

SuDSmart Plus



Sustainable Drainage Assessment

Site Address

Land to the rear of 43 Wivelsfield Road
Haywards Heath
West Sussex
RH16 4EN

Date

12/03/2025

Report Status

FINAL

Grid Reference

533464, 122951

Site Area

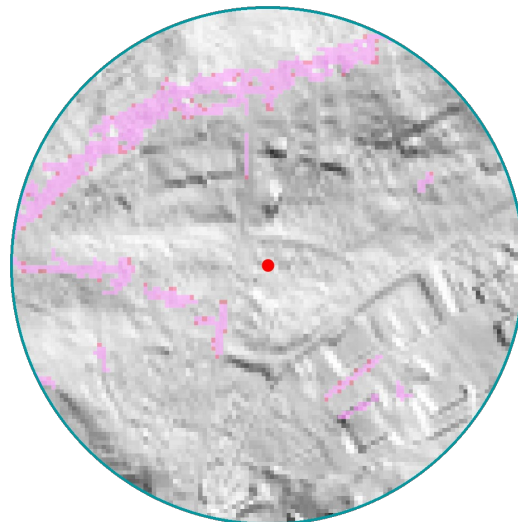
370 m²

Report Prepared for

Proteus Management

Report Reference

85116R1



Infiltrate into ground

The proposed Sustainable Drainage Scheme (SuDS) strategy is comprised of a rainwater harvesting butt, permeable paving and a soakaway to attenuate surface water runoff during the 1 in 100 plus 45% climate change event.

A site investigation should be conducted to confirm the infiltration capacity of the ground in line with BRE 365 guidelines to confirm the infiltration rate and the groundwater level.

Foul water will discharge to the nearby foul sewer subject to confirmation from Southern Water.

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1 Executive summary



This report assesses the feasibility of a range of Sustainable Drainage Scheme (SuDS) options in support of the Site development process. A SuDS strategy is proposed to ensure surface water runoff can be managed effectively over the lifetime of the development.

SuDS suitability

Risk	Issue	Result
Discharge Location	What is the infiltration potential at the Site?	High
	What is the potential to discharge to surface water features?	Low
	What is the potential to discharge to sewers?	High
	What is the potential to discharge to highway drains?	Medium
Flooding	What is the river (fluvial) flood risk at the Site?	Very Low
	What is the surface water (pluvial) flood risk at the Site?	Very Low
	What is the groundwater flood risk at the Site?	Negligible
Pollution	Is the groundwater a protected resource?	No
	Is the surface water feature a protected resource?	N/A

Summary of existing and proposed development

The Site is currently used within an auxiliary residential capacity. At present the Site consists of an access road, car park and garage. Development proposals comprise the demolition of the garage along with the construction of a three-bedroom dwelling to the east of the Site. Site plans and drawings are provided in Appendix A.

Summary of discharge routes

GeoSmart's SuDS Infiltration Potential (SD50) map indicates the Site has a High potential for infiltration, primarily due to the high permeability of the underlying geology (Upper Tunbridge Wells Sand). Infiltration to ground is therefore feasible.

Ordnance Survey (OS) mapping indicates that there are no surface water features within 100 m of the Site. Therefore, discharge to surface water feature is not feasible.

The asset location plan search included in Appendix C confirms the Site is located within 30 m of the public surface water sewer network. Due to the short distance to nearby sewers discharging surface water runoff to the sewer is feasible.

According to Google Streetview, highway gullies are located within Wivelsfield Road, indicating the presence of the highway drainage network.

Runoff rate and attenuation requirements

Discharging via infiltration requires 4.58 m³ of attenuation to be provided to ensure there is no flooding as a result of the development in all storm events up to and including the 1 in 100 year including a 45% allowance for climate change. This volume has been calculated using Causeway Flow v.10.7 based on an assumed infiltration rate of 1 x 10⁻⁵ m/s taken from the table 25.1 of the CIRIA SuDS (C753) (2015) as the worst case scenario for 'slightly silty slightly clayey sand' soil type. This is subject to the results of infiltration testing and would ensure runoff is not increased above the greenfield scenario.

Discharging off-Site requires 2.47 m³ of attenuation to be provided to ensure there is no flooding within the development in all storm events up to and including the 1 in 100 year including a 45% allowance for climate change. This volume is subject to the discharge rate being restricted to 1.0 l/s (as close to the Greenfield 1 in 1 year rate as possible, without increasing the potential for blockages).

Proposed SuDS strategy

SuDS features comprised of a rainwater harvesting butt, permeable paving and a soakaway are proposed to attenuate a minimum of 4.58 m³ of surface water runoff. The SuDS features would provide some water quality benefits (interception and filtration) prior to infiltrating to ground. Focused infiltration features should be sited at least 5m from building foundations and from adjacent highways.

The proposed SuDS strategy would ensure surface water runoff is stored on-Site in SuDS features for the 1 in 100 year event including a 45% allowance for climate change and will not cause flooding to the proposed development in accordance with DEFRA's non-statutory technical standards (DEFRA, 2015).

Foul Drainage Strategy

A system for a single house with up to and including 3 bedrooms shall be designed for a minimum population (P) of 5 people. The proposed development has a final P of 5P for a total of 750l per person per day (0.75m³).

The proposed development should discharge to the foul sewer north of the Site following permission from Southern Water to connect.

SuDS & drainage network maintenance

The management and maintenance of the SuDS features, in line with the details and schedules outlined in Section 10 of this report, will be undertaken by contractors appointed by the owners and occupiers of the new residential building, where payments for the works will form part of the property deeds and / or rental agreements.

Recommendations / Next steps

A site investigation is required to confirm the infiltration capacity of the ground in line with BRE 365 guidelines to confirm the infiltration rate and the groundwater level.

Where site investigation confirms the underlying ground conditions are not conducive to infiltration, the capacity of the public sewer network should be confirmed with the utility provider and permission to connect gained where required.

Permission to connect the development to the foul sewer network to the west should be gained from Southern Water.

2 Proposed SuDS strategy



The most suitable SuDS options are outlined below and a SuDS strategy schematic is shown overleaf. Supporting information is provided in subsequent sections.

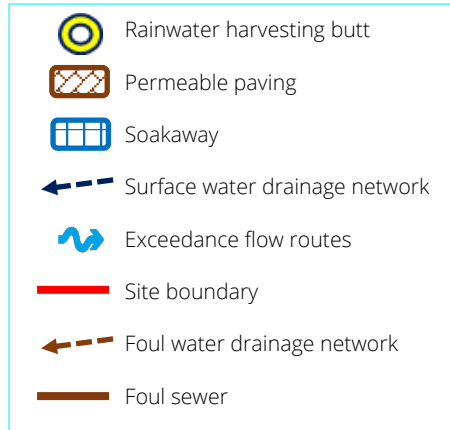
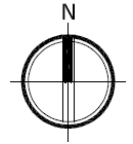
Table 1. Proposed SuDS type, features, discharge location and rate restriction

SuDS type	Source control (interception) and infiltration SuDS.
SuDS features	Rainwater harvesting butt, permeable paving and a soakaway.
Discharge location	Infiltration.
Discharge rate	1×10^{-5} m/s (the worst-case infiltration rate for 'slightly silty, slightly clayey sand' soil types, taken from Table 25.1 of the CIRIA SuDS manual (C753) (2015) – to be confirmed via infiltration testing).

Table 2. Proposed SuDS sizing (dimensions) and attenuation volumes

Rainwater Harvesting	A rainwater harvesting butt should be established for the proposed dwelling. In terms of attenuation storage within this SuDS scheme, the volume of run-off which could be attenuated by rainwater harvesting has not been considered within the strategy.
Permeable paving	A 22 m ² area of permeable paving (underlain with a Type 3 aggregate material) within the proposed patio area surrounding the dwelling. This will be an unfocused infiltration feature reducing the total area of impermeable surfaces, closer mimicking greenfield conditions. As these areas will exclusively drain themselves the volume of attenuation has not been considered.
Soakaway	A soakaway with a width of 2 m, length of 2 m and depth of 1.2 m filled with geo-cellular crates to a 95% void ratio is proposed. This soakaway will provide c. 4.58 m ³ attenuation.
Total Attenuation Provided	4.58 m ³
Total Attenuation Required	4.58 m ³

Figure 1. Proposed SuDS scheme



Surface water from the proposed dwelling will be conveyed into the rainwater harvesting tank. Overflows will be directed towards the soakaway for infiltration into ground.

Exceedance flows are directed towards non-essential, vacant areas on Site.

Foul water will be discharged to the public foul sewer network 5 m west of the Site following permission from Southern Water to connect.



Schematic is not to scale

3 Site analysis



Site location

Figure 2. Aerial Imagery (Bluesky, 2025)

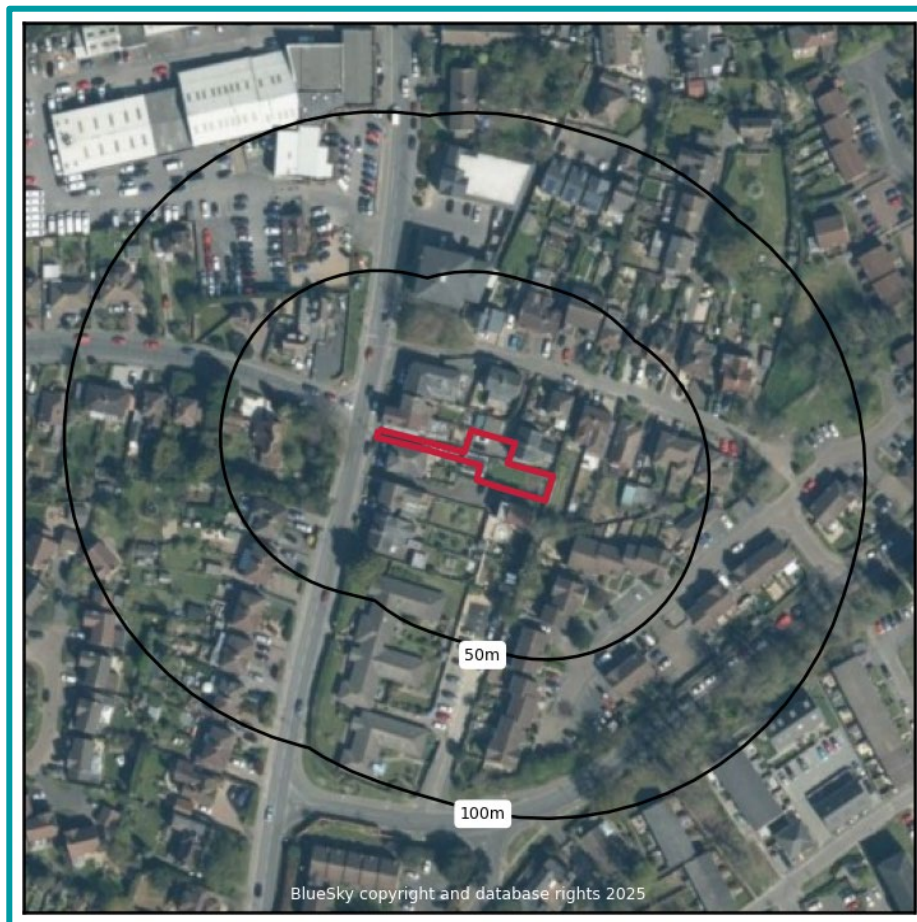
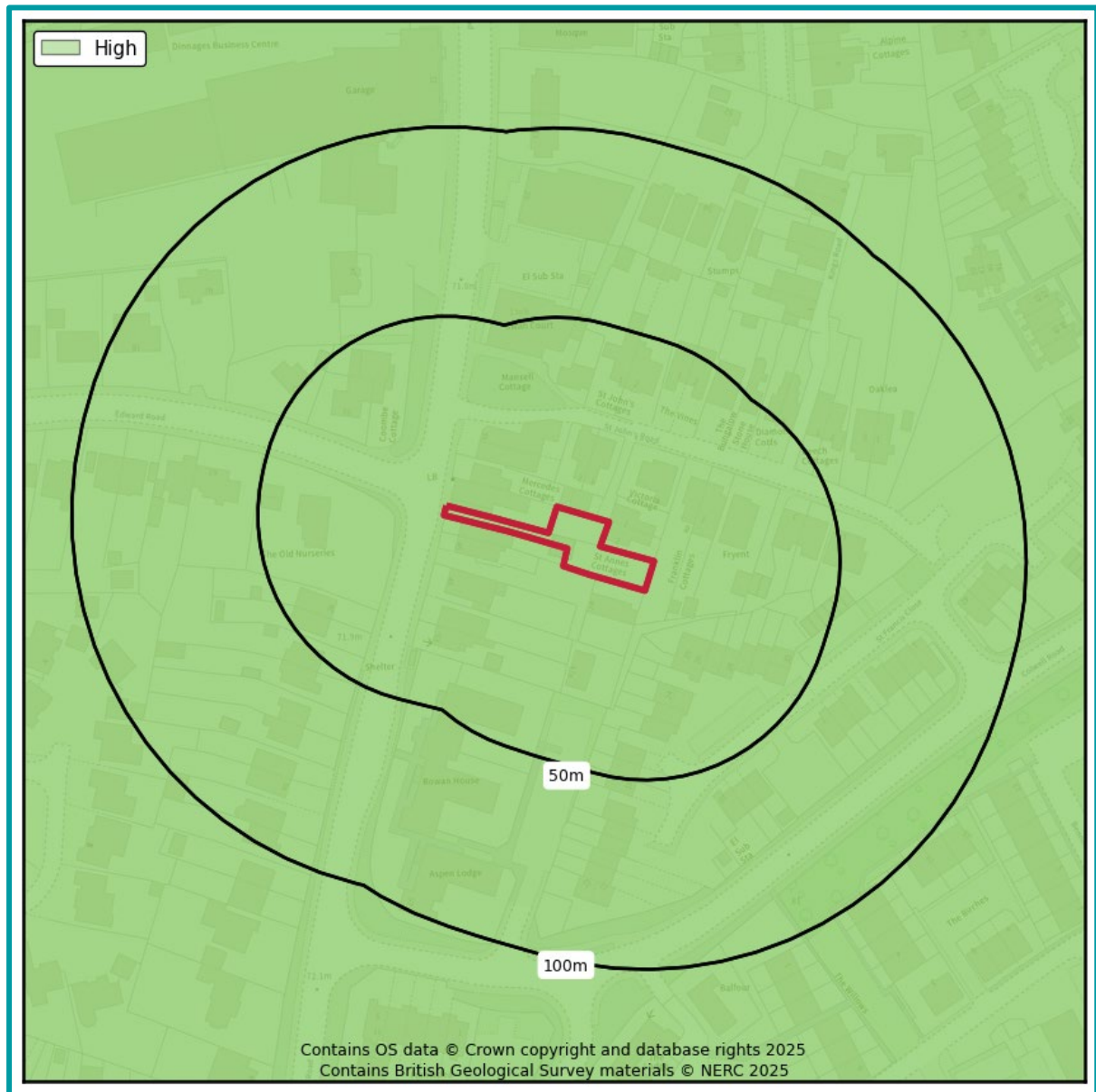


Figure 3. SuDS infiltration suitability (SD50) map (GeoSmart, 2025)



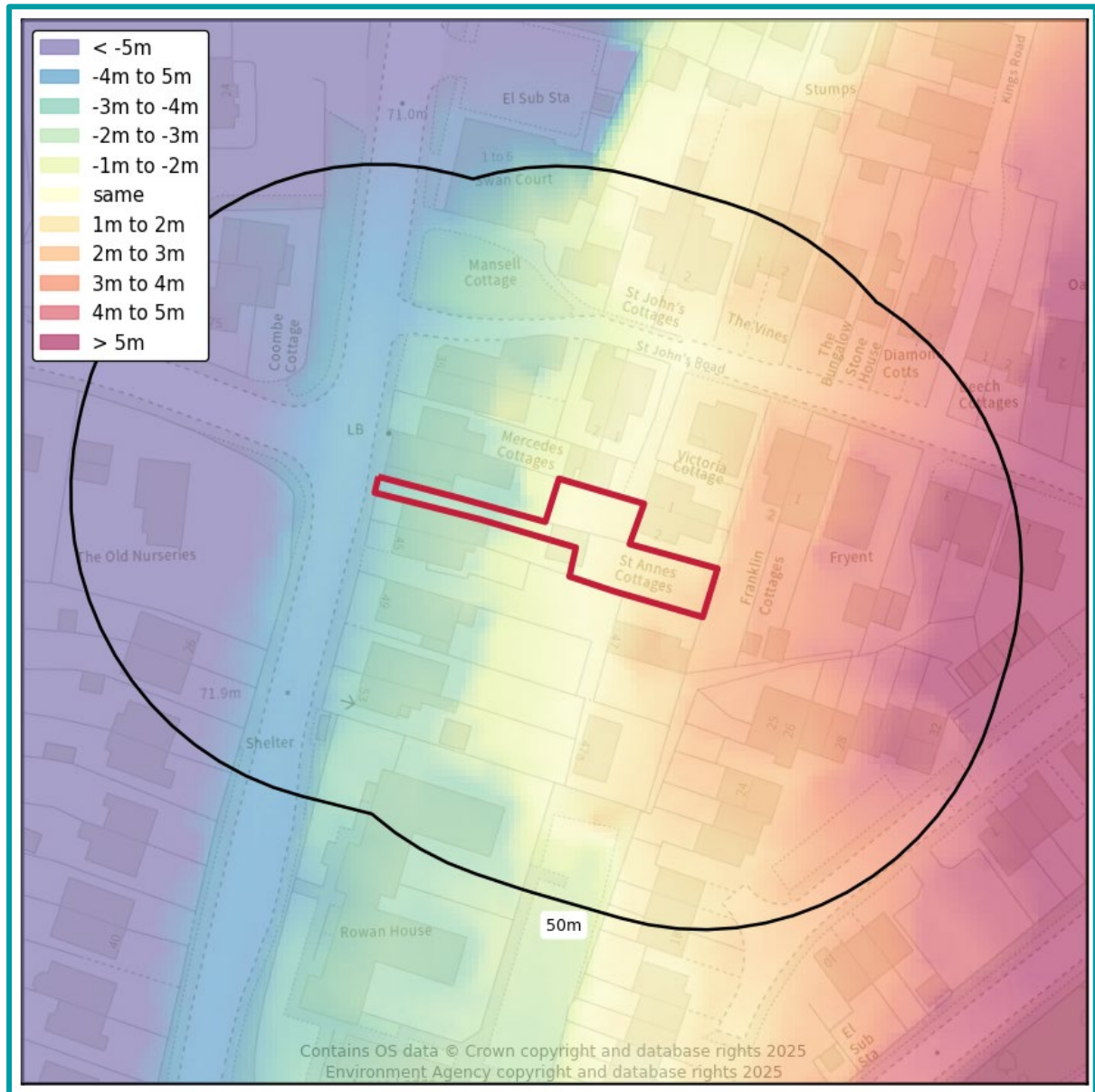
The GeoSmart SuDS Infiltration Suitability Map (SD50) screens the potential for infiltration drainage at the Site and indicates where further assessment is recommended. The map combines information on the thickness and permeability of the underlying material and the depth to the high groundwater table. It supports conceptual Site drainage design and the planning of further Site investigation.

There is a High potential for infiltration SuDS across the Site. It is likely that the underlying geology at the Site has high permeability and an infiltration SuDS scheme has the potential to be possible at the Site.

Groundwater levels are expected to be sufficiently deep at the Site. Although, a Site Investigation is recommended to confirm the infiltration capacity and the depth to

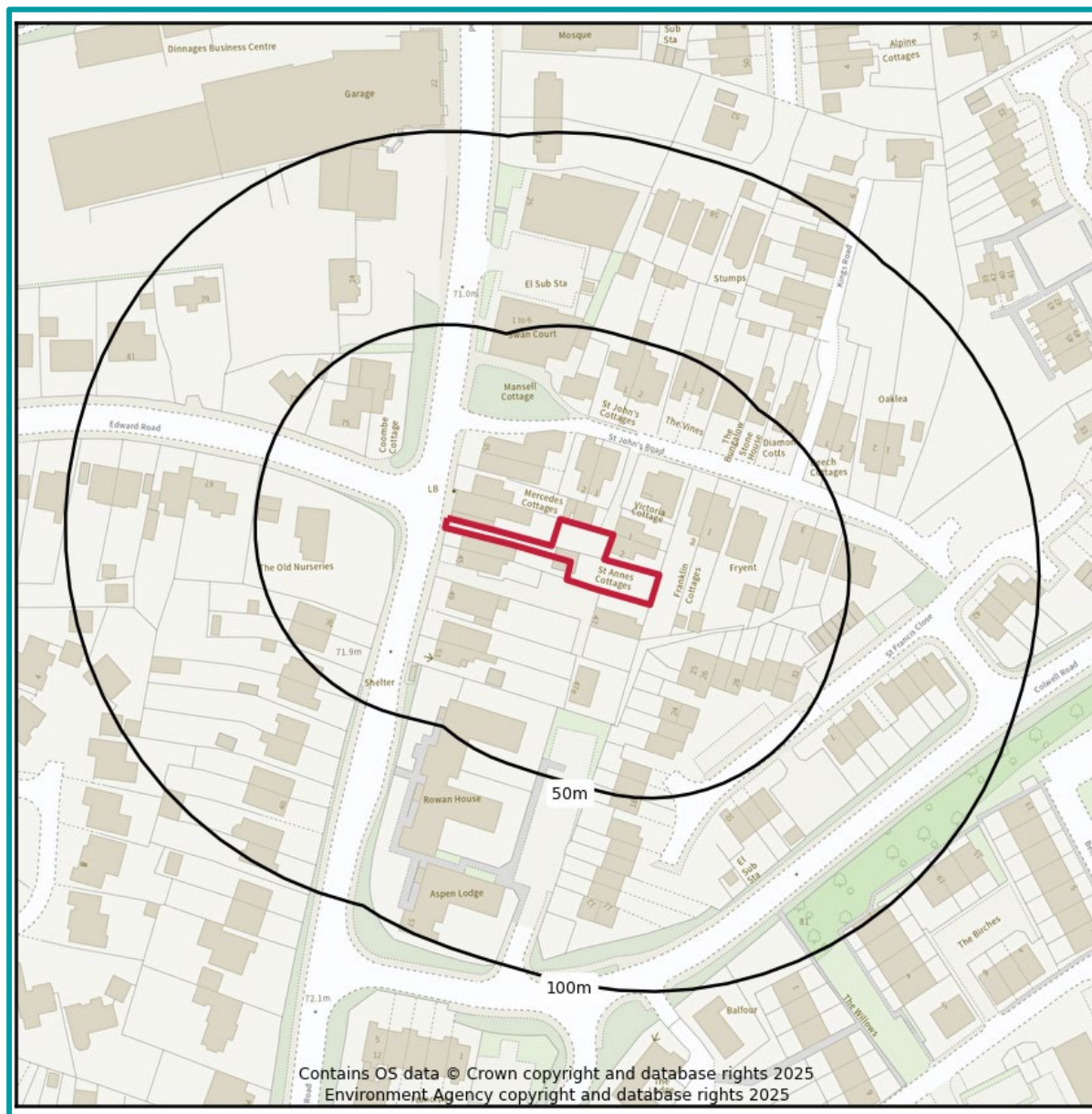
groundwater. Various options can be considered for infiltration SuDS and these include infiltration trenches, soakaways, swales and permeable pavements.

Figure 4. Site topography (GeoSmart, 2025)



An assessment of the topography at the Site has been undertaken using LiDAR DTM5 elevation data to identify the general slope and any localised depressions. The mapping shows a comparison between average ground levels on the Site with ground levels in the surrounding area. The mapping confirms the overall Site is generally falling in a westerly direction.

Figure 5. Source protection zone map (EA, 2025)

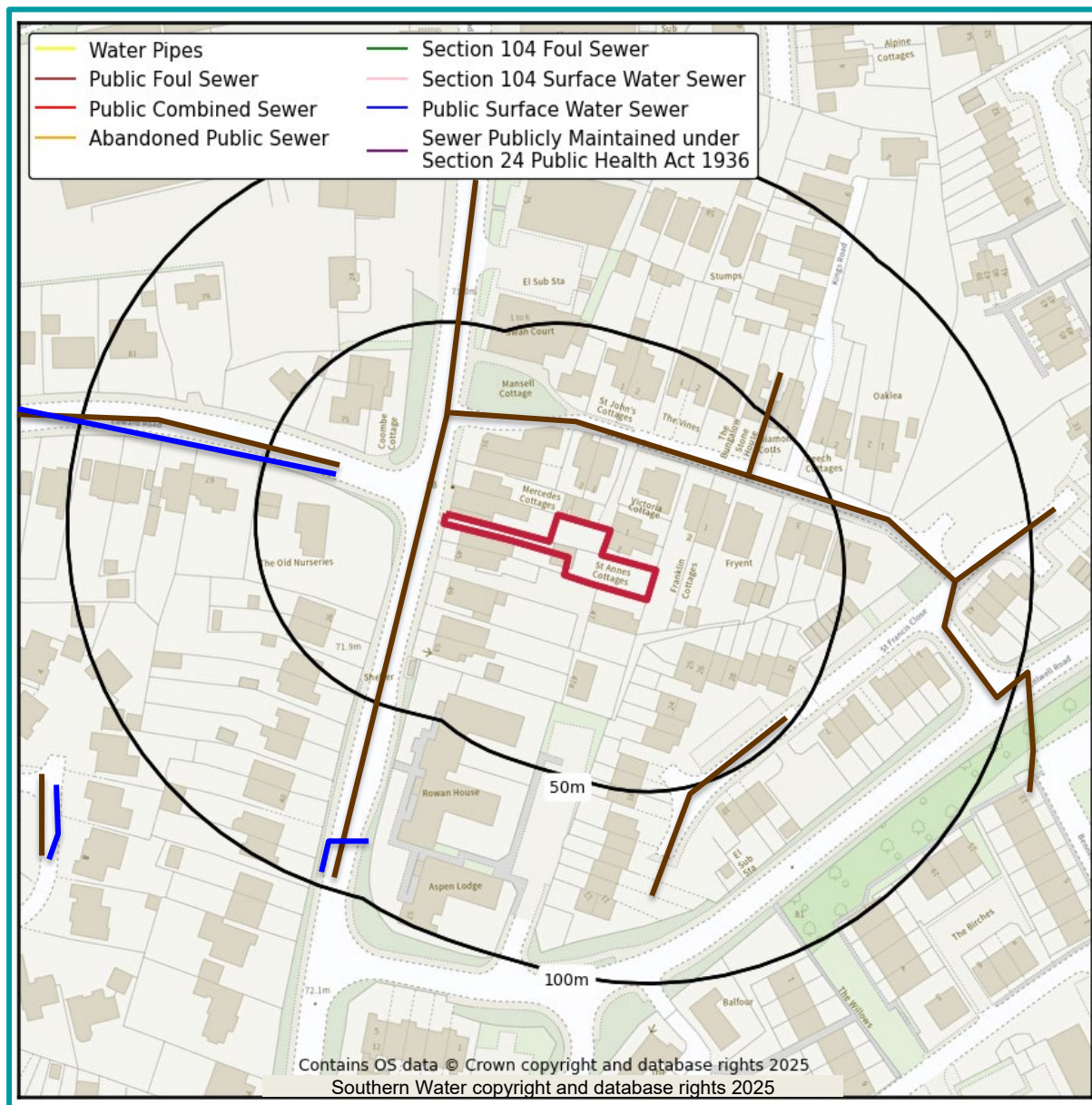


An assessment of the EA's groundwater Source Protection Zones (SPZs) has been undertaken within the vicinity of the Site and confirms the Site is not located within an SPZ.

Infiltration, if possible, is likely to be acceptable providing risk screening identifies suitable mitigation measures, if required, to prevent an impact on water quality from the proposed or historical land use and contaminated land.

If further analysis is required, this would involve a review of Site specific contaminated land data. If hazards are identified, it is recommended that the Local Authority and the Environment Agency are contacted to confirm the susceptibility of any SPZs within the wider area.

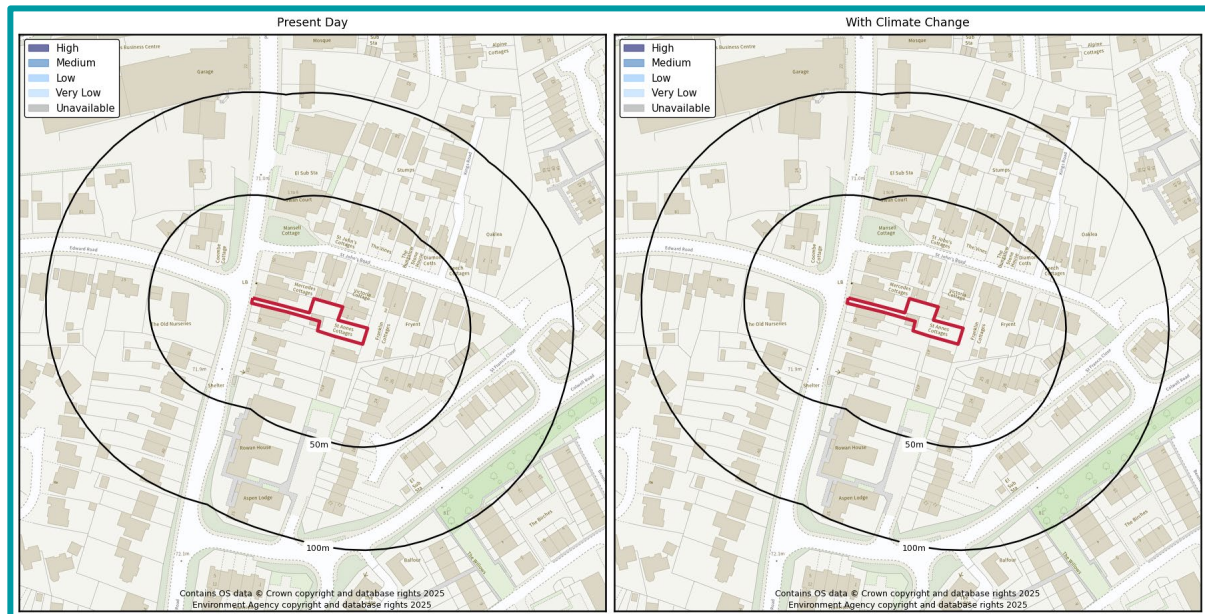
Figure 7. Sewer features map (OS & Southern Water, 2025)



GeoSmart has undertaken an assessment of the location of sewer features within the vicinity of the Site. According to the Southern Water asset location plan there is a public surface water sewer, located approximately 30 m west of the Site. Due to the close proximity, discharge to sewer is likely to be appropriate.

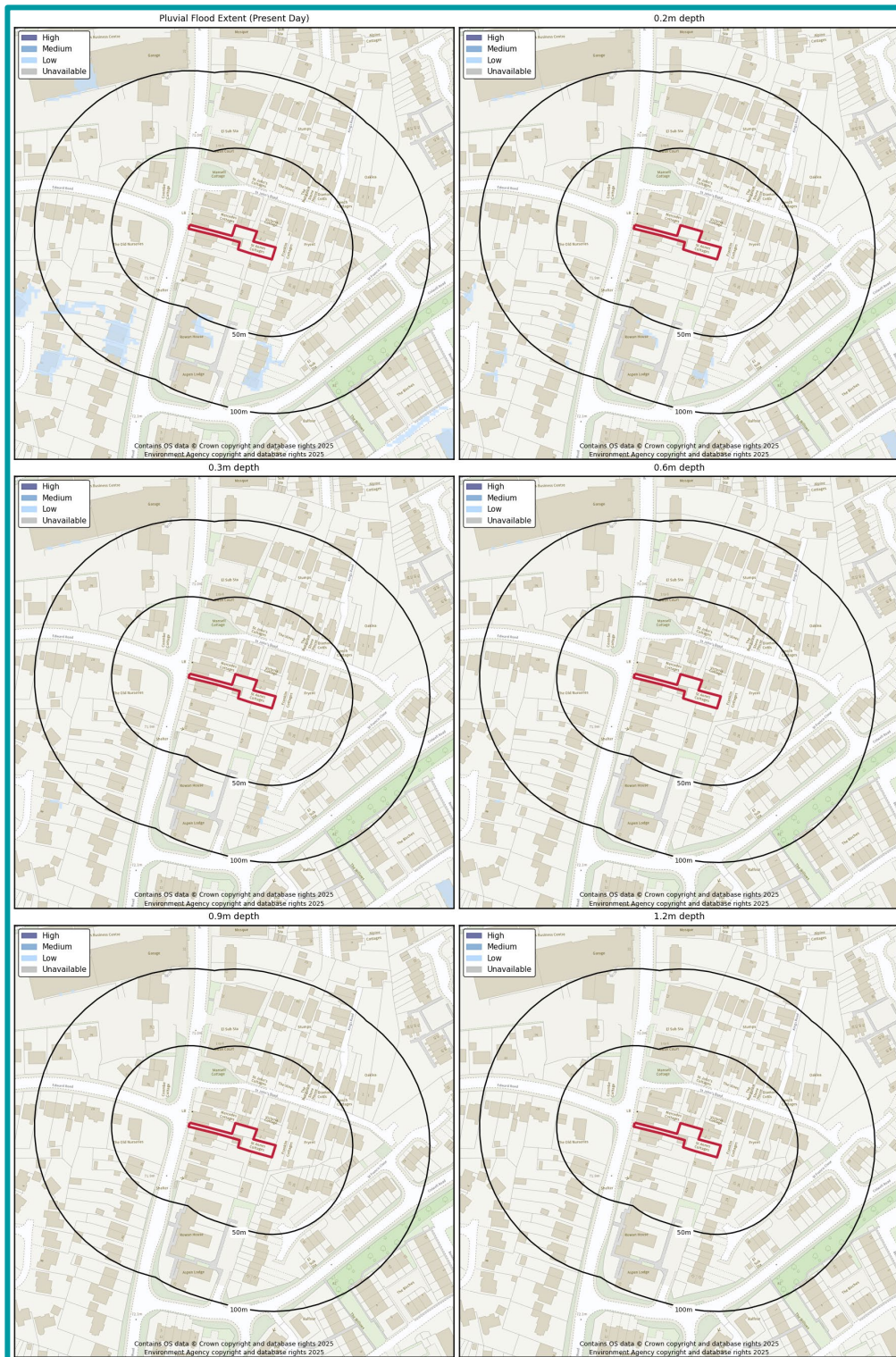
Further analysis of the connections and condition of the public surface water drainage system should be undertaken by carrying out a CCTV survey or by contacting the drainage provider or the Local Council to confirm the presence, location and condition of the sewer. Consultation with the drainage provider would also be required to determine that sufficient capacity is available to accept the proposed discharge, and to gain permission to connect if required.

Figure 8. Risk of flooding from rivers & sea map (EA, 2025)



According to the EA's Risk of Flooding from Rivers and the Sea (RoFRS) map, the Site has a Very Low risk of flooding from fluvial or coastal flooding in both the present day and climate change scenario, with less than 0.1% annual probability of flooding. As such, the SuDS design is unlikely to be affected.

Figure 9. Risk of surface water flooding map (EA,2025)



GeoSmart have undertaken an assessment of the risk of flooding from surface water (pluvial) sources within the vicinity of the Site using the EA's Risk of Flooding from Surface Water (RoFSW) mapping. The EA's mapping confirms the Site is considered to be at Very Low risk of surface water flooding.

Figure 9 shows the present day extent and depth of flooding during the >3.3% annual probability (AEP) (1 in 30 year – High risk), 3.3 – 1% AEP (1 in 100 year – Medium risk) and 1 – 0.1% AEP (1 in 1000 year – Low risk) events. This confirms that there are no areas of the Site which would be affected by surface water flooding.

Further analysis could be undertaken by visiting the Site or by contacting the Local Council and the Environment Agency to confirm the pluvial flood risk, flood depths and velocities where applicable.

As part of RoFSW mapping, climate change modelling has been applied exclusively for the central allowance up to the 2050s epoch. Whilst it should be noted that the risk of pluvial flooding is likely to be greater than this dataset indicates for the lifetime of the development, in the absence of more extensive modelling scenarios this data is considered the best resource at the time of writing.

According to the RoFSW climate change modelling, the Site is modelled to remain at a Very Low risk.

Figure 10. Future risk of surface water flooding map (EA,2025)

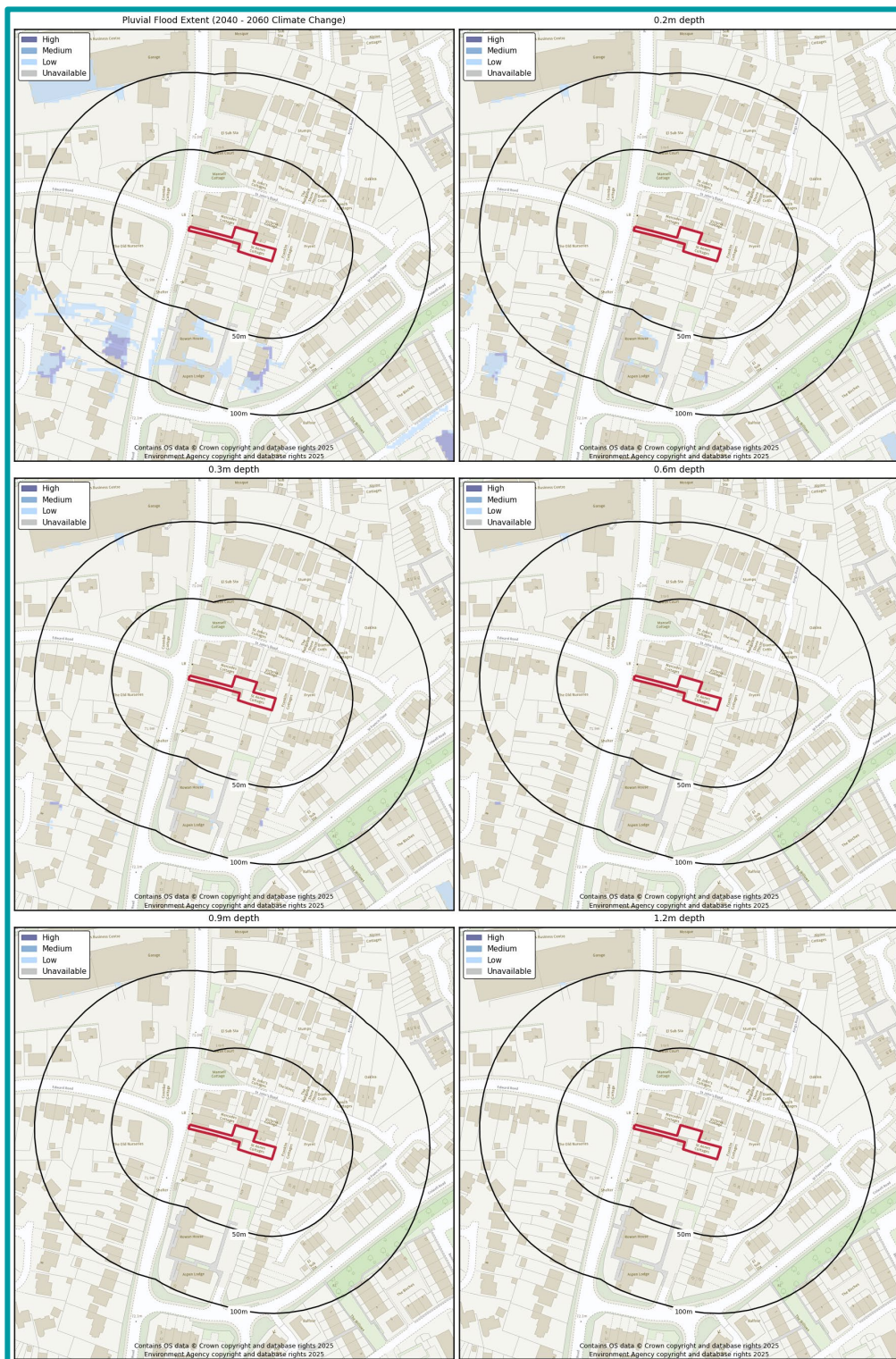
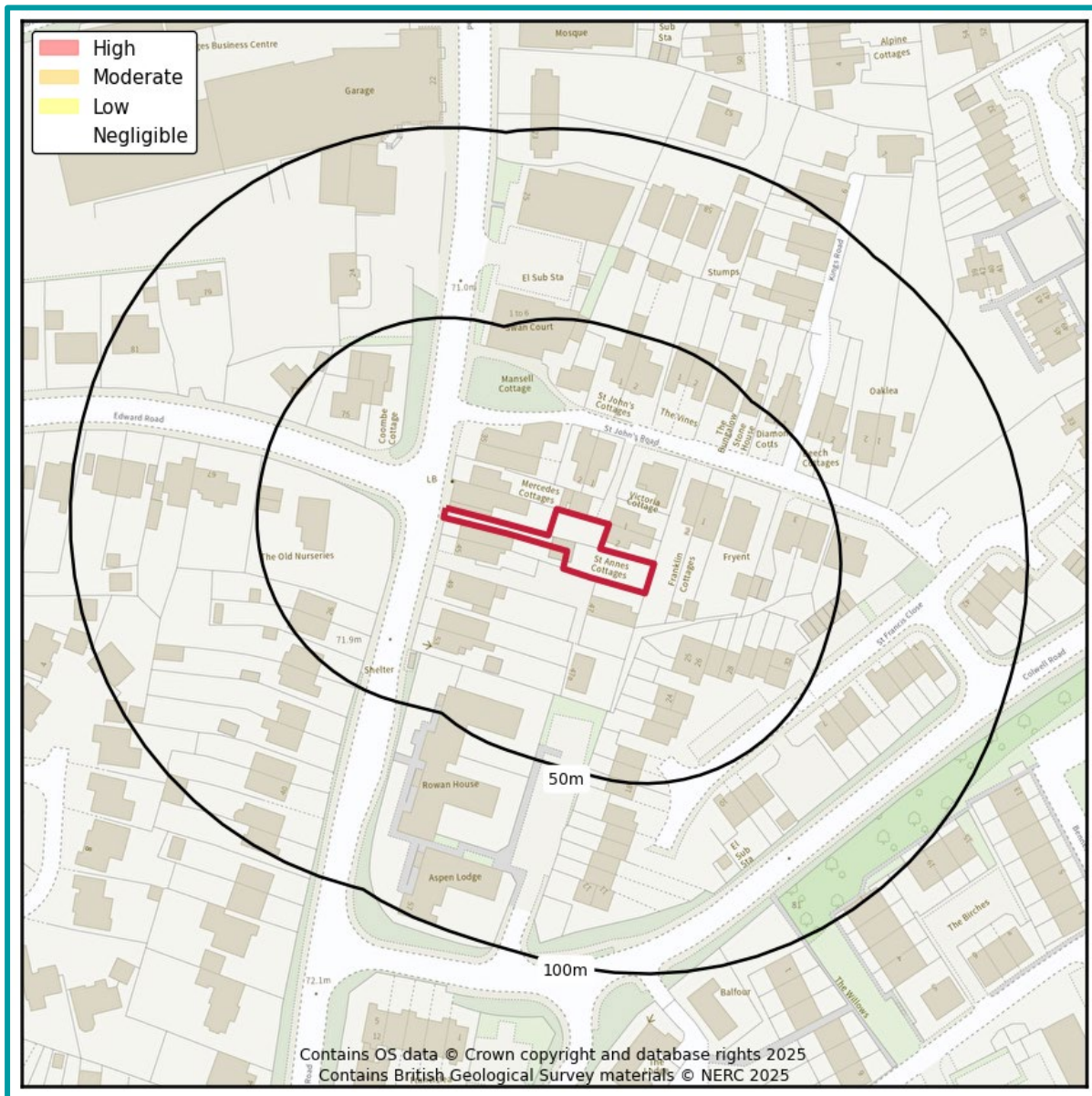


Figure 11. Groundwater flood risk (GW5) map (GeoSmart, 2025)



GeoSmart have undertaken an assessment of the risk of flooding from groundwater within the vicinity of the Site. GeoSmart's Groundwater Flood Risk Screening (GW5) map confirms the Site has a Negligible risk of groundwater flooding during a 1% annual probability (1 in 100 year) event.

4 Site context



Site information

The purpose of this report is to assess the potential for disposing of surface water through a Sustainable Drainage System (SuDS) for the site of Land to the rear of 43 Wivelsfield Road, Haywards Heath, West Sussex, RH16 4EN (the Site). The Site is located on the outskirts of Haywards Heath in a setting of residential use.

The land falls to the west from 77.99 mAOD to 72.11 mAOD. This is based upon a Site-specific topographic survey undertaken by Proteus Management.

Development

The Site is currently used within an auxiliary residential capacity. At present the Site consists of an access road, car park and garage. Development proposals comprise the demolition of the garage along with the construction of a three-bedroom dwelling to the east of the Site. Site plans and drawings are provided in Appendix A.

Geology, permeability and thickness

British Geological Survey (BGS) national superficial and bedrock geology mapping confirms the geological formations underlying the Site and each formation may have a range of permeability.

Table 3. Site Geology

Geology present on-Site		Potentially permeable?
Superficial geology (Figure 11)	No underlying superficial deposits	N/A
Bedrock geology (Figure 12)	Upper Tunbridge Wells Sand (UTW) - mudstone, siltstone and sandstone (interbedded)	✓

The permeability of the underlying material at the Site shown within the BGS mapping is high, confirmation of the infiltration capacity is required.

The BGS website was used to extract ground information from the nearest and most relevant borehole record to the Site (ref: TQ32SW35). This borehole is located approximately 475 m to the north-east of the Site at an elevation of approximately 95 mAOD.

It should be noted that the borehole was drilled a reasonable distance (>250 m) from the Site and therefore is unlikely to be fully representative of the underlying Site conditions; however, it has been included for completion in the absence of more relevant data.

Table 4. Summary of BGS borehole information

Strata encountered	BGS borehole TQ32SW35
	Base of strata (m bgl)
Brown silty soil	2.0
Yellow and brown sand	7.0
Yellow sand and clay	9.0
Grey clay, yellow at base	11.0
Yellow sand	12.0
Light grey yellow clay	15.0
Buff sands	18.0
No returns, lost circulation	24.0
Black clay	25.0
No returns, lost circulation	30.8
Red siltstone	36.0
Grey shale/mudstone	39.0
Grey shale/mudstone and red siltstone	47.0
No returns, lost circulation	49.0
Grey/red siltstone	50.0
Grey black green siltstone/clay	54.0
Grey mudstone	56.0
Grey sandstone/sands	60.0
Shale/mudstone	62.0

Strata encountered	BGS borehole TQ32SW35
	Base of strata (m bgl)
Clay/mudstone	63.0
Mudstone and thin siltstone	99.0
Sands and shales	106.0
No returns, lost circulation, hard band at 115 m	129.8

Infiltration SuDs are proposed directly into a bedrock aquifer.

The soil infiltration coefficient must be sufficient to accommodate the constraints on the dimensions of the soakaway and its emptying time.

Figure 12. Superficial Geology (BGS, 2025)

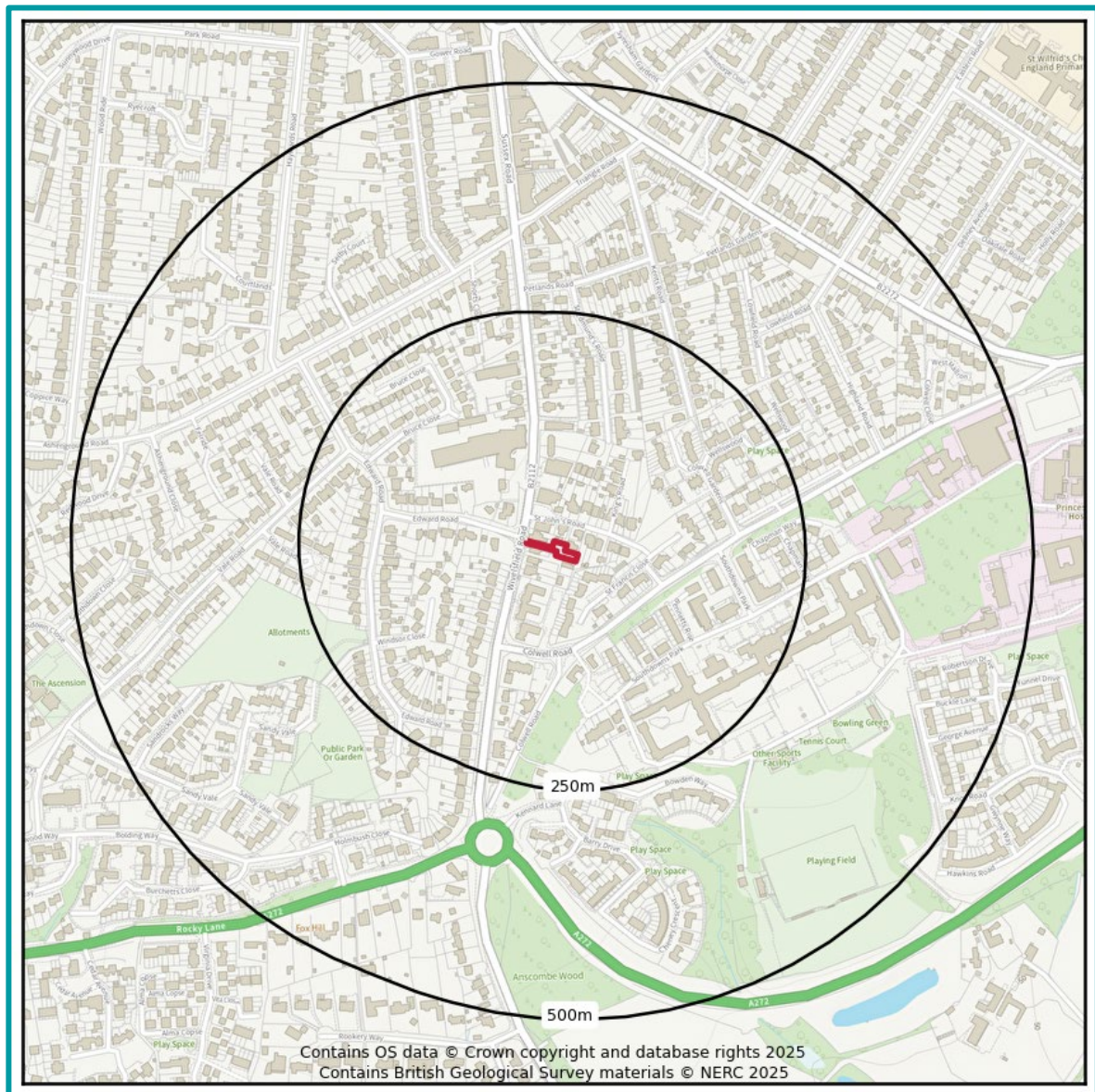
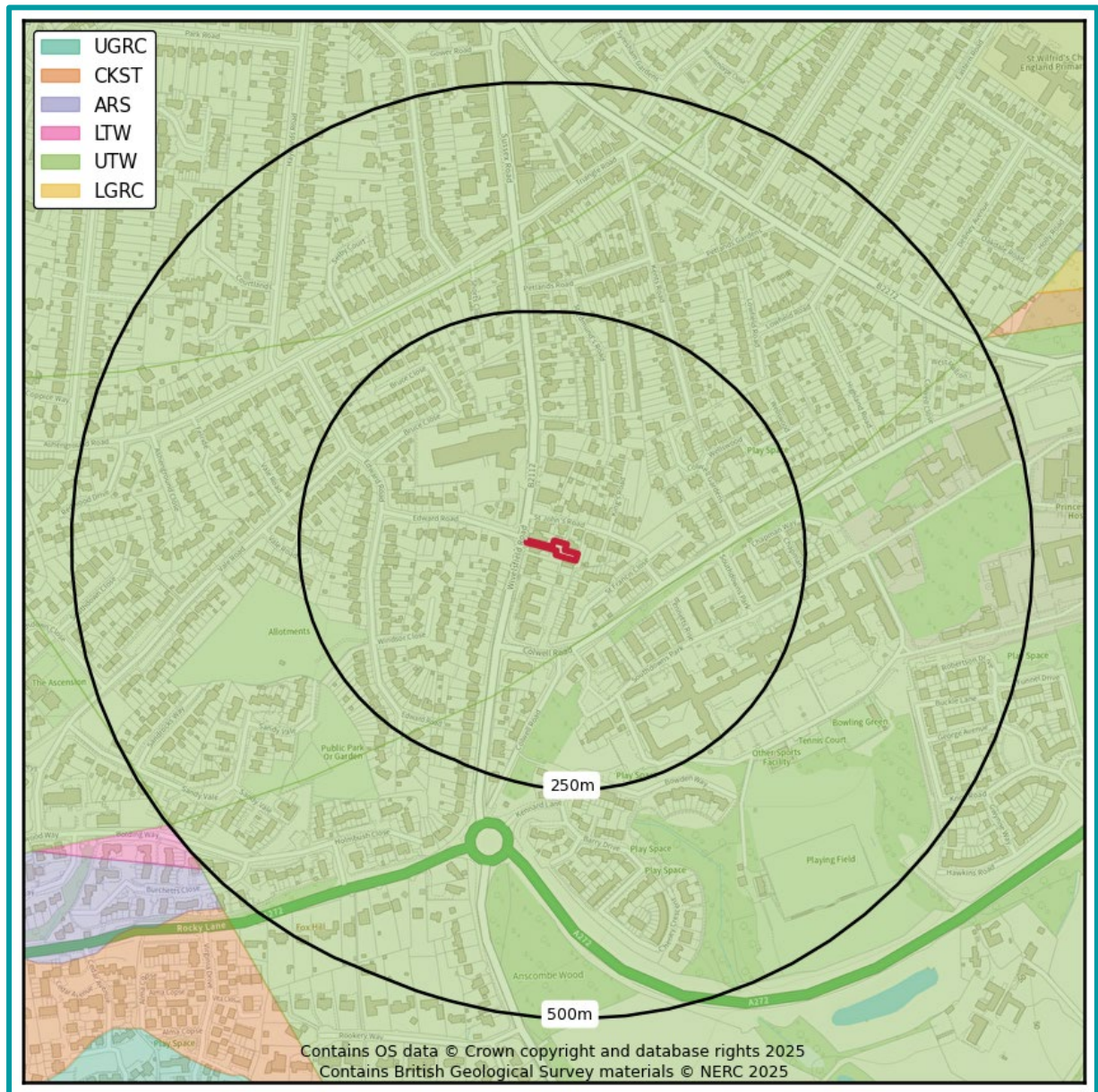


Figure 13. Bedrock Geology (BGS, 2025)



Depth to groundwater

The SuDS system should be designed to operate in periods of extreme groundwater levels.

BGS borehole TQ32SW35 records a resting water level of 50.5 m bgl on completion, approximately within the siltstone, clay or mudstone layer.

According to borehole data and GeoSmart's Groundwater Flood Risk (GW5) map, shallow groundwater is unlikely to be an issue at the Site.

The base of the infiltration system needs to be 1 m above the expected seasonal high-water table. Passage through unsaturated soil is important for improving the quality of infiltrating water before it reaches the water table.

Ground conditions

A proportionate site-specific review of underlying ground conditions is recommended to ensure focused infiltration does not cause ground instability as a result of landslide or collapse associated with dissolution or shallow mining. Hazards that should be considered include soluble rocks, landslides, compressible ground, collapsible ground, shrink-swell clays, running sand and shallow mining.

Soakaways should be a minimum of 5 m away from the foundations of a building and local guidance may recommend a greater distance.

Water quality

The Site does not lie within an SPZ. The infiltrated water quality should be of sufficient quality that it does not give rise to pollution of the underlying groundwater. Further consultation with the water company is unlikely to be required.

Infiltration systems should not be used where there is a risk of contaminating groundwater by infiltrating polluted runoff or where receiving groundwater is particularly sensitive.

The influence of surface runoff on water quality will depend on whether there is a source of contamination on-Site and the sensitivity of the receiving environment, either groundwater or surface water. The intervening pathway from source to receptor including mitigation and natural attenuation will determine the final impact.

The impact of contaminants on the groundwater will be reduced by travel and natural attenuation through the unsaturated soil zone. A greater depth of unsaturated zone and the presence of significant clay and organic material will provide greater protection for the underlying groundwater. Rapid flow through fractures will provide less protection than intergranular flow around soil and rock particles.

5 National & local policy context



National Guidance

CIRIA SuDS Manual (C753) (2015)

A development should utilise sustainable drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

1. Use infiltration techniques, such as porous surfaces in non-clay areas,
2. attenuate rainwater in ponds or open water features for gradual release,
3. attenuate rainwater by storing in tanks or sealed water features for gradual release,
4. discharge rainwater direct to a watercourse,
5. discharge rainwater to a surface water sewer / drain,
6. discharge rainwater to the combined sewer.

Defra - Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems (2015)

Peak Flow control

For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.

Volume control

Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event. The runoff volume must be discharged at a rate that does not adversely affect flood risk.

The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the Site for a 1 in 30 year rainfall event.

Ministry of Housing, Communities & Local Government – National Planning Practice Guidance: Flood risk assessments: climate change allowances (2022)

The Peak rainfall intensity allowances section provides advice on the increased rainfall effects on river levels and land and urban drainage systems. As of May 2022, the applicable climate change allowance is defined by specific Management Catchment for the 1 in 30 ($\geq 3.3\%$ AEP) and 1 in 100 (< 3.3 to 1% AEP) year event.

As the Site is located within the Adur and Ouse Management Catchment the following climate change allowances are applicable.

Table 5. Adur and Ouse Management Catchment peak rainfall allowances

Adur and Ouse Management Catchment	3.3% Annual exceedance rainfall event		1% Annual exceedance rainfall event	
	2050s	2070s	2050s	2070s
Central	20%	20%	20%	25%
Upper end	35%	40%	45%	45%

The drainage system should be designed to make sure there is no increase in the rate of runoff discharged from the Site for the upper end allowance.

Where on-Site flooding for the upper end allowance presents a significant flood hazard (for example, depths and velocities of surface water runoff cause a significant danger to people), you will need to take further mitigation measures to protect people and property (for example, raising finished floor levels). As a minimum, there should be no significant flood hazard to people from on-Site flooding for the central allowance.

Sub-national Drainage Policy

Water, People, Places - A guide for master planning sustainable drainage into developments - Prepared by the Lead Local Flood Authorities of the South East of England (AECOM, 2013)

Attenuation

Storing and slowly releasing runoff is one of the primary benefits SuDS offer. Rather than spilling off quickly into sewers or watercourses, increasing the risk of flooding and erosion, SuDS act as a sponge, soaking up excess water, storing it in plants, soils and constructed voids, before slowly releasing back into the surrounding environment through infiltration, plant up-take or controlled discharge. Areas with less permeable soils can incorporate SuDS features that are designed to hold and manage water on or near the surface for controlled discharge or re-use.

Water treatment

Pollution typically found in runoff including sediment, oils, metals, fertilizer, pesticides, and rubbish can be harmful to watercourses and coastal waters. The soils, gravels and vegetation present in many forms of SuDS act as filters, removing many pollutants before returning cleansed water to the natural environment.

Infiltration

SuDS can be used to first cleanse rainwater runoff then to promote infiltration into the ground to replenish groundwater, thereby letting water infiltrate which would have been prevented from soaking into the ground by impermeable development areas. This also helps to prevent soils from drying out.

Water reuse

South East England is a water stressed region. Many SuDS features can be used locally to capture, treat and manage water for re-supply of cleansed water to buildings or landscapes. Rainwater harvesting can be installed at a range of scales, from individual property scale to site-wide scale, by storing treated runoff at the end of a SuDS treatment train. Re-using rainwater for non-potable purposes such as irrigation and toilet flushing will help reduce potable water demand and deliver Code for Sustainable Homes, BREEAM and other sustainability targets.

Biodiversity and Habitat

SuDS can be designed to include a range of natural processes for managing and filtering surface water runoff. The inclusion of plants, trees, and other vegetation is often advantageous to slow and store water while providing filtration. These can be designed to support local biodiversity aims. SuDS treatment trains can be used to develop ecological corridors at the same time. They can also incorporate a range of vegetation species, ranging from wetland plantings to more common garden varieties. SuDS should be designed to complement and improve the ecology of the area, however consideration should be given to the effects of both species selection and maintenance requirements on the ability of existing habitats to continue functioning effectively.

Amenity

SuDS that integrate greenery or water features can improve the visual character of a development, and in doing so they can also increase property values. Access to green space, views of high quality public realm and street trees have all been shown to increase the resale value of properties. This is particularly the case in urban areas where these elements are not as common. Views of green space and water have been shown to increase commercial rents between 15 and 35%, while a view of a natural environment or high quality public realm can increase residential property values by as much as 15%.

Design for SuDS where space is limited?

SuDS are often associated with large green spaces, however, there are a range of SuDS features which can be easily designed into tight urban settings. Design forethought is required to build SuDS into multi-functional spaces and build up a network of SuDS that

manage runoff close to its source to avoid the need for large storage areas. Space efficient SuDS include green roofs, bioretention gardens, permeable paving, rills, rainwater harvesting, hardscape storage, micro-wetlands, and bioretention tree pits.

Local Policy

General Drainage Requirement Guidance (Mid Sussex District Council Flood Risk & Drainage Team, 2023)

Surface Water Drainage

Finalised detailed surface water drainage design is required to be submitted and approved prior to construction starting on site. The design should be based on the Environment Agency's latest climate change allowances and follow the latest West Sussex Lead Local Flood Authority Policy for the Management of Surface Water.

The use of pumped surface water drainage is not considered to be sustainable and therefore would not be considered an appropriate means of managing surface water as part of a development.

The locating of attenuation, detention, or infiltration devices (including permeable surfacing) within flood extents is not acceptable, this includes areas of increased surface water flood risk.

Foul Water Drainage

Finalised detailed foul water drainage design is required to be submitted and approved prior to construction starting on site. The use of public foul sewer connection should always be prioritised over non-mains drainage options.

The use of non-mains foul drainage should consider the latest Environment Agency's General Binding Rules.

The Environment Agency have advised that any existing septic tank foul drainage systems that are found to not comply with the latest Binding Rules will need to be replaced or upgraded.

6 Storage, volume and peak flow rate



Suggested minimum and aspirational storage requirements for an infiltration or attenuation SuDS scheme for the development footprint are set out below, with more detail provided in subsequent sections. Storage volumes may be reduced (but not below the minimum level) if the design incorporates off-Site discharge.

Table 6. Storage requirements at the proposed development Site (Discharge runoff via infiltration)

Attenuation scenario	Attenuation required (m ³)	Explanation
1 in 100 year including 45% CC	4.58*	Attenuation required to ensure surface water runoff is attenuated in all storm events up to and including the 1 in 100 year event including a 40% allowance for climate change. Calculations are based on an assumed infiltration rate of 1×10^{-5} m/s (the worst-case infiltration rate for 'slightly silty, slightly clayey sand' soil types, taken from Table 25.1 of the CIRIA SuDS manual (C753) (2015) – to be confirmed via infiltration testing).

*Subject to confirmation through infiltration testing.

Table 7. Storage requirements at the proposed development Site (Discharge runoff to surface water sewer)

Attenuation scenario		Attenuation required (m³)	Explanation	
Discharge runoff to surface water sewer	1 in 30 year	0.85	Attenuation required to ensure surface water runoff is attenuated in all storm events up to and including the 1 in 30 year (0.25 hour, Critical Storm Duration) event*. Flooding of the Site of 0.45 m³ should be contained within permeable landscaped areas within the Site to ensure no flooding of internal areas during the 1 in 100 year storm event.	A further 1.17 m³ should be managed within overland flow routes to ensure there is no increase in flood risk in all events up to the 1 in 100 year including 45% allowance for climate change.
	1 in 100 year	1.30	Attenuation required to ensure surface water runoff is attenuated in all storm events up to and including the 1 in 100 year (0.25 hour, Critical Storm Duration) event*.	
	1 in 100 year including 45% CC	2.47	Attenuation required to ensure surface water runoff is attenuated in all storm events up to and including the 1 in 100 year (0.50 hour, Critical Storm Duration) event including a 45% allowance for climate change*.	

*See Appendix B for associated runoff and discharge calculations. Discharge rates all restricted as close as possible to greenfield rates in their respective events.

Surface water runoff

An increase in impermeable area on-Site will result in greater rainfall runoff. Reduction in runoff will help mitigate flood risk both on and off-Site. Further information on the surface water runoff calculations is provided in Section 12 'Background Information'.

Guidance

The Non-Statutory Technical Guidance for SuDS (Defra, March 2015) states:

"Where reasonably practicable, for Greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the Greenfield runoff volume for the same event. Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the Greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event."

Table 8. Change in impermeable area associated with the development

Total Site area	372 m ²
Impermeable area (and as a percentage of the total area of the proposed development footprint of 196 m ²)	
Pre-development	Post-development
20 m ² (10%)	64 m ² (33%)
Impermeable land use: Garage*	New impermeable land use: New dwelling
Permeable land use: Landscaped areas	New permeable land use: Landscaped areas and 22 m ² of permeable paving**

*Please note, only the area of the garage within the Site boundary has been included.

**Please note, while these areas will be utilised for SuDS, for the secondary strategy calculations these areas will be classed as impermeable in order to assess the potential run-off volumes and rates for the Site post- development and the potential holding capability of the proposed SuDS features.

Guidance

"The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event' and 'flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development"

(Defra, March 2015, non-statutory guidance).

The access road and car park are already present and do not represent any change in impermeable areas. As a result of this, they have not been included in the area proposed for development and not considered for the runoff calculations found in Appendix B.

Peak discharge rates

The table below presents peak discharge rates for a range of storm events used to assess the impact of the proposed development and select the maximum permitted discharge rate. Further information on the calculation and control of peak discharge rates is provided in Section 12 'Background Information'.

Table 9. Peak discharge rates associated with the development

Rainfall event	Greenfield runoff rates (l/s)	Existing runoff rates ¹ (l/s)	Potential runoff rates without attenuation (l/s)	Potential minus existing (l/s)
QBAR	0.11	N/A	N/A	N/A
6 hour 1 in 1 year	0.10	0.13	0.18	0.05
6 hour 1 in 10 year	0.19	0.21	0.28	0.07
6 hour 1 in 30 year	0.26	0.26	0.35	0.09
6 hour 1 in 100 year	0.37	0.33	0.44	0.11
6 hour 1 in 100 year + 20% CC	N/A	N/A	0.52	0.20
6 hour 1 in 100 year + 45% CC	N/A	N/A	0.63	0.31

¹ Assumes 100% runoff from impermeable surfaces. Assumes Greenfield runoff from permeable surfaces calculated using the loH124 method.

Relevant national, regional and local planning policy has been consulted in Section 5 to determine restrictions on runoff from previously developed and greenfield sites. In some cases, greenfield rates may be requested, but in practice it is difficult to restrict discharge rates at any one control point to less than 2 l/s, without increasing the risk of any potential blockages occurring in the drainage network.

Total discharge volumes

The table overleaf presents discharge volumes for a range of storm events used to assess the impact of the proposed development and calculate the required storage volumes. Further information on the calculation of total discharge volumes is provided in Section 11 'Methodology and Limitations'.

Table 10. Total discharge volumes associated with the development

Rainfall event	Greenfield runoff volume (m ³)	Existing runoff volume ² (m ³)	Potential runoff volume without attenuation (m ³)	Potential minus existing (m ³)
QBAR	2.72	N/A	N/A	N/A
6 hour 1 in 1 year	2.56	2.86	3.83	0.97
6 hour 1 in 10 year	4.09	4.54	5.99	1.46
6 hour 1 in 30 year	5.09	5.68	7.61	1.93
6 hour 1 in 100 year	6.31	7.04	9.43	2.40
6 hour 1 in 100 year + 20% CC	N/A	N/A	11.32	4.28
6 hour 1 in 100 year + 45% CC	N/A	N/A	13.68	6.64

² Assumes 100% runoff from impermeable surfaces. Assumes Greenfield runoff from permeable surfaces calculated using the loH124 method.

Critical storm duration and volume requirements

Storage volumes for a range of return periods including the 1 in 30 year, 1 in 100 year and 1 in 100 year plus climate change (45%) events have been calculated to assess the impact of the proposed development. The required storage volumes for attenuation features have been calculated for the critical storm durations, limited to a maximum discharge rate of 1.0 l/s.

Table 11. Critical Storm Duration and Attenuation volume requirements

Return Period	Runoff rate restriction (l/s)	Critical Storm Duration (hr)	Attenuation volume required (m ³)
1 in 30 year	1.00	0.25	0.85
1 in 100 year	1.00	0.25	1.30
1 in 100 year including a 45% climate change	1.00	0.50	2.47

7 Runoff destination



Options for the destination for the runoff generated on-Site have been assessed in line with the prioritisation set out in the Building Regulations Part H document (HM Government, published in 2010 and updated in 2015) and Defra's Non-statutory Technical Standards for SuDS (2015).

Flow attenuation using infiltration SuDS (discharge to ground) is generally the preferred option. If discharge to ground is not available, runoff discharge to surface water is the other preferred method. Only if these two options are impractical should discharge to the sewer network be considered.

Discharge to ground

The Site has High potential for infiltration, with permeable underlying mudstone, siltstone and sandstone. Based on the available borehole information (subject to confirmation by site investigation) and groundwater flood risk mapping, a shallow groundwater beneath the Site is unlikely.

There are no known issues identified relating to Site contamination or the presence of a SPZ.

A site investigation comprising trial pits is recommended to confirm the depth to groundwater and allow infiltration tests to be undertaken to confirm the feasibility of an infiltration SuDS scheme.

Discharge to surface watercourse

Ordnance Survey (OS) mapping indicates that there are no surface water features within 100 m of the Site. Therefore, discharge to surface water feature is not feasible.

Discharge to sewer

GeoSmart has undertaken an assessment of the location of sewer features within the vicinity of the Site. According to the Southern Water asset plan, there is a public surface water sewer, located approximately 30 m west of the Site. Due to the close proximity, discharge to sewer is likely to be appropriate.

Discharging to the sewer is unlikely to be the most sustainable drainage solution for the new development. If necessary, consultation with the local sewer authority should be carried out. This option would only be considered if all other drainage methods are proven to be unfeasible. In such cases, discharge must be controlled, with on-site attenuation measures in place.

Foul Drainage

Similar to surface water drainage, foul water discharge must also demonstrate compliance with a drainage hierarchy. The National Planning Practice Guidance and Building Regulations Approved Document H provide a hierarchy of drainage options that must be considered and discounted in the following order:

- Connection to the public sewer;
- Package sewage treatment plant (which can be offered to the Sewerage Undertaker for adoption);
- Septic tank;
- If none of the above are feasible, a cesspool.

Southern Water sewer records confirm a foul water sewer is located approximately 5 m west of the Site boundary (Appendix C).

The proposed volume of foul water has been calculated using the British Water guidance "Flows and Loads" (2014) based on the following 'Schedules of Accommodation':

Residential dwelling = 150 litres per day per person

- 1 x three-bedroom dwelling = 5P

The population of 5 P equates to an equivalent flow of 750 litres or 0.75 m³ per day to be discharged to the foul sewer, west of the Site following permission from Southern Water to connect.

8 Water quality



A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution. This can be effectively managed by an appropriate “train” or sequence of SuDS components that are connected in series. The 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 5-10 mm of rainfall (first flush) should be adequately treated with SuDS.

The minimum number of treatment stages will depend on the sensitivity of the receiving water body and the potential hazard associated with the proposed development SuDS Manual (CIRIA, 2015). The proposed development consists of Very Low (roof water). The Site does not lie within an SPZ and therefore additional treatment stages are not required.

Table 12. Level of hazard

Hazard	Source of hazard
Very Low	Residential roof drainage
Low	Residential, amenity uses including low usage car parking spaces and roads, other roof drainage.
Medium	Commercial, industrial uses including car parking spaces and roads (excluding low usage roads, trunk roads and motorways).
High	Areas used for handling and storage of chemicals and fuels, handling of storage and waste (incl. scrap-yards).

The recommended minimum number treatment stages suggested for the different runoff waters identified for the proposed development is highlighted in the table below.

Table 13. Minimum number of treatment stages for runoff

		Sensitivity of the receiving water body		
		Low	Medium	High
Hazard	Low	1	1	1
	Med	2	2	2
	High	3	3	3

9 Proposed SuDS strategy



Sustainable drainage systems

DEFRA's non-statutory requirements for SuDS require the below ground drainage systems to have the capacity to accommodate at least the 1 in 30 year event and to manage the 1 in 100 year event without flooding of on-site buildings and substations. All runoff should be managed on-Site though for the 1 in 100 year event, accounting for the maximum impacts of climate change to ensure flood risk is not increased to third-parties.

It is assumed that drainage from areas outside the development footprint will continue to use existing drainage arrangements.

A surface water drainage strategy (summarised in Section 2 of this report) includes the following SuDS features to intercept, attenuate and treat surface water runoff.

Primary SuDS Strategy:

Ground conditions at the Site are conducive to infiltration, surface water runoff will be managed within SuDS features and infiltrated to ground.

Table 14. Proposed SuDS type, features, discharge location and rate restriction

SuDS type	Source control (interception) and infiltration SuDS.
SuDS features	Rainwater harvesting butt, permeable paving and a soakaway.
Discharge location	Infiltration.
Discharge rate	1 x 10 ⁻⁵ m/s (the worst-case infiltration rate for 'slightly silty, slightly clayey sand' soil types, taken from Table 25.1 of the CIRIA SuDS manual (C753) (2015) – to be confirmed via infiltration testing).

Table 15. Proposed SuDS sizing (dimensions) and attenuation volumes

Rainwater Harvesting	A rainwater harvesting butt should be established for the proposed dwelling. In terms of attenuation storage within this SuDS scheme, the volume of run-off which could be attenuated by rainwater harvesting has not been considered within the strategy.
Permeable paving	A 22 m ² area of permeable paving (underlain with a Type 3 aggregate material) within the proposed patio area surrounding the dwelling. This will be an unfocused infiltration feature reducing the total area of impermeable surfaces, closer mimicking greenfield conditions. As these areas will exclusively drain themselves the volume of attenuation has not been considered.

Soakaway	A soakaway with a width of 2 m, length of 2 m and depth of 1.2 m filled with geo-cellular crates to a 95% void ratio is proposed. This soakaway will provide c. 4.58 m ³ attenuation.
Total Attenuation Provided	4.58 m ³
Total Attenuation Required	4.58 m ³

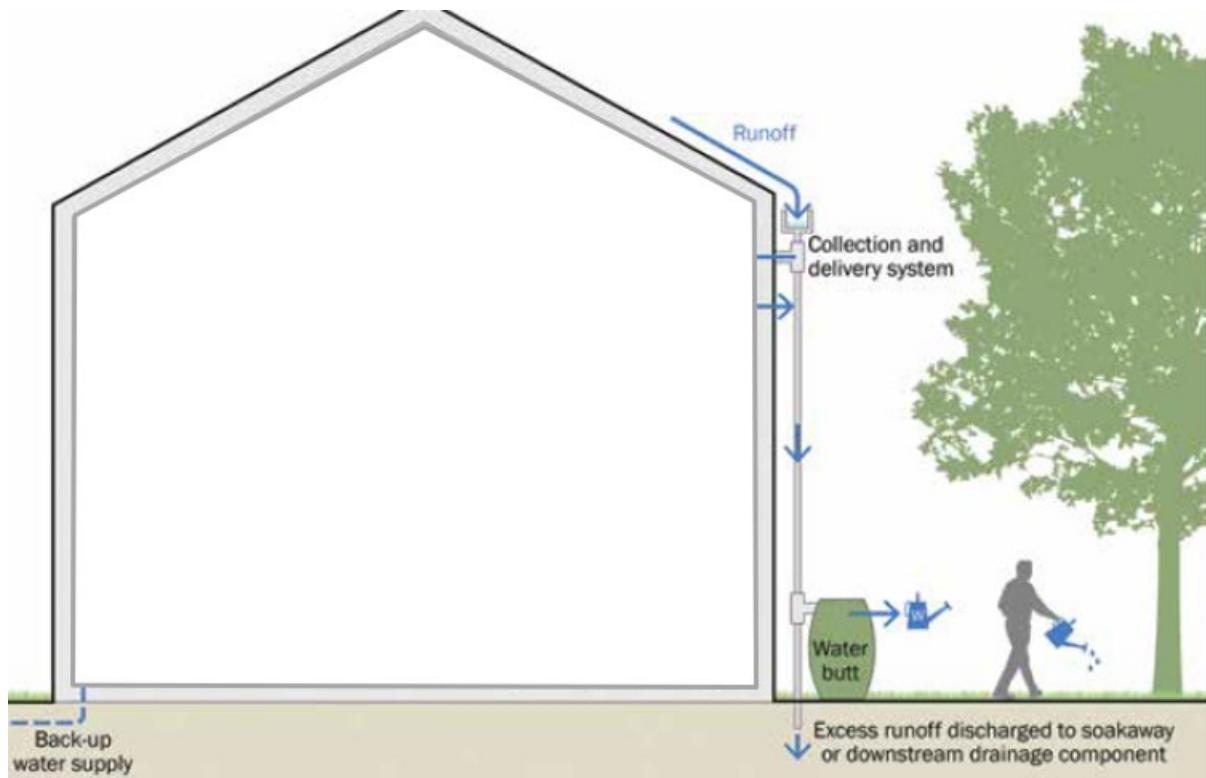
Rainwater harvesting

A rainwater harvesting butt is proposed. The run-off from the proposed development roof should be led into rainwater harvesting butts via rainwater downpipes and guttering to catch run-off from the extension roof. Overflow from the butts should be discharged into the storage system provided by the soakaway.

Due to the relatively insignificant amounts of attenuation provided by rainwater harvesting tanks in this instance and the requirement to retain water for non-potable uses such as garden maintenance, the volume of run-off which could be attenuated by rainwater harvesting has not been considered within the report.

As there is an issue with the storage capability of rainwater harvesting tanks, this method should have a fixed attenuation volume and a controlled outlet to discharge into the proposed SuDS feature. An overflow system will be required for implementation on the Site due to exceedance events (where the pumps fail or there is a blockage within the system / or the number of residents and subsequent water usage is reduced).

Roof run-off is generally less polluted than run-off from road surfaces but can still generate pollutants such as sediments. Pollutants would be captured by the collection and filtration system and, by reducing the volume of run-off generated from the Site. Primary screening devices are used to prevent leaves and other debris from entering the butt and first flush devices can be designed to divert the first part of the rainfall away from the main storage tank and can pick up most of the dirt, debris and contaminants that collect on a residential roof.



Modified from Figure 11.3 of the CIRIA SuDS Manual (C753) (2015)

Permeable paving

Permeable paving is proposed for the patio area surrounding the dwelling to intercept runoff. Suitable aggregate materials (angular gravels with suitable grading as per CIRIA, 2015) will improve water quality due to their filtration capacity and usually work to a 30% porosity. A geotextile layer will be required for paving underlain by aggregate material to intercept silt/particles. Permeable pavements are multi-layered surfacing systems. The surface layer is constructed out of permeable material allowing infiltration of water through gaps along its surface. A geomembrane isolates stored water from the surrounding soil, especially in contaminated areas and a geotextile layer prevents clogging and damage to the geo-cellular modules.

The geotextile layer works to intercept silt/particles flowing through the system via direct rainfall, or through vehicle use deposited onto the car park area and into the permeable paving. The majority of silt would be trapped within the top 30mm of the joining material between the paving blocks.

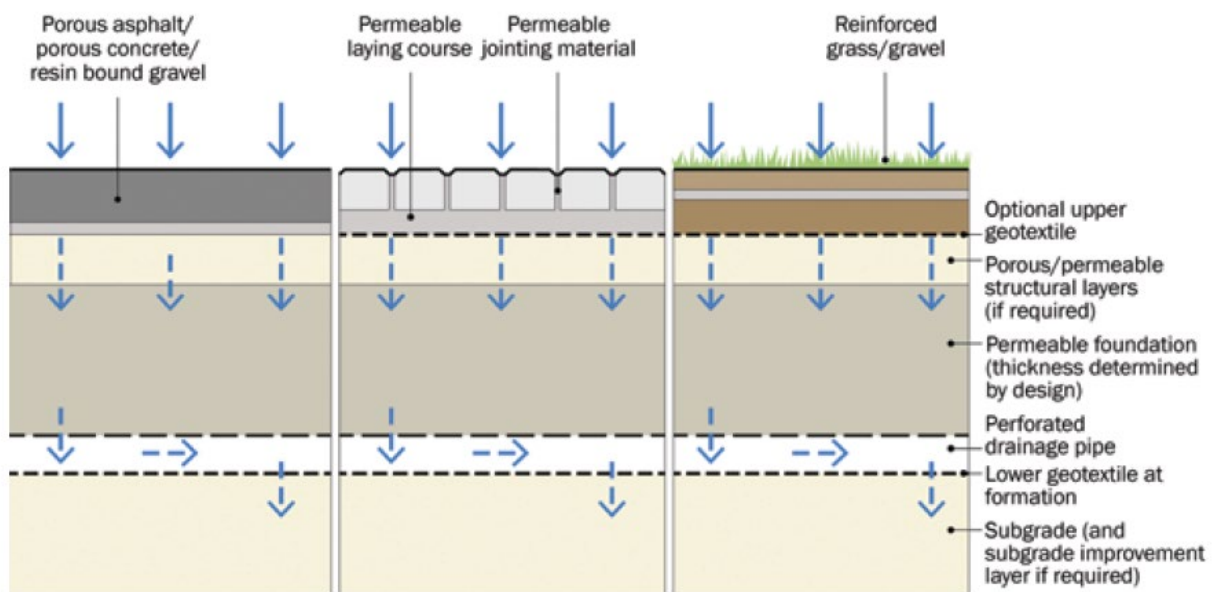


Figure 20.13 of the CIRIA SuDS Manual (C753) (2015)

Plastic geo-cellular systems could also be used, which can increase the void space and therefore storage but do not allow filtration unless they are combined with aggregate material and/or permeable geotextiles which could increase their storage potential by up to 20%. Geo-cellular modules also have the added advantage of reducing the amount of aggregate sub base required, thus keeping costs lower. Void systems, such as permavoids, have a void ratio of 95% (i.e. for every 1 m³ there is 0.95 m³ of space available for water storage), which has been factored into the storage capacity calculations.

Soakaways

Soakaways should be used to store run-off and infiltrate collected water gradually into the ground. Roof water should be collected and conveyed by underground pipes to the proposed soakaways. The base of the infiltration features should lie at an elevation at least 1 m above the highest winter groundwater levels, to ensure there is sufficient space for surface water to discharge. Soakaway excavation should be outside of the root zone of any protected trees and dimensions will depend on the depth to the sand layer where the soakaway is eventually situated.

Draining via soakaways means that property owners are less likely to pay for the utility company to drain surface water. In terms of future ownership and maintenance, where a soakaway drains a single property, the ownership and maintenance would be the property owner's responsibility. When a soakaway drains several properties, an agreement would have to be made between the property owners with regards to the maintenance. However, in the new sewers for adoption guidance, utility providers may adopt private soakaways and provide the necessary maintenance:

Soakaways: Adoption would normally include the whole structure up to the external face, including any external rubble fill or membrane.

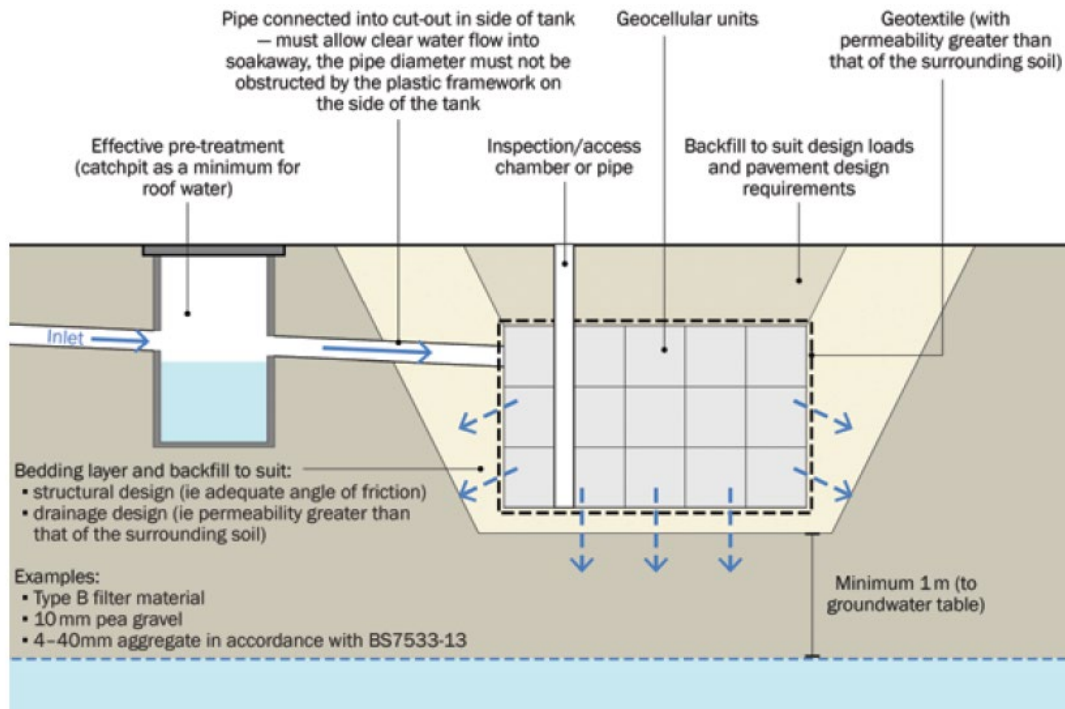


Figure 13.1 of the CIRIA SuDS Manual (C753) (2015)

Exceedance Flows

Exceedance flow routes are included within the proposed SuDS drainage layout. Where possible, exceedance flows should be directed away from buildings and into non-essential areas of the Site such as the car park. The SuDS system recommended for the Site should provide enough storage that this method would only be utilised during a worst case scenario.

Secondary SuDS strategy:

Where infiltration to ground is not achievable at the Site, an attenuation volume of 2.47 m³ should be stored within lined SuDS features to accommodate the calculated 0.50 hour Critical Storm Duration for surface water discharge runoff, restricted to 1.0 l/s.

SuDS features listed in the primary recommendations are still applicable to the secondary recommendation the Site.

Permeable paving can still be incorporated if discharge to ground is not achievable however paving will need to be lined to ensure groundwater does not interact with the system.

Table 16. Proposed SuDS type, features, discharge location and rate restriction

SuDS type	Source control (interception) and attenuation SuDS.
SuDS features	Rainwater harvesting butt and lined permeable paving.
Discharge location	Public surface water sewer network.
Discharge rate	1.0 l/s.

Table 17. Proposed SuDS sizing (dimensions) and attenuation volumes

Rainwater Harvesting	A rainwater harvesting butt should be established for the proposed dwelling. In terms of attenuation storage within this SuDS scheme, the volume of run-off which could be attenuated by rainwater harvesting has not been considered within the strategy.
Lined permeable paving	A 22 m ² area of permeable paving (underlain with a Type 3 aggregate material) within the proposed driveway areas to a depth of 0.40 m, with a 30% porosity would result in c. 1.65 m ³ attenuation.
Total Attenuation Provided	2.64 m ³
Total Attenuation Required	2.47 m ³
Freeboard Storage Provided	0.17 m ³

10 SuDS maintenance



Regular maintenance is essential to ensure effective operation of the SuDS features over the intended lifespan of the proposed development. The SuDS Manual (C753) (CIRIA, 2015) provides a maintenance schedule for SuDS with details of the necessary required actions as shown in the Table below.

Table 18. SuDS operation and recommended maintenance requirements

Asset type	Maintenance schedule (and frequency)
Soakaways	Regular maintenance: - Remove sediment and debris from pretreatment and inspection chamber. Clean gutters, filters, downpipes. Trim roots prevent blockages (annually). - Reconstruct/ clean if performance deteriorates, replace clogged geotextile (as required) Monitoring: - Inspect inlets/outlets, silt traps – note rate of accumulation (monthly). - Check water levels and emptying time (annually).
Permeable pavements	Regular maintenance: - Brushing and vacuuming (three times per year). - Trimming any roots and surrounding grass and weeds that may be causing blockages (annually or as required). Monitoring: - Initial inspection (monthly). - Inspect for poor performance and inspection chambers (annually).
Underground drainage pipe network	Regular maintenance: - Remove sediment and debris from pre-treatment devices and floor of inspection tube or chamber (annually). - Cleaning of gutters and any filters on downpipes (annually). - Trimming any roots that may be causing blockages (annually or as required). Monitoring: - Inspect silt traps and note rate of sediment accumulation (monthly in the first year and then annually).
Rainwater Harvesting	Regular maintenance: Inspection of tank for debris and sediment build up (annually and following poor performance).

Asset type	Maintenance schedule (and frequency)
	- Inspection of inlets, outlets, overflow areas, pumps and filters (annually and following poor performance). - Cleaning of tank, inlets, outlets, gutters, roof drain filters and withdrawal devices (annually or as required). Remedial actions: - Repair or overflow erosion damage or damage to tank and associated components (as required)

Client checklist

A drainage strategy has been recommended as suitable on the basis of the information provided. Prior to installation of the Site drainage system it is recommended that the client carries out the following checks to confirm the development proposals. GeoSmart would be able to support with any updates required to the drainage scheme, please contact us and we would be happy to provide you with a proposal to undertake the work.

Table 19. Potential SuDS limitations

Conditions in Non-Statutory Technical Standards (Defra, 2015), limitations to infiltration SuDS	Do these conditions arise at the Site?
Is the surface runoff greater than the rate at which water can infiltrate into the ground?	
Is there an unacceptable risk of ground instability?	
Is there an unacceptable risk of mobilising contaminants?	
Is there an unacceptable risk of pollution to groundwater?	
Is there an unacceptable risk of groundwater flooding?	
Is the infiltration system going to create a high risk of groundwater leakage to the combined sewer?	

Table 20. SuDS design considerations

Confirm that potential flooding on-Site in excess of the design storm event and exceedance flow routes have been considered.	
Review options for the control of discharge rates (e.g. hydrobrake).	

Confirm the owners/adopters of the drainage system. Consider management options for multiple owners.	
Is there an unacceptable risk of pollution to groundwater?	
Review access and way leave requirements.	
Review maintenance requirements.	

Health and safety considerations for SuDS

GeoSmart reports may include outline strategies or designs to support with development plans. Any drawings or advice provided do not comprise any form of detailed design. Implementation of any conceptual scheme options may constitute 'Construction Work' as defined by CDM Regulations (2015).

The CDM Regulations place specific Health and Safety duties on those commissioning, planning and undertaking construction works. If you are uncertain what this means you should seek the advice of your architect, builder or other competent professional.

GeoSmart does not provide health and safety advisory services but we are required to advise you of your general responsibilities under CDM (visit <http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/> for more information).

Please remember that detailed design work should be undertaken by a competent professional who might be your engineer, architect, builder or another competent party.

11 Methodology and limitations of study



This report assesses the feasibility of infiltration SuDS and alternative drainage strategies in support of the Site development process. From April 6th 2015 SuDS are regulated by Local Planning Authorities and will be required under law for major developments in all cases unless demonstrated to be inappropriate. What is considered appropriate in terms of costs and benefits by the Planning Authority will vary depending on local planning policy, and Site setting. The Lead Local Flood Authority will require information as a statutory consultee on major planning applications with surface water drainage implications. The National Planning Policy Framework requires that new developments in areas at risk of flooding should give priority to the use of SuDS and demonstrate that the proposed development does not increase flood risk downstream to third parties.

How was the suitability of SuDS estimated for the Site?

There are a range of SuDS options available to provide effective surface water management that intercept and store excess runoff. When considering these options, the destination of the runoff should be assessed using the order of preference outlined in the Building Regulations Part H document (HM Government, 2010) and Defra's National Standards for SuDS (2015):

1. Discharge to the ground;
2. Discharge to a surface water body;
3. Discharge to a surface water sewer;
4. Discharge to a local highway drain; and
5. Discharge to a combined sewer.

Data sets relating to each of the potential discharge options have been analysed to assess the feasibility of each option according to the hierarchy set out above. Hydrogeological characteristics for the Site are assessed in conjunction with the occurrence of SPZ's to assess infiltration suitability. The Site has been screened to determine whether flood risk from groundwater, surface water, fluvial or coastal sources may constrain SuDS. The distance to surface water bodies and sewers has been reviewed gauge whether these provide alternative options.

GeoSmart SuDS Infiltration Suitability Map (SD50)

The GeoSmart SuDS Infiltration Suitability Map (SD50) screens the suitability for infiltration drainage in different parts of the Site and indicates where further assessment is recommended. In producing the SuDS Infiltration Suitability Map (SD50), GeoSmart used data from the British Geological Survey on groundwater levels, geology and permeability to screen

for areas where infiltration SuDS may be suitable. The map classifies areas into 3 categories of High, Medium and Low suitability for infiltration SuDS. This can then be used in conjunction with additional data on Site constraints to give recommendations for SuDS design and further investigation.

The primary constraint on infiltration potential is the minimum permeability of the underlying material and in some cases the range in permeability may be considerable, ranging down to low. The map classifies these areas as moderate infiltration suitability requiring further investigation. In cases where the thickness of the receiving permeable horizon is less than 1.5 meters then additional Site investigation is recommended. If the Site is at risk of groundwater flooding for up to the 1% annual occurrence the map classifies these areas as moderate infiltration suitability requiring further investigation.

The GeoSmart SuDS Infiltration Suitability Map (SD50) is a national screening tool for infiltration SuDS techniques but a Site specific assessment should be used before final detailed design is undertaken. Further information on the GeoSmart SuDS Infiltration Suitability Map (SD50) is available at geosmartinfo.co.uk

How is the suitability to discharge to sewers and watercourses calculated?

The suitability to discharge to discharge to sewers and watercourses has been calculated using the distance from the Site to both. For example, where the Site is within 50 m of a surface water body. Discharge to surface water is potentially appropriate subject to land access arrangements and a feasibility assessment. Where the Site is within 50 m of a sewer, discharge to sewer is potentially appropriate subject to land access arrangements and a feasibility assessment. The utility company should be contacted to agree connection feasibility and sewer capacity.

Further information relating to sewers available in the area can be found in Appendix C.

What is a Source Protection Zone?

The Environment Agency have defined Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which is occasionally applied. The zones are used to set up pollution prevention measures in areas which are at a higher risk. The shape and size of a zone depends on the condition of the ground, how the groundwater is removed, and other environmental factors. Inner zone (Zone 1) is defined as the 50 day travel time from any point below the water table to the source (minimum radius of 50 metres). Outer zone (Zone 2) is defined by a 400 day travel time. Total catchment (Zone 3) is defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source.

How was surface water runoff estimated from the Site?

In accordance with The SuDS Manual (C753) (CIRIA, 2015), the Greenfield runoff from the Site has been calculated using the IoH124 method and is assumed representative of the runoff generated on the undeveloped surfaces that are affected by the proposed development. The method used for calculating the runoff complies with the NPPF (MHCLG, 2024). For the impermeable surfaces, it has been assumed that 100% runoff will occur (calculations provided in Appendix B). Rainfall data is derived from the Flood Estimation Handbook (FEH), developed by NERC (2009). Only areas affected by the proposed development are considered in the flow and volume calculations. Permeable areas that remain unchanged are not included in the calculations as it is assumed these will not be actively drained and attenuated.

What is the peak discharge rate?

An estimation of peak runoff flow rate and volume is required to calculate infiltration, storage and discharge requirements. The peak discharge rate is the maximum flow rate at which surface water runoff leaves the Site during a particular storm event, without considering the impact of any mitigation such as storage, infiltration or flow control. Proposed discharge rates (with mitigation) should be no greater than existing rates for all corresponding storm events. If all drainage is to infiltration there will be no discharge off-Site. Discharging all flow from Site at the existing 1 in 100 event would increase flood risk during smaller events. Flow restriction is generally required to limit the final discharge from Site during all events as a basic minimum to the green field QBAR rate. A more complex flow restriction which varies the final discharge rate from the Site depending on the storm event will reduce the volume of storage required on-Site. Drainage to infiltration SuDS is subtracted from the total discharge off-Site to achieve a beneficial net affect.

What is the total discharge volume?

The total discharge volume is calculated on the basis of the surface water runoff that has the potential to leave the Site as a result of the assumed 6 hour duration design storm event. The runoff is related to the underlying soil conditions, impermeable cover, rainfall intensity and duration of the storm event. The total volume generated by the current Site is compared to the potential total volume from the developed Site (not taking into consideration any mitigation). The difference provides the minimum total volume that will need to be stored and infiltrated on-Site or released at a controlled rate. Guidance indicates that the total discharge volume should never exceed the runoff volume from the development Site prior to redevelopment for that event and should be as close as is reasonably practicable to the Greenfield runoff volume.

12 Background SuDS information



SuDS control surface water runoff close to where it falls. SuDS are designed to replicate, as closely as possible, the natural drainage from the Site before development to ensure that the flood risk downstream does not increase as a result of the Site being developed, and that the Site will have satisfactory drainage under current and likely future climatic conditions. SuDS provide opportunities to reduce the causes and impacts of flooding; remove pollutants from urban runoff at source; and combine water management with green space with benefits for amenity, recreation and wildlife. Government planning policy and planning decisions now include a presumption in favour of SuDS being used for all development Sites, unless they can be shown to be inappropriate.

For general information on SuDS see our website: <http://geosmartinfo.co.uk/>

Infiltration SuDS

Government policy for England is to introduce sustainable drainage systems (SuDS) via conditions in planning approvals. Guidance indicates that capturing rainfall runoff on-Site and infiltrating it into the ground (infiltration SuDS) is the preferred method for managing surface water without increasing flood risk downstream.

The greatest benefit to general flood risk is if all runoff is infiltrated on-Site, however, this may not be feasible due to physical and economic constraints in which case infiltration may be considered as a part of an integrated drainage solution. The final design capacity for an infiltration SuDS system depends on the Site constraints and the requirements of the individual Planning Authority and the Lead Local Flood Authority.

The capacity of the ground to receive infiltration depends on the nature, thickness and permeability of the underlying material and the depth to the high groundwater table. The final proportion of the Site drained by infiltration will depend on topography, outfall levels and a suitable drainage gradient. It is important to note that, even if the whole Site cannot be drained by infiltration, the use of partial infiltration is encouraged, with the remainder of runoff discharged via other SuDS systems.

Types of infiltration SuDS

Infiltration components include infiltration trenches, soakaways, swales and infiltration basins without outlets, rain gardens and permeable pavements. These are used to capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, before returning it to the water table below.

An infiltration trench is usually filled with permeable granular material and is designed to promote infiltration of surface water to the ground. An infiltration basin is a dry basin or depression designed to promote infiltration of surface water runoff into the ground. Soakaways are the most common type of infiltration device in the UK where drainage is often connected to over-sized square or rectangular, rubble-filled voids sited beneath lawns.

According to the guidance in Building Research Establishment (BRE) Digest 365 (2016) a soakaway must be able to discharge 50% of the runoff generated during a 1 in 10 year storm event within 24 hours in readiness for subsequent storm flow. This is the basic threshold criteria for a soakaway design and the internal surface area of the proposed soakaway design options should be calculated on this basis by taking into account the soil infiltration rate for the Site.

Developers need to ensure their design takes account of the construction, operation and maintenance requirements of both surface and subsurface components, allowing for any machinery access required.

SuDS maintenance and adoption

Regular maintenance is essential to ensure effective operation of the soakaway(s) over the intended lifespan of the proposed development. A maintenance schedule for SuDs is required. Sewerage undertakers or Local Authorities may adopt SuDS and will require maintenance issues to be dealt with in accordance with their Management Plan. If the SuDS will not be adopted other provision is required with associated financial implications. Maintenance is a long-term obligation requiring the upkeep of all elements of the SuDS, including mechanical components (e.g. pumps), as well as inspections, regular maintenance and repair.

Additional background SuDS information can be found on our website: <http://geosmartinfo.co.uk/>

13 Further information



The following table includes a list of additional products by GeoSmart:

Additional GeoSmart Products			
	Additional assessment: FloodSmart Report		The FloodSmart Report range provides clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at a Site. Our consultants assess available data to determine the level of risk based on professional judgement and years of experience. Please contact info@geosmartinfo.co.uk for further information.
	Additional assessment: EnviroSmart Report		Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective. Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements. Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions. Please contact info@geosmartinfo.co.uk for further information.

14 References and glossary



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Ministry of Housing, Communities & Local Government. (2022). National Planning Policy Guidance (NPPG).

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Glossary

General terms

Attenuation	Reduction of peak flow and increased duration of a flow event.
Combined sewer	A sewer designed to carry foul sewage and surface water in the same pipe.
Detention basin	A vegetated depression, normally is dry except after storm events, constructed to store water temporarily to attenuate flows. May allow infiltration of water to the ground.
Evapotranspiration	The process by which the Earth's surface or soil loses moisture by evaporation of water and by uptake and then transpiration from plants.
FEH	Flood Estimation Handbook, produced by Centre for Ecology and Hydrology, Wallingford (formerly the Institute of Hydrology).
Filter drain or trench	A linear drain consisting of a trench filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water, but may also be designed to permit infiltration.
First flush	The initial runoff from a site or catchment following the start of a rainfall event. As runoff travels over a catchment it will collect or dissolve pollutants, and the "first flush" portion of the flow may be the most contaminated as a result. This is especially the case for intense storms and in small or more uniform catchments. In larger or more complex catchments pollution.
Flood plain	Land adjacent to a watercourse that would be subject to repeated flooding under natural conditions (see Environment Agency's Policy and practice for the protection of flood plains for a fuller definition).
Greenfield runoff	This is the surface water runoff regime from a site before development, or the existing site conditions for brownfield redevelopment sites.
Impermeable surface	An artificial non-porous surface that generates a surface water runoff after rainfall.
Permeability	A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium, for example grain size, porosity and pore shape.

Runoff	Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.
Sewerage undertaker	This is a collective term relating to the statutory undertaking of water companies that are responsible for sewerage and sewage disposal including surface water from roofs and yards of premises.
Soakaway	A subsurface structure into which surface water is conveyed to allow infiltration into the ground.
Treatment	Improving the quality of water by physical, chemical and/or biological means.

The terms included in this glossary have been taken from CIRIA (2015) guidance.

Data Sources

Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2025 BlueSky copyright and database rights 2025
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2025 Ordnance Survey data © Crown copyright and database right 2025
Flood Risk (RoFRS/Pluvial/Surface Water Features/SPZ)	Environment Agency copyright and database rights 2025 Ordnance Survey data © Crown copyright and database right 2025
Flood Risk (Groundwater) and SuDS infiltration suitability (SD50)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2025) Contains British Geological Survey materials © NERC 2025 Ordnance Survey data © Crown copyright and database right 2025
Sewer Location	Contains Ordnance Survey data © Crown copyright and database right 2025 Contains Southern Water search data 2025
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2025 Environment Agency copyright and database rights 2025

15 Appendices



Appendix A



Site plans

Drawing Specific Notes:

Red lines indicates boundary of property.

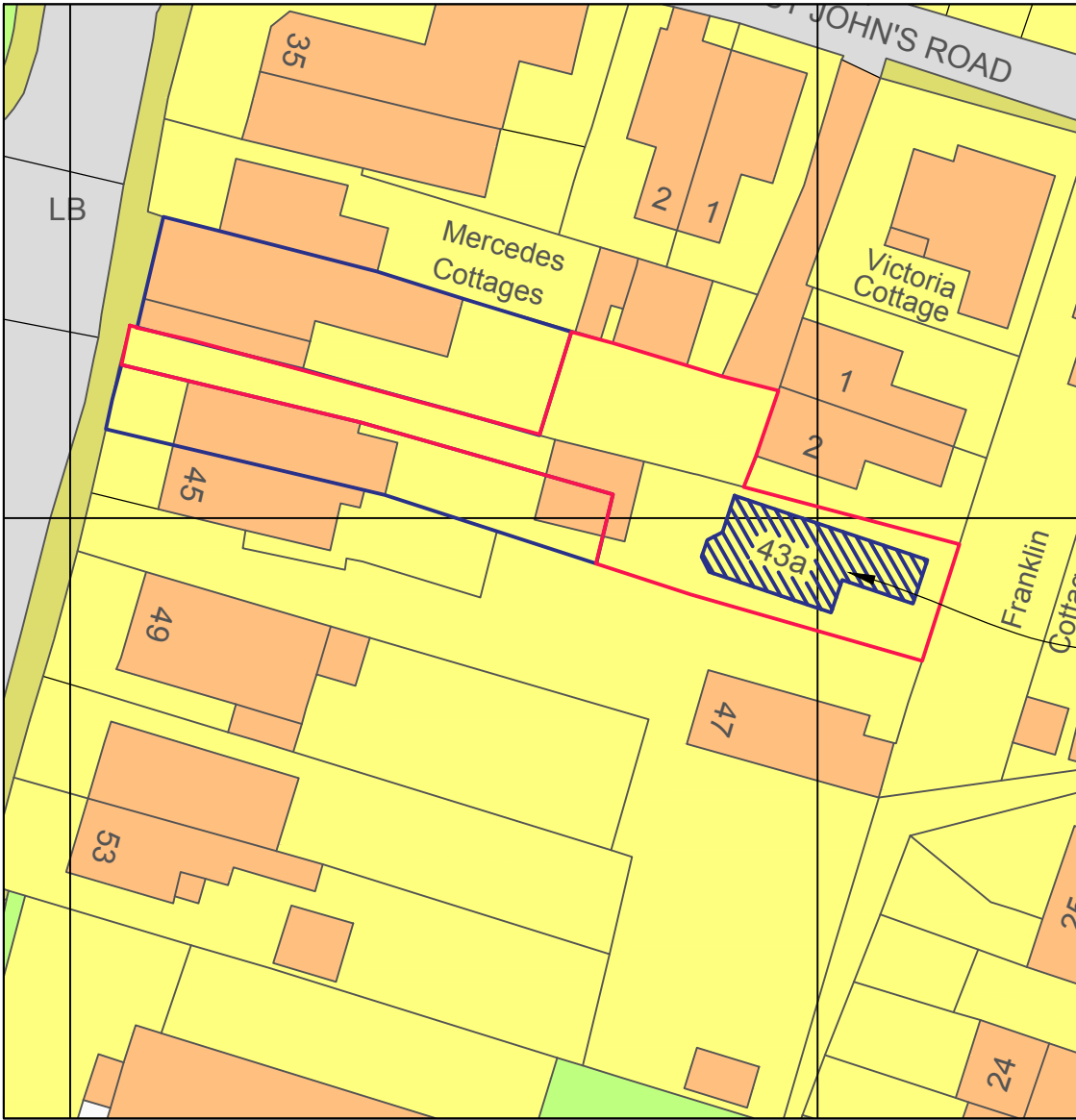
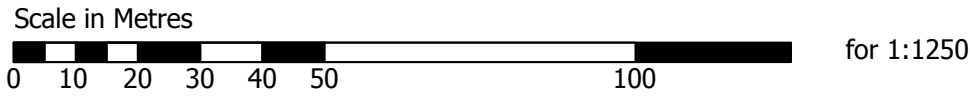
Blue line indicates site boundary of the proposed works .

All dimensions and particulars are to be checked on site before work commences and any discrepancy to be reported to PM Home Consultants.

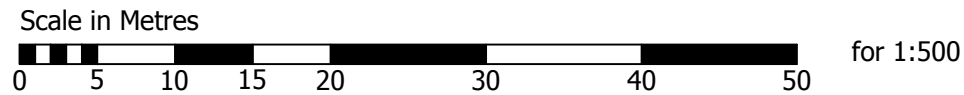
This drawing can be scaled for Planning purposes. **DO NOT SCALE** this drawing for setting out, use written dimensions only. Any work commenced before Council approval is at the Clients risk



01 Location plan
1000 1:1250 (at A3)



02 Site/Block plan
1000 1:500 (at A3)





Proteus Management
Home Extension Consultants

Project:

Construction of a three bed dwelling with associated landscaping at 43a Wivelsfield road, RH16 4EN

Drawing Title:

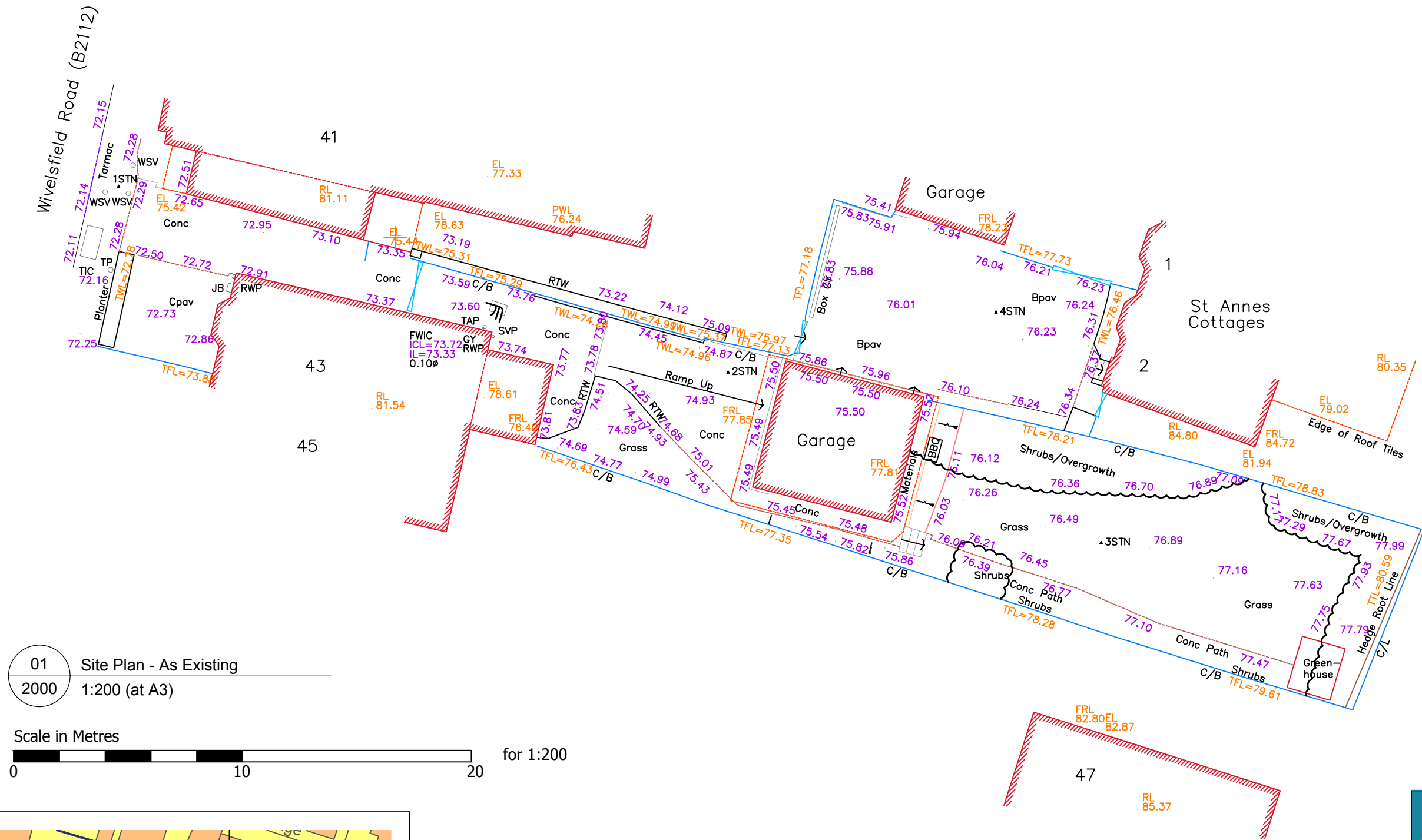
Location and Site/Block plan

Drawing Number:	Date:	Revision:
1000	01/10/24	A

Scale: (at A3)	Status:
1:1250 / 1:500	Planning

Client:

Amy Bath



01 Site Plan - As Existing
2000 1:200 (at A3)

Scale in Metres
0 10 20 for 1:200

Location Key:



Proteus Management
Home Extension Consultants

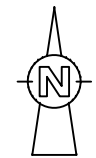
Project:
Construction of a three bed dwelling with
associated landscaping at 43a Wivelsfield
road, RH16 4EN

Drawing Title:
Existing Site plan / topographical survey

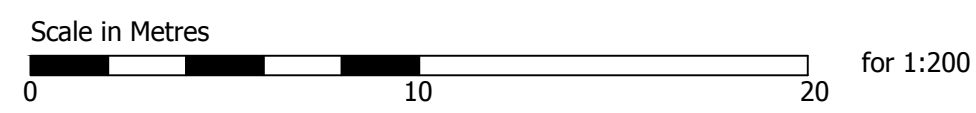
Drawing Number:	Date:	Revision:
2000	01/10/24	A

Scale: (at A3)	Status:
1:200	Planning

Client:
Amy Bath



01 Site Plan - As Proposed
3000 1:200 (at A3)



Drawing Specific Notes:

Red lines indicates boundary of property.

Blue line indicates site boundary of the proposed works .

All dimensions and particulars are to be checked on site before work commences and any discrepancy to be reported to PM Home Consultants.

This drawing can be scaled for Planning purposes. **DO NOT SCALE** this drawing for setting out, use written dimensions only. Any work commenced before Council approval is at the Clients risk



Proteus Management
Home Extension Consultants

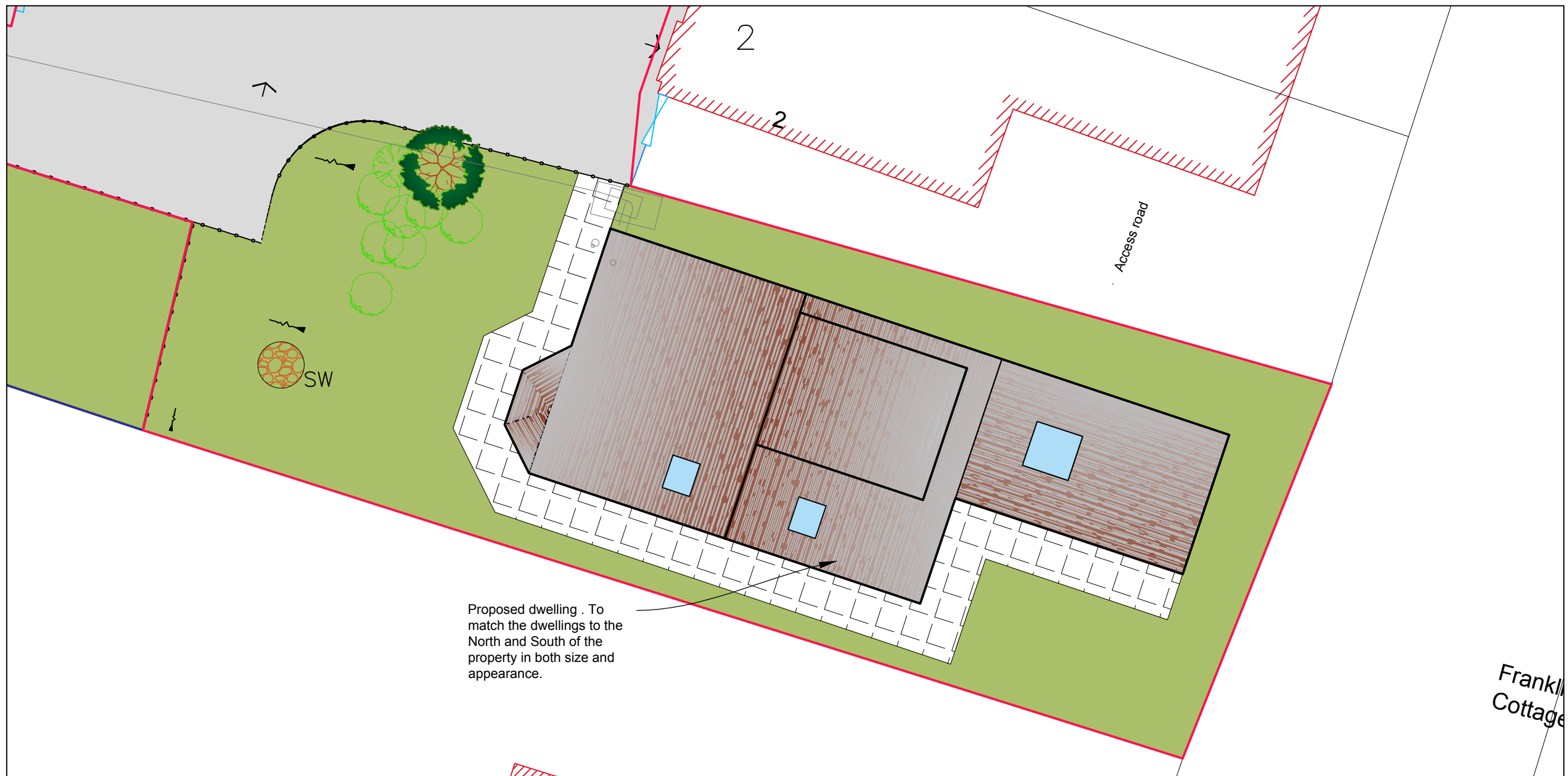
Project:
Construction of a three bed dwelling with associated landscaping at 43a Wivelsfield road, RH16 4EN

Drawing Title:
Proposed Site Plan

Drawing Number:	Date:	Revision:
3000	01/10/24	A

Scale: (at A3)	Status:
1:200	Planning

Client:
Amy Bath



Proposed dwelling . To match the dwellings to the North and South of the property in both size and appearance.

Franklin Cottage

01 Site Plan - As Proposed
3001 1:100 (at A3)

Scale in Metres
0 5 10 for 1:100

Location Key:



Drawing Specific Notes:

Red lines indicates boundary of property.

Blue line indicates site boundary of the proposed works .

All dimensions and particulars are to be checked on site before work commences and any discrepancy to be reported to PM Home Consultants.

This drawing can be scaled for Planning purposes. **DO NOT SCALE** this drawing for setting out, use written dimensions only. Any work commenced before Council approval is at the Clients risk



Proteus Management
Home Extension Consultants

Project:

Construction of a three bed dwelling with associated landscaping at 43a Wivelsfield road, RH16 4EN

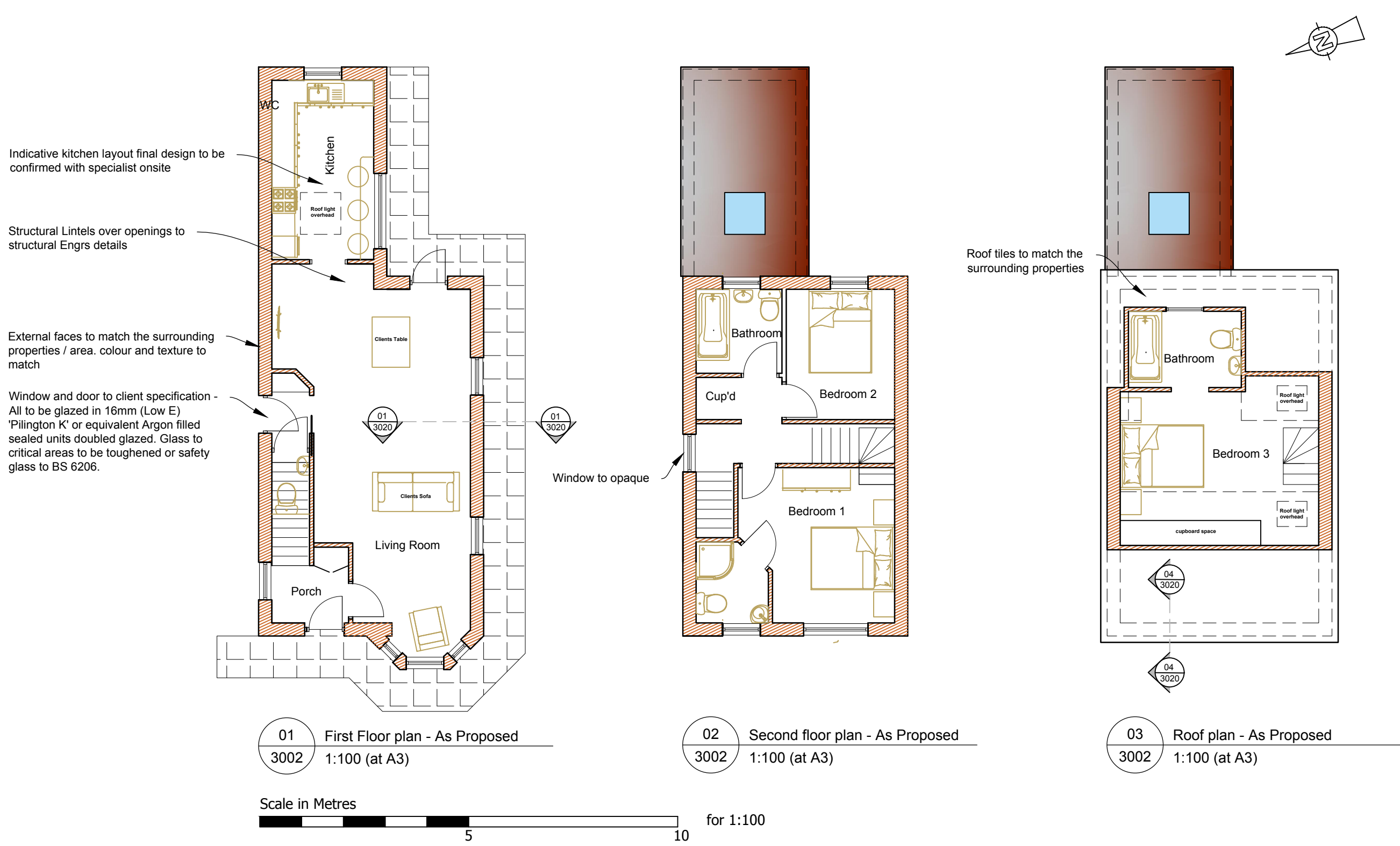
Drawing Title:

Proposed Site Plan

Drawing Number:	Date:	Revision:
3001	01/10/24	A

Scale: (at A3)	Status:
1:100	Planning

Client:
Amy Bath



Drawing Specific Notes:

Red dimensions and text indicate setting out notes.

Mains operated linked smoke alarm detection system to BS EN 14604 and BS 5839-6:2019 to at least a Grade D category LD3 standard. System to be mains powered with battery back up. Smoke alarms should be sited so that there is a smoke alarm in the circulation space on all levels/storeys and within 7.5m of the door to every habitable room. If ceiling mounted they should be 300mm from the walls and light fittings. Where the kitchen area is not separated from the stairway or circulation space by a door, there should be an interlinked heat detector in the kitchen.

All works are to be carried out in a workmanlike manner. All materials and workmanship must comply with Regulation 7 of the Building Regulations, all relevant British Standards, European Standards, Agreement Certificates, Product Certification of Schemes (Kite Marks) etc. Products conforming to a European technical standard or harmonised European product should have a CE marking.

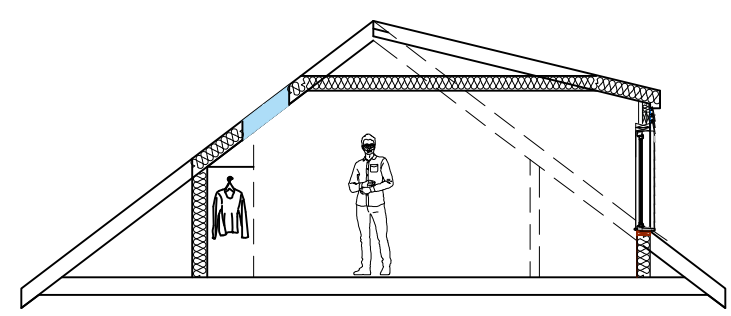
The extension should meet the following Minimum U values

Wall	0.18 W/m²K
Roof	0.15 W/m²K
Floor	0.18 W/m²K

All dimensions and particulars are to be checked on site before work commences and any discrepancy to be reported to PM Home Consultants. This drawing can be scaled for Planning purposes. **DO NOT SCALE** this drawing for setting out, use written dimensions only. Any work commenced before Council approval is at the Clients risk

An opening or recess greater than 0.1m² shall be at least 550mm from the supported wall (measured internally).

All external finished to match the materials of the current dwelling



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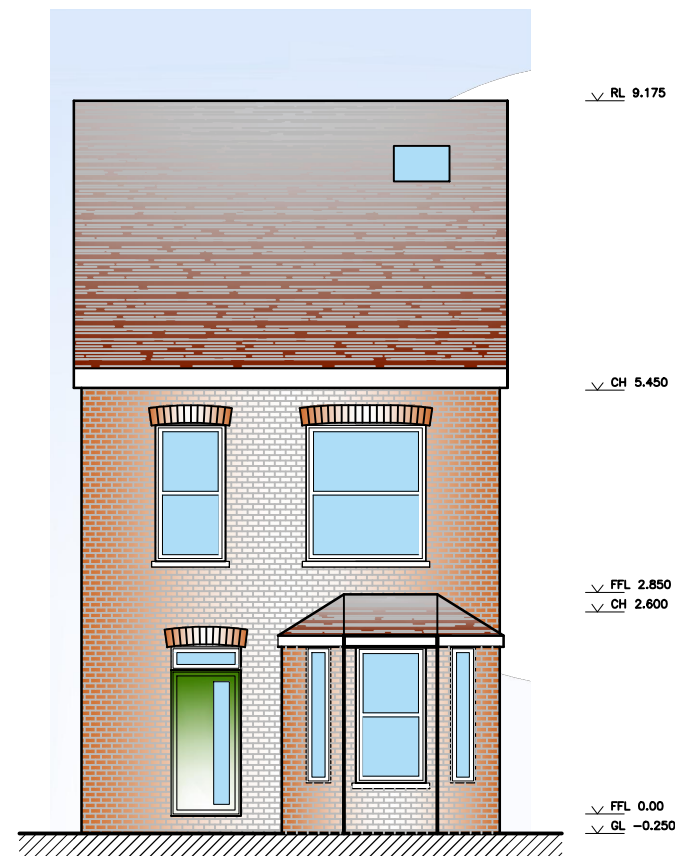
Project:
Construction of a three bed dwelling with associated landscaping at 43a Wivelsfield road, RH16 4EN

Drawing Title:
Proposed Floor Plans

Drawing Number: 3002	Date: 01/10/24	Revision: C
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Scale: (at A3) 1:100	Status: Planning
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Client:
Amy Bath



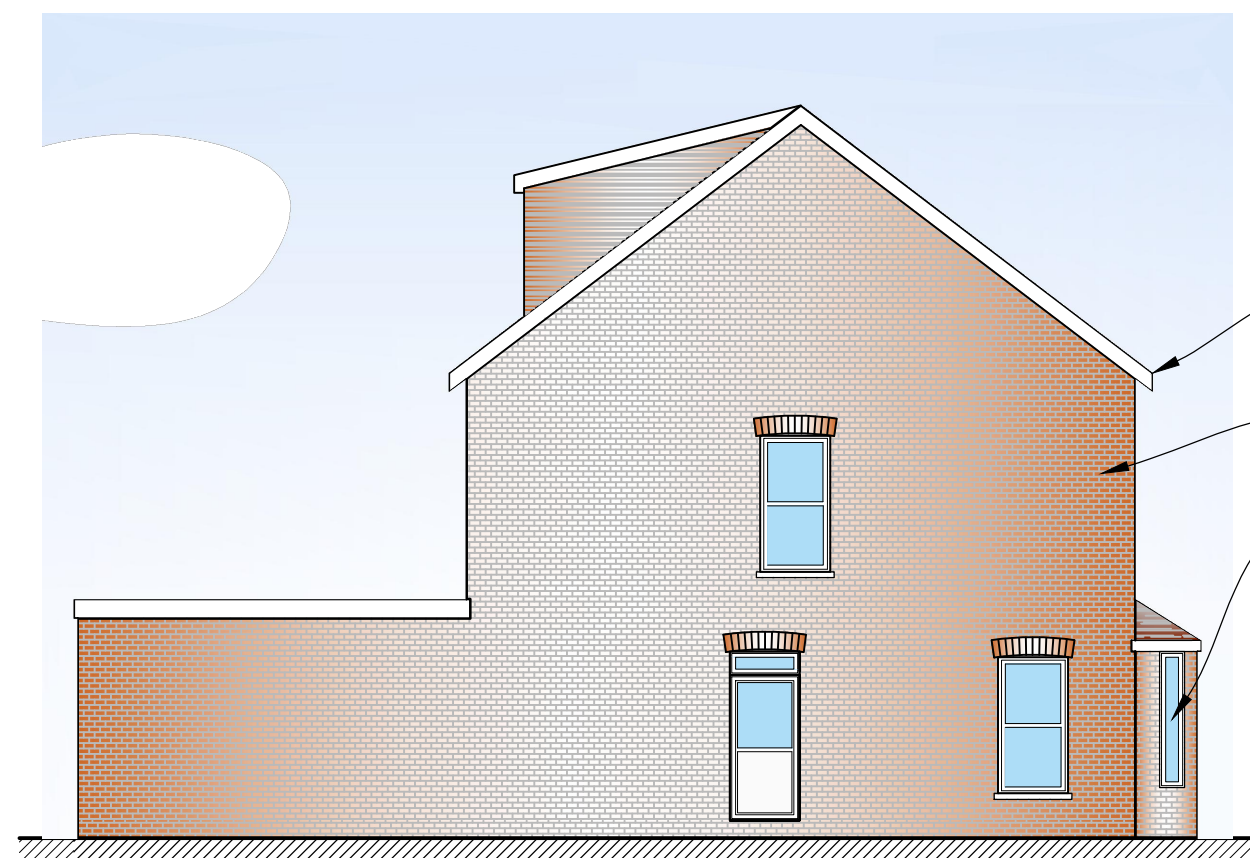
01 Front Elevation - As Proposed
3003 1:100 (at A3)



02 Side Elevation - As Proposed
3003 1:100 (at A3)



03 Rear Elevation - As Proposed
3003 1:100 (at A3)



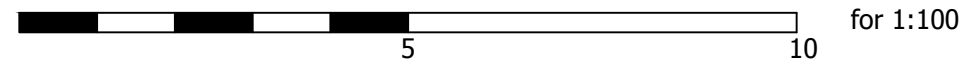
04 Side Elevation - As Proposed
3003 1:100 (at A3)

Roof tiles to match the surrounding properties

External surfaces of the proposed dwelling shall match those used on the surrounding buildings.

Window and door to client specification - All to be glazed in 16mm (Low E) 'Pirlington K' or equivalent Argon filled sealed units doubled glazed. Glass to critical areas to be toughened or safety glass to BS 6206.

Scale in Metres



for 1:100



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Project:
Construction of a three bed dwelling with associated landscaping at 43a Wivelsfield road, RH16 4EN

Drawing Title:
Proposed Elevations

Drawing Number:	Date:	Revision:
3003	01/10/24	B

Scale: (at A3)	Status:
1:100	Planning

Client:
Amy Bath

Drawing Specific Notes:

Where named products are proposed on these drawings, the manufacturer's typical details should be adhered to in the first instance, from which these details have been drawn. If there is found to be a discrepancy between the drawings and the manufacturer's details, the PM must be informed by the contractor prior to proceeding. The manufacturer's details will take precedence and should be followed unless otherwise agreed.

Red dimensions and text indicate setting out notes.

Foundations and ground floor designs to be amended as necessary in accordance with LABC/ NHBC guidance for building on clay soils near trees.

Structural Engineers details are to take precedence with all specifications.

Mains operated linked smoke alarm detection system to BS EN 14604 and BS 5839-6:2019 to at least a Grade D category LD3 standard. System to be mains powered with battery back up. Smoke alarms should be sited so that there is a smoke alarm in the circulation space on all levels/storeys and within 3m of bedroom doors and to every habitable room. If ceiling mounted they should be 300mm from the walls and light fittings. Where the kitchen area is not separated from the stairway or circulation space by a door, there should be an interlinked heat detector in the kitchen.

All works are to be carried out in a workmanlike manner. All materials and workmanship must comply with Regulation 7 of the Building Regulations, all relevant British Standards, European Standards, Agreement Certificates, Product Certification of Schemes (Kite Marks) etc. Products conforming to a European technical standard or harmonised European product should have a CE marking.

The building should meet the following Minimum U values

Wall	0.18 W/m²K
Roof	0.15 W/m²K
Floor	0.18 W/m²K

All dimensions and particulars are to be checked on site before work commences and any discrepancy to be reported to PM Home Consultants. This drawing can be scaled for Planning purposes. **DO NOT SCALE** this drawing for setting out, use written dimensions only. Any work commenced before Council approval is at the Clients risk. The drawing must be read in conjunction with all other related drawings and documentation.

Cavity trays with stopped ends and weepholes, minimum 2No per opening and at 900mm centres to be provided over lintels in external cavity walls.

Drainage where passing through the substructure to be in accordance with AD H H1 diagram 7 to include where linteled over a 50mm air space all round the pipe and suitably masked or short length of pipe bedded in wall with joints formed within 150mm of either wall face and adjacent rocker pipes a maximum of 600mm in length. (Para 2.23, 2.24 and diagram 7).

Windows and external cills to be installed to manufacturers specification. New internal cill to be formed and fixed to structural cill with builders caulk dabs. To project by 25mm to the front and sides of the internal window reveal. Insulated cavity closer's to be fitted to all openings.

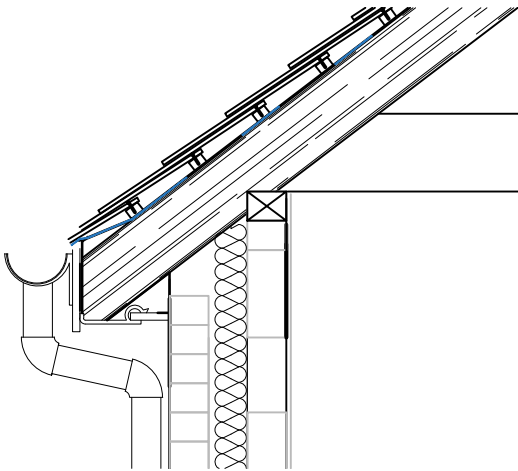
If the the new extension cannot be drained into existing drainage system a crate soakaway system required. All soakaways must be sited at least 5m from any building and preferably at least 2.5m from any boundary as per APPROVED DOC H. Drainage system is totally separate

All branch pipes and fittings to be polypropylene rigid push fit with a fall of 1:80. All sub soil drainage to be laid with bedding and backfill as specified by as per APPROVED DOC H, diagram 10(flexible pipes)

Hyload D.P.C. to inner and outer leaves, 150mm above external ground level. D.P.C not to bridge the cavity

All new walls below ground to be constructed using blockwork compliant with BS EN 771 and suitable for below ground level or semi engineering brickwork. Walls to be built using 1:4 masonry mortar mix or equal approved specification to BS EN 1996-1-1. Cavities below ground level to be filled with lean mix concrete min 225mm below damp proof course. Or provide lean mix backfill at base of cavity wall (150mm below damp course) laid to fall to weepholes.

Provide minimum 300 mm x 600mm concrete foundation, concrete mix to conform to BS EN 206:2013 and BS 8500-2. All foundations to be a minimum of 1000mm below ground level, exact depth to be agreed on site with Building Control Officer to suit site conditions. All constructed in accordance with 2010 Building Regulations A1/2 and BS 8004:2015 Code of Practice for Foundations. Ensure foundations are constructed below invert level of any adjacent drains. Base of foundations supporting internal walls to be min 600mm below ground level. Sulphate resistant cement to be used if required. Please note that should any adverse soil conditions be found or any major tree roots in excavations, the Building Control Officer is to be contacted and the advice of a Structural Engineer should be sought.New foundations to be tied into existing with 4 no h16 bars minimum 300mm embedment into existing footings with resin anchors.



UNVENTED PITCHED ROOF (imposed load max 0.75 kN/m² - dead load max 0.75 kN/m²)To achieve U-value 0.15 W/m²K. Timber roof structures to be designed by an Engineer in accordance with NHBC Technical Requirement R5 Structural Design. Calculations to be based on BS EN 1995-1-1:2004 Eurocode 5: Design of timber structures. Roofing tiles to match existing on 50 x 38mm tanalised sw treated battens on minimum 25mm thick treated vertical counter battens on breathable felt to relevant BBA Certificate, proprietary eaves carrier system to be installed. Battens to be fixed to 47 x 170mm grade C24 rafters at max 400mm centres, max span 2.29m. Rafters supported on 100 x 50mm sw wall plates. Insulation to be 150mm Celotex XR4000 between rafters and 30mm TB4000 under. Fix 12.5mm plasterboard (joints staggered) over VCL. Finish with 3mm skim coat of finishing plaster to the underside of all ceilings.

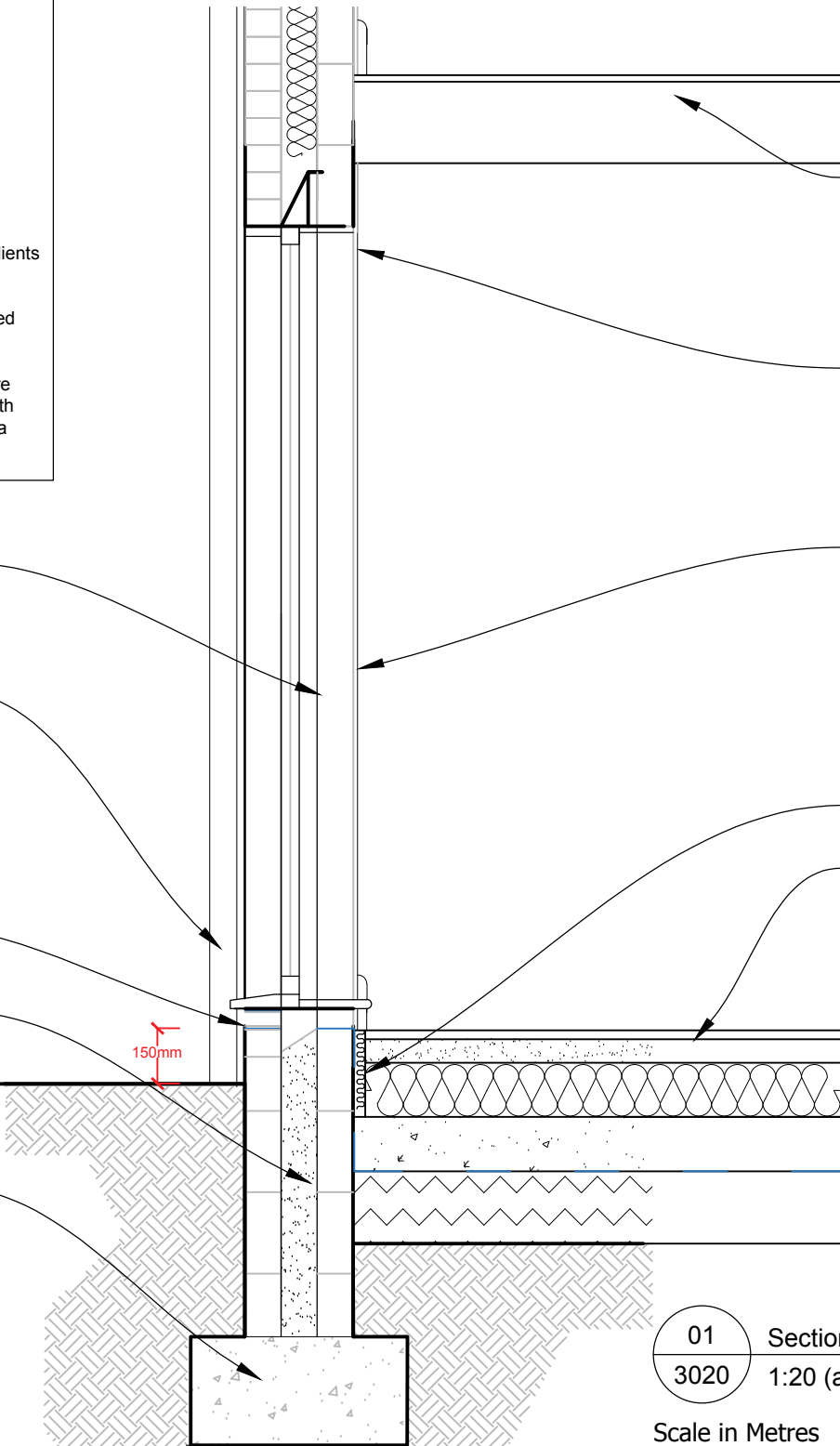
47 x 195 C24 floor joists @ 400mm C/C (doubled up under partitions) first floor to be provided with 30 minute fire resistance and to include 12.5mm plasterboard ceiling and 22mm t&g floor boarding. Steel beams where below ceiling level to be provided with 30 minute fire resistance to include framework and encasement in accordance with the board manufactures recommendations. cavity wall insulation to lap top of upstand floor insulation by 150mm

Lateral restraints to be provided to the gable wall where parallel at first floor, ceiling joist and rafter level with suitable 30x5mm galvanised mild steel straps built in at maximum 2m centres and taken over 3No joists/rafters with timber noggin support beneath the full length of the strap and floor joists being built in or supported on restraint type hangers to provide lateral restraint to walls at right angles.

Wall Build U-value = 0.18 W/m².K: FULL FILL CAVITY WALL To achieve minimum U Value of 0.18 W/m²K (actual U Value achieved 0.16 W/m²K) New cavity wall to comprise of 103mm suitable facing brick. Full fill the cavity with 115mm Celotex Thermaclass Cavity Wall 21 as manufacturer's details. Inner leaf to be 100mm lightweight block, 0.45 W/m²K. Internal finish to be 12.5mm plasterboard on dabs. Walls to be built with 1:1:6 cement mortar.Vertical joints in the board must be staggered and all joints tightly butted.All details including corner and junction to be as relevant BBA certificate.Location to be assessed for suitability of insulation boards.10mm cavity to be provided if required.

Perimeter insulation around screed to prevent thermal bridging.

Floor Build- SOLID FLOOR INSULATION OVER SLAB Solid ground floor to consist of 150mm consolidated well-rammed hardcore, blinded with 50mm sand blinding. Provide 100mm ST2 or Gen2 ground bearing slab concrete mix to conform to BS 8500-2 over a 1200 gauge polythene DPM. DPM to be lapped in with DPC in walls. Floor to be insulated over slab and DPM with min 90mm thick Celotex GA4000 insulation. 25mm insulation to continue around floor perimeters to avoid thermal bridging. A VCL should be laid over the insulation boards and turned up 100mm at room perimeters behind the skirting, all joints to be lapped by 150mm and sealed. Finish with 65mm sand/cement finishing screed with light mesh reinforcement. Where drain runs pass under new floor, provide A142 mesh 1.0m wide and min 50mm concrete cover over length of drain. Where existing suspended timber floor air bricks are covered by new extension, ensure cross-ventilation is maintained by connecting to 100mm dia UPVC pipes with 100mm concrete cover laid under the extension. Pipes to terminate at new 65mm x 215mm air bricks with cavity tray over.



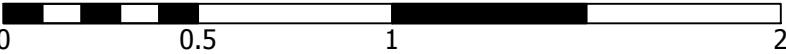
01

3020

Section 1 - As Proposed

1:20 (at A3)

Scale in Metres



for 1:20



Proteus Management
Home Extension Consultants

Project:
Construction of a three bed dwelling with associated landscaping at 43a Wivelsfield road, RH16 4EN

Drawing Title:
Section one

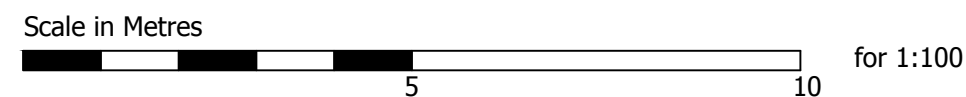
Drawing Number:	Date:	Revision:
3020	01/10/24	A

Scale: (at A3)	Status:
1:20	Planning

Client:
Amy Bath



01 Site Plan - As Proposed
3001 1:100 (at A3)



Drawing Specific Notes:

Red lines indicates boundary of property.

Blue line indicates site boundary of the proposed works .

All dimensions and particulars are to be checked on site before work commences and any discrepancy to be reported to PM Home Consultants. This drawing can be scaled for Planning purposes. **DO NOT SCALE** this drawing for setting out, use written dimensions only. Any work commenced before Council approval is at the Clients risk

All hedges and planting to provide positive Biodiversity enhancement. Using hedges and not fences where possible will create habitats and promote wildlife.

Drawing to read in conjunction with Biodiversity statement

Project: Construction of a three bed dwelling with associated landscaping at 43a Wivelsfield road, RH16 4EN		
Drawing Title: Proposed Landscaping Plan		
Drawing Number: 3040	Date: 01/10/24	Revision: A
Scale: (at A3) 1:100		Status: Planning
Client: Amy Bath		

Appendix B



Rainfall runoff calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	Cover Level (m)	Depth (m)
Soakaway	0.006	10.000	1.800

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	20.0		

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	0	0	0
100	0	0	0
100	45	0	0

Node Soakaway Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Invert Level (m)	8.200	Depth (m)	1.200
Side Inf Coefficient (m/hr)	0.03600	Time to half empty (mins)	864	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	2.000	Number Required	1
Porosity	0.95	Pit Length (m)	2.000		

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Soakaway	495	8.478	0.278	0.1	1.0742	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)					
720 minute winter	Soakaway	Infiltration	0.0					

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Soakaway	344	8.824	0.624	0.3	2.4139	0.0000	OK
Link Event (Upstream Depth)		US Node	Link	Outflow (l/s)				
360 minute winter		Soakaway	Infiltration	0.0				

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Soakaway	448	8.984	0.784	0.3	3.0304	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)					
480 minute winter	Soakaway	Infiltration	0.1					

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Soakaway	675	9.384	1.184	0.3	4.5767	0.0000	OK
Link Event (Upstream Depth)		US Node	Link	Outflow (l/s)				
720 minute winter		Soakaway	Infiltration	0.1				

Input parameters for run-off calculations	
Country	England
Total site area	372 m^2
Area proposed for development	196 m^2
Current permeable ground cover	176 m^2
Current impermeable ground cover	20 m^2
Proposed permeable ground cover	110 m^2
Proposed impermeable ground cover	86 m^2
Urban Creep Allowance	0%
Final impermeable ground cover	86 m^2
SPR	0.47
SAAR	826 mm
Region	7
Climate change factor	45%
Discharge Rate (l/s)	1.0
Run-off coefficient	100%

Current impermeable area as % of total	10%
Proposed impermeable area as % of total	44%
Change in permeable area (m2)	-66
Change in impermeable area (m2)	66
Change in impermeable area as % of total	34%

Rainfall event	Greenfield run-off rates (l/s)	Existing run-off rates(l/s)	Potential run-off rates without attenuation (l/s)	Potential minus exisiting (l/s)
QBAR	0.11	N/A	N/A	N/A
6 hour 1 in 1 year	0.10	0.13	0.18	0.05
6 hour 1 in 10 year	0.19	0.21	0.28	0.07
6 hour 1 in 30 year	0.26	0.26	0.35	0.09
6 hour 1 in 100 year	0.37	0.33	0.44	0.11
6 hour 1 in 100 year + 20% CC	N/A	N/A	0.52	0.20
6 hour 1 in 100 year + 45% CC	N/A	N/A	0.63	0.31

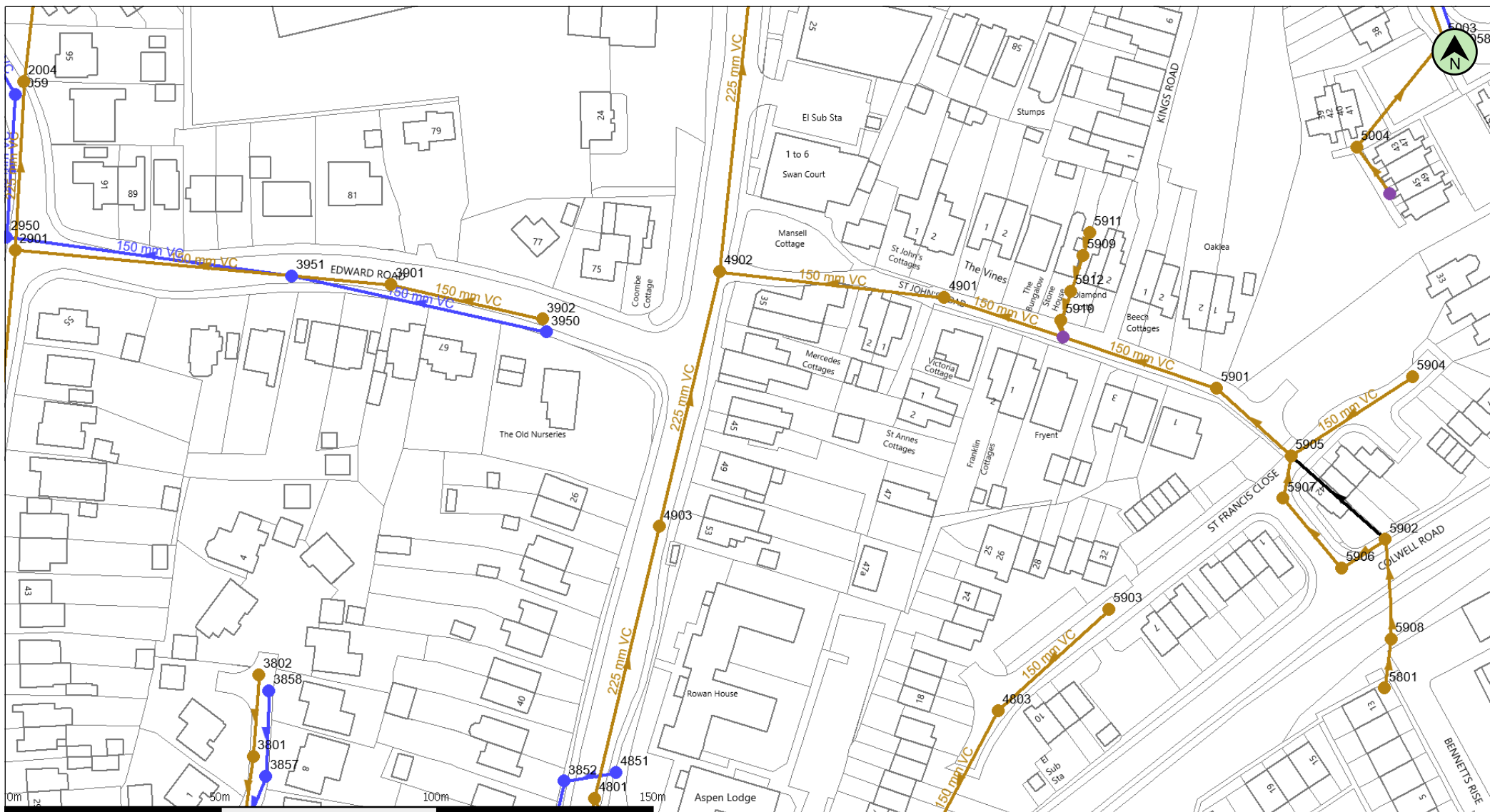
Rainfall event	Greenfield run-off volume (m³)	Existing run-off volume (m³)	Potential run-off volume without attenuation (m³)	Potential minus existing (m³)
QBAR	2.72	N/A	N/A	N/A
6 hour 1 in 1 year	2.56	2.86	3.83	0.97
6 hour 1 in 10 year	4.09	4.54	5.99	1.46
6 hour 1 in 30 year	5.09	5.68	7.61	1.93
6 hour 1 in 100 year	6.31	7.04	9.43	2.40
6 hour 1 in 100 year + 20% CC	N/A	N/A	11.32	4.28
6 hour 1 in 100 year + 45% CC	N/A	N/A	13.68	6.64

Return Period	Runoff rate restriction (l/s)	Critical Storm Duration (hr)	Attenuation Volume Required (m³)	Volume required above previous return period
1 in 30 year	1.00	0.25	0.85	N/A
6 hour 1 in 100 year	1.00	0.25	1.30	0.45
6 hour 1 in 100 year + 45% CC	1.00	0.50	2.47	1.17

Appendix C



Southern Water Asset Location Plan



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Date: 04/03/25

Scale: 1:1250

Map Centre: 533438,122955

Data updated: 26/02/25

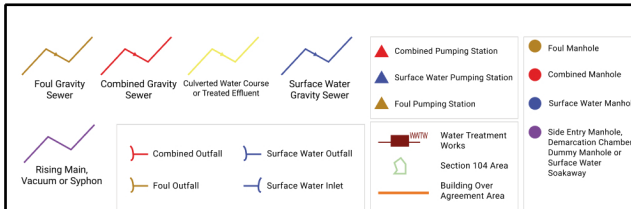
Our Ref: 1706934 - 1

Wastewater Plan A4
Powered by digdat

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WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

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



davidsouth@geosmartinfo.co.uk

85116



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Important consumer protection information

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Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

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- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
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TPOs contact details:

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

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Please ask your search provider if you would like a copy of the search code

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- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk.

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Jessica Bayliff

Operations Manager and Principal Consultant

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

JessicaBayliff@geosmartinfo.co.uk

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