2019].

3.6 Catchment Hydrology

OS Mapping

- 3.6.1 OS mapping (Figure 3.8) shows an unnamed land drain conveying flows northwest along the north-eastern wider ownership Site boundary. The land drain appears to convey flow from a small pond which is located just outside the south eastern wider Site boundary. The land drain appears to culvert under the A539 and continue to convey flow north.
- 3.6.2 OS mapping also shows Hanmer Mere, which is located 230m south of the Site. The mere may have a connection to the pond / land drain.

Figure 3.8: Map of Watercourses



Site Walkover Observations

- 3.6.3 A Site walkover was undertaken during July 2019. Below is a summary of the Site walkover observations, supported by photographs.
- 3.6.4 The land drain identified on OS mapping was observed along the eastern wider Site boundary (Figure 3.9). The drain was heavily vegetated carrying low flows (~150mm). The drain was approximately 1.5m deep, with a 0.5m bed width and 1:2 side slopes.
- 3.6.5 The land drain originated from a pond just outside the south east of the wider Site (Figure 3.11).
- 3.6.6 At the northern boundary of the wider Site the land drain entered a Ø600mm culvert (Figure 3.10) which conveyed flow beneath the A539. On the northern side of the A539 the channel outfalls through a Ø600mm culvert and continues to convey flow north in open channel.

- 3.6.7 Hanmer Mere is located 230m to the south of Site. The mere enters a 1x1m box culvert covered with a trash screen on its northern boundary. It is not known if this has connectivity to the pond / land drain within the Site.

Figure 3.9: Land drain along eastern boundary



Figure 3.10: Ø600mm culvert conveying flow beneath A539.



Figure 3.11: Pond outside south eastern boundary.



Figure 3.12: View of Hanmer Mere and Box Culvert to the north of the mere



Left: Hanmer Mere Right: 1m x 1m Box Culvert to north of mere

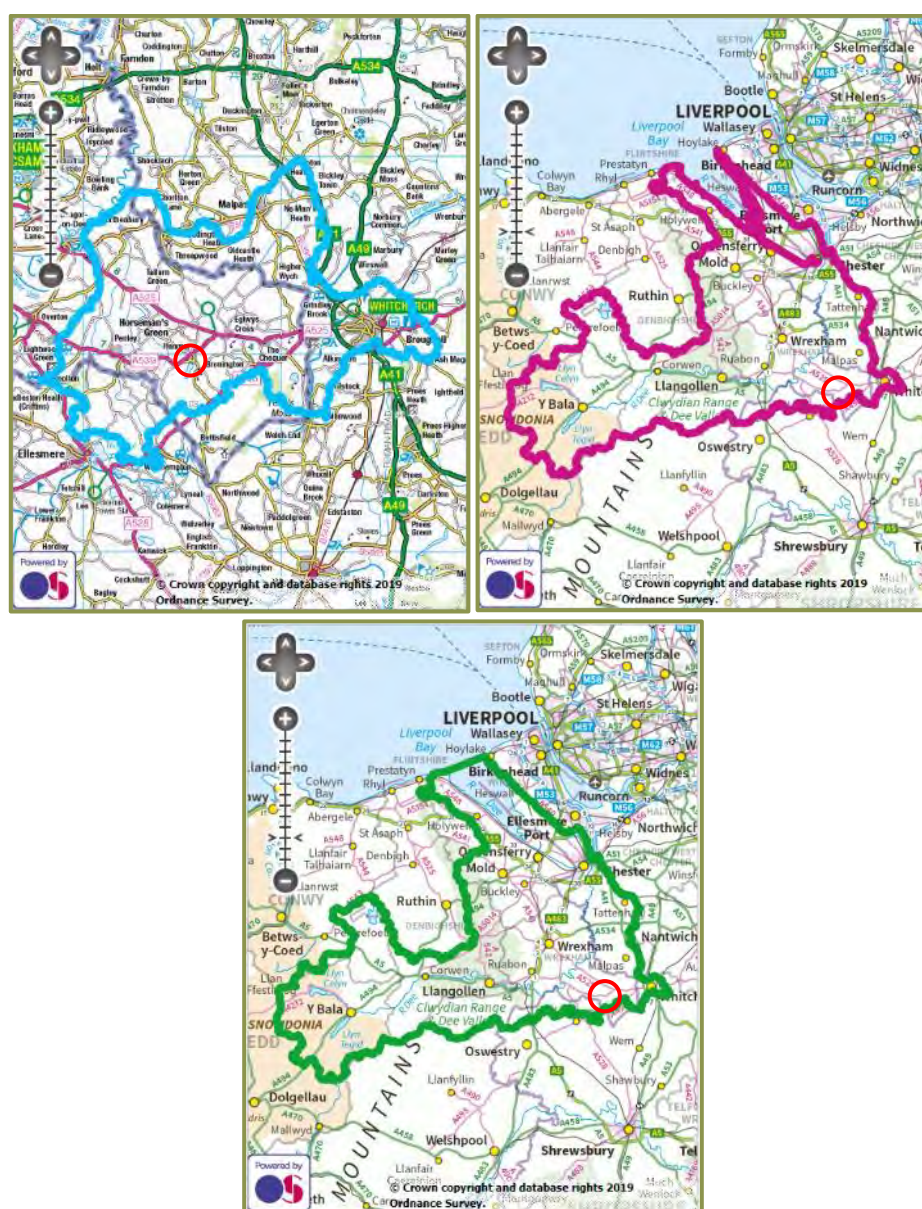
Main River Map

- 3.6.8 The Natural Resources Wales main river map (Figure 3.13) shows no Main Rivers within the Site or its immediate vicinity (within 1km).

Environment Agency Catchment Data Explorer Mapping

- 3.6.9 Natural Resources Wales mapping shows that the Site is in the Worthenbury Operational Catchment, Dee Management Catchment and Dee River Basin District (Figure 3.13).

Figure 3.13: Catchment Data Explorer



Top Left: Worthenbury Operational Catchment. Top Right: Dee Management Catchment. Bottom: Dee River Basin District. Contains Natural Resources Wales information © Natural Resources Wales and database right [2018].

Climate Change Allowances

3.6.10 The climate change allowances applicable to peak river flows in the Dee River Basin District are included in Table 3.2. These apply to peak flows within the onsite and nearby watercourses.

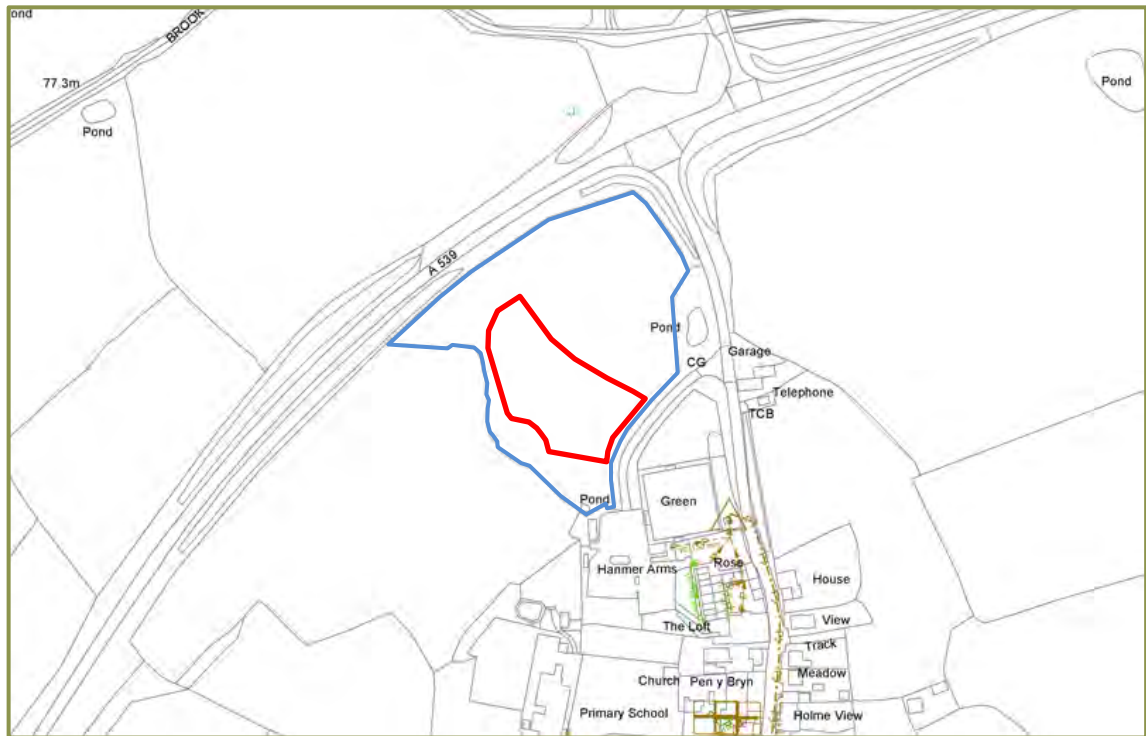
Table 3.2: Peak River Flow Allowances

Allowance Category	Total Potential Change Anticipated for the '2080s' (2070 to 2115)
Upper End	45%
Central	20%

3.7 Sewerage Assets

- 3.7.1 Welsh Water sewer asset plans (Figure 3.14 and Appendix 3) show that there is private foul sewer conveying flow south 100m south east of the Site. There are no surface water sewers within the immediate vicinity of the Site.

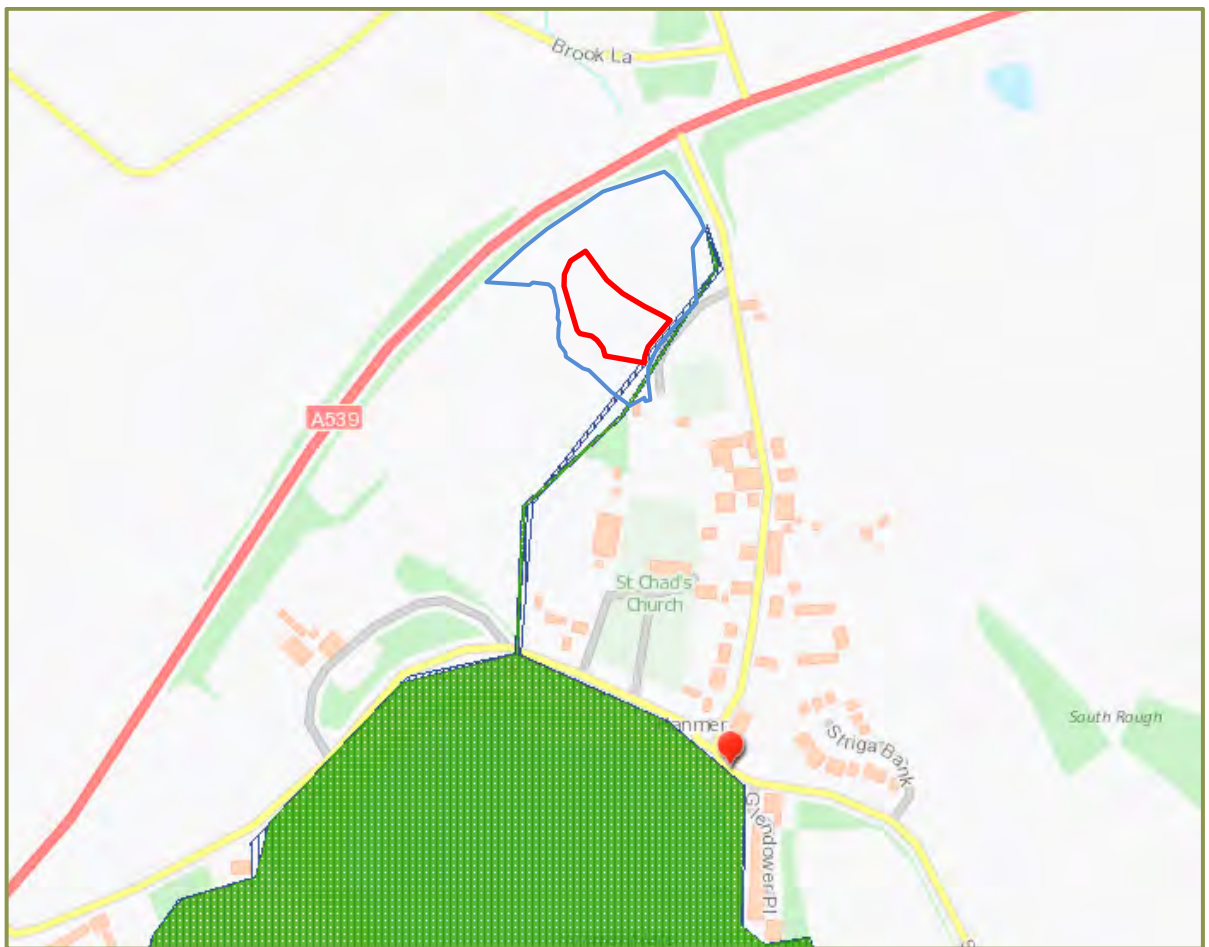
Figure 3.14: Sewer Asset Plans



3.8 Designated Sites

- 3.8.1 The DEFRA Magic Map (England and Wales) (Figure 3.15) shows the Midland Meres & Mosses (Site of Special Scientific Interest [SSSI] and Ramsar site) is located within the east of the Site associated with the pond / watercourse. Consequently, it is proposed that surface water quality is improved through the utilisation of SuDS features (see Section 6). The Hanmer Mere SSSI is also located 220m to the south of the Site, upstream of the Site.
- 3.8.2 The fact the SSSI / Ramsar site is shown to extend from Hanmer Mere to the pond / watercourse suggests that there is connectivity between the two.

Figure 3.15: Designated Sites



From Magic Map. Contains Natural Resources Wales information © Natural Resources Wales and database right [2019].

4.0 Site Drainage

4.1 Surface Water Drainage

- 4.1.1 The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in a catchment, particularly flooding downstream; and replacing permeable vegetated areas with low permeability roofs, roads and other paved areas will increase the speed, volume and peak flow of surface water runoff. The reception will be built on foundations however the lodges will be built on a series of concrete pads and therefore the majority of the Site will remain permeable.
- 4.1.2 A surface water management strategy for the development is proposed to manage and reduce the flood risk posed by surface water runoff from the Site. The developer will be required to ensure that any scheme for surface water should build in sufficient capacity for the entire Site.
- 4.1.3 The surface water drainage arrangements for any development Site should be such that the volume and peak flow rates of surface water leaving a developed Site are no greater than the rates prior to the proposed development, unless specific off-Site arrangements are made and result in the same net effect.
- 4.1.4 An assessment of the surface water runoff rates was undertaken to determine the surface water options and attenuation requirements for the Site.

4.2 Existing Drainage System

- 4.2.1 The 1.5ha wider Site land use comprises agricultural (grazing) land.
- 4.2.2 The Site is underlain by impermeable soils and bedrock. It is likely that drainage is predominantly via overland flow, following the topography of the Site to the topographic low points, with a small amount of infiltration to bedrock, and throughflow to watercourse.
- 4.2.3 There is currently no foul water discharging from the undeveloped Site.

4.3 Developable and Impermeable Areas

- 4.3.1 The proposal is for 10 touring pitches with an associated amenity block. The amenity block comprises 100m² roof area. The touring pitches and road will be gravelled and therefore permeable. As such there will be a 100m² increase in impermeable area from the amenity block.

4.4 Sustainable Drainage Options (SuDS)

Feasibility of SuDS

- 4.4.1 The soils and geology mapping are indicative of low infiltration potential. It is therefore assumed that the use of infiltration-based SuDS would not be feasible. This assumption would need to be confirmed through soakaway testing.

Choice of SuDS Options

- 4.4.2 Sustainable water management measures should be used to control the surface water runoff from the proposed development Site, thereby managing the flood risk to the Site and surrounding areas from surface water runoff. These measures will also improve the quality of water discharged from the Site.

- 4.4.3 Current guidance promotes sustainable water management using SuDS. Options applicable to this Site are identified in Table 4.3.

Table 4.3: SuDS Options

Green roofs	Infiltration basins
Water butts	Detention basins
Permeable paving	Oversized pipes
Rainwater harvesting	Brown roofs
Filter strips	Swales
Wetland Areas	Cellular Storage

Note: SuDS appropriate to the development are highlighted green.

- 4.4.4 A hierarchy of SuDS techniques is identified¹:

- 1. Prevention** – the use of good Site design and housekeeping measures on individual Sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- 2. Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
- 3. Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole Site).
- 4. Regional Control** – management of runoff from several Sites, typically in a detention pond or wetland.

- 4.4.5 Using SuDS as opposed to conventional drainage systems provides several benefits by:

- reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed Sites;
- improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources;
- reducing potable water demand through rainwater harvesting;
- improving amenity through the provision of public open spaces and wildlife habitat; and
- replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

SuDS Maintenance

- 4.4.6 A swale will form the main attenuation feature within the development Site.

¹ CIRIA (2004) Report C609, Sustainable Drainage Systems – Hydraulic, Structural and Water Quality advice.

- 4.4.7 Maintenance of the SuDS features would be in line with the SuDS Manual (CIRIA C753, 2015), as detailed in Figure 4.1. The maintenance would be undertaken by a private maintenance company.
- 4.4.8 It is standard for SuDS features within a new development to be maintained by a private maintenance company, unless the council adopt it. If the maintenance company goes into administration, the Site will be contracted to a new maintenance company. Residents will pay a surcharge to the maintenance company and a number of them would be appointed to its board. This will ensure maintenance throughout the lifetime of the development.
- 4.4.9 Details of other SuDS features, and maintenance would be considered further at detailed design, when a detailed layout has been produced. The level of detail provided within this FRA should be sufficient at outline stage to demonstrate that SuDS would be deliverable.

Figure 4.1: Swale Operation and Maintenance Requirements (Table 17.1 of the SuDS Manual)

TABLE 17.1 Operation and maintenance requirements for swales			
	Maintenance schedule	Required action	Typical frequency
Regular maintenance		Remove litter and debris	Monthly, or as required
		Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
		Manage other vegetation and remove nuisance plants	Monthly at start, then as required
		Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
		Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
		Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
		Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance		Re-seed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions		Repair erosion or other damage by re-turfing or re-seeding	As required
		Re-level uneven surfaces and reinstate design levels	As required
		Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
		Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
		Remove and dispose of oils or petrol residues using safe standard practices	As required

4.5 Surface Water Management Strategy

Hierarchy of Discharge

- 4.5.1 In accordance with requirement H3 of the Building Regulations 2002 rainwater runoff must discharge to one of the following, listed in order of priority:

² Office of the Deputy Prime Minister, The Building Regulations 2000.

- 1. An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable:** The use of infiltration-based SuDS is not feasible due to low infiltration potential (to be confirmed by soakaway testing).
 - 2. A watercourse; or where that is not reasonably practicable:** An unnamed land drain conveys flows south-west along the south-east wider Site boundary.
 - 3. A sewer:** There are no public surface water sewers located within the immediate vicinity of the Site.
- 4.5.2 The potential route to discharge from the existing Site will be by outfall to the unnamed land drain.

Drainage Design

- 4.5.3 Surface water runoff would be directed to a swale through drainage gullies located around the perimeter of the amenity block.
- 4.5.4 The areas for the pitches and road would be comprised of gravel and as such would infiltrate and require no formal drainage system.
- 4.5.5 Landscaped areas should be incorporated into the layout where possible, and unit will allow a proportion of the rainfall to infiltrate into the soil substrate.
- 4.5.6 The swale would be positioned and contoured to achieve a gravity fed connection to the land drain. It is proposed a free discharge into the swale given the negligible runoff rate as a result of the amenity block.
- 4.5.7 An indicative drainage layout is in Drawing 004.

Water Quality

- 4.5.8 The surface water will discharge into an unnamed land drain. The unnamed land drain is part of the Hanmer Mere SSSI and Ramsar Site. It is proposed that the water quality associated with the development runoff is managed through the utilisation of a swale. Swales are effective at removing polluting suspended solids through filtration and sedimentation. The vegetation traps organic and mineral particles that are then incorporated into the soil, while the vegetation takes up any nutrients.
- 4.5.9 Enzygo carried out a Habitat Regulations Assessment Screening Report (HRA) for the above Site. The report outlines mitigation measures required to avoid impact to the designated Site during the construction and operational phases, including those outlined above.
- 4.5.10 The HRA concludes there will be no anticipated significant effect on the proposals on the Midland Meres and Mosses Phase 2 Ramsar (or the overlapping Hanmer Mere SSSI). A full copy of the report can be found in MAN.244.002.EC.R.002.

4.6 Exceedance Routes

- 4.6.1 A storm event in excess of this design standard would be extreme and would cause the swale to overtop (with no sudden deluge) and would then shed overland following the topography (towards the watercourse, as per existing conditions).
- 4.6.2 Finished floor levels will be set above external levels, which will mitigate the residual risk of overtopping.

4.7 Foul Drainage

- 4.7.1 The Site is not currently served by a foul drainage network.
- 4.7.2 It is proposed that foul flow from the amenity block is discharged to the Ø150mm private foul sewer within the Hanmer Arms (subject to agreement).
- 4.7.3 All foul sewerage should be designed in accordance with Building Regulations Part H. In areas where sewers are to be adopted by Welsh Water, sewerage should be designed in accordance with Sewers for Adoption (7th Edition) and supplemented with additional standards provided by Welsh Water. An application to enter into a Section 104 agreement for sewer adoption must be made in writing to Welsh Water prior to any works commencing on Site. A connection point should be agreed with Welsh Water.

5.0 Summary, Conclusions and Recommendations

5.1 Introduction

- 5.1.1 An Outline Drainage Strategy has been undertaken for a proposed touring park, located on land north of Hanmer Arms, Hanmer.

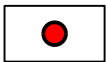
5.2 Outline Drainage Strategy

- 5.2.1 The Drainage Strategy has identified the following:

- The soils and geology indicate a low infiltration potential. It is assumed that drainage is primarily via overland flow, following the topography of the Site to the topographic low points (unnamed land drain). Infiltration-based SuDS should be utilised in the first instance however the infiltration potential suggests they would not be feasible on this Site (this would need confirming through soakaway testing).
- The unnamed land drain conveys flows northwest along the north-eastern wider Site boundary. A positive outfall to watercourse would be feasible.
- The proposed development will have a negligible increase in the area of impermeable surfaces.
- Surface water from the development would be directed to a swale which would discharge into the unnamed land drain. The runoff rate would be so small it is proposed that there is no formal hydrobrake / discharge rate into the swale.



Key

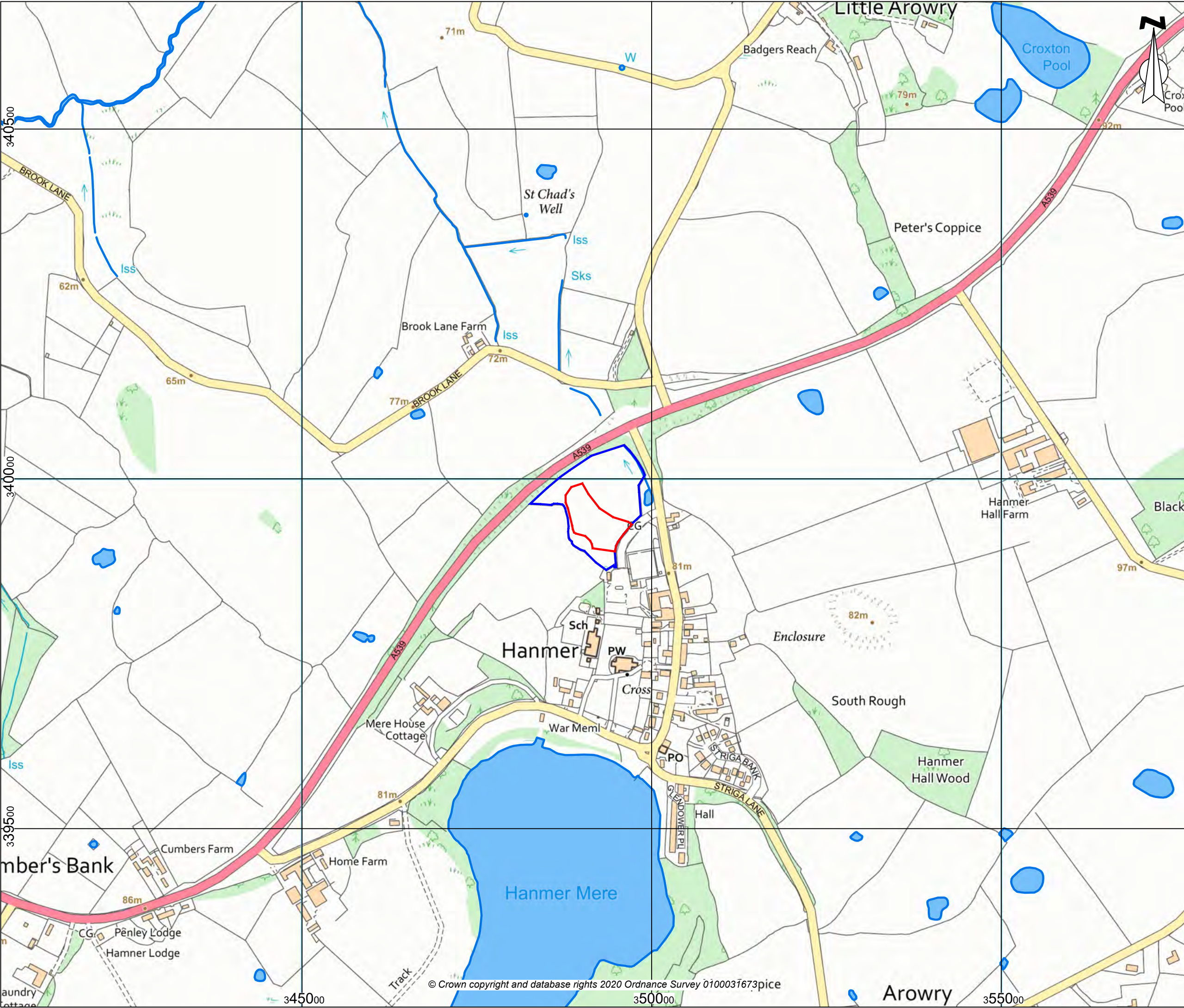


Site Location
(SJ 4543 3996)

enzygo
environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:		PROJECT REF:	
Carlton Holdings Partnership		MAN.244.002	
SCALE:		DATE:	
1:20,000@A3		January 2020	
DRAWN:		PROJECT:	
CH		Hanmer Arms, Hanmer	
CHECKED:		TITLE:	
MG		Site Location Plan	
DRAWING NO:			
MAN.244.002.HY.D.001			



Key

Site Boundary

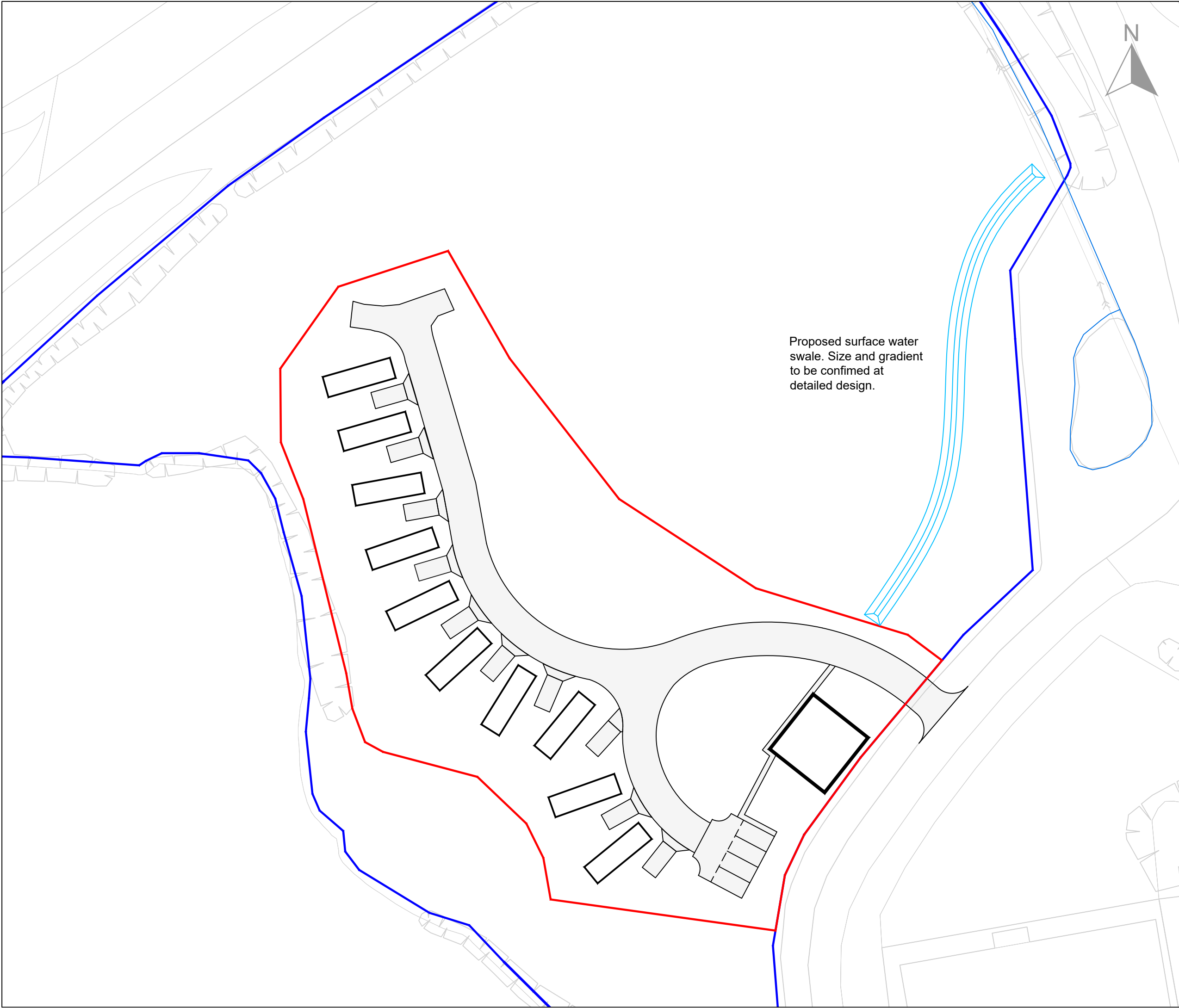
Surface Water Features

enzygo

environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:		
Carlton Holdings Partnership		
SCALE:	PROJECT REF:	
1:5,000@A3	MAN.244.002	
DRAWN:	CHECKED:	DATE:
CH	MG	January 2020
PROJECT:		
Hanmer Arms, Hanmer		
TITLE:		
Surface Water Features		
DRAWING NO:		
MAN.244.002.HY.D.002		



NOTES

1. Do not scale from this drawing
2. All dimensions are in meters unless stated otherwise
3. This drawing is to be read in conjunction with all relevant drawings and documents associated with this project.
4. All surveyed information including levels and layout is provided by others
5. All existing and proposed dimensions, levels and locations to be checked and verified by the main contractor on site prior to the commencement of the works and any anomalies reported to the engineer.
6. All works, workmanship and materials on private drainage to be in accordance with the civil engineering specification for water industry 7th edition published by the water research council.

Key

Site Boundary

Site Ownership Boundary

P02	31/01/20	Drainage updated to suit new layout.	CH	MGg	EO'C
P01	20/08/19	First Issue	CH	MGg	EO'C
REV:	DATE:	DETAIL:	DES:	CHK:	APP:

enzygo

environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

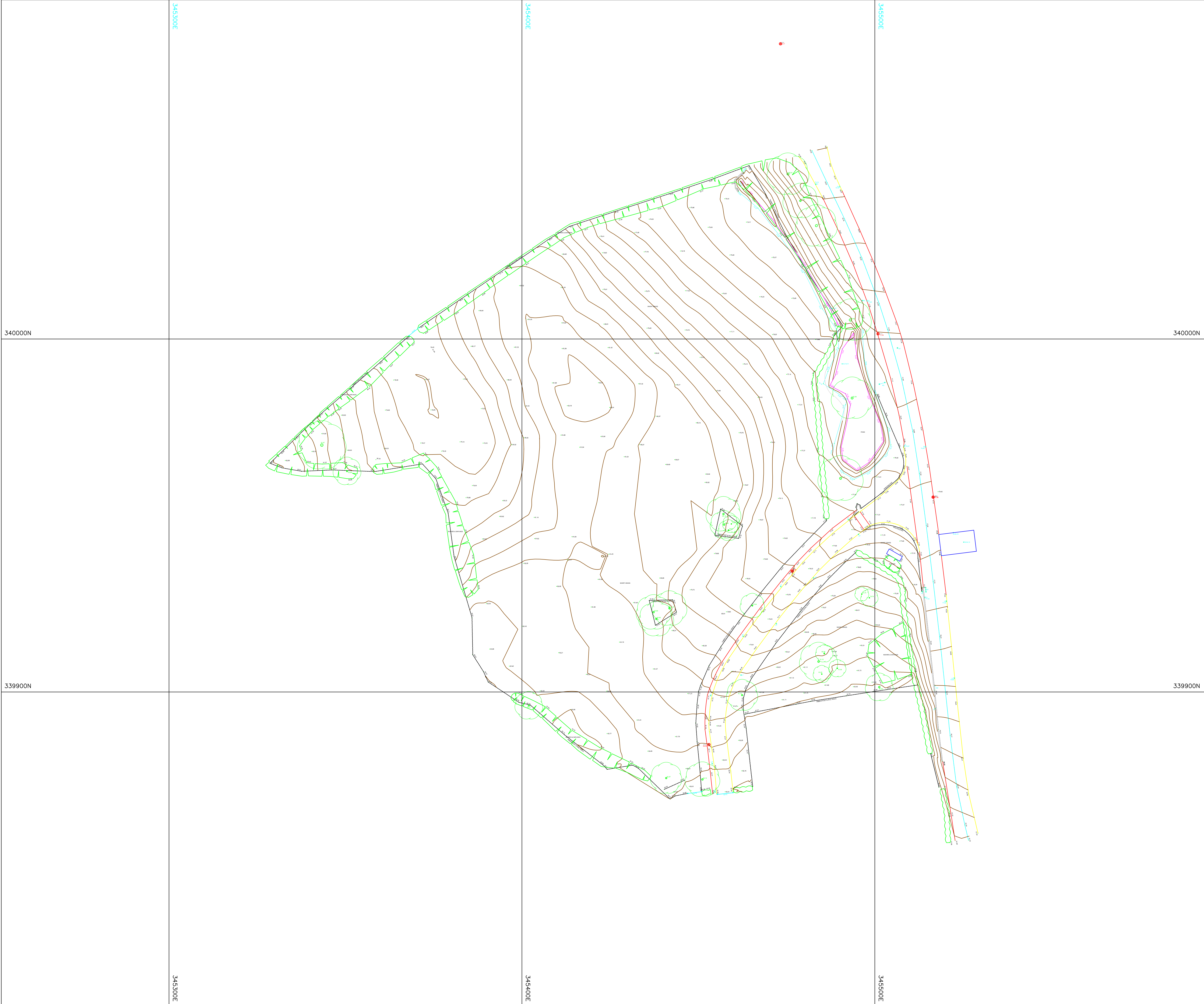
CLIENT:
Carlton Holdings Partnership

PROJECT:
Hanmer Arms, Hanmer

DRAWING TITLE:
SW and FW Drainage Strategy

DRAWN: CH	DESIGNED: CH	CHECKED: MGg	APPROVED: EO'C
DATE: 20/08/2019		SCALE @ A3: 1:500	
PROJECT NO.: MAN.244.002		DRAWING NO.: 101	
DRAWING STATUS: Preliminary		ISSUE: P02	

Appendix 1 – Topographical Survey



COORDINATED STATIONS			
STATION	EASTING	NORTHING	LEVEL (m)
A	345516.492	339955.187	77.099
B	345476.596	339934.224	78.587
C	345500.912	340001.463	77.493
D	345473.264	340083.653	80.773
E	345452.996	339885.056	82.061

ABBREVIATIONS

AV	AIR VALVE/VENT	IC	INSPECT CHAMBER
BOL	BOLLARD	IL	INVERT LEVEL
BB	BELISHA BEACON	JKW	JAPANESE KNOTT WEED
BM	BENCH MARK	LH	LAMP HOLE
BL	BED LEVEL	LP	LAMP POST
BS	BUS STOP	NP	NAME PLATE
BT	BRITISH TELECOM	MH	MANHOLE
CL	COVER LEVEL	PS	POST/SIGN POST
DI	DIAPHRAGM	PB	POST BOX
Dis	DISUSED	PX	UNKNOWN SERVICE
EL	EAVES LEVEL	RE	RODDING EYE
ELE	ELEC JUNCT. BOX	RL	RIDGE LEVEL
EP	ELECTRICITY POLE	RS	ROAD SIGN
FH	FIRE HYDRANT	ST	STOP TAP
FL	FLOOR LEVEL	TH	TRIAL HOLE
FOS	FULL OF SEDIMENT	TL	TRAFFIC LIGHT
FP	FLAG POLE	TP	TELEGRAPH POLE
G	GULLY	TV	CABLE TV BOX
GM	GAS METER	UH	UNABLE TO LIFT
GV	GAS VALVE	WM	WATER METER

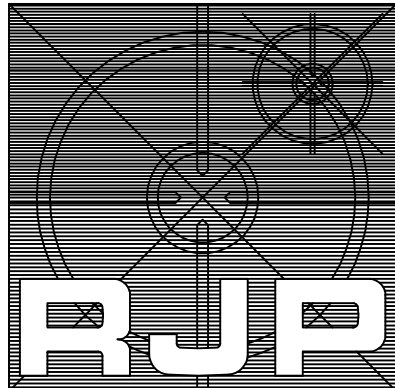
SYMBOLS

	SURVEY STATION		TREE
	O/H ELEC CABLE		BENCH MARK
	O/H PHONE LINE		TRIAL PIT
	CANOPY/HEDGE		BOREHOLE

NOTES

- A) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN
- B) O/S USED AND ORIENTATED TO TRUE NORTH
- C) LEVELS IN METRES RELATED TO G.P.S.
- D) DRAINAGE INFORMATION TAKEN FROM LOCAL AUTHORITY RECORDS. INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING

Rev	Description	Date
PROPOSED DEVELOPMENT AT HANMER ARMS, PLANNING		
RICHARD LEE PROJECT PLANNING		
TOPOGRAPHICAL SURVEY		
RLP001/T00	Drawn	S. FAIRHURST
	Date	SEPTEMBER 2018
	Scale	1:500 @ A1



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WN8 0QP

TEL: 01257 251554
MOBILE: 07710 308709
WEBSITE : www.rjpsurveyors.co.uk
E-MAIL: mail@rjpsurveyors.co.uk

Appendix 2 – Borehole Logs

SJ 43 NE 39
4525 3980

Site Investigation Specialist
Mining and Foundation Consultants

BOREHOLE RECORD SHEET No. 1

Geo - Civil

(Gustrest Limited)
Hilton House,
7-11 Bury Road, Radcliffe, Lancs.
Telephone 061-724 6421

Date

Date 28.11.75
Scale 1:50
Job No. GC.75100/WM12
Location HANMER
Diameter 76mm
Ground level

Description of Strata	Legend	Depth	Thick- ness	Sample		SPT 'N' Value	Water levels and General Remarks
				Type	Depth		
TOPSOIL		0.56	0.56				
COMPACT REDDISH BROWN FINE SAND				SPT	0.91	15	
				SPT	1.82	19	
				SPT	2.74	22	
		3.66	3.10				B.H. DRY
BOREHOLE COMPLETE							

British Geological Survey

British Geological Survey

British Geological Survey

Geo - Civil

(Gustcrest Limited)

Hilton House,

7-11 Bury Road, Redcliffe, Lancs.

Telephone 081-724 6421

Date

Date 28.11.75

Scale 1:50

Job No. GC.75100/WM12

Location HANMER

Diameter 76mm

Ground level

Description of Strata	Legend	Depth	Thick- ness	Sample		SPT 'N' Value	Water levels and General Remarks
				Type	Depth		
TOPSOIL		0.41	0.41				
COMPACT REDDISH BROWN CLAY WITH GRAVEL INCLUSIONS		0.84	0.43				
				SPT	0.91	12	
				SPT	1.82	18	
				SPT	2.74	21	
		3.66	2.82				B.H. DRY
BOREHOLE COMPLETE							

ST 43 NE 41
4525 3980

Investigation Specialist
Mining and Foundation Consultants

BOREHOLE RECORD SHEET No. 3

Geo - Civil

(Gustcrest Limited)
Hilton House,
7-11 Bury Road, Radcliffe, Lanes.
Telephone 061-724 6421

Date 28.11.75
Scale 1:50
Job No. GC.75100/WM12
Location HANMER
Diameter 76mm
Ground level

Date

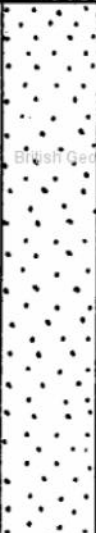
Description of Strata	Legend	Depth	Thick- ness	Sample		SPT 'N' Value	Water levels and General Remarks
				Type	Depth		
TOPSOIL		0.15	0.15				
COMPACT REDDISH BROWN FINE SAND				SPT	0.91	10	
				SPT	1.82	14	
				SPT	2.74	19	
		3.66	3.51				B.H. DRY
BOREHOLE COMPLETE							

Geo - Civil

(Gustrest Limited)
Hilton House,
7-11 Bury Road, Redcliffe, Lanes,
Telephone 061-724 6421

Date

Date 28.11.75
Scale 1:50
Job No. GC.75100/WM12
Location HANMER
Diameter 76mm
Ground level

Description of Strata	Legend	Depth	Thick- ness	Sample		SPT 'N' Value	Water levels and General Remarks
				Type	Depth		
TOPSOIL		0.18	0.18				
COMPACT REDDISH BROWN FINE SAND				SPT	0.91	10	
				SPT	1.82	15	
				SPT	2.74	21	
		3.66	3.48				B.H. DRY
BOREHOLE COMPLETE							

Geo - Civil

(Gustcrest Limited)
Hilton House,
7-11 Bury Road, Radcliffe, Lanes.
Telephone 061-724 6421

Date

Date 28.11.75
Scale 1:50
Job No. GC.75100/WM12
Location HANMER
Diameter 76mm
Ground level

Description of Strata	Legend	Depth	Thick- ness	Sample		SPT 'N' Value	Water levels and General Remarks
				Type	Depth		
TOPSOIL		0.25	0.25				
COMPACT REDDISH BROWN FINE SAND				SPT	0.91	13	
				SPT	1.82	16	
				SPT	2.76	22	
		3.66	3.41				B.H. DRY
BOREHOLE COMPLETE							

Appendix 3 – Welsh Water Sewer Asset Plans

Land off Hanmer Arms



LEGEND(Representative of most common features)

Waste network:			
	Foul chamber		Outfall
	Surface water chamber		Lamphole
	Combined chamber		Storm Overflow
	Combined sewer overflow		Rising main
	Special purpose chamber		Gravity sewer
	Treatment works		Private sewer
	Pumping station		Private sewer subject to Sect. 104 adoption agreement
NB: Sewer symbol colour indicates the type.			
RED	- Combined		Private Sewer Transfer
GREEN	- Surface Water		Lateral Drain
BROWN	- Foul		Inspection Chamber
BROWN - 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.

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

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

EXACT LOCATIONS OF ALL APPARATUS
TO BE DETERMINED ON SITE.

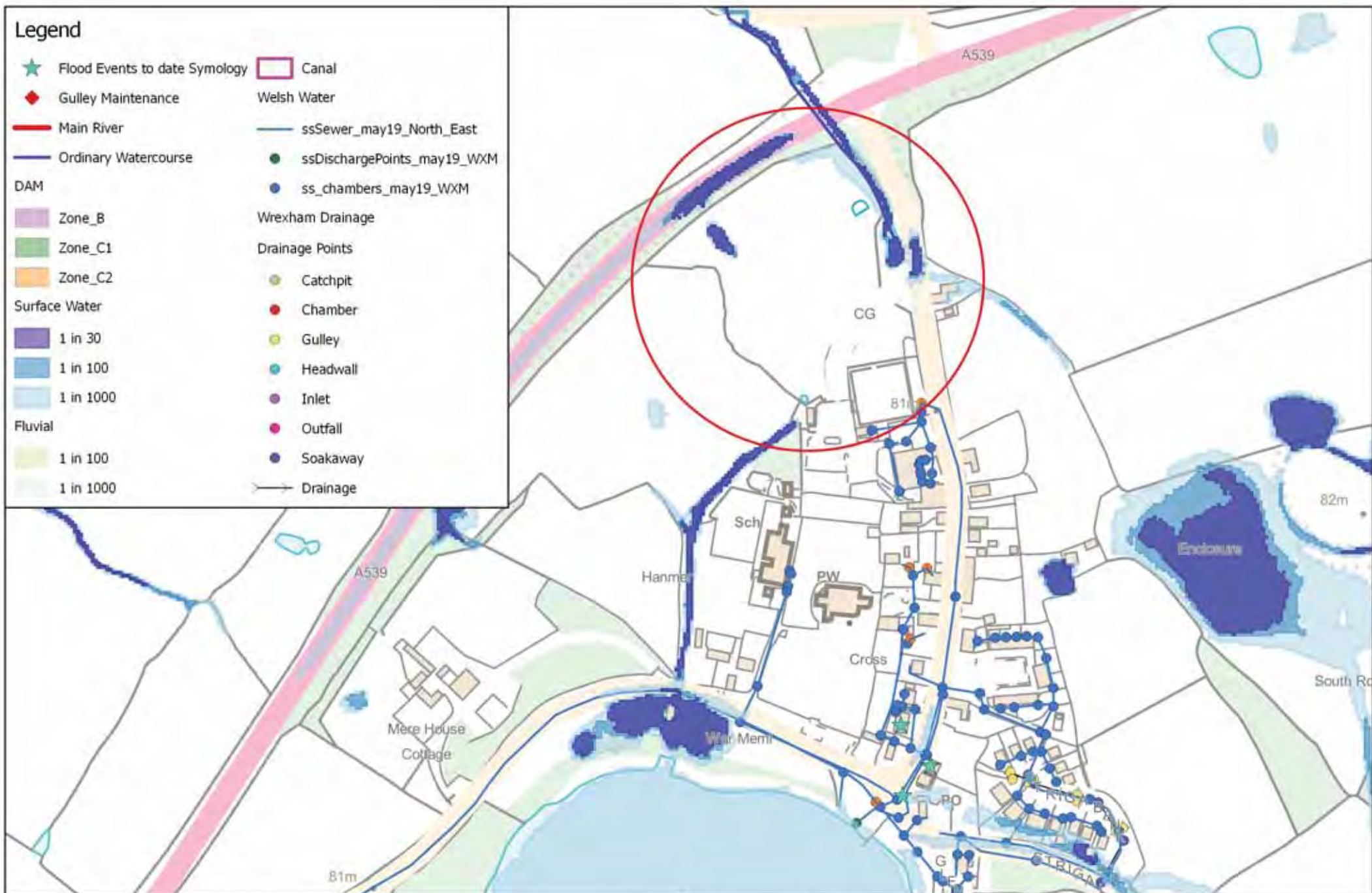
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Map Ref: 345389,339879
Map scale: 1:2500
Printed by: John Emma
Printed on: 19 Jul 2019

Appendix 4 – Wrexham Borough Council Correspondence

Legend

- | | |
|---------------------------------|-----------------------------|
| ★ Flood Events to date Symology | Canal |
| ◆ Gulley Maintenance | Welsh Water |
| — Main River | ssSewer_may19_North_East |
| — Ordinary Watercourse | ssDischargePoints_may19_WXM |
| DAM | ss_chambers_may19_WXM |
| Zone_B | Wrexham Drainage |
| Zone_C1 | Drainage Points |
| Zone_C2 | ● Catchpit |
| Surface Water | ● Chamber |
| 1 in 30 | ● Gulley |
| 1 in 100 | ● Headwall |
| 1 in 1000 | ● Inlet |
| Fluvial | ● Outfall |
| 1 in 100 | ● Soakaway |
| 1 in 1000 | — Drainage |





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Flooding, Drainage and Hydrology

Landscape Architecture

Arboriculture

Permitting and Regulation

Waste Technologies and Renewables

Waste Contract Procurement

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