GeoSmart Information

SuDSmart Plus

Sustainable Drainage Assessment

Site Address

Ribbleside Hall
Sawley Road
Chapburn
BB7 4LD

Grid Reference

377022, 444740

Report Prepared for

Iscarha Properties

Date

2024-05-10

Report Status

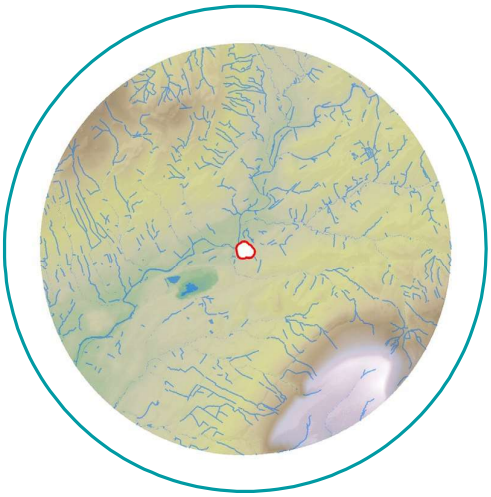
FINAL

Site Area

1.53 ha

Report Reference

82209R1



Discharge to Ground

The proposed Sustainable Drainage Scheme (SuDS) strategy is comprised of rainwater harvesting butts, unlined permeable paving/surfacing and a soakaway to attenuate surface water prior to infiltrating to ground. The scheme is designed to attenuate surface water runoff during a 1 in 100 plus 50% climate change event.

Infiltration testing should be undertaken to confirm the capacity and suitability of the underlying geology for focused infiltration features.

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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?	Moderate
	What is the potential to discharge to surface water features?	High
	What is the potential to discharge to sewers?	Low
	What is the potential to discharge to highway drains?	Low
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?	No

Summary of existing and proposed development

The Site is currently used in an agricultural capacity, comprising numerous fields. Development proposals comprise the 'Change of Use' from agricultural to commercial, including the construction of nine lodges and a manager's lodge. Development proposals also comprise associated access, car parking and landscaping. Site plans and drawings are included within Appendix A.

Summary of discharge routes

GeoSmart's SuDS Infiltration Potential (SD50) map indicates the Site has a Moderate potential for infiltration, primarily due to the moderate to high permeability of the underlying geology (limestone/mudstone principal aquifer). Infiltration to ground is therefore likely to be feasible.

Ordnance Survey (OS) mapping indicates that there are numerous surface water features within proximity to the Site, with the closest (drainage ditch) located adjacent to the southern Site boundary. As the surface water features are located in close proximity to the Site, discharge into this feature should therefore be considered. Further discussions should be

held with third party landowners and regulators to agree a suitable discharge route and any easements required.

The asset location plan search included in Appendix C confirms the Site is not located within close proximity of the public surface water or combined water sewer network. Discharging surface water runoff to the sewer is therefore not feasible.

According to Google Streetview, there are no highway gullies located within proximity of the Site which can be discharged to.

Runoff rate and attenuation requirements

Discharging via infiltration requires 60.80 m^3 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 50% 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.

Where infiltration testing may suggest that infiltration to the ground is not viable, a Secondary SuDS Strategy is proposed to attenuate and discharge surface water off-Site. Discharging off-Site requires 303.62 m^3 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 50% allowance for climate change. This volume is subject to the discharge rate being restricted to 2 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 rainwater harvesting butts, unlined permeable paving and five soakaways are proposed to attenuate a minimum of 60.80 m^3 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 50% allowance for climate change and will not cause flooding to the proposed development in accordance with DEFRAs non-statutory technical standards (DEFRA, 2015).

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 Site management, 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 condition and capacity of the surface watercourse should be confirmed and permission should be obtained from the Local Council (and/or Environment Agency) for proposed outfalls and any other permits required.

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) infiltration SuDS.
SuDS features	Rainwater harvesting butts, unlined permeable paving and soakaways.
Discharge location	Infiltrate to ground.
Discharge rate	1 x 10^{-5} m/s (0.036 m/hr)*

*An assumed infiltration rate taken from Table 25.1 of the CIRIA SuDS manual (2015) as the worst case scenario for 'slightly silty slightly clayey sand' soil type.

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

Rainwater Harvesting	Rainwater harvesting butts should be established for each proposed unit. 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 Preliminary SuDS schematic.
Permeable paving	A 2,220 m^2 area of unlined permeable paving will be utilised for the proposed driveway and parking areas. 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	Five soakaways are proposed to attenuate surface water from the proposed units. These will be filled with a plastic geo-cellular crates with a 95% void ratio to an example width of 4.0 m, length of 4.0 m and a depth of 0.8 m. Each soakaway will provide 12.16 m^3 of attenuation combining for a total of 60.80 m^3.
Total Attenuation Provided	60.80 m^3

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Figure 1. Proposed SuDS scheme

- Soakaway
- Unlined permeable paving
- Rainwater harvesting butt
- Surface water drainage network
- Exceedance flow routes
- Site boundary

The proposed SuDS scheme comprises rainwater harvesting butts for each lodge, to provide surface water storage for surface water runoff. Overflow from the rainwater harvesting butts are then discharged into the respective soakaways in the soft landscaping.

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

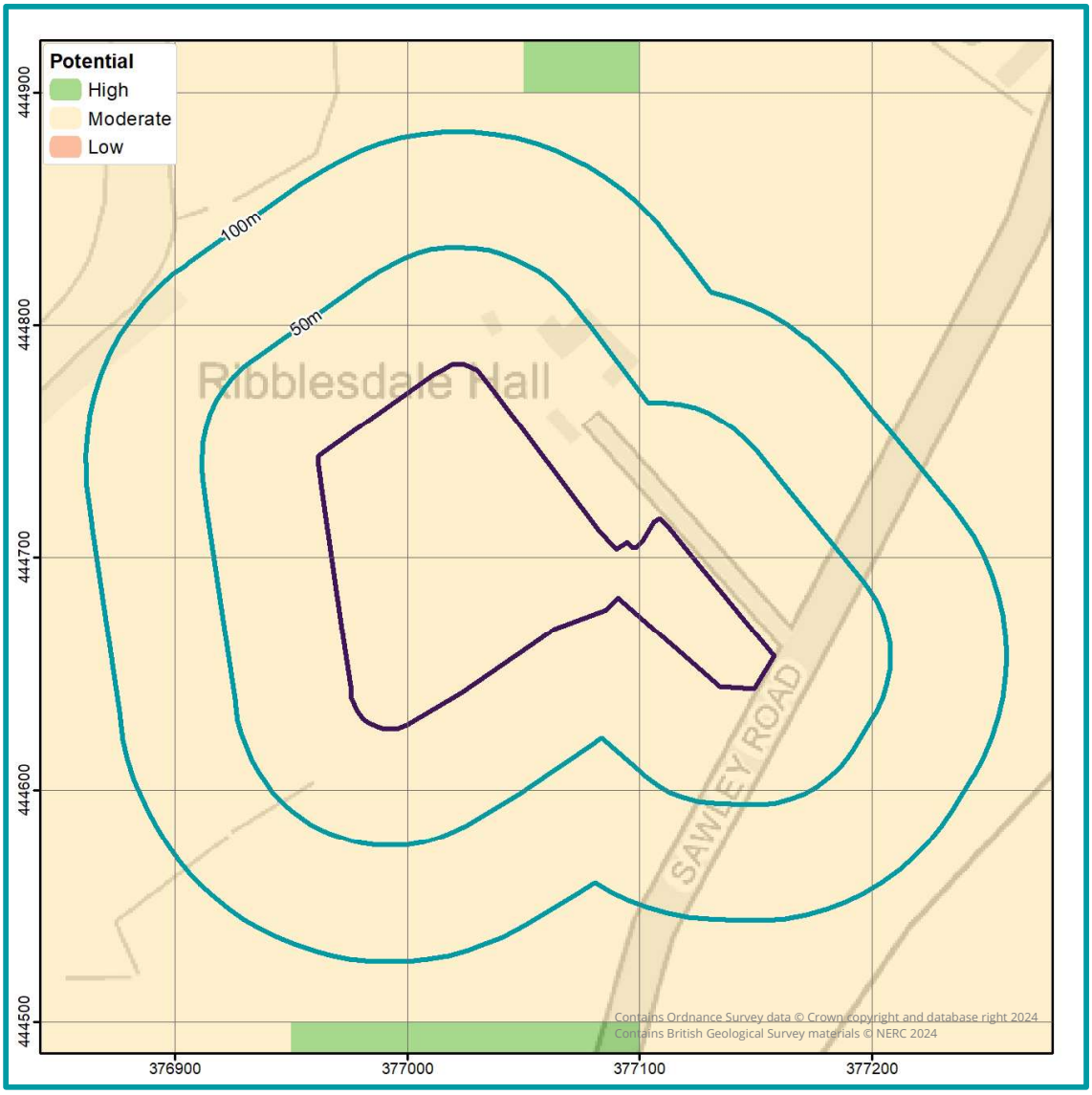
Schematic is not to scale

3 Site analysis

Site location

Figure 2. Aerial Imagery (Bluesky, 2024)

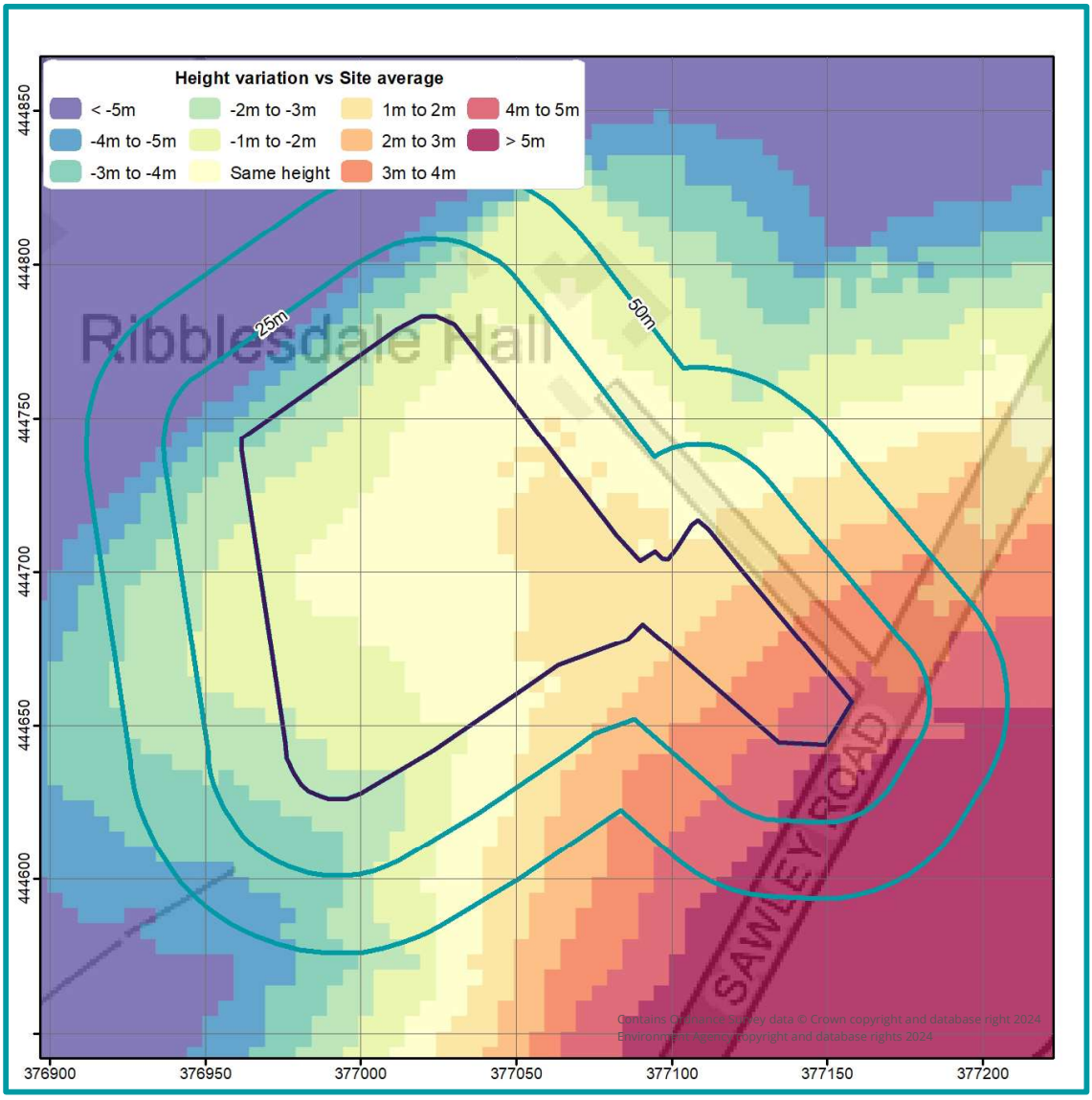
Figure 3. SuDS infiltration suitability (SD50) map (GeoSmart, 2024)



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.

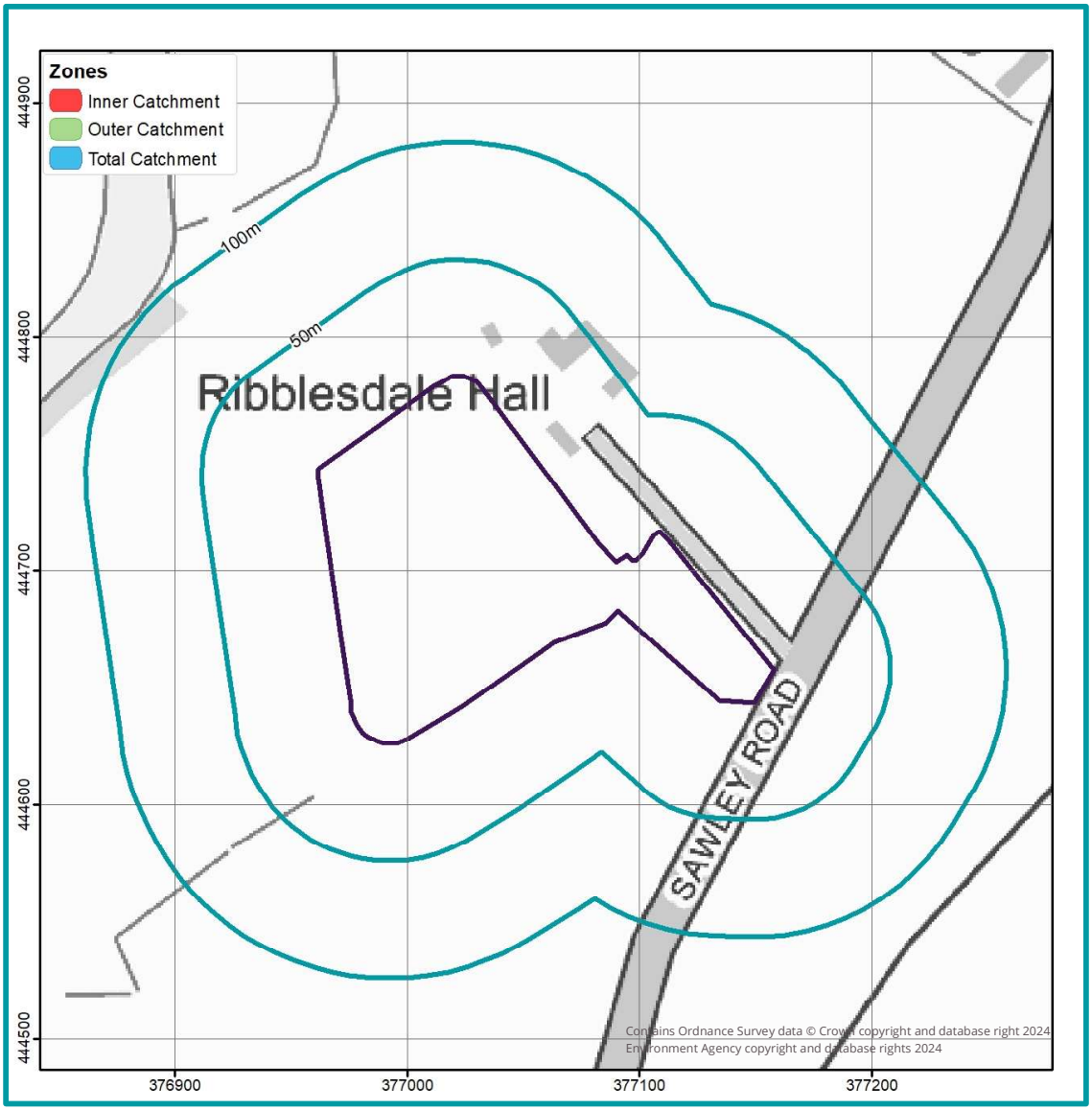
There is a Moderate potential for infiltration SuDS across the Site. It is likely that the underlying geology at the Site has a variable permeability and an infiltration SuDS scheme has the potential to be possible at the Site.

Figure 4. Site topography (GeoSmart, 2024)



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 sloping to the northwest.

Figure 5. Source protection zone map (EA, 2024)

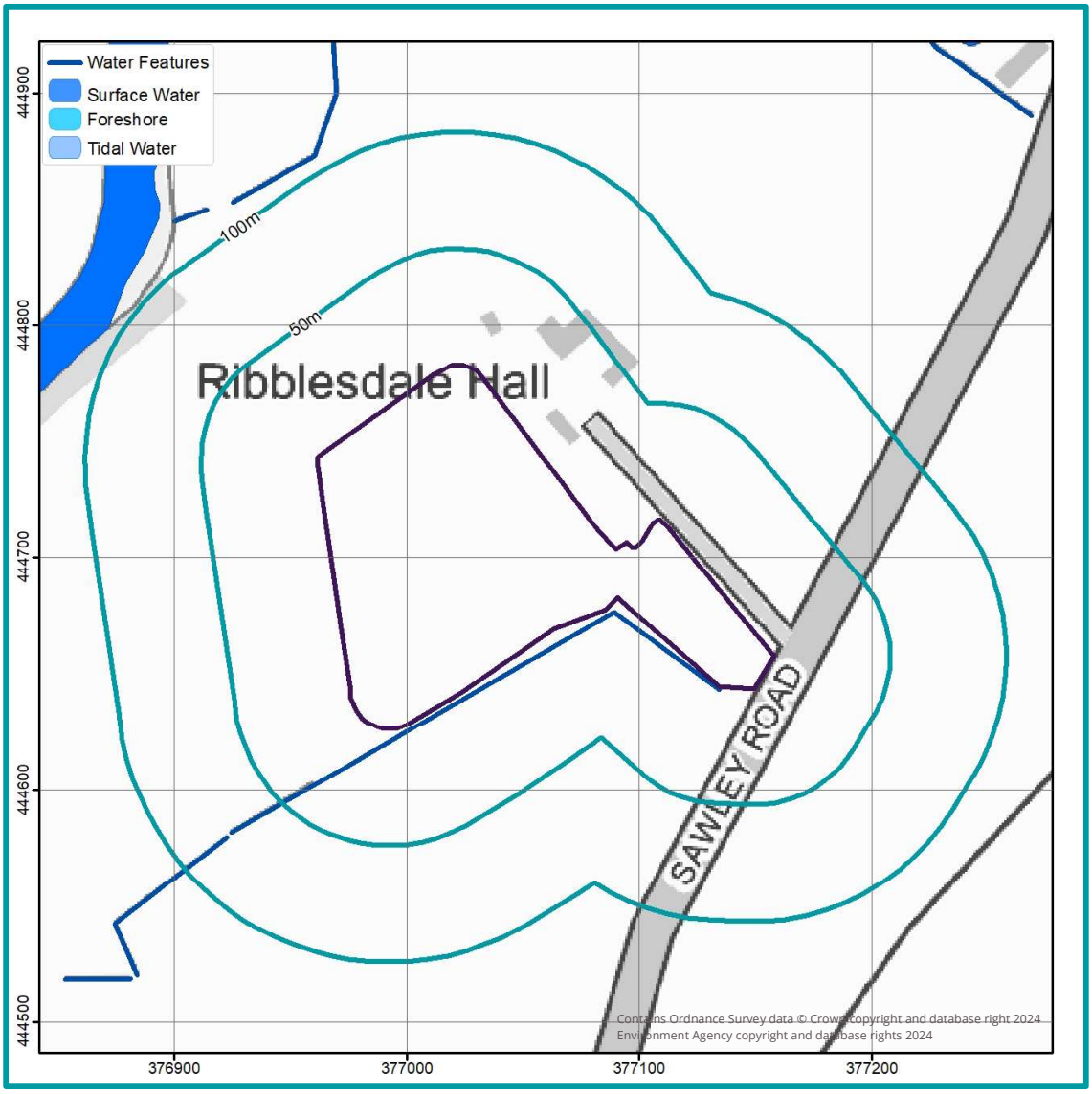


An assessment of the EA's groundwater Source Protection Zones (SPZs) has been undertaken within the vicinity of the Site and confirms the Site is not located within an SPZ.

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 6. Surface water features map (EA, 2024)



OS mapping indicates that there are numerous surface water features located within proximity of the Site.

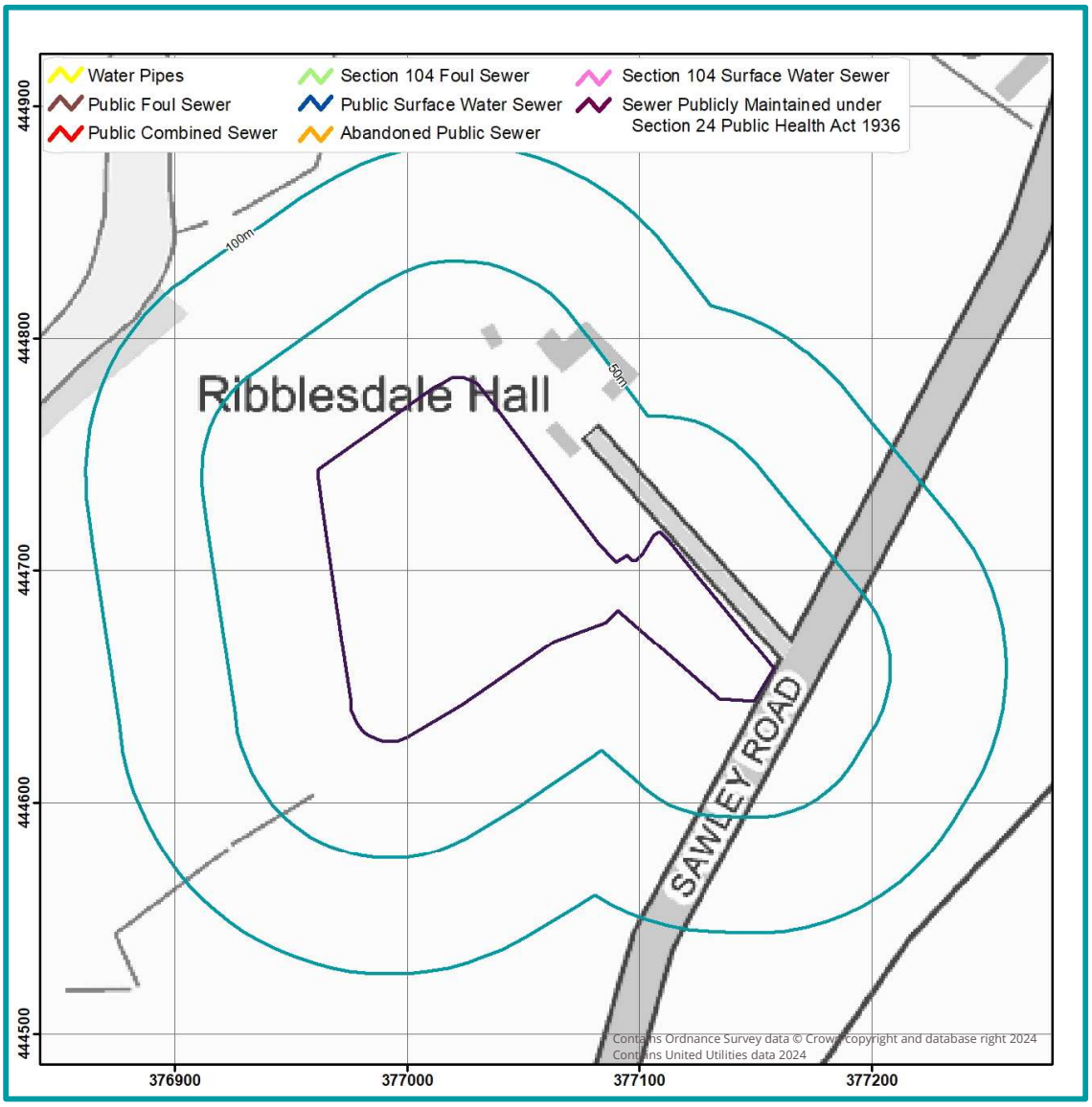
- An unnamed watercourse leading from Heys Brook is located adjacent to the southern boundary of the Site.
- The River Ribble is located 100m northwest of the Site.
- The Heys Brook is located 160m west of the Site.

The unnamed water feature is located adjacent to the Site and therefore, discharge into this feature should be considered. Further discussions should be held with third party landowners and regulators to agree a suitable discharge route and any easements required.

According to DEFRA's Magic Map, the Site is not within 250m of a SSSI or SPA. The nearest SSSI (Clitheroe Knoll Reefs) is located c. 400m southeast of the Site.

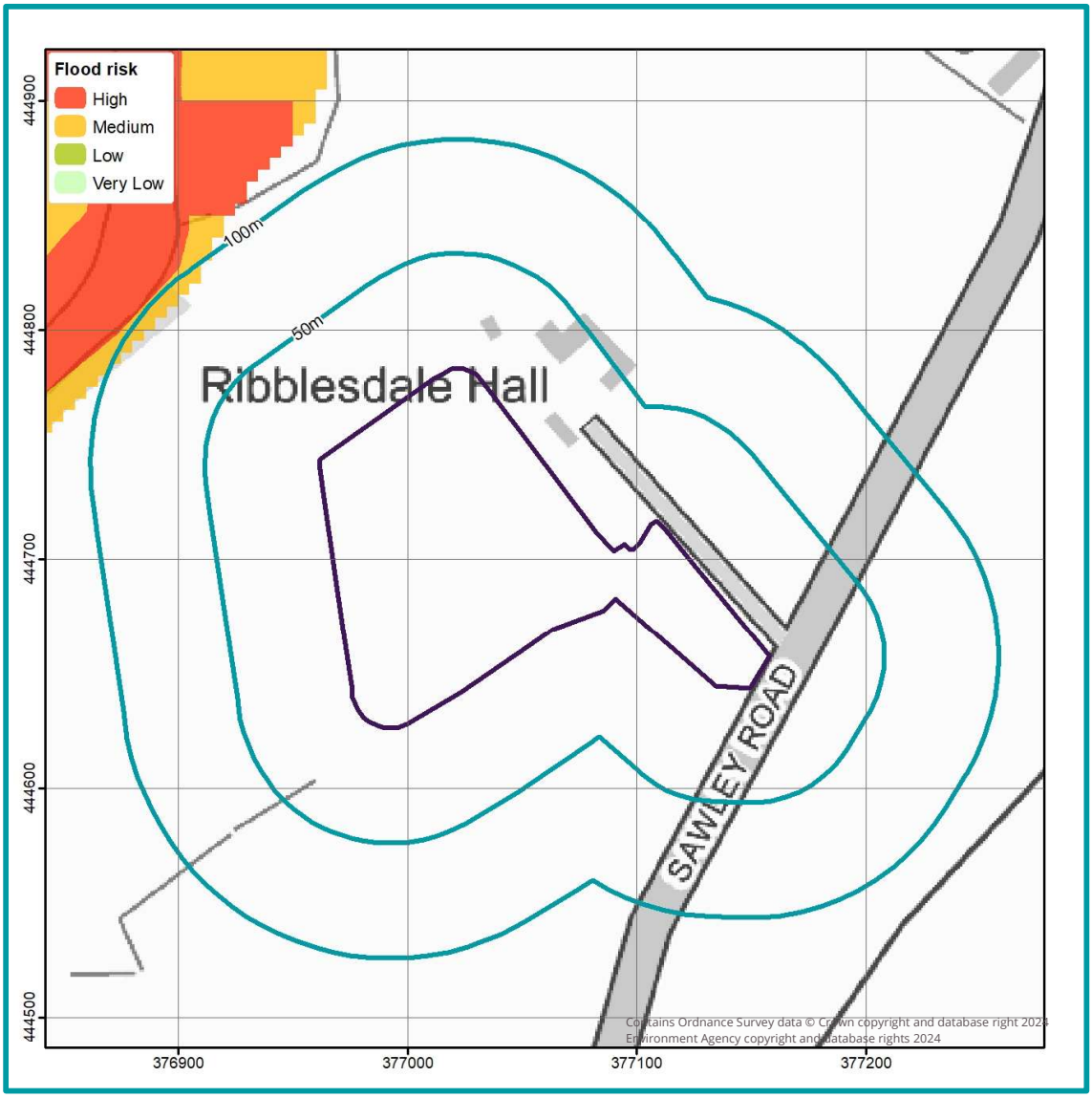
Further analysis could be undertaken by visiting the Site or by contacting the Local Council and the Environment Agency (EA) to confirm the presence, location and condition of any mapped or additional unmapped surface water features.

Figure 7. Sewer features map (OS & United Utilities, 2024)



GeoSmart has undertaken an assessment of the location of sewer features within the vicinity of the Site. According to the United Utilities asset location plan obtained for the Site (Appendix C), there are no public surface water sewer or combined sewers located within the vicinity of the Site.

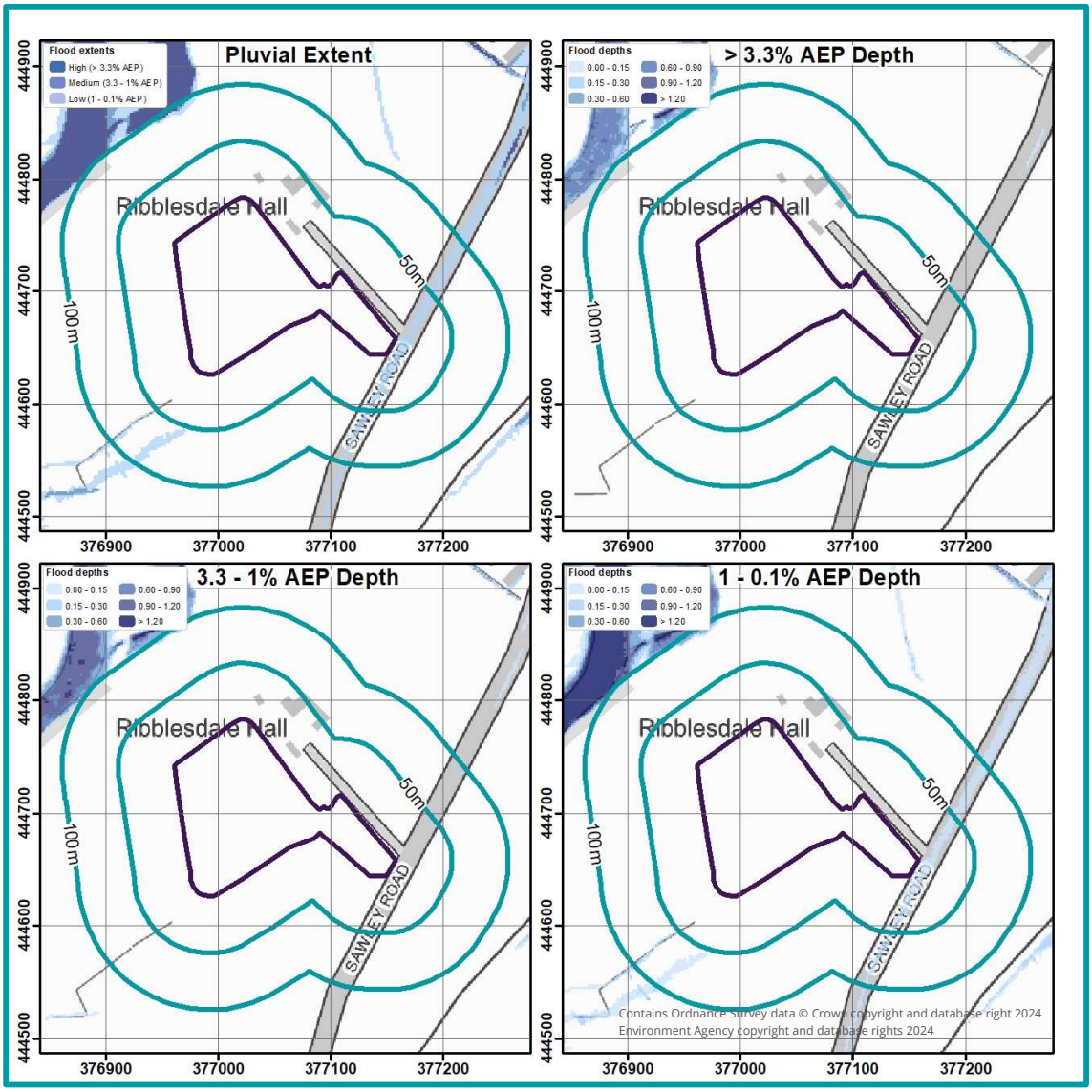
Figure 8. Risk of flooding from rivers & sea map (EA, 2024)



According to the EA's Risk of Flooding from Rivers and the Sea (RoFRS) map, the Site has a Low risk with less than 1% annual probability of flooding from fluvial or coastal flooding, therefore the SuDS design is unlikely to be affected.

A separate Flood Risk Assessment (FRA) has been prepared by Flood Risk Consultancy Limited in 2021 (ref: 20091-01) to further assess the flood risk to the proposed development.

Figure 9. Risk of surface water flooding map (EA, 2024)

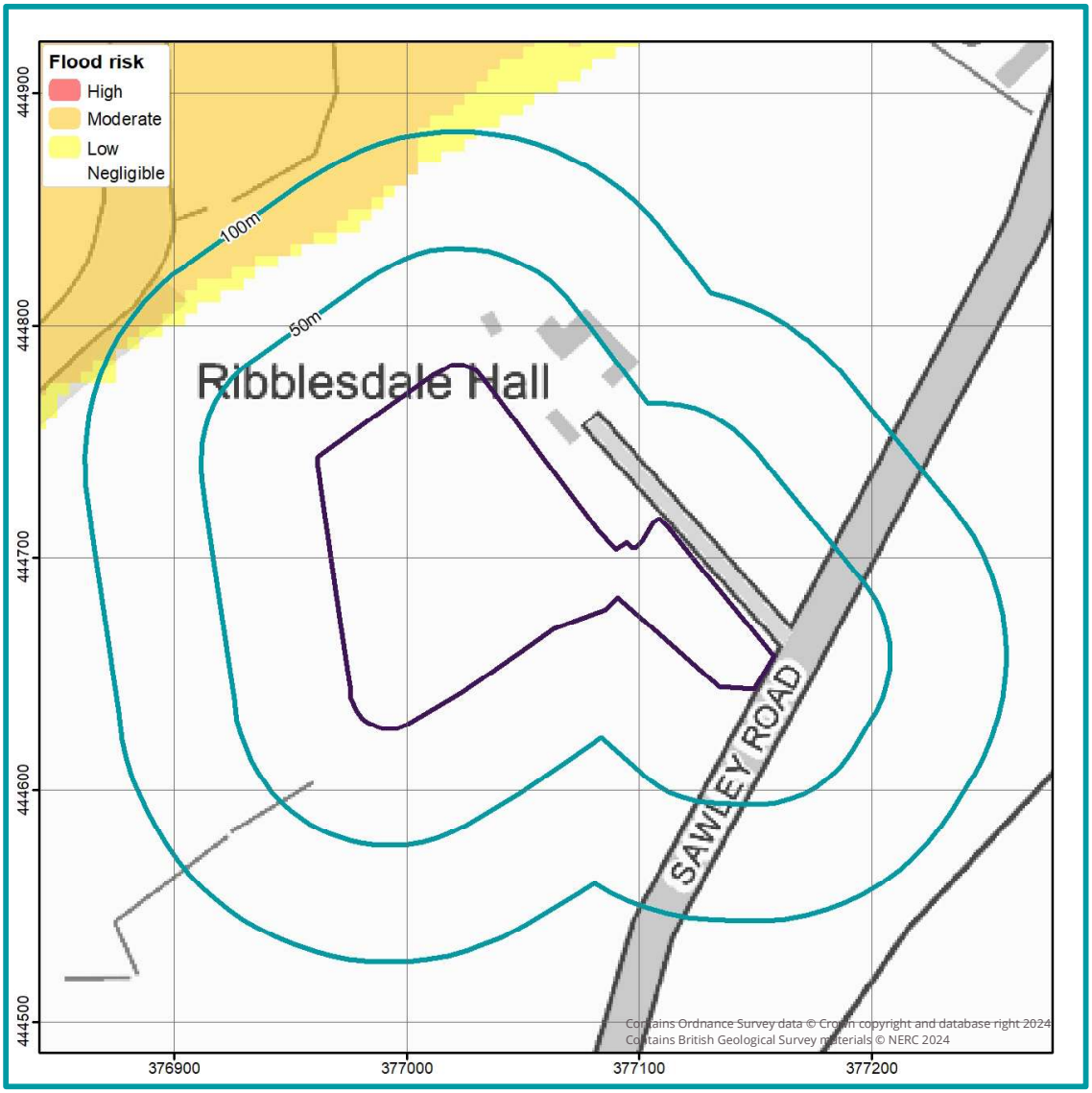


GeoSmart have undertaken an assessment of the risk of flooding from surface water (pluvial) sources within the vicinity of the Site using the EA's Risk of Flooding from Surface Water (RoFSW) mapping. The EA's mapping confirms the Site is considered to be at Very Low risk of surface water flooding.

The above map shows the 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.

Figure 10. Groundwater flood risk (GW5) map (GeoSmart, 2024)



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 Ribbleside Hall, Sawley Road, Chatburn, Ribble Valley, Lancashire, BB7 4BG (the Site). The Site is located in a setting of residential and agricultural use.

The land slopes to the south from 83.94 mAOD to 90.98 mAOD along the southern boundary. This is based on EA elevation data obtained for the Site to a 1 m resolution with a vertical accuracy of ±150 mm. A topographic survey was also undertaken for the Site by Site Surveying Services Ltd in 2020 (Appendix A).

Development

The Site is currently used in an agricultural capacity, comprising numerous fields. Development proposals comprise the 'Change of Use' from agricultural to commercial, including the construction of nine lodges and a manager's lodge. Development proposals also comprise associated access, car parking and landscaping. 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)	Till Devnsian (TILLD)	✓
Bedrock geology (Figure 12)	Clitheroe Limestone and Hodder Mudstone formation (undifferentiated) (CLHCM)	✓

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

The BGS website was used to extract ground information from the nearest borehole records to the Site. Numerous boreholes are located along the A59 Whalley/Clitherore By-Pass at a closest distance of c.260m east of the Site (ref: SD74SE71-84). However, no relevant

information concerning the hydrogeological characteristics in these locations could be identified and are therefore not utilised in this report.

Based on the available information, infiltration SuDs are proposed directly into permeable superficial deposits above 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 11. Superficial Geology (BGS, 2024)

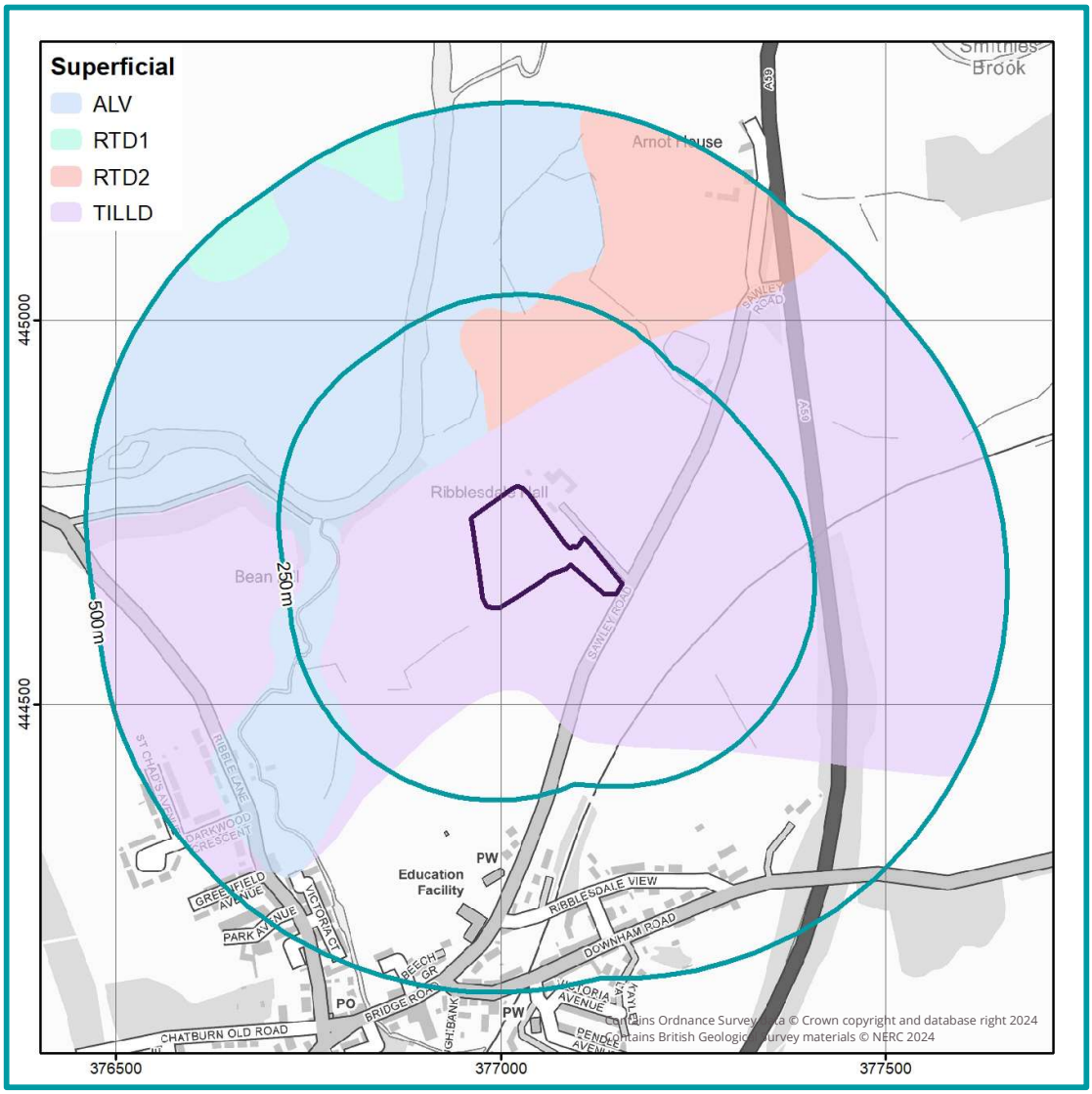


Figure 12. Bedrock Geology (BGS, 2024)

Depth to groundwater

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

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

Due to the lack of relevant borehole/trial pit records within proximity of the Site, the depth to groundwater could not be confirmed.

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 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 5m away from the foundations of a building and local guidance may recommend a greater distance, such as 10m on some areas of the Chalk. A detailed ground assessment is recommended: on steep slopes where infiltrating water would produce saturation and instability downslope; or within layered geology, where infiltrating water would produce springs down gradient.

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 (≥ 3.3% AEP) and 1 in 100 (< 3.3 to 1% AEP) year event.

As the Site is located within the Ribble Management Catchment the following climate change allowances are applicable.

Table 4. Ribble Management Catchment peak rainfall allowances

Ribble Management Catchment	3.3% Annual exceedance rainfall event		1% Annual exceedance rainfall event	
	2050s	2070s	2050s	2070s
Central	25%	30%	25%	35%
Upper end	35%	40%	40%	50%

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.

Local Policy

Lancashire County Council - Sustainable Drainage Systems (SuDS) Pro-forma Guidance for completing your pro-forma and the design of SuDS in Lancashire (April 2020)

Urban Creep

Urban creep is the conversion of permeable surfaces to impermeable over time e.g. surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas, extensions and addition of parking spaces to non-residential development. 16 The allowance for urban creep should be included in the design of the drainage system over the lifetime of the proposed development. In accordance with Section 24.7.2 of The SuDS Manual (C753) and Section 8.3 of BS 8582:2013, the Lead Local Flood Authority expects a 10% urban creep allowance to be applied to the total impermeable site

area, unless this would produce a percentage impermeability greater than 100%. Allowances must be applied when designing SuDS for both the 3.3% (1 in 30-year) and 1% (1 in 100-year) annual exceedance probability events.

North West SuDS Pro-forma (April 2020)

Managing Water Quantity (Section 2)

Approach 1 – Volume control / Long Term Storage (Technical Standards S2/3, S4/5)

- The attenuated runoff volume for the 1 in 100 year 6 hour event (plus climate change allowance) is limited to the greenfield runoff volume for the 1 in 100 year 6 hour event, with any additional runoff volume utilising long term storage and either infiltrated or released at 2 l/s/ha
- The discharge rate for the critical duration 1 in 1 year event is restricted to the 1 in 1 year greenfield runoff rate
- The discharge rate for the critical duration 1 in 100 year event (plus climate change allowance) is restricted to the 1 in 100 year greenfield runoff rate

Approach 2 – Qbar (Technical Standards S6)

- Justification has been provided that the provision of volume control/long term storage is not appropriate and an attenuation only approach is proposed. All events up to the critical duration 1 in 100 year event (plus climate change allowance) are limited to Qbar (1 in 2 year greenfield rate) or 2 l/s/ha, whichever is greater.

Peak Runoff Rates (Section 3)

Total discharge at the 1 in 100 year rate should be restricted to the greenfield runoff volume for the 1 in 100 Year 6 hour event with additional volumes (long-term storage volume) released at a rate no greater than 2 l/s/ha where infiltration is not possible. The climate change allowance should only be applied to the proposed rate and not the existing or greenfield rate.

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 5. Storage requirements at the proposed development Site for the Primary Strategy (Discharge runoff via infiltration)

Attenuation scenario	Attenuation required (m^3)	Explanation
1 in 100 year including 50% CC	60.80*	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 50% allowance for climate change**.

*Required attenuation has been calculated using Causeway Flow v.10.7 based on an assumed infiltration rate of 1 x 10^{-5} m/s (0.036 m/hr) taken from Table 25.1 of the CIRIA SuDS manual (2015) as the worst case scenario for 'slightly silty slightly clayey sand' soil type.

*Subject to confirmation through infiltration testing.

Table 6. Storage requirements at the proposed development Site for the Secondary Strategy (Discharge runoff to watercourse)

Attenuation scenario		Attenuation required (m^3)	Explanation	
Discharge runoff to watercourse	1 in 30 year	130.57	Attenuation required to ensure surface water runoff is attenuated in all storm events up to and including the 1 in 30 year (8 hour, Critical Storm Duration) event*. Flooding of the Site of 40.28 m^3 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 132.77 m^3 should be managed within overland flow routes to ensure there is no increase in flood risk in all events up to the 1 in

	1 in 100 year	170.85	Attenuation required to ensure surface water runoff is attenuated in all storm events up to and including the 1 in 100 year (10 hour, Critical Storm Duration) event*.	100 year including 50% allowance for climate change.
	1 in 100 year including 50% CC	303.62	Attenuation required to ensure surface water runoff is attenuated in all storm events up to and including the 1 in 100 year (16 hour, Critical Storm Duration) event including a 50% 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 7. Change in impermeable area associated with the development

Total Site area	15,261 m^2	
Impermeable area (and as a percentage of the total area of the proposed development footprint of 2,862 m^2)		
Pre-development	Post-development	With 10% Urban Creep
0 m^2 (100%)	2,892 m^2 (100%)	3,181 m^2 (110%)
Permeable land use: Agricultural land	New impermeable land use: 739.2 m^2 built footprint (lodges) 2,220m^2 driveway and parking areas*	

* For the primary strategy, calculations will classify this area as permeable where the paving will be unlined and self-draining. For the purpose of the secondary strategy, permeable paving has been 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.

Only the areas intended for building development have been considered for the calculations. It is assumed that drainage from areas outside the development footprint (i.e., soft landscaping), will continue to use existing drainage arrangements.

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).

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 8. 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	2.74	N/A	N/A	N/A
6 hour 1 in 1 year	2.33	3.94	4.15	0.21
6 hour 1 in 10 year	3.78	5.71	6.00	0.29
6 hour 1 in 30 year	4.60	7.26	7.64	0.38
6 hour 1 in 100 year	5.70	8.77	9.24	0.47

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)
6 hour 1 in 100 year + 20% CC	N/A	N/A	11.09	2.31
6 hour 1 in 100 year + 50% CC	N/A	N/A	13.86	5.08

[1] Assumes 100% runoff from impermeable surfaces. Assumes Greenfield runoff from permeable surfaces calculated using the IoH124 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 below 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 9. 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	42.11	N/A	N/A	N/A
6 hour 1 in 1 year	39.98	85.05	89.56	4.51
6 hour 1 in 10 year	60.70	123.40	129.67	6.27
6 hour 1 in 30 year	73.70	156.80	165.11	8.31
6 hour 1 in 100 year	89.07	189.51	199.56	10.04
6 hour 1 in 100 year + 20% CC	N/A	N/A	239.47	49.96
6 hour 1 in 100 year + 50% CC	N/A	N/A	299.34	109.82

[2] Assumes 100% runoff from impermeable surfaces. Assumes Greenfield runoff from permeable surfaces calculated using the IoH124 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 (50%) 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 2 l/s.

Table 10. 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	2	8	130.57
1 in 100 year	2	10	170.85
1 in 100 year including a 50% climate change	2	16	303.62

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 a Moderate potential for infiltration, with permeable underlying gravel. Based on the available information and groundwater flood risk mapping (subject to confirmation by site investigation) the Site has a Negligible groundwater risk but may be in hydraulic continuity with the nearby watercourses.

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

An unnamed watercourse (drainage ditch) is located adjacent to the southern Site boundary. It sits at a lower elevation than any potential SuDS scheme and is also in the direction of the natural flow path of runoff from the Site. If site investigation proves on-Site infiltration is not possible, then off-Site discharge with flow attenuation and storage may be a suitable alternative option.

If the capacity or condition of the drainage ditch is deemed unsuitable for discharge, alternative possible off-Site discharge routes include the Heys Brook or the River Ribble located at lower elevations than the Site, 160m west and 100m northwest respectively.. Access would need to be arranged and the outfall would be subject to river level and flood conditions.

A flow control device would be required to limit peak discharge rates to the maximum selected rate as indicated in Section 6 along with the appropriate attenuation storage volume.

Discharge to sewer

GeoSmart has undertaken an assessment of the location of sewer features within the vicinity of the Site. According to the asset location plan undertaken at the Site (Appendix C), there are no public surface water sewer or combined sewers located within the vicinity of the Site.

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 is a combination of Very Low (roof water) to Low hazard (runoff from car parking and road). The Site does not lie within an SPZ and therefore additional treatment stages are not required.

Table 11. 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 12. 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 13. Proposed SuDS type, features, discharge location and rate restriction

SuDS type	Source control (interception) infiltration SuDS.
SuDS features	Rainwater harvesting butts, unlined permeable paving and soakaways.
Discharge location	Infiltrate to ground.
Discharge rate	1 x 10^{-5} m/s (0.036 m/hr)*

*An assumed infiltration rate taken from Table 25.1 of the CIRIA SuDS manual (2015) as the worst case scenario for 'slightly silty slightly clayey sand' soil type.

Table 14. Proposed SuDS sizing (dimensions) and attenuation volumes

Rainwater Harvesting	Rainwater harvesting butts should be established for each proposed unit. 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 Preliminary SuDS schematic.
Permeable paving	A 2,220 m^2 area of unlined permeable paving will be utilised for the proposed driveway and parking areas. 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	Five soakaways are proposed to attenuate surface water from the proposed units. These will be filled with a plastic geo-cellular crates with a 95% void ratio to an example width of 4.0 m, length of 4.0 m and a depth of 0.8 m. Each soakaway will provide 12.16 m^3 of attenuation combining for a total of 60.80 m^3.
Total Attenuation Provided	60.80 m^3

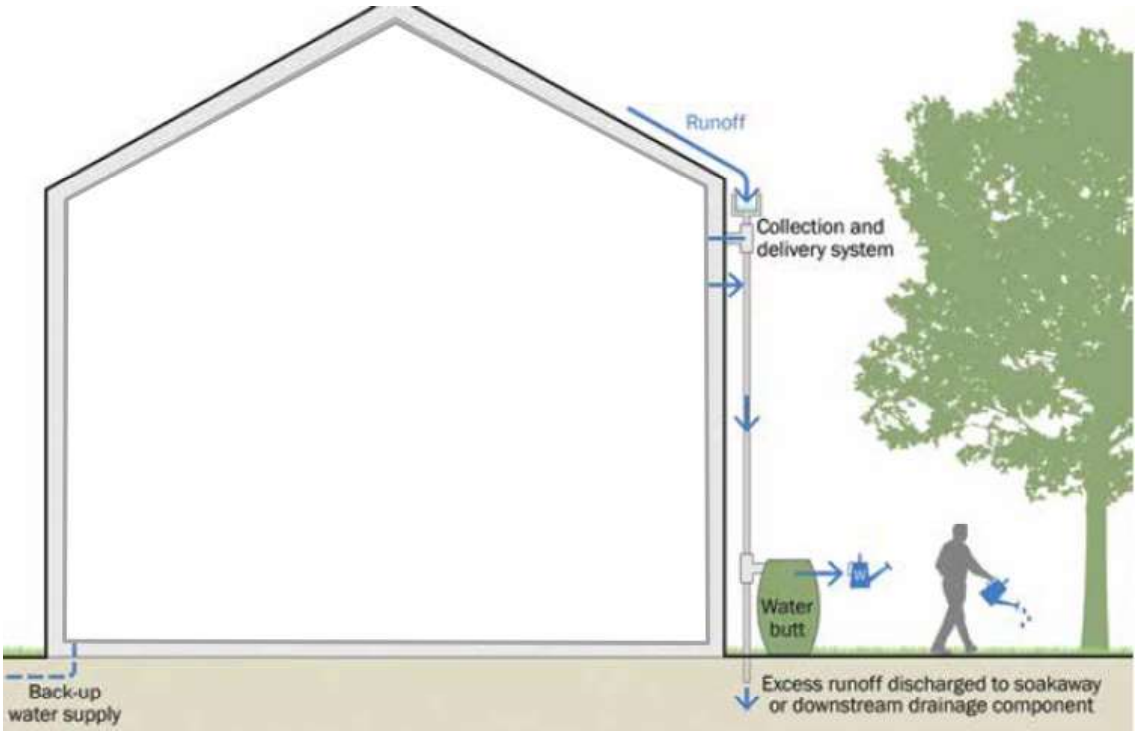
Rainwater harvesting

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 soakaways.

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 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 devises 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 contaminates 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 driveway and parking areas 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.

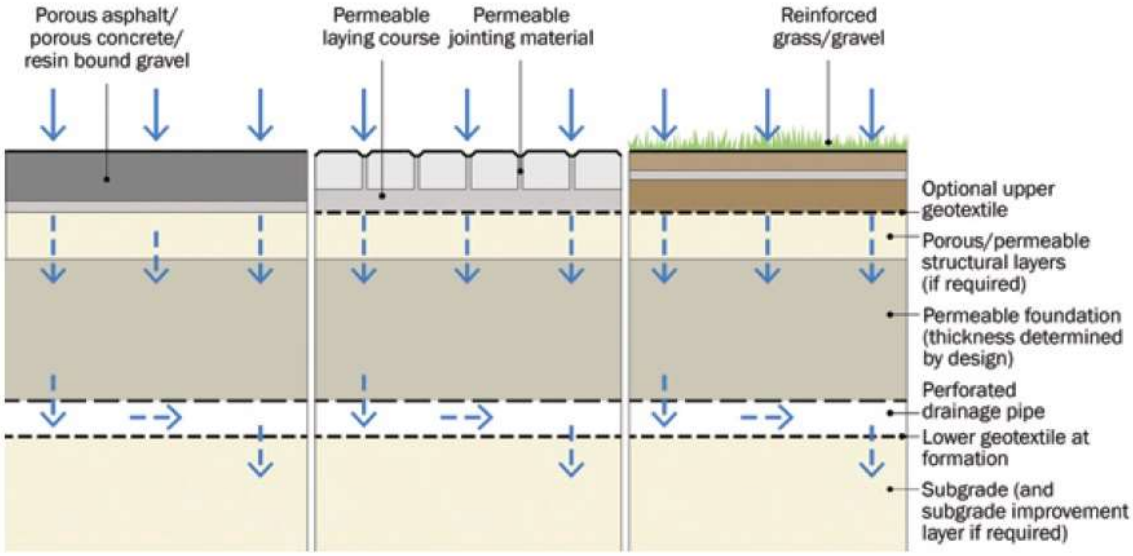


Figure 20.13 of the CIRIA SuDS Manual (C753) (2015)

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 m^3 there is 0.95 m^3 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. The base of the infiltration features should lie at an elevation at least 1m above the highest seasonal groundwater levels, to ensure there is sufficient space for surface water to discharge. Excavation of the soakaways should be outside of the root zone of any protected trees and dimensions will depend on the depth to where the soakaways are eventually situated.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 and soft landscaping. 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 303.62 m^3 should be stored within lined SuDS features to accommodate the calculated 16 hour Critical Storm Duration for surface water discharge runoff, restricted to 2 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 15. Proposed SuDS type, features, discharge location and rate restriction

SuDS type	Source control (interception) and attenuation SuDS.
SuDS features	Rainwater harvesting butts, lined permeable paving and an attenuation tank
Discharge location	Surface water feature
Discharge rate	2 l/s

Table 16. Proposed SuDS sizing (dimensions) and attenuation volumes

Rainwater Harvesting	Rainwater harvesting butts should be established for each proposed unit. 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 Preliminary SuDS schematic.
Permeable paving	A 2,220 m^2 area of lined 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. 199.80 m^3 attenuation.
Attenuation Tank	An attenuation tank with length 9 m, width 8.5 m, depth 1.5 m, with a void ratio of 95% would provide c. 109.01 m^3 attenuation.
Total Attenuation Provided	308.81 m^3
Total Attenuation Required	303.62 m^3
Freeboard Storage Provided	5.19 m^3

Attenuation Tanks

Attenuation tanks are proposed to provide the storage required. Attenuation tanks provide a below-ground void space for use of temporary storage via controlled release. They can also be modified to suit specific characteristics of a site. DEFRA, 2015 states that the run-off volume from the development to drain to any sewer of surface water body in the 1 in 100 year rainfall event must be constrained to a value as close as is reasonably practical to the

greenfield runoff volume for the same event but should never exceed the runoff volume from the development prior to redevelopment from the Site. Issues with attenuation tanks are the level of accessibility, lack of treatment performance and cost in comparison to surface systems.

Flow control devices and systems

Hydrobrake Flow control systems can be used to reduce the runoff rate from the Site. These are usually a device used for controlling water flow into a connecting feature, such as a sewer, to a specific attenuation performance. The design consists of an intake, a volute and an outlet and the configuration is critical to ensure discharge control. For drainage areas which are less than 3 ha, outlet throttle diameters would have to be small (<150mm diameter) to achieve outflow rates which could result in blockage. For most SuDS features, a flow control device will comprise a fixed orifice or a throttle such as a short pipe.

A Vortex Control is usually a self-activating vortex flow device which directs water into a volute to form a vortex. For the Site, rainwater down pipes from the development roof should drain directly into the attenuation feature to reduce infill from potential flood water.

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 17. 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).
Hydro-Brake Flow Control	Low amounts of maintenance required as there are no moving parts within the Hydro-Brake® Flow Control. • Initial monthly inspection at the manhole once the construction phase is over. If blockages occur they normally do so at the intake. Hydro-Brake® Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur. Inspection should be undertaken annually or when a storm event occurs.
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).

Asset type	Maintenance schedule (and frequency)
	• 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). • 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)
Attenuation Tanks / Geo-cellular storage	Regular maintenance: • Remove litter and debris from inlets and outlets (monthly). • Trimming any roots and surrounding grass blockages (as required). Monitoring: • Inspect inlets, outlets and overflows for blockages (monthly or after a heavy storm). • Inspect inlets and outlets for silt accumulation (half yearly). • Inspect infiltration surfaces for compaction and ponding (monthly).

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 18. 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 19. 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, 2023). 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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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

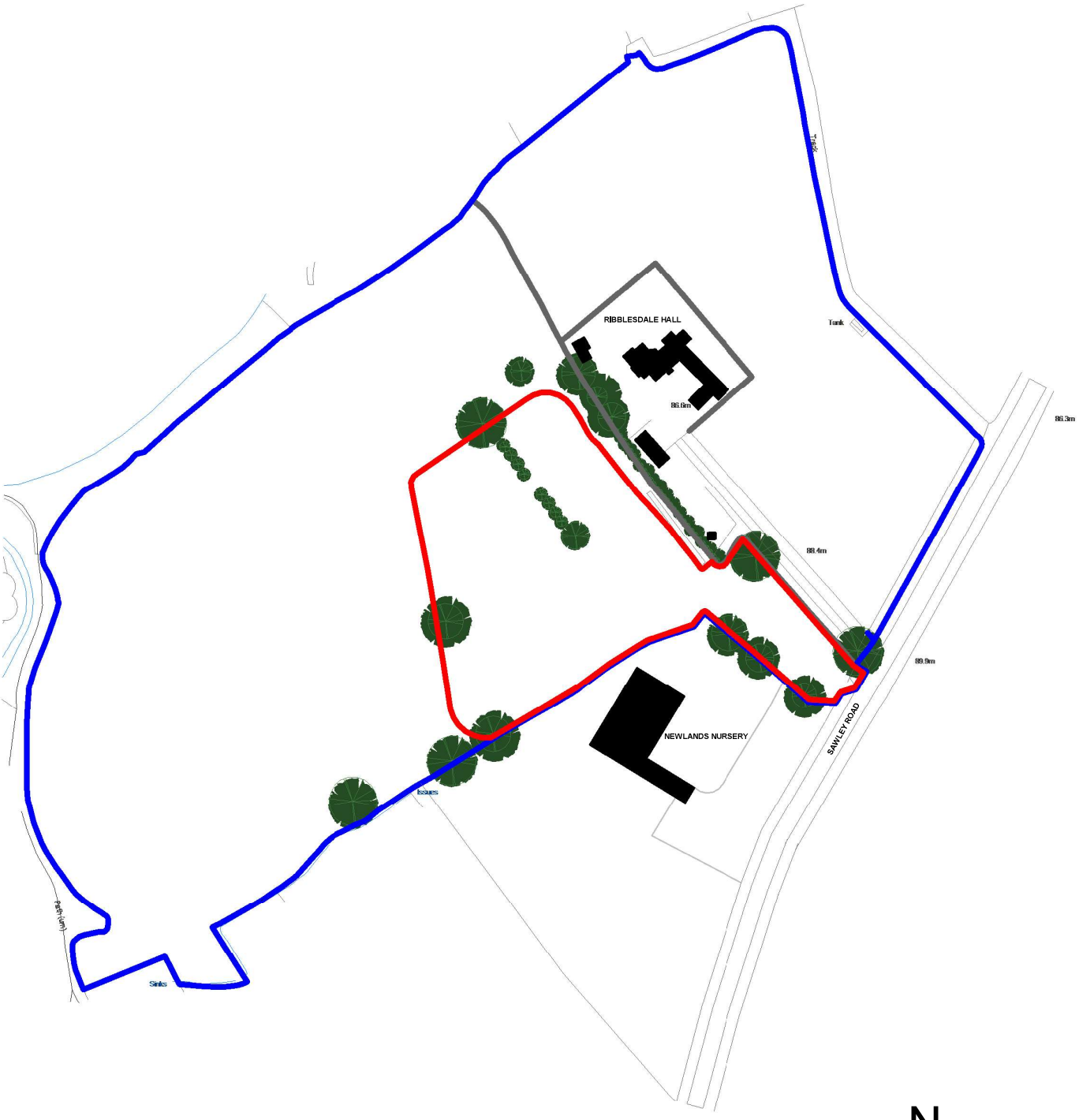
Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2024 BlueSky copyright and database rights 2024
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2024 Ordnance Survey data © Crown copyright and database right 2024
Flood Risk (RoFRS/Pluvial/Surface Water Features/SPZ)	Environment Agency copyright and database rights 2024 Ordnance Survey data © Crown copyright and database right 2024
Flood Risk (Groundwater) and SuDS infiltration suitability (SD50)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2024) Contains British Geological Survey materials © NERC 2024 Ordnance Survey data © Crown copyright and database right 2024
Sewer Location	Contains Ordnance Survey data © Crown copyright and database right 2024 Contains United Utilities Search data 2024
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2024 Environment Agency copyright and database rights 2024

15 Appendices

GeoSmart Information

Appendix A

Site plans



1 LOCATION PLAN

1 : 2500

N

Peter Hitchen Architects

PROJECT
RIBBLESDALE HALL
PROPOSED HOLIDAY LODGES AND ASSOCIATED WORKS

SHEET
LOCATION PLAN

CLIENT
BARRY TURNER

Date	Project Number	Scale (@ A4)
25/03/21	PHA385	1 : 2500

Drawn by: DC

Checked by: PH

DRAWING NUMBER
A101

1 PROPOSED SITE PLAN
1 : 500

N

Peter Hitchen
Architects

Marathon House
The Sidings Business Park
Whalley, BB7 9SE

01254 823 885

www.peterhitchenarchitects.co.uk

NOTES:

PROPOSED LODGES TO BE SOURCED FROM PRESTIGE HOMESEEKERS :

- 5 FORESTERS LODGES
- 4 DOVECOAT LODGES
- 1 HOTEL LODGE (MANAGERS LODGE)

SITE ENTRANCE - REFER TO SHEET A204 & 205 FOR FURTHER DETAIL

REFER TO ECOLOGY REPORT AND TREE SURVEY FOR FURTHER DETAIL ON ROOT PROTECTION AREAS AND LANDSCAPING MATTERS

No.	Description	Date

CLIENT:

BARRY TURNER

PROJECT:

PROPOSED HOLIDAY LODGES AND ASSOCIATED WORKS

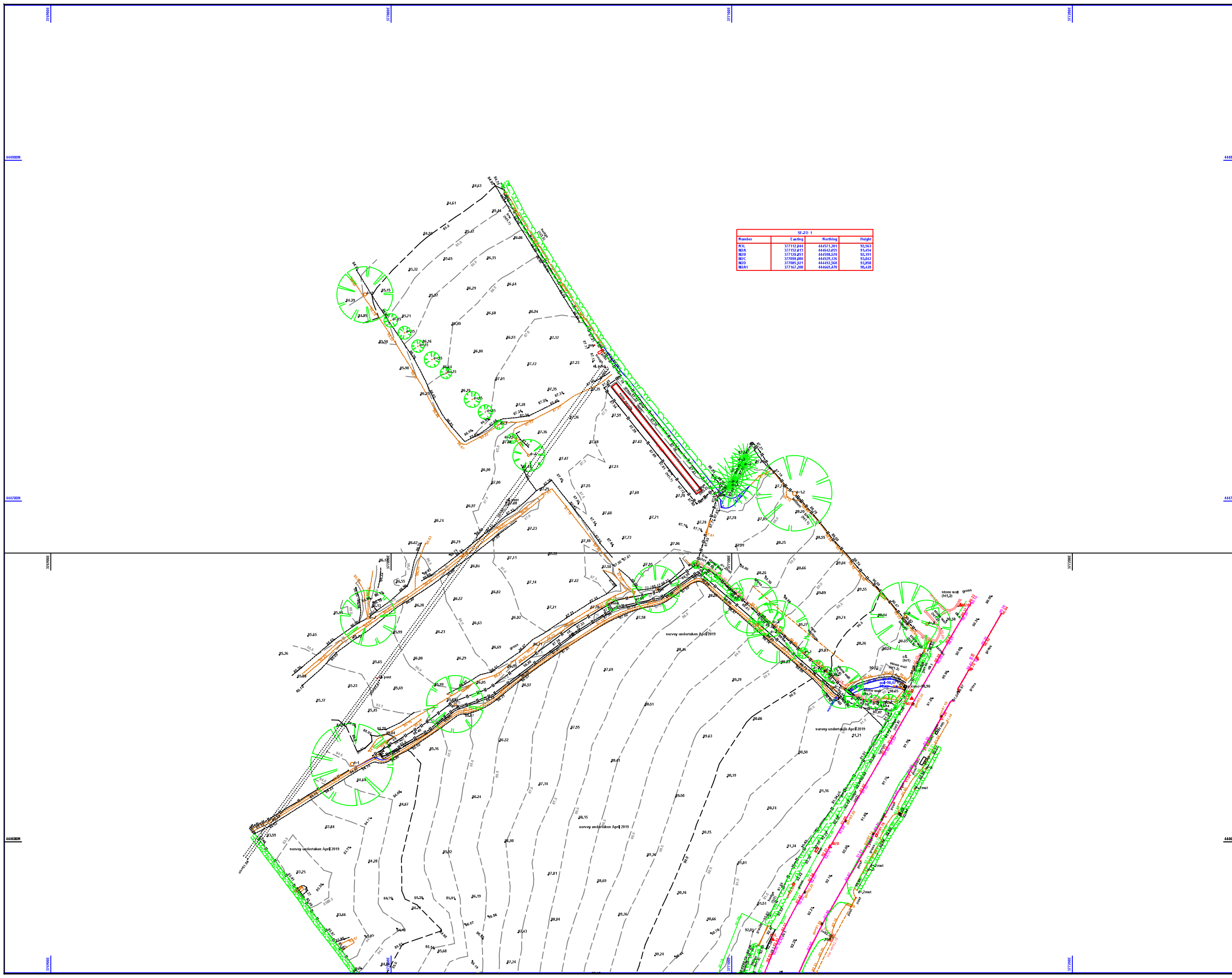
SHEET:

PROPOSED SITE PLAN

Project number	385
Date	05/07/21
Drawn by	DC
Checked by	PH

A100

Scale	1 : 500
Sheet size	A1



SF-TO 1			
Number	Easting	Northing	Height
N3L	377112.044	444571.301	92.563
M2A	377152.813	444642.055	91.454
M2B	377128.851	444598.578	92.191
M2C	377098.080	444529.126	93.042
M2D	377085.921	444492.560	93.858
M2A1	377167.208	444669.470	90.420

Location Plan
Sheet 1 of 2

Site Surveying Services Ltd

Unit 9
Twin Brook Business Park
Twin Brook Road
Clitheroe BB7 1QX
Tel 01200 438320

surveyors@sitesurvey.co.uk

Setting out & Control Surveys
Topographic & Volumetric Surveys
GPS Specialists using GPS post process to tie in any site to OS without trig points or BM.

Construction Line Registered.
TSA Member.

construction line

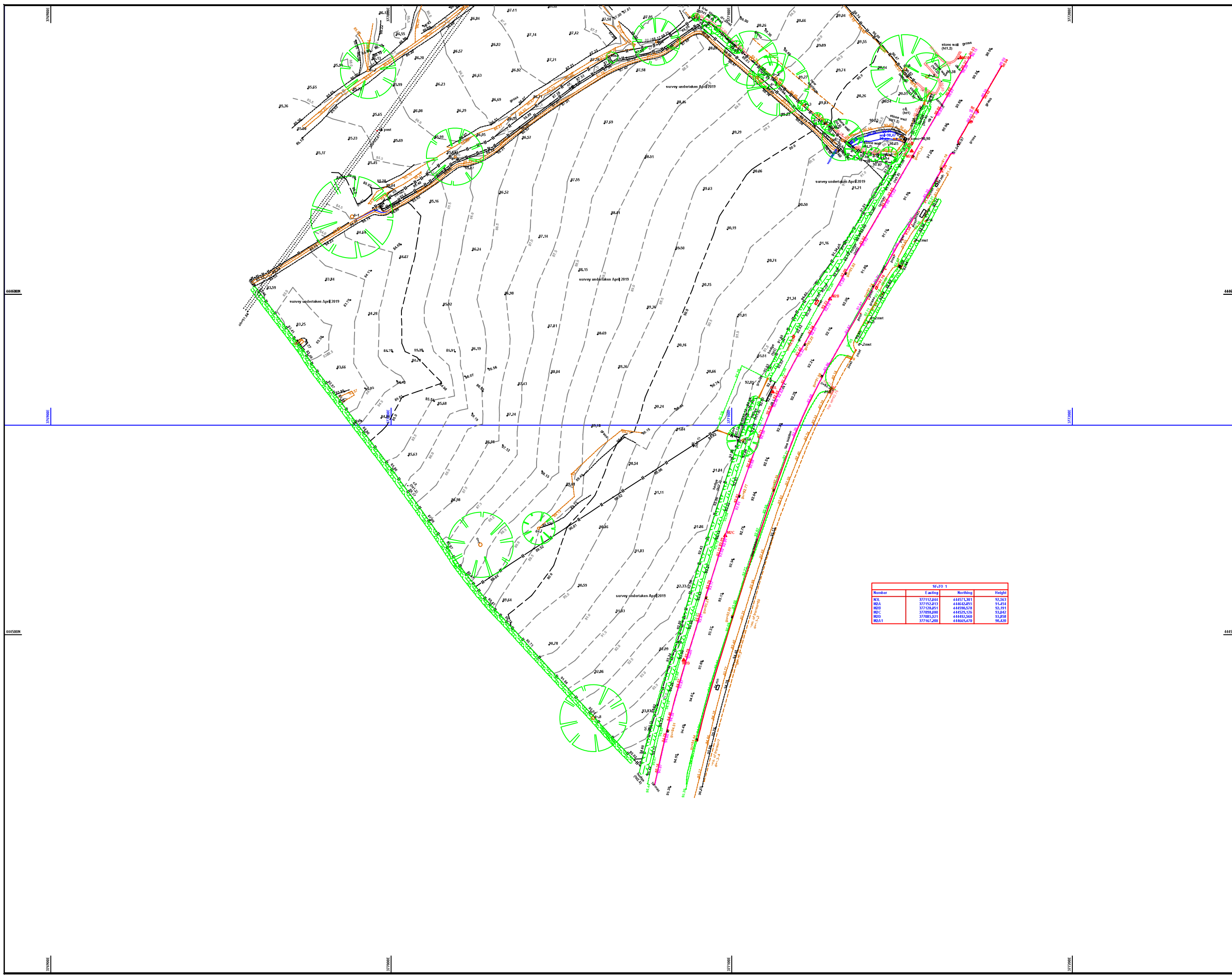
Client / Location: PHA
Ribblesdale Hall, Chatburn

All work to our standard terms & conditions (see website)
Revision Details:

THE SURVEY ASSOCIATION

Additional Comments:
To local grid based on ostn15/osgm15 all work to sss specification, some by gps, contact us regarding details

Drawing Number:	sss-9103	Revision: A	
Drawn By:	MR	Checked By:	HW
Date:	22/01/2020	Scale:	1:500 @ A1



SF-TO 1			
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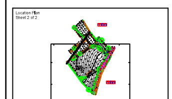
M2D	377085.921	444492.560	93.858
M2A1	377167.208	444669.470	90.420

Location Plan
Sheet 2 of 2



Site Surveying Services Ltd

Unit 9
Twin Brook Business Park
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Clitheroe BB7 1QX
Tel: 01200 438320

surveyors@sitesurvey.co.uk

Setting out & Control Surveys
Topographic & Volumetric Surveys
GPS Specialists using GPS post process to tie in any site to OS without trig points or BM.

Construction Line Registered.
TSA Member.

Client / Location: PHA
Ribblesdale Hall, Chatburn

All work to our standard terms & conditions (see website)
Revision Details:

Additional Comments:
To local grid based on ostn15/osgm15 all work to sss specification, some by gps, contact us regarding details

Drawing Number:	sss-9103	Revision: A	
Drawn By:	MR	Checked By:	HW
Date:	22/01/2020	Scale:	1:500 @ A1

GeoSmart Information

Figure 1. Proposed SuDS scheme

- Soakaway
- Unlined permeable paving
- Rainwater harvesting butt
- Surface water drainage network
- Exceedance flow routes
- Site boundary

The proposed SuDS scheme comprises rainwater harvesting butts for each lodge, to provide surface water storage for surface water runoff. Overflow from the rainwater harvesting butts are then discharged into the respective soakaways in the soft landscaping.

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

Schematic is not to scale

GeoSmart Information

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)	0.600
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)
1	0.073	10.000	1.800

Simulation Settings

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

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0
100	0	0	0
100	50	0	0

Node 1 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)	1213	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.500	Number Required	3
Porosity	0.95	Pit Length (m)	4.000		

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
720 minute winter	1	600	8.739	0.539	2.4	28.1055	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	1	Infiltration	0.4

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
720 minute winter	1	690	8.888	0.688	2.9	35.8285	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
720 minute winter	1	Infiltration	0.4

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
1440 minute winter	1	1110	9.328	1.128	2.6	58.7630	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
1440 minute winter	1	Infiltration	0.6

Input parameters for run-off calculations		
Country	England	
Total site area	15261	m^2
Area proposed for development	2892	m^2
Current permeable ground cover	0	m^2
Current impermeable ground cover	2892	m^2
Proposed permeable ground cover	-289.2	m^2
Proposed impermeable ground cover	2892	m^2
Urban Creep Allowance	10%	
Final impermeable ground cover	3181.2	m^2
SPR	0.47	
SAAR	1245	mm
Region	10	
Climate change factor	50%	
Discharge Rate (l/s)	2.0	
Run-off coefficient	100%	

Current impermeable area as % of total	100%
Proposed impermeable area as % of total	110%
Change in permeable area (m2)	-289
Change in impermeable area (m2)	289
Change in impermeable area as % of total	10%

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	2.74	N/A	N/A	N/A
6 hour 1 in 1 year	2.33	3.94	4.15	0.21
6 hour 1 in 10 year	3.78	5.71	6.00	0.29
6 hour 1 in 30 year	4.60	7.26	7.64	0.38
6 hour 1 in 100 year	5.70	8.77	9.24	0.47
6 hour 1 in 100 year + 20% CC	N/A	N/A	11.09	2.31
6 hour 1 in 100 year + 50% CC	N/A	N/A	13.86	5.08

Rainfall event	Greenfield run-off volume (m^3)	Existing run-off volume (m^3)	Potential run-off volume without attenuation (m^3)	Potential minus existing (m^3)
QBAR	42.11	N/A	N/A	N/A
6 hour 1 in 1 year	39.98	85.05	89.56	4.51
6 hour 1 in 10 year	60.70	123.40	129.67	6.27
6 hour 1 in 30 year	73.70	156.80	165.11	8.31
6 hour 1 in 100 year	89.07	189.51	199.56	10.04
6 hour 1 in 100 year + 20% CC	N/A	N/A	239.47	49.96
6 hour 1 in 100 year + 50% CC	N/A	N/A	299.34	109.82

Return Period	Runoff rate restriction (l/s)	Critical Storm Duration (hr)	Attenuation Volume Required (m^3)	Volume required above previous return period
1 in 30 year	2.00	8	130.57	N/A
6 hour 1 in 100 year	2.00	10	170.85	40.28
6 hour 1 in 100 year + 50% CC	2.00	16	303.62	132.77

GeoSmart Information

Appendix C

United Utilities Asset Location Plan

United Utilities
Water for the North West

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

GeoSmart Information

Suite 9-11, Old Bank Buildings
Bellstone,
Shropshire,
SY1 1HU

FAO:

Your Ref: 82209
Our Ref: UUPS-ORD-567844
Date: 08/05/2024

Dear Sirs

Location: RIBBLESDALE HALL SAWLEY ROAD, CHATBURN, CLITHEROE, BB7 4LD

I acknowledge with thanks your request dated 02/05/2024 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

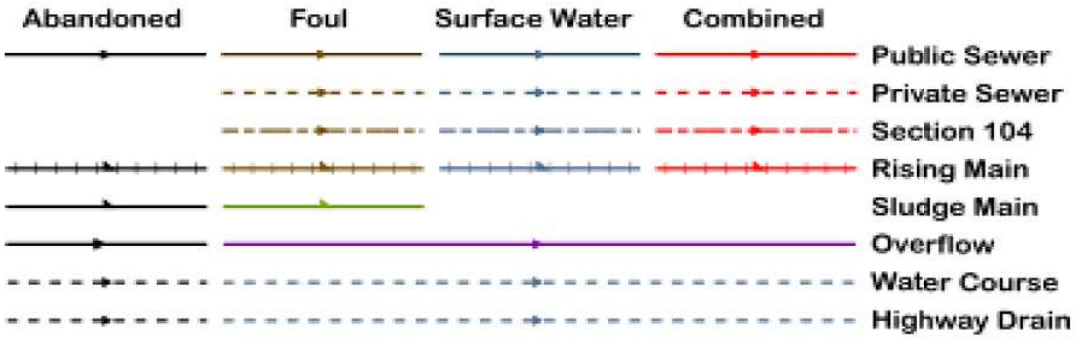
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

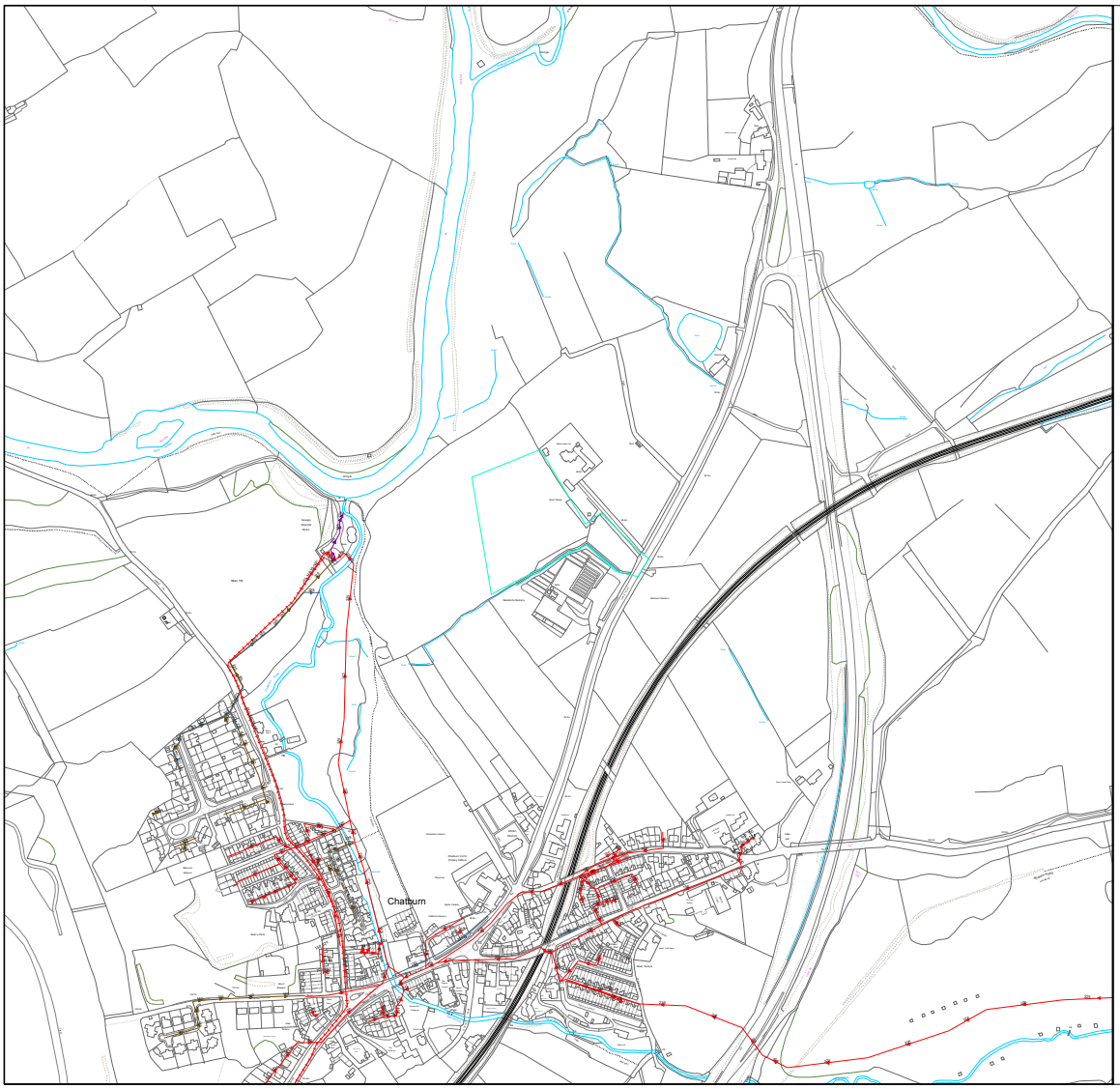
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- ST Septic Tank
- CK Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic



Extract from Map of Sewer Mains

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

RIBBLESDALE HALL SAWLEY ROAD, CHATBURN, CLITHEROE, BB7 4LD

Printed By: Property Searches Date: 08/05/2024

DO NOT SCALE

Approximate Scale: 1:5000

United Utilities

Water for the North West

Disclaimer

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

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

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For full T&Cs see http://geosmartinfo.co.uk/terms-conditions

Further information

Information on confidence levels and ways to improve this report can be provided for any location on written request to info@geosmart.co.uk or via our website. Updates to our model are ongoing and additional information is being collated from several sources to improve the database and allow increased confidence in the findings. Further information on groundwater levels and flooding are being incorporated in the model to enable improved accuracy to be achieved in future versions of the map. Please contact us if you would like to join our User Group and help with feedback on infiltration SuDS and mapping suggestion.

Important consumer protection information

This search has been produced by GeoSmart Information Limited, Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU.

Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

GeoSmart Information Limited is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom.
- sets out minimum standards which firms compiling and selling search reports have to meet.
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.
- By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports.
- act with integrity and carry out work with due skill, care and diligence.
- at all times maintain adequate and appropriate insurance to protect consumers.
- conduct business in an honest, fair and professional manner.
- handle complaints speedily and fairly.
- ensure that products and services comply with industry registration rules and standards and relevant laws.
- monitor their compliance with the Code.

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If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award up to £5,000 to you if the Ombudsman finds that you have suffered actual financial loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

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

You can get more information about the PCCB from www.propertycodes.org.uk.

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

Complaints procedure

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly. If you want to make a complaint, we will:

- 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:

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

martinlucass@geosmartinfo.co.uk

16 Terms and conditions, CDM regulations and data limitations

Terms and conditions can be found on our website:

http://geosmartinfo.co.uk/terms-conditions/

CDM regulations can be found on our website:

http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/

Data use and limitations can be found on our website:

http://geosmartinfo.co.uk/data-limitations/