Ansty Garden Community

Environmental Statement

Volume 4

November 2023

APPENDIX B: OTHER TECHNICAL REPORTS

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Appendix B1: Flood Risk Assessment and Outline Drainage Strategy

Ansty Garden Community: Flood Risk Assessment and Outline Drainage Strategy

A REPORT FOR FAIRFAX ACQUISITIONS LTD

JULY 2023

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Title

Ansty Garden Community: Flood Risk Assessment and Outline Drainage Strategy

Client

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1 Introduction

1.1 INSTRUCTION

Yellow Sub Geo Ltd (Yellow Sub) was instructed by Fairfax Acquisition Ltd (the Client) to provide a Flood Risk Assessment (FRA) and Outline Sustainable Drainage (SuDS) Strategy for a proposed residential led mixed use development on a parcel of land near Ansty, Mid-Sussex (the Site). Instruction to proceed was provided by email on the 19th July 2022.

1.2 BACKGROUND

The Client is seeking to obtain planning permission for a residential led development at the Site. The development will contain up to 1,450 dwellings (including 30% affordable housing), up to 90 residential care (C2 units), a primary school, new SEND school, sports facilities including all weather hockey pitches and tennis centre, allotments, retail, community and employment uses together with ancillary and associated development including new and enhanced pedestrian/cycle routes, open spaces, and landscaping. In addition to this, the planning application includes a greenfield area to the north; this area will be utilised as a Parkland Reserve (no development in this area). Further details of the proposed development are provided in Section 3.

This report constitutes a FRA and Outline Sustainable Drainage Strategy for the proposed development which is required for the planning application. This report focuses primarily on the proposed housing development area ("the Site ") and with a lesser focus on the proposed Parkland Reserve ("Beechy Bottom Parkland Reserve"), which will not be developed and is considered a water compatible land use (see Figure 1).

1.3 SCOPE OF THE REPORT

The scope of this assessment is as follows:

- Preparation of a FRA, written in line with the National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance (PPG) to satisfy the Mid Sussex District Council (MSDC) and the Lead Local Flood Authority (LLFA, West Sussex County Council) that all potential flood risks to and from the proposed development have been considered and that the proposed development is appropriate, as defined in the NPPF;
- Consideration of appropriate Site-specific flood risk mitigation measures; and,
- Development of an outline SuDS strategy to mitigate the potential increase in runoff and deterioration in water quality released from the Site, as well as providing amenity and biodiversity benefits.

1.4 DATA SOURCES

The main sources of data utilised in this assessment are summarised below:

- A topographical survey of the Site;
- Proposed Site development plans as provided by the Client;
- Data collected during a Site walkover;
- Site specific infiltration test data collected in June 2023;
- Southern Water sewer asset location plans;
- Environment Agency (EA) flood risk data;
- The Mid Sussex Level 1 Strategic Flood Risk Assessment (Mid Sussex District Council, 2015);

- The West Sussex LLFA Policy for the Management of Surface Water (West Sussex County Council, 2018);
- A guide for master planning sustainable drainage into developments in southeast of England (AECOM, 2013);
- LiDAR digital terrain model (DTM) data;
- Ordnance Survey mapping; and,
- British Geological Survey (BGS) mapping and borehole logs.

1.5 LIMITATIONS

This report is written strictly for the benefit of the Client and bound by the conditions presented in Appendix A.

2 Site description

2.1 SITE SETTING AND SURROUNDING AREA

The Site is located to the east of Ansty Village in the District of Mid Sussex, closest postcode is RH17 5AG (see Figure 1) The National Grid Reference for the approximate centre of the Site is TQ 29653 23438. The Site covers a total area of approximately 100Ha, and Beechy Bottom Parkland Reserve covers an approximate area of 103Ha.

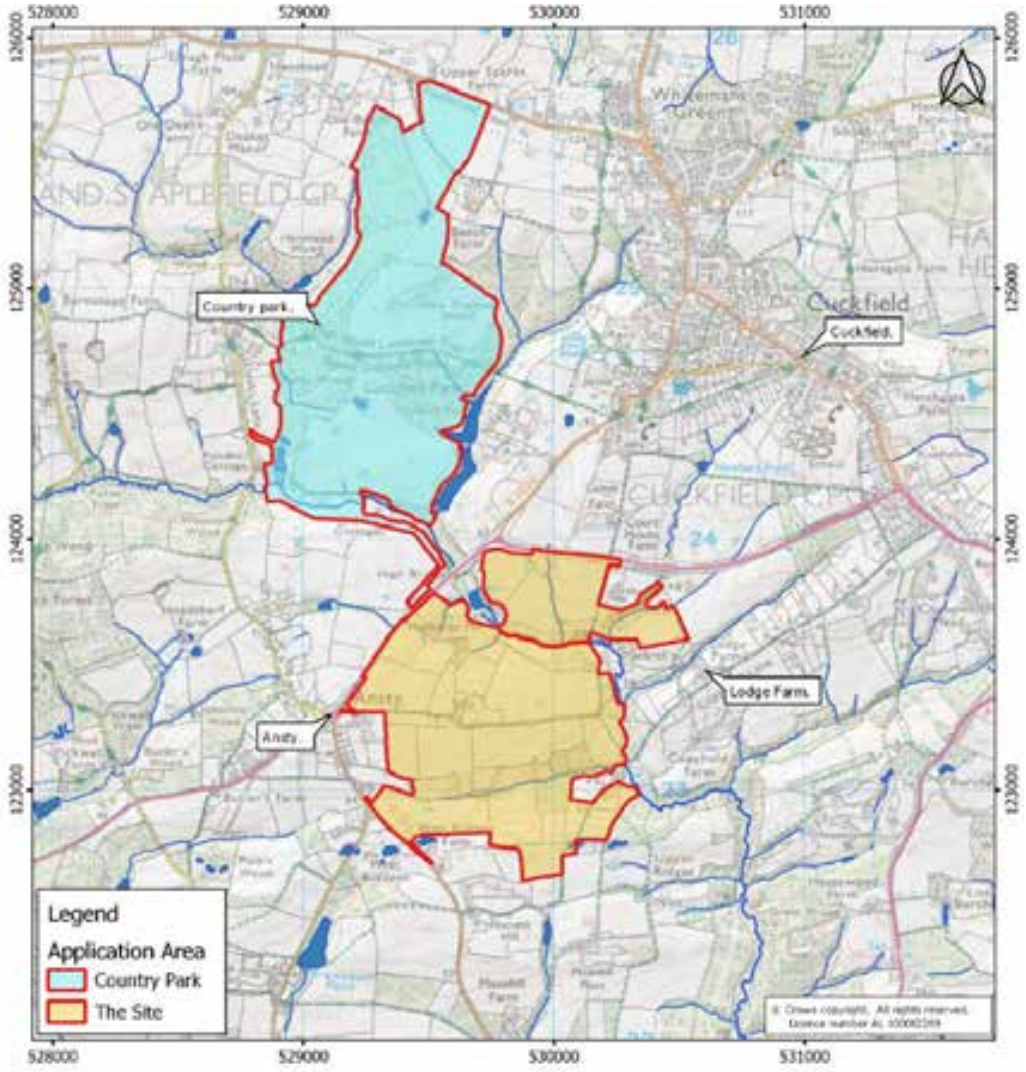

Figure 1 Location plan

Figure 2 presents an aerial image of the Site showing its current land use and condition. The Site currently comprises agricultural fields separated by hedgerows and ditches. There are also wooded areas in parts of the Site, particularly in the vicinity of the watercourses and overland flowpaths.

The village of Ansty lies at the western extent of the Site, and Cuckfield is located approximately 1km to the northeast. The Site is bounded to the south by more agricultural land. The A272 road bounds the Site to the north. A wastewater treatment works is located adjacent to the northern boundary.

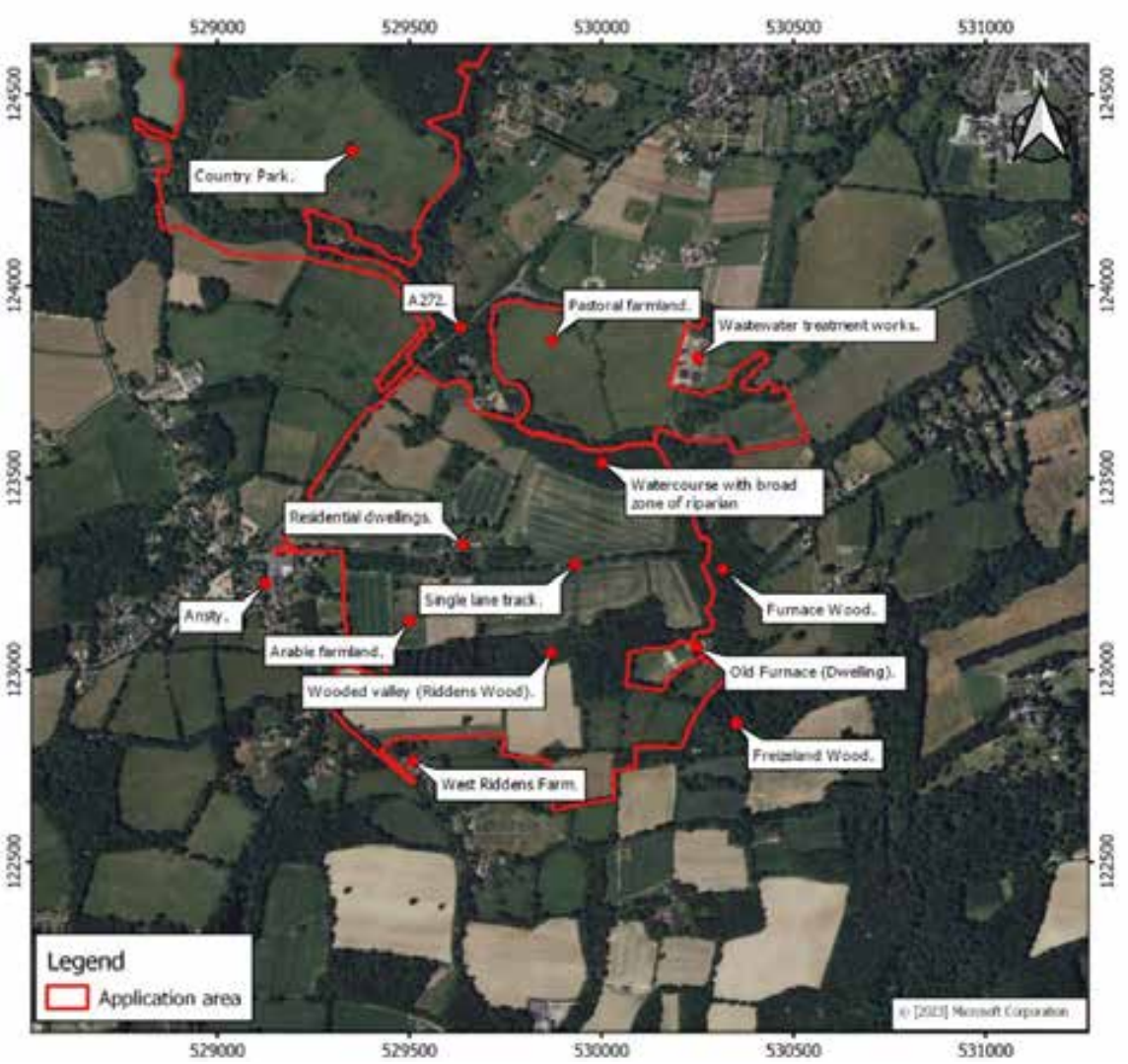

Figure 2 Existing Site layout (development area)

The Beechy Bottom Parkland Reserve area to the north is a mixture of mature woodland and fields and Copyhold Gill flows eastwards through the southern end of this area. The Site and the Beechy Bottom Parkland Reserve are separated by the A272.

2.2 TOPOGRAPHY

Topographical data (from LiDAR) is provided in Figure 3. Ground levels at the Site range between approximately 32.85m and 78.37m above Ordnance Datum (m aOD). The Copyhold Gill valley separates the northern and southern parts of the Site. The areas allocated for development in the proposed plans are located on the elevated parts of the Site, above the valley bottom.

The topography of Beechy Bottom Parkland Reserve falls from an elevated point in the centre (approximately 104m aOD) towards the valleys along the eastern, western and southern boundaries.

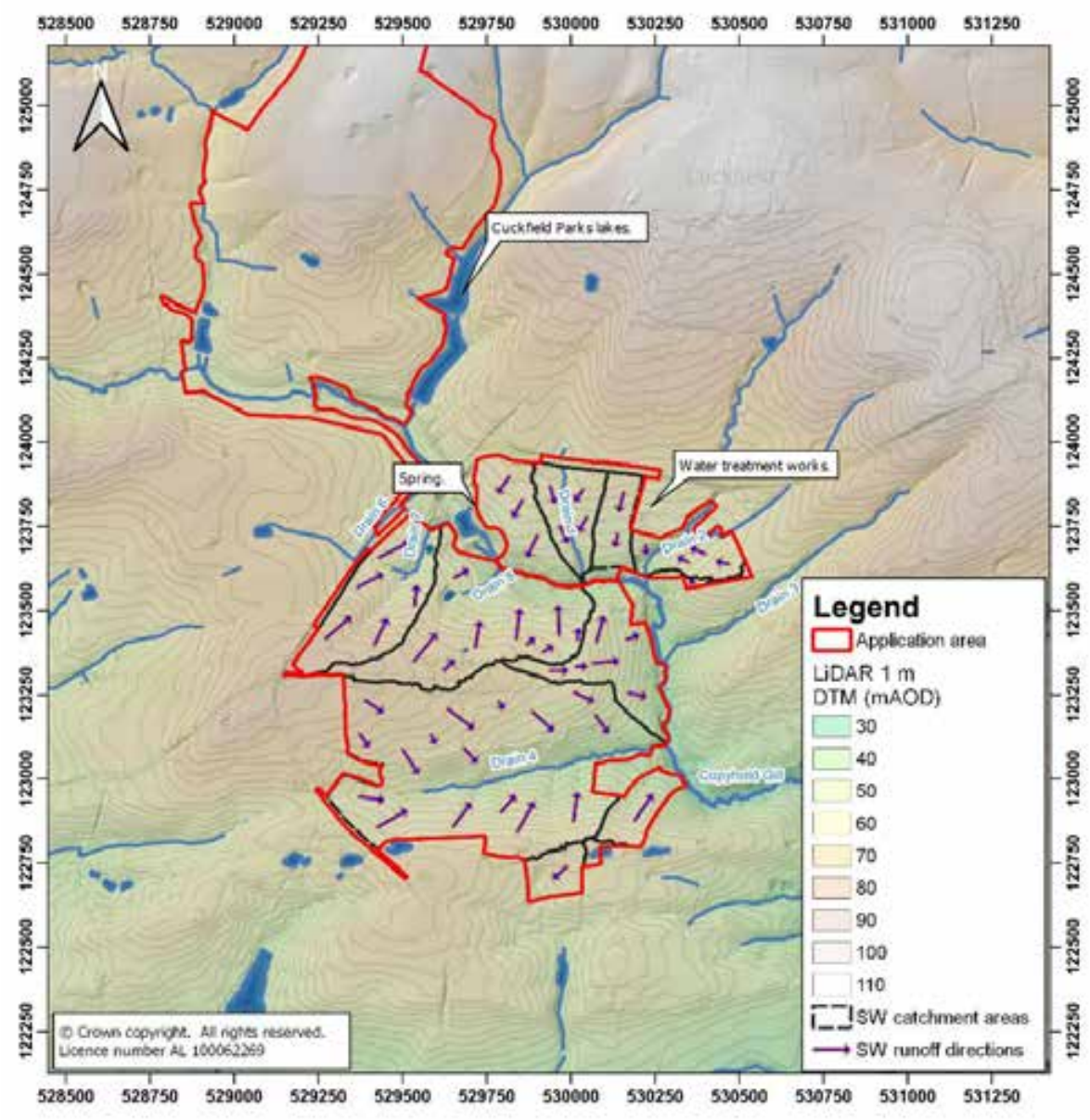

Figure 3 Site topography and current runoff regime in development area

2.3 SITE VISIT AND DATA COLLECTION

Site visits were undertaken by Yellow Sub in January and May 2023. The weather was dry and partly sunny on the day although in January the ground conditions remained very wet and soft following a period of prolonged rainfall. The purpose was to undertake a site walkover and gain an understanding of the general Site conditions and potential development constraints and/or opportunities.

2.4 GEOLOGY AND HYDROGEOLOGY AND SOILS

2.4.1 Published geology and soils

The following information has been compiled Soilscapes and British Geological Survey (BGS) 1:50,000 scale mapping. The geological sequence underlying the Site is as follows (see Figure 4 for spatial distribution of referenced formations/ features).

2.4.1.1 Soil

Soilscapes provides high level information on natural soil characteristics across the UK. Soilscapes classifies the soil type at the Site as: 'Slightly acid loamy and clayey soils with impeded drainage' (Cranfield Soil and AgriFood Institute, 2023).

2.4.1.2 Superficial deposits

Superficial deposits are largely absent over the Site area, with the exception of a small area of Head Deposits (silt, sand and gravel) on the western boundary.

2.4.1.3 Solid geology

Much of the Site is underlain by the Upper Tunbridge Wells Sand (interbedded sandstone and siltstone). The northern and southern parts of the Site are also underlain by the Lower Tunbridge Wells Sand (sandstone, siltstone and mudstone), the Lower Grinstead Clay (mudstone) and the Cuckfield Stone Bed (calcareous sandstone).

2.4.2 Published BGS borehole records

Several BGS boreholes are noted in the area (see Figure 4). Borehole TQ32SW22 is located at Copyhold Farm, just to the east of the Site, which describes the geology as being a series of clays down to 16m below ground level (m bgl). No groundwater is noted in this log.

BGS borehole TQ22SE25 is located along the northern Site boundary. This log notes clay to a depth of 3.80m bgl over mudstone. Water was encountered at 3.8m bgl, which rose to 1.9m bgl after 15 minutes. This suggests that the groundwater may be confined with the upward migration of groundwater being inhibited by the cohesive overlying material.

BGS borehole TQ22SE14 is located 670m to the southwest of the Site, located on the Upper Tunbridge Wells Sands. This log notes the Weald Clay Formation to a depth of 12m bgl, overlying the Tunbridge Wells Sands (thickness of 33m at this location) and then further Weald Clay Formation below this. Groundwater strikes are not noted in this log owing to the drilling method utilised.

2.4.3 Hydrogeology

The Upper Tunbridge Wells Sand which underlies much of the Site is classified by the EA as a Secondary A aquifer. These are described by the EA as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The Upper Tunbridge Wells Sand at the Site is classed as being at high vulnerability. The Site is not located within a groundwater source protection zone (SPZ).

2.4.4 Soakaway test results

On-Site infiltration testing was undertaken in June 2023. The proposed soakaway test locations were chosen to coincide with the proposed attenuation basins supporting the proposed development. Trial pits were typically excavated to a depth of 3m with infiltration testing between 1m and 3m bgl in accordance with methodology set out in BRE365. Full details of the site work undertaken including engineering logs and the and results are included in Appendix D. All soakaway locations failed and therefore infiltration will not be taken forward as a means of surface water disposal for the proposed development.

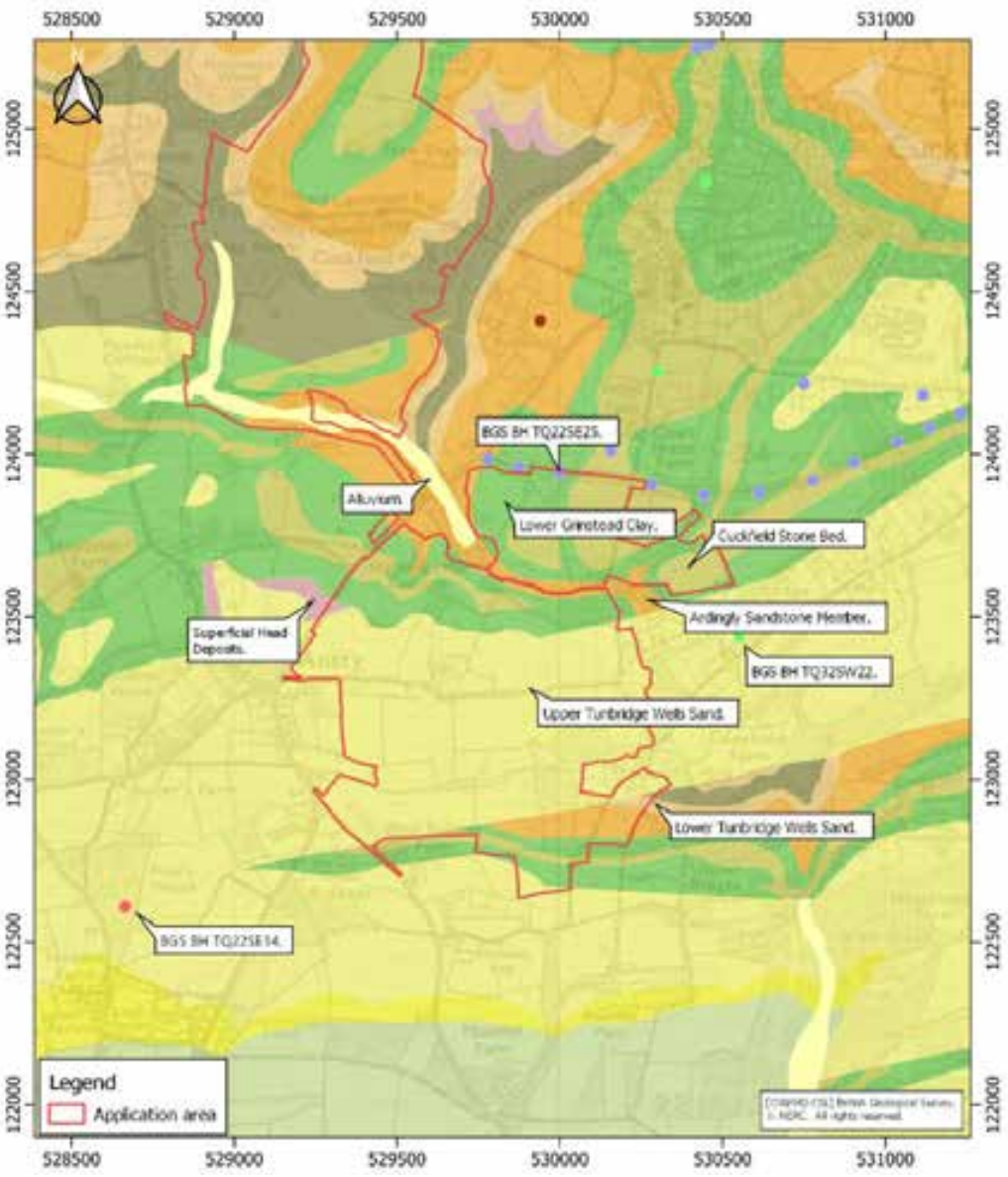

Figure 4 Bedrock and superficial geology

2.5 HYDROLOGY

The valley of Copyhold Gill separates the northern and southern parts of the Site and is also present in the south of Beechy Bottom Parkland Reserve. Copyhold Gill is a relatively minor watercourse with a catchment area of around 8.7km^2 at this location – it is designated as an Ordinary Watercourse.

The Site area includes several small unnamed surface watercourses/ drains and overland flow paths, which drain to Copyhold Gill. Where these features do not have a name, they have been ascribed a numerical ID (see Figure 3) for the purposes of this assessment, to avoid confusion.

The Copyhold Gill (see photos in Figure 5) is constrained in a steep-sided valley at this location, as is also evident from the fluvial flood risk data presented later.

Figure 5 Site photos collected March 2023. Clockwise from top left: Ground cover in centre of the Site, surface water ponding on-site, on-site pond; Copyhold Gill

2.6 CLIMATE

The Standard Average Annual Rainfall (SAAR) for the Site area is 813mm per annum (mm/a).

2.7 CURRENT DRAINAGE ARRANGEMENTS

The Site is not currently served by a formal drainage system and rainfall runoff primarily drains to Copyhold Gill (either directly or via one of the smaller tributaries). Figure 3 presents the runoff directions and surface water catchment areas for the Site under current conditions. The majority of the southern part of the Site drains to an unnamed drain/ stream (named "Drain 4" in this assessment) which flows through Ridden's Wood to the confluence with Copyhold Gill. The extreme southern end of the Site drains in a southerly direction to an area of farmland.

Public sewer asset plans for the Site and surrounding local area have been sourced from Southern Water and are presented in Appendix D. There is a foul sewer flowing south into the existing sewage treatment works along the northern boundary, as well as foul sewer assets serving the dwellings in Ansty to the west of the Site. There are no surface water or combined sewers in the vicinity. The dwellings within the centre of the Site (The Barn House, The Grainloft and Old Place) are assumed to be served by private drainage. This likely drains surface water runoff to the adjacent surface water bodies and foul sewerage to closed/ septic systems.

Some photos are included below of the on-Site drains and surface water flowpaths. These are incorporated into the Outline SuDS scheme presented in Section 8 which aims to preserve the pre-existing flowpaths and surface water features.

Figure 6 (Left) Drain 1 in the north (right) Drain 8

Given the cohesive soils noted during the site visits, the waterlogged conditions and failed soakaway tests, it appears that the majority of rainfall in this area runs off to Copyhold Gill.

3 Proposed development

3.1 THE SITE

The illustrative masterplan for the Site is provided in Appendix C. The Proposed Development will create a new Garden Community and separate Beechy Bottom Parkland Reserve, comprising of the erection of up to 1,450 homes (including 30% affordable), up to 90 residential care (C2 units),), a primary school, new special educational needs and disabilities (SEND) school, sports facilities including all weather hockey pitches and tennis centre, allotments, retail, community and employment uses together with ancillary and associated development including new and enhanced pedestrian/cycle routes, open spaces, and landscaping

To support the outline planning application, development zones/ parameters have been identified, rather than defined individual plots, gardens and buildings.

The Site will be accessed via three points, one in the south (B2036), the west (the A272 near Ansty) and the north (the A272). The principle internal access road will be surfaced with impermeable hardstanding, with minor access roads and driveways surfaced with permeable material.

Areas of mature vegetation and overland flow routes (such as the Ridden's Wood valley) will be retained/ enhanced. Additional surface water features will be installed downgradient of the development areas to manage surface water runoff from the various sub-catchments of the developed Site as close to the source as possible.

3.2 BEECHY BOTTOM PARKLAND RESRVE

Beechy Bottom Parkland Reserve occupies approximately 103Ha of land to the north-west of the Site, to the west of Cuckfield and north of Ansty. It comprises approximately 96Ha of farmland and woodland and 7Ha of private recreation grassland. The proposed development will comprise change of use of farmland and woodland to parkland reserve to include public access and instigation of long-term management and rewilding regime, including establishment of pedestrian and cycle tracks, with new pedestrian and cycle access points off Cuckfield Road to the south and Staplefield Road to the north. Proposals to include the addition of two wooden viewing platforms. Sports pitches at Beech Farm Field to remain in sports use.

4 Flood risk to the proposed development

4.1 FLUVIAL AND TIDAL

The Environment Agency (EA) Flood Map for Planning for the Site area is presented in Figure 7. The definitions of each flood zone are presented within Table 1.

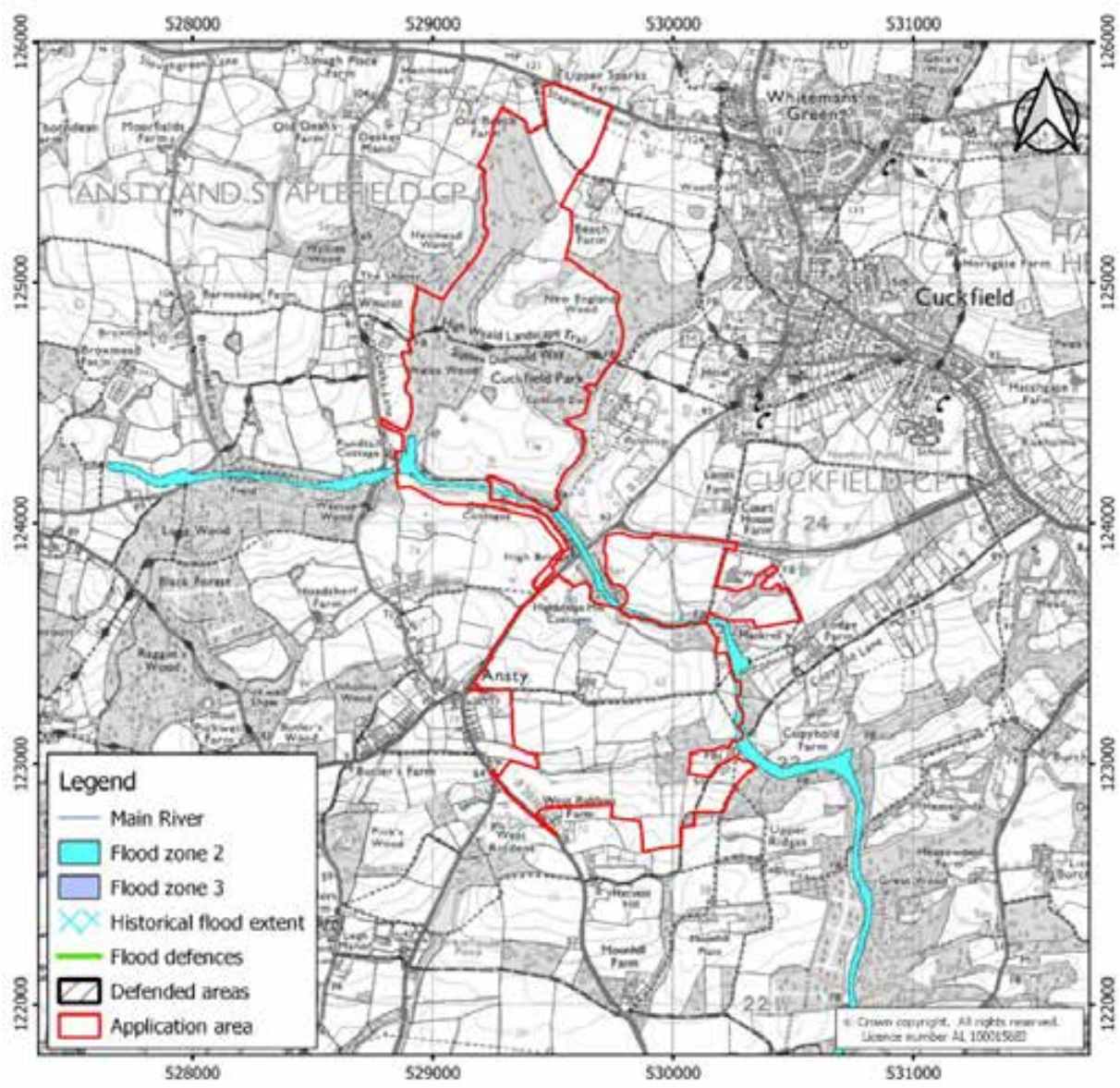

Figure 7 EA fluvial flood risk data

Table 1 EA Flood Zone definitions

Flood zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.(Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

The Site is principally located within Flood Zone 1. Part of the Site, along the boundary adjacent to Copyhold Gill, is classed as Flood Zone 2; this does not include any of the proposed development areas.

The EA were contacted to request fluvial flood model data. None currently exists for Copyhold Gill.

4.2 FLOOD DEFENCES

The Site is not protected by formal flood defences according to EA data and Site observations. The watercourse is constrained in a well-defined valley at this location.

4.3 SURFACE WATER (PLUVIAL)

Surface water (pluvial) flooding is usually associated with extreme rainfall events but may also occur when rain falls on land that is already saturated or has a low permeability. Rainfall that is unable to infiltrate into the ground generates overland flow which can lead to flooding or 'ponding' in localised topographical depressions before the runoff is able to enter local drainage systems and watercourses.

A map of surface water flood risk is shown in Figure 8 and Figure 9. The majority of the Site is at negligible risk of surface water flooding, owing to its elevated position relative to the local watercourses. Linear areas of elevated risk (low to high probability) are present along the bottom of the valleys of Copyhold Gill and its tributaries. A larger area of low risk is also noted in the northwest of the Site (illustrated in Figure 8); the low risk zones indicate areas which may flood under a very extreme flood scenario (1 in 100 TO 1 in 1,000 year event). An overland flow path drains the area northwest of Ansty (i.e. part of the Site area) to this accretion area - this area may be expected to experience relatively waterlogged conditions at times (less so following the installation of the drainage assets post-development).

Most of Beechy Bottom Parkland Reserve area is at a very low risk of surface water flooding, given its elevated landform. Some overland flowpaths are noted near the eastern and western boundaries, which drain small catchment areas to the valleys around the site boundary.

There are no identified critical drainage areas (CDA) within proximity of the Site according to the SFRA (Mid Sussex District Council, 2015).

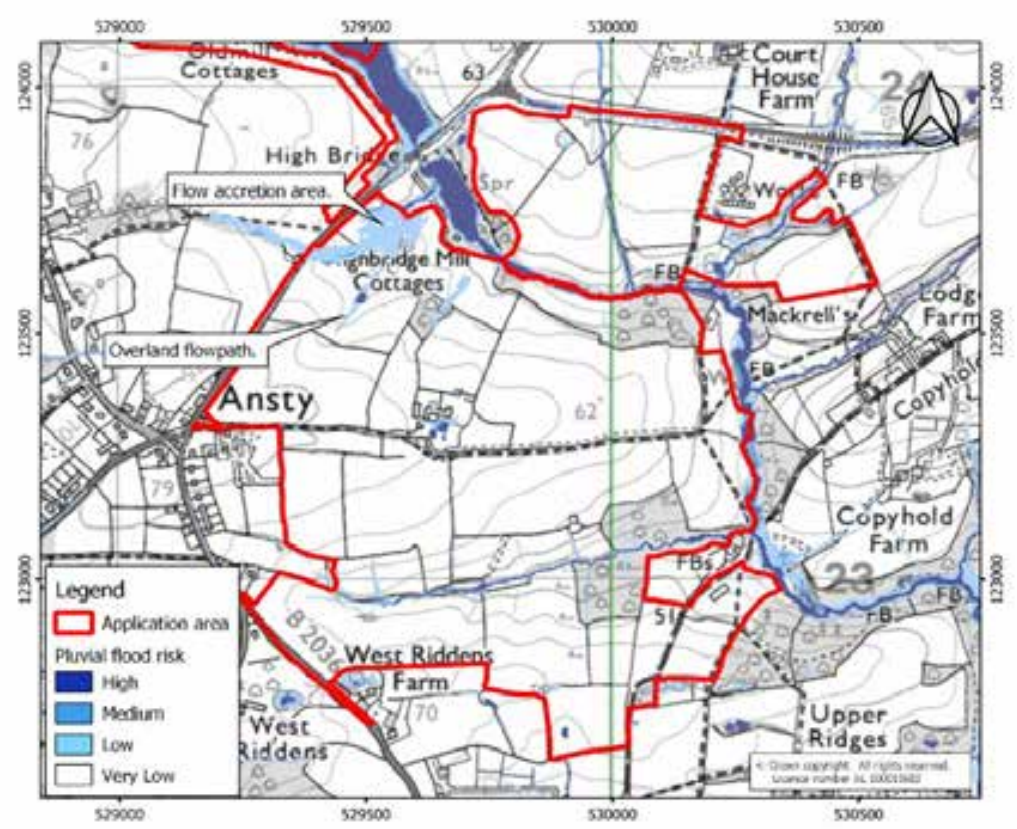

Figure 8 EA pluvial flood risk data – Site area

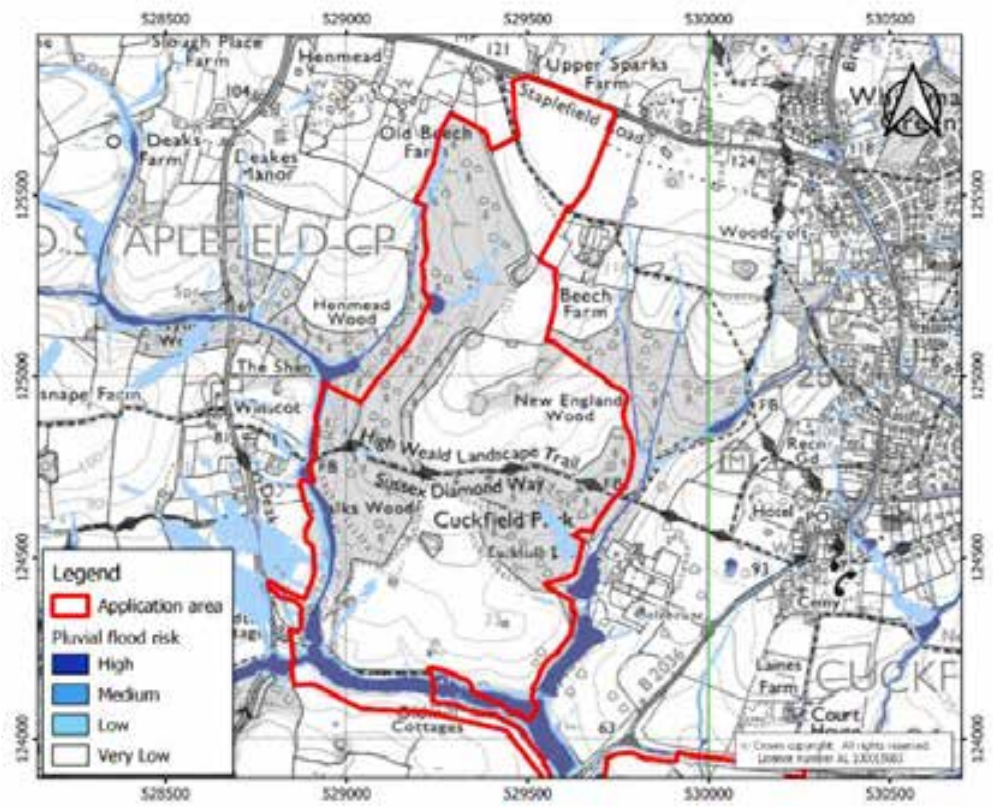

Figure 9 EA pluvial flood risk data - Beechy Bottom Parkland Reserve

4.4 GROUNDWATER

Groundwater flooding occurs when the water table rises above the surface elevation (or the floor of sub-surface structures).

Commercial groundwater flood risk data has been purchased for this assessment and is presented below. This illustrates that the majority of the Site is classified as being at negligible risk of groundwater flooding (Class 1). Some areas of elevated groundwater flood risk (Low and Medium risk) are noted in the valley bottom of Copyhold Gill and Drain 2, where there will likely be some emergence of groundwater into the watercourses. The areas of elevated groundwater flood risk to not overlap with any of the proposed development zones.

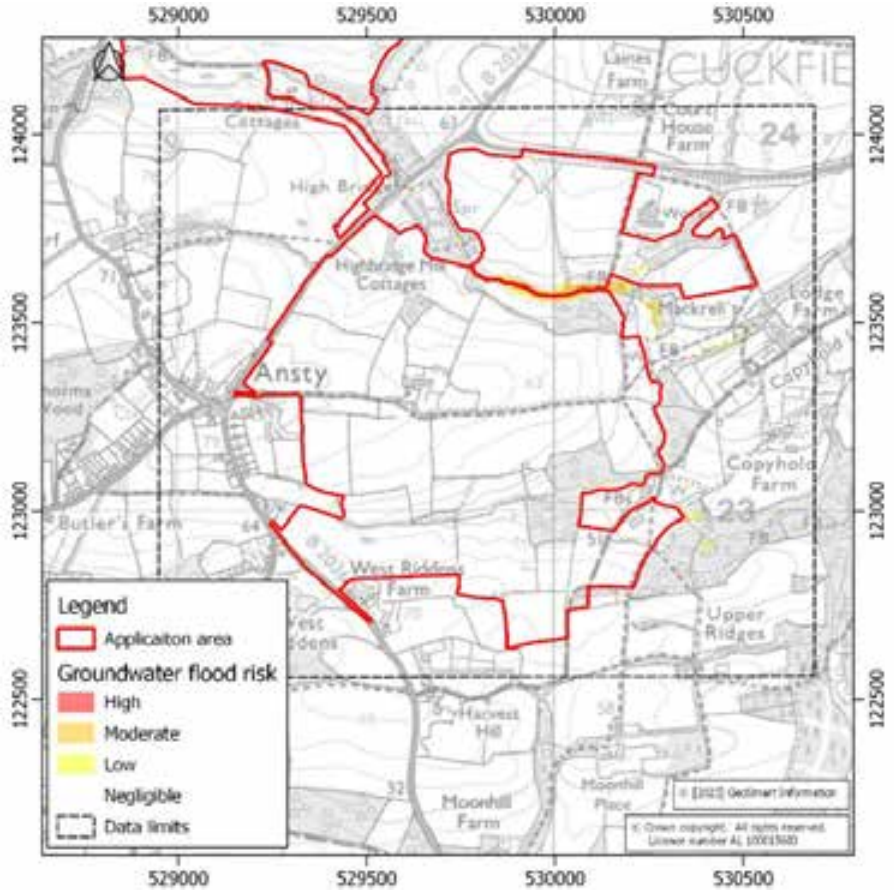

Figure 10 Groundwater flood risk (Geosmart Information, 2023)

Table 2 Groundwater flood risk zone descriptions (Geosmart Information, 2023)

Risk level	Description
1	There is a negligible risk of groundwater flooding in this area and any groundwater flooding incidence has a chance of less than 1% annual probability of occurrence.
2	There is a low risk of groundwater flooding in this area with a chance of greater than 1% annual probability of occurrence.
3	There is a moderate risk of groundwater flooding in this area with a chance of greater than 1% annual probability of occurrence.
4	There is a low risk of groundwater flooding in this area with a chance of greater than 1% annual probability of occurrence.

4.5 SEWER FLOODING

Sewer flooding can occur during periods of intense rainfall and/ or if a sewer becomes blocked with debris. The Site is not currently served by a sewer system but is adjacent to some residential streets which would be.

The Mid-Sussex SFRA does not identify the Ansty area as having issues with sewer flooding, although Burgess Hill is noted as having previously experienced regular sewer flooding (Mid Sussex District Council, 2015).

4.6 CATASTROPHIC FAILURES

This section considers catastrophic failures of water bearing infrastructure in the area of interest.

The risk of reservoir flooding is related to the failure of a large water storage reservoir. The maximum expected extent of flooding from reservoir failures does not encroach on the Site area according to EA data.

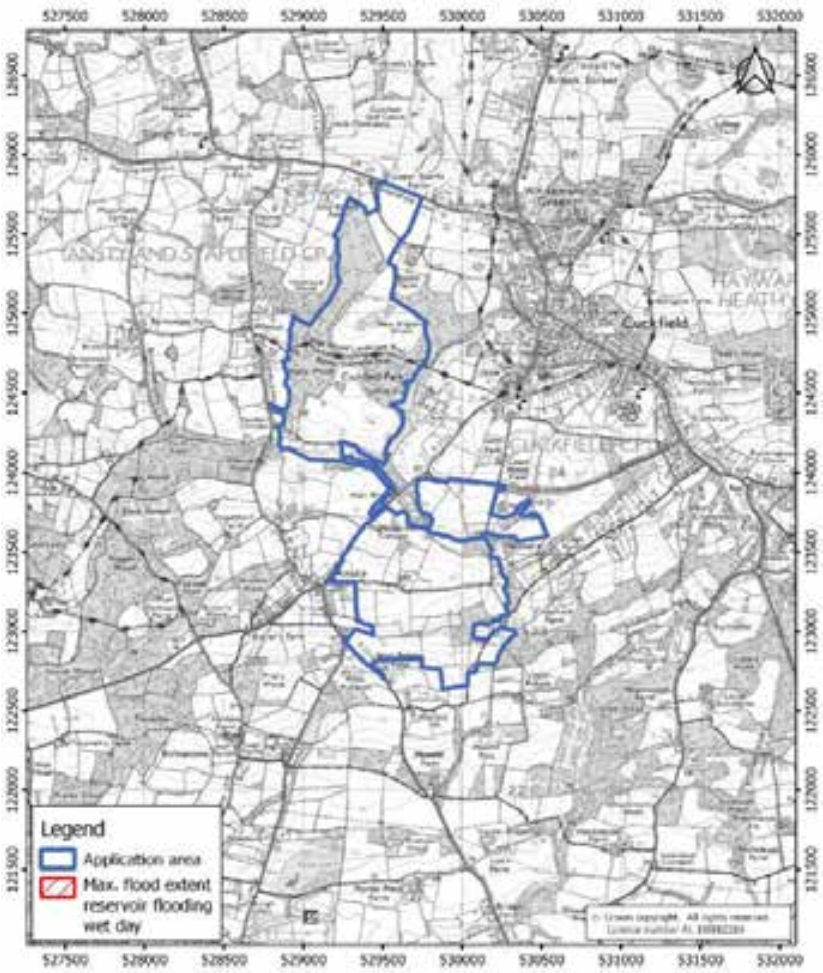

Figure 11 Reservoir flood risk zones

4.7 HISTORIC FLOODING

The EA database of historical flooding contains no evidence of flooding having occurred in this area. The Mid Sussex SFRA contains no references of historical flooding occurring at the Site area. Water levels in Copyhold Gill and its tributaries will have reached extreme, flood levels in the past, during storm conditions. Given the steep sided valleys and the relatively

large range of ground elevations across the Site, this is unlikely to have caused flooding of the wider Site area – as illustrated in the Flood Zone 2 and surface water flood risk extents.

5 Suitability of the proposed development

The Sequential Test, outlined in the PPG for Flood Risk and Coastal Change, identifies that developments should be directed to areas with the lowest probability of flooding. The Site is located primarily within Flood Zone 1 (see Figure 7). with some small areas close to Copyhold Gill also within Flood Zone 2.

All types of development are considered appropriate within Flood Zone 1. More Vulnerable developments are allowable in Flood Zone 2 (see Table 3). For the Site, the development areas are all located in Flood Zone 1.

Table 3 Flood risk vulnerability and Flood Zone compatibility (PPG for Flood Risk and Coastal Change)

Flood risk vulnerability classification	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3a	Exception Test required	✓	×	Exception Test required	✓
Zone 3b (functional floodplain)	Exception Test required	✓	×	×	×

Beechy Bottom Parkland Reserve would be classified as "Water Compatible" with regards to flood risk and would therefore be allowable in this area.

5.1 SEQUENTIAL DEVELOPMENT

Where flood risk is present to varying degrees across a Site, layouts should be tailored to ensure the most sensitive parts of a development are located in parts of the Site least at risk of flooding.

As stated above, all development areas will be located in Flood Zone 1.

6 Flood Risk from the Proposed Development

The National Planning Policy Framework (NPPF) stipulates that all new developments must be "safe, without increasing flood risk elsewhere". As such the following stipulations are provided in the EA guidance for managing rainfall runoff (Environment Agency, 2013):

- Stormwater runoff rates and volumes discharged from urban developments should approximate to the Site greenfield response over a range of storm frequencies of occurrence (return periods).
- Runoff for extreme events should be managed on-site. This requires:
  - the peak rate of stormwater runoff to be limited;
  - the volume of runoff to be limited;
  - the pollution load to receiving waters from stormwater runoff to be minimised; and,
  - the assessment of overland flows and temporary flood storage across the Site.

The Sustainable Drainage Strategy for the Site (see Section 8) has been designed in such a way as to prevent any increase in runoff from the Site under a range of design storm scenarios. This includes suitable allowances for future increases in rainfall intensity caused by climate change.

7 Flood risk mitigation measures

7.1 KEY CONSIDERATIONS

To meet the PPG requirements, the proposed development will be considered appropriate in this location provided the following conditions are met:

- Remains safe in times of flooding whilst taking climate change into account;
- Does not result in a net loss of floodplain storage;
- Does not impede existing water flow pathways; and,
- Does not increase the volume and rate of surface water runoff leaving a site over its intended design lifetime.

Each of these requirements is discussed in relation to the proposed development in Sections 7.2 to 7.5 below.

7.2 REMAIN SAFE IN TIMES OF FLOODING

The development areas are in Flood Zone 1 and will be at negligible risk of flooding from rivers (and the sea), surface water and groundwater. The proposed development zones are illustrated in Figure 12 along with peak surface water and fluvial flood extents under the extreme (1 in 100 to 1 in 1,000 year storm events).

A crossing is proposed over Copyhold Gill. This will need to be designed to ensure a safe crossing during times of flooding (a sufficient elevation above the flood water level and sufficient capacity for watercourse flows beneath).

7.3 NO NET LOSS OF FLOODPLAIN STORAGE

There is no development proposed within a floodplain. A crossing of Copyhold Gill is proposed to connect the areas to the north and south of the watercourse. This will be designed to minimise potential losses in floodplain storage and to provide sufficient flow capacity for extreme storm flows to pass underneath.

7.4 NO IMPEDIMENTS TO FLOOD WATER FLOWS

An overland flowpath is noted in the north-western part of the Site. This drains an area to the west of the Site to a wetland feature. This will be retained post-development. The smaller flowpath to the north of this is derived from Site runoff and will be managed by the drainage infrastructure post-development.

Several crossing are proposed over Drain 4 and one over Copyhold Gill. A suitable design will be required to ensure that these do not impede storm flows such that local flood risk is increased.

7.5 NO INCREASE IN THE VOLUME AND RATE OF SURFACE WATER RUNOFF

The Sustainable Drainage Strategy discussed in Section 8 would ensure that runoff rates and volumes are not increased as a result of the proposed development.

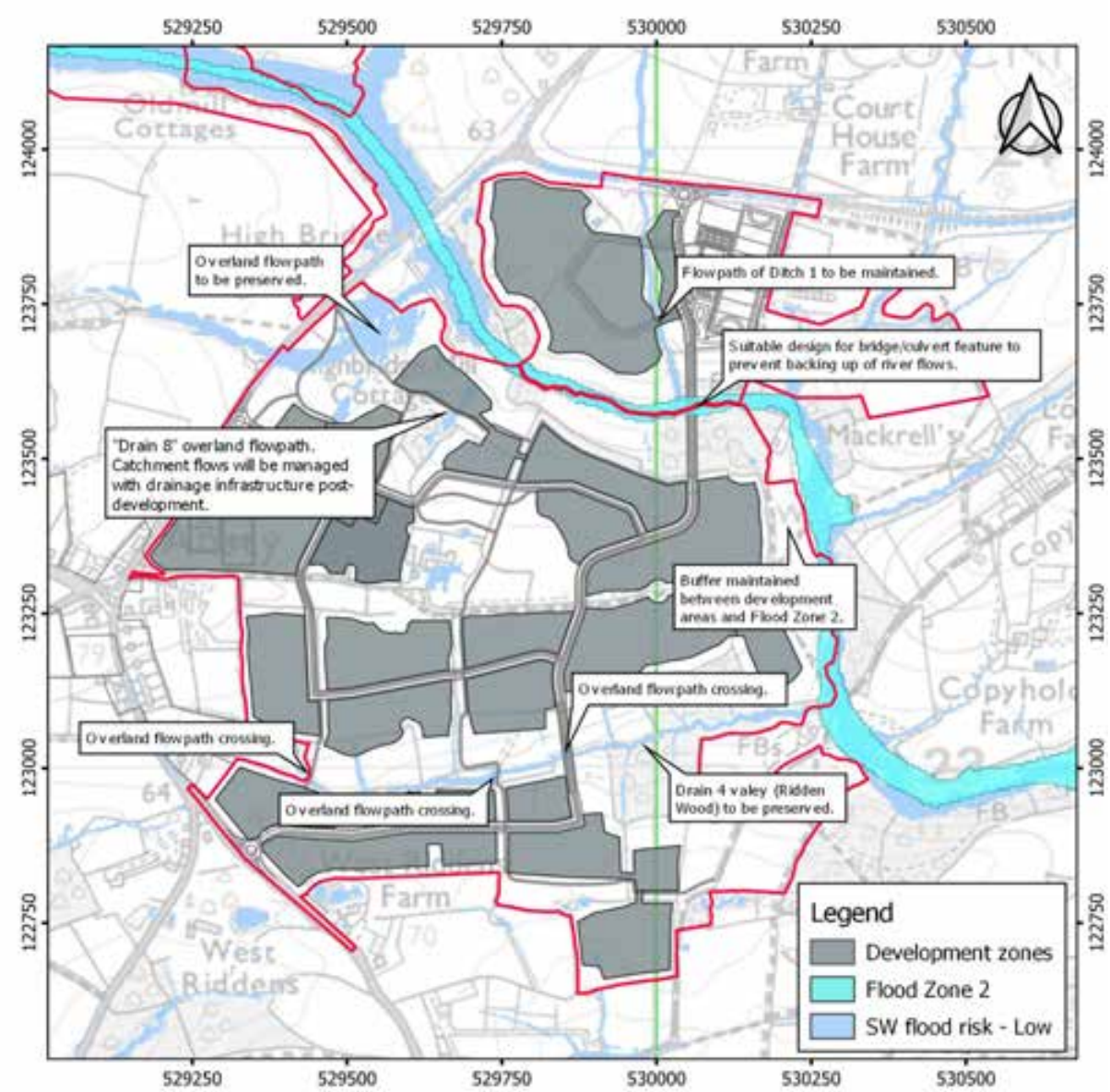

Figure 12 Development areas and flood risk

8 Outline Sustainable Drainage (SuDS) Drainage

8.1 INTRODUCTION

The following sections describe the outline SuDS Strategy for the proposed development with due regard to DEFRA's Non-Statutory Technical Standards for SuDS (DEFRA, 2015) and the policy for surface water drainage on major developments in West Sussex (West Sussex County Council, 2018), which recommends the following hierarchy for the disposal of surface water from new developments:

1 Discharge to ground via infiltration techniques (most preferred)[1];

2 Discharge to a surface water body;

3 Discharge to a surface water sewer; local highway drain or another drainage system; and,

4 Discharge to a combined sewer (least preferred).

The WSCC Policy for the Management of Surface Water provides individual SuDS policies by which planning applications are determined against. These policies are summarised in Table 4

Table 4 Individual SuDS policies included in the WSCC's 2018 Policy for the Management of Surface Water

Policy	Summary
SuDS Policy 1	Follow the drainage hierarchy
SuDS Policy 2	Manage Flood Risk Through Design
SuDS Policy 3	Mimic Natural Flows and Drainage Flow Paths
SuDS Policy 4	Seek to Reduce Existing Flood Risk
SuDS Policy 5	Maximise Resilience
SuDS Policy 6	Design to be Maintainable
SuDS Policy 7	Safeguard Water Quality
SuDS Policy 8	Design for Amenity and Multi-Functionality
SuDS Policy 9	Enhance Biodiversity
SuDS Policy 10	Link to Wider Landscape Objectives

The policies presented within WSCC's Policy for the Management of Surface Water are broadly consistent with the National Planning Policy Framework (NPPF), National Planning Practice Guidance and Defra Non-Technical Standards for Sustainable Drainage.

The proposed residential development will be located on previously undeveloped, 'greenfield' land. A significant proportion of the Site would comprise impermeable areas following its development (for example, roofs and some of the main access roads). Without appropriate management, this would result in a significant increase in both the volume and rate of surface runoff generated by the proposed development, which could lead to an increase in surface

[1] On-site water reuse is now also considered to be a preferred method for surface water disposal.

water flood risk elsewhere (i.e. downstream). Surface runoff from the developed Site will, however, be sustainably managed using SuDS, as described in the following sections.

SuDS aim to mimic the natural drainage characteristics of a site prior to its development by controlling surface water runoff as close to where the rain falls as possible e.g. through interception and re-use, evaporation and infiltration into the ground. Furthermore, SuDS provide opportunities to remove pollutants from runoff and also provide amenity and biodiversity benefits.

No SuDS are proposed in the Beechy Bottom Parkland Reserve area, given that no development is planned in this area. Therefore this Section focuses on the proposed housing development area (The Site).

8.2 GREENFIELD RUNOFF AND PERMISSIBLE DISCHARGE RATES

The Institute of Hydrology Report 124 (IH124) method in the 'Rural Runoff' calculator within the industry standard software Causeway Flow+ was utilised to estimate the greenfield runoff rates for the existing Site as a whole (see Appendix F). It would seem appropriate to consider the bulk runoff rates at this point given that the whole Site is thought to ultimately discharge to the Copyhold Gill, either directly or via the smaller on-Site tributaries. This total value has been scaled down for each of the post-development sub-catchment areas in the following Outline Drainage Strategy, to define suitable flow control rates in each location.

The 'QBAR' (i.e. 1 in 2.3 year return period) greenfield runoff rate for the existing Site was determined along with runoff rates for other relevant return period storms using the regional growth curve (see Table 5). The greenfield runoff volumes were calculated using the 'Rural Runoff' calculator (with an SPR value of 47%) and are also included in Table 5.

Table 5 Greenfield runoff

Storm return period(yrs.)	Peak greenfield runoff rate(l/s)	Total greenfield runoff volume
1	460.0	11,000 (extrapolated)
2.3 (Qbar)	541.2	14,200
30	1055.3	27,148
100	1342.2	34,900

The greenfield QBAR runoff rate or 2 l/s/ha (whichever is greater) is generally set as the 'permissible discharge rate' for new developments. However, the WSCC's Policy for the Management of Surface Water states that:

> *"Discharge to a watercourse or surface water sewer must be restricted to the estimated mean greenfield runoff rate (Q1) by means of a controlled outflow…"*

Q1 is defined as the greenfield 1 in 1 year flow rate; in this case the Q1 rate would be 460.0 l/s for the Site as a whole (but has been scaled down for the various sub-catchments of the Site as discussed below).

8.3 CLIMATE CHANGE

The potential increase in rainfall intensity needs to be considered when designing drainage strategies. The recommended allowances for rainfall intensity in the Adur and Ouse Management Catchment are included in Table 6.

Table 6 Climate change allowances for rainfall in the Adur and Ouse Management Catchment

Epoch	Central allowance	Upper end allowance
1 in 30 year (3.3%)		
2050s	20%	35%
2070s	20%	40%
1 in 100 (1%)		
2050s	20%	45%
2070s	25%	45%

The EA guidance for climate change allowances in flood risk assessments (Environment Agency, 2022) recommends designing development so that, with the upper end allowances for the 1 in 100 year event:

- *"there is no increase in flood risk elsewhere; and*
- *your development will be safe from surface water flooding".*

A design lifespan of 100 years has been assumed and the upper end allowances are applicable in runoff/ drainage calculations for the proposed development.

8.4 RUNOFF DESTINATION AND PROPOSED SUDS DESIGN

On-site infiltration testing has demonstrated that infiltration based SuDS are not viable in this location (Section 2.4.4).

Southern Water asset location plans (Appendix E) demonstrate that there are no surface water or combined sewers in the vicinity of the Site.

Discharges to surface watercourses (Copyhold Gill and associated tributaries) with suitable attenuation in surface blue/green infrastructure is considered to be feasible in this instance, given the extensive size and undeveloped nature of the Site. An Outline Sustainable Drainage Strategy has been drafted primarily based on this method of water disposal. This includes swales and ponds within each sub-catchment to provide the attenuation required prior to off-site discharge at a controlled rate (<Q1). As the layout plans for the Site progress, the required attenuation will be distributed over a greater number of features which will comprise a "SuDS train" within each sub-catchment, but the level of detail currently provided is considered to be consummate with the current stage of the design and planning process.

Rainwater harvesting (i.e. the use of water butts or more sophisticated tank systems) could be implemented at the Site. These systems collect water from clean surfaces (such as rooftops) for (generally non-potable) use on-site. Rainwater harvesting is particularly useful at sites with a low infiltration potential and limited space for attenuation features. It also has wider sustainability benefits with regards to lowering the water supply demand.

GIS software was used to calculate the total area within the sub-catchments draining to each SuDS feature (see Figure 13). The impermeable surface area within each catchment has been estimated based on the housing density in each development zone (see Table 7). The final impermeable areas used in the calculations are included in Table 8 below – no urban creep

has been included in these calculations as the impermeable surface areas utilised are already considered to be conservatively high; this can be added to the calculations at the detailed design phase, once the actual impermeable surface area is known.

The permissible discharge rates for each catchment have been included for each of the sub-catchments. This has been scaled down from the total 1 in 1 year peak flow rate for the whole Site (see Table 5for the respective catchment areas. This value was used to set the flow control limits from the principle SuDS features.

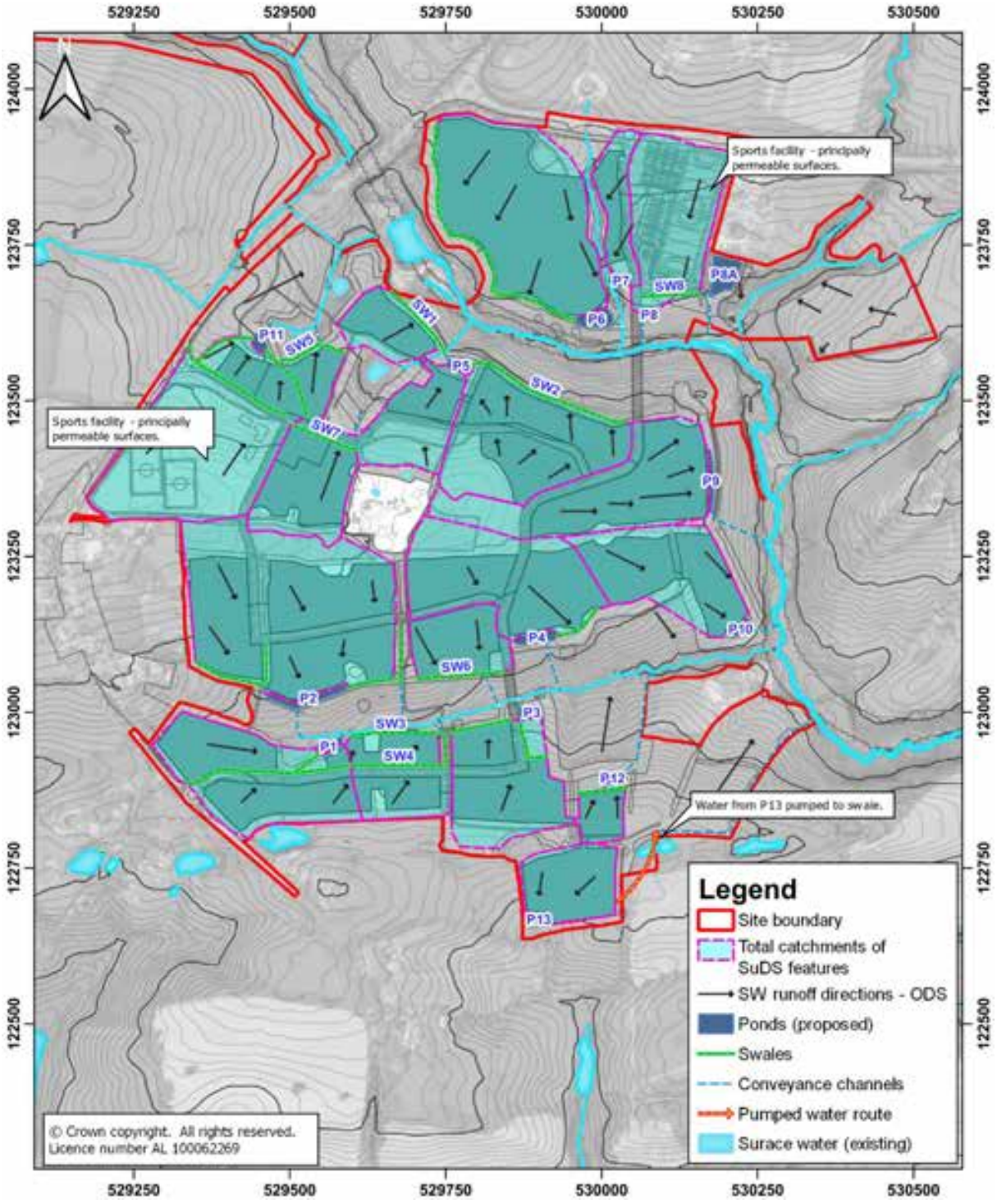

Figure 13 Catchment areas and proposed SuDS features

Table 7 Impermeable areas assumed for development areas

Housing density (DPH)	% Impermeable
30	50%
32.5	53%
35	55%
40	57%
45	65%
50	70%
80	75%

Table 8 Impermeable areas and greenfield rates of post-development SuDS catchments

SuDS feature	Total catchment area (ha.)	Development area (ha.)	Mean density (DPH)	% impermeable	Imp. area (ha.)	Peak T1 flow rate (l/s)	Notes
P1	3.978	3.187	32.5	53%	1.689	17.65	
P2	7.955	5.255	45	65%	3.416	35.29	
P3	3.119	2.512	40	57%	1.432	13.84	
P4	4.262	2.671	45	65%	1.736	18.91	
P5	2.014	1.668	32.5	53%	0.884	8.94	
P6	6.072	5.454	35	55%	3.000	26.94	
P7	1.114	0.619	35	55%	0.340	4.94	
P8A	0	0	n/a	n/a	1.000	0.00	No catchment within development. Nominal imp. area added for now to represent inflows. May be used in future as part of sewage works wetland project
P8	0	n/a	Permeable	25%	0.000	0.00	Receives outflow from SW8 (and upstream catchment).
P9	3.000	3.763	32.5	53%	1.994	13.31	
P10	3.168	2.304	32.5	53%	1.221	14.05	
P11	6.487	0.867	45	65%	0.564	28.78	
P12	0.629	0.49	32.5	53%	0.260	2.79	
P13	1.683	1.539	35	55%	0.846	7.47	
SW1	1.208	0.855	32.5	53%	0.453	5.36	
SW2	4.362	0.742	35	55%	0.408	19.35	Drains onwards to P5.
SW3	0.756	0.648	45	65%	0.421	3.35	
SW4	1.286	0.632	30	50%	0.316	5.71	
SW5	0.745	0.634	50	70%	0.444	3.31	
SW6	1.558	1.355	45	65%	0.881	6.91	
SW7	0.000	0.000	50	70%	0.000	0.00	Received outflows from perm paving.

SuDS feature	Total catchment area (ha.)	Development area (ha.)	Mean density (DPH)	% impermeable	Imp. area (ha.)	Peak T1 flow rate (l/s)	Notes
SW8	3.39	n/a	Permeable	25%	0.848	15.04	Coverings largely permeable. Nominal imp. area value of 25% used for calculations. Drains to P8.
Perm paving	2.221	3.488	50	70%	2.442	9.85	Drains to SW7.

The Outline SuDS layout is included in Appendix G along with the relevant dimensions of each SuDS feature and other supporting information/ details. Additional details will be added as the design of the site layout progresses. Ponds are included with a large freeboard depth at present (which will likely be revised down in future as the scheme is developed). These would have a shallow permanent waterbody at the base for ecological benefit.

The Site is not expected to require land raising/ lowering to accommodate a gravity driven drainage system; there is a suitable gradient over most of the Site to allow for a gravity driven drainage network.

8.5 PERFORMACE CALCULATIONS

The initial design of the principal attenuation SuDS features has been undertaken using the Causeway "Flow+" v 10.4 industry standard software. Simulations were run for the 1 in 30 year + 40% and the 1 in 100 year + 45% events (allowances given for climate change as defined above). Hydrological descriptors for the Site were obtained from the Flood Estimation Handbook (FEH) website (UK Centre for Ecology & Hydrology, 2023). These are shown in Table 9 below.

Table 9 FEH Hydrological Descriptors

Catchment Descriptor	Abbreviation	Value
Base Flow Index associated with each HOST soil class	BFIHOST19	0.459
Proportion of time when soil moisture deficit was equal to, or below, 6mm during 1961-90	PROPWET	0.36 (i.e. 36% of the time)
Average Annual Rainfall (1961 – 1990)	SAAR	813 mm

The main attenuation features (ponds and swales) within each catchment have been included as storage features within the model. The attenuation capacity provided by other grassed conveyance swales and source control features were added as a generalised capacity within the network, rather than at discrete locations (considered appropriate for this stage of the design). The capacity of the main SuDS features included in the model may be reduced in due course as more SuDS features are included across the Site.

Note that the Site has a fairly steep gradient in places and therefore, some check dams within the swales will be required – perhaps a cascade sequence of smaller features where appropriate). This will maximise the storage capacity available, increase residency time within the features and reduce scour risk. This fine tuning of the scheme can be achieved during the detailed design phase and for now, the swales have been modelled as single features with a single invert/ bank levels to demonstrate the broad general feasibility of the scheme (i.e. that there is sufficient space to provide the required attenuation prior to discharging to a watercourse at the greenfield Q1 rate).

The infiltration rate for all features was set to zero, based on the results of the on-Site test results (Section 2.4.4).

Hydro-brake® flow control features have been included to limit the outflow from the various SuDS features. These may be substituted for alternative features at the detailed design phase if appropriate.

Appendix G contains the output from the drainage simulations. This confirms that, based on the parameters described above, the proposed drainage scheme will be able to attenuate and discharge all runoff generated during the 1 in 30 year storm event with a 40% allowance for climate change. Flooding of many of the features is expected under the extreme 1 in 100 year +45% scenario. Details of exceedance flows is provided in Section 8.6. Suitable overflow features will be installed within the banks of the features to control overflows under such an extreme event.

As the detailed layout plan evolves, it will be possible to include further SuDS techniques within the development layout in order to enhance the 'SuDS Management Train'. Techniques such as rainwater capture and re-use and bio-retention areas will be considered during the development of the detailed layout to maximise water efficiency, water quality, biodiversity, health and wellbeing, and amenity benefits.

It is important to note that the calculated sum total of the outflow and overflow discharge over the storm event for the 1 in 100 year event with CC allowance (11,898 m^3) is below the QBar greenfield discharge volume (14,200 m^3). This should result in considerable betterment to downstream flood risk receptors under the more extreme storm events (e.g. T30 – T100).

8.6 EXCEEDANCE ROUTES

Flooding of some features is expected under the extreme 1 in 100 year +45% scenario (as shown in Appendix H). Under these extreme events, exceedance flows from the SuDS features will be designed to follow the existing preferential surface water flow pathways towards Copyhold Gill and its tributaries (or to the south in the instance of Pond 13). This is illustrated in Figure 14. A more detailed analysis of exceedance flows can be undertaken once the drainage network has been finalised and modelled.

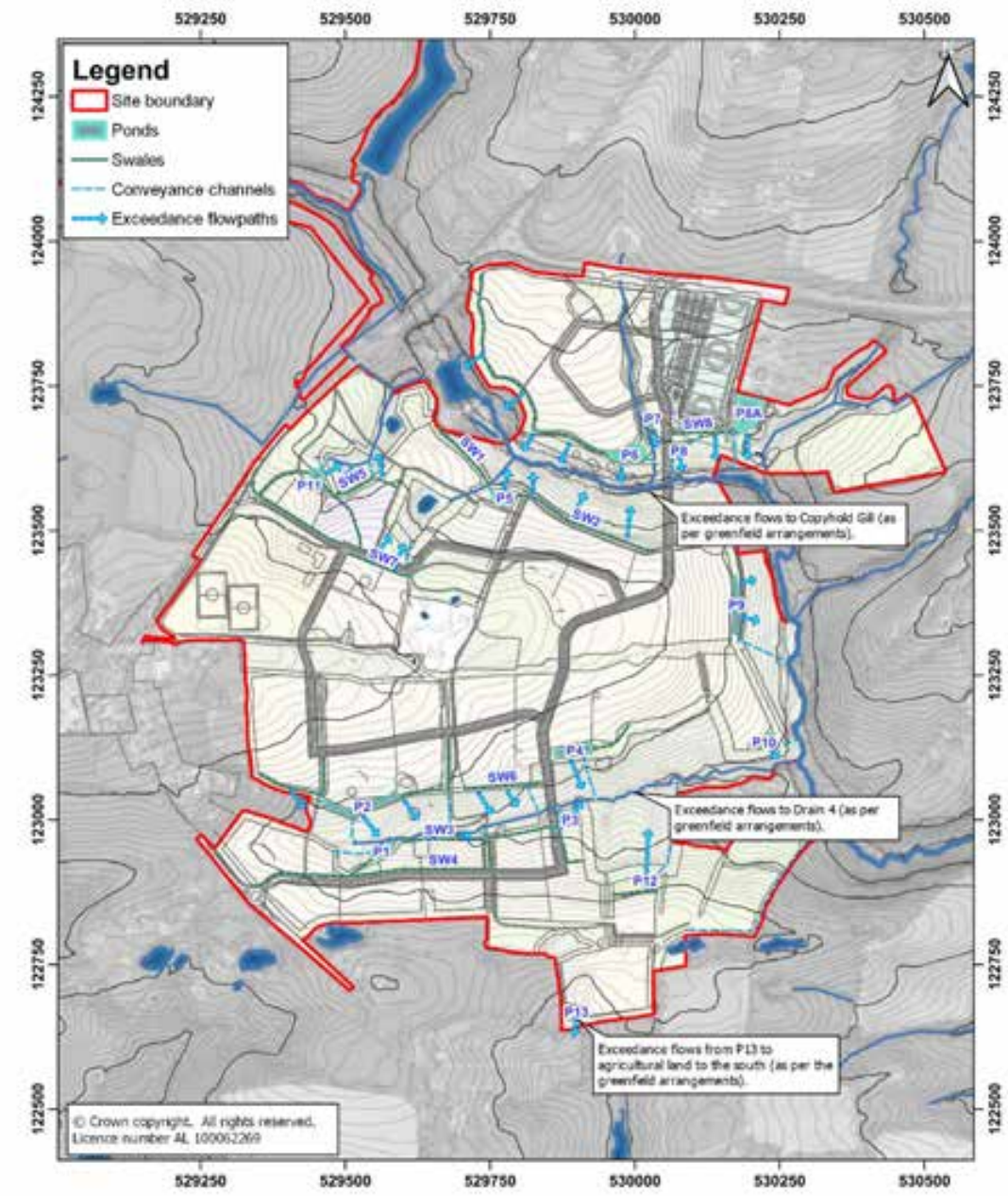

Figure 14 Exceedance flow routes from SuDS features

8.7 WATER QUALITY

SuDS techniques can be used to effectively manage the quality of surface water flowing across a site. Different methods can be used to intercept pollutants and allow them to degrade or be stored in-situ without impacting the quality of water further downstream. Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals and various organic and inorganic contaminants). Therefore, the first 5mm to 10 mm of rainfall (i.e. the 'first flush') should be adequately treated using SuDS.

The proposed development will include residential dwellings, low traffic roads and driveways. The CIRIA SuDS manual categorises runoff from residential dwellings as presenting a very low water quality hazard and runoff from low usage roads and residential driveways as presenting a low hazard rating (see Table 10).

Table 10 Water quality hazard ratings (CIRIA, 2015)

Land use	Hazard level
Residential Roof drainage	Very Low
Residential, amenity uses including low usage car parking spaces and roads, other roof drainage.	Low
Commercial uses including car parking spaces and roads (excluding low usage roads, trunk roads and motorways).	Medium
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemical and fuels (other than domestic fuel oil) are delivered, handled, stored used or manufactured, industrial sites.	High
Trunk roads and motorways	High

The CIRIA SuDS manual (CIRIA, 2015) advocates a qualitative approach to designing a SuDS scheme for a site with a low hazard rating. This should provide adequate controls on pollutants contained in runoff water.

As the proposed development is residential in nature with a low hazard rating, hazard indices of 0.5 for Total Suspended Solids (TSS), 0.4 for Metals and 0.4 for Hydrocarbons are considered applicable.

The following measures in Table 11, are examples which are suitable for inclusion in a drainage strategy for a residential development to mitigate a potential increase in pollutant load within on-site and off-site runoff – note text in bold are measures included in this SuDS Strategy. Removal indices are included for each feature type relative to the specific pollutant.

Table 11 Mitigation indices for SuDS components

Component Type	TSS	Metals	Hydrocarbons
Filter drain	0.4	0.4	0.4
Swale	**0.5**	**0.6**	**0.6**
Permeable paving	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	**0.7**	**0.7**	**0.5**

The inclusion of swales and ponds within the SuDS Strategy for the post-development catchments will provide adequate treatment to mitigate the low hazard associated with runoff from the development.

Additional SuDS measures (such as source control features) will be included in the layout as the design progresses. These features will add to a SuDS train for the management of runoff from each development area catchment.

Sediment traps (i.e. sumps within the inspection chambers of the final manhole upstream of each feature) will be used to facilitate the maintenance of these SuDS features and reduce the build-up of potentially polluted material.

All runoff from roads will pass through at least one water treatment feature prior to discharging to a watercourse (to be included at the detailed design phase).

8.8 SUDS MAINTENANCE

Inspection and long-term maintenance of SuDS components ensures efficient operation and prevents failure. Surface SuDS components can be managed using landscape maintenance techniques. Table 12 describes the management and maintenance requirements for the SuDS features included. These requirements will be implemented following the completion of the proposed development, and will be undertaken either by the Lead Local Flood Authority, a private management company or by the local water company, subject to discussions regarding this responsibility.

Table 12 Management and maintenance requirements for SuDS features

SuDS Device	Maintenance requirements	Maintenance frequency
Swales	• Litter/trash removal • Cut grass • Inlet/outlet cleaning • Sediment monitoring and silt removal.	• Monthly • Monthly in summer • Quarterly • Annually or every three years
Ponds	• Litter/trash removal • Inlet/outlet cleaning • Vegetation management • Sediment monitoring and silt removal.	• Monthly • Quarterly • Quarterly • Annually or every 3 yrs.

8.9 FURTHER SUDS CONSIDERATIONS

As the layout plan evolves, it will be possible to include further SuDS techniques within the development layout in order to improve the 'SuDS Management Train'. Techniques such as rainwater capture and re-use, and bio-retention areas will be considered during the development of the detailed layout plan to maximise water efficiency, water quality, biodiversity, health and wellbeing, and amenity benefits.

8.10 BIODIVERSITY AND AMENITY

SuDS schemes present opportunities to enhance habitat for wildlife on-site and this often improves the biodiversity of the surrounding areas. Ponds, constructed wetlands and other surface water features are landscape assets that have amenity value and improve the aesthetics of a site more than conventional drainage systems. The use of grassed swales and ponds (with mature vegetation around the banks) will enhance the biodiversity and amenity value of the Site post-development. Ecological diversity should be enhanced by the use of native planting within each feature.

Surface water flowpaths will be preserved along with areas of open green space to provide naturalised zones within the Site boundary which will provide amenity and ecology benefits.

9 Conclusions

The Site is primarily within Flood Zone 1, with a linear area of Zone 2 present along Copyhold Gill. The proposed development areas are all within Flood Zone 1. As noted in Section 4, there is a low risk of flooding from fluvial, surface water, groundwater, sewer and catastrophic sources to the proposed development areas.

The proposed development will be residential in nature, with a vulnerability classification of 'More Vulnerable' with regards to flood risk. All types of development are permissible within Flood Zone 1.

Given the apparent low flood risk present at the Site, no specific mitigation measures are proposed other than the implementation of a Sustainable Drainage Strategy to mitigate any potential increases in off-site flood risk and the suitable design of infrastructure which intersects water features and surface water flowpaths.

This report provides an Outline SuDS Strategy for the Site. The principal components of the scheme are ponds and large grassed swales located downgradient of the development areas. The details of the drainage network will evolve along with the layout plans, but the key findings of the present strategy and calculations are that there is a suitable means for water disposal in the area and there is ample space for the required attenuation and treatment of runoff prior to its disposal.

A preliminary assessment of the performance of the initial SuDS system under the 1 in 30 year + 40% climate change storm was undertaken and shows that the proposed SuDS are capable of accommodating the required stormwater runoff volumes.

Appropriate management and maintenance arrangements for the proposed SuDS scheme will be in place throughout the lifetime of the proposed development.

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Appendices

Appendix A: Report Conditions

Report Conditions

This report has been prepared by Yellow Sub Geo Ltd. (Yellow Sub Geo) in its professional capacity as soil and groundwater specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client, and is provided by Yellow Sub Geo solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to Yellow Sub Geo at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

Where necessary and appropriate, the report represents and relies on published information from third party, publicly and commercially available sources which is used in good faith of its accuracy and efficacy. Yellow Sub Geo cannot accept responsibility for the work of others.

Site investigation results necessarily rely on tests and observations within exploratory holes only. The inherent variation in ground conditions mean that the results may not be representative of ground conditions between exploratory holes. Yellow Sub Geo take no responsibility for variation in ground conditions between exploratory positions.

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Appendix B: Topographical Site survey

Metres
0 20 40 60 80 100
1:2500

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Reference: OI1164308
Centre coordinates: 529333 123366

A

B

C

Ansty

Fairfax

FAIRFAX AQUISITIONS LTD

project:

ANSTY FARM
ANSTY

title:

BOUNDARY PLAN - MASTER PLAN

date: May '18 scale: 1:2500 @ A1

drawing number:	Rev.
AF/CFL/MP.05	E

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Appendix C: Site development plans

LEGEND

- ANSTY GARDEN COMMUNITY BOUNDARY
- PARKLAND RESERVE BOUNDARY
- DEVELOPMENT BLOCK
- ANCIENT WOODLAND
- EXISTING WOODLAND
- PROPOSED TREES AND WOODLAND
- PROPOSED SUDS

1. SITE ACCESS
2. TREE-LINED SPINE STREET
3. TREE-LINED SECONDARY LOOP
4. TERTIARY STREET
5. FEATURE NODE WITH BUS STOP
6. LOCAL CENTRE
7. RETIREMENT LIVING/CARE HOME
8. 2FE PRIMARY & SEND SCHOOLS
9. EXISTING ACCESS TRACK TO MACKERELL'S FARM COTTAGE RETAINED
10. RETAINED WOODLAND WITH BUFFER
11. RETAINED ANCIENT WOODLAND WITH BUFFER
12. RETAINED HEDGEROW
13. PARKLAND RESERVE
14. RETAINED PROW
15. NEW FOOT/CYCLE LINK
16. SPORTS FACILITY, INCLUDING HOCKEY, OUTDOOR TENNIS, INDOOR TENNIS AND PADEL COURTS
17. PUBLIC OPEN SPACE
18. FORMAL CHILDREN'S PLAY
19. ALLOTMENTS
20. BRIDGE ACROSS WOODED VALLEY
21. MOBILITY HUB

REV.	DESCRIPTION	APP.	DATE
08	Updated footpths	ID	17.10.23
07	Updated footpths	ID	13.10.23
06	Updated accesses and minor amends	ID	04.10.23
05	Parkland reserve in blue boundary	ID	08.09.23
04	Updates to sports facility, northern blocks and northern site access	ID	19.05.23
03	Updates to bus stops	ID	13.04.23
02	Update to sports centre	ID	06.04.23
01	Update to street widths and layout	ID	31.03.23

fabrik

PROJECT TITLE
LAND AT ANSTY, HAYWARDS HEATH

DRAWING TITLE
CONCEPT MASTERPLAN

ISSUED BY	London	T: 020 7620 1453	
DATE	MAR 2023	**DRAWN**	JH
SCALE@A0	1:2,500	**CHECKED**	ID
STATUS	FINAL	**APPROVED**	BS

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Appendix D: Soakaway testing report

Ansty Garden Community: Soakaway Testing

P21367_R4
August 2023

Document Control

Title

Ansty Garden Community: Soakaway Testing

Client

Fairfax Acquisitions Ltd.
Buncton Barn,
Buncton Lane,
Bolney,
West Sussex,
RH17 5RE

Reference

P21367_R4

Status

Final

Document Reference	Issue Date	Comments	Written by	Approved by
P21367_R4	August 2023	Final	RLW	JEM

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1. Introduction

1.1. Instruction

Yellow Sub Geo Ltd (Yellow Sub) was instructed by Fairfax Acquisitions Ltd (the Client) to undertake infiltration testing for a parcel of land at Ansty Farm, Haywards Heath (the Site). Instruction to proceed in accordance with Yellow Sub proposal (Ref: P21367_P4) was confirmed by email dated 8th November 2022.

1.2. Site location

The Site is located to the east of Ansty Village in the District of Mid Sussex. A Site location plan is presented as drawing P21367_R4_D01. The Site address is as follows:

Ansty Farm,
Haywards Heath,
West Sussex,
RH17 5AG

The National Grid Reference (NGR) for the approximate centre of the Site is TQ 29653 23438. The Site covers a total area of c. 99 ha.

1.3. Brief

The Client is seeking to obtain outline planning permission for a proposed residential development. To support the application a sustainable drainage strategy is required which this report supports by demonstrating whether infiltration drainage may be viable at the Site.

1.4. Scope

The scope of work was to undertake infiltration testing across the Site in accordance with BRE365 (2016), to inform the proposed development drainage strategy. Yellow Sub have also been commissioned to prepare a flood risk assessment and sustainable drainage strategy which the data herein informs and is presented separately (see P21367_R5).

1.5. Limitations

This report is written strictly for the benefit of the Client and bound by the conditions presented in Appendix A.

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2. Fieldwork

Fieldwork was undertaken over 4No. days between the 26th and 29th June 2023, with the location of each exploratory hole agreed with the Client and designed to minimise Site damage whilst providing suitable coverage. Drawing P21367_R4_D02 details the locations of the exploratory holes, and the ground conditions encountered are discussed in Section 3. The works undertaken are summarised in the following table:

Table 2-1 Fieldwork undertaken

Work element	Comments/ rationale
Utilities and service clearance	Prior to the Site works a utilities report was obtained and each position was checked for services by trained and competent Yellow Sub staff using the plans (see Appendix B) and non-intrusive CAT and Genny techniques.
Trial pits	Twelve trial pit locations (TP01, TP02A, TP02B, TP03, TP04A, TP04B, TP04C, TP04D, TP04E, TP05, TP08, TP10) were machine excavated (using a JCB) to depths of between 1.6m and 3m below ground level (m bgl). TP03, TP04A, TP04B, TP04C, TP04D and TP04E were all terminated within Upper Tunbridge Wells Sand. TP01, TP02A, TP02B, TP05 and TP10 all terminate within the Cuckfield Stone Bed and TP08 within the Lower/Upper Grinstead Clay. In all trial pits, the faces and base were cut to create as square a shape as possible, the dimensions of each pit were then measured and recorded
Logging of strata	All strata were logged by competent Yellow Sub staff in accordance with BS5930. The engineering logs are presented in Appendix C.
Soakaway testing	Soakaway testing in general accordance with BRE 365 (2016) was carried out in each trial pit using a 1,000 litre IBC, which rapidly inundated the trial pits to the required depth. Water levels were measured at regular intervals across the test period. If tests were successful, repeat tests were run in the same saturated pit as detailed by BRE365. The results of this testing are presented in Appendix D.
Installations	None of the exploratory positions were installed.
Backfill	On completion of excavation and testing, the pits were backfilled with arisings, which were compacted in discrete layers by the JCB in reverse order to excavation. Excess materials were carefully mounded on the backfilled pits to accommodate future settlement.

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3. Ground conditions

3.1. Strata Encountered

The strata encountered during the fieldwork are summarised as follows:

- **Topsoil:** Typically 0.1m to 0.5m thick. Encountered as grass covered yellowish brown to brown, sandy CLAY with an occasional sandstone gravel.
- **Upper Tunbridge Wells Sand:** Encountered in TP03, TP04A, TP04B, TP04C, TP04D and TP04E between 0.15 to 2.7m bgl. Typically encountered as a orangish brown to reddish brown slightly sandy CLAY but also as a clayey SAND with TP04B. Within TP04A encountered as a yellow medium grained SANDSTONE between 1.5 and 1.6m bgl.
- **Cuckfield Stone Bed:** encountered in TP01, TP02A, TP02B, TP05 and TP10 between 0.4 and 2.8m bgl. Typically recorded a sandy gravelly CLAY but also encountered as a very clayey, sandy GRAVEL within TP05 and as a very clayey SAND in TP10. Gravel is typically medium to coarse of iron rich calcareous sandstone concretions.
- **Lower/Upper Grinstead Clay:** Encountered only in TP08 between 0.1 and 0.4m bgl as a light brown, very clayey SAND and between 0.4 to 3m bgl to as a brown, mottled grey and orange CLAY.

Exploratory logs of each position can be found in Appendix C and a photographic log is shown in Appendix E.

3.2. Progress and Obstructions

No obstructions were encountered in any of the exploratory holes.

3.3. Stability

All pits remained open and stable for the duration of infiltration testing.

3.4. Visual and olfactory evidence of contamination

There was no evidence of significant or gross impact to soils encountered within exploratory positions. In addition, no Made Ground was encountered in any of the locations.

3.5. Groundwater

No seepages or groundwater strikes were noted in any of the exploratory positions.

3.6. Summary of infiltration testing results

A summary of the infiltration testing is presented in Table 3-1 below with full results presented in Appendix D. The infiltration values for each pit have been calculated in accordance with the methodology set out in BRE 365.

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Table 3-1 Summary of infiltration testing

Trial pit	Test	Depth of pit (m)	Geology of test section	Permeability (m/s)
TP01	1	2.8	Cuckfield Stone Bed	Failed
TP02A	1	2.5	Cuckfield Stone Bed	Failed
TP02B	1	2.9	Cuckfield Stone Bed	Failed
TP03	1	2.5	Upper Tunbridge Wells Sand	Failed
TP04A	1	1.6	Upper Tunbridge Wells Sand	Failed
TP04B	1	2.4	Upper Tunbridge Wells Sand	Failed
TP04C	1	2.5	Upper Tunbridge Wells Sand	Failed
TP04D	1	2.7	Upper Tunbridge Wells Sand	Failed
TP04E	1	1.5	Upper Tunbridge Wells Sand	Failed
TP05	1	1.9	Cuckfield Stone Bed	Failed
TP08	1	2.7	Lower/ Upper Grinstead Clay	Failed
TP10	1	2.8	Cuckfield Stone Bed	Failed

All twelve of the infiltration tests failed to drain sufficiently with no repeat tests undertaken. This indicates that infiltration drainage is unlikely to be feasible at the Site.

4. Conclusions

4.1. Ground conditions encountered

The trial pitting confirmed the published geology at the Site, consisting of up to 0.5m of topsoil underlain by the Cuckfield Stone Bed, Upper Tunbridge Wells Sand and Lower/ Upper Grinstead Clay to the maximum excavated depth of 3m bgl.

No groundwater seepages were noted within the excavations. No visual or olfactory evidence of gross contamination was noted within the excavations and no Made Ground was encountered.

4.2. Infiltration drainage potential

Infiltration rates have been calculated for each trial pit. None of the positions drained away within sufficient timescales. As a result, it is possible to conclude that that soakaway drainage is unlikely to be suitable for the Site.

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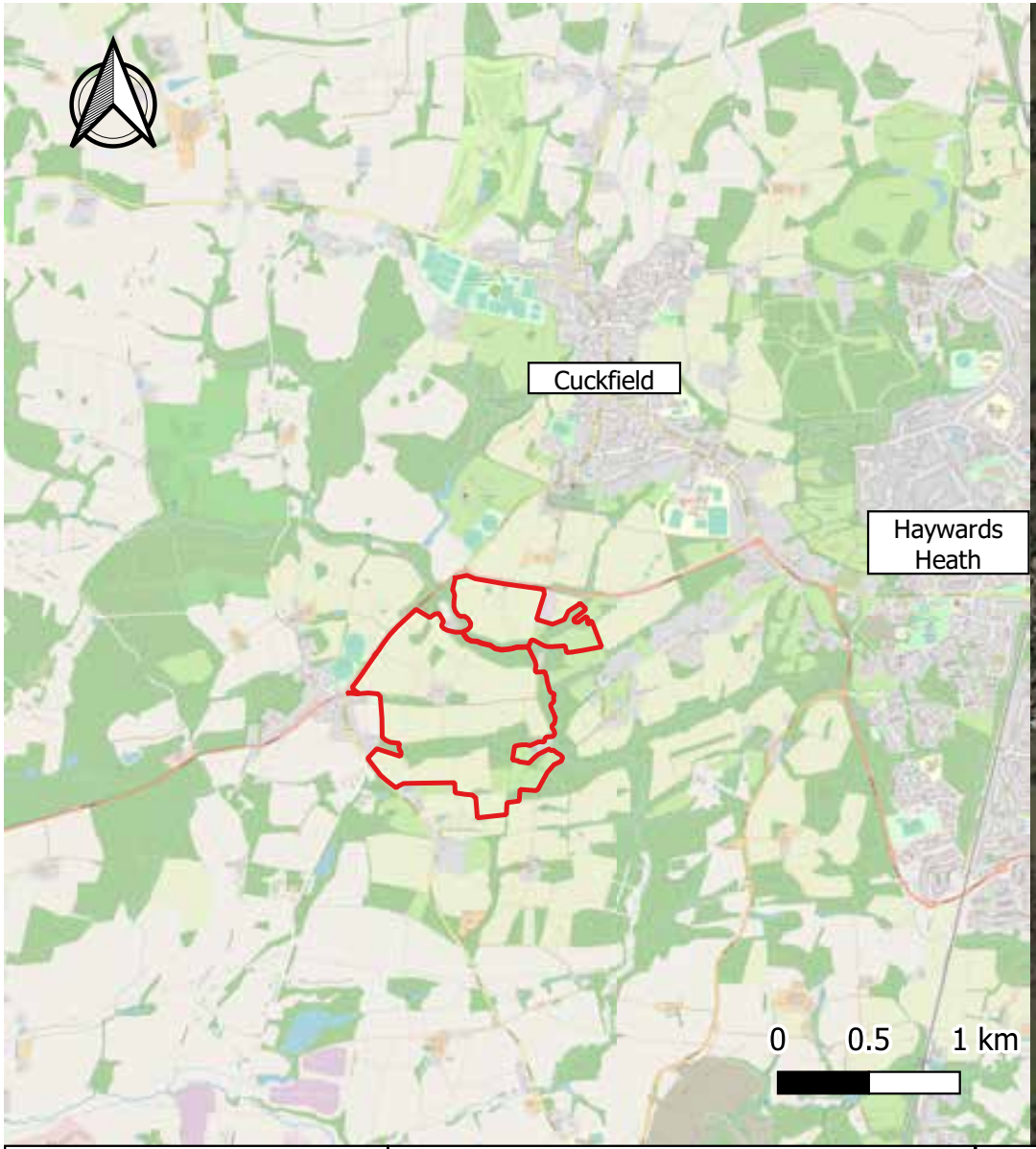
Drawings



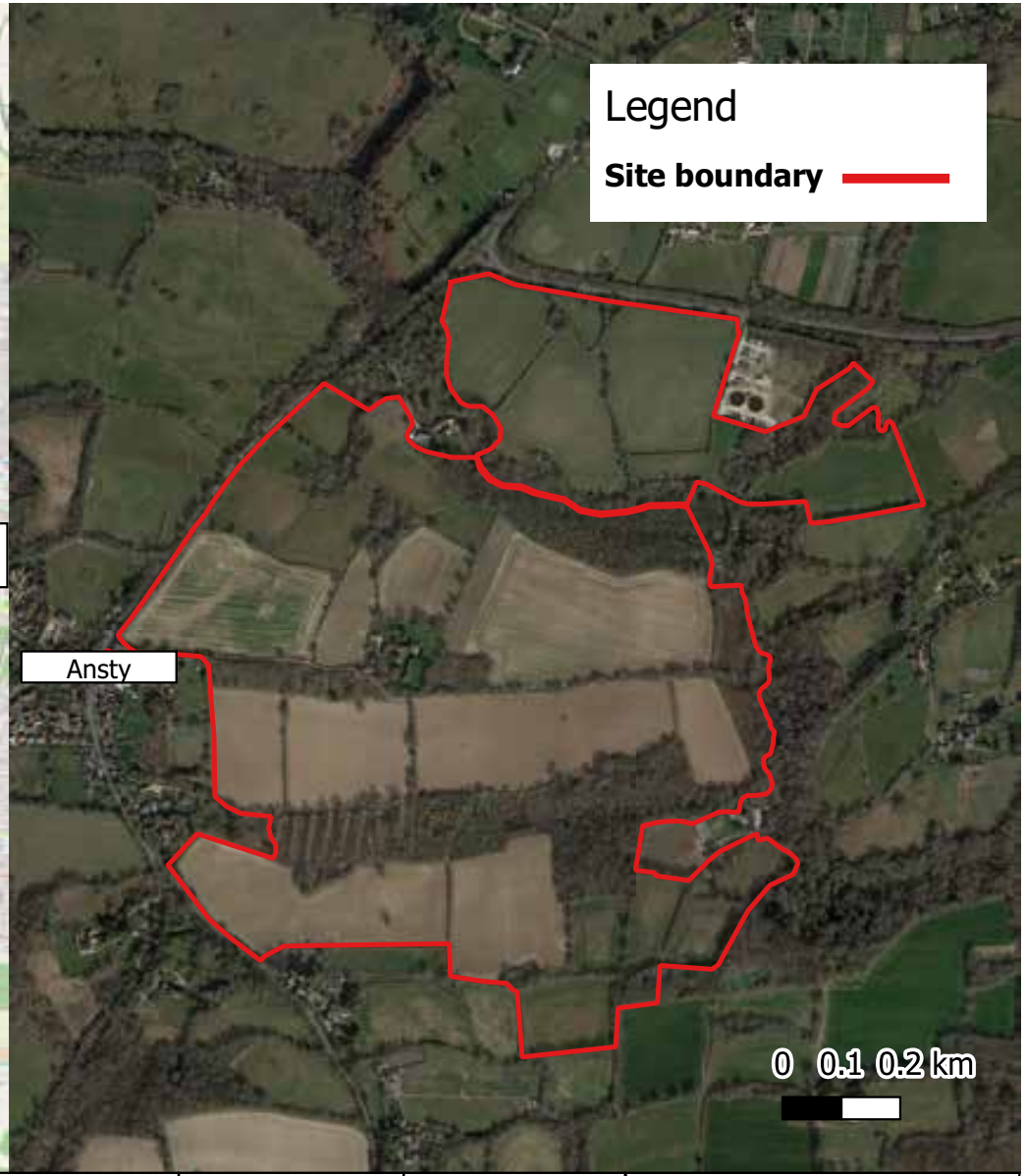


	Figure Title: Site location, Ansty Farm	Client: Fairfax Properties Ltd	Date: 24/10/2022	Drawn: RLW	YELLOW SUB GEO
			Scale: NTS	Checked: JEM	
		Drawing Number: P21367_R4_D01	Original: A4	Revision 1	
		Project Number: 21367	Ansty Farm, Mid Sussex		

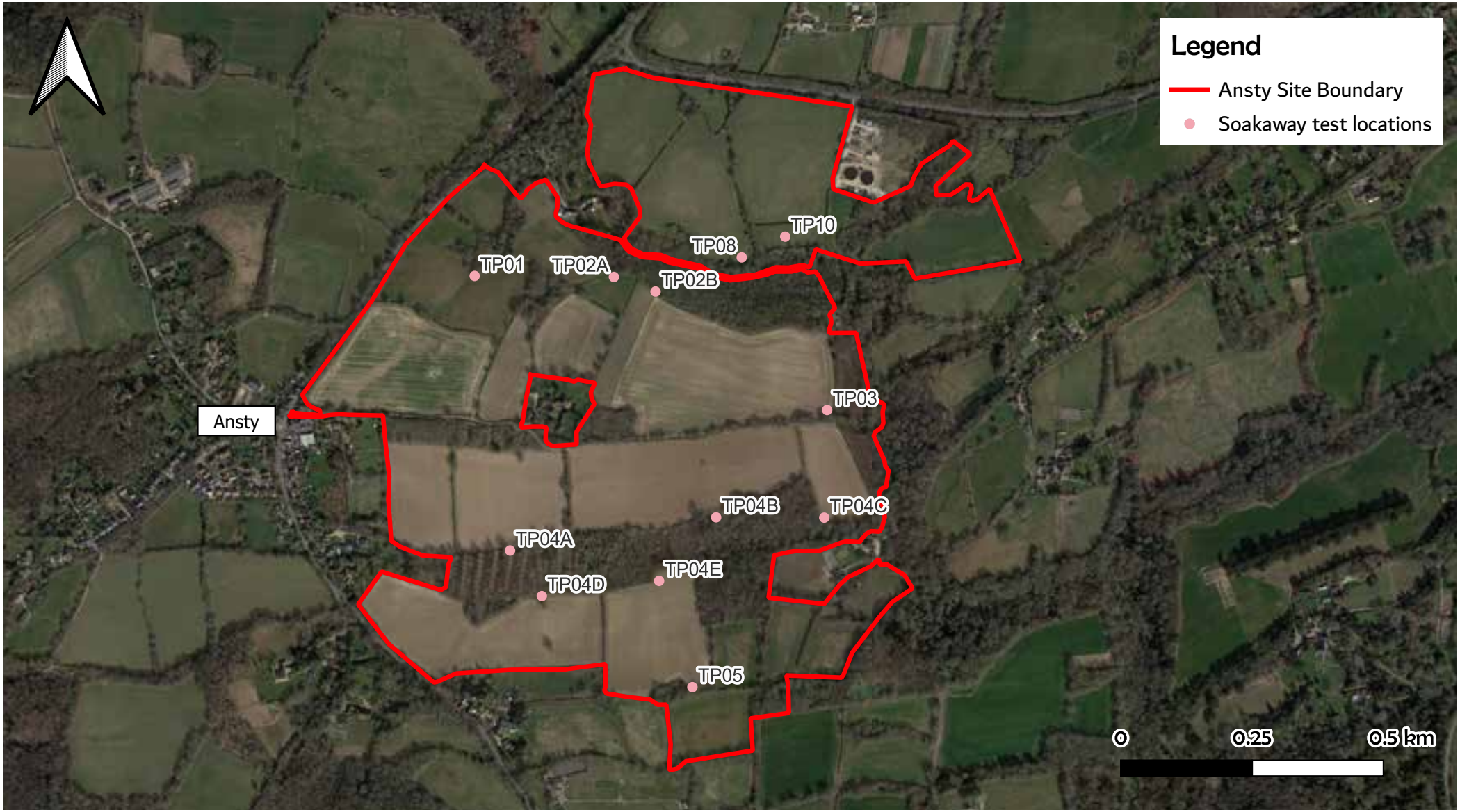


Figure Title

Exploratory positions, Ansty Farm

Client

Fairfax Properties Ltd

Drawing Number	Scale	Original
P21367_R4_D02	1:10,000	A4
Project Number	**Drawn**	**Checked**
P21367	RLW	JEM
Date	**Site Location**	
05/10/23	Ansty Farm, Mid Sussex	

YELLOW SUB GEO

Appendix E: Sewer asset location plans

Ansty

Plot Date:	17/07/2023	This plan is based upon an Ordnance Survey map. © Crown copyright and database rights 2020 Ordnance Survey License No. 100019560	south east water
Grid Reference:	529,360.3432 123,174.1918	**ArcGIS Web Map**	
Scale:	1:2,071		

Appendix F: Greenfield runoff calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years) 1 SAAR (mm) 800 Urban 0.000
Area (ha) 99.410 Soil 0.450 Region Number Region 7

Results l/s

QBAR Rural 473.4
QBAR Urban 473.4

Q1 year 402.4

Q1 year 402.4
Q30 years 1072.9
Q100 years 1510.1

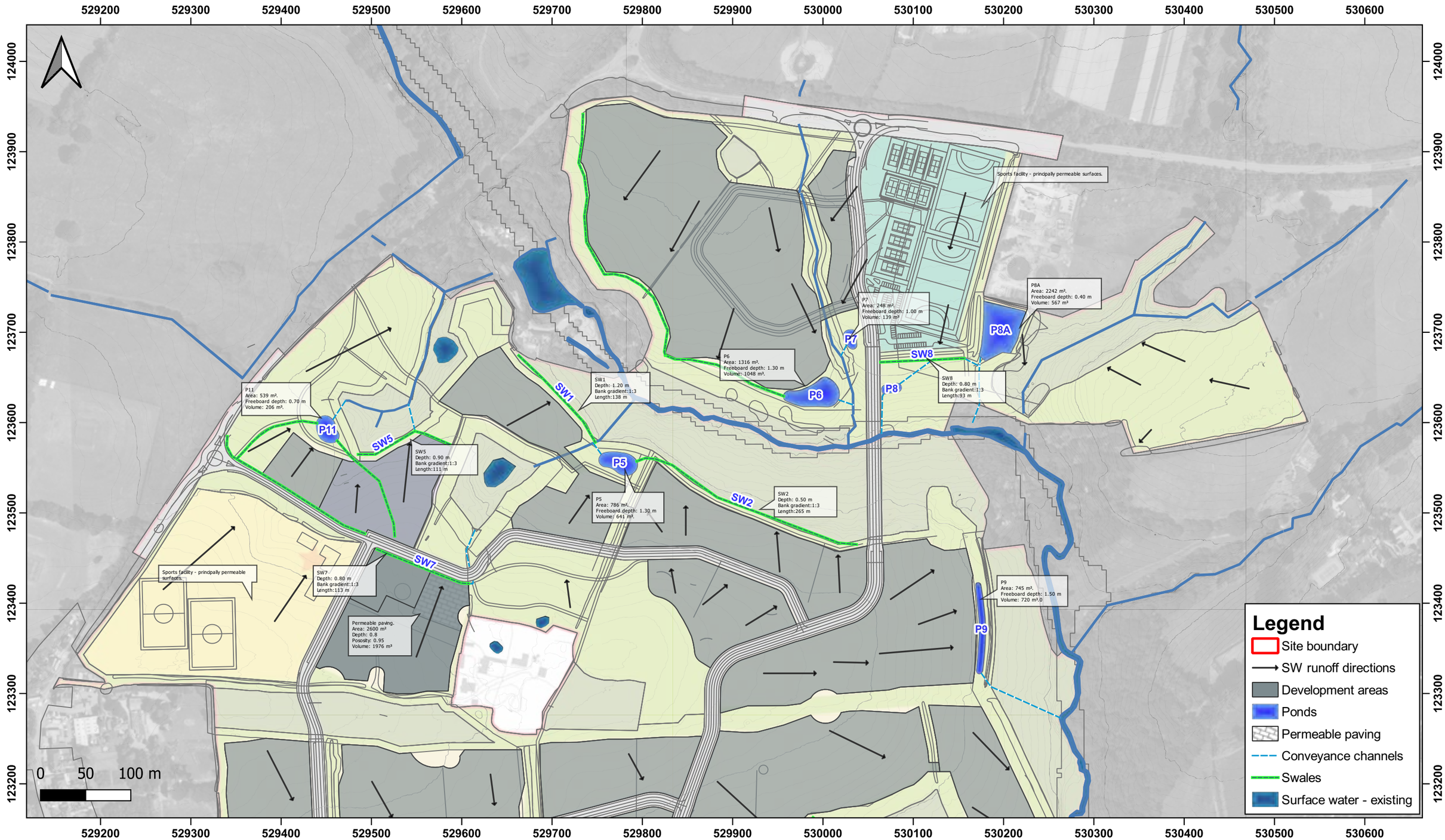
Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	101.740
SAAR (mm)	813
Soil Index	4
SPR	0.47
Region	1
Betterment (%)	0
QBar (l/s)	541.2

OK
Cancel
Load
Calc

Return Period (years)	Growth Factor	Q (l/s)
1	0.85	460.0
30	1.95	1055.3
100	2.48	1342.2

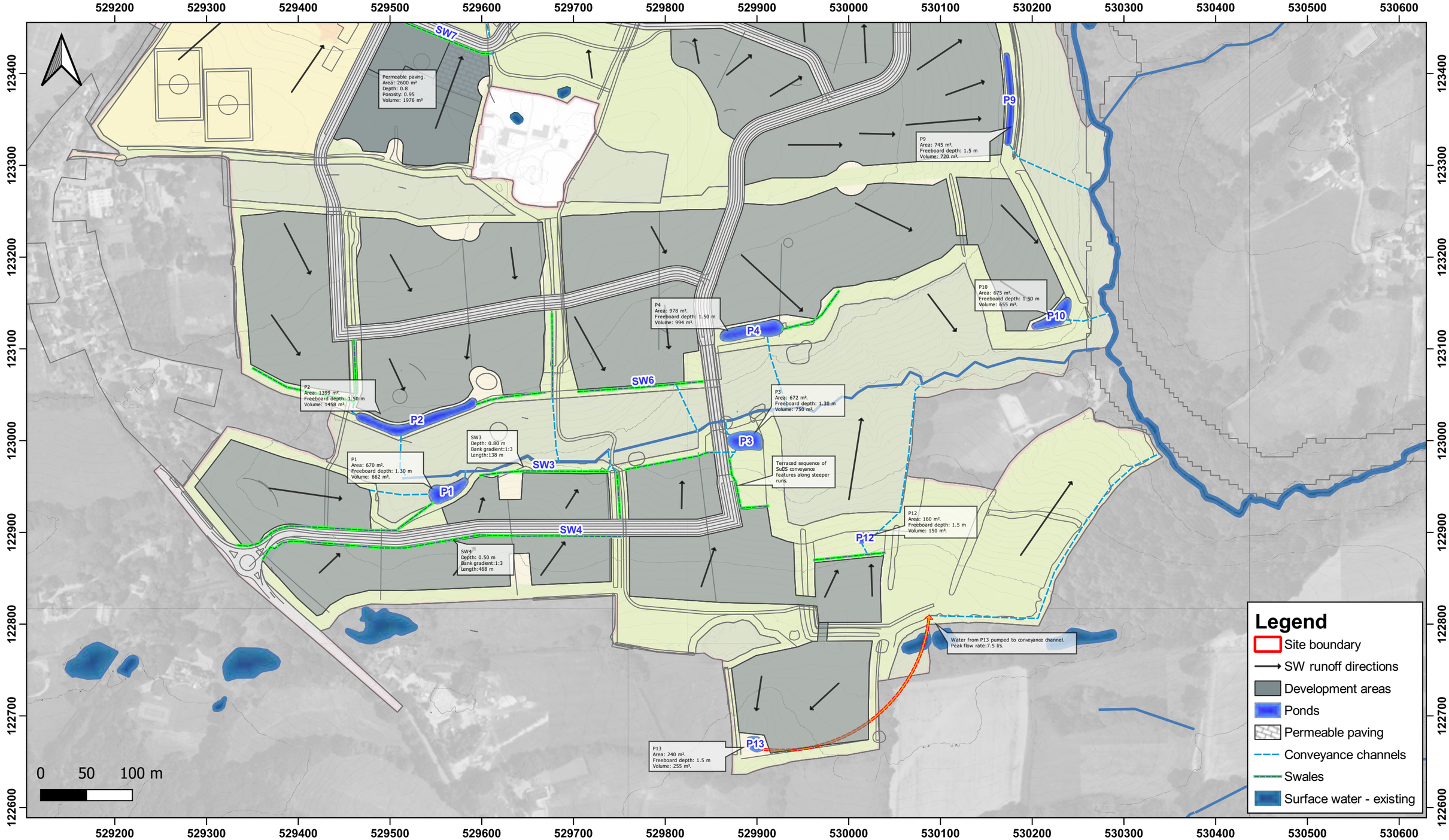
Appendix G: Outline Drainage Strategy layout



Outline drainage layout and relevant design information - north.

Date	2023	Drawn	HJK
Scale	1:4000	Checked	JEM
Original	A3	Revision	1
File reference	Projects\2266 - Ansty\GIS		

YELLOW SUB GEO



Outline drainage layout and relevant design information - south.

Date	2023	Drawn	HJK
Scale	1:4000	Checked	JEM
Original	A3	Revision	1
File reference	Projects\2266 - Ansty\GIS		

YELLOW SUB GEO

Appendix H: Drainage calculations

Design Settings

Rainfall Methodology	FEH-13	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	10.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Diameter (mm)	Depth (m)
P10	1.879	30.00	42.000	Manhole	1500	1.500
P4	1.736	30.00	54.950	Manhole	1500	1.500
P3	1.432	30.00	46.770	Manhole	1500	1.300
P12	0.333	30.00	57.400	Manhole	1200	1.500
P13	1.077	30.00	56.930	Manhole	1200	1.500
P2	3.416	30.00	57.300	Junction		1.500
P1	1.689	30.00	52.500	Junction		1.300
P7	0.340	30.00	51.950	Manhole	1200	1.000
P6	3.000	30.00	49.150	Manhole	1800	1.300
P8A	1.000	30.00	49.750	Manhole	1500	0.400
P11	0.564	30.00	59.900	Manhole	1800	0.700
P5	0.884	30.00	52.150	Manhole	1200	1.300
P9	1.994	30.00	49.350	Manhole	1500	1.500
SW3	0.453	30.00	50.350	Junction		0.800
SW4	0.316	30.00	55.200	Junction		0.500
SW6	0.881	30.00	52.650	Junction		1.000
SW7	0.000	30.00	67.680	Junction		0.800
SW5	0.444	30.00	58.150	Junction		0.900
SW1	1.221	30.00	51.500	Junction		1.200
SW2	0.408	30.00	53.650	Junction		0.500
Perm1	2.442	10.00	69.150	Junction		0.800
P8	0.000	30.00	47.750	Junction		1.000
SW8	0.848	30.00	53.400	Junction		0.800

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Drain Down Time (mins)	240	Check Discharge Rate(s)	x
Summer CV	0.750	Skip Steady State	x	Additional Storage (m³/ha)	99.0	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	45	0	0
30	40	0	0				

Node P2 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	55.800	Product Number	CTL-SHE-0248-3530-1500-3530
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.300
Design Flow (l/s)	35.3	Min Node Diameter (mm)	1800

Node P1 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	51.200	Product Number	CTL-SHE-0184-1770-1300-1770
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	17.7	Min Node Diameter (mm)	1500

Node P3 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	45.470	Product Number	CTL-SHE-0164-1380-1300-1380
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	13.8	Min Node Diameter (mm)	1500

Node P4 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	53.450	Product Number	CTL-SHE-0187-1890-1500-1890
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	18.9	Min Node Diameter (mm)	1500

Node P12 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	55.900	Product Number	CTL-SHE-0073-2800-1500-2800
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.8	Min Node Diameter (mm)	1200

Node P13 Offline Pump Control

Flap Valve	x	Invert Level (m)	55.430	Design Flow (l/s)	7.5	Switch off depth (m)	0.000
Loop to Node		Design Depth (m)	1.500	Switch on depth (m)	0.050		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.050	7.500	1.500	7.500

Node P10 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	40.500	Product Number	CTL-SHE-0163-1410-1500-1410
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	14.1	Min Node Diameter (mm)	1500

Node P9 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	47.850	Product Number	CTL-SHE-0158-1330-1500-1330
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	13.3	Min Node Diameter (mm)	1500

Node P5 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	50.850	Product Number	CTL-SHE-0134-8900-1300-8900
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.9	Min Node Diameter (mm)	1200

Node P11 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	59.200	Product Number	CTL-SHE-0236-2880-0700-2880
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.300
Design Flow (l/s)	28.8	Min Node Diameter (mm)	1500

Node P6 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	47.850	Product Number	CTL-SHE-0222-2690-1300-2690
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.300
Design Flow (l/s)	26.9	Min Node Diameter (mm)	1800

Node P8A Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	49.350	Product Number	CTL-SHE-0182-1500-0400-1500
Design Depth (m)	0.400	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	15.0	Min Node Diameter (mm)	1200

Node P7 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	50.950	Product Number	CTL-SHE-0104-4900-1000-4900
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.9	Min Node Diameter (mm)	1200

Node SW1 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	50.300	Product Number	CTL-SHE-0106-5400-1200-5400
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.4	Min Node Diameter (mm)	1200

Node SW2 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node	P5	Sump Available	✓
Invert Level (m)	53.150	Product Number	CTL-SHE-0205-2000-0500-2000
Design Depth (m)	0.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.0	Min Node Diameter (mm)	1200

Node SW3 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	49.550	Product Number	CTL-SHE-0091-3400-0800-3400
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	3.4	Min Node Diameter (mm)	1200

Node SW4 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	54.500	Product Number	CTL-SHE-0117-5700-0700-5700
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.7	Min Node Diameter (mm)	1200

Node SW5 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	57.250	Product Number	CTL-SHE-0088-3300-0900-3300
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.3	Min Node Diameter (mm)	1200

Node SW6 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	51.650	Product Number	CTL-SHE-0123-6900-1000-6900
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.9	Min Node Diameter (mm)	1200

Node SW7 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	66.880	Product Number	CTL-SHE-0148-9900-0800-9900
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	9.9	Min Node Diameter (mm)	1200

Node P13 Offline Pump Control

Flap Valve	x	Loop to Node	Invert Level (m)	55.430	Switch on depth (m)	0.100	Switch off depth (m)	0.050

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	12.000	1.500	12.000

Node Perm1 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node	SW7	Sump Available	✓
Invert Level (m)	65.350	Product Number	CTL-SHE-0149-1000-0800-1000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	10.0	Min Node Diameter (mm)	1200

Node P8 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	46.750	Product Number	CTL-SHE-0175-1500-1000-1500
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	15.0	Min Node Diameter (mm)	1200

Node SW8 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node	P8	Sump Available	✓
Invert Level (m)	52.600	Product Number	CTL-SHE-0177-1500-0800-1500
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	15.0	Min Node Diameter (mm)	1200

Node P7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.950
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	30.0	0.0	1.000	248.3	0.0

Node P6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	47.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	300.0	0.0	1.300	1316.0	0.0

Node P8A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.350
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	600.0	0.0	0.400	2242.0	0.0

Node P11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	59.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	87

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	0.0	0.700	539.4	0.0

Node P5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	200.0	0.0	1.300	786.3	0.0

Node P9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	47.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	215.0	0.0	1.500	745.0	0.0

Node P10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	40.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	200.0	0.0	1.500	675.0	0.0

Node P4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	53.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	350.0	0.0	1.500	977.5	0.0

Node P3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	45.470
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	250.0	0.0	1.300	750.0	0.0

Node P12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	55.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	0.0	1.500	160.0	0.0

Node P13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	55.430
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	215

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	100.0	0.0	1.500	240.0	0.0

Node P2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	55.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	550.0	0.0	1.500	1399.0	0.0

Node P1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	51.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	250.0	0.0	1.300	670.0	0.0

Node SW3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.550
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	41.5	0.0	0.800	705.1	0.0

Node SW4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	140.0	0.0	0.500	1544.0	0.0

Node SW6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	51.650
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	38.6	0.0	1.000	854.4	0.0

Node SW7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	66.880
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	32.6	0.0	0.800	554.0	0.0

Node SW5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	57.250
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	32.6	0.0	0.900	628.0	0.0

Node SW1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	38.6	0.0	1.200	965.9	0.0

Node SW2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	53.150
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	113

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	79.8	0.0	0.500	239.0	0.0

Node Perm1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Width (m)	26.000	Depth (m)	0.800
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	68.350	Length (m)	100.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	1000.0		

Node P8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	46.750
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	0.0	1.000	187.0	0.0

Node SW8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	52.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	27.9	0.0	0.800	474.3	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	P10	264	41.023	0.523	59.7	213.7037	0.0000	OK
360 minute summer	P4	248	53.789	0.339	55.2	182.1501	0.0000	OK
360 minute summer	P3	248	45.826	0.356	45.5	153.0420	0.0000	OK
360 minute summer	P12	264	56.349	0.449	10.6	36.3767	0.0000	OK
120 minute summer	P13	98	55.776	0.346	49.0	65.2174	0.0000	OK
360 minute summer	P2	248	56.215	0.415	108.5	370.3067	0.0000	OK
240 minute summer	P1	180	51.590	0.390	64.5	172.0934	0.0000	OK
180 minute summer	P7	136	51.227	0.277	14.1	26.3433	0.0000	OK
360 minute summer	P6	256	48.310	0.460	95.3	326.5264	0.0000	OK
480 minute summer	P8A	320	49.474	0.124	27.6	136.5517	0.0000	OK
120 minute summer	P11	90	59.363	0.163	25.7	30.8719	0.0000	OK
360 minute summer	P5	280	51.256	0.406	37.7	146.0860	0.0000	OK
360 minute summer	P9	264	48.389	0.539	63.4	238.8786	0.0000	OK

US Node	DS Node	Outflow (l/s)	Discharge Vol (m³)
P10		14.1	361.4
P4		18.6	335.2
P3		13.8	277.9
P12		2.4	65.7
P13		7.5	67.7
P13		12.0	77.2
P2		35.2	651.0
P1		17.7	283.4
P7		4.9	53.6
P6		26.9	581.0
P8A		9.1	173.8
P11		17.8	74.6
P5		8.9	236.0
P9		13.3	366.8

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	SW3	264	49.801	0.251	14.4	50.5739	0.0000	OK
120 minute summer	SW4	98	54.752	0.052	14.4	14.3107	0.0000	OK
360 minute summer	SW6	256	52.000	0.350	28.0	94.0924	0.0000	OK
1440 minute summer	SW7	1380	67.459	0.579	12.5	128.2135	0.0000	OK
360 minute summer	SW5	264	57.531	0.281	14.1	48.9438	0.0000	OK
480 minute summer	SW1	368	50.796	0.496	33.7	164.1424	0.0000	OK
120 minute summer	SW2	90	53.289	0.139	18.6	25.3549	0.0000	OK
360 minute summer	Perm1	280	68.490	0.140	84.1	265.1216	0.0000	OK
240 minute summer	P8	216	46.959	0.209	15.0	13.4608	0.0000	OK
180 minute summer	SW8	132	52.884	0.284	35.2	60.3131	0.0000	OK

US Node	DS Node	Outflow (l/s)	Discharge Vol (m³)
SW3		3.4	88.3
SW4		5.7	42.7
SW6		6.9	175.1
SW7		9.9	744.1
SW5		3.3	87.2
SW1		5.4	193.2
SW2	P5	12.1	52.9
Perm1	SW7	12.7	415.1
P8		14.5	148.7
SW8	P8	15.0	133.5

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 98.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	P10	368	41.983	1.483	168.6	831.2435	0.0000	OK
360 minute summer	P4	360	54.493	1.043	155.8	713.5935	0.0000	OK
360 minute summer	P3	360	46.534	1.064	128.5	601.9406	0.0000	OK
360 minute summer	P12	368	57.174	1.274	29.9	145.3968	0.0000	OK
120 minute summer	P13	126	56.867	1.437	160.1	343.7094	0.0000	OK
360 minute summer	P2	360	57.060	1.260	306.6	1425.8590	0.0000	OK
240 minute summer	P1	248	52.397	1.197	190.2	684.3325	0.0000	OK
180 minute summer	P7	188	51.755	0.805	43.2	122.8562	0.0000	OK
360 minute summer	P6	360	49.097	1.247	269.2	1270.0010	0.0000	OK
360 minute summer	P8A	280	49.629	0.279	89.7	397.5923	0.0000	OK
60 minute summer	P11	65	59.645	0.445	90.8	127.9098	0.0000	OK
480 minute summer	P5	488	51.974	1.124	86.9	586.9649	0.0000	OK
360 minute summer	P9	368	49.339	1.489	178.9	910.5358	0.0000	OK

US Node	DS Node	Outflow (l/s)	Discharge Vol (m³)
P10		14.1	437.2
P4		18.9	514.3
P3		13.8	388.5
P12		2.6	81.1
P13		7.5	153.4
P13		12.0	236.9
P2		35.3	968.6
P1		17.7	416.0
P7		4.9	99.8
P6		26.9	806.6
P8A		15.0	400.4
P11		28.8	201.9
P5		8.9	309.8
P9		13.3	414.8

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 98.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	SW3	368	50.142	0.592	40.7	202.9296	0.0000	OK
120 minute summer	SW4	128	54.900	0.200	47.0	97.1477	0.0000	OK
360 minute summer	SW6	368	52.480	0.830	79.1	385.6537	0.0000	OK
1440 minute summer	SW7	1680	67.674	0.794	12.8	231.5457	0.0000	OK
360 minute summer	SW5	368	57.912	0.662	39.8	198.7424	0.0000	OK
600 minute summer	SW1	615	51.402	1.102	80.8	623.0525	0.0000	OK
120 minute summer	SW2	102	53.576	0.426	60.6	97.3487	0.0000	OK
480 minute summer	Perm1	480	68.805	0.455	198.9	1136.7640	0.0000	OK
1440 minute summer	P8	1110	46.975	0.225	15.0	14.6954	0.0000	OK
180 minute summer	SW8	176	53.397	0.797	107.8	283.1712	0.0000	OK

US Node	DS Node	Outflow (l/s)	Discharge Vol (m³)
SW3		3.4	97.7
SW4		5.7	115.0
SW6		6.9	206.6
SW7		9.9	903.3
SW5		3.3	95.4
SW1		5.4	238.8
SW2	P5	20.0	176.5
Perm1	SW7	13.4	546.0
P8		14.6	673.4
SW8	P8	15.0	322.1

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	P10	288	42.000	1.500	184.0	844.9215	295.4211	FLOOD
360 minute summer	P4	368	54.762	1.312	200.5	971.7193	0.0000	OK
360 minute summer	P3	304	46.770	1.300	165.4	794.0647	21.5507	FLOOD
480 minute summer	P12	344	57.400	1.500	32.6	184.6635	12.8609	FLOOD
180 minute summer	P13	120	56.930	1.500	177.6	363.3195	127.2401	FLOOD
360 minute summer	P2	264	57.300	1.500	394.4	1799.9340	153.9550	FLOOD
480 minute summer	P1	296	52.500	1.300	165.4	765.2112	165.2444	FLOOD
240 minute summer	P7	244	51.933	0.983	49.4	169.0647	0.0000	OK
360 minute summer	P6	224	49.150	1.300	346.4	1350.7080	417.9648	FLOOD
360 minute summer	P8A	320	49.697	0.347	115.5	540.9721	0.0000	OK
60 minute summer	P11	69	59.772	0.572	121.6	190.0008	0.0000	OK
480 minute summer	P5	384	52.150	1.300	106.6	730.0813	69.1342	FLOOD
480 minute summer	P9	288	49.350	1.500	195.3	920.0565	333.6547	FLOOD

US Node	DS Node	Outflow (l/s)	Discharge Vol (m³)
P10		14.1	540.5
P4		18.9	549.4
P3		13.8	428.2
P12		2.8	104.4
P13		7.5	179.1
P13		12.0	277.9
P2		35.3	994.8
P1		17.7	654.8
P7		4.9	122.9
P6		26.9	843.7
P8A		15.0	409.3
P11		28.8	270.3
P5		8.9	333.9
P9		13.3	512.1

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	SW3	488	50.257	0.707	44.4	276.5230	0.0000	OK
180 minute summer	SW4	188	54.952	0.252	52.1	140.1515	0.0000	OK
480 minute summer	SW6	488	52.640	0.990	86.3	524.7142	0.0000	OK
1440 minute summer	SW7	1380	67.680	0.800	13.1	234.6400	45.2290	FLOOD
480 minute summer	SW5	488	58.041	0.791	43.5	271.3720	0.0000	OK
1440 minute summer	SW1	870	51.500	1.200	55.3	723.5796	141.4326	FLOOD
60 minute summer	SW2	56	53.650	0.500	88.0	120.0920	19.6479	FLOOD
720 minute summer	Perm1	720	68.964	0.614	185.2	1579.9680	0.0000	OK
360 minute summer	P8	376	46.985	0.235	15.0	15.5018	0.0000	OK
180 minute summer	SW8	120	53.400	0.800	139.8	284.8320	101.6123	FLOOD

US Node	DS Node	Outflow (l/s)	Discharge Vol (m³)
SW3		3.4	126.0
SW4		5.7	130.7
SW6		6.9	267.0
SW7		9.9	929.6
SW5		3.3	122.9
SW1		5.4	494.2
SW2	P5	20.0	174.6
Perm1	SW7	13.7	728.3
P8		14.7	449.5
SW8	P8	15.0	329.2

Appendix B2: Land Quality Desk Study

Ansty Garden Community: Land Quality Desk Study

A REPORT FOR FAIRFAX ACQUISITIONS LTD
APRIL 2023
P21367_R2_Rev1

Document Control

Title

Ansty Garden Community: Land Quality Desk Study

Client

Fairfax Acquisitions Ltd.
Buncton Barn,
Buncton Lane,
Bolney,
West Sussex,
RH17 5RE

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Drawing P21367_R2_D01 Site location plan
Drawing P21367_R2_D02 Site feature plan

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Appendix B: Drawings provided by client
Appendix C: Photos
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Appendix E: Ciria C552 Risk Assessment Methodology

1 Introduction

1.1 INSTRUCTION

Yellow Sub Geo Ltd (Yellow Sub) was instructed by Fairfax Acquisitions Ltd (the Client) to provide a Phase 1 land quality focussed preliminary risk assessment (Desk Study) for Ansty Farm, Haywards Heath (the Site). Instruction to proceed in accordance with Yellow Sub proposal (Ref: P21367_P1) was confirmed by email dated 19th July 2022.

1.2 BRIEF

The brief was to provide a land quality desk study to support the proposed residential development through the Environmental Impact Assessment (EIA) and planning process.

1.3 SCOPE

This report presents records of desk study research, which is in-turn used to develop a conceptual site model and inform a preliminary environmental risk assessment.

The report identifies key potential land quality risks and uncertainties associated with the ground conditions which may require further assessment and/ or risk management in due course via suitable condition(s) linked to the future planning consent.

1.4 LIMITATIONS

This report is written strictly for the benefit of the Client and bound by the conditions presented in Appendix A.

2 Desk Study

The following section collates and presents available information pertinent to the Site ad it's local environs.

2.1 SITE LOCATION

The Site is located to the east of Ansty Village in the District of Mid Sussex. A Site location plan is presented as drawing P21367_R1_D01. The Site address is as follows:

Ansty Farm,
Haywards Heath,
West Sussex,
RH17 5AG

The National Grid Reference (NGR) for the approximate centre of the Site is TQ 29653 23438. The Site covers a total area of c. 99 ha.

2.2 PROPOSED DEVELOPMENT

The proposed development is currently envisaged to comprise up to 1 1,450 homes (including 30% affordable housing), up to 90 residential care (C2 units), a primary school, new SEND school, sports facilities including all weather hockey pitches and tennis centre, allotments, retail, community and employment uses together with ancillary and associated development including new and enhanced pedestrian/cycle routes, open spaces, and landscaping Drawings provided by the Client are included in Appendix B.

2.3 CONSULTATIONS

As part of the desk study, consultation requests were made to West Sussex County Council (WSCC), Mid-Sussex District Council (MSDC) and the Environment Agency (EA). WSCC responded in relation to mineral consultation zones which are covered in more detail in the Preliminary Mineral Assessment for the Site (ref: P21367_R3, April 2023).

2.4 SITE WALKOVER

A Site walkover was undertaken on the 3rd January 2023. Selected photographs are presented in Appendix C. The Site comprised a series of agricultural fields comprising pastural and grazing land bisected by access tracks and public footpaths. The fields were noted to be saturated with ground conditions very soft in nature. Several areas of ponded water comprising suspected historic quarries/ borrow pits were noted in the northern and southern sections of Site, these were typically overgrown with thick vegetation. Site access was possible for the north of the Site via a gated track off the A272. Southern access was possible off the A272 in Ansty village down a paved farm track.

The Site comprises a series of hill and valley systems with valley areas typically afforested and with watercourses flowing along their base. Further vegetated areas were noted along field boundaries and in the south-east of the Site.

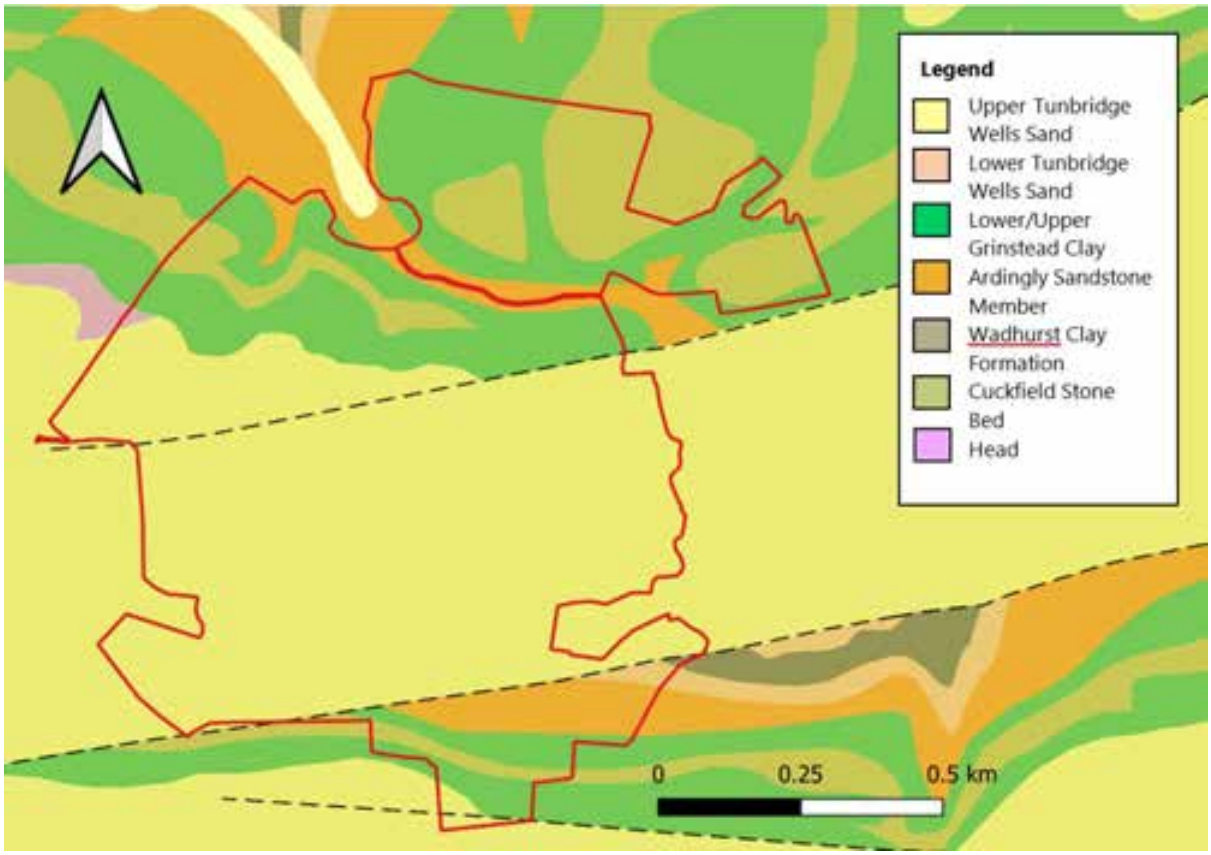
2.5 GEOLOGY

2.5.1 Published Geology

The majority of the Site is underlain by the Upper Tunbridge Wells Sand. The Lower Grinstead Clay, Cuckfield Stone Bed, Upper Grinstead Clay and Ardingly Sandstone Member also outcrop in both the north and south of the Site. In the south of the Site small outcrops of the Lower

Tunbridge Wells Sand and Wadhurst Clay Formation are also present. There is a small outcrop of superficial Head Deposits in the northwest of the Site, otherwise no superficial deposits are mapped. The Site is bisected by three faults, two of which trend NEE-SWW and one NWW-SEE. Figure 2-1 depicts the geology at the Site.

Figure 2-1 Published BGS Geology



2.5.2 Mineral consultation zone

Parts of the Site are located within the WSCC Mineral Safeguarding Area (MSA) for building stone resources, which comprises the Ardingly Sandstone Member and Cuckfield Stone Bed. There is also a MSA associated with the Wadhurst Clay Formation, however only a small area extends onto the Site in the far southeast.

2.5.3 BGS Boreholes

Nearby historical borehole logs within the BGS database are summarised in Table 2-1.

Table 2-1 Strata encountered in nearby historical boreholes logs

Borehole ref.	Strata	Maximum depth (m bgl)
TQ32SW9 (0.1km north)	Topsoil (dark grey-brown, clayey, very sandy silt with occasional gravel, pockets of silty sand and rootlets) Compact, dark orange-brown with light orange-brown patches silty fine SAND with some pockets and layers of weak friable poorly cemented sandstone and occasional pockets and layers of sandy silty CLAY (highly weathered bedrock) Firm to stiff becoming stiff with depth fissured light orange-brown with grey patches silty CLAY with occasional ironstone concretions Very weak to weak blue-grey moderately weathered silty MUDSTONE with some pockets of very stiff silty clay Moderately strong dark grey slightly to moderately weathered highly calcareous MUDSTONE with occasional pockets and layers of silty clay.	0.5 1.3 3.4 4.2 4.7
TQ32SE23 (0.1km north)	Dark brown, slightly clayey, very sandy SILT with roots Firm, friable light yellow-brown with light grey patches, slightly sandy, silty CLAY with occasional sandstone gravel and calcareous nodules. Very dense, yellow-brown, silty. fine sand with occasional gravel sized fragments of very weak poorly cemented silty sand and pockets of silty clay (highly weathered bedrock) Very weak poorly cemented yellow brown moderately weathered silty fine SANDSTONE with pockets and layers of very dense silty sand	0.55 1.7 2.1 8
TQ32SW22 (0.3km east)	Yellow Clay Brown Clay Dark shell and clay	1.8 4.6 14.6

2.6 HYDROGREOLOGY

The Upper and Lower Tunbridge Wells Sand, Ardingly Sandstone Member and Cuckfield Stone Bed beneath the Site are all classified by the EA as Secondary A aquifers. These are layers of rock or drift deposits that have high intergranular and/ or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. The Upper Grinstead Clay and Wadhurst Clay Formation are classed by the EA as unproductive strata. Where superficial Head Deposits are present these are classified as a Secondary (undifferentiated) aquifer. These are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. They have only a minor value.

Groundwater vulnerability is classed as high.

2.7 HYDROLOGY

2.7.1 Surface water

The Site lies within the catchment of the Rivers Adur and Teville. The Site and surrounding area is covered by a network of small inland rivers. The north of the Site is bisected by a small river flowing between Highbridge Mill Cottages and Mackerells farm cottage. This is associated with several small tributaries, one flowing southwards from the A272 and another from the northeast corner of the Site. The watercourse then flows along the eastern Site boundary where it is joined at Furnace Woods by another tributary, which crosses the south of the Site through Ridden's Wood.

There are also at least nine small ponds located across the Site with a further nineteen additional ponds within 50m of the Site boundary.

2.7.2 Flooding

EA mapping indicates the majority of the Site is located within Flood Zone 1, at low risk of flooding from rivers or sea. However, a small area in the north of the Site and along the eastern Site boundary, associated with the watercourse, is in Flood Zone 2/3 (extreme flooding from rivers or sea without defences).

2.7.3 Groundwater Flooding

According to the BGS, there is limited potential for groundwater flooding to occur across the Site.

2.8 SITE HISTORY

A review of historical Ordnance Survey (OS) mapping of the Site has been undertaken. The historical mapping is provided in Appendix D. The salient observations are summarised in Table 2-2.

Table 2-2 Site history

Epoch	Details	Development consideration
1874 to 1879 (1:2,500 & 1:10,560)	The Site and surrounding area is predominantly agricultural. On Site is Mackrell's Farm and Ansty Farm, there are also several small ponds across the Site. Ansty village is located to the west of the Site and Highbridge Mill and mill pond is adjacent to the north eastern boundary of the Site. There are numerous ponds surrounding the Site, the largest being at Cuckfield Park 250m north of Site. There also numerous wells within 100m of the Site. A sand pit is recorded approximately 150m north of the Site, near Highbridge Mill. Areas at Cow Bottom and west of Freizeland Wood, both adjacent to the east of the Site and at the south of the Site near Riddens Farm, also appear to have been worked.	None.
1897 to 1899 (1:2,500 & 1:10,560)	A further small pond is recorded at Ansty Farm. Off Site, a sewage farm with associated tanks is now shown bordering the northeast of the Site. Old sand pits are shown 60m northeast of Site, next to the Sewage Farm and 400m east of the Site along Copyhold Lane. Old quarries are now labelled at Highbridge Mill (50m north of Site), Riddens Farm (at south west boundary of Site) and at Freizeland Wood.	Potential contamination associated with migration from off Site sources including the sewage

Epoch	Details	Development consideration
		treatment works and old sand pits.
1910 to 1913 (1:2,500 & 1:10,560)	No significant changes on Site. The area northeast of the Site is now labelled as a golf course. The sand pit on Copyhold Lane is no longer shown. Addition of an unknown tank 30m west of Site within Ansty village.	None.
1937 to 1938 (1:2,500)	Addition of a footpath across the Site towards Ansty Farm, no other significant changes on Site. Off Site, a series of filter beds are now present at the sewage farm. Ansty village has expanded westwards to include several new buildings. And several new houses have been built along Copyhold Lane to the east of the Site. There is now a cricket ground and pavilion 150m north of the Site.	None.
1938 to 1952 (Aerial photograph & 1:10,560)	No significant changes on Site. Off Site, Ansty continues to expand.	None.
1955 to 1958 (1:2,500 & 1:10,000)	The pond at Mackrell's Farm is no longer shown. Off Site, the golf course is no longer present. There is now a Cricket ground at the west of the Site, north of Ansty. Ansty has expanded further westwards and southwards to include more housing. New housing has also been built southwest of the Site by Marlpit Ponds.	Potential contamination associated with migration from off Site sources including infilled pits/ ponds.
1960 to 1979 (1:1,250 & 1:2,500 & 1:10,000)	Ansty Farm at the centre of Site is now labelled the Old Place and Grain Loft and a pond has been filled in. Off Site, continued expansion of Ansty, including construction of The Lizard, Birch Tree and Whitton Lodge and Ansty Social Club. There is also now a timber yard at Ansty, 300m west of the Site.	Potential for contamination associated with infilled pond.
1984 (1:2,500)	No significant changes on Site. Off Site, addition of an electricity substation 300m east of the Site along Copyhold Lane. Additional filter beds are shown at the sewage treatment works.	None.
1989 (1:2,500)	No significant changes on Site. Construction of the A272 along the northern Site boundary. Addition of new buildings at Lodge Farm and Crabtree Cottage 300m east of the Site	None.
1992 to 1994 (1:1,120, 1:2,500 & 1:10,000)	Construction of a roundabout next to the northwest corner of the Site and widening of the road at High Bridge. Cricket Ground at Ansty is now labelled as a recreation ground. Construction of several new small buildings at Birch Trees Farm at the western edge of the Site, by Ansty.	None.
1999 to 2000 (1:10,000 & Aerial photograph)	Addition of a swimming pool at Old Place in the centre of the Site. Addition of a small building at Mackrell's Farm 40m east of the Site. Expansion of Ansty Farm 400m west of the Site and infilling of pond previously there.	Potential contamination associated with migration from off Site sources including infilled pits/ ponds.

Epoch	Details	Development consideration
2003 to 2016 (1:10,000)	No significant changes on Site. Addition of housing along the southwestern boundary of the Site at Ansty Place and Harvest Hill Cottages	None.
2021 to 2022 (1:10,000 & Aerial photograph)	Old Place and Grain loft at the centre of the Site is now labelled The Barn House. Construction of new housing at Ansty. There is also now a depot in Ansty 350m west of the Site. The Mill Pond at Highbridge Mill appears to have been redeveloped with three small buildings surrounding a possibly smaller pond. Construction of new buildings at Laines Farm 120m north of Site.	None.

2.8.1 Other data sources

Additional online data sources including Google Earth, Britain from Above and National Library of Scotland maps, were reviewed but no additional relevant information was identified.

2.9 ENVIRONMENTAL DATABASE SEARCH

An Envirocheck report was purchased as part of the desk study assessment. The full database report is provided in Appendix D. A summary of the database records is provided in Table 2-3 below with reference to entries within 250m of the Site, unless considered to be relevant at greater distances.

Table 2-3 Environmental database records

Distance (m)/ direction	Land use / permitted activity / authorisation	Development consideration
On Site to 168m (NE, NW, N, W, SE)	28No. Discharge Consents. 10No. Non water company (private) sewage discharges- final/treated effluent and 18No. Discharge consents for waste water treatment works/ sewage treatment works at Newbury Lane, Cuckfield, 2no. which are active currently.	Potential baseline impacts to surface and groundwater quality from the discharge of treated effluent.
On Site to 25m (SE)	1No. local authority recorded landfill is present Site in the northwest corner. However, the details of this are noted to be related to the Cuckfield bypass therefore it is not known if this is on Site or off site along the A272. 1No. landfill site is recorded adjacent to the southern boundary at West Riddens Farm. No further details were provided.	Potential contaminants from unknown Made Ground both on and off Site.
6 to 84 (SE, SW, S, N, NW)	3No. areas of potentially infilled land (non-water) dated 1992-1994	Potential contaminants from unknown Made Ground.
On Site to 202 (E, S, SE, N, NE)	17No. BGS recorded mineral sites. Of these, 5No. are on Site including Laines Farm Pits, Highbridge Mill Pit, Ansty Farm Pit, Hamshalls Pits and Mackrell's Farm Pits. All have ceased operation and are opencast pits in the Ardingly Sandstone Member or Cuckfield Stone Bed.	Potential contaminants from unknown Made Ground if pits are infilled.

Distance (m)/ direction	Land use / permitted activity / authorisation	Development consideration
18 to 158 (NW)	10No. Contemporary trade directory entries, 2 of which are active today, a car dealers and a petrol filling station.	None.

2.10 GEO-HAZARDS

The Envirocheck report provided in Appendix D also includes information from the BGS regarding potential geo-hazards on or near the Site. These potential geo-hazards are summarised in Table 2-4 below.

Table 2-4 Summary of geo-hazards

Ground Stability Hazards	The following potential ground stability hazards have been identified by the BGS on-Site:	
	Collapsible ground	Very Low
	Compressible ground	No Hazard
	Ground dissolution	No Hazard
	Landslide ground	Moderate
	Running sand	Very Low
	Shrinking or swelling clay	Low
Radon	The property is in a lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Basic radon protection measures are therefore likely to be required in the construction of new houses.	

2.11 ENVIRONMENTAL DESIGNATIONS

Online mapping (Defra) indicates there are multiple environmental designations nearby to the Site and in the surrounding local area, a summary of these designations is provided in Table 2-5 below.

Table 2-5 Environmental designation within proximity of the Site

Designation	Location	Information
Ancient Woodland	On Site	Biddens Wood, Furnace Wood, Highbridge Mill, Highbridge Mill Shaw, Mackrells Shaw and Pook Ryde Shaw - may be impacted by the proposed development.
Area of Outstanding Natural Beauty (AONB)	8m North	High Weald – may be impacted by the proposed development.
Nitrate Vulnerable Zone (NVZ)	On Site	Adur East (Sakeham) NVZ - not considered to have potential implications on the proposed development.

2.12 PRELIMINARY UXO RISK ASSESSMENT

Zetica produce online mapping relating to potential risks associated with discovering unexploded ordnance (UXO). Based on this mapping, the Site is indicated to be at a Low Risk from all forms of Unexploded Ordnance. Therefore, it is considered that the risk of encountering UXO is unlikely.

3 Preliminary conceptual Site model and risk assessment

The following section draws together the findings of the desk study to develop a preliminary conceptual site model. The relationship of identified sources, viable pathways and identified environmental receptors is considered and used as a technical basis to inform a qualitative assessment of risk to human health and the wider environment posed by the proposed ground conditions and the proposed redevelopment of the Site.

3.1 SOURCES

The key identified potential contaminant sources are summarised as follows and covered within the risk assessment table in Section 3.4.

3.1.1 On-site source potential

- **Current Agricultural Site use:** Potential sources of contamination associated with the current site use include the use of herbicides and pesticides.
- **Infilled quarries:** Potential contamination may be associated with the unknown Made Ground if the former quarries have been infilled.
- **Historical landfill:** Potential contamination, leachate, impacted groundwater and ground gases associated with the possible landfill located in the northwest of the Site.

3.1.2 Off-site source potential

- **Sewage treatment works:** to the north of the Site.
- **Historical landfill/ infilled pits:** Potential contamination, leachate, impacted groundwater and ground gases associated with the landfill located 25m south of the Site.

3.2 PATHWAYS

For the purposes of this risk assessment, it is assumed that the relevant pathways comprise:

- Direct contact with sub-surface materials (dermal soil/ leachate contact, soil ingestion and dust ingestion/ inhalation);
- Leaching of contaminants to groundwater;
- Migration of dissolved phase contamination in groundwater;
- Preferential flow through the drainage system; and,
- Migration of gas and/ or vapours through preferential pathways and/ or permeable sub-surface materials.

3.2.1 Construction-phase pathways

In addition to the above, during the redevelopment of the Site it will be necessary to cause a period of exposure of bare earth. This in turn will allow for increased infiltration during rainfall events, and therefore an increased potential for leaching and throughflow of potential sub-surface contaminants.

3.3 RECEPTORS

The key identified potential environmental receptors are summarised as follows and covered within the risk assessment table in Section 3.4 below.

3.3.1 Human health

- Demolition, construction and maintenance workers (short term acute risks);
- Off-Site residential and commercial occupants; and,
- Future Site occupants (predominantly residential).

3.3.2 Environmental

- Secondary A Aquifers;
- Streams and ponds across and adjacent to the Site ;
- On Site designated Area of Outstanding natural beauty; and,
- On Site areas of Ancient Woodland.

3.4 PRELIMINARY RISK ASSESSMENT

A summary of the potential contaminant linkages associated with the Site is presented in Table 3-1, alongside an assessment of the risks posed by each linkage. The contaminant linkages have been assessed using the risk assessment methodology described in CIRIA C552 (2001). As such, risk is considered to be a function of both the probability (likelihood) of contamination occurring at the study site and also the potential severity (consequence) of the environmental impacts associated with any such contamination. The classification system used to define contaminant probability, consequence and risk is described in Appendix E.

Table 3-1 Pollutant linkage assessment

Sources	Pathways	Receptors	Consequence	Probability	Risk	Risk management / remediation
Potential contamination from infilled quarries. Historical Landfills Contaminants from Agricultural use (herbicides and pesticides) . Contaminants from off Site sewage treatment works	Direct human contact exposure pathways (dermal, ingestion, inhalation)	Future Site users (Residential) Off-Site residential and commercial occupants	Medium	Low likelihood	Moderate /low	Potential sources of contamination on and in the vicinity of the Site are typically discrete including small historical quarries and a sewage treatment works. Therefore, in reality the potential risks to future Site occupants and off Site users is likely to to be **low**. However, a suitable targeted site investigation is required to understand the ground conditions on Site and contamination status of the underlying soils and groundwater, particularly in the areas of infilled ground. If required, this should result in a suitable risk management strategy to ensure that occupants of the proposed development are not impacted.
		Construction workers	Mild	Low likelihood	Low	Risk to construction works can be adequately managed by standard precautions and health and safety procedures commensurate with working on brownfield sites.
	Ingress into potable supply pipes	Future Site users (Residential) Off-Site residential and commercial occupants	Medium	Low likelihood	Moderate /low	The potential presence of made ground infilling former quarries and historical landfill may include potential organic contaminants which may impact buried potable pipes. Subject to the findings of the above site investigation and location of potable supply pipes delivered as part of the proposed development, barrier pipe may be required should areas of Made Ground be crossed.

Sources	Pathways	Receptors	Consequence	Probability	Risk	Risk management / remediation
	Migration of gases and/or vapours through permeable subsurface materials and/or preferential pathways	Future Site users (Residential) Off-Site residential and commercial occupants	Medium	Low likelihood	Moderate /low	The historic pits and landfill recorded may have been infilled with materials which could act as a potential source of ground gas and vapour. However, these sources are typically small and discrete. Therefore, in reality the potential risks to future Site occupants and off Site users is likely to be **low**. It is recommended that this should be investigated further as part of the above targeted site investigation and, if required, suitable gas protection measures installed within the proposed dwellings.
	Leaching and/or water mobile constituents passing through permeable sub-surface soils and/or shallow preferential pathways	Secondary (A) Aquifer and Principal Aquifer Streams and ponds across Site	Medium	Low likelihood	Moderate /low	The historic pits and landfill recorded may have been infilled with materials which could act as a potential source of leachate. However, these sources are typically small and discrete. Therefore, in reality the potential risks to the wider environment is likely to be **low**. In addition, the off-Site sewage works is considered to be the most likely source of local diffuse groundwater pollution. It is recommended that the presence and depth of groundwater at the Site should be investigated further as part of the above targeted site investigation. This should include consideration of off-Site sources including the sewage treatment works.

4 Conclusions and next steps

4.1 CONCLUSIONS

The Site has undergone limited development since the earliest OS maps and has remained agricultural. Small parts of the Site and the surrounding area have historically been subject to the small scale extraction of building stone from the Ardingly Sandstone Member and Cuckfield Stone Bed. There are 6No. recorded historical quarries across the Site, which may have been infilled by unknown materials however, many were noted during the walkover to remain as, possibly partial, depressions. 1No. recorded landfill Site is present in the north-western corner of the Site and a further 1No. located approximately 25m south of the Site, which may be associated with historic quarries. The landfill located on Site is listed as being associated with the Cuckfield bypass (A272) and as such may not actually be located on the Site itself. In addition, the sewage treatment works located adjacent to the northern boundary is likely to be locally impacting surface and ground water quality albeit the discharge will be covered by an Environmental Permit.

Based on this, potential sources of contamination include: potential materials infilling quarries, historical landfill sites, herbicides and pesticides from current agricultural Site use and diffuse pollution from the sewage treatment works.

Based on the findings of the desk study and the proposed residential led development an assessment of land quality has been undertaken in accordance with current guidance and best practice. On this basis, the potential risk to **human health** is considered to be **MODERATE/ LOW**.

The potential risk to the **wider environment** is assessed to be **MODERATE/ LOW** on the basis that it is underlain by Secondary A Aquifers and surface water features are located across the Site.

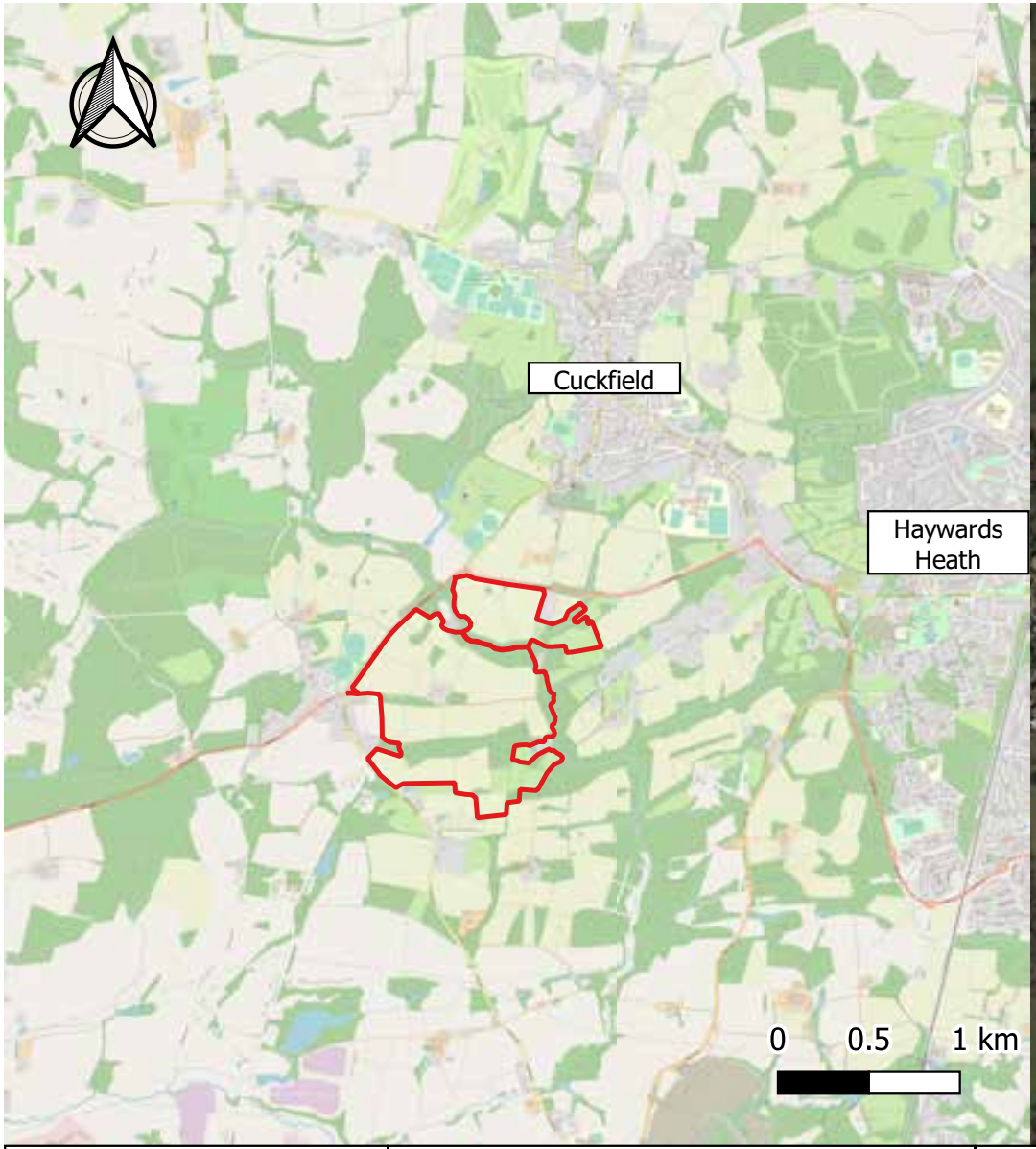
Whilst the above risk assessment indicates an overall moderate/ low risk, it is important to note that many of the sources are both historical but also discrete/ isolated with the vast majority of the Site likely to result in a **LOW** potential risk to future Site users and the wider environment.

4.2 NEXT STEPS

The preliminary conceptual site model and desk based preliminary risk assessment presented herein is considered sufficient to support the proposed planning application. However, following granting of planning permission, a suitably scoped and targeted site investigation should be undertaken to understand the ground, groundwater and ground gas regime across the Site and to test the preliminary conceptual site model. Such an investigation will also provide the opportunity to characterise the ground for the purposes of geotechnical characterisation for foundation design and may also support the design of infiltration drainage.

Given the Site's history, it is important that any site investigation is proportionate and targeted to the features of interest and potential sources of contamination.

Drawings



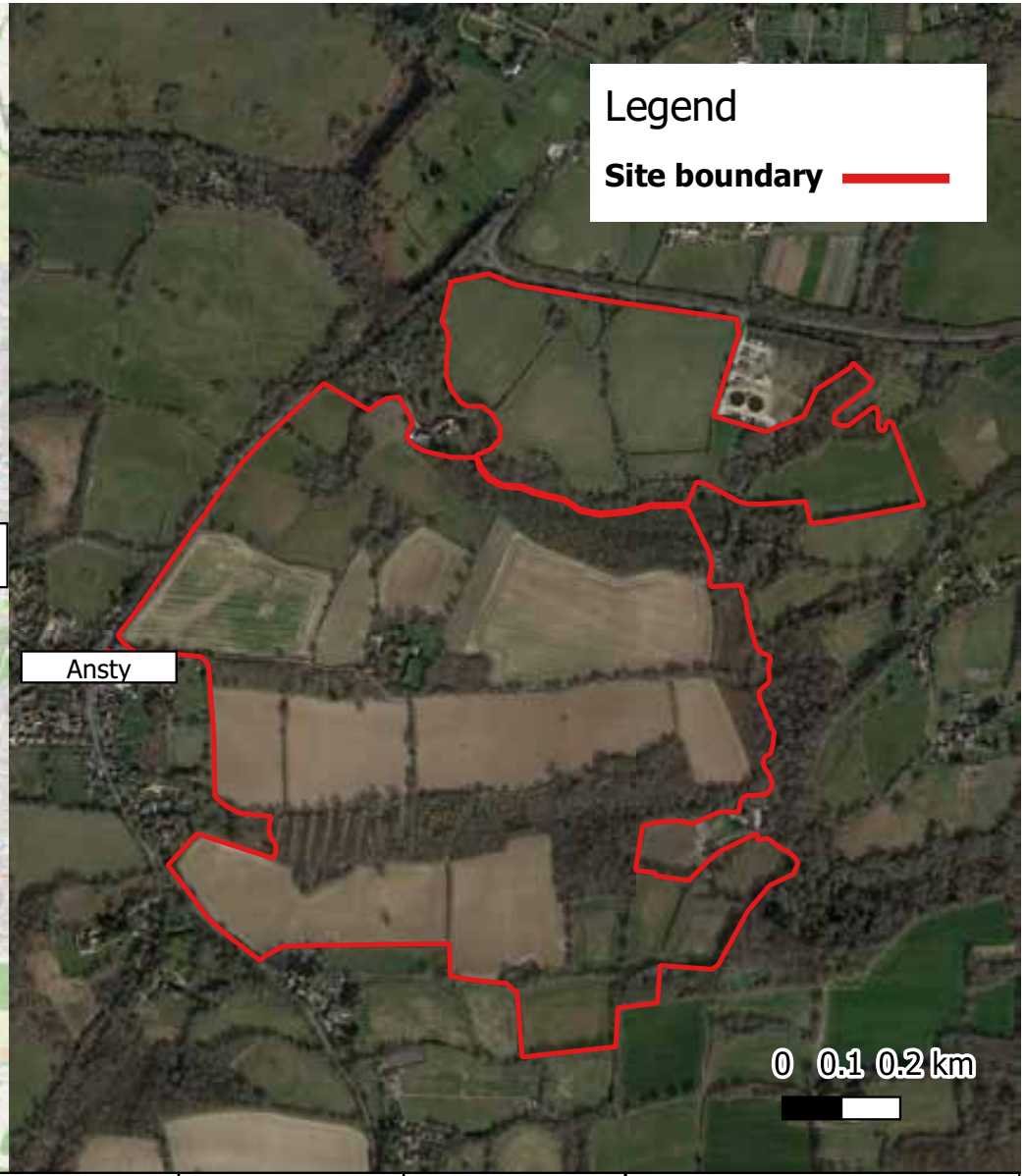


	Figure Title: Site location, Ansty Farm	Client: Fairfax Properties Ltd	Date: 24/10/2022	Drawn: RLW	YELLOW SUB GEO
			Scale: NTS	Checked: JEM	
		Drawing Number: P21367_R2_D01	Original: A4	Revision 1	
		Project Number: 21367	Ansty Farm, Mid Sussex		

Figure Title

Site featues plan, Ansty Farm

Client

Fairfax Acquisitions Ltd

Drawing Number	Scale	Original
P21367_R2_D02	1:10,000	A4
Project Number	**Drawn**	**Checked**
P21367	RLW	JEM
Date	**Site Location**	
21/04/2023	Ansty Farm, Mid Sussex	

YELLOW SUB GEO

Appendices

Appendix A: Report Conditions

Report Conditions

This report has been prepared by Yellow Sub Geo Ltd. (Yellow Sub Geo) in its professional capacity as soil and groundwater specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client, and is provided by Yellow Sub Geo solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to Yellow Sub Geo at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

Where necessary and appropriate, the report represents and relies on published information from third party, publicly and commercially available sources which is used in good faith of its accuracy and efficacy. Yellow Sub Geo cannot accept responsibility for the work of others.

Site investigation results necessarily rely on tests and observations within exploratory holes only. The inherent variation in ground conditions mean that the results may not be representative of ground conditions between exploratory holes. Yellow Sub Geo take no responsibility for variation in ground conditions between exploratory positions.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, Yellow Sub Geo may, by prior written agreement, agree to such release, provided that it is acknowledged that Yellow Sub Geo accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. Yellow Sub Geo accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against Yellow Sub Geo except as expressly agreed with Yellow Sub Geo in writing. Yellow Sub Geo reserves the right to withhold and/ or negotiate the transference of reliance on this report, subject to legal and commercial review.

Appendix B: Drawings provided by Client