Ansty Garden Community: Flood Risk Assessment and Outline Drainage Strategy

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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

Aqua Terra Consultants Ltd (Aqua Terra) 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 on the proposed housing development area (“the Site ”), the proposed Parkland Reserve (“Beechy Bottom Parkland Reserve”), which will not be developed and is considered a water compatible land use (see Figure 2-1) is covered by a separate flood risk note (ref: P25035_R3, May 2025).

1.3. Scope

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:

- The proposed development plans as provided by the Client;
- LiDAR Digital Terrain Model (DTM) data obtained through data.gov.uk;
- Topographical survey of the Site (provided by the Client);
- Ordnance Survey data;
- Data collected during a Site walkover;
- Environment Agency (EA) flood risk data;
- The Mid Sussex Level 1 Strategic Flood Risk Assessment (Mid Sussex District Council, 2024);
- 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);
- Soilscapes soil mapping;
- British Geological Survey (BGS) mapping and borehole logs;
- Site specific infiltration test data collected in June 2023; and,
- Southern Water sewer asset location plans

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 setting

The following section collates and presents available information pertinent to the Site and its local environs.

2.1. Site location and description

The Site is located to the east of Ansty Village in the District of Mid Sussex, closest postcode is RH17 5AG (see Figure 2-1) 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 87Ha.

Figure 2-1 Site location

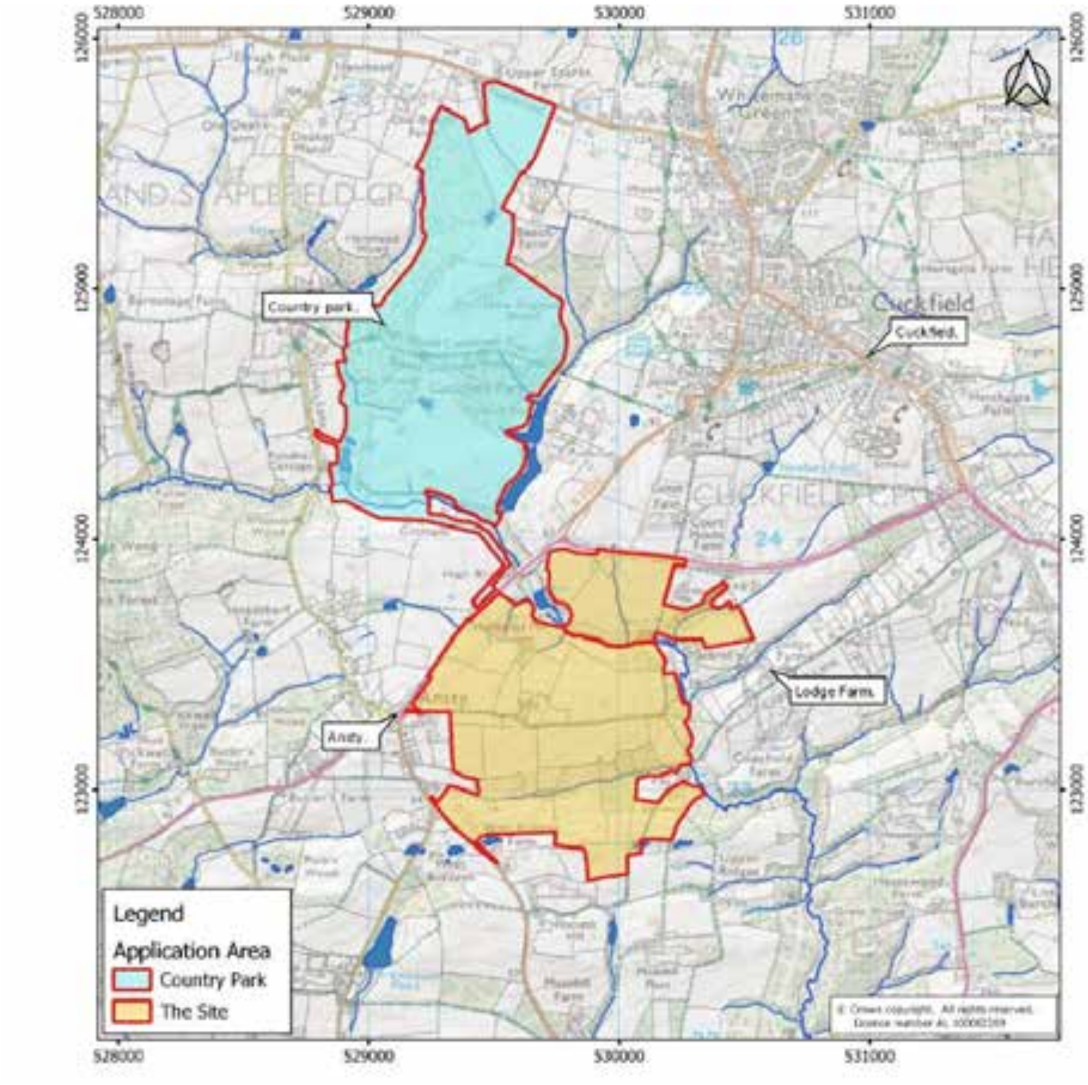

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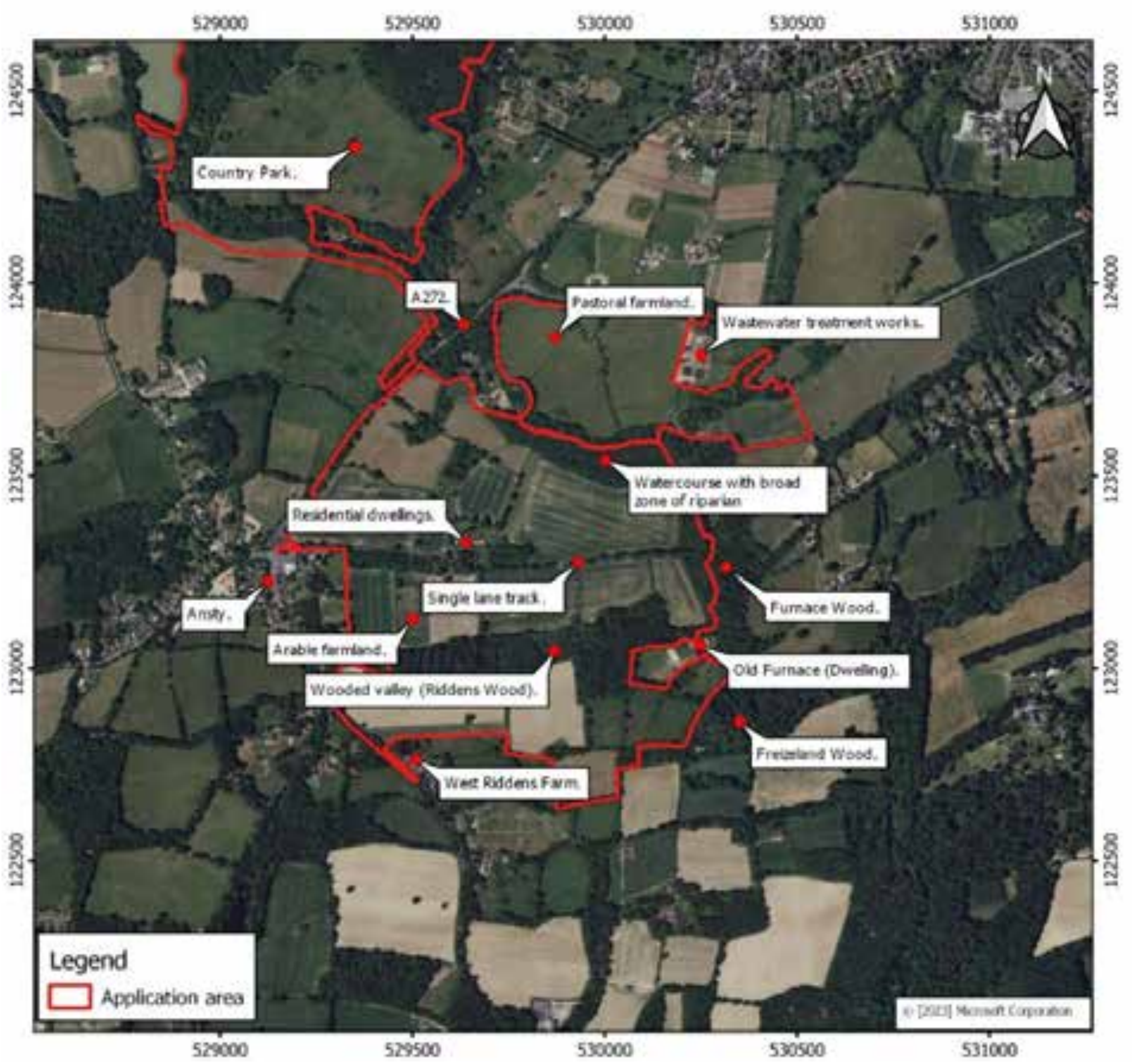
Figure 2-2 presents an aerial image of the Site showing its current land use and condition. The Site currently comprises agricultural fields separated by hedgerows and ditches. There are also wooded areas in parts of the Site, particularly in the vicinity of the watercourses and overland flowpaths.

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 2-2 Existing Site layout (development area)



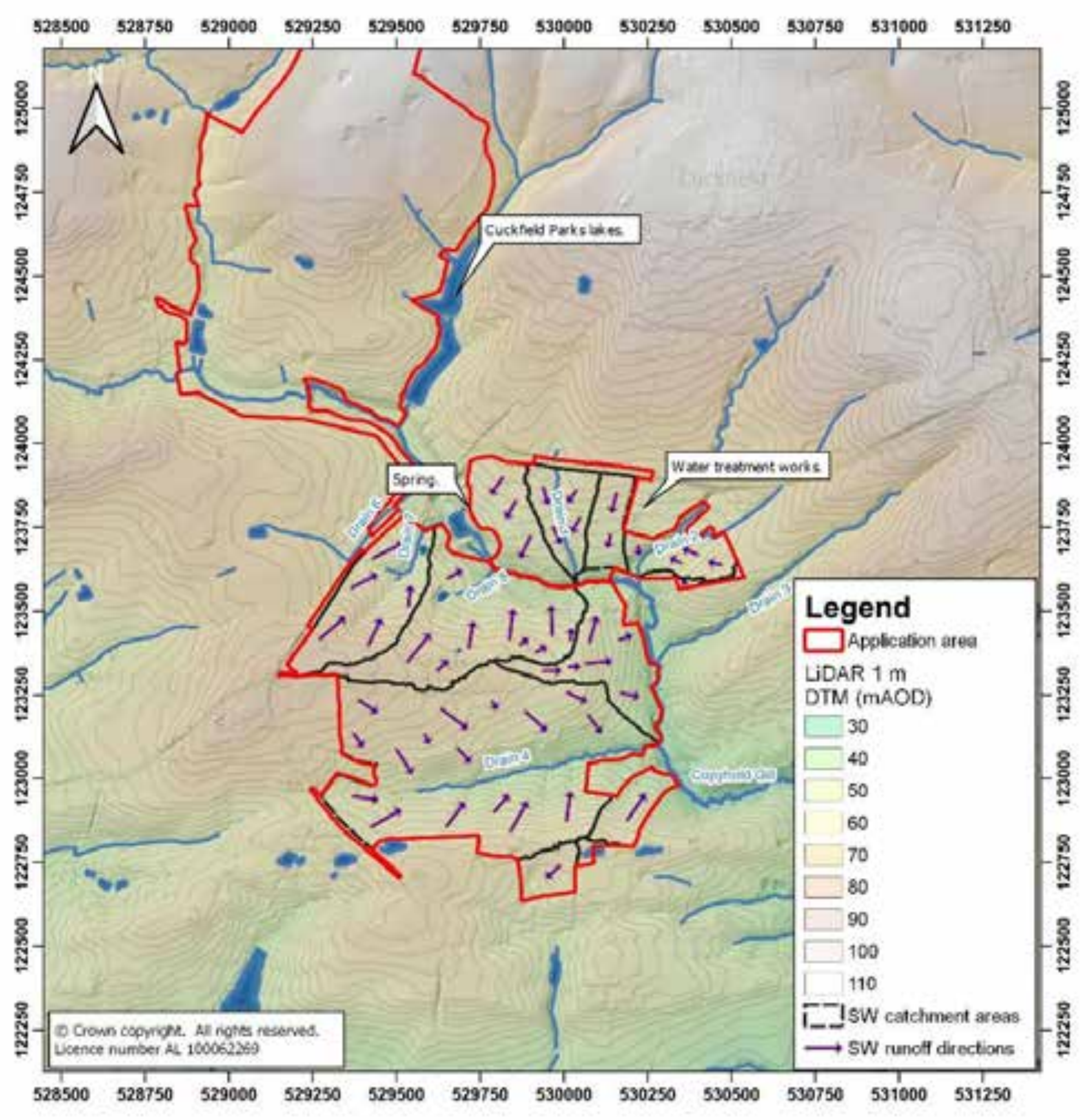
The Beechy Bottom Parkland Reserve area to the north is a mixture of mature woodland and fields and Copyhold Gill flows eastwards through the southern end of this area. The Site and the Beechy Bottom Parkland Reserve are separated by the A272.

2.2. Topography

Topographical data (from LiDAR) is provided in Figure 2-3. 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 2-3 Site topography and current runoff regime in development area



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2.3. Site visit and data collection

Site visits were undertaken by Yellow Sub Geo Ltd 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

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 2-4 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 2-4). 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.

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 2-3) for the purposes of this assessment, to avoid confusion.

The Copyhold Gill (see photos in Figure 2-5) is constrained in a steep-sided valley at this location, as is also evident from the fluvial flood risk data presented later.

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 2-3 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 in Figure 2-6 of the on-Site drains and surface water flowpaths. These are incorporated into the Outline SuDS scheme presented in Section 7 which aims to preserve the pre-existing flowpaths and surface water features.

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.

Figure 2-4 Superficial deposits and bedrock (1:50,000)

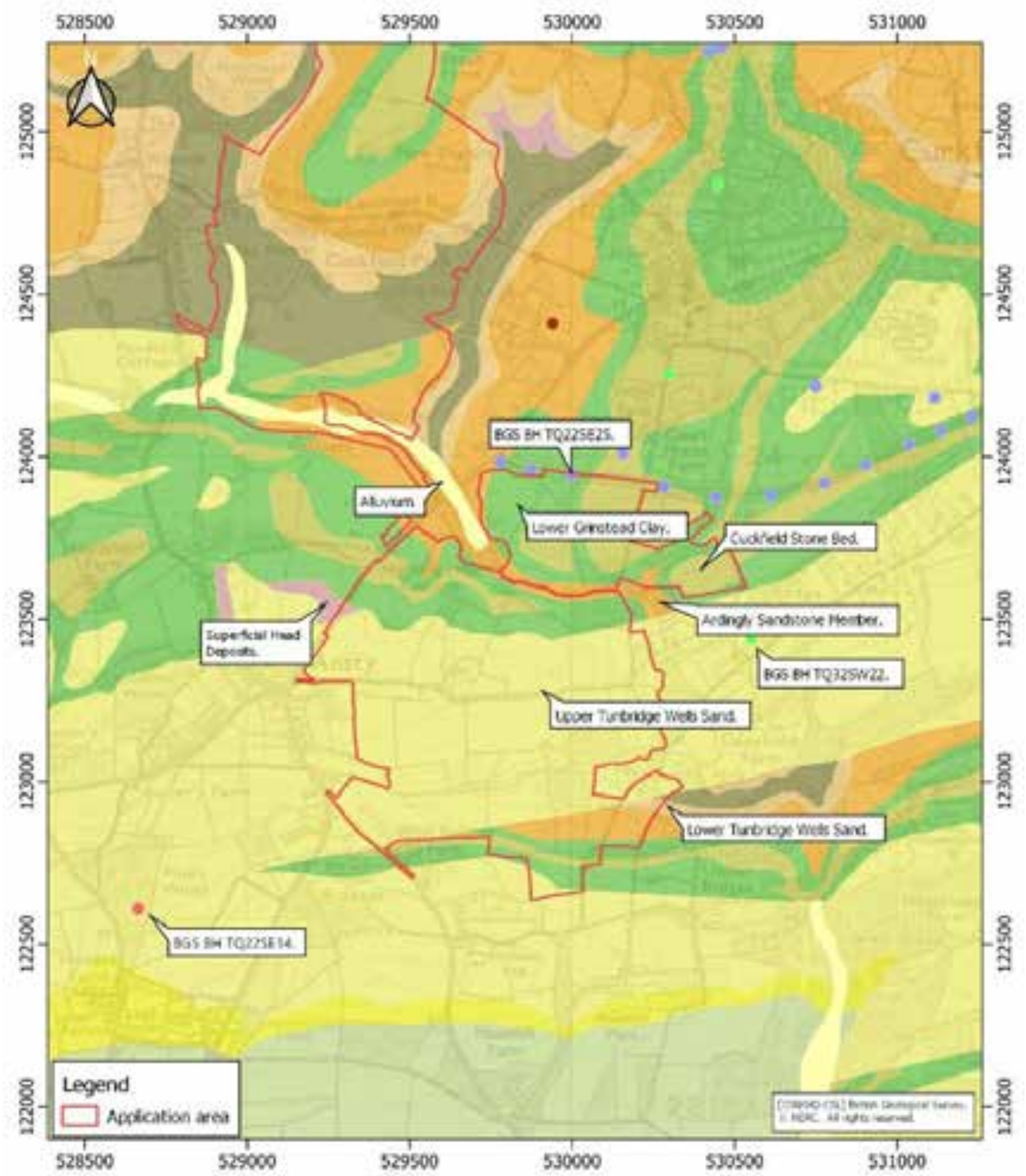

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Figure 2-5 Site photos collected March 2023. Clockwise from top left: Ground cover in centre of the Site, surface water ponding on-site, on-site pond; Copyhold Gill

Figure 2-6 (Left) Drain 1 in the north (right) Drain 8

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 Reserve

Beechy Bottom Parkland Reserve occupies approximately 87Ha of land to the north-west of the Site, to the west of Cuckfield and north of Ansty. It comprises approximately 80Ha of agricultural land 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.

As noted in Section 1.2 Beechy Bottom Parkland Reserve is covered separately and is not discussed further herein.

4. Flood risk to the proposed development

4.1. Fluvial and tidal

The EA Flood Map for Planning for the Site area is presented in Figure 4-1. The definitions of each flood zone are presented within Table 4-1.

The Site is principally located within Flood Zone 1. Part of the Site, along the boundary adjacent to Copyhold Gill, is classed as within Flood Zone 2 and 3 and the course of Drain 4 is also classified as within Flood Zone 2; these areas do not include any of the proposed development areas.

Figure 4-1 Flood map for planning

Contains Open Street Map data © OpenStreetMap

Table 4-1 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). Mid Sussex Level 1 SFRA defines this as having a 1 in 20 or greater annual probability of flooding.

Source: Environment Agency: Flood risk and coastal change guidance, accessed 07/11/2023

4.1.1. Fluvial flood model data

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

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 **Error! Reference source not found.** and Figure 4-3 for the present day and with climate change scenarios respectively. 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.

There are no identified critical drainage areas (CDA) within proximity of the Site according to the SFRA (Mid Sussex District Council, 2024).

Figure 4-2 Surface water flood risk zones (current)

Contains Open Street Map data © OpenStreetMap

Figure 4-3 Surface water flood risk zones (2040 to 2060 epoch)

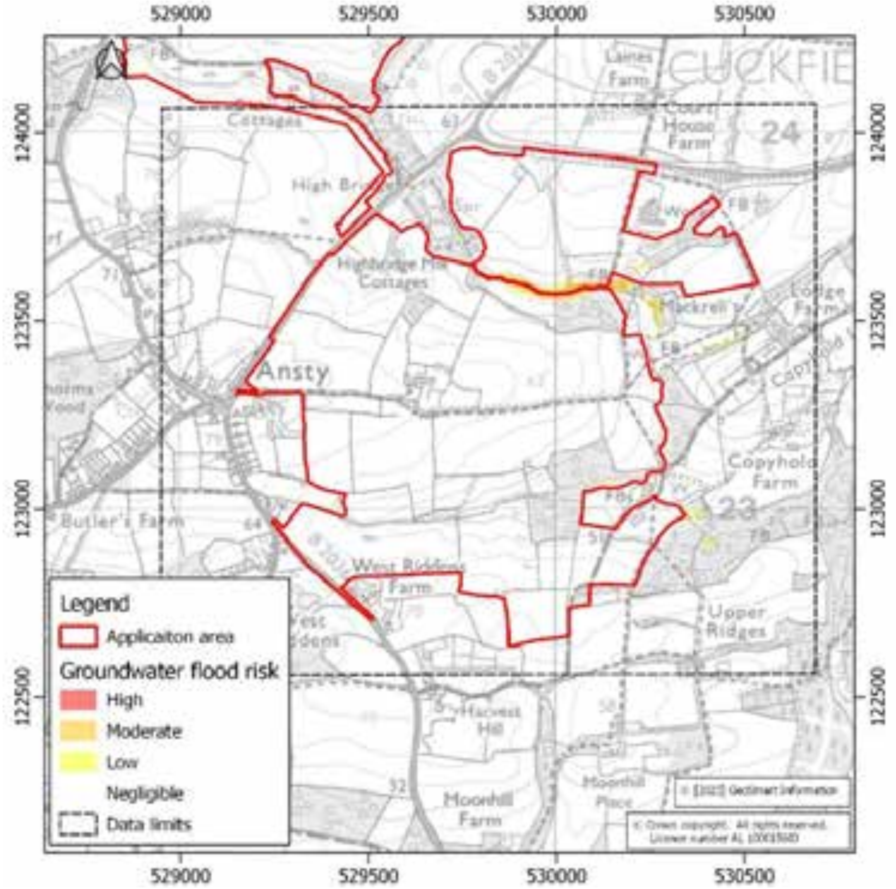
Contains Open Street Map data © OpenStreetMap

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. 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 4-4 Flood Risk from Groundwater Ambiental Risk Analytics)



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, however there have been 11 incidents reported over the last 10 years in post code district RH17 5, which includes Ansty and Cuckfield. Burgess Hill is also noted as having previously experienced regular sewer flooding (Mid Sussex District Council, 2024).

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.

4.7. Historical 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 National Planning Policy Framework requires that "the sequential test is used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potential vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future".

The Planning Practice Guidance note on Flood risk and coastal change provides a Flood risk vulnerability and flood zone 'incompatibility' table (see Table 5-1) indicating where proposed development should be allowed with respect to the fluvial and tidal flood zones. The Site is mostly located within Flood Zone 1 with the developable area entirely in Flood Zone 1 (see Figure 4-1), and therefore should be acceptable for all types of development without the requirement of an Exception test. This assessment however only accounts for the fluvial and tidal flood risk to the Site, and not the surface water flood risk which is known to exist across the Site.

Table 5-1 Flood risk vulnerability and Flood Zone compatibility

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	Exception test required	✓	×	×	×

Source: PPG for Flood Risk and Coastal Change

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.

For the Site, all development is located within Flood Zone 1. Areas at high risk of surface flooding are predominantly confined to existing woodland areas and areas of soft landscaping. The remaining areas at risk of surface water flooding are likely to change as the Site is re-profiled, particularly due to their drainage catchment being entirely, or almost entirely contained within the Site boundary, and due to runoff being collected by the proposed Sustainable Urban Drainage Scheme for the Site (detailed below).

As the Site as a whole includes areas within Flood Zone 3 and surface water flow paths, a Sequential Test has been completed (ref: P25035_R1, May 2025).

5.2. Flood risk from the proposed development

The 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:

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); and,

Runoff for extreme events should be managed on-site. This requires:

- The peak rate of stormwater run-off to be limited.
- The volume of run-off to be limited.
- The pollution load to receiving waters from stormwater runoff to be minimised.
- The assessment of overland flows and temporary flood storage across the Site.

A Sustainable Drainage Strategy will be drafted for the Site, which is designed in such a way as to prevent an 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.

In particular the Sustainable Drainage Strategy references the surface water flow paths crossing the Site, and how that will be captured and incorporated into the drainage design to reduce flood risk to the Site and from the Site.

6. Flood risk mitigation measures

6.1. 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 6.2 to 6.5 below.

6.2. 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.

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).

6.3. 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.

6.4. No impediments to flood water flows

An overland flowpath is noted in the north-western part of the Site (along drains 6 and 7). These drain an area to the west of the Site to Copyhold Gill through an area of woodland. This will be retained post-development, and does not extend over the proposed development footprint. There is a s smaller 'low risk' flow path draining southwest to northeast in the same area, and joining drain 7 within the wooded area, which does overlap the proposed development footprint. This flow path 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.

6.5. No increase in the volume and rate of surface water runoff

The Sustainable Drainage Strategy discussed in Section 7 would ensure that runoff rates and volumes are not increased as a result of the proposed development.

7. Outline Sustainable Drainage (SuDS) Strategy

7.1. 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);

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 7-1.

Table 7-1 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 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).

7.2. 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 7-2.

Table 7-2 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).

7.3. 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 7-3.

Table 7-3 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.

7.4. Runoff destination and proposed SuDS design

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

Southern Water asset location plans (see 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 7-1). The impermeable surface area within each catchment has been estimated based on the housing density in each development zone (see Table 7-4). The final impermeable areas used in the calculations are included in Table 7-5 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 5 for the respective catchment areas. This value was used to set the flow control limits from the principle SuDS features

Figure 7-1 Catchment areas and proposed SuDS features

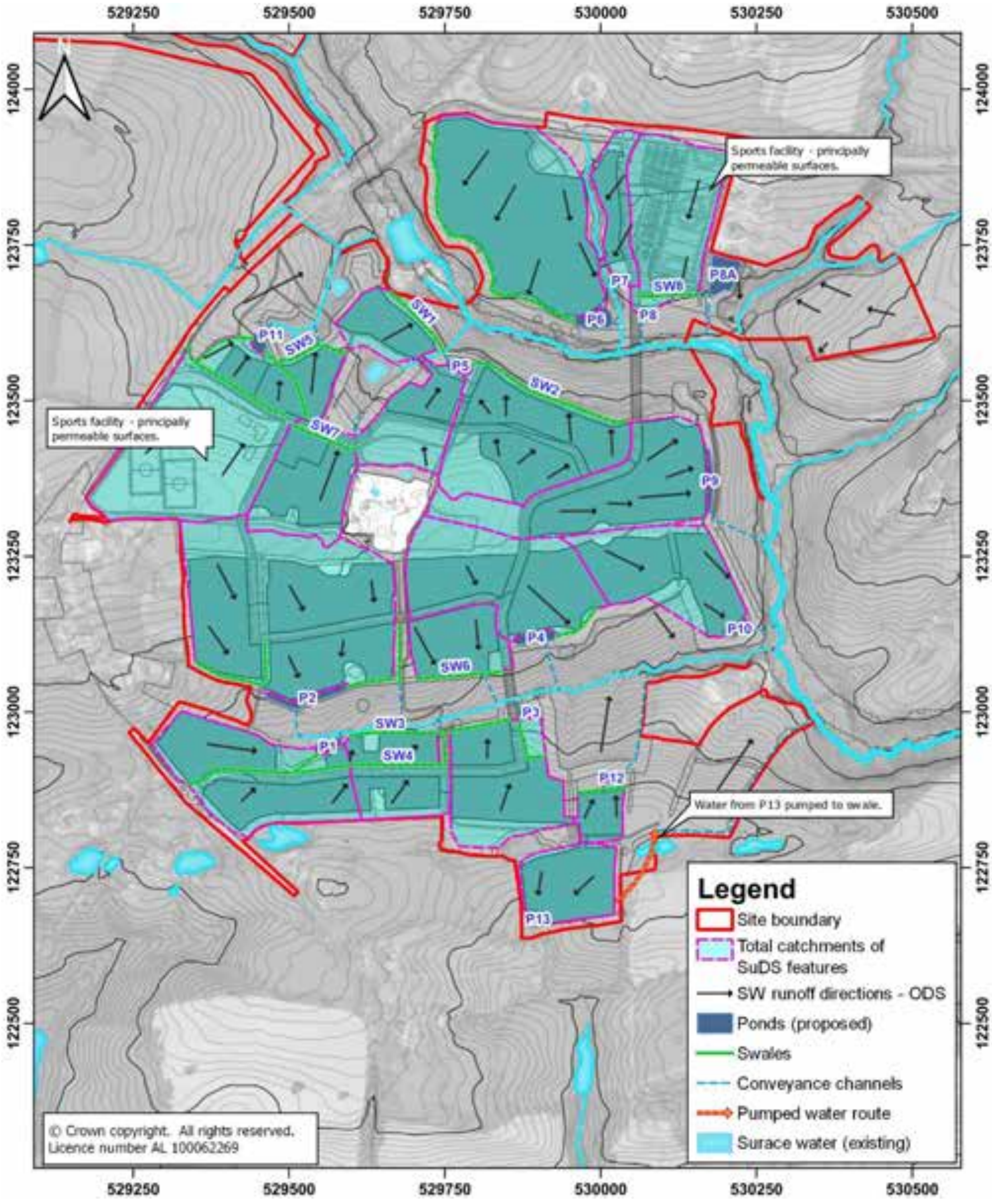


Table 7-4 Impermeable areas assumed for development areas

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

Table 7-5 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 Q1 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	

SuDS feature	Total catchment area (ha.)	Development area (ha.)	Mean density (DPH)	% impermeable	Imp. area (ha.)	Peak Q1 flow rate (l/s)	Notes
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.
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.

7.5. Performance 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 7-6 below.

Table 7-6 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.

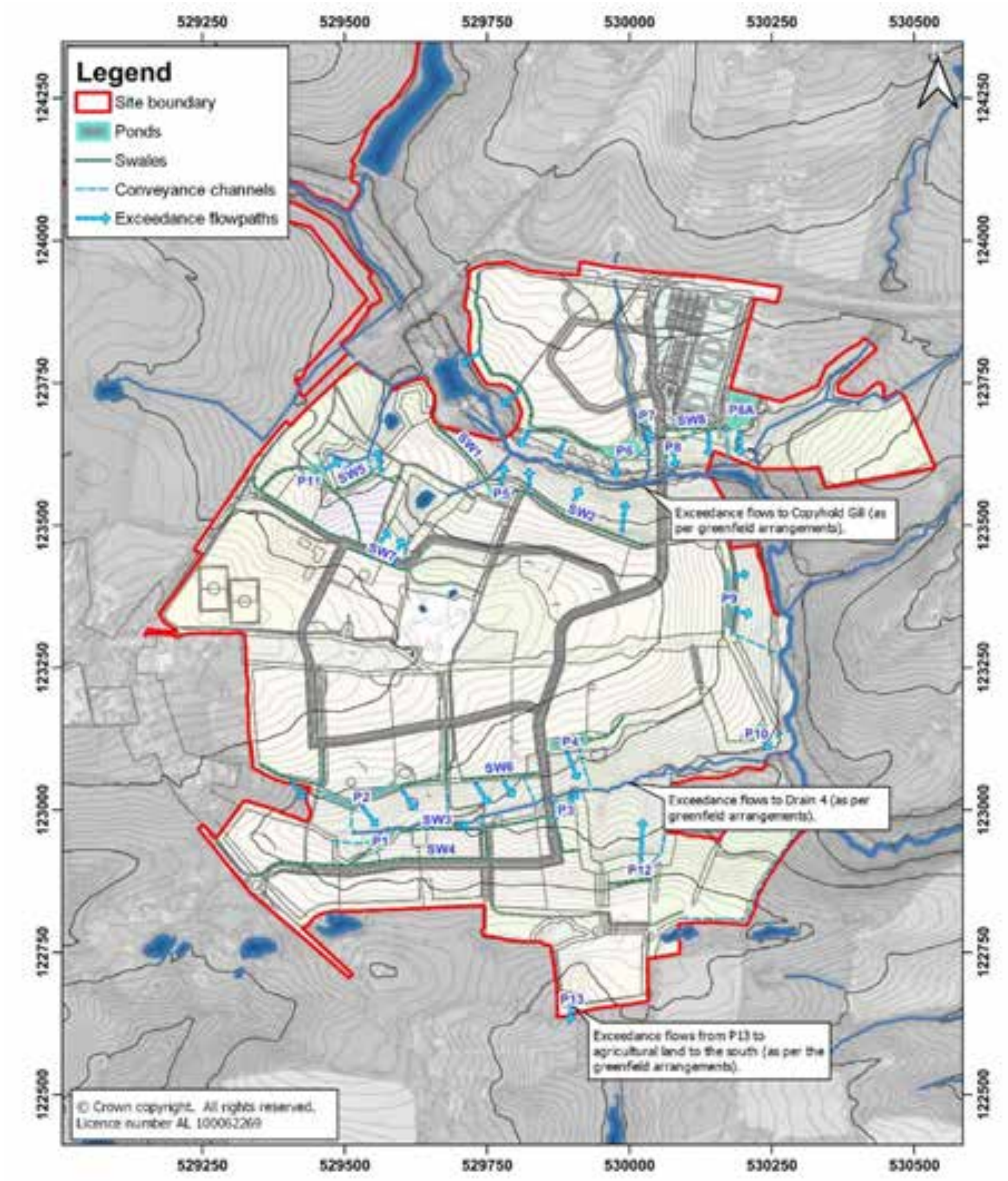
Appendix G contains the output from the drainage simulations. This confirms that, based on the parameters described above, the proposed drainage scheme will be able to attenuate and discharge all runoff generated during the 1 in 30 year storm event with a 40% allowance for climate change. Flooding of many of the features is expected under the extreme 1 in 100 year +45% scenario. Details of exceedance flows is provided in Section 7.6. 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.

7.6. 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 7-2. A more detailed analysis of exceedance flows can be undertaken once the drainage network has been finalised and modelled.

Figure 7-2 Exceedance flow routes from SuDS features



7.7. 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 7-7).

Table 7-7 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 7-8, 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 7-8 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).

7.8. 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 7-9 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 7-9 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.

7.9. 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.

7.10. 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.

8. Conclusions

The Site is primarily within Flood Zone 1, with a linear area of Zone 3 present along Copyhold Gill in the north of the Site and Drain 4 in the south of the Site. 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.

9. References

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West Sussex County Council. (2018). West Sussex LLFA Policy for the Management of Surface Water.

Appendix A Report conditions

Report Conditions

This report has been prepared by Aqua Terra Consultants Ltd. (Aqua Terra) 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 Aqua Terra 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, taking account of the terms of reference agreed with the client. The findings are based on the information made available to Aqua Terra 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. Aqua Terra 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. Aqua Terra 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, Aqua Terra may, by prior written agreement, agree to such release, if it is acknowledged that Aqua Terra accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. Aqua Terra 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 Aqua Terra except as expressly agreed with Aqua Terra in writing. Aqua Terra reserves the right to withhold and/ or negotiate the transference of reliance on this report, subject to legal and commercial review.

Appendix B Topographical survey

Surveyed by: S Smith / N Mills

Plotted by: S Brown

Drawn by: Acad

Legend

ACU	Air Conditioning Unit
AV	Air Valve
BC	Barrier Control
BOL	Bollard
BTB	British Telecom Junction Box
BTMH	British Telecom Manhole
CL	Cover Level
CTV	Cable TV
ELCP	Electricity Cable Pit
EM	Electricity Cable Marker
EP	Electricity Pole
ER	Earth Rod
FH	Fire Hydrant
FP	Flag Pole
G	Gully
GV	Gas Valve
IB	Illuminated Bollard
IL	Invert Level
JB	Junction Box
LB	Letter Box
LC	Lamp Column
MH	Manhole
MRK	Concrete Marker
O/F	Outfall
PM	Parking Meter
RE	Rodding Eye
RWP	Rainwater Pipe
SC	Stop Cock
SP	Sign Post
SV	Sluice Valve
TCB	Telephone Kiosk
TL	Traffic Light
TLC	Traffic Light Cover
TM	Ticket Machine
TP	Telegraph Pole
UTR	Unable To Raise
UTS	Unable To Survey
VC	Vent Column
WM	Water Meter
WO	Wash Out
WWP	Waste Water Pipe

Data

i) Trees shown thus 9/6/200 indicates Ht. in metres/Span. dia in metres Trunk dia. in millimetres

ii) Trees shown thus 9/6x6/200 indicates Ht. in metres/Span. dia in metres Trunk dia. in millimetres

iii) Grid : Metric and oriented to north

iv) Levels : Metric and based on OS GPS DATA

Situated on Survey station 2

Value: 62.297m

N

Client

FAIRFAX

Site

ANSTY FARM
ANSTY

Marvin & Partners
Limited

Plestor House
Farnham Road
West Liss
Hampshire GU33 6JQ

Tel : 01428 751888
Email: paul@maplimited.com

Date	SEPT 2018
Scale	1/200 @ A0
Dwg/Job No.	18/5151
Checked By	

Appendix C Site development plans

J:\D3012 LAND AT ANSTY, HAYWARDS HEATH\DRAWINGS\07 FABRIK\02 PHOTOSHOP\B EXPORTED IMAGES

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

10	Site boundary updated to incorporate new access	ID	21.05.25
09	Updated western access location	ID	20.05.25
08	Updated footpaths	ID	17.10.23
07	Updated footpaths	ID	13.10.23
06	Updated accesses and minor amends	ID	04.10.23
05	Parkland reserve in blue boundary	ID	06.09.23
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	05.04.23
01	Update to street widths and layout	ID	31.03.23
REV.	DESCRIPTION	APP.	DATE

fabrik

PROJECT TITLE

LAND AT ANSTY, HAYWARDS HEATH

DRAWING TITLE

CONCEPT MASTERPLAN

ISSUED BY London T: 020 7620 1453

DATE MAY 2025 **DRAWN** SD
SCALE@A0 1:2,500 **CHECKED** ID
STATUS FINAL **APPROVED** BS

DWG. NO. D3012-FAB-00-XX-DR-Y-009

Notes:
1. This drawing is the property of fabrik ltd. It must not be copied or reproduced without written consent.
2. Only figured dimensions are to be taken from this drawing. All contractors must visit site and be responsible for taking and checking all dimensions related to the works shown on this drawing.

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

Table of Contents

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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.

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.

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.

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.

Drawings

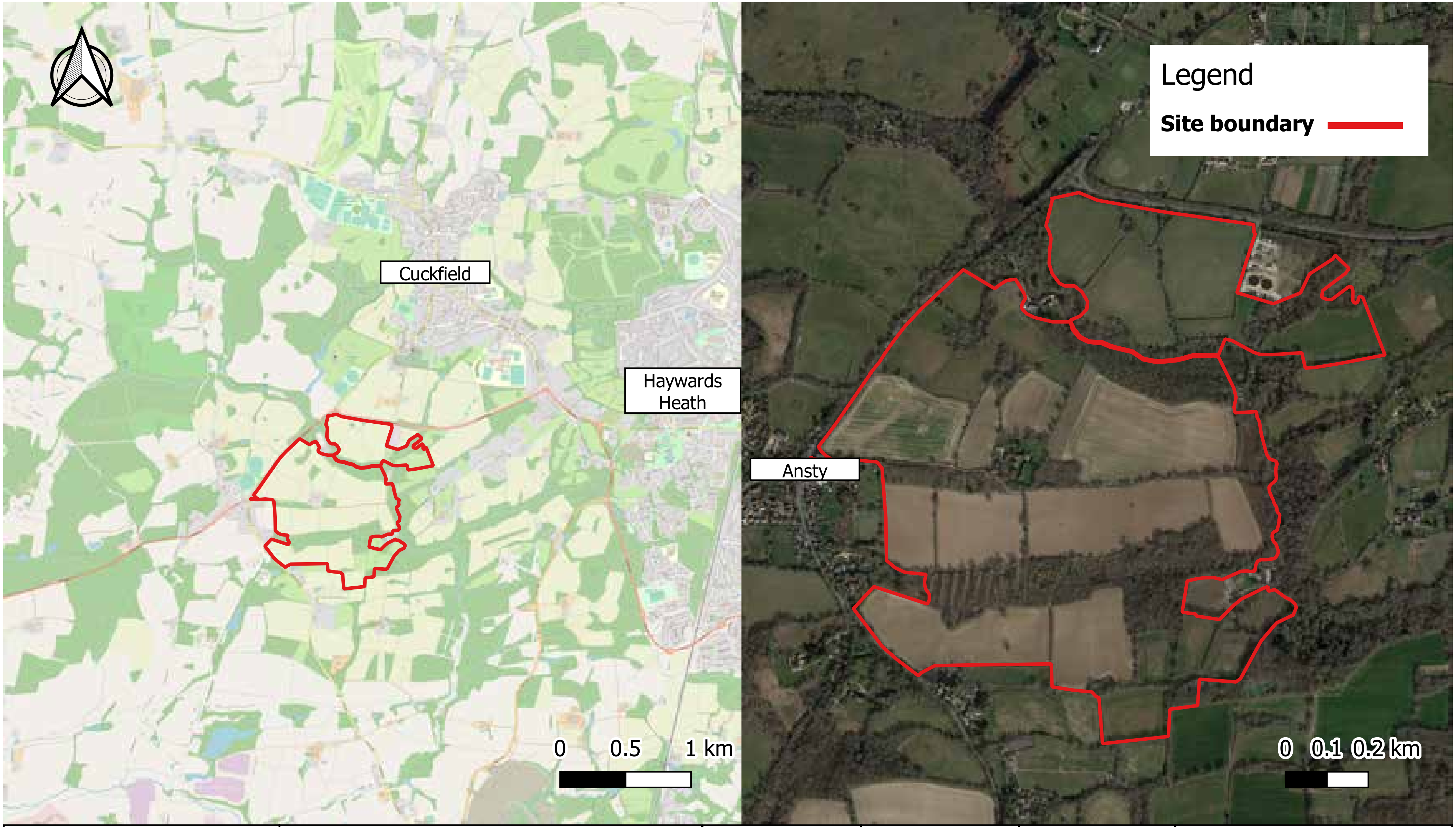

Figure Title	Site location, Ansty Farm
Client	Fairfax Properties Ltd
Drawing Number	P21367_R4_D01
Project Number	21367
Date	24/10/2022
Scale	NTS
Original	A4
Drawn	RLW
Checked	JEM
	Revision 1
	Ansty Farm, Mid Sussex

YELLOW SUB GEO

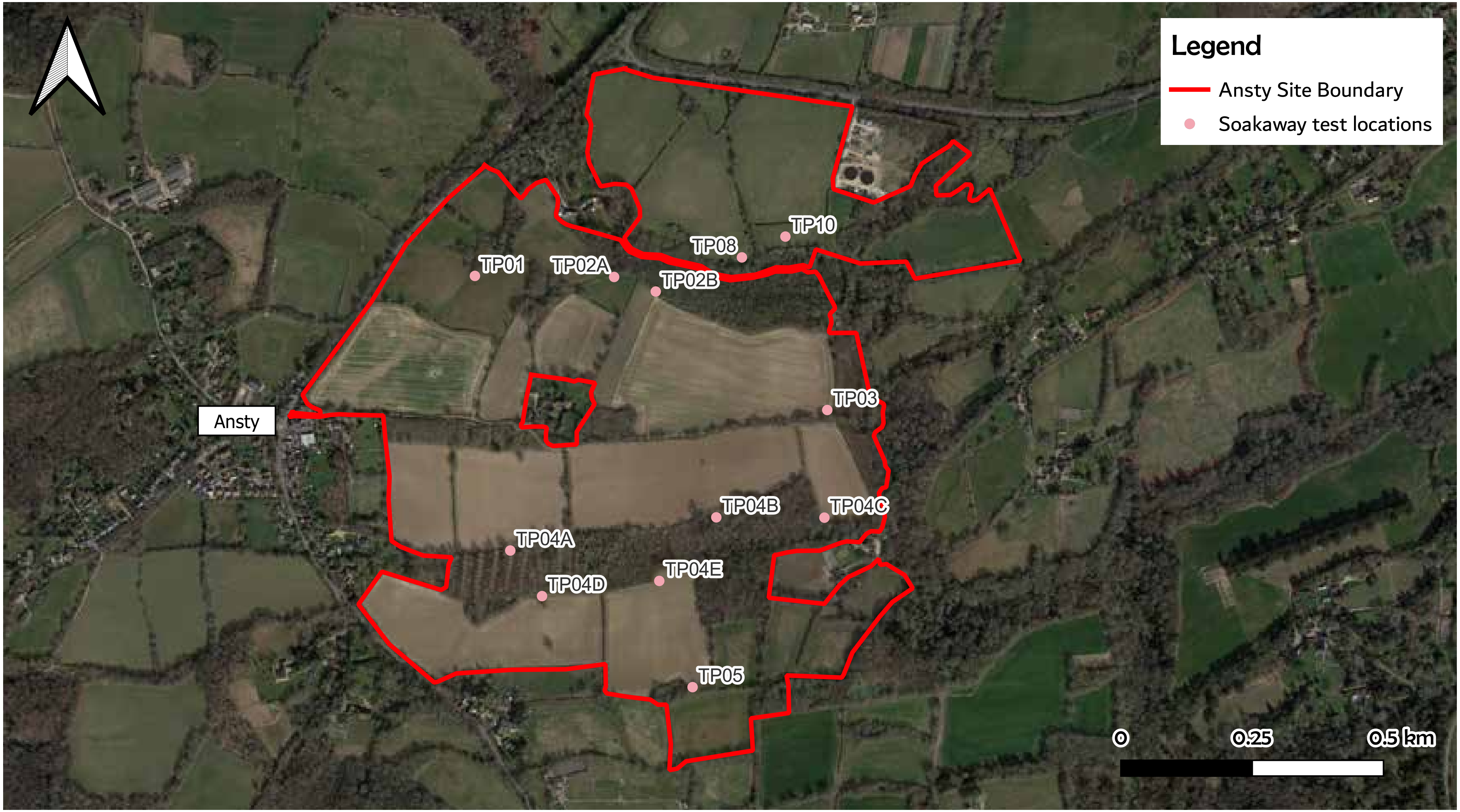

Figure Title

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**

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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, 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, if 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 Service Plans

Appendix C : Engineering Logs

Trial Pit Log

TP01
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 27/6/23 - 27/6/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.6 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
▨		0.40	▨	TOPSOIL: Grass over brown sandy CLAY. Sand is fine to medium. Abundant roots and rootlets		
▨		2.80	▩	Brown mottled light grey and orange sandy gravelly CLAY. Gravel is medium to coarse sub-angular of iron rich calcareous sandstone concretions	@ 1.5m becoming cobbly of iron rich concretions up to 15cm long axis @ 2.4 becoming very gravelly	0.5 1.0 1.5 2.0 2.5
						3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 3m bgl whereupon soakaway testing was performed. Position backfilled with arisings.

Trial Pit Log

TP02A
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 27/6/23 - 27/6/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 2 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
▨		0.50	▨	TOPSOIL: Grass over brown slightly sandy slightly gravelly CLAY sand is fine to medium gravel is coarse sub-angular to angular of sandstone		
▨		2.50	▤	Brown mottled orange slightly gravelly CLAY gravel is medium to coarse sub-angular of sandstone	@1.0m low cobble content of sandstone @ 1.6m becoming blue grey mottled brown @ 2.0m occasional rootlets, dead decaying	

Position cleared with CAT and progressed to 3m bgl whereupon soakaway testing was performed. Position backfilled with arisings.

YELLOW SUB GEO

Trial Pit Log

TP02B
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 27/6/23 - 27/6/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 2 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
		0.35		TOPSOIL: Grass over brown sandy CLAY sand is fine		
		1.10		Yellowish brown mottled light blue grey CLAY		
		2.90		Blue grey mottle orange and ochre sandy, gravelly CLAY with medium cobble content. Gravel is fine to coarse sub-angular of sandstone, sand is fine to coarse		

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

Position cleared with CAT and progressed to 3m bgl whereupon soakaway testing was performed. Position backfilled with arisings.

Trial Pit Log

TP03
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 27/6/23 - 27/6/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.6 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
▨		0.40	▨	TOPSOIL: Grass over brown slightly sandy CLAY. Sand is fine to medium. Abundant rootlets		
		1.50	▤	Orangeish brown slightly sandy CLAY sand is fine		0.5 1.0 1.5
		2.50	⁘	Yellowish brown occasionally brown slightly clayey slightly gravelly fine to medium SAND with a low cobble content up to 10cm long axis of lithic fragments. Gravel is fine to coarse sub-angular of lithic fragments of sandstone	@2.0m becoming very gravelly with a high cobble content	2.0 2.5
						3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 3m bgl whereupon soakaway testing was performed. Position backfilled with arisings.

Trial Pit Log

TP04A
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 28/06/23 - 28/06/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.9 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
		0.45		TOPSOIL: Grass over orangeish brown very sandy CLAY sand is fine to medium		
		1.50		Light brown mottled grey slightly sandy and slightly gravelly CLAY sand is fine to coarse gravel is fine to coarse sub-angular of iron rich concretions	@1.5m becoming gravelly	0.5 1.0
		1.60		Yellow medium grained SANDSTONE recovered as yellow orange gravelly sand		1.5
						2.0 2.5 3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 1.6m bgl position terminated on bedrock whereupon soakaway testing was performed. Position backfilled with arisings.

YELLOW SUB GEO

Trial Pit Log

TP04B
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 28/06/23 - 28/06/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.7 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
		0.15		TOPSOIL: Grass over orangeish brown very sandy CLAY sand is fine to medium		
		0.75		Reddish brown slightly sandy CLAY sand is fine to medium		0.5
		2.40		Yellow, grey and orange clayey fine to medium predominantly fine SAND. Occasional pockets of (<10cm) of very sandy clay		1.0 1.5 2.0
						2.5 3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 2.4m bgl position whereupon soakaway testing was performed. Position backfilled with arisings.

Trial Pit Log

TP04C
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 28/06/23 - 28/06/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.8 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
△		0.15	▨	TOPSOIL: Grass over orangeish brown very sandy CLAY sand is fine to medium		
△		2.50	▤	Orange mottled grey slightly sandy CLAY sand is fine to medium		0.5 1.0 1.5 2.0 2.5
						3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 2.5m bgl position whereupon soakaway testing was performed. Position backfilled with arisings.

Trial Pit Log

TP04D
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 28/06/23 - 28/06/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.9 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
▨		0.40	▩	TOPSOIL: Grass over brown slightly sandy slightly gravelly CLAY sand is fine to medium gravel is coarse sub-angular to angular of sandstone		
▨		2.70	▤	Orangeish brown mottled light grey CLAY rare coarse gravel sized iron rich concretions		0.5 1.0 1.5 2.0 2.5
						3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 2.7m bgl position whereupon soakaway testing was performed. Position backfilled with arisings.

YELLOW SUB GEO

Trial Pit Log

TP04E
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP Logged By: JRB Dates: 29/06/23 - 29/06/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.9 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
△		0.40	▨	TOPSOIL: Grass over brown sandy CLAY sand is fine		
△		2.50	▤	Light brownish orange mottled light blue grey CLAY friable		0.5 1.0 1.5 2.0
						2.5 3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 2.5m bgl position whereupon soakaway testing was performed. Position backfilled with arisings.

Trial Pit Log

TP05
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP   Logged By: JRB   Dates: 29/06/23 - 29/06/23
Client: Fairfax Acquisitions Ltd   Consultant: JRB
Plant Used: Wheeled Excavator   Length: 1.2   Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
		0.10		TOPSOIL: Grass over orangeish brown very sandy CLAY sand is fine to medium abundant rootlets		
		1.20		Reddish brown slightly sandy CLAY with rare pockets <15cm of fine gravel of sub-angular sandstone		0.5 1.0
		1.90		Grey very clayey sandy fine to coarse angular GRAVEL of sandstone sand is fine to coarse		1.5
						2.0 2.5 3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 1.9m bgl position whereupon soakaway testing was performed. Position backfilled with arisings.

Trial Pit Log

TP08
Page 1 of 1

Project Name: Ansty Farm   Project No: P21367
Location: Haywards Heath, Sussex   Co-ords: -   Level:
Hole Type: TP   Logged By: JRB   Dates: 26/6/23 - 26/6/23
Client: Fairfax Acquisitions Ltd   Consultant: JRB
Plant Used: Wheeled Excavator   Length: 1.6   Width: 0.6

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
		0.10		TOPSOIL: Grass over yellowish brown sandy CLAY. Sand is fine to medium. Abundant rootlets		
		0.40		Light brown very clayey fine to medium SAND with occasional rootlets		0.5
		3.00		Brown mottled grey and orange CLAY occasional relic rootlet casts		1.0 1.5 2.0 2.5 3.0
						3.5 4.0 4.5

Position cleared with CAT and progressed to 3m bgl whereupon soakaway testing was performed. Position backfilled with arisings.

YELLOW SUB GEO

Trial Pit Log

TP10
Page 1 of 1

Project Name: Ansty Farm Project No: P21367
Location: Haywards Heath, Sussex Co-ords: - Level:
Hole Type: TP Logged By: JRB Dates: 26/6/23 - 26/6/23
Client: Fairfax Acquisitions Ltd Consultant: JRB
Plant Used: Wheeled Excavator Length: 1.5 Width: 0.5

Well	Water	Depth	Legend	Stratum Description	Detailed Description	Depth m
		0.15		TOPSOIL: Grass over brown sandy CLAY. Sand is fine to medium. Abundant rootlets		
		0.40		Light brown very clayey fine to medium SAND with occasional rootlets		0.5
		2.80		Brown mottled light grey and orange slightly gravelly CLAY. Gravel is medium to coarse sub-angular of iron rich calcareous concretions		1.0 1.5 2.0 2.5
						3.0 3.5 4.0 4.5

Position cleared with CAT and progressed to 3m bgl whereupon soakaway testing was performed. Position backfilled with arisings.

Appendix D: Infiltration test results

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP05	Test number:	1	Date of test:	29/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	1.9
Effective depth of Pit, D (1)	(m)	1.27
Length of Pit, L	(m)	1.9
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g (2)		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.60
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.60
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.00

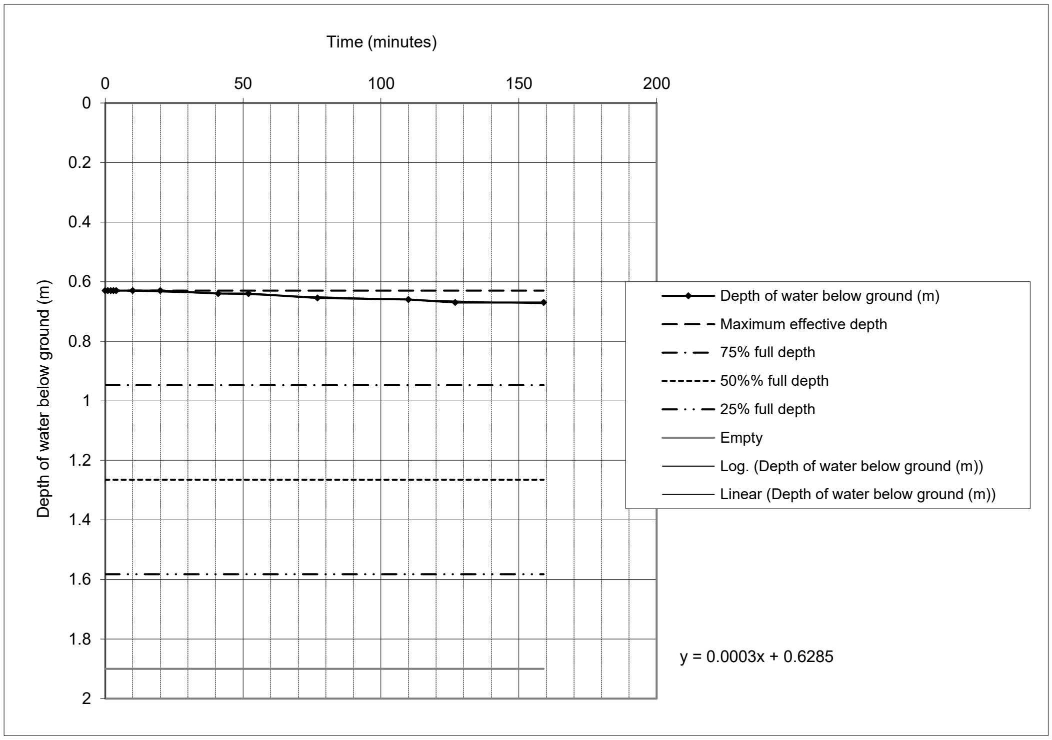
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.63
1	0.63
2	0.63
3	0.63
4	0.63
10	0.63
20	0.63
41	0.64
52	0.64
77	0.655
110	0.66
127	0.67
159	0.67



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.60}{4.00 \quad x \quad 0}$$

Soil infiltration rate, f	**=**	**Failed**	m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP04E	Test number:	1	Date of test:	28/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	1.5
Effective depth of Pit, D [(1)]	(m)	0.84
Length of Pit, L	(m)	1.9
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.40
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.40
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	2.97

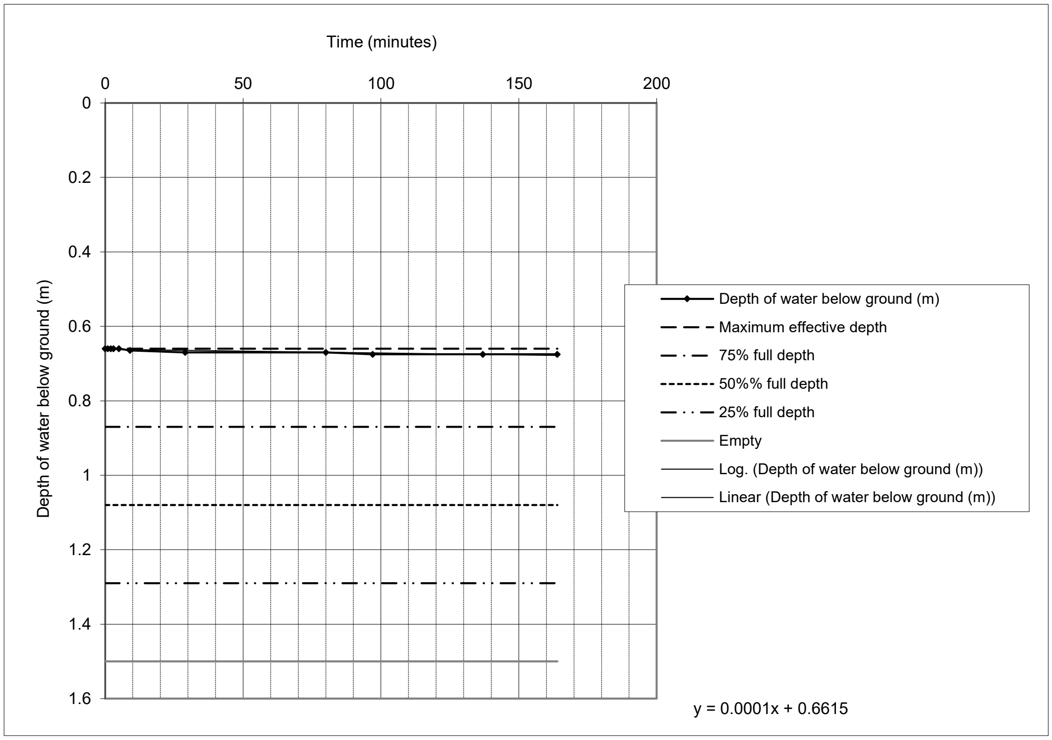
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.66
1	0.66
2	0.66
3	0.66
5	0.66
9	0.665
29	0.67
80	0.67
97	0.675
137	0.675
164	0.675



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.40}{2.97 \quad x \quad 0}$$

Soil infiltration rate, f = Failed m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP04D	Test number:	1	Date of test:	28/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.7
Effective depth of Pit, D [(1)]	(m)	2.01
Length of Pit, L	(m)	1.9
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.95
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.95
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	5.77

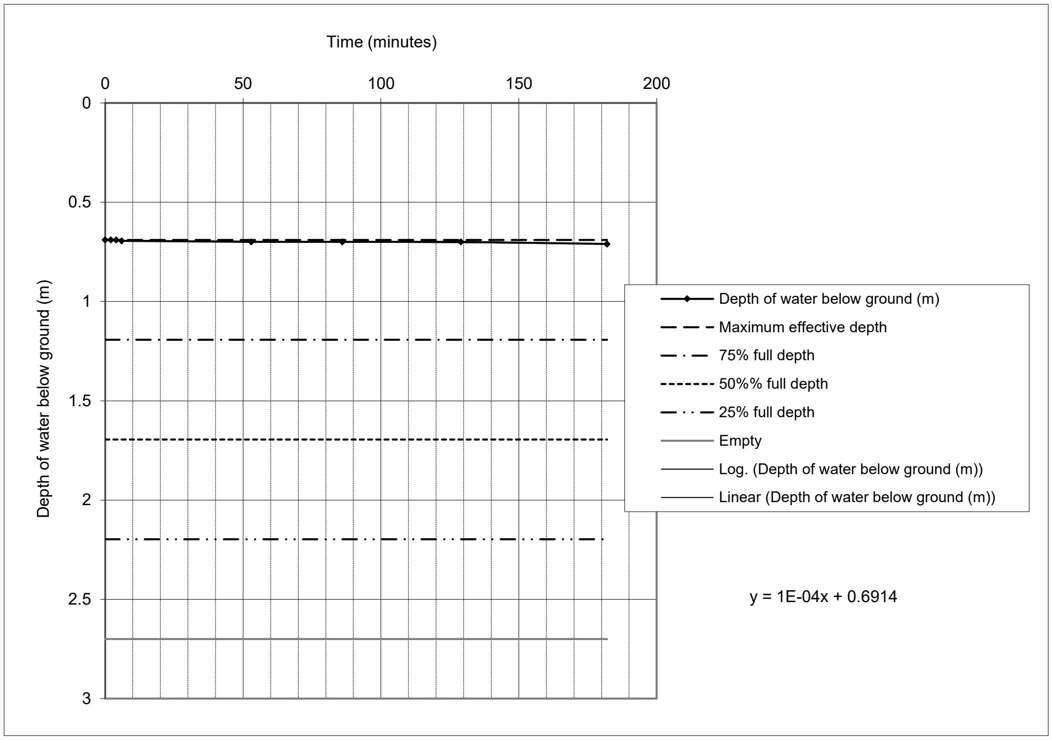
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.69
2	0.69
4	0.69
6	0.695
53	0.7
86	0.7
129	0.7
182	0.71



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.95}{5.77 \quad x \quad 0}$$

Soil infiltration rate, f = **Failed** m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	**1**	**of**	**1**

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP04C	Test number:	1	Date of test:	28/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.5
Effective depth of Pit, D [(1)]	(m)	1.76
Length of Pit, L	(m)	1.8
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.79
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.79
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.95

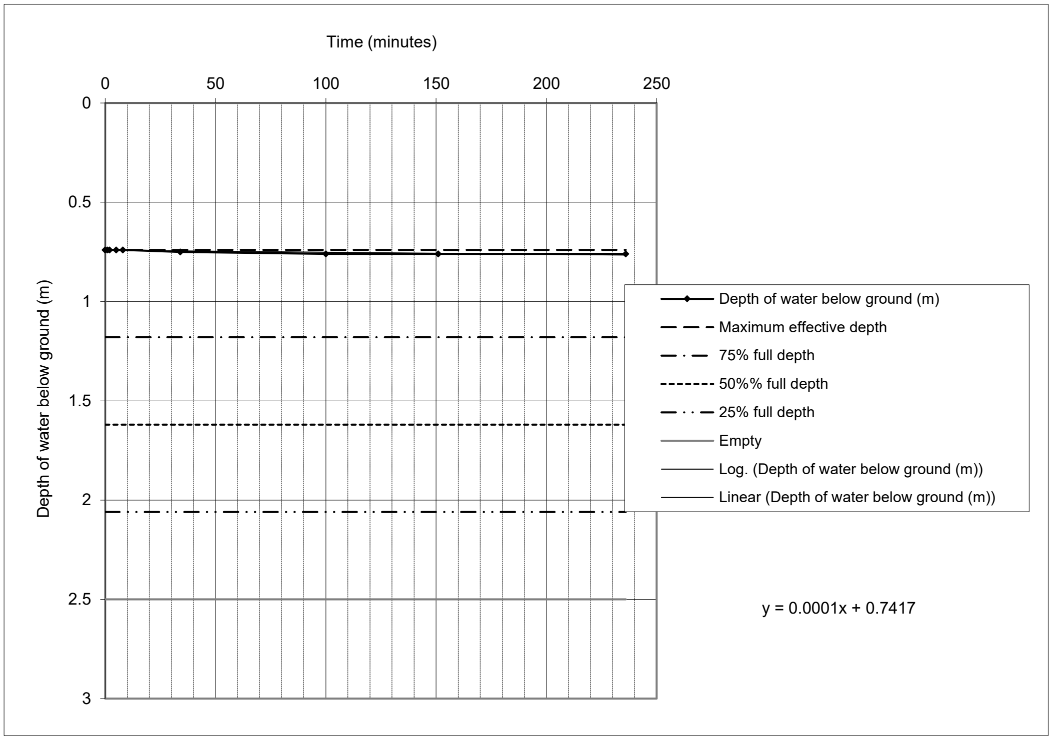
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.74
1	0.74
2	0.74
5	0.74
8	0.74
34	0.75
100	0.76
151	0.76
236	0.76



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.79}{4.95 \quad x \quad 0}$$

Soil infiltration rate, f **=** **Failed** m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP04B	Test number:	1	Date of test:	28/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.4
Effective depth of Pit, D [(1)]	(m)	1.68
Length of Pit, L	(m)	1.7
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.71
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.71
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.55

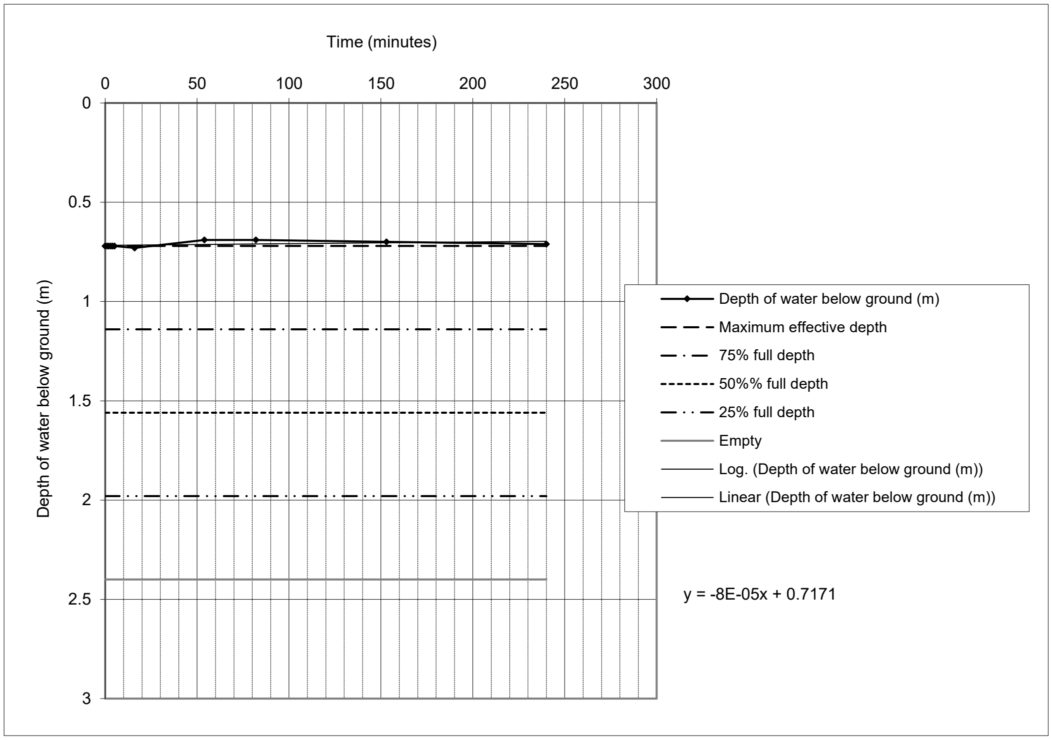
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.72
1	0.72
2	0.72
3	0.72
4	0.72
5	0.72
16	0.73
54	0.69
82	0.69
153	0.7
240	0.71



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.71}{4.55 \quad x \quad 0}$$

Soil infiltration rate, f = **Failed** m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

Sheet 1 of 1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP04A	Test number:	1	Date of test:	28/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	1.6
Effective depth of Pit, D (1)	(m)	1.04
Length of Pit, L	(m)	1.9
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g (2)		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.49
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.49
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	3.45

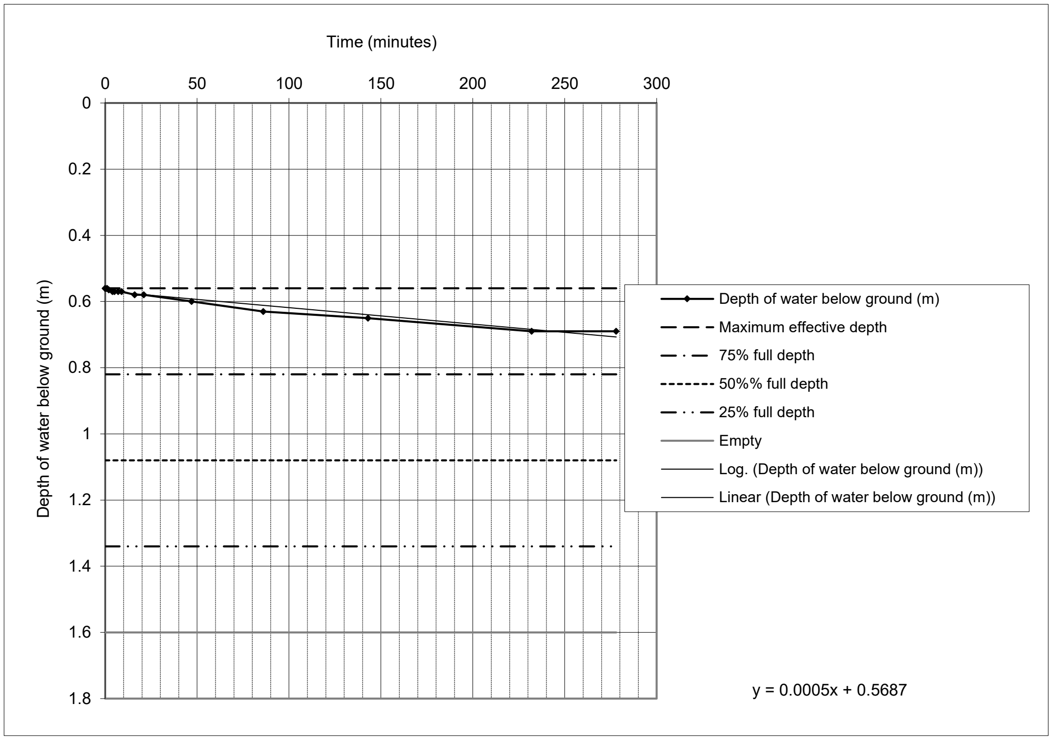
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.56
1	0.56
2	0.565
4	0.57
5	0.57
7	0.57
9	0.57
16	0.58
21	0.58
47	0.6
86	0.63
143	0.65
232	0.69
278	0.69



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.49}{3.45 \quad x \quad 0}$$

Soil infiltration rate, f = **Failed** m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP03	Test number:	1	Date of test:	27/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.5
Effective depth of Pit, D [(1)]	(m)	1.61
Length of Pit, L	(m)	1.6
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.64
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.64
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.18

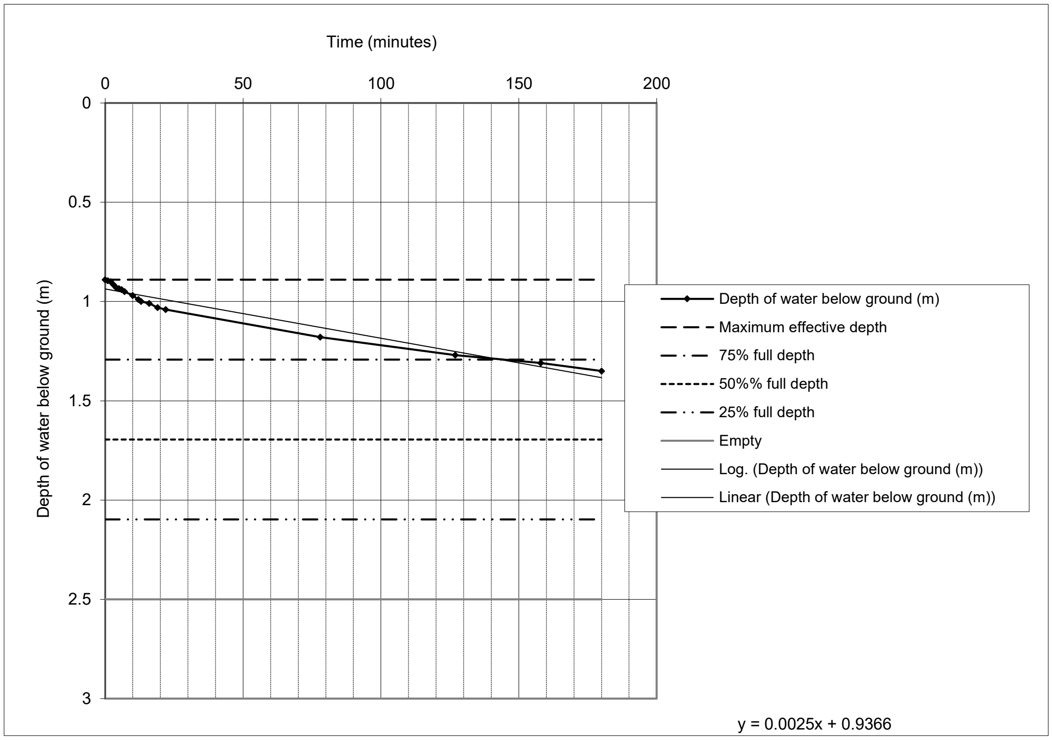
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.89
1	0.895
2	0.9
3	0.915
4	0.93
5	0.935
6	0.94
7	0.95
10	0.97
12	0.99
13	1
16	1.01
19	1.03
22	1.04
78	1.18
127	1.27
158	1.31
180	1.35



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.64}{4.18 \quad x \quad 0}$$

Soil infiltration rate, f **=** **Failed** m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP02B	Test number:	1	Date of test:	27/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.9
Effective depth of Pit, D (1)	(m)	2.06
Length of Pit, L	(m)	1.8
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g (2)		0

Notes:

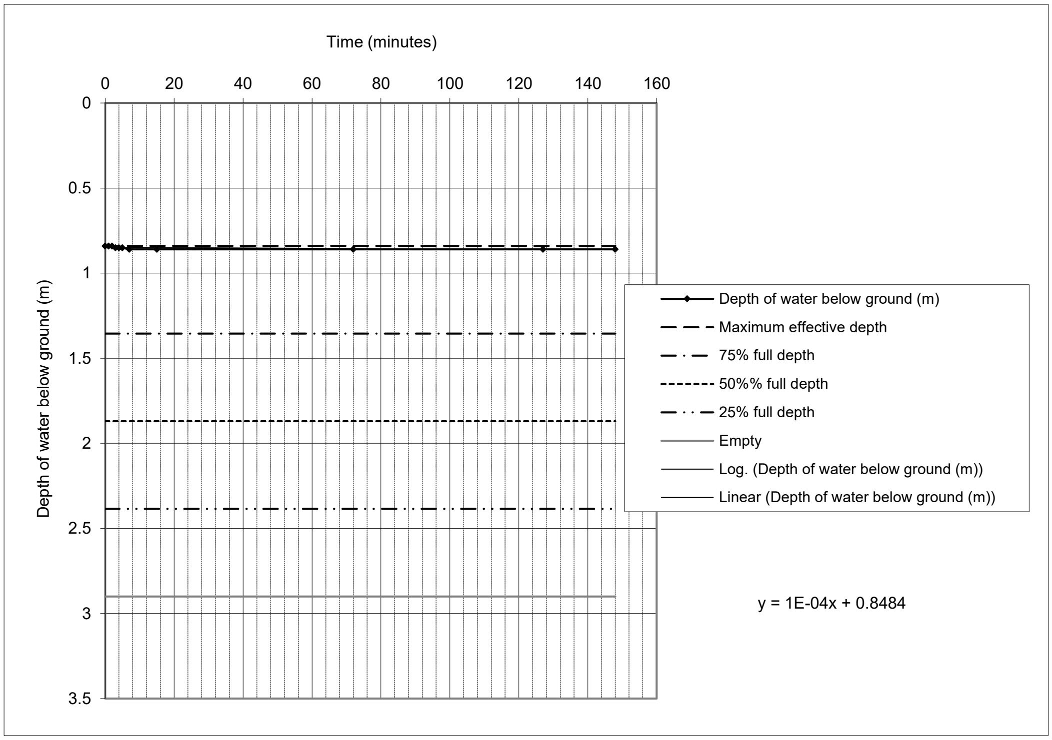
(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.93
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.93
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	5.64

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.84
1	0.84
2	0.84
3	0.85
4	0.85
5	0.85
7	0.86
15	0.86
72	0.86
127	0.86
148	0.86



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.93}{5.64 \quad x \quad 0}$$

Soil infiltration rate, f	**=**	**Failed**	m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	**1**	**of**	**1**

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP02A	Test number:	1	Date of test:	27/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.5
Effective depth of Pit, D [(1)]	(m)	1.3
Length of Pit, L	(m)	2
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.65
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.65
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.25

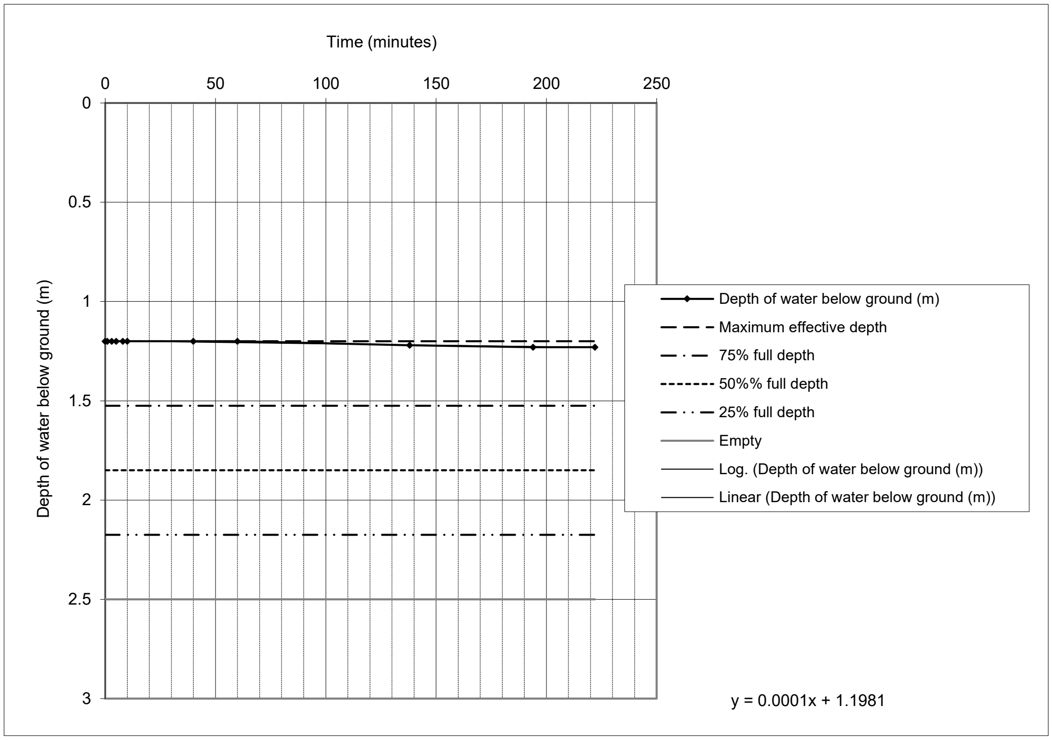
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	1.2
1	1.2
3	1.2
5	1.2
8	1.2
10	1.2
40	1.2
60	1.2
138	1.22
194	1.23
222	1.23



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.65}{4.25 \quad x \quad 0}$$

Soil infiltration rate, f	**=**	**Failed**	m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP01	Test number:	1	Date of test:	27/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.8
Effective depth of Pit, D [(1)]	(m)	1.67
Length of Pit, L	(m)	1.6
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.67
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.67
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.31

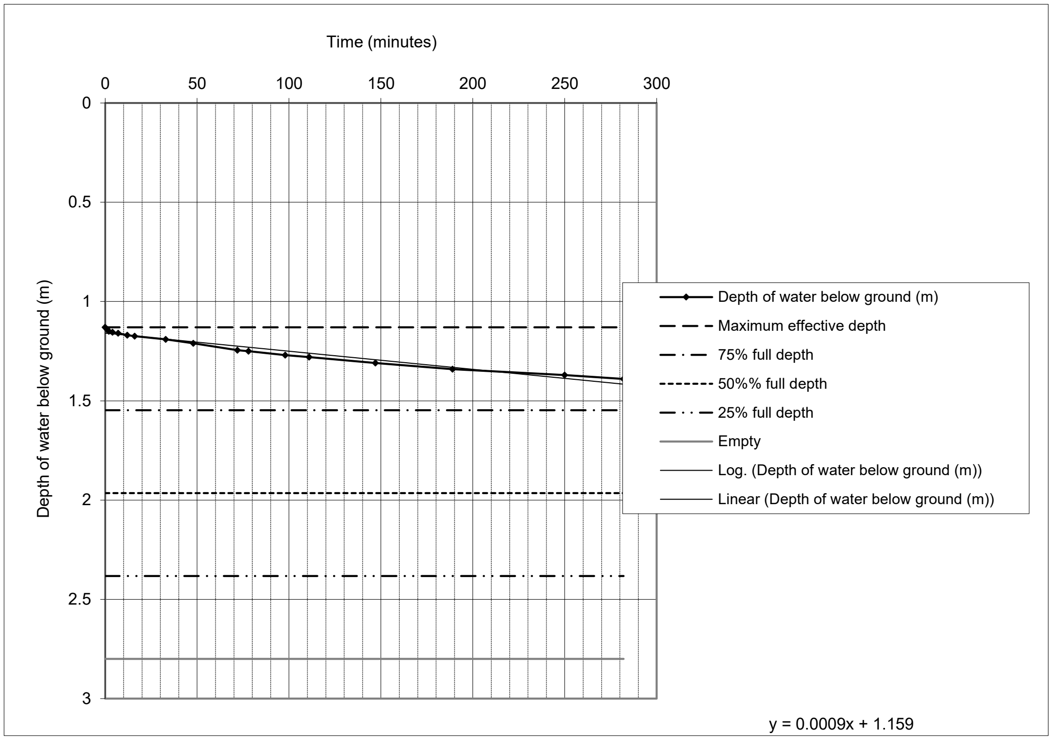
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	1.13
1	1.14
2	1.15
4	1.155
7	1.16
12	1.17
16	1.175
33	1.19
48	1.21
72	1.245
78	1.25
98	1.27
111	1.28
147	1.31
189	1.34
250	1.37
282	1.39



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.67}{4.31 \quad x \quad 0}$$

Soil infiltration rate, f = **Failed** m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP10	Test number:	1	Date of test:	26/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.8
Effective depth of Pit, D [(1)]	(m)	2.07
Length of Pit, L	(m)	1.5
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.78
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.78
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.89

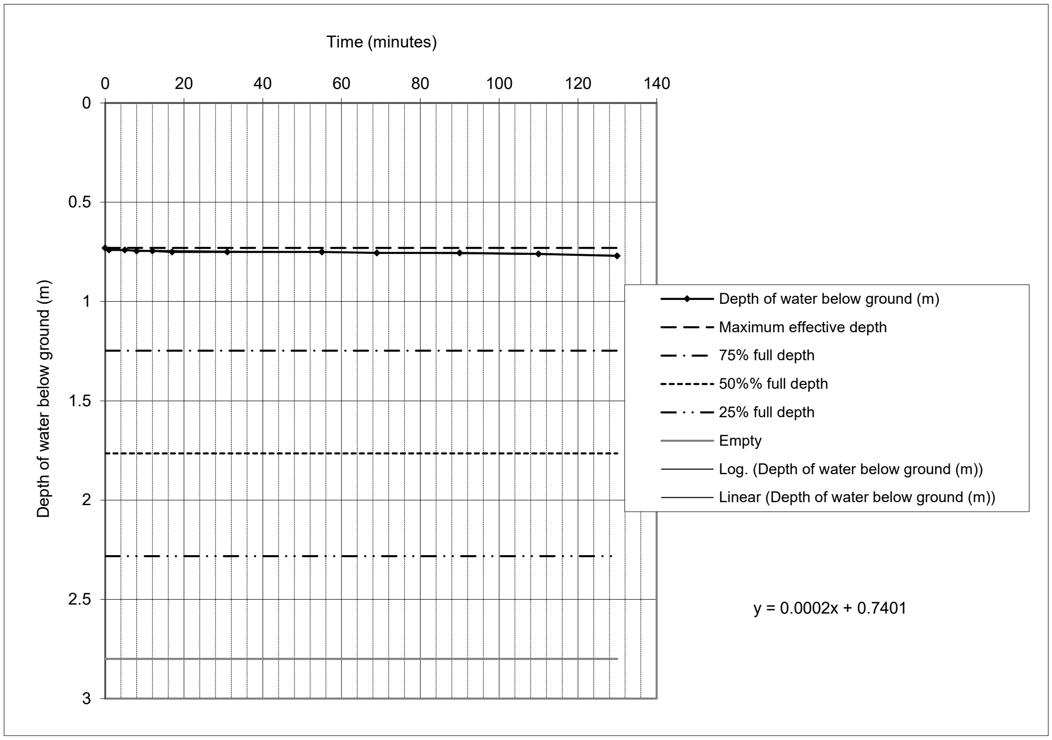
Notes:

(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.73
1	0.74
5	0.74
8	0.745
12	0.745
17	0.75
31	0.75
55	0.75
69	0.755
90	0.755
110	0.76
130	0.77



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.78}{4.89 \quad x \quad 0}$$

Soil infiltration rate, f = Failed m/s

BRE SOAKAWAY INFILTRATION RATE CALCULATION

	Sheet	1	of	1

The following spreadsheet calculations are based on the method given in BRE Digest 365

Note: enter values only in the yellow-highlighted cells - do not alter any other cell, even if it appears to be blank.

Project title:	Ansty Farm			Project number:	P21367
Trial pit number:	TP08	Test number:	1	Date of test:	26/06/2023
Test carried out by:	JRB	Calculations by:	JRB	Verified by:	JEM

Details of pit

Actual depth of pit, D'	(m)	2.7
Effective depth of Pit, D [(1)]	(m)	1.72
Length of Pit, L	(m)	1.6
Width of Pit, W	(m)	0.5
Proportion of pit volume occupied by gravel solids, P_g [(2)]		0

Notes:

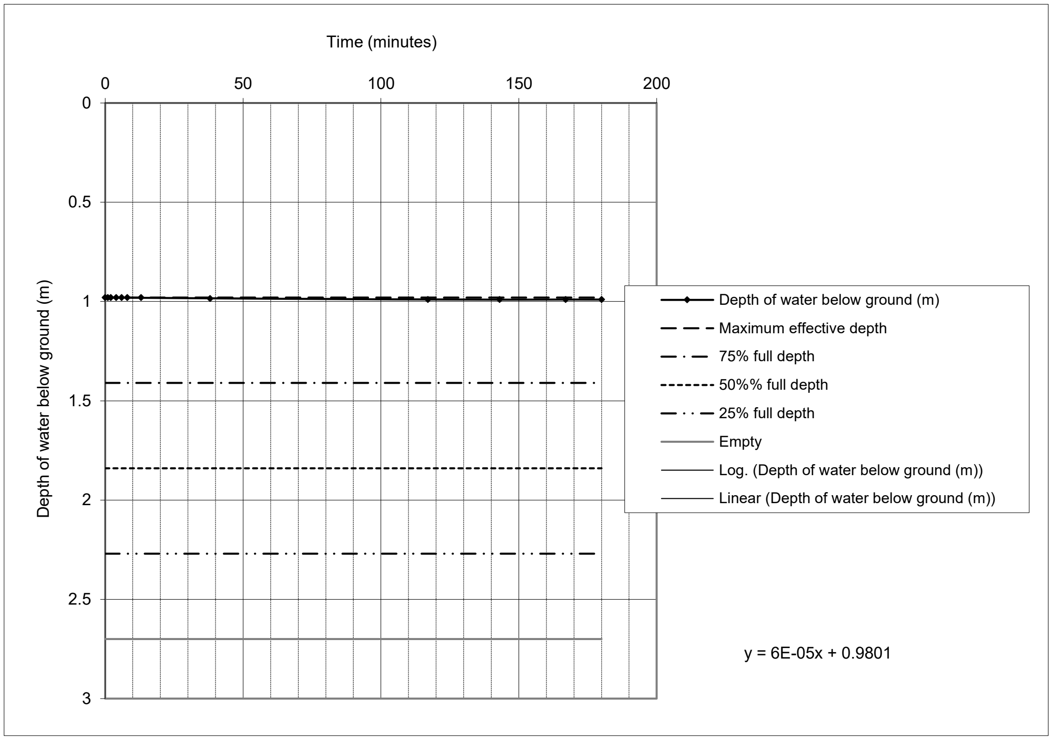
(1) For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

(2) Typically, for a gravel of dry density 18kN/m^3, specific gravity of rock solids 2.65, the proportion of volume occupied by rock is 0.69 (i.e. 69%). For dry density 16kN/m^3, the rock volume is 0.61 (61%), and for dry density 20kN/m^3, it is 0.77 (77%). If the pit is left open (gravel is not used) then put P_g = 0.

Volume, V, of pit between 75% and 25% depths (m^3) = L x W x ½D =	0.69
Effective volume between 75% and 25% depths, V_{p75-25}, = V x P_g =	0.69
Internal surface area of pit up to 50% level, a_{p50}, (m^2) = area of 2 sides + 2 ends + base = (2 x L x ½D) + (2 x W x ½D) + (L x W)	4.41

Water level readings

Time elapsed (min)	Depth of water below ground (m)
0	0.98
1	0.98
2	0.98
4	0.98
6	0.98
8	0.98
13	0.98
38	0.985
117	0.99
143	0.99
167	0.99
180	0.99



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Extrapolated Time for water to drop to 75% effective depth		Extrapolated using linear trendline equation
Extrapolated Time for water to drop to 25% effective depth		Extrapolated using linear trendline equation
Time taken for water to drop from 75% to 25% (mins)	0	
Time taken for water to drop from 75% to 25% (secs)	0	

$$= \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} = \frac{0.69}{4.41 \quad x \quad 0}$$

Soil infiltration rate, f = **Failed** m/s

Appendix E: Photos

	TP2A Pit		TP2A excavated to 2.5m bgl
Project	Ansty Farm	Date	26/06/23
Project No.	P21367	Engineer	JRB
Client	Fairfax Properties Ltd	Comments	

	TP2B Pit		**TP2B excavated to 2.9m bgl**
Project	Ansty Farm	Date	26/06/23
Project No.	P21367	Engineer	JRB
Client	Fairfax Properties Ltd	Comments	

	TP3 Pit and Arisings		**TP4E Pit and Arisings**
Project	Ansty Farm	Date	26/06/23
Project No.	P21367	Engineer	JRB
Client	Fairfax Properties Ltd	Comments	

	TP4C Pit and Arisings		TP4D Pit and Arisings
Project	Ansty Farm	Date	26/06/23
Project No.	P21367	Engineer	JRB
Client	Fairfax Properties Ltd	Comments	

	TP10 Pit		TP8 Pit
Project	Ansty Farm	Date	26/06/23
Project No.	P21367	Engineer	JRB
Client	Fairfax Properties Ltd	Comments	

Appendix E Sewer asset plans

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Date: 28/11/22

Scale: 1:1250

Map Centre: 529824,123596

Data updated: 27/10/22

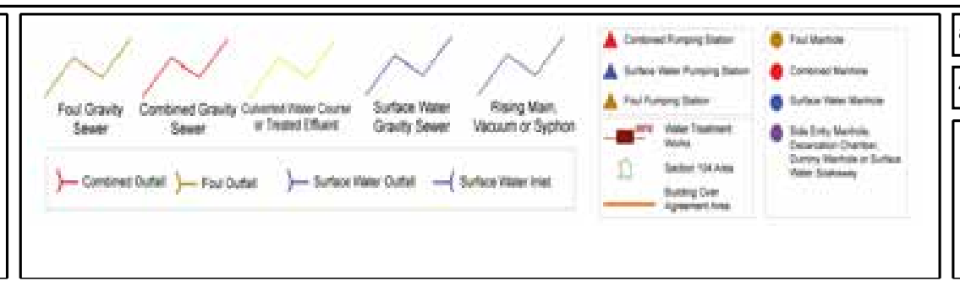
Our Ref: 1014863 - 1

Wastewater Plan A0

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2022 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



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424793

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Date: 28/11/22

Scale: 1:1250

Map Centre: 529828,122683

Data updated: 27/10/22

Our Ref: 1014863 - 2

Wastewater Plan A0

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2022 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

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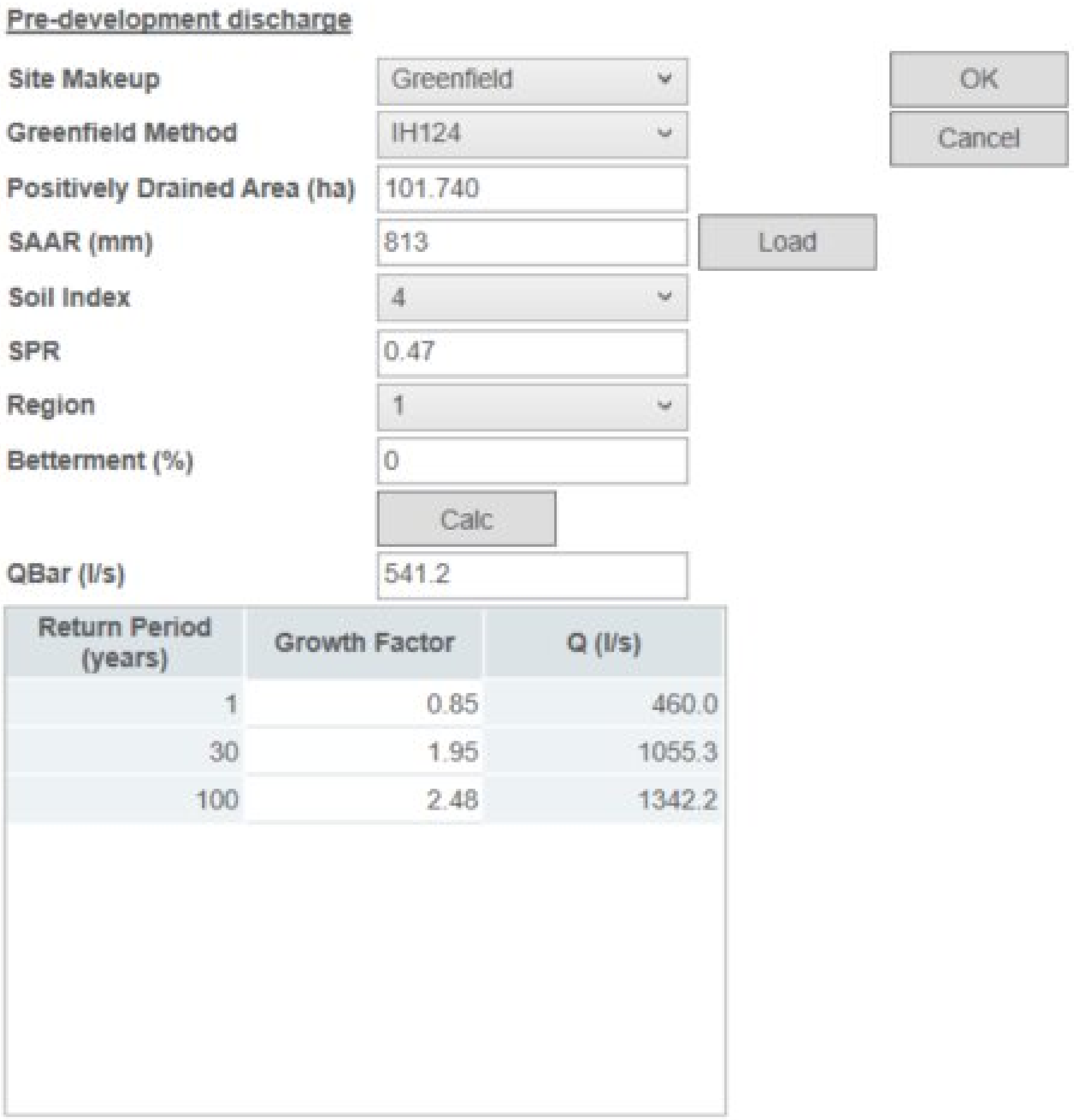
424793

Appendix F Greenfield runoff calculations

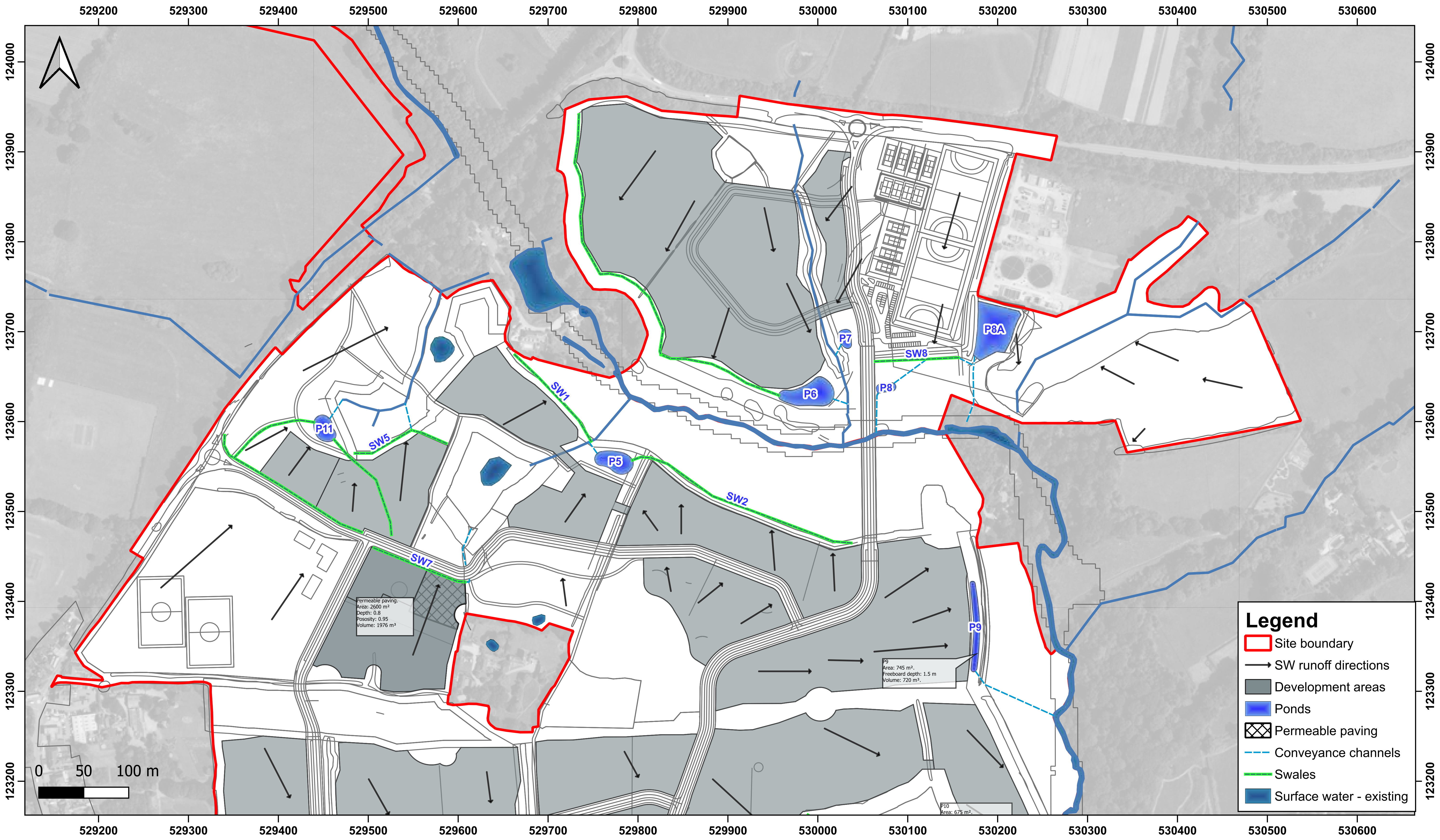


Pre-development discharge

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

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

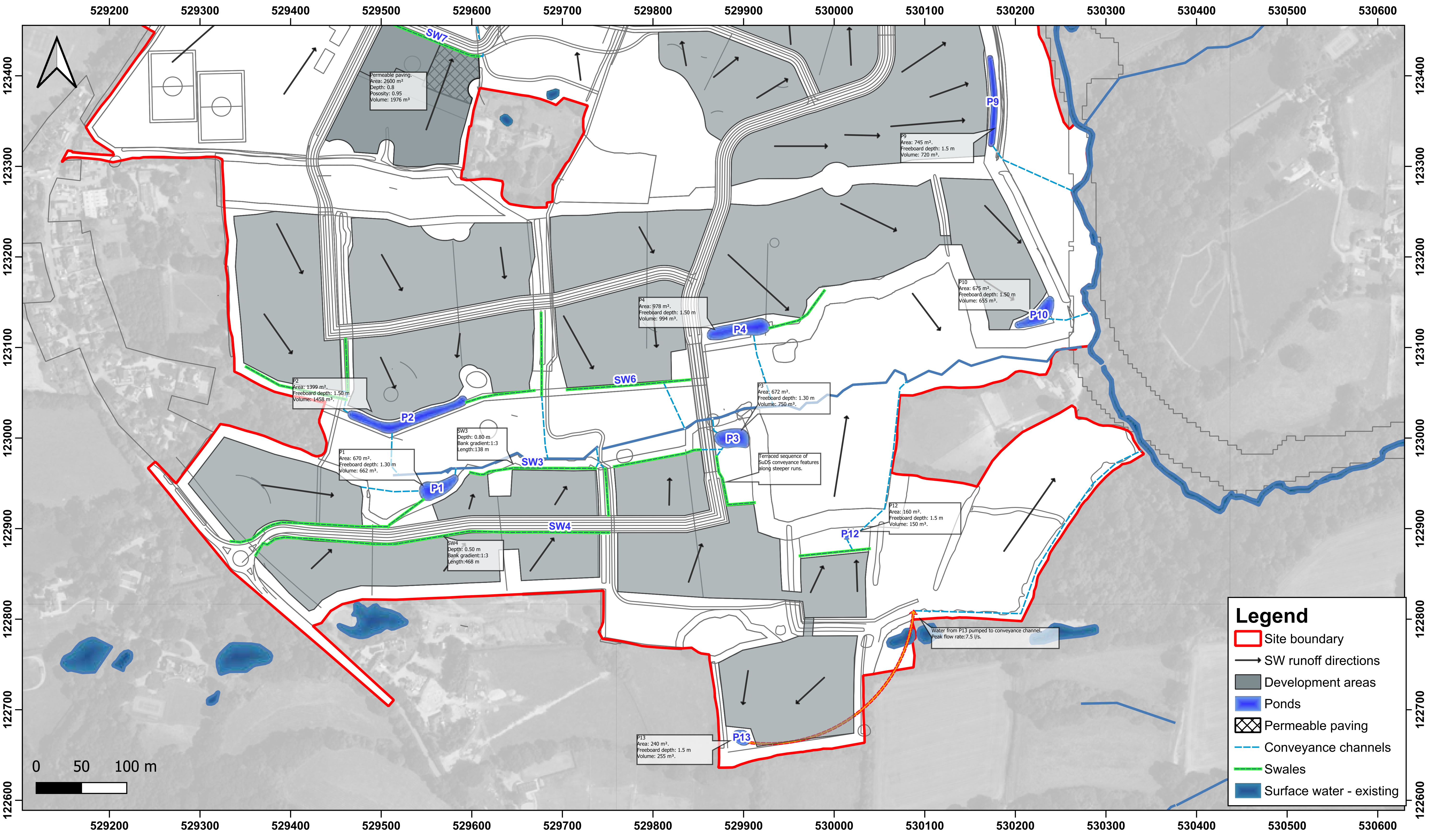
Appendix G Outline drainage strategy



Conceptual drainage layout and relevent design information.

Date	2025	Drawn	MJF
Scale	1:4000	Checked	JEM
Original	A3	Revision	2
File reference	P25035		

AQUA TERRA
CONSULTING



Outline drainage layout and relevent design information.

Date	2025	Drawn	MJF
Scale	1:4000	Checked	JEM
Original	A3	Revision	2

File reference
Projects\P25035

AQUA TERRA
CONSULTING

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 %)
2	0	0	0
30	40	0	0
100	45	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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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 (m^2)**	**Inf Area (m^2)**	**Depth (m)**	**Area (m^2)**	**Inf Area (m^2)**
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 (m^2)**	**Inf Area (m^2)**	**Depth (m)**	**Area (m^2)**	**Inf Area (m^2)**
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 (m^2)**	**Inf Area (m^2)**	**Depth (m)**	**Area (m^2)**	**Inf Area (m^2)**
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 (m^2)**	**Inf Area (m^2)**	**Depth (m)**	**Area (m^2)**	**Inf Area (m^2)**
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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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 (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
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