



Transportation Planning : Infrastructure Design

Flood Consequence Assessment and Drainage Strategy

Proposed Residential Development – 70 new dwellings

Land off Green Lane, Ewloe

SCP

October 2023

Prepared by: Lauren Campton - Engineer

Checked by: Nick McGorry – Regional Director

Approved by: Nick McGorry – Regional Director

Document Revision Control

Revision	Date	Status	Prepared By	Approved By
A	06/10/23	First Issue	LC	NMc



**SCP Offices
Colwyn Chambers
19 York Street
Manchester
M2 3BA**

**T: 0161 832 4400
E: info@scptransport.co.uk
W: www.scptransport.co.uk**

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of SCP being obtained. SCP accepts no responsibility or liability for the consequence of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purposes agrees and will by such use or reliance be taken to confirm his agreement to indemnify SCP for all loss or damage resulting there from. SCP accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned.

CONTENTS

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	2
3.0	POLICY & GUIDANCE.....	5
4.0	EXISTING SITE CHARACTERISTICS	9
5.0	DEVELOPMENT PROPOSALS	14
6.0	FLOOD CONSEQUENCE ASSESSMENT.....	15
7.0	SUSTAINABLE URBAN DRAINAGE SYSTEMS.....	20
8.0	DRAINAGE STRATEGY	21
9.0	WATER QUALITY MANAGEMENT	27
10.0	FOUL WATER MANAGEMENT	30
11.0	RECOMMENDATIONS AND MITIGATION MEASURES	31
12.0	SUMMARY	32

LIST OF TABLES

Table 1 – Site Description	10
Table 2 – Existing Runoff Rates	11
Table 3 – Proposed Peak Run-off Rates	25
Table 4 – Attenuation Requirements	25
Figure 1: Site Plan (Source: Google Earth 2023).....	9
Figure 2: Nearest Watercourse to the Development Site (Source: Google Earth, 2023).....	12
Figure 3: Proposed Site Plan.....	14
Figure 4: Natural Resources Wales Development Advice Flood Map.....	15
Figure 5: Natural Resources Wales Flood Risk from Rivers Map	16
Figure 6: Natural Resources Wales Flood Risk from Surface Water & Small Watercourses.....	17
Figure 7: Natural Resources Wales Flood Risk from Reservoirs	18
Figure 8: Natural Resources Wales Recorded Flood Extents.....	19
Figure 9: Extract from Welsh Government Flood Consequences Assessments: Climate Change Allowances Report	22

APPENDICES

APPENDIX A – PROPOSED SITE PLAN

APPENDIX B – PROPOSED DRAINAGE LAYOUT

APPENDIX C – PROPOSED CATCHMENT PLAN

APPENDIX D – EXISTING GREENFIELD RUNOFF CALCULATIONS

APPENDIX E – MICRO-DRAINAGE STORAGE ESTIMATES

APPENDIX F – NATURAL RESOURCES WALES & BGS EXTRACTS

APPENDIX G – WELSH WATER UTILITY ASSET PLAN

APPENDIX H – TOPOGRAPHICAL SURVEY

1.0 EXECUTIVE SUMMARY

- 1.1 SCP have been commissioned by Castle Green Homes to provide a Flood Consequence Assessment (FCA) and Drainage Strategy (DS) in respect of a Planning Application for 70 dwellings at the land off Green Lane, Ewloe.
 - 1.2 The existing site is currently a greenfield site.
 - 1.3 The Flood Consequence Assessment has reviewed all sources of flood risk to both the proposed development and to the adjacent areas as a result of the development proposals and has identified the site as being at low risk of flooding from fluvial and pluvial sources; therefore, the development site is Flood Zone A.
 - 1.4 Discharge via infiltration has the potential to be utilised as the information provided by Natural Resources Wales and BGS suggests that the soil conditions are suitable for infiltration. Further infiltration testing will be required to determine this is a viable option. However, for the purpose of this report, discharge via infiltration has currently been discounted due to unconfirmed soil conditions.
 - 1.5 Discharge via watercourse has been chosen as a **suitable choice** at planning application stage as there is a minor watercourse which is culverted within the development boundary, which appears to flow into the river New Inn Brook. However, connection into this watercourse will require approval from the LLFA / SAB and Welsh Water.
 - 1.6 Discharge via surface water system has been eliminated as a suitable choice as there is no surface water sewer present within the vicinity of the development. The closest surface water sewer is located to the north of the site on Circular Drive.
 - 1.7 Onsite attenuation in the form of oversized pipes for up to a 30-year storm event and offline detention basins for up to 100-year plus climate change storm event will be provided with water quality management techniques being implemented in order to provide treatment to surface water flows.
 - 1.8 The proposed surface water discharge rate for the development is restricted to 12.1l/s to match the existing greenfield runoff rate. This discharge rate will need to be accepted and confirmed by the LLFA / SAB through the planning process. The discharge from the site will be controlled by a flow control.
 - 1.9 The foul water is proposed to discharge into a foul water sewer on Green Lane at a discharge rate of 3.24 l/s. However, this rate will have to be approved by Welsh Water.
-

2.0 INTRODUCTION

Appointment

2.1 SCP have been commissioned by Castle Green Homes to provide a Flood Consequence Assessment (FCA) and Drainage Strategy (DS) to support a planning application for 70 new dwellings including a new access road, associated parking and landscaping on greenfield land on land off Green Lane, Ewloe.

Objective of Strategy

Scope of the Flood Consequence Assessment

2.2 The objective of the strategy is to undertake a site-specific Flood Consequence Assessments in accordance with the Technical Advice Note (TAN) 15 – Development and Flood Risk.

2.3 The detail and complexity of a Flood Consequence Assessment should reflect the level of risk to the site. The TAN 15 is the official document which provides technical guidance which supplements the policy set out in Planning Policy Wales in relation to development and flooding.

2.4 A site-specific flood consequence assessment should develop a full appreciation of:

- The consequences of flooding on the development.
- The consequences of the development on flood risk elsewhere within the catchment for a range of potential flooding scenarios up to that flood having a probability of 0.1%.
- The assessment can be used to establish whether appropriate mitigation measures can be incorporated within the design of the development to ensure that development minimises risk to life, damage to property and disruption to people living and working on the site or elsewhere in the floodplain.

2.5 The site-specific flood consequence assessment should also:

- Assess all sources of potential flooding – rivers, tidal, coastal, groundwater, surface flow or any combination of these to include estimates of extreme flood flows from the threshold to the probable maximum flood.
 - Identify the sources of floodwater, understand how floodwater enters and flows across the site, assess how high floodwaters will reach and how quick they rise and fall.
 - The effects on access and egress and infrastructure, e.g., public sewer outfalls, combined sewer overflows, surface water sewers and effluent discharge pipes from wastewater treatment works.
-

- Access the impact of the development in terms of flood risk on neighbouring properties and elsewhere on the floodplain.
- Indicate what measures will be taken to ensure the flooding consequences are managed to acceptable levels.
- Provide a clear and comprehensive summary of the assessment describing the outcomes and recommendations.

2.6 This report therefore assesses flood risk to the site and any impact on flood risk to other land because of the development proposals.

Scope of the Drainage Strategy

2.7 The scope of the drainage strategy is to set out the principles of the drainage design for the proposed development and summarise the reasoning behind the chosen design.

2.8 The drainage strategy will utilise the hierarchy for disposal of surface waters generated as runoff on the site to ensure that there is not a potential exacerbation of flood risk elsewhere as a result of undertaking the development. This will be undertaken in accordance with widely accepted best practise principles such as detailed in industry guidance such as the C753 SUDS Manual, Design and Construction Guidance and applicable sections of the TAN15 – Development and Flood Risk.

2.9 The Drainage Strategy aims to provide guarantee that the proposed surface water drainage safely and appropriately conveys all flows derived from the site to appropriate discharge or attenuation locations, so as to ensure sustainable and safe site operation. This should be done in accordance with prescribed best practice, building codes and prioritise the incorporation of sustainable urban drainage systems, or SUDS, where appropriate and practicable for the management of surface water.

2.10 Additionally, the drainage strategy will identify potential connection points and discharge rates for surface and foul water generated on the site through the sites occupancy and proposed development type.

Limitations

2.11 This report has been prepared for exclusive use by Castle Green Homes for the purpose of assisting them in evaluating the potential risk of flooding associated with the site and in making a Planning Application.

2.12 SCP accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than

the Client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of SCP. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole.

- 2.13 SCP has endeavoured to assess all information provided to them during this assessment and therefore this report has been compiled from a number of external sources.
 - 2.14 The Flood Consequence Assessment addresses the flood risk posed to and from the proposed development, the extent of which is shown on the Proposed Site Plan, see Appendix A.
 - 2.15 This report has been undertaken with the assumption that the site will be developed in accordance with the proposals included within, without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.
-

3.0 POLICY & GUIDANCE

3.1 In carrying out our assessment and preparing this report, regard has been taken of the provisions of the development plan and a range of other material considerations. However, it is the Government's Technical Advice Note 15 which provide the most up to date and specific guidance on the scope of Flood Consequence Assessments and drainage requirements.

Technical Advice Note 15: Development and Flood Risk

3.2 The Technical Advice Note (TAN) 15: Development and Flood Risk was first published in Wales in July 2004 and was last updated in November 2021. The Welsh Government have revised the TAN15 2021 in response to climate change, the consequences of which will impact the physical and built environment and updated the document title to Technical Advice Note 15: Development, Flooding and Coastal Erosion.

3.3 However, as of March 2023, the Welsh Government (WG) have further suspended the coming into force of the updated TAN15: Development, Flooding and Coastal Erosion due to the need of further consultation. Whilst this delay has been confirmed by WG, they are yet to confirm when the new TAN will come into effect.

3.4 Therefore, the TAN15: Development and Flood Risk, issued in 2004 and updated in 2021 remains the adopted version.

3.5 One of the key aims of the TAN15 is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions and to direct new development away from those areas which are at high risk of flooding.

3.6 New development should be directed away from Zone C and towards suitable land in Zone A, otherwise to Zone B, where river or coastal flooding will be less than an issue.

3.7 The report advises on development and flood risk as this relates to sustainability principles and provides a framework within which risks arising from both river and coastal flooding, and from additional run-off from development in any location, can be assessed.

Planning Policy Wales

3.8 The current Planning Policy Wales (PPW) was first published in December 2018 and was last updated in February 2021. The PPW sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes, Welsh Government

Circulars, and policy classification letters, which together with PPW provide the national planning policy.

- 3.9 The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.
- 3.10 The PPW for water and flood risk advises that new development should be located and implemented with sustainable provision of water services in mind, using design approaches and techniques within improve water efficiency and minimise adverse impacts on water resources.
- 3.11 New developments require approval from the SuDS Approval Body (SAB) before construction can commence. Adoption and management arrangements, including a funding mechanism for maintenance of SuDS infrastructure and all drainage elements are to be agreed by the SAB.
- 3.12 The PPW advises that development should reduce and must not increase flood risk arising from river and/or coastal flooding on and off the development site itself. The priority should be to protect the undeveloped or unobstructed floodplain from development and to prevent the cumulative effects of incremental development.

Sustainable Drainage (SuDS) Statutory Guidance

- 3.13 The Welsh Government published the National Standards for Sustainable Drainage Systems (SuDS) in October 2018. This document provides guidance on the design, construction, operation and maintenance of surface water drainage systems.
- 3.14 The document sets out a list of principles which underpin the design of surface water management schemes to meet the standards. SuDS schemes should aim to:
- Manage water on or close to the surface and as close to the source of the runoff as possible;
 - Ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it;
 - Manage rainfall to help protect people from increased flood risk;
 - Take account of likely future pressure on flood risk, the environment and water resources such as climate change and urban creep;
 - Perform safely, reliably and effectively over the design life of the development taking into account the need for reasonable levels of maintenance.
- 3.15 Applicants seeking SAB approval must demonstrate how they have complied with the principles set out in the guidance or provide justification for any departure.
-

Flood and Water Management Act 2010

3.16 The Flood and Water Management Act 2010 received Royal Assent on 8th April 2010. This Act provides duties on the Environment Agency, Local Authorities, Developers and other bodies to manage flood risks.

LLFA Technical Requirements

3.17 The main areas affecting Developers are:

- Lead Local Flood Authority (LLFA) or regional Water Authority to adopt and maintain sustainable urban drainage systems (SUDS).
- Approval fees and non-performance bonds to be standardised.
- Changes to the rights to connect to sewers will restrict automatic connection rights to only Section 104 sewer schemes or approved SUDS schemes constructed to a new national sewer or new SUDS standard respectively.
- Two options for the SUDS approval process. Either directly to the SUDS Approval Body or as a combined application to the Planning Authority as part of the Planning Application.

3.18 Flintshire County Council Local Development Plan (LDP) was adopted by the Council in 2023 and covers the period 2015 to 2030. It forms part of the statutory development plan alongside Future Wales: The National Plan 2040.

3.19 Within Flintshire County Council LDP, Policy EN14 relates to flood risk. Policy EN14 states that in order to avoid the risk of flooding, development will not be permitted:

- In areas at risk of fluvial, pluvial, coastal and reservoir flooding, unless it can be demonstrated that the development can be justified in line with national guidance and is supported by a technical assessment that verifies that the new development is designed to alleviate the treat and consequences of flooding;
- Where it would lead to an increase in the risk of flooding on the site or elsewhere from fluvial, pluvial, coastal or increased surface water run-off from the site;
- Where it would have a detrimental effect on the integrity of existing flood risk management assets; or
- Where it would impede access to existing and proposed flood risk management assets for maintenance and emergency purposes.

3.20 Along with the LDP, Flintshire County Council also have a Local Flood Risk Management Strategy (LFRMS) document as they are the Lead Local Flood Authority (LLFA).

- 3.21 The purpose of the LFRMS is to address potential flood risk arising from local sources within the boundaries of the Authority area. An important part of the local strategy will be to ensure that communities are aware of what risks exist, aware of what the Council and other Risk Management Authorities (RMA's) responsibilities are in terms of flood risk and what communities can do to involve themselves.
- 3.22 Flintshire County Council has stated that from January 2019, all new developments of more than 1 house or where the construction area is of 100m² or more will require sustainable drainage to manage on-site surface water. Surface water drainage systems must be designed and built in accordance with mandatory standards for sustainable drainage published by Welsh Ministers.
- 3.23 Any sustainable drainage must be approved by the local authority acting in its SuDS Approving Body (SAB) role before construction work begins.
- 3.24 The SAB will have a duty to adopt compliant systems so long as it is built and functions in accordance with the proved proposals, including any SAB conditions of approval.
- 3.25 The SAB is established to:
- Evaluate and approve drainage applications for new developments where construction work has drainage implications, and
 - Adopt and maintain sustainable surface water drainage systems according to Section 17 of Schedule 3 (FWMA).
 - The SAB also has powers of inspection and enforcement;
 - And uses discretionary powers to offer non-statutory pre-application advice
-

4.0 EXISTING SITE CHARACTERISTICS

Site Location

- 4.1 The site is located on lane off Green Lane, Ewloe. The area consists of agriculture fields to the west and residential dwellings to the east of the development site.
- 4.2 An approximate postcode for the site is CH5 3BP and OS Co-ordinates 329182E, 366638Y.



Figure 1: Site Plan (Source: Google Earth 2023)

Table 1 – Site Description

Area		2.428 hectares or 24,280m ²
Existing Surfacing		The existing site is a greenfield site
General Topography		The general topography of the site falls from a relatively high spot within the centre of the site at 89.360AOD to 82.450AOD northeast and 86.35 southwest.
Current Use		The site is currently an agriculture field.
Previous Use		The previous use is unknown.
Watercourses		Culverted watercourse within the site boundary. The River New Inn Brook is circa 460m to the west.
Boundaries	North	Children’s playground / Residential housing
	East	Residential housing
	South	Green Lane
	West	Agriculture field / farm
Access	Vehicular	Green Lane
	Pedestrian	Green Lane

4.3 The existing site is currently a greenfield site.

4.4 An assessment of the existing greenfield runoff rates has been undertaken using the ICP method on Micro-drainage. Calculations are summarised in Table 2 and can be found in Appendix D.

Table 2 – Existing Runoff Rates

Return Period (Yr.)	Existing Runoff Rate (l/s)
1 Year	10.7 l/s
30 Year	21.3 l/s
100 year	26.4 l/s
QBar	12.1 l/s

Existing Public Sewers

- 4.5 Records from Welsh Water has shown that there is a foul water sewer present along Green Lane which connects into a combined sewer system on Mold Road.
- 4.6 Additionally, the Welsh Water records show that there are foul water and surface water sewers present north of the development site along Circular Drive.
- 4.7 See Appendix G for Welsh Water Asset maps.

Watercourses, Land Drainage and other Waterbodies

- 4.8 There is a minor watercourse which appears to be culverted located at the southern end of the development site. This watercourse appears to flow from the east to the west, see Appendix H for topographical survey.
- 4.9 The nearest main watercourse to the site is the River New Inn Brook which is located approximately 460 metres west from the development site, see Figure 2.
- 4.10 Further investigation of the watercourse is required to establish bed and water levels and to define the route of culverted sections located within the site boundary.
-



Figure 2: Nearest Watercourse to the Development Site (Source: Google Earth, 2023)

Existing Flood Defences and Other Structures

4.11 There are no flood defences recorded on any maps within close proximity to the application site.

Historical Land Use

4.12 The historical land use of the development area is unknown.

Geology

4.13 As Ground Investigation reports have not been provided, the geology information has been based on freely accessible information from Natural Resources Wales and British Geology Survey (BGS).

4.14 Information taken from Natural Resources Wales online interactive map indicates that the site is located within a Bedrock geological area classified as Secondary A. These are permeable layers that can support local water supplies and may form an important source of base flow to rivers.

4.15 The superficial deposits for the development area are classified by Natural Resources Wales as Secondary (undifferentiated). These layers are not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type.

- 4.16 Natural Resources Wales has also identified the development site as being medium - low groundwater vulnerability.
 - 4.17 Natural Resources Wales has defined Source Protection Zones (SPZs) around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.
 - 4.18 The proposed development site is identified by Natural Resources Wales as not being located within a SPZ.
 - 4.19 Information provided on British Geology Survey (BGS) has stated that the bedrock geology of the development site is 'Pennine Middle Coal Measures Formation – Mudstone, siltstone and sandstone' with superficial deposits consisting of 'Till, Devensian – Diamicton'.
 - 4.20 See Appendix F for all map extracts from Natural Resources Wales and BGS.
-

5.0 DEVELOPMENT PROPOSALS

- 5.1 The current proposals are to provide 70 new dwellings including associated access road, parking facilities and landscaping.
- 5.2 A new vehicular access is proposed on Green Lane.
- 5.3 The site area is 2.428ha, with 60% (1.457ha) proposed to be impermeable. See Appendix C for catchment plan.
- 5.4 The current site plan provided by Castle Green can be found within Appendix A along with the extract below as Figure 3.



Figure 3: Proposed Site Plan

6.0 FLOOD CONSEQUENCE ASSESSMENT

Sources of Flood Risk

Source	Definition	Likelihood
Fluvial	River Flood	Low
Pluvial	Surface Water Flooding	Medium
Coastal - Sea	Tidal Surge	Not Applicable
Coastal - Estuarine	Tidal Surge	Not Applicable
SWS, FWS, CS, CSO	Sewer Flooding	Low
Groundwater	Emergence from ground	Low / Unknown

6.1 Information relating to flood risk at the site has been obtained via Natural Resources Wales Flood and Coastal Erosion Risk Maps. This information has been presented below.

Fluvial Flood Risk (River Flood)

6.2 Examination of flood maps from Natural Resources Wales shows that the site is located within an area classified as Flood Zone A with the risk of flooding considered to be at little to no risk of fluvial flooding, see Figure 4.

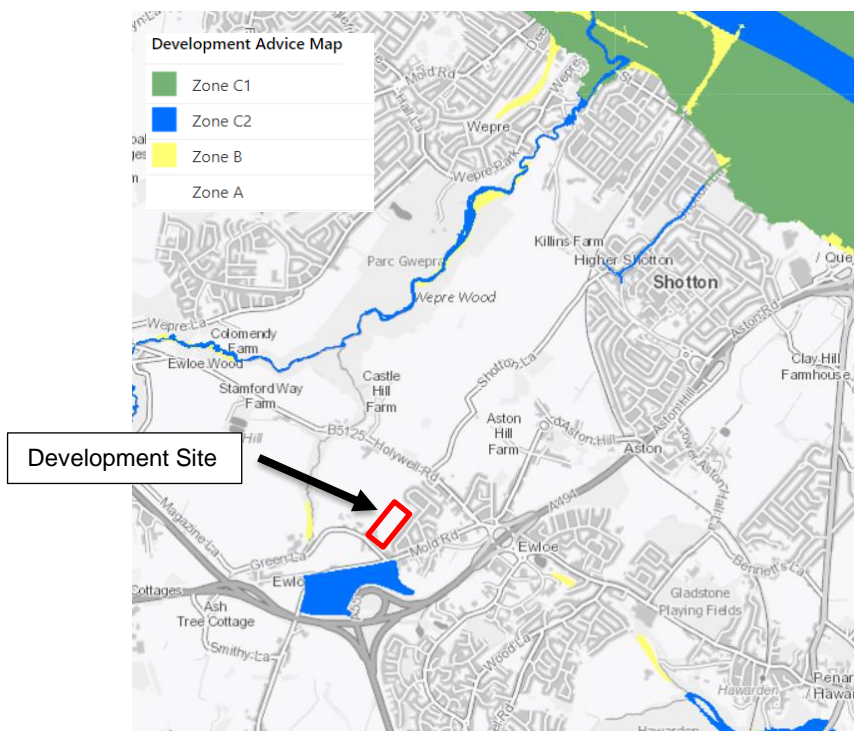


Figure 4: Natural Resources Wales Development Advice Flood Map

(Source: Natural Resources Wales, 2023)

6.3 Additionally, the Natural Resources Wales flood risk from rivers map indicates that the site has a very low risk of flooding from rivers, see Figure 5.

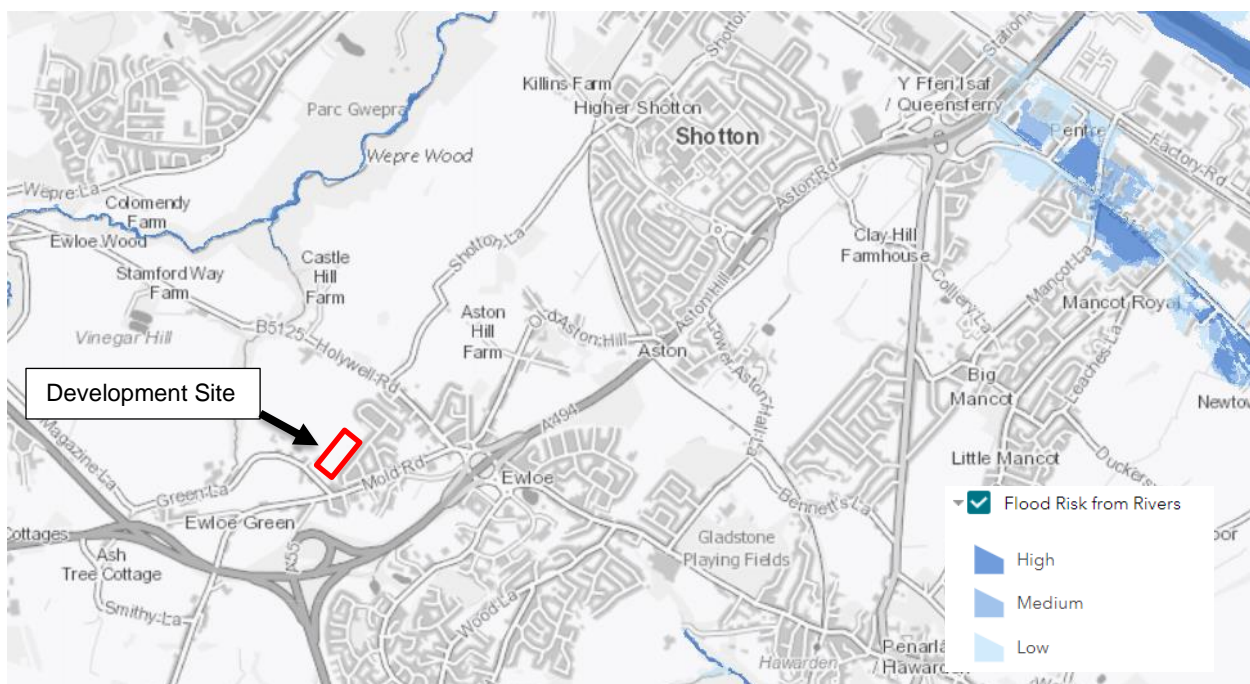


Figure 5: Natural Resources Wales Flood Risk from Rivers Map

(Source: Natural Resources Wales, 2023)

Pluvial Flood Risk (Emergence from Ground Surface Flooding)

- 6.4 Pluvial flooding is defined as flooding resulting from rainfall-generated overland flow before runoff enters any watercourse or sewer.
- 6.5 It is usually associated with high intensity rainfall events but can also occur with low intensity rainfall or melting snow where ground is saturated, frozen, developed or otherwise has low permeability resulting in overland flow and ponding in depressions in the topography. Large catchment areas are particularly prone to this type of flooding.
- 6.6 The Natural Resources Wales shows the development and surrounding area does indicate pluvial flooding; see Figure 6.

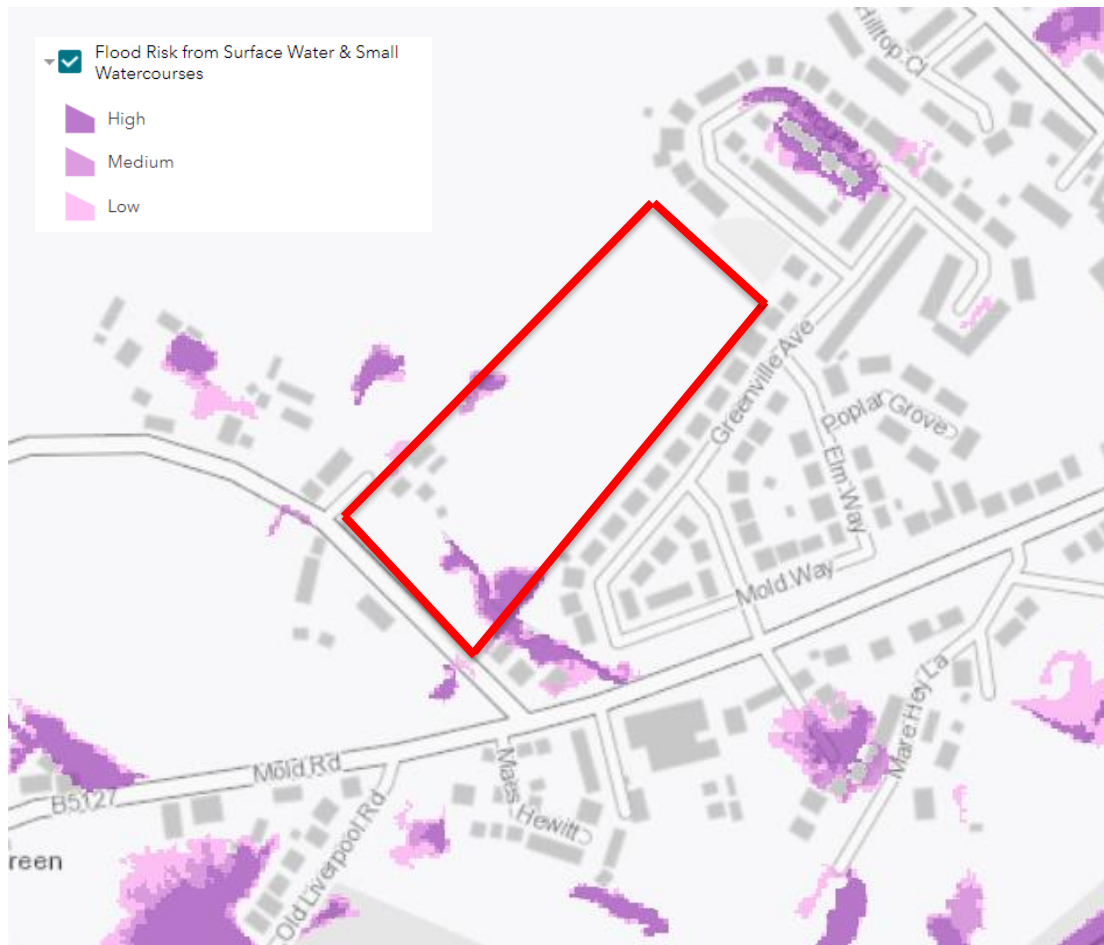


Figure 6: Natural Resources Wales Flood Risk from Surface Water & Small Watercourses

(Source: Natural Resources Wales, 2023)

6.1 The area subject to surface water flooding is in the south-east corner of the development site near the culverted watercourse. Additionally, this area on the proposed site plan is to consist of the access road and public open space.

Reservoir or Canal Failure Flood Map

6.2 The Natural Resources Wales website shows that the development site is not at risk of flooding from reservoirs or canal failures, see Figure 7.

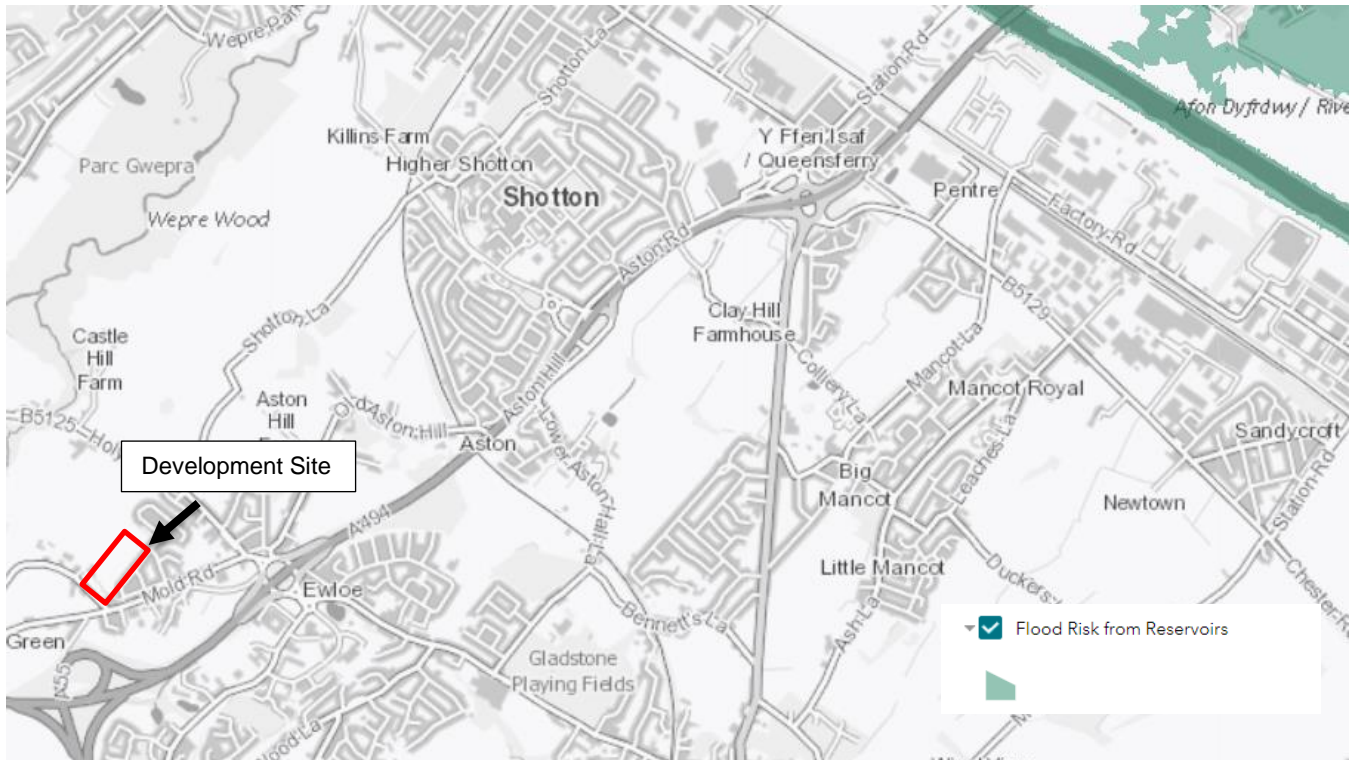


Figure 7: Natural Resources Wales Flood Risk from Reservoirs

(Source: Natural Resources Wales, 2023)

Groundwater Flood Risk

- 6.3 In general terms groundwater flooding can occur from three main sources, raised water tables, seepage and percolation, and groundwater recovery or rebound.
- 6.4 If groundwater levels are naturally close to the surface, then this can present a flood risk during intense rainfall.
- 6.5 As reviewed on the Natural Resources Wales online website, information relating to the groundwater is available to be reviewed for specific areas. This has been completed for the development. The site is in a medium-low area for groundwater vulnerability.
- 6.6 The site is not located within the groundwater source protection zone.

Sewer Flood Risk

- 6.7 Records from Welsh Water has shown that there is a foul water sewer present along Green Lane which connects into a combined sewer system on Mold Road. There are also foul water and surface water sewers present north of the development site along Circular Drive.

6.8 It is not known whether there are any existing flood issues with these existing sewers.

Historical Flooding Information

6.9 The nearest historical flood event available on the Natural Resources Wales website is for an area located to the south of the development site. This area has a historical flood event dating back to 2000, see Figure 8.

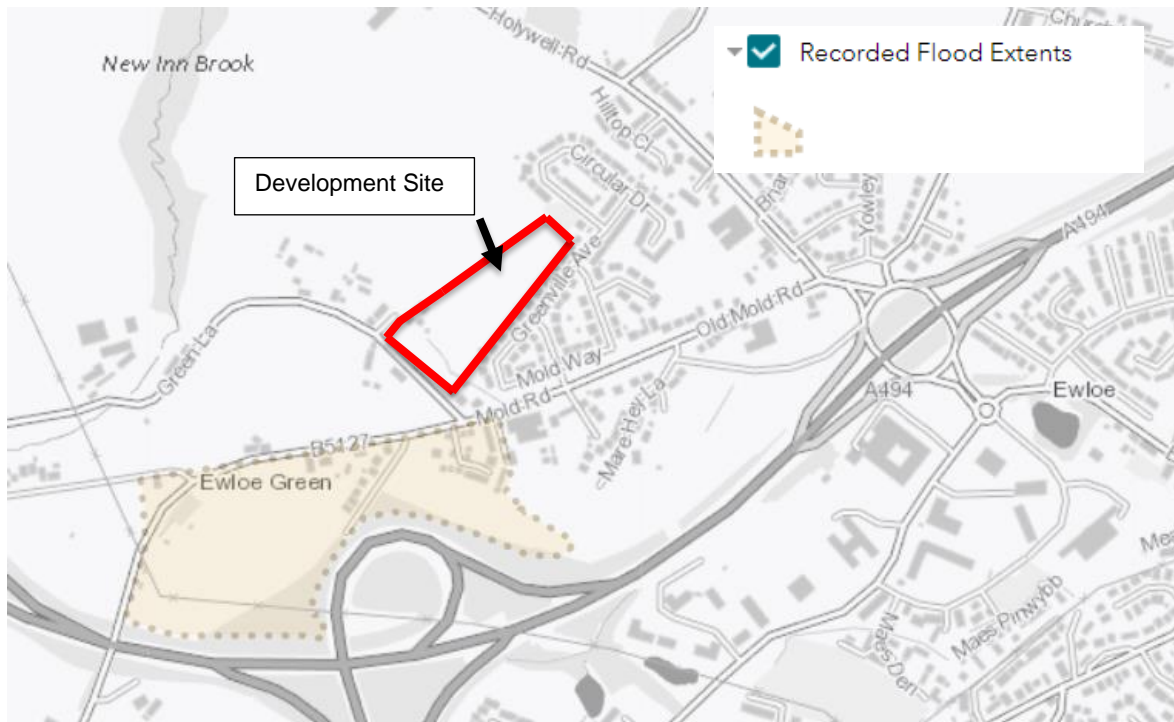


Figure 8: Natural Resources Wales Recorded Flood Extents

(Source: Natural Resources Wales, 2023)

7.0 SUSTAINABLE URBAN DRAINAGE SYSTEMS

7.1 CIRIA guidance sets out 4 key pillars for SuDS; water quality, water quantity, amenity and biodiversity. These 4 pillars provide guidance on design criteria that should be achieved on a scheme wherever possible.

7.2 As part of the drainage strategy, a SuDS assessment has been completed for the development site, in-line with standard guidance CIRIA SuDS Manual [C753] and the following is summarised:

SuDS	Present	Potential	Reason
Soakaways	No	Potentially	Requires further tests to determine if viable
Attenuation underground cellular storage Tank	None	Yes	Control flow off site
Pond	No	Yes	To be discussed with Client / Architect
Flow Control	No	Yes	Maintain discharge rate
Oil / petrol interceptors	No	Yes	Prevent oil / petrol entering surface water system.
Landscape Relief areas	No	Yes	To be reviewed upon site investigation results
Silt Traps	No	Yes	Prevent silt entering Attenuation tank
Green Roofs	No	Yes	To be discussed with Client / Architect
Water Butts	No	Yes	To be discussed with Client / Architect
Rainwater Harvesting	No	Yes	To be discussed with Client / Architect
Filter Strips	No	Yes	To be reviewed upon site investigation results
Filter Trenches	No	Yes	To be reviewed upon site investigation results
Tree Pits	No	Yes	To be reviewed upon site investigation results
Swales	No	Yes	To be discussed with Client / Architect
Permeable Pavement	No	Yes	To be discussed with Client / Architect
Infiltration Basins	No	Potentially	Requires further tests to determine if viable
Detention Basin	No	Yes	To be discussed with Client / Architect

7.3 In summary, SuDS features can be implemented on the development site. However, further discussions and investigations are required to identify the most appropriate feature/features for this site.

8.0 DRAINAGE STRATEGY

Introduction

- 8.1 The Technical Advice Note 15: Development and Flood Risk (2004) and accompanying Planning Policy Wales indicate surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.
- 8.2 Consideration should therefore firstly be given to using sustainable urban drainage (SuDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements.
- 8.3 Approved document Part H of the Building Regulations (2010) and Standard S1 of the Welsh Government National Standards for Sustainable Drainage Systems sets out a hierarchy for the disposal of surface water which encourages a SuDS approach, as detailed above.

Climate Change

- 8.4 The Welsh Government released a Flood Consequences Assessment: Climate Change Allowances report in September 2021 and was last updated in December 2021. This document supplements the advice in Technical Advice Note 15 – Development and Flood risk (2004).
- 8.5 When considering new development proposals, TAN 15 states that flooding is expected to increase with time as a consequence of climate change. Therefore, must plan new development sensitivity, and begin to do so now with climate change in mind.
- 8.6 Additionally, TAN 15 expresses that it is necessary to take account of the potential impact of climate change over the lifetime of development.
- 8.7 Climate Change Allowances are to be applied to peak river flows in areas impacted by river flooding and rainfall intensity for smaller catchments.
- 8.8 The development site is located within the River Dee Catchment basin. The below figure, an extract from the Welsh Government Climate Change Allowance and Flood Consequence Assessment, indicates the climate change considerations for this catchment.
-

Table 1: peak river flow allowances by river basin district (using 1961 to 1990 baseline¹)

	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Severn			
Upper end estimate	25%	40%	70%
Change factor /central estimate	10%	20%	25%
Lower end estimate	0%	5%	5%
West Wales			
Upper end estimate	25%	40%	75%
Change factor /central estimate	15%	25%	30%
Lower end estimate	5%	10%	15%
Dee			
Upper end estimate	20%	30%	45%
Change factor /central estimate	10%	15%	20%
Lower end estimate	5%	5%	5%

Figure 9: Extract from Welsh Government Flood Consequences Assessments: Climate Change Allowances Report

- 8.9 As stated in the Welsh Government Flood Consequences Assessment: Climate Change report, the projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, it is recommended that the central estimate, or change factor for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of an FCA.
- 8.10 Therefore, the climate change allowance for the development site has been identified at 20%.
- 8.11 A review of the impact of flooding caused by the Upper End estimate (45%) should be undertaken at detailed design stage to understand the routing of potential flood waters from exceedance events.

Existing Site Drainage

- 8.12 From the asset records obtained from Welsh Water, there is a foul water sewer along Green Lane which flows into a combined sewer on Mold Street. Additionally, there is a surface water and foul water sewer located to the north of the development site on Circular Drive.
- 8.13 See Appendix G for Welsh Water Utility records.

Methods of Surface Water Management

- 8.14 As set out in Part H of the Building Regulations and in Standard S1 of the Welsh Government National Standards for Sustainable Drainage Systems, there are three methods that have been reviewed for the management and discharge of surface water for the site which are detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority as listed:

- Discharge via soakaway or other infiltration system
- Discharge via watercourse;
- Discharge via surface water system;

Proposed Site Drainage

Discharge by Infiltration

- 8.15 The available information on the development site as identified in Section 4, suggests that the soils may be suitable for infiltration. However, no infiltration testing has been completed.
- 8.16 Testing in accordance with BRE365 will be required to determine if this is a viable option.
- 8.17 For the purpose of this report, due to the unconfirmed soil conditions infiltration has been discounted as a suitable option.

Discharge by watercourse

- 8.18 The topographical survey (see appendix H) has indicated that there is a minor watercourse which appears to be culverted towards the south of the development site. Upon review of the topographical survey, the watercourse flows from east to northwest.
- 8.19 Additionally, the nearest watercourse to the site is the River New Inn Brook which is located approximately 480 metres west from the development site.
-

8.20 As there is an open section of the watercourse within the development site, discharge via watercourse, is a suitable choice to discharge the surface water.

Discharge by Surface Water System

8.21 Welsh Water maps have been obtained, see Appendix G. These plans show that there is no surface water sewer present within the immediate vicinity of the site. However, there is a surface water system present on Circular Drive, to the north of the development site.

8.22 However, connection to this sewer would require permission from third parties and the proposed site layout does not suit for discharging to the surface water sewer.

8.23 Therefore, discharge via surface water system has been discounted as a suitable choice.

Surface Water Drainage Strategy

8.24 As noted above in the hierarchy review, discharge via watercourse is the preferred method for the purpose of this report. However, upon completion of Ground Investigations, infiltration will be considered and applied where appropriate.

8.25 The proposed impermeable area for the site is 1.457ha which consists of a new access road, private parking, dwellings and footways. All these areas will generate surface runoff.

8.26 The general principle of the surface water drainage strategy for this site is to collect the surface water runoff and restrict the discharge flow to an existing watercourse located towards the south of the development site.

8.27 The discharge rate is supposed to match existing greenfield runoff which is 12.1 l/s.

8.28 Therefore, the discharge rate of the development site will be restricted to 12.1 l/s. However, this discharge rate needs to be agreed with Flintshire County Council and Welsh Water.

8.29 The flows from the site will be controlled by a flow control to ensure that no discharge exceeds 12.1 l/s.

8.30 The proposed site peak run-off rates are provided in Table 3.

Table 3 – Proposed Peak Run-off Rates

Return Period (Yr.)	Proposed Runoff Rate (l/s)
1 Year	12.1 l/s
30 Year	12.1 l/s
100 year (+20%)	12.1 l/s

- 8.31 Due to the surface water flow being restricted, attenuation will be required for the site.
- 8.32 The attenuation volume for the development site has been calculated based on an impermeable area of 14,570m² and will cater for up to the 1 in 100-year storm + 20% climate change.
- 8.33 The attenuation will be provided for up to a 30-year storm event in the form of oversized pipes and for up to 1 in 100-year storm event plus 20% climate change will be attenuated in offline detention basins.
- 8.34 A calculation for estimated attenuation requirements has been completed, see Table 4 for attenuation requirement and Appendix E for Micro-drainage storage calculations.

Table 4 – Attenuation Requirements

Rainfall Method	Maximum Volume (m ³)
Oversized Pipes – 30 year	526m ³
Offline Detention Basin – 100 year & 20% CC	393m ³
Total Storage	919m³

- 8.35 For the purpose of this report, a proposed drainage layout has been prepared, see Appendix B.
- 8.36 The drainage layout is subject to proposed levels and RWP locations.
- 8.37 Detailed surface water calculations for the network and sizing of the storage features will need to be completed during the post-planning stage (detailed design) to ensure suitable attenuation volumes and carrier drains are provided.
- 8.38 Areas of exceedance will be considered in the detailed design phase once proposed finished levels have been finalised. The development will be designed to ensure all flows from up to and

including the 1 in 100 years plus 20% will be attenuated below ground, controlled surface ponding will be acceptable up to the 1 in 100-year event plus 20% climate change and no flooding off site will occur due to the development.

- 8.39 Urban Creep is defined as any increase in the impervious area that is drained to an existing drainage system without planning permission being required, and therefore without any consideration of whether the capacity of the receiving sewerage system can accommodate the increased flow.
- 8.40 Due to the nature of the proposed development, urban creep should be considered and to allow for future urban expansion within the development, an increase in paved surface area of 10% has been incorporated into the design calculations. Incorporating urban creep at this stage will reduce conflict with the client at a later stage if we increase attenuation sizes.
-

9.0 WATER QUALITY MANAGEMENT

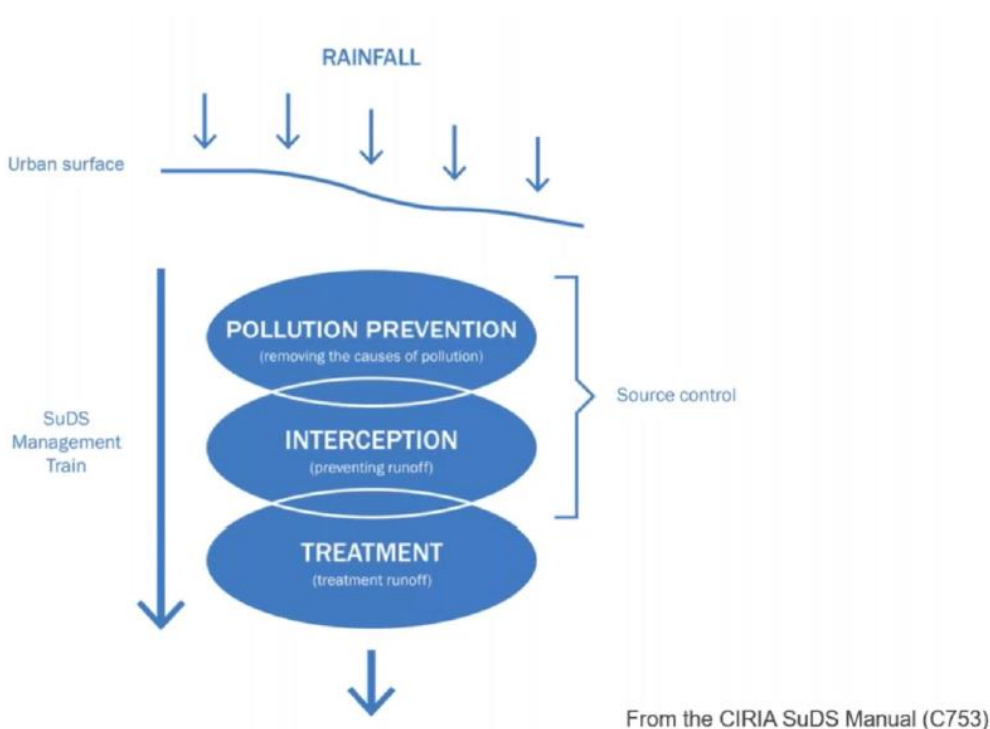
9.1 Water Quality Management options have been reviewed for the development site, in-line with standard guidance CIRIA SuDS Manual [C753] and the following is summarised:

The following are general notes and identified stages to consider on water quality:

9.2 The most important rainfall event to manage in terms of water quality is frequent rainfall events – low rainfall / high pollutant % [supposed to when you get high rainfall and diluted pollution %].

- Sunlight [UV light] brakes down pollution.
- Pollution on the surface is easier to identify and remove / maintain.
- Remove sediment / pollution as early as possible.
- Review the state of the receiving [downstream] waterbody.
- Sediment sinks and hydrocarbons / oils float.

3 Stages of water quality management



General Design Summary for this Site:

9.3 All water will be treated on site through a three-stage process which includes sumps in [1] all gullies, [2] catch pits, [3] water storage.

- Gullies provide sediment to sink
- Catchpits enable sediment to sink
- Water storage aids to dilute any pollution in the water

Pollution Hazard Levels

9.4 Table 4.3 and 26.2 from the SuDS manual provides pollution hazard levels and values for different elements of a development, the following has been identified:

Element	Pollution hazard level
Individual property driveways / residential car parks	Low
Low traffic roads	Low
Other areas	Low

9.5 Based on the above water quality assessment which has identified this site pollution hazard levels and values, the following mitigation measures and the resulting pollution sufficiency have been assessed:

Pollution	Mitigation	Pollution sufficiency summary
Individual property driveways / residential car parks – Low pollution hazard level	Gullies and drainage channels with sumps	Sufficient
Low traffic roads – Low pollution hazard level	Gullies with sumps	Sufficient
Other areas – low pollution hazard level	Catchpits	Sufficient

9.6 The following items that can be implemented on this site:

1. On the surface pollution prevention

- Manage routing activities – silts and sediments, hydrocarbons and oils, metals, micro plastics, and pesticides

1. Interception –

- Capture the rainfall for use in water butts or similar
- Tree pits
- Permeable paving (driveways / shared access)

2. Treatment – drainage elements –

- Gullies
 - Catchpits
 - Detention Basins
 - Swales
 - Petrol Interceptors (these are difficult to implement on residential developments)
-

10.0 FOUL WATER MANAGEMENT

- 10.1 The foul water system will be designed and constructed in accordance with the current Building Regulations, BS EN:752 drainage and sewer systems outside buildings, the local authority building control specifications and requirements, Design and Construction Guidance (DCG) and the Civil Engineering Specification for the Water Industry 7th Edition.
- 10.2 It is proposed to construct a new foul water drainage system to serve the proposed development.

Foul Water Capacity and Point of Connection

- 10.3 The foul water drainage is proposed to connect to an existing foul water sewer present on Green Lane. The exact outfall location is to be confirmed during detailed design once drainage surveys and a pre-development enquiry from Welsh Water have been submitted.
- 10.4 The proposed foul network is outlined within the proposed drainage strategy in Appendix B.
- 10.5 The proposed foul flows have been calculated using 4000 litres per dwelling per day as per the DCG, and therefore the proposed foul peak flow is 3.24 l/s.
-

11.0 RECOMMENDATIONS AND MITIGATION MEASURES

- 11.1 As identified above, the development site lies within Flood Zone A and is at a low risk of fluvial flooding.

Flood Risk Management Measures

- 11.2 All drainage features should be located in open areas which are accessible.
- 11.3 Gradients of the hardstanding areas, where possible, should be designed to fall away from buildings such that any overland flow resulting from extreme events would be channelled away.
- 11.4 The proposed levels drain away from the vehicle access and pedestrian access, and therefore is considered that access and egress will not be at an increased risk.
- 11.5 Attenuation will be provided in form of oversized pipes for up to a 30-year storm event and offline detention basins for up to 100-year storm events plus 20% climate change.

Residual Risks

- 11.1 As with any drainage system, blockages within the surface water system have potential to cause flooding or disruption. It is important that any drainage systems not being offered for adoption to either the Water Company or the Local Authority has an appropriate maintenance regime scheduled which would be advised to prospective property owners where appropriate.
- 11.2 Any overland flows generated by the proposed development must be directed away from any adjacent existing properties surrounding the site and towards the highway network where it can follow natural flow paths.

Maintenance

- 11.1 Requirements for ongoing maintenance of the drainage network will form part of the Operation and Maintenance manual for the site and will be undertaken by the building management. Any specialist or proprietary products that are specified at detailed design will have a manufacturer specific maintenance regime which will be included within the document.
- 11.2 All surface water arrangements outlined above are subject to approval by Welsh Water and the LLFA.
-

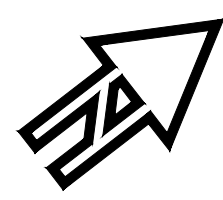
12.0 SUMMARY

- 12.1 SCP have been commissioned by Castle Green Homes to provide a Flood Consequence Assessment in respect of a planning application for 70 new dwellings including associated landscaping, access road and private parking.
- 12.2 The total area for the site is calculated as being 2.428ha with approximately 1.457ha proposed impermeable areas.
- 12.3 The existing site is currently a greenfield site. Calculations of the existing greenfield discharge rate have concluded a QBar of 12.1l/s.
- 12.4 The Flood Consequence Assessment has reviewed all sources of flood risk to both the proposed development and adjacent areas as a result of the development proposals and has identified the site as being at low risk of flooding from fluvial sources; therefore, the development site is Flood Zone A.
- 12.5 Discharge via infiltration has currently been discounted due to unconfirmed soil conditions. However, testing in accordance with BRE365 will be required to determine if this could be a viable option.
- 12.6 Discharge via watercourse has been chosen as a suitable option for discharging the surface water as there is a minor watercourse present within the development site. The watercourse appears to flow from east to west which then may connect into the River New Inn Brook. However, this will need to be approved by the LLFA.
- 12.7 Discharge via surface water sewer has been discounted to due there being no surface water sewer within the immediate vicinity of the development site. The nearest surface water sewer is located north of the site in Circular Drive.
- 12.8 Prior to detailed drainage design, ground investigations must be completed.
- 12.9 The proposed surface water discharge rate for the development is to be restricted to 12.1l/s to match the existing greenfield runoff rate. This discharge rate will need to be accepted and confirmed by the LLFA and Welsh Water through the planning process. The discharge from the site will be controlled by a flow control.
- 12.10 Oversized pipes and offline detention basins are proposed in order to account for climate change at 20%, with water quality management techniques being implemented in order to provide treatment to surface water flows.
-

- 12.11 SuDS features can be implemented on the development site. However, further discussions and investigations are required to confirm their suitability for detailed design.
 - 12.12 Further investigation of the watercourse is required to establish bed and water levels and to define the route of culverted sections located within the site boundary
 - 12.13 The foul water system is proposed to connect into an existing foul water sewer on Green Lane. The proposed peak flow from the development site is 3.24l/s.
 - 12.14 In accordance with TAN 15 and other relevant guidelines and policies, the development is suitable in this location.
-

Appendix A

Proposed Site Plan



SCHEDULE OF ACCOMMODATION				
HOUSETYPE	DESCRIPTION	SQFT	NUMBER	PERCENTAGE
4P2B (Affordable)	2 Bed, 2 Storey, End-Mid-Terrace	895 SQFT	16	22.86
5P3B (Affordable)	3 Bed, 2 Storey, End-Terrace	1015 SQFT	12	17.14
Oakley	2 Bed, 2 Storey, Mid Terrace	705 SQFT	3	4.29
Highfield	3 Bed, 2 Storey, End Terrace	821 SQFT	6	8.57
Marlow Semi	3 Bed, 2 Storey	987 SQFT	10	14.29
Henley	3 Bed, 2 Storey	1048 SQFT	2	2.86
Stratford	3 Bed, 2 Storey	1055 SQFT	11	15.71
Cheltenham	3 Bed, 2 Storey	1234 SQFT	5	7.14
Wentworth	4 Bed, 2 Storey	1345 SQFT	5	7.14
TOTAL		69991 SQFT	70	100.00
Gross Site Area		6 Acres	2.43 Hectares	
Existing Landscaping		0.37 Acres	0.15 Hectares	
P.O.S.		1.05 Acres	0.43 Hectares	
Undevelopable: Site Access, SSR & Sub station		0.19 Acres	0.08 Hectares	
NETT SITE AREA:		4.38 ACRES	1.77 HECTARES	
Gross Density:		11.67 Units/Acre	28.83 Units/Hectare	
NETT DENSITY:		16.98 UNITS/ACRE	39.49 UNITS/HECTARE	
Gross Footage:		11665.17 SQFT/Acre	2677.95 SQM/Hectare	
NETT FOOTAGE:		19979.68 SQFT/ACRE	3668.39 SQM/HECTARE	

Key:

- Site Boundary
- 1.8m high boundary fence
- 1.8m high screen wall / fence
- Private Drive
- Visibility Splays - 2.4x??m to Site Entrances
- Indicative Landscaping. - refer to landscaping design for exact details
- Number of parking spaces proposed to Semi-Detached and Detached Dwellings in accordance with LPA Parking Standards
- Parking space allocation to Frontage Parking Dwellings
- Existing retained hedges/landscaping

Rev:	Description:	Date:
A-	Amendments to housing mix & Numbers	20/09/23



Castle Green,
Unit 20,
St. Asaph Business Park,
St Asaph,
Denbighshire. LL17 0LJ.
Tel. 01745 536677

Site: **Land off Green Lane, Ewloe**

Title: **Site Layout**

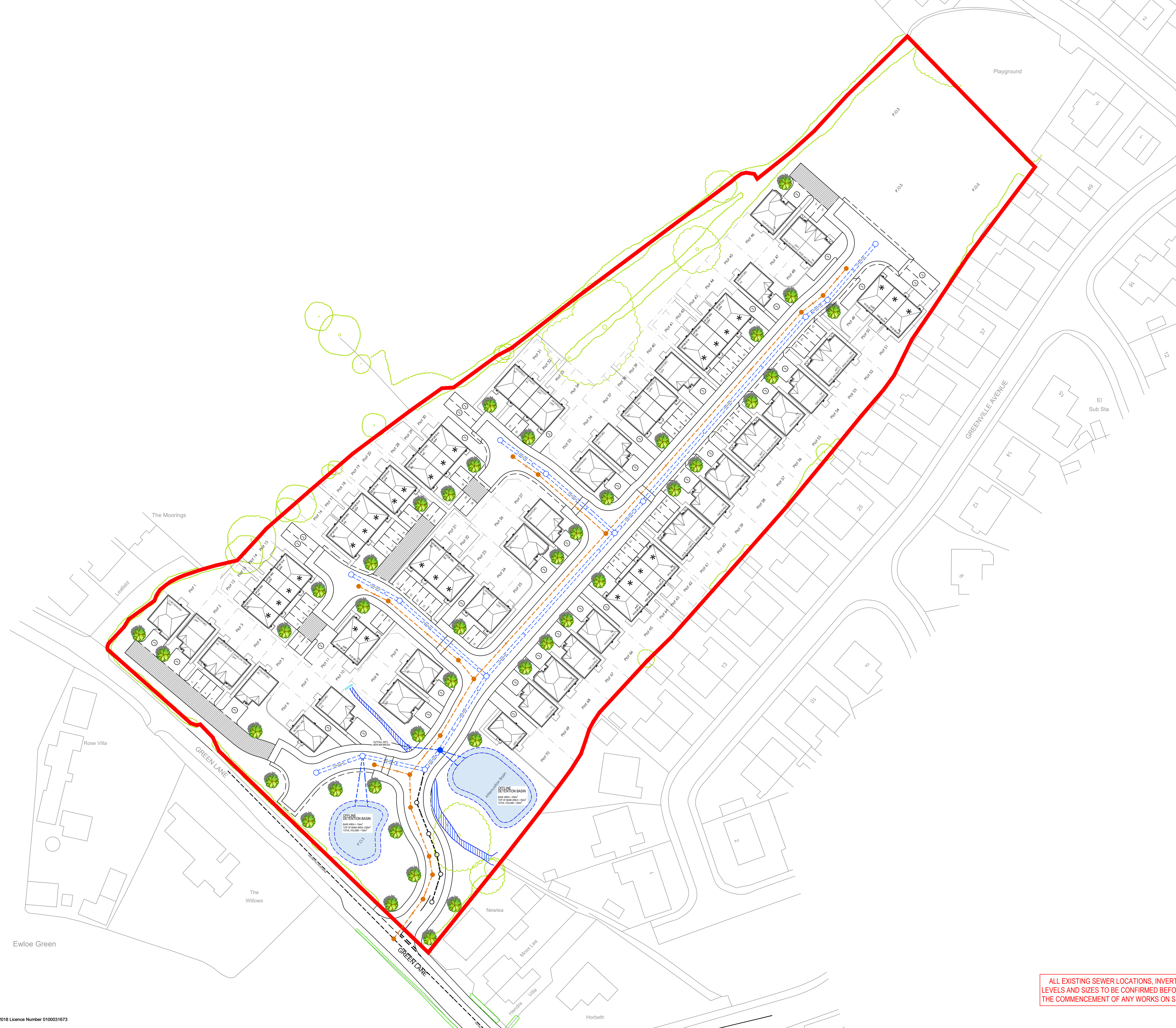
Scale: **1:500 at A1** Date: **03/05/2023**

Ref: **GL-EWL-SL.01** Rev: **A**

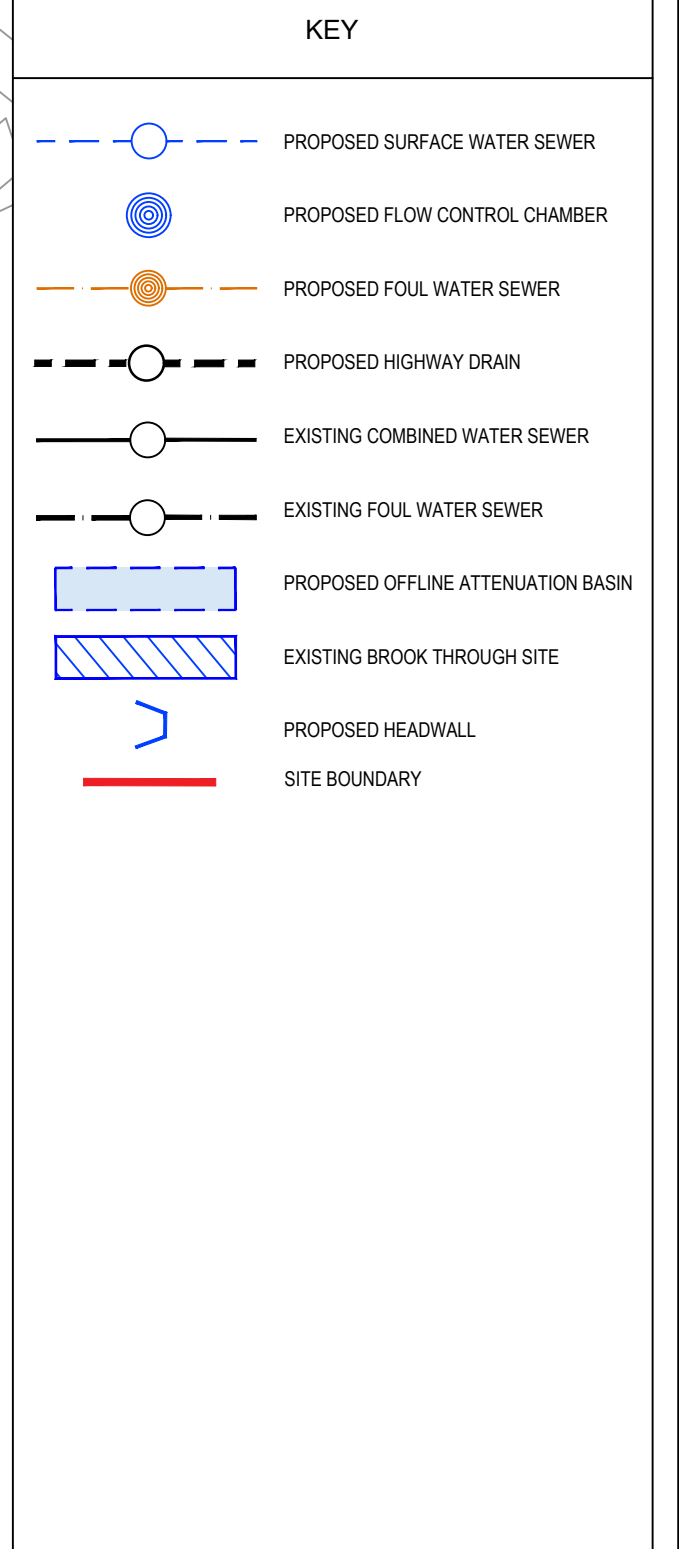


Appendix B

Proposed Drainage Layout



- NOTES**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. ALL LEVELS ARE IN METRES RELATED TO ORDNANCE DATUM NEWLYN (OD) UNLESS NOTED OTHERWISE.
 3. ALL COORDINATES ARE IN METRES RELATED TO ORDNANCE SURVEY NATIONAL GRID.
 4. ALL MATERIALS AND WORKMANSHIP WILL BE AS DEFINED IN THE SPECIFICATION UNLESS NOTED OTHERWISE.
 5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL DRAWINGS AND DOCUMENTATION ASSOCIATED WITH THE PROJECT.
 6. THIS DRAWING HAS BEEN BASED UPON SURVEYORS INFORMATION SUPPLIED BY A THIRD PARTY AND SCP SHALL NOT BE LIABLE FOR ANY INACCURACY OR DEFICIENCIES ARISING FROM IT.
 7. ALL LEVELS, DIMENSIONS AND LOCATIONS ARE TO BE CHECKED BY THE MAIN CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORK ON SITE.
 8. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH LOCAL AUTHORITY ADOPTABLE RESIDENTIAL ROAD SPECIFICATION AND STANDARD DETAILS.



REVISIONS

REV	DESCRIPTION	DATE	BY
A	ISSUED FOR INFORMATION	06.10.23	LC



Client Name:
CASTLE GREEN HOMES

Project Title:
GREEN LANE, EWLOE

Drawing Title:
PROPOSED DRAINAGE STRATEGY

Date: 06.10.2023	Drawn By: LC
Scale: 1:500 @ A1	Checked: NMc
Status: PLANNING	Approved: NMc

Drawing No: SCP-230830-0000-SK01	Rev: A
--	------------------

ALL EXISTING SEWER LOCATIONS, INVERT LEVELS AND SIZES TO BE CONFIRMED BEFORE THE COMMENCEMENT OF ANY WORKS ON SITE

Appendix C


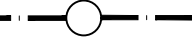

Proposed Catchment Plan



NOTES

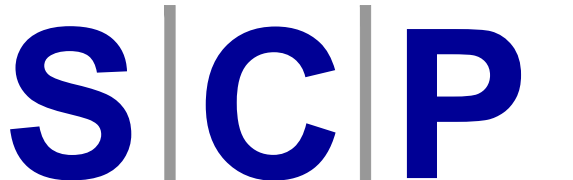
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATED TO ORDNANCE DATUM NEWLYN (OD) UNLESS NOTED OTHERWISE.
3. ALL COORDINATES ARE IN METRES RELATED TO ORDNANCE SURVEY NATIONAL GRID.
4. ALL MATERIALS AND WORKMANSHIP WILL BE AS DEFINED IN THE SPECIFICATION UNLESS NOTED OTHERWISE.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL DRAWINGS AND DOCUMENTATION ASSOCIATED WITH THE PROJECT.
6. THIS DRAWING HAS BEEN BASED UPON SURVEY/IOS INFORMATION SUPPLIED BY A THIRD PARTY AND SCP SHALL NOT BE LIABLE FOR ANY INACCURACY OR DEFICIENCIES ARISING FROM IT.
7. ALL LEVELS, DIMENSIONS AND LOCATIONS ARE TO BE CHECKED BY THE MAIN CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORK ON SITE.
8. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH LOCAL AUTHORITY ADOPTABLE RESIDENTIAL ROAD SPECIFICATION AND STANDARD DETAILS.

KEY

-  PROPOSED IMPERMEABLE CATCHMENT
-  EXISTING FOUL WATER SEWER
-  SITE BOUNDARY

REVISIONS

REV	DESCRIPTION	DATE	BY
A	ISSUED FOR INFORMATION	06.10.23	LC



Transportation Planning : Infrastructure Design

Colwyn Chambers, 19 York Street, Manchester, M2 3BA, Tel 0161 832 4400, www.scptransport.co.uk, Email info@scptransport.co.uk

Client Name:

CASTLE GREEN HOMES

Project Title:

GREEN LANE, EWLOE

Drawing Title:

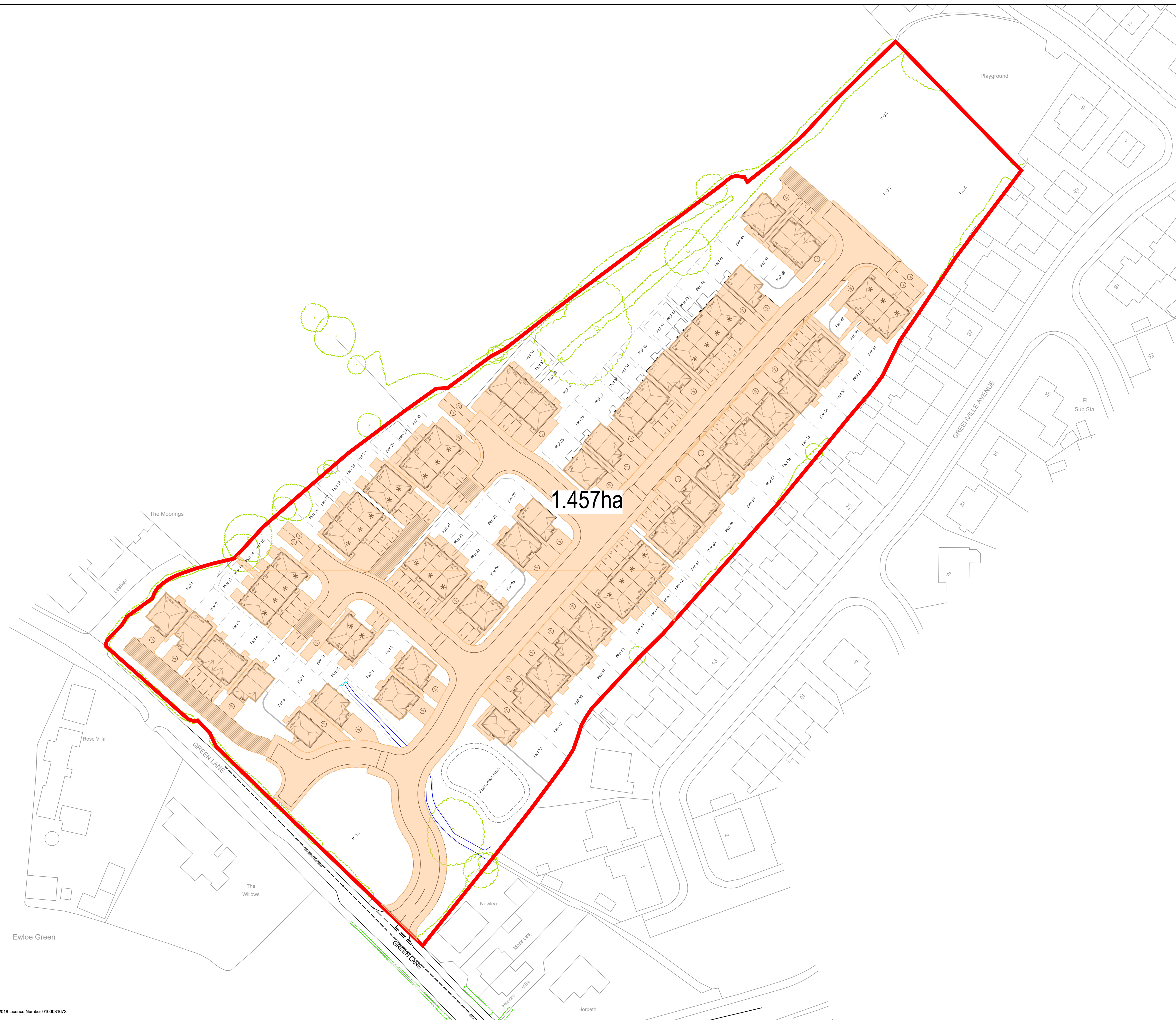
PROPOSED CATCHMENT PLAN

Date: 06.10.2023 Drawn By: LC

Scale: 1:500 @ A1 Checked: NMc

Status: PRELIMINARY Approved: NMc

Drawing No: SCP-230830-0000-SK02 Rev: A



Appendix D

Existing Greenfield Runoff Calculations

Colwyn Chambers
19 York St
Manchester M2 3BA



Date 29/09/2023 16:08
File

Designed by lauren.campton
Checked by

XP Solutions Source Control 2020.1.3

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	2.428	Urban	0.000
SAAR (mm)	780	Region Number	Region 9

Results 1/s

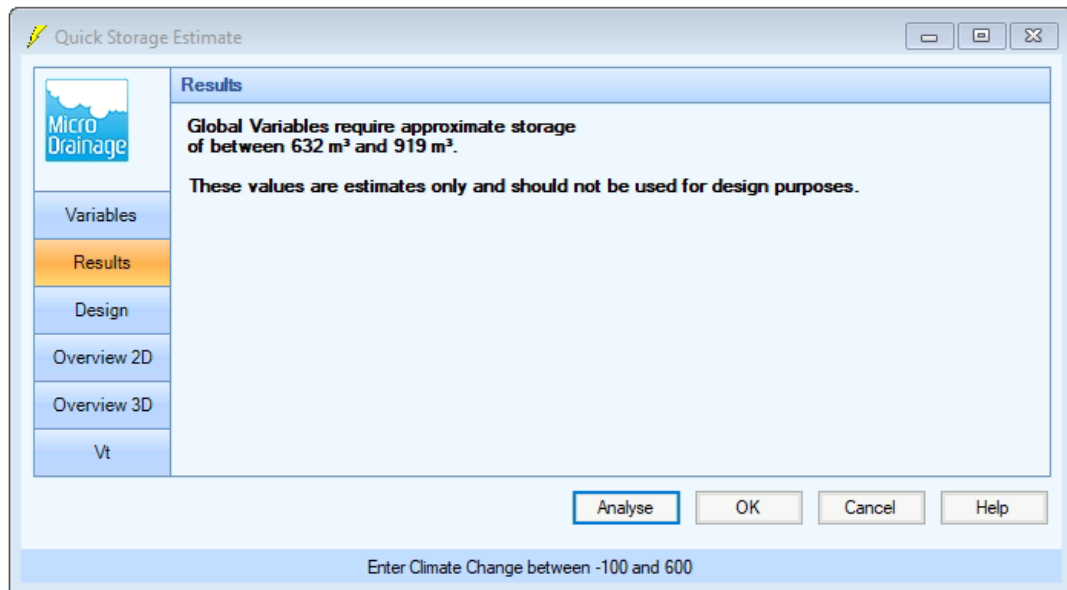
QBAR Rural	12.1
QBAR Urban	12.1
Q100 years	26.4
Q1 year	10.7
Q30 years	21.3
Q100 years	26.4

Appendix E

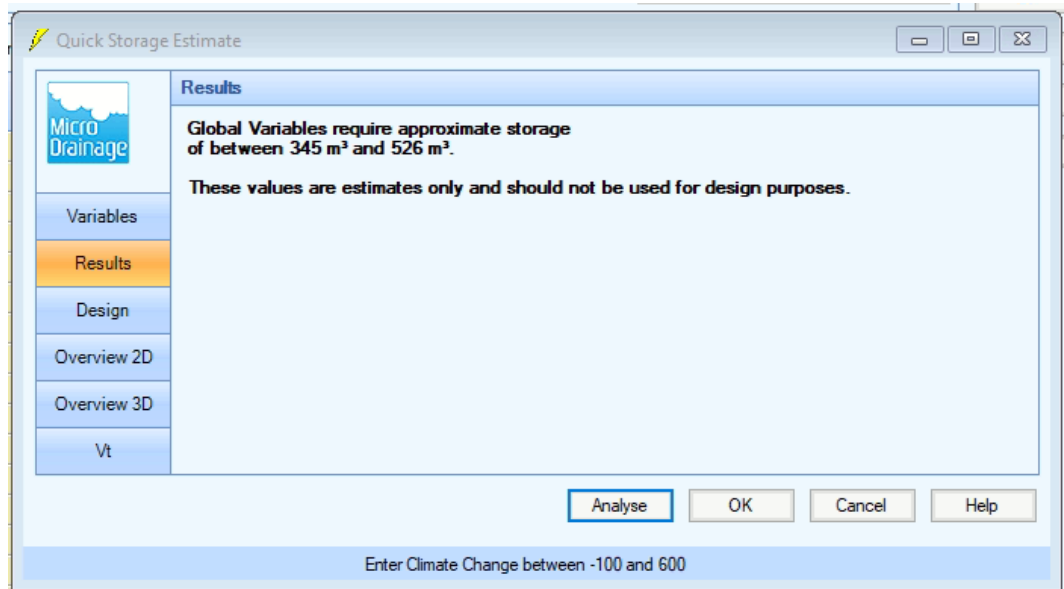
Micro-Drainage Storage Estimates

Micro-Drainage Quick Storage Calculations

Extract 1: 100 year storm event plus 20% Climate Change allowance storage estimate



Extract 2: 30 year storm event storage estimate



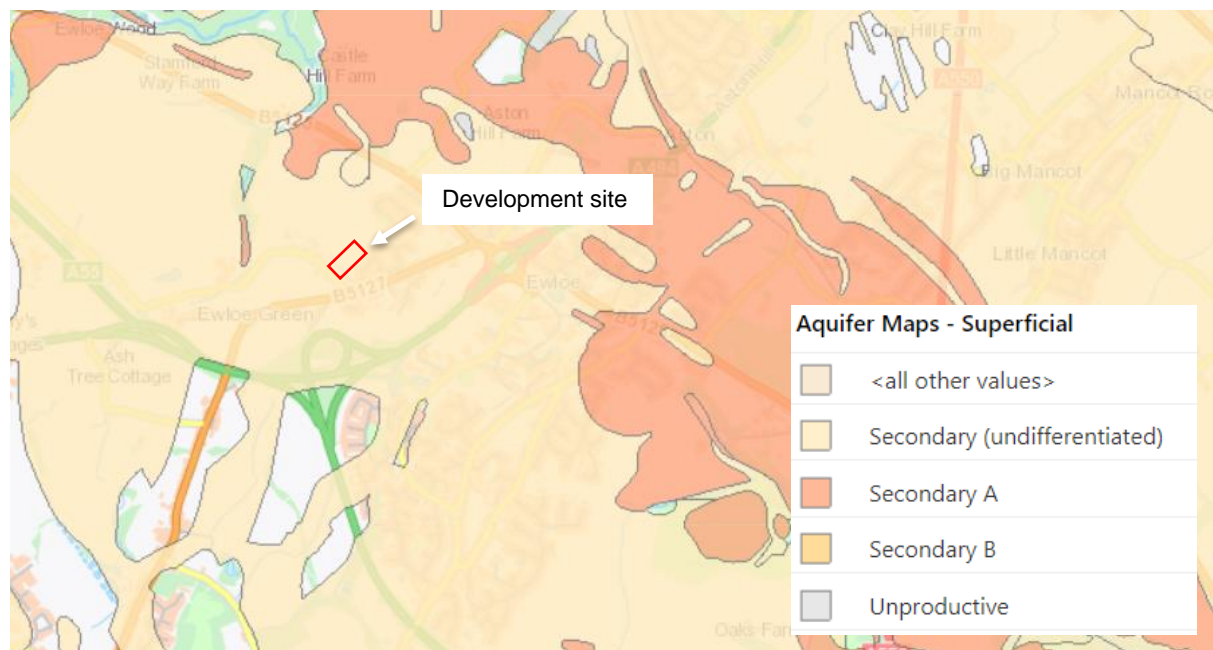
Appendix F

Natural Resources Wales & BGS Extracts

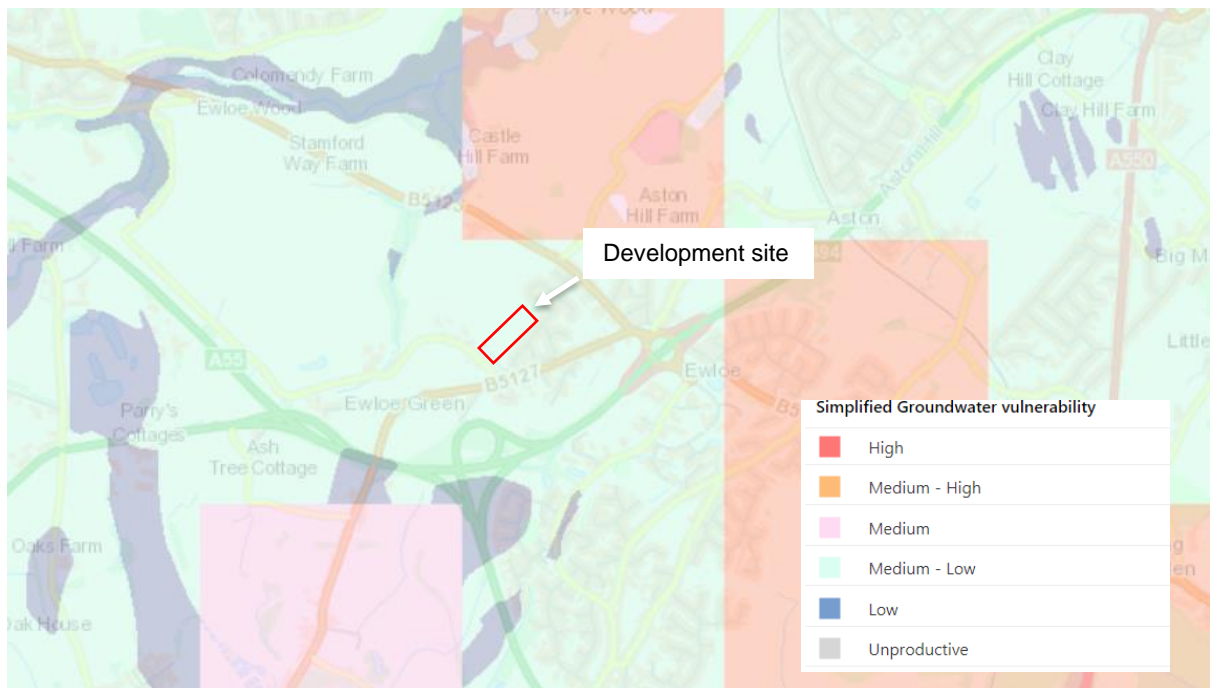
Extract 1: Natural Resources Wales Bedrock Classifications



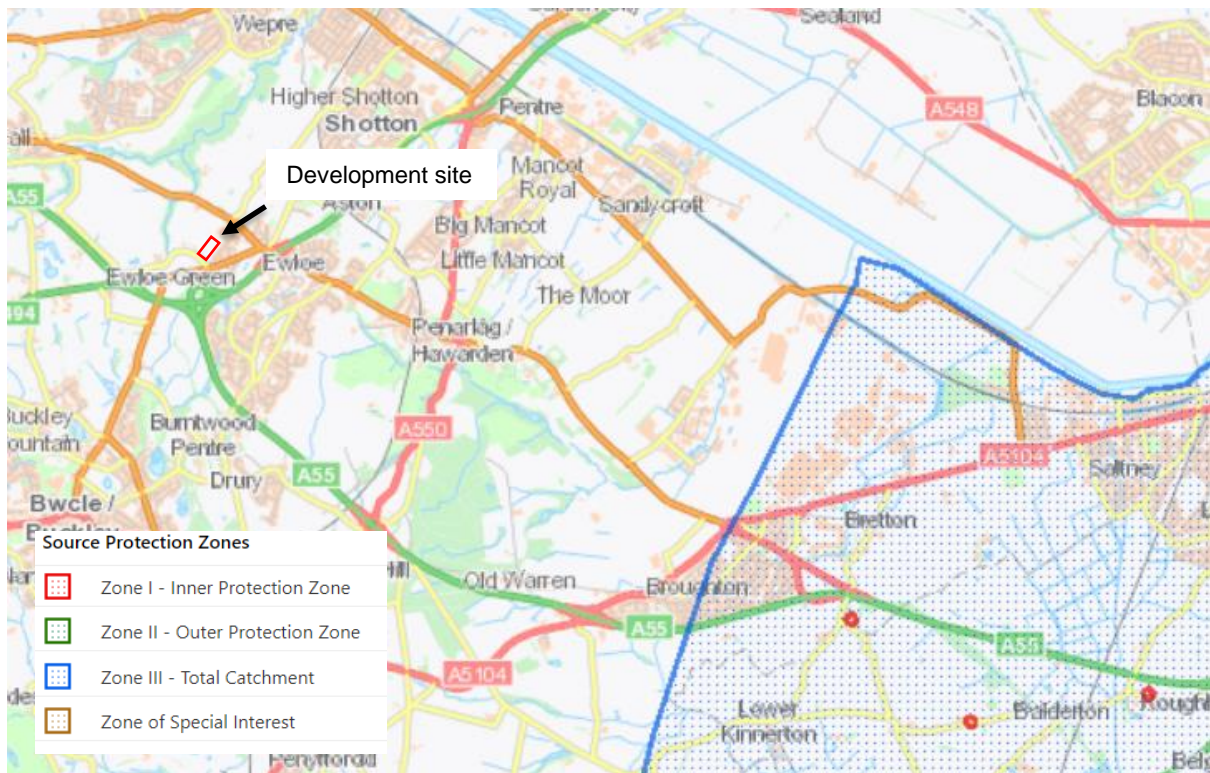
Extract 2: Natural Resources Wales Superficial Drift Classifications



Extract 4: Natural Resources Wales Groundwater Vulnerability



Extract 6: Natural Resources Wales Source Protection Zones



Extract 7: BGS Soil Classification



Geology



Bedrock geology



Pennine Middle Coal Measures Formation - Mudstone, siltstone and sandstone. Sedimentary bedrock formed between 318 and 309.5 million years ago during the Carboniferous period.

[More Information](#)

Superficial deposits



Till, Devensian - Diamicton. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

[More Information](#)

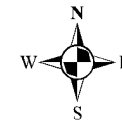
Appendix G

Welsh Water utility Asset Plan

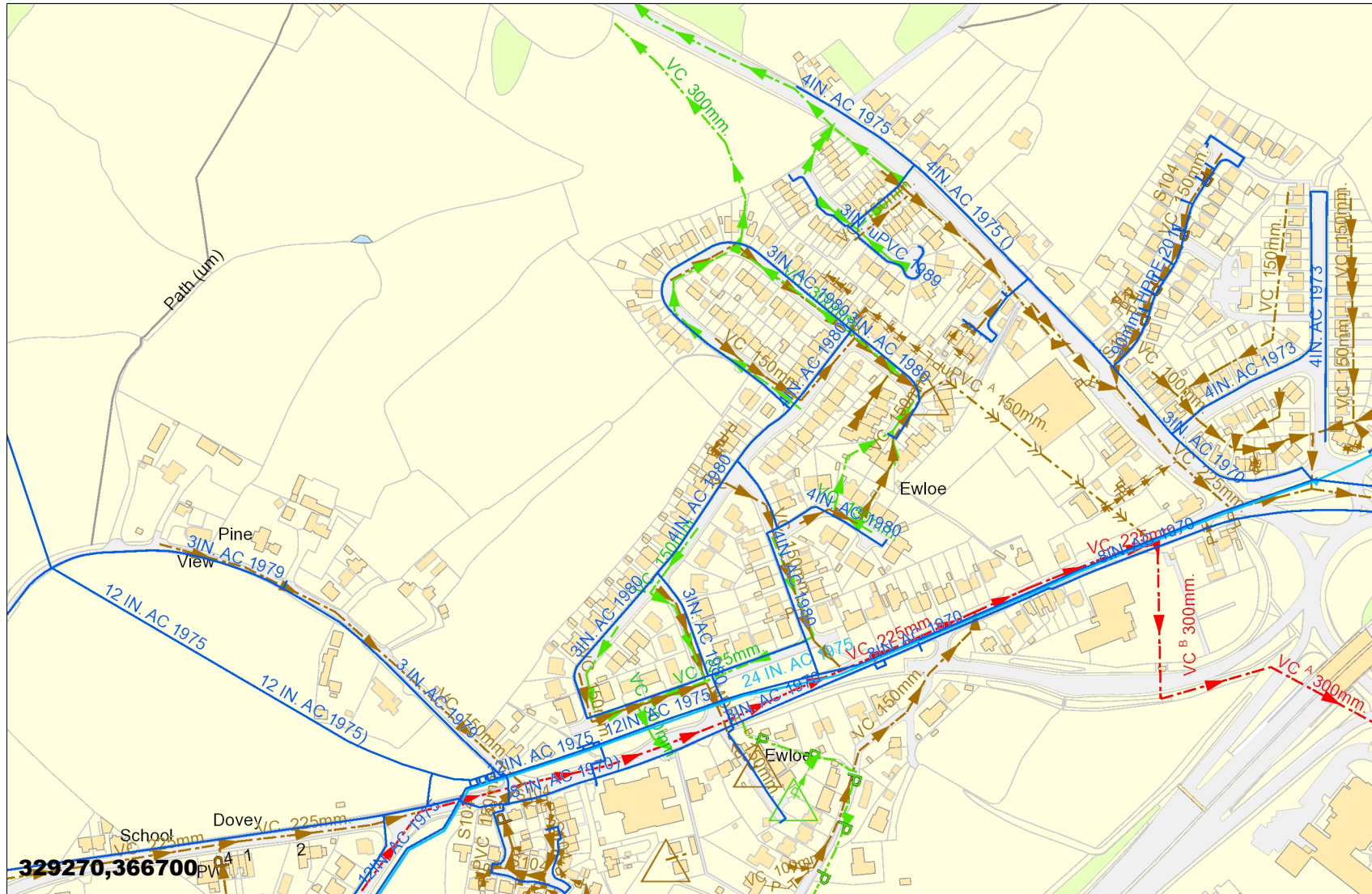


Dwr Cymru
Welsh Water

15/02/2019



Scale: 1: 4213



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

Dwr 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 and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby by the company, is done so in accordance with statutory requirements of sections 198 and 199 f the water industry Act 1991 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 drain sewer or disposal main 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 us 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.

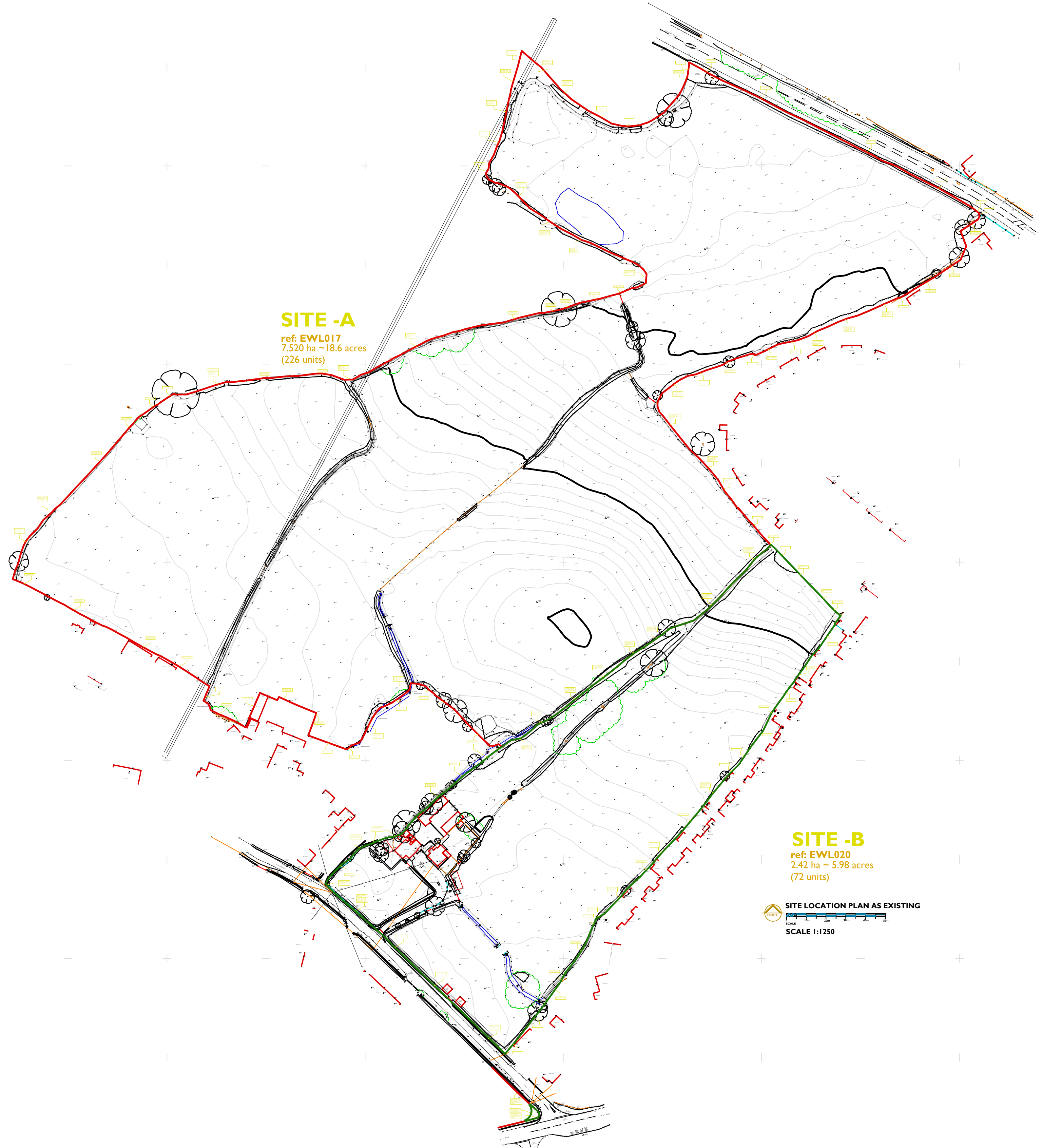
EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright. Licence No: WU298565.

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

Appendix H

Topographical Survey





SITE -A

ref: EWL017
7.520 ha ~18.6 acres
(226 units)

SITE -B

ref: EWL020
2.42 ha ~ 5.98 acres
(72 units)

 **SITE LOCATION PLAN AS EXISTING**

SCALE 1:1250