

STAFF ACCOMMODATION AT RUCKFORD HOUSE, HURSTPIERPOINT COLLEGE

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

JULY 2025



Ref: 12337/17/FRA

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Client: Hurstpierpoint College

Prepared by	Checked by	Approved by	Revision
Tom Butler	Andrew Keen	Andrew Keen	V2 21.07.2025

1.0 INTRODUCTION

- 1.1 HOP Consulting Ltd (HOP) has been instructed by Hurstpierpoint College (HPPC) to undertake a Flood Risk Assessment and Drainage Strategy report for the proposed staff accommodation development at the Ruckford House site within HPPC grounds, Hurstpierpoint.
- 1.2 The development proposal is to clear the development site, and to construct 4No semi-detached properties (2No separate buildings), for the housing of college staff. Additionally, improved vehicle and pedestrian routes and expanded car parking facilities are proposed.
- 1.3 The flood risk element of this report has been prepared in accordance with the principles of the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG) for Development and Flood Risk. The purpose of this report is to demonstrate the risk of flooding from all sources, and that foul and surface water discharge from the proposed development can be managed effectively and in accordance with the statutory authorities' requirements.
- 1.4 Details of the development proposals have been provided by Building Solutions Consultants Ltd (BSC) to show the extent of the development and confirm the existing site layout. Information in this report has been received from a number of external parties and HOP does not accept liability for the accuracy of this information. Should there be material change in the development proposals, this report will need to be revised accordingly.

2.0 SITE DESCRIPTION AND LOCATION

- 2.1 The proposed buildings and parking area, henceforth referred to as the development site, are located approximately 1.5km northeast of the village of Hurstpierpoint in West Sussex and 300m northeast of the main HPPC site (shown in Figure 2.1). The surrounding land use is predominantly agricultural with school playing fields bordering the site to the north, and two existing school-managed residential buildings to the southwest and southeast.
- 2.2 The development site is currently occupied by a carport, rough surfacing for parking formed of rough asphalt, compacted aggregate and soft landscaping/vegetation.
- 2.3 The site address is: Ruckford House, Malthouse Lane, Hurstpierpoint, West Sussex, BN6 9JX. The site's grid reference is: 529182E, 117808N.

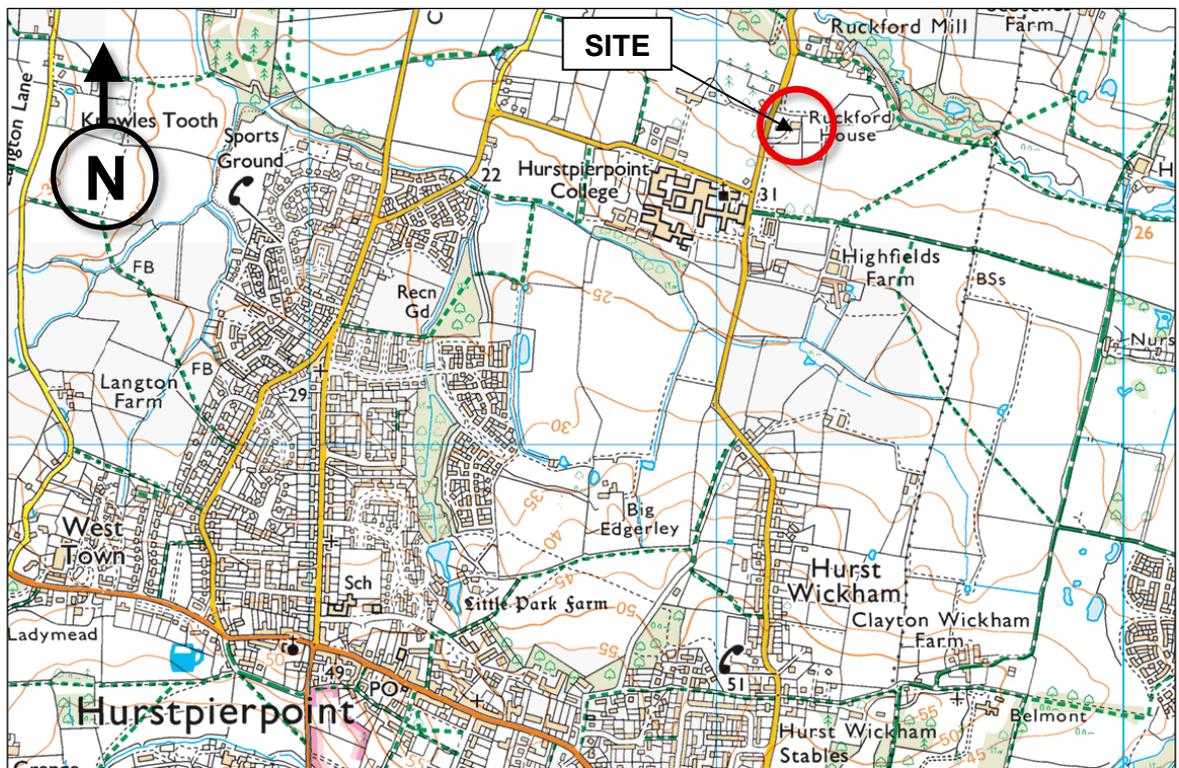


Figure 2.1 Site Location Plan

- 2.4 The surrounding land falls gently away to the north and south of the development site. Based on topographical survey data, the maximum elevation to the south of the proposed buildings is approximately 29.0mAOD (above Ordnance Datum), falling to approximately 28.4mAOD at the northern boundary.
- 2.5 The British Geological Survey (BGS) online mapping shows the site to be underlain by the Weald Clay Formation, with superficial deposits of River Terrace Deposits consisting of sand and gravel. Environment Agency (EA) online mapping, accessed via the Magic Map application, shows the site is not located within a groundwater Source Protection Zone (SPZ).

3.0 DEVELOPMENT PROPOSALS

- 3.1 The development proposals are to construct 4 No semi-detached properties for the housing of college staff as shown in Figure 3.1. Additionally, the existing vehicle and pedestrian routes and car parking facilities are to be improved.
- 3.2 The total development area is to include the proposed buildings, external areas surrounding Ruckford House and the access drive leading from Malthouse Lane.

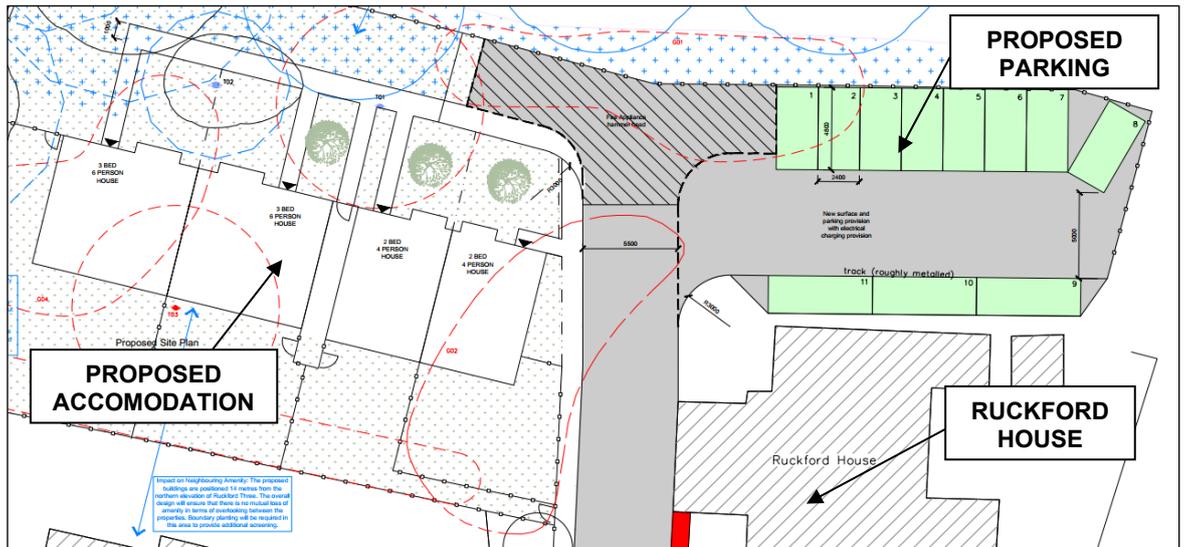


Figure 3.1 Extract of proposed development site layout (BSC)

- 3.3 The site access improvements are to consist of a widening of the entrance bellmouth within the boundary of HPPC land and the addition of a passing place at the bend in the drive. These improvements are to provide a minimum 3m road width, facilitating improved fire vehicle access. A pedestrian footpath is to be added approximately following the road, improving safety by separating pedestrians and vehicles. The access proposals are illustrated in Figure 3.2 below. Further architectural proposals for the full site are included in Appendix A.

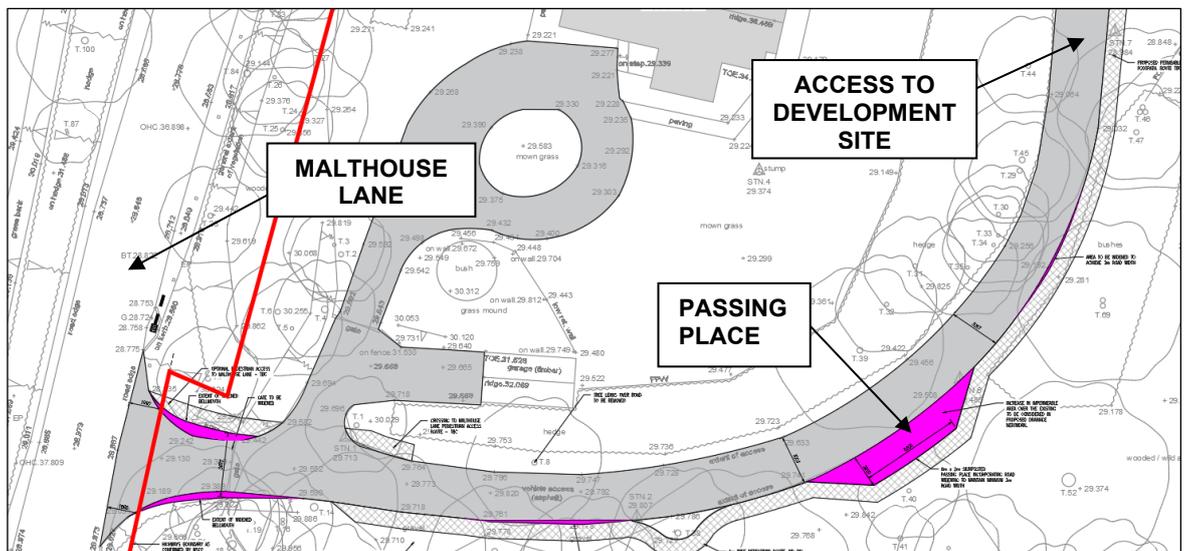


Figure 3.2 Extract of proposed access enhancements (HOP)

4.0 DRAINAGE STRATEGY

FOUL WATER

- 4.1 The two existing buildings, Ruckford House and Ruckford Three, discharge foul water to a private foul pump station located to the northeast of the development site. The connection from Ruckford House was confirmed during a site walkover by HOP on 14th May 2025. The connection from Ruckford Three was verbally confirmed by the HPPC estate manager following previous works in the area carried out by the college.
- 4.2 The existing pump station pumps flows to the private foul drainage network serving the main HPPC site before discharging to the public foul sewer south of HPPC. The pump station also receives a pumped inflow from further HPPC owned properties located approximately 190m to the northeast of the site. The pump station was inspected by Countyclean Environmental Services Ltd in April 2025 and was confirmed to be in full working order.
- 4.3 The Southern Water guidance has been used to calculate the proposed peak foul flow from the proposed new units:

General housing peak foul flow		
Number of properties, N	4	Units
Occupancy, O	5	Persons / unit
Per capita flow, G (L/D)	125	litres / head / day
Population, P (N x O)	20	People
Storm duration, SD	300	Minutes
Peaking Factor, PF	2	
Peak Flow	0.061	l/s

For misconnection of surface water into foul		
Approximate Site Area, A	1000	m ²
Development density, DD (N/A/10000)	160	Units / Ha
Area allowance per property	0.6	m ²
Area misconnected	2.4	m ²
Peak flow	0.023	l/s

TOTAL PEAK FOUL FLOW	0.084	l/s
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Table 4.1 proposed peak foul flow

- 4.4 Site observations and a review of the topographic survey identified 101m² of external surfacing north of Ruckford House that is currently drained via a gully to the foul drainage network. The proposals are for this area to be resurfaced and the runoff to be managed within the surface water drainage system, thereby removing it from the foul network. The flow rate for the 1-year return period storm event was calculated in Causeway Flow and identified a 1.2l/s peak flow rate for this 101m² catchment discharging to the foul sewer. These calculations can be found in Appendix D. The proposals are therefore considered to generate a betterment to the existing pump arrangement.

SURFACE WATER

Existing

- 4.5 Surface water from the two existing building's roof areas and the 101m² external area, discussed in Section 4.4, is discharged to the foul drainage network by conventional gullies, gutters and downpipes. The existing carport and the majority of external hardstanding, including the access road, is not formally drained and discharges onto the adjacent landscaping where it is assumed to infiltrate into the ground.

Proposed

- 4.6 To mitigate future surface water flood risk, a sustainable drainage (SuDS) strategy has been developed, utilising infiltration.
- 4.7 Infiltration testing was undertaken in general accordance with BRE365 by Soak Services in June 2025. During this testing, a deeper trial pit encountered groundwater at 2.2m deep. Shallow infiltration testing (0.5m deep) in the location of the proposed car park identified an infiltration rate of 3.968×10^{-6} m/s which is considered suitable for a permeable paving based infiltration sustainable drainage (SuDS) scheme to manage surface water runoff. A factor of safety (FoS) of 3 is normally appropriate for an infiltration scheme of this scale, however, a FoS of 5 has been applied to the proposed calculations to reflect expected wetter conditions in winter months. Infiltration testing results are included in Appendix C.
- 4.8 It is proposed to utilise new infrastructure to collect surface water runoff from roofs and impermeable external areas via downpipes, permeable paving, and below ground pipework before discharging to ground. Infiltration will be the ultimate means of managing runoff at source. This will provide an improvement over the existing arrangement, which is either unmanaged or drains to the foul drainage system. This is also the preferred surface water management method defined by the SuDS hierarchy in the CIRIA SuDS Manual, and Building Regulations Part H.
- 4.9 The new external hard surfacing is to be permeably paved. The 452m² permeably paved parking area is proposed to incorporate a deepened sub-base allowing it to accommodate additional flows from the proposed building's roof areas. The access track is to be maintained, with less than 7m² of additional surfacing required to widen the drive to 3m along its length. It is proposed to allow these minimal additional areas to discharge onto the adjacent soft landscaping. The proposed passing place is to be of permeable construction, reflecting the existing soft landscaping it will be located within.
- 4.10 All proposed footpaths are to be of permeable construction, reflecting the existing predominantly soft landscaping in these areas. 'No-dig' construction methods will be employed where surfacing lies within tree root zones.
- 4.11 Roof runoff will be collected via guttering, which will drain to the below ground drainage, passing through a concrete catch pit manhole to minimise sedimentation before discharging into the permeable sub-base of the car park.
- 4.12 The proposed surface water drainage layout is shown in Appendix B.
- 4.13 In accordance with the National Standards for SuDS (NSS), the surface water drainage system should be designed so that flooding does not occur on any part of the site for a 1 in 30 year rainfall event; and so that flooding does not occur during a 1 in 100 year event in any part of a building or in any utility plant susceptible to water.

- 4.14 A 475mm deep permeable sub-base with a minimum 30% voids ratio is proposed for the car parking area. Through utilising these infiltration SuDS to accommodate the 1 in 100 year rainfall event (+45% allowance for climate change), it can be shown that no part of the site is vulnerable to surface water flooding from the managed on-site runoff. Calculation output for the permeable paving-based infiltration scheme is included in Appendix D.
- 4.15 As all runoff is proposed to be managed at source through infiltration SuDS, there will be no surface water runoff from the proposed development once mitigation features are implemented.

Surface Water Runoff Quality

- 4.16 The preferred solution for managing surface water runoff is to utilise infiltration SuDS techniques, with a soakaway and infiltration features located to the south of the site. Surface water will therefore be discharged to the underlying clay bedrock geology, which is classified by the EA as a Secondary A Aquifer. Consideration must therefore be given to water quality treatment measures, to ensure the protection of controlled waters.
- 4.17 Both the SuDS Manual (CIRIA C753) and guidance from the EA, as outlined in the recently withdrawn Pollution Prevention Guidance 3 (PPG3), state that rainwater runoff from roof areas is considered to be at very low risk of containing contaminants and does not require any pollution control to be implemented prior to discharge, outside of the removal of gross solids and sediments only.
- 4.18 Reference to Table 26.2 of the SuDS Manual shows that the proposed land use comprises residential car parks and low traffic roads and that these represent a low risk of pollution hazard level. The guidance for this level of risk is to use the simple index approach to pollution control requirements for discharging to surface water sewers.
- 4.19 The notes to Table 26.2 state that extra measures may be required for discharges to protected resources, the guidance clarifies that in England and Wales, protected groundwater resources are represented by the catchment of a SPZ 1 classification. As discussed in Paragraph 2.5, the development site does not lie within an SPZ and therefore no additional pollution control measures are required in this regard.
- 4.20 The simple index approach is outlined in the SuDS Manual and provides pollution hazard indices for different land use classifications. An extract applicable to the development site is provided in Table 4.2. This shows pollution hazard indices for; total suspended solids (TSS) 0.5; Metals 0.4; and Hydrocarbons 0.4.

Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

Table 4.2 Extract of table 26.2 from the SuDS Manual.

4.21 These are to be compared against mitigation indices for individual SuDS components, as provided in Table 26.4 of the SuDS Manual. An extract showing the mitigation indices for SuDS components is provided in Table 4.3.

Indicative SuDS mitigation indices for discharges to groundwater			
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates¹	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.6 ⁴	0.5	0.6
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.8 ⁴	0.8	0.8
Proprietary treatment systems ^{5, 6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Table 4.3 Extract of table 26.4 from the SuDS Manual.

4.22 The SuDS Manual also allows for proprietary systems such as oil interceptors, smart filters, membranes and silt/debris traps to be utilised to minimise the risk of watercourse pollution. These products must demonstrate that they can address each of the contaminant types as described in Table 4.3. The proposals include permeable paving which sufficiently mitigates the pollution risk without the need for proprietary petrol interceptors.

SuDS Maintenance and Management Plan

- 4.23 A maintenance regime has been established for the components within the drainage system, to ensure its ongoing functionality. Table 32.1 of the SuDS Manual shows necessary maintenance activities for different SuDS components.
- 4.24 A maintenance schedule for the drainage components including SuDS features is presented in Appendix E.

TABLE 32.1 Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 11–23)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swales/bioretention/trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management ¹	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Table 4.4 – Extract of Table 32.1 of the SuDS Manual summarising maintenance activities

5.0 FLOOD HAZARD AND PROBABILITY

5.1 Flood risk data for the site has been obtained from the online EA Flood Map, an extract of which is shown in Figure 5.1. The mapping shows the site to be located entirely within Flood Zone 1. The PPG to the NPPF defines Flood Zone 1 as having less than 1:1000 annual probability of river or sea flooding (less than 0.1%).

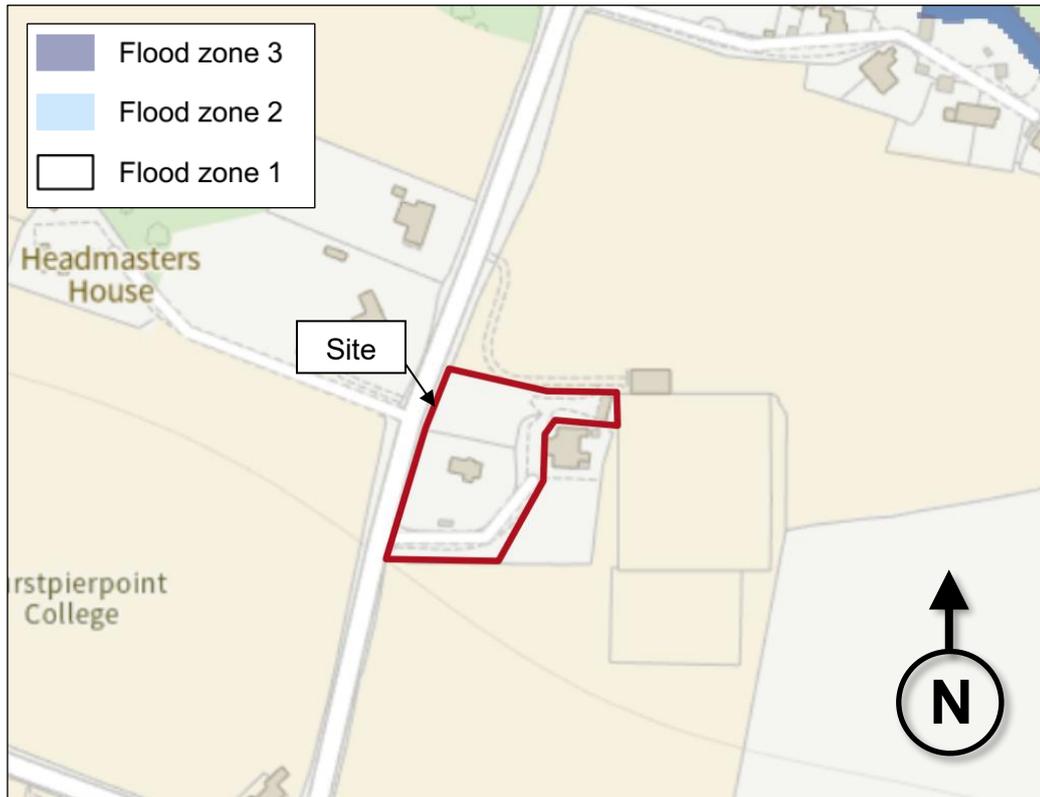


Figure 5.1 Extract from EA Online Flood Zone Map

5.2 Table 2 of the NPPF classifies all forms of development to be appropriate for Flood Zone 1.

Surface Water Flooding

- 5.3 The EA has produced surface water flood maps which show no areas of surface water flooding within the site boundary. An area of localised surface water flooding is identified in Malthouse Lane to the west of the site. The road is at a lower elevation to the site with runoff contained within the highway boundary. The site walkover identified this stretch of road to be served by highway gullies that drain into the highway ditch network to the northwest of the site.



Figure 5.2 Extract from EA Surface Water Flood Map (100 year event)

- 5.4 Surface water flood risk will be mitigated by the inclusion of a new SuDS system, as described in Section 4.0, which will actively manage surface water at source ensuring there is no increase in risk to site users and neighbouring or downstream properties. Exceedance event conveyance routes will be engineered into the final levels scheme with runoff conveyed away from the parking and proposed buildings northwards towards the less vulnerable area in the playing fields to the north of the farm.

Sewer Flooding

- 5.5 Within the Mid Sussex District Council (MSDC) Strategic Flood Risk Assessment (SFRA), there are no historical records of known highway or sewer flooding affecting the site. The existing private foul pump station is situated at a lower elevation than the proposed buildings with levels falling gently away directing runoff to the playing fields to the north should a flood event occur from this location. Risk of sewer flooding affecting the site is considered to be low.

Reservoir Flooding

- 5.6 The online EA maps show the site to be outside any flood risk area associated with reservoir flooding, therefore the risk from this source is considered to be very low.

Groundwater Flooding

- 5.7 The MSDC SFRA notes that the majority of the Mid Sussex area is considered to have low potential for groundwater flooding as a result of underlying geology. Groundwater concerns are most prevalent in the south of the district where permeable chalk geology can be found. The site is underlain by a clay bedrock suggesting a limited susceptibility to groundwater flooding. The site is located on a crest of surrounding levels so that any emergence of groundwater would be directed overland to the north and south, away from the site. Groundwater flood risk is therefore considered to be low.

Climate Change

- 5.8 Increased rainfall intensity, longer storm durations and rising sea levels are all attributed to global climate change. An allowance for an additional 45% rainfall intensity is taken in to account in the design of surface water management for residential developments. The new surface water drainage infrastructure should be designed to manage the 1 in 100 year storm event, plus a 45% allowance for climate change, in accordance with the SFRA and the NSS.

Residual Risk

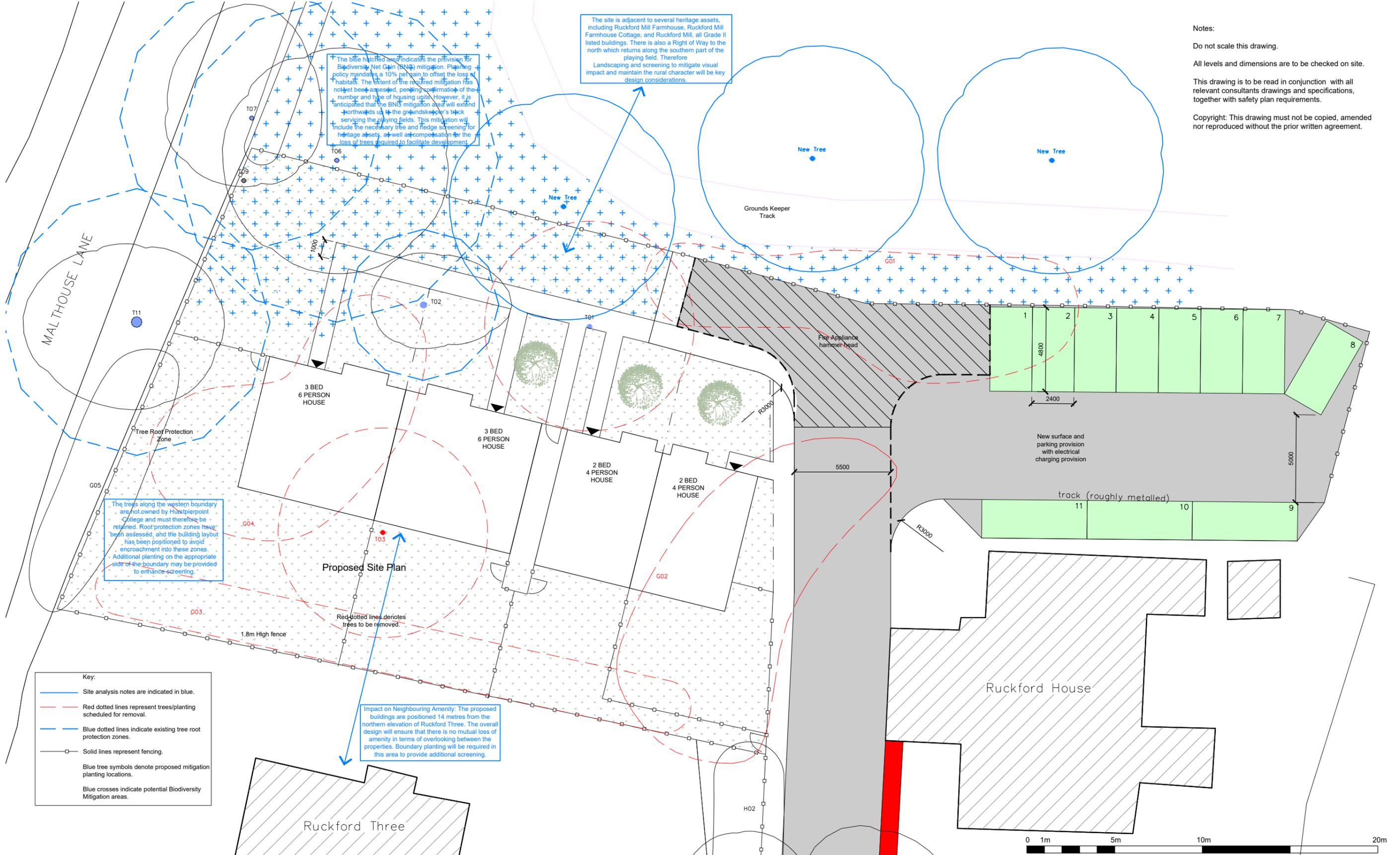
- 5.9 Residual risks are limited to exceedance events above the design criteria and/or a blockage failure of the local drainage network. Should flooding occur due to excess rainfall or through infrastructure blockage or failure, the surrounding topography and engineered hardstanding levels would suggest that overland flows established from such potential events would be directed beyond the site boundary to undeveloped land to the south.

6.0 CONCLUSIONS

- 6.1 The proposed development of staff accommodation at Hurstpierpoint College is deemed appropriate for Flood Zone 1 according to the principles set out in the NPPF. The site is currently shown to be at low risk of surface water flooding at the development site. Surface water flood risk will be further mitigated by the inclusion of a new SuDS system. The risk of flooding from all other sources is considered to be low or very low.
- 6.2 The staff accommodation site is served by private sewerage infrastructure, with foul and surface water flows from the existing buildings pumped to the public sewer network by a private pump station to the northwest of the site. An area of impermeable hardstanding currently draining to the foul pump station is to be incorporated into the infiltration-based surface water proposals, reducing the flow to the drainage system. Additional foul flows are anticipated to the foul drainage system, however an overall decrease in peak flows is anticipated due to the surface water catchment to be removed.
- 6.3 Infiltration testing was undertaken within the Head deposits and found to be acceptable for the proposed SuDS features. Infiltration will be the ultimate means of managing runoff at source. This will provide an improvement over the existing arrangement, which is currently unmanaged in places, and discharges to the foul drainage network in others. Infiltration is the preferred solution as defined by the SuDS hierarchy in the CIRIA SuDS Manual and Building Regulations Part H.
- 6.4 The external surfaces will be drained via permeable paving. Roof runoff will be collected via guttering, which will drain into the permeable paving sub-base.
- 6.5 As dictated by current guidance, the permeable paving has been designed to accommodate surface water generated from storm with a 100-year return period, with an additional 45% increase in rainfall intensity due to climate change. Exceedance flow routes have been assessed and are directed to the playing fields to the north and south of the site to further mitigate the risk to people and property.
- 6.6 This report has identified measures that reduce the level of residual risk to the site with the construction of a new SuDS system utilising infiltration. This report shows that the proposals for the redevelopment of the HPPC Ruckford House staff accommodation site can be successfully implemented and managed and that there should be no increase in risk to users and neighbouring properties from flooding over the expected design life of the development.



APPENDIX A - Architectural Proposals and Topographic Survey



The blue hatched area indicates the provision for Biodiversity Net Gain (BNG) mitigation. Planning policy mandates a 10% net gain to offset the loss of habitats. The extent of the required mitigation has not yet been assessed, pending confirmation of the number and type of housing units. However, it is anticipated that the BNG mitigation area will extend northwards up to the groundskeeper's track servicing the playing fields. This mitigation will include the necessary tree and hedge screening for heritage assets, as well as compensation for the loss of trees required to facilitate development.

The site is adjacent to several heritage assets, including Ruckford Mill Farmhouse, Ruckford Mill Farmhouse Cottage, and Ruckford Mill, all Grade II listed buildings. There is also a Right of Way to the north which returns along the southern part of the playing field. Therefore Landscaping and screening to mitigate visual impact and maintain the rural character will be key design considerations.

The trees along the western boundary are not owned by Hurstpierpoint College and must therefore be retained. Root protection zones have been assessed, and the building layout has been positioned to avoid encroachment into these zones. Additional planting on the appropriate side of the boundary may be provided to enhance screening.

Impact on Neighbouring Amenity: The proposed buildings are positioned 14 metres from the northern elevation of Ruckford Three. The overall design will ensure that there is no mutual loss of amenity in terms of overlooking between the properties. Boundary planting will be required in this area to provide additional screening.

- Key:
- Site analysis notes are indicated in blue.
 - - - Red dotted lines represent trees/planting scheduled for removal.
 - - - Blue dotted lines indicate existing tree root protection zones.
 - Solid lines represent fencing.
 - Blue tree symbols denote proposed mitigation planting locations.
 - ⊕ Blue crosses indicate potential Biodiversity Mitigation areas.

Notes:

Do not scale this drawing.

All levels and dimensions are to be checked on site.

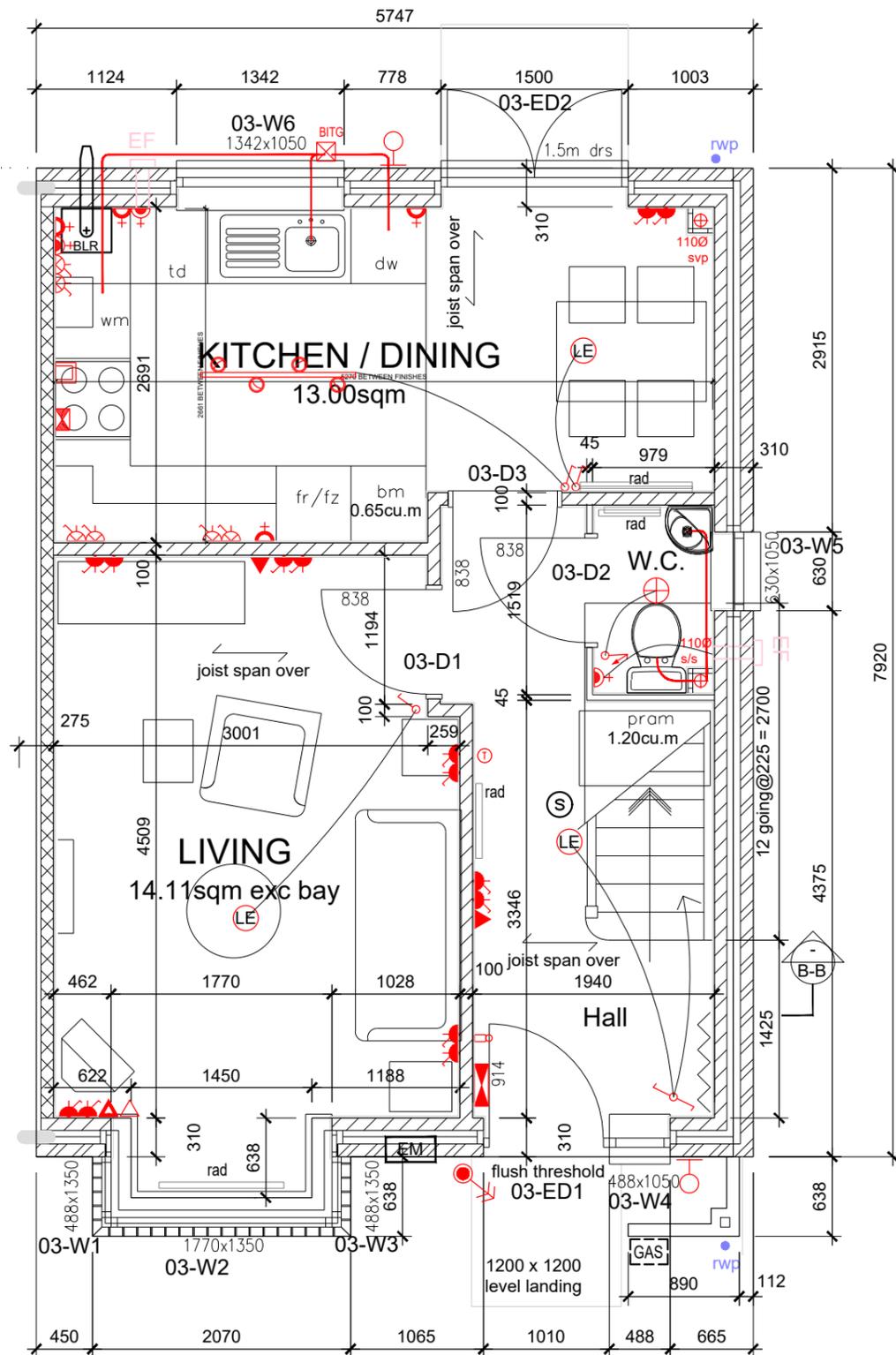
This drawing is to be read in conjunction with all relevant consultants drawings and specifications, together with safety plan requirements.

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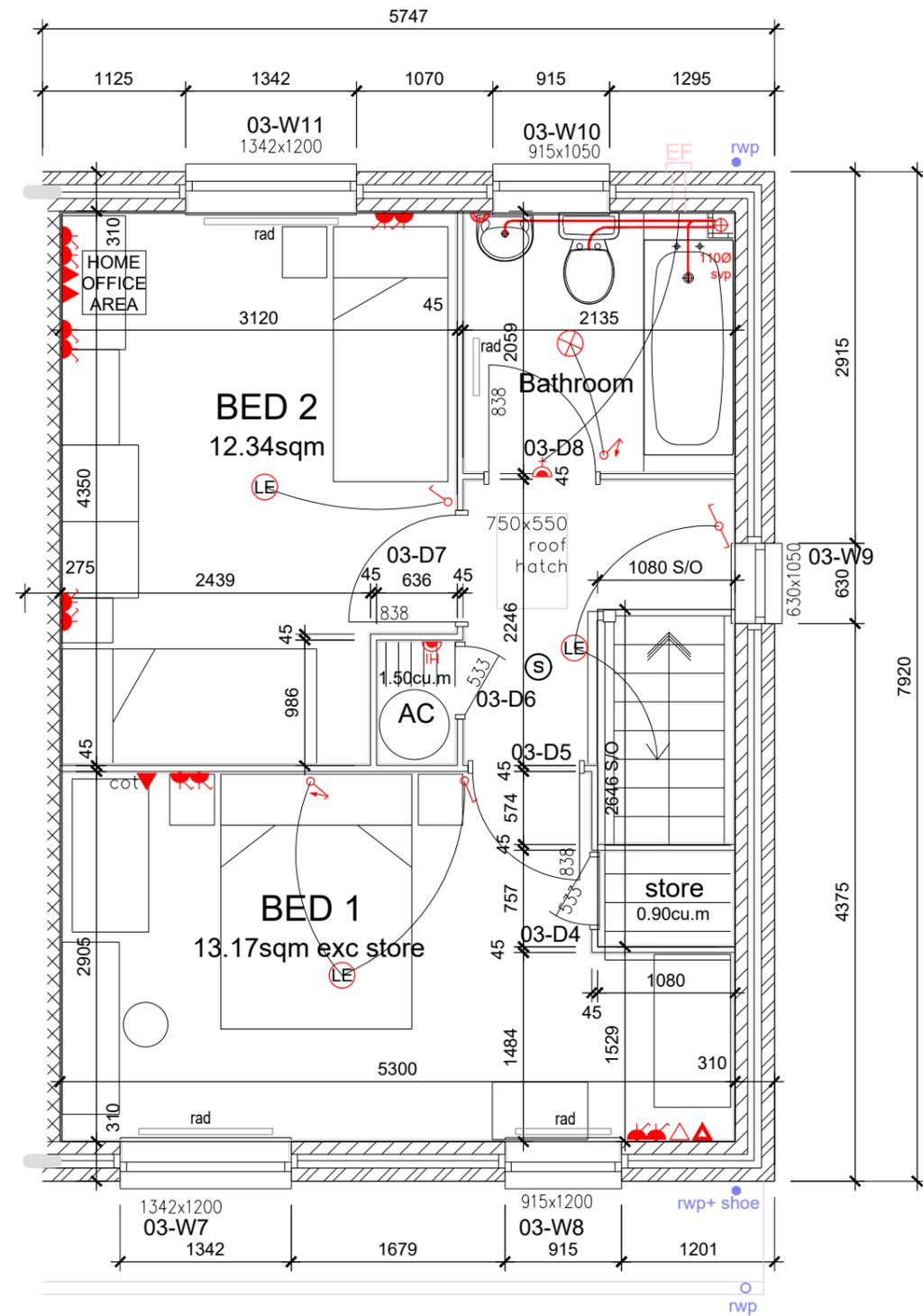
REV.#	DATE	NAME	NOTES
A	15/05/2025	DB	Housing Types Amended - Client Instruction

BUILDING SOLUTIONS CONSULTANTS LTD.
23 Titian Road, Hove, BN3 5QR

PROJECT New Staff Accommodation, Hurstpierpoint College			
DRAWING Proposed Site and Floor Plans			
STAGE Stage 2 Output			JOB NO. : 675
			DATE : 09/05/2025
DWG NO. SK.04	SCALE 1:200 @A3	REVISION : a	DRAWN : DB
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GROUND FLOOR PLAN
1:50



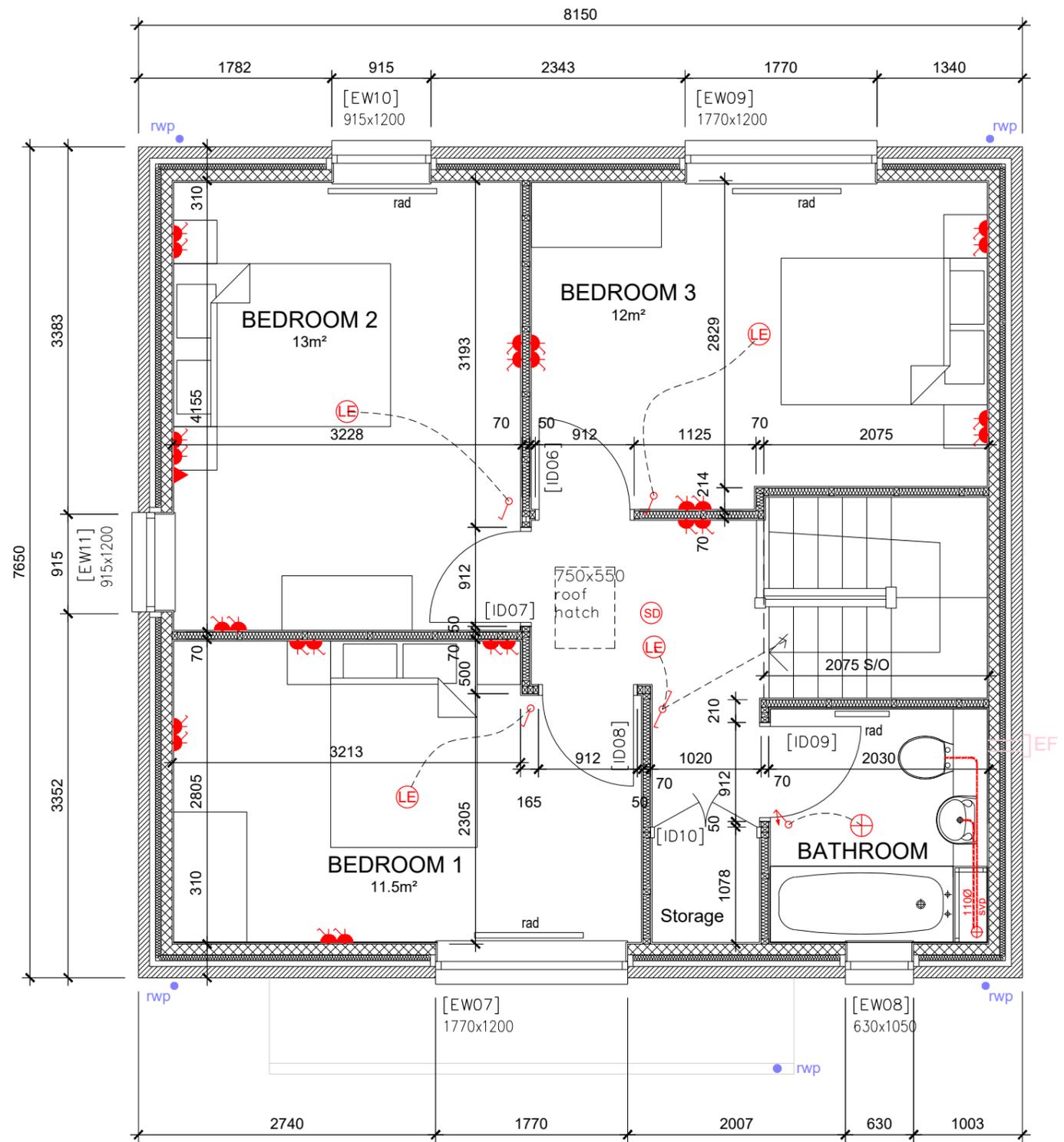
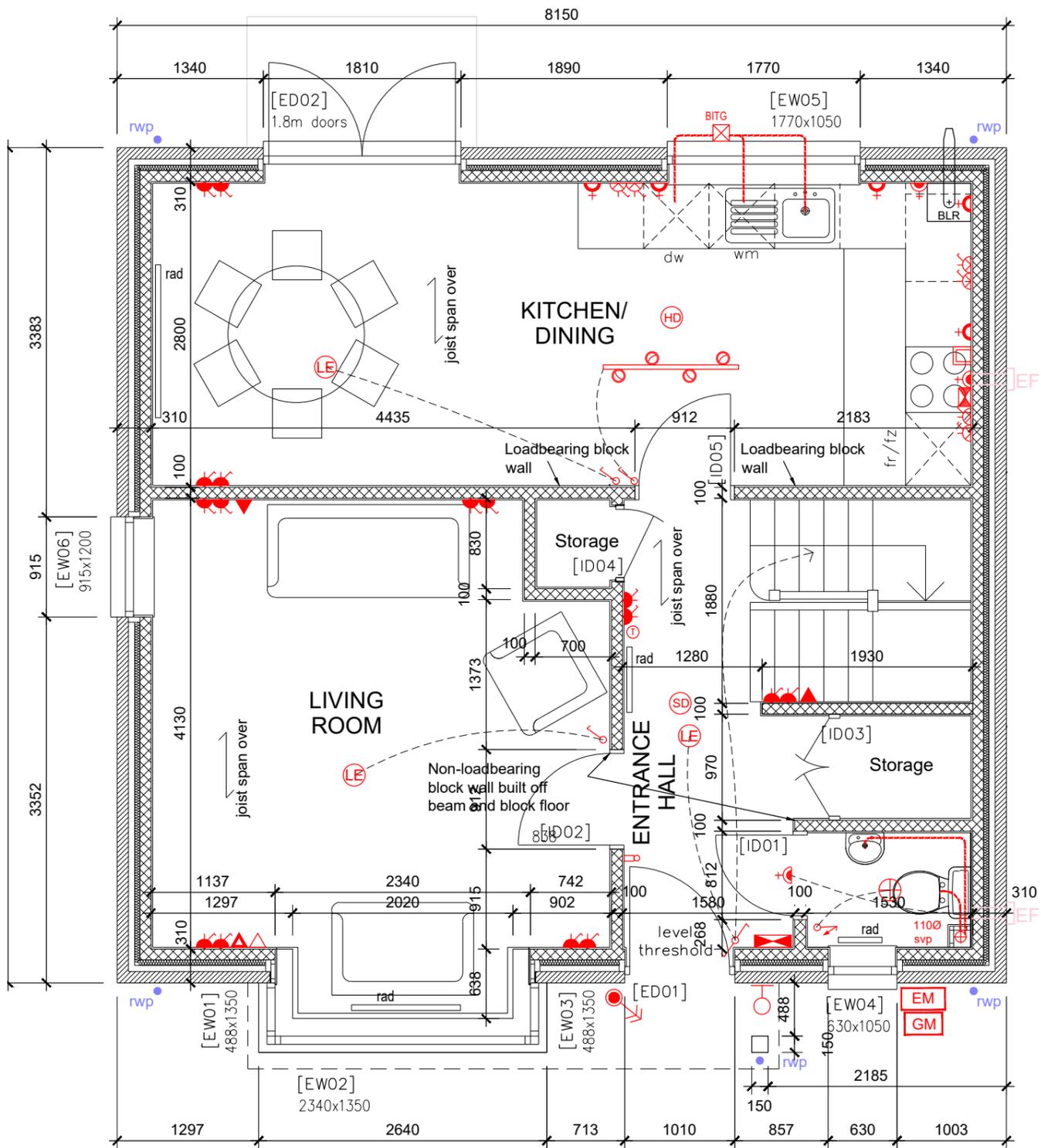
FIRST FLOOR PLAN
1:50

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REV.#	DATE	NAME	NOTES

PROJECT New Staff Accommodation, Hurstpierpoint College			
DRAWING Typical Floor Plans (2B4P)			
STAGE DRAFT - For Discussion Purposes			JOB NO.: 675
			DATE : 18/03/2025
DWG NO. SK.05	SCALE 1:100 @A3	REVISION : -	DRAWN : DB
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GROUND FLOOR PLAN 1:50

FIRST FLOOR PLAN 1:50

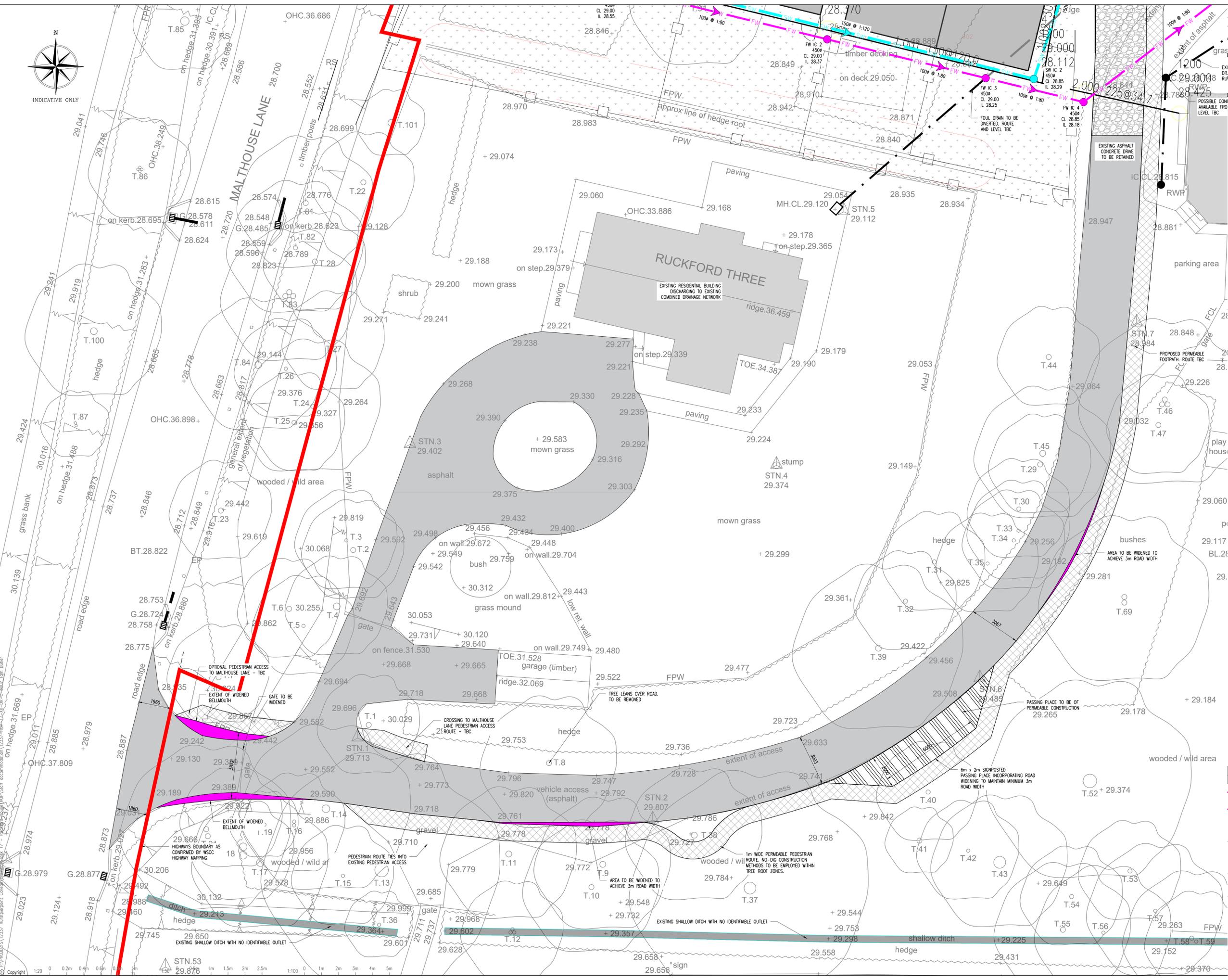
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REV.#	DATE	NAME	NOTES

PROJECT New Staff Accommodation, Hurstpierpoint College			
DRAWING Typical Floor Plans (3B6P)			
STAGE DRAFT - For Discussion Purposes			JOB NO. : 675
			DATE : 18/03/2025
DWG NO. SK.06	SCALE 1:100 @A3	REVISION : -	DRAWN : DB
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APPENDIX B - HOP Proposed Drainage Layout



1. GENERAL
- A. This drawing is not to be scaled, work to figured dimensions only, confirmed on site.
 - B. This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.
 - C. Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.
 - D. The contractor is responsible for all temporary works and for the stability of the works in progress.

POSSIBLE CONVI AVAILABLE FRO LEVEL TBC

EXISTING ASPHALT CONCRETE DRIVE TO BE RETAINED

STN.7 28.848 + 28.984

parking area

PROPOSED PERMEABLE FOOTPATH ROUTE TBC

play house

bushes

AREA TO BE WIDENED TO ACHIEVE 3m ROAD WIDTH

wooded / wild area

grass

grass mound

garage (timber)

vehicle access (asphalt)

shallow ditch

hedge

wooded / wild area

grass

grass

shallow ditch

hedge

REVISED FOR FRA	TRB AK	21.07.25	P02
FIRST ISSUE - INITIAL CONCEPT LAYOUT	TRB AK	06.06.25	P01

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

Highway Layout

Project: NEW STAFF ACOMODDATION

Client: HURSTPIERPOINT COLLEGE

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

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APPENDIX C – Infiltration Testing Data (Soak Services)

26th June 2025
Soak reference: 20137

Infiltration testing report at Ruckford House, Hurstpierpoint College, Malthouse Lane, Hurstpierpoint, Hassocks, West Sussex, BN6 9JX

Background

Soak Services was instructed by the client to carry out infiltration testing to BRE 365 in a parcel of land adjacent to Ruckford House (1 & 2) and Ruckford 3 off Malthouse Lane. The land is mostly grass ringed by hedge and mature trees with a short gravel drive/parking area. The land very gently slopes downwards from west to east. (Figure 1)

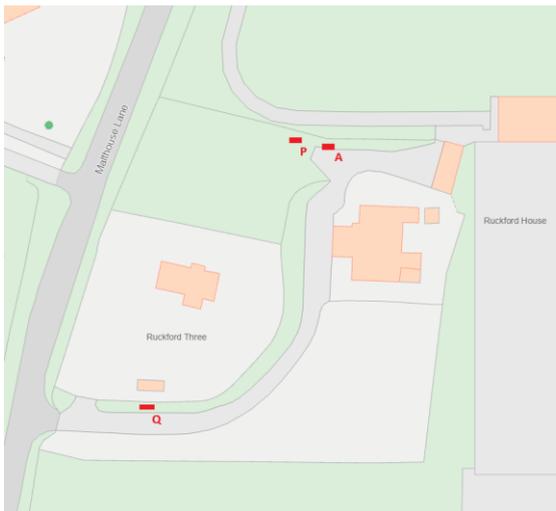


Figure 1 OS Map with pit locations



Figure 2 Satellite photo of test site showing pit locations.

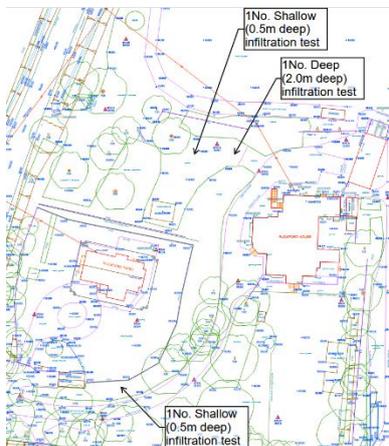


Figure 3 Topographic survey of the site.

Test and site conditions

Pits were dug on 25/6/2025 (see Figures 1, 2 and 3 above for locations) with a 3-ton excavator using a 300mm wide bucket. The preceding months had been exceptionally dry and no rain had fallen on this site in the few days before testing. On the morning of testing the ground remained firm and the soil excavated remained dry at the upper levels of all pits. Pit (Q) was surprisingly damp below 0.5m and ground water was eventually encountered at 2.2m. The weather was warm and sunny (see photo 16).

Table 1 The location of the pit, soil profile and dimensions

Pit label	Location	What3Words	Soil Profile from top	Dimensions (mm)
A	N 50°56' 42.9900" W 0° 9' 44.9856"	///renovated.roadmap.belly (see photo 1)	160mm unmade ground 2040mm clay (damp and mouldable by hand) Water	1640L x 340W x 2200D
P	N 50°56' 43.0872" W 0° 9' 45.4464"	///confident.sulky.cries (see photo 7)	170mm top-soil 355mm clay	860L x 360W x525D
Q	N 50°56' 41.4384" W 0° 9' 46.6776"	///protests.united.measuring (see photo 9)	230mm top- soil 325mm clay	970L x 320W x 555D

Excavation of the pits revealed various soil layers (specified in the table above).

Testing took place on Wednesday 25/6/2025.

Works carried out

The test pit (pit A) was excavated to 2200mm. Water was observed lining the bottom of the pit almost immediately. After one hour this had risen to a depth of 234mm. Further testing for this pit was therefore cancelled.

Test pits P & Q were excavated to 525 and 555mm respectively and filled to 100mm from the top. Water levels were then monitored for the rest of the day and changes recorded.

BRE 365 requires 3 tests to be made on each pit being tested but this proved not to be possible for either pit P or pit Q.

At the end of the day the pits were filled and the ground reinstated.

Summary of test results

Test pit A. It was not possible to measure infiltration at this pit as ground water was encountered at 2.2m. After 1 hour ground water had filled the bottom of the pit to a depth of 254mm.

Test Pit P. Only one test was possible in the day due to slow infiltration. BRE 365 requires 3 tests to be made but this would not have been possible to complete in a day.

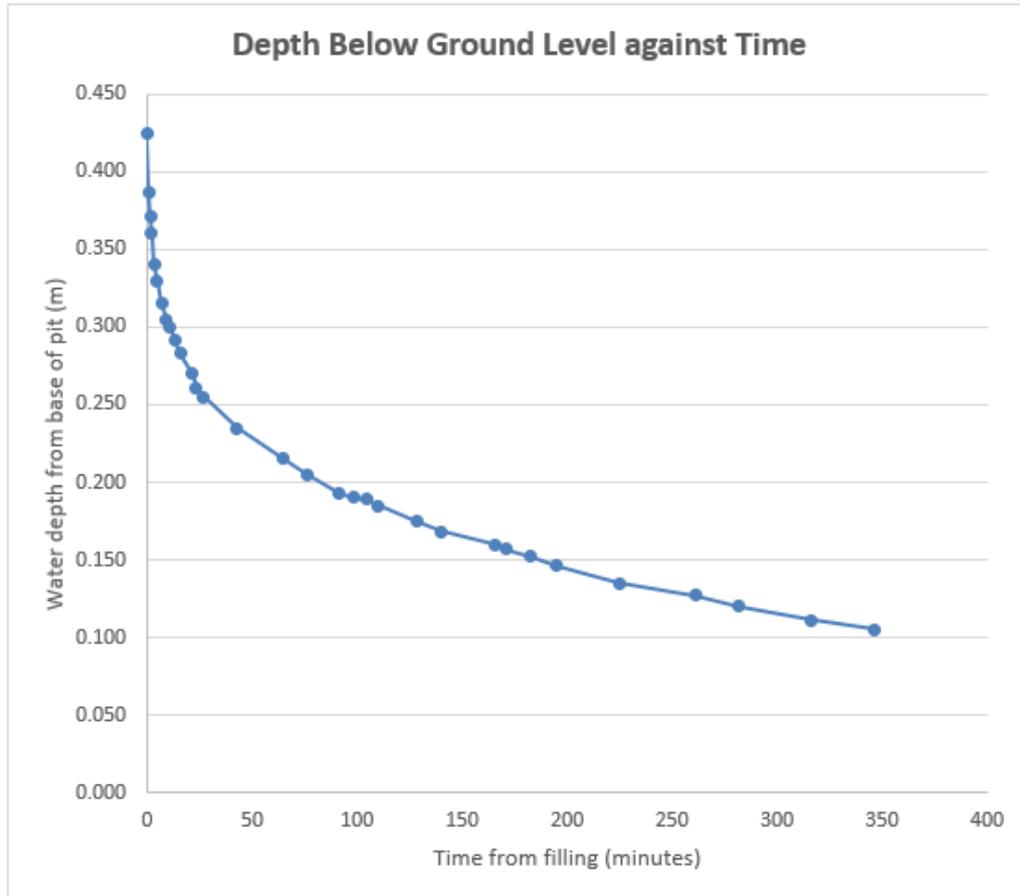
Test Pit Q. Only one test was possible due to very slow infiltration and a projected measurement was made to achieve 75% drainage.

Pit	Test	Infiltration rate m/s
A	1	Not obtainable Due to ground water ingress.
P	1	3.968×10^{-6}
Q	1	1.316×10^{-6} (estimated)

Full test data and charts are in appendix 1, below.

Appendix 1 Test Data and charts

Appendix 1: Test data, pit P test 1



Pit length 0.860 m
 Pit width 0.360 m
 Pit depth 0.525 m

Max water depth 0.425 m

D_{eff} 0.425 m

D_{p25} 0.106 m

D_{p75} 0.319 m

t_{p25} 340.230 s

t_{p75} 6.521 s

a_{p50} 0.828 m²

V_{p75} 0.099 m³

V_{p25} 0.033 m³

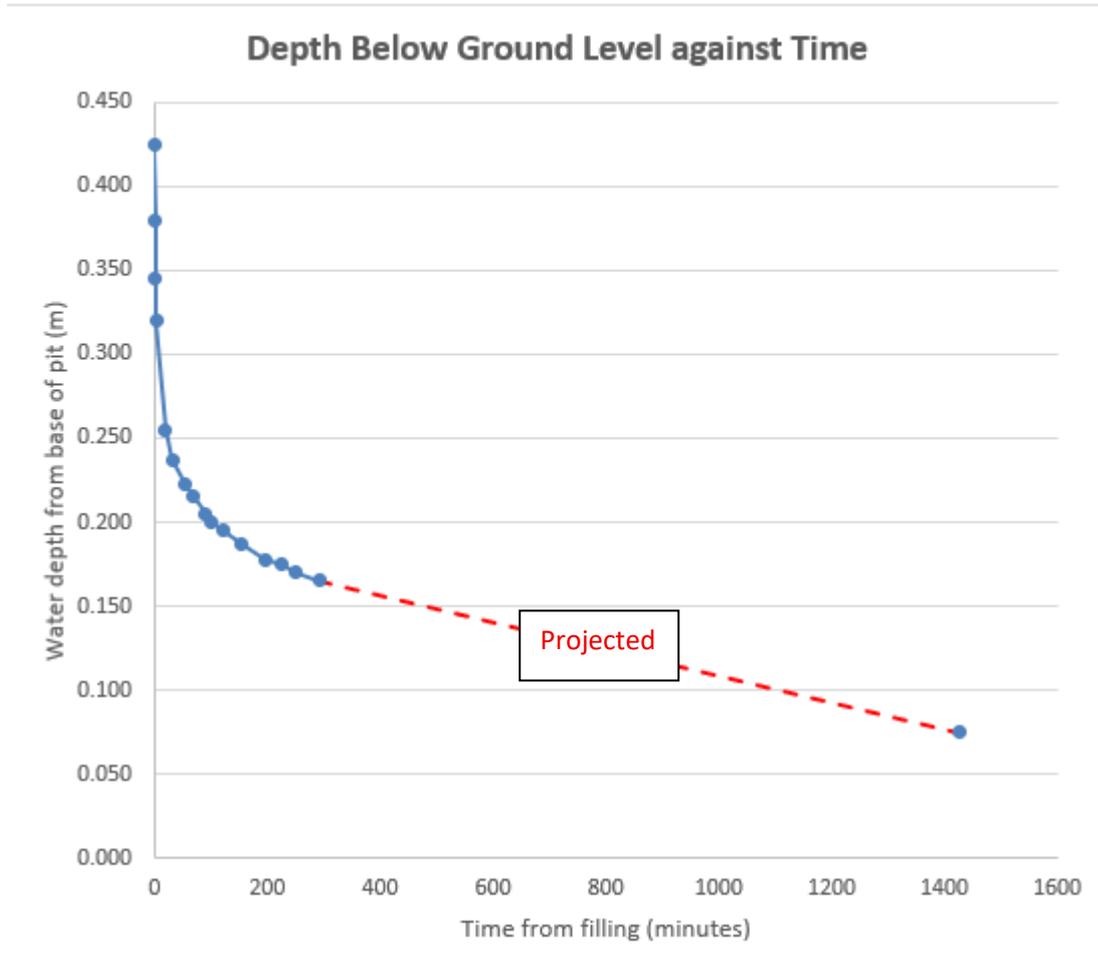
V_{p75-25} 0.066 m³

Infiltration rate 3.968E-06 m/s

Test Data

Time (of day)			Depth to water (m)
H	M	S	
10	6	:18	0.10
10	6	:59	0.14
10	7	:45	0.15
10	8	:25	0.17
10	9	:52	0.19
10	11	:11	0.20
10	13	:22	0.21
10	15	:20	0.22
10	17	:11	0.23
10	19	:14	0.23
10	22	:10	0.24
10	28	:0	0.26
10	29	:49	0.26
10	33	:2	0.27
10	49	:2	0.29
11	11	:20	0.31
11	22	:22	0.32
11	37	:16	0.33
11	44	:36	0.34
11	50	:28	0.34
11	56	:27	0.34
12	15	:5	0.35
12	26	:24	0.36
12	51	:49	0.37
12	57	:2	0.37
13	9	:5	0.37
13	21	:35	0.38
13	51	:10	0.39
14	27	:15	0.40
14	48	:4	0.41
15	22	:27	0.41
15	52	:52	0.42

Appendix 1: Test data, pit Q test 1



Pit length 0.970 m
 Pit width 0.320 m
 Pit depth 0.555 m

Max water depth 0.425 m

D_{eff} 0.425 m
D_{p25} 0.106 m
D_{p75} 0.319 m
t_{p25} 1031.385 s
t_{p75} 3.713 s

Infiltration rate 1.316E-06 m/s

Test Data

Time (of day)

H	M	S	Depth to water (m)
11	15	:3	0.10
11	15	:55	0.15
11	17	:4	0.18
11	18	:28	0.21
11	33	:52	0.27
11	46	:26	0.29
12	9	:30	0.30
12	23	:39	0.31
12	45	:0	0.32
12	54	:35	0.33
13	17	:22	0.33
13	47	:41	0.34
14	30	:27	0.35
15	0	:26	0.35
15	25	:40	0.36
16	6	:32	0.36
35	0	:0	0.45

Appendix 2: Site photographs

Photo 1 Pit A What3Words location



renovated.roadmap.belly
50°56'42.9900"N, 0°9'44.9856"W

Photo 2 Pit A after reinstatement



Photo 3 Pit A ground water



Photo 4 Pit A extracted clay mouldable by hand and damp.



Photo 5 Pit P left of IBC (reinstated pit A right of shed)



Photo 6 Pit P side elevation



Photo 7 Pit P What3Words location

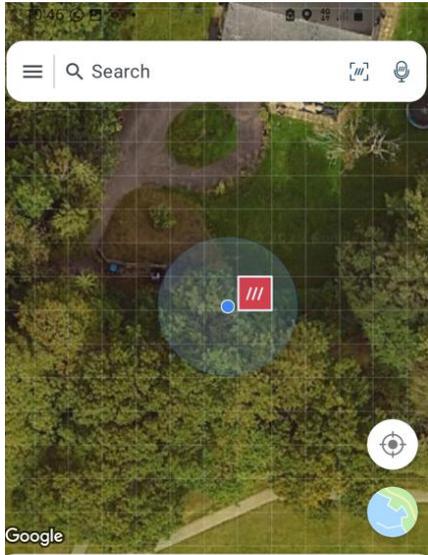
Photo 8 Pit P from above



///confident.sulky.cries

50°56'43.0872"N, 0°9'45.4464"W

Photo 9 Pit Q What3Words location. Photo 10 Pit Q location.



///protests.united.measuring 
50°56'41.4384"N, 0°9'46.6776"W

Photo 11 Pit Q from above



Photo 12 Pit Q side elevation



Photo 13 Pit Q clay excavated



Photo 14 Looking towards Pit P and A from side of garden.

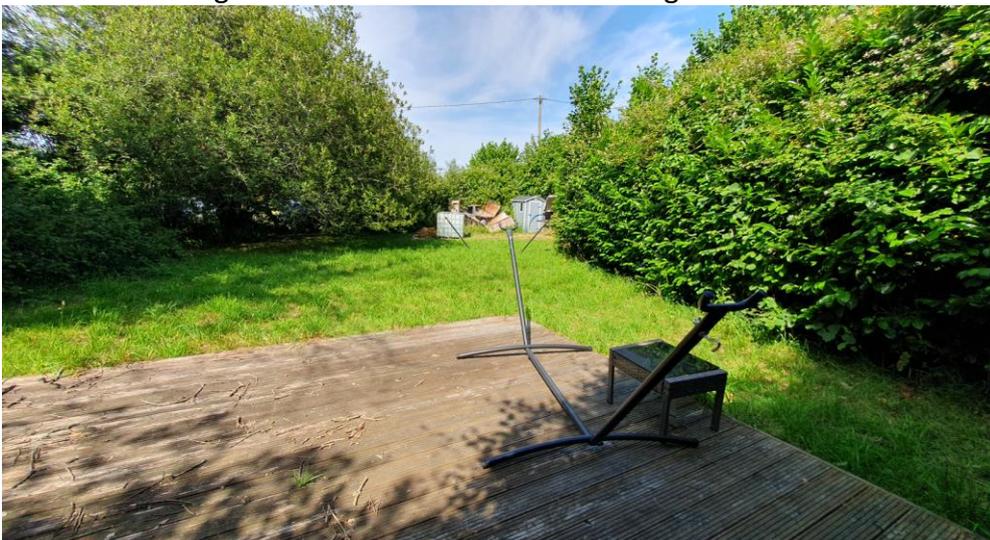
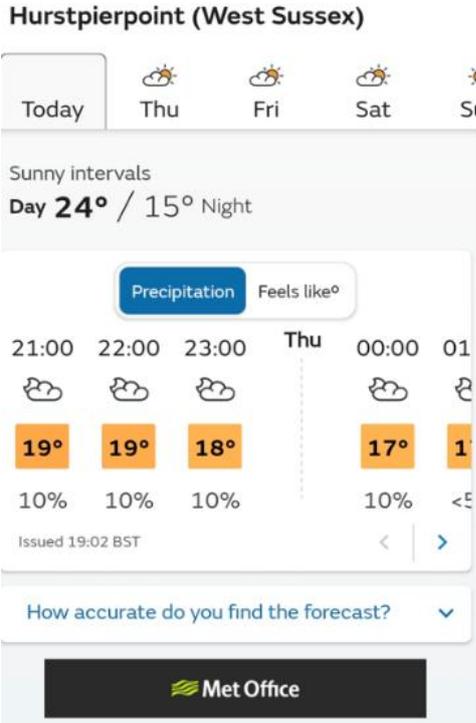


Photo 15 Carefully avoided, previously broken manhole cover outside Ruckford House



Photo 16 Met Office Forecast Wed 25th June



APPENDIX D – Causeway Flow Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	45	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.350
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	200.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1		5.00	29.000	450	529146.143	117804.001	0.500
2	0.011	5.00	29.000	1200	529161.280	117800.326	0.630
4			29.000	1200	529173.865	117797.223	0.738
5	0.006	5.00	29.000	450	529151.826	117812.484	0.500
6			29.000	1200	529163.625	117809.951	0.601
7	0.005	5.00	29.000	1200	529175.462	117806.077	0.828
Carpark infiltrating	0.052	5.00	28.700		529180.181	117806.605	0.700

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)
1.000	1	2	15.577	0.600	28.500	28.370	0.130	120.0	150	5.28
1.001	2	4	12.962	0.600	28.370	28.262	0.108	120.0	150	5.52
1.002	4	7	8.997	0.600	28.262	28.172	0.090	100.0	150	5.67
2.000	5	6	12.068	0.600	28.500	28.399	0.101	120.0	150	5.22
2.001	6	7	12.455	0.600	28.399	28.295	0.104	120.0	150	5.45
1.003	7	Carpark infiltrating	4.748	0.600	28.172	28.000	0.172	27.6	150	5.71

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.916	16.2	0.0	0.350	0.480	0.000	0.0	0	0.000
1.001	0.916	16.2	9.0	0.480	0.588	0.011	0.0	80	0.940
1.002	1.005	17.8	8.9	0.588	0.678	0.011	0.0	75	1.006
2.000	0.916	16.2	5.3	0.350	0.451	0.006	0.0	59	0.820
2.001	0.916	16.2	5.2	0.451	0.555	0.006	0.0	58	0.816
1.003	1.923	34.0	17.8	0.678	0.550	0.022	0.0	77	1.945

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	15.577	120.0	150	Circular	29.000	28.500	0.350	29.000	28.370	0.480
1.001	12.962	120.0	150	Circular	29.000	28.370	0.480	29.000	28.262	0.588
1.002	8.997	100.0	150	Circular	29.000	28.262	0.588	29.000	28.172	0.678
2.000	12.068	120.0	150	Circular	29.000	28.500	0.350	29.000	28.399	0.451
2.001	12.455	120.0	150	Circular	29.000	28.399	0.451	29.000	28.295	0.555
1.003	4.748	27.6	150	Circular	29.000	28.172	0.678	28.700	28.000	0.550

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	450	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.002	4	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
2.000	5	450	Manhole	Adoptable	6	1200	Manhole	Adoptable
2.001	6	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
1.003	7	1200	Manhole	Adoptable	Carpark infiltrating		Junction	

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	240	Check Discharge Volume	x
Summer CV	1.000	Additional Storage (m³/ha)	0.0		
Analysis Speed	Normal	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Carpark infiltrating Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.01420	Safety Factor	5.0	Invert Level (m)	28.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	1268

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	520.0	520.0	0.570	520.0	520.0	0.571	0.0	520.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 15 minute summer	516.529	146.160
100 year +45% CC 30 minute summer	346.403	98.020
100 year +45% CC 60 minute summer	237.326	62.718
100 year +45% CC 120 minute summer	143.135	37.826
100 year +45% CC 180 minute summer	109.115	28.079
100 year +45% CC 240 minute summer	85.927	22.708
100 year +45% CC 360 minute summer	65.335	16.813
100 year +45% CC 480 minute summer	51.430	13.592

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 600 minute summer	42.107	11.517
100 year +45% CC 720 minute summer	37.511	10.053
100 year +45% CC 960 minute summer	30.730	8.092
100 year +45% CC 1440 minute summer	22.208	5.952
100 year +45% CC 2160 minute summer	15.821	4.372
100 year +45% CC 2880 minute summer	13.116	3.515
100 year +45% CC 4320 minute summer	9.900	2.588
100 year +45% CC 5760 minute summer	8.179	2.094
100 year +45% CC 7200 minute summer	7.003	1.787
100 year +45% CC 8640 minute summer	6.178	1.576
100 year +45% CC 10080 minute summer	5.575	1.422

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	1	28.500	0.000	0.0	0.0000	0.0000	OK
1440 minute summer	2	1260	28.471	0.101	0.7	0.1147	0.0000	OK
1440 minute summer	4	1260	28.471	0.209	0.7	0.2368	0.0000	SURCHARGED
15 minute summer	5	10	28.561	0.061	5.3	0.0098	0.0000	OK
1440 minute summer	6	1260	28.471	0.072	0.4	0.0819	0.0000	OK
1440 minute summer	7	1260	28.471	0.299	1.4	0.3386	0.0000	SURCHARGED
1440 minute summer	Carpark infiltrating	1260	28.471	0.471	6.6	73.5335	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Link Vol (m ³)
15 minute summer	1	1.000	2	0.0	0.000	0.0797
1440 minute summer	2	1.001	4	0.7	0.468	0.1962
1440 minute summer	4	1.002	7	0.7	0.467	0.1584
15 minute summer	5	2.000	6	5.3	0.783	0.0812
1440 minute summer	6	2.001	7	0.4	0.386	0.1620
1440 minute summer	7	1.003	Carpark infiltrating	3.4	0.523	0.0836
1440 minute summer	Carpark infiltrating	Infiltration		0.4		

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	45	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.350
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	200.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
outfall	0.010	5.00	28.700	529180.181	117806.605	0.700

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	240	Check Discharge Volume	x
Summer CV	1.000	Additional Storage (m³/ha)	0.0		
Analysis Speed	Normal	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0

Node outfall Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	28.000
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)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1.0	1.0	0.570	1.0	1.0	0.571	0.0	1.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	75.572	21.384	1 year 960 minute summer	7.243	1.907
1 year 30 minute summer	49.095	13.892	1 year 1440 minute summer	5.339	1.431
1 year 60 minute summer	33.473	8.846	1 year 2160 minute summer	3.925	1.085
1 year 120 minute summer	25.660	6.781	1 year 2880 minute summer	3.359	0.900
1 year 180 minute summer	21.569	5.550	1 year 4320 minute summer	2.707	0.708
1 year 240 minute summer	17.938	4.740	1 year 5760 minute summer	2.368	0.606
1 year 360 minute summer	14.448	3.718	1 year 7200 minute summer	2.131	0.544
1 year 480 minute summer	11.660	3.081	1 year 8640 minute summer	1.963	0.501
1 year 600 minute summer	9.685	2.649	1 year 10080 minute summer	1.842	0.470
1 year 720 minute summer	8.711	2.335			

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	outfall	1	28.000	0.000	1.2	0.0000	0.0000	OK

APPENDIX E – SuDS Maintenance Schedule

STAFF ACCOMMODATION, HURSTPIERPOINT COLLEGE
PROPOSED MAINTENANCE & INSPECTION SCHEDULE FOR BELOW GROUND DRAINAGE
(FOUL WATER AND SURFACE WATER) INCLUDING SUSTAINABLE DRAINAGE SYSTEMS (SuDS)

Item	Required Maintenance/Monitoring	Suggested Frequency	Responsibility
Foul Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures	As required	Specialist
Surface Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures.	As required	Specialist
Surface Water Catch Pits	Check silt traps and inspection chambers and note the rate of sediment accumulation. Remove sediment if present.	Every month for the first year and then annually, or as conditions require	Facilities Management
Permeable Paving	Sweep clean of debris.	Every six months	Facilities Management
	Remove fines from paving using a suction road sweeper (Asphalt only)	Every 5 years or as required	Specialist
	Weed removal (Block paving only)	Every six months	Facilities Management
General	Remove sediment, litter, debris and vegetation from the surface of pathways areas	As necessary and after heavy rainfall	Facilities Management
Flood Flow Routes	Ensure flood flow routes are not obstructed (i.e. lower lying portions of the land that will direct surface water runoff away from vulnerable assets in the event of drainage failure).	Every year and during periods of heavy rainfall	Facilities Management

NOTES

The facilities management team will be responsible for the implementation of the maintenance schedule for below ground drainage, by appointing appropriate persons and/or sub-consultants that are qualified to undertake these operations.

Maintenance is to be carried out by the facilities management team or by a specialist contractor, as noted in Responsibility column above.

This maintenance schedule has been produced with reference to the guidelines outlined in 'The SuDS Manual' (CIRIA C753: 2015). The suggested frequency of maintenance is considered a guide, and should not replace the guidance from manufacturers of proprietary systems.

Refer to Engineering drawings for location and details of below ground drainage assets and SuDS features.