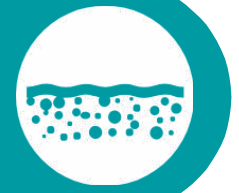
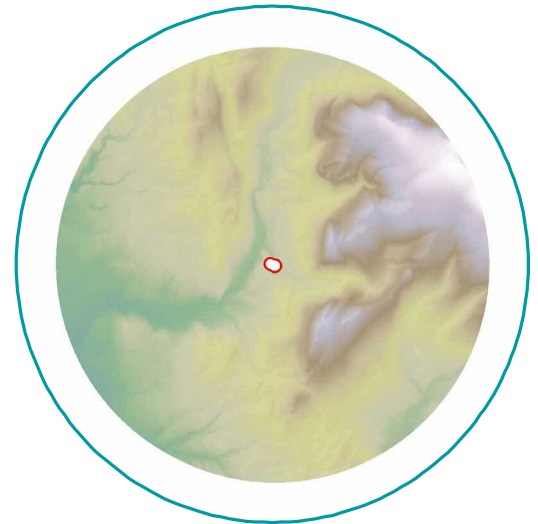


# SuDSmart Design



## Sustainable Drainage Assessment

Site Address	Date
Longhorn Stables Hagg Lane Upper Rawcliffe-With-Tarnacre Lancashire PR3 0UJ	2023-12-13
Grid Reference	Report Status
343450, 441848	FINAL
Report Prepared for	Site Area
Barbara Ainsworth	0.06 ha
	Report Reference
	80040R2



## Discharge to watercourse

SuDS features such as rainwater harvesting butts and an attenuation tank are proposed to attenuated surface water runoff from the Site prior to discharging to the nearby watercourse via a flow control.

Report Author

Josef Peace Lossl

Consultant

Report Checker & Reviewer

Michelle Gregg

Principal Drainage Consultant

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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?	Low*
	What is the potential to discharge to surface water features?	Medium**
	What is the potential to discharge to sewers?	Low
	What is the potential to discharge to highway drains?	Low
Flooding	What is the fluvial flood risk at the Site?	Very Low
	What is the 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?	Yes
	Is the surface water feature a protected resource?	N/A

\*While GeoSmart's SD50 mapping shows the Site has a Moderate potential for infiltration, site investigation has proven infiltration does not work at the Site and the infiltration potential has therefore been downgraded to Low.

\*\*Client information indicates a drainage network adjacent to the Site discharging to a culvert 180m north of the Site.

## Summary of existing and proposed development

The Site is currently used within an agricultural capacity. The site comprises an existing caravan which is to be retained and re-purposed and a small paddock adjacent hard standing, grassland and hedges to the edge of Hagg Lane.

Development proposals comprise the construction of 1 no essential rural workers dwelling and change of use of land for siting of caravan for use as residential accommodation for equine students/trainees (retrospective). (Site Plans are included in 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 anticipated permeability of the underlying geology (TILLD). However Site investigation by Geo Environmental Engineering Ltd in November 2023

attempted infiltration testing at the Site but found water did not drain away sufficiently to calculate an infiltration rate. Infiltration to ground is therefore not considered to be feasible.

Ordnance Survey (OS) mapping indicates no surface water features located within 100 m of the Site. However, according to client information, there is a drainage network discharging to a culvert along a private road approximately 180m to the north of the Site. As infiltration to ground has been proven infeasible, discharge to this watercourse is proposed, subject to the confirmation of the asset owner and an assessment of the watercourse location, depth and capacity.

The asset location plan included in Appendix C confirms the Site is not located within 100m of the public sewer network. Due to the long distance to nearby sewers discharging surface water runoff to the sewer is not feasible.

According to Google Streetview, no highway gullies are located within Rawcliffe Road, indicating no presence of the highway drainage network.

### Runoff rate and attenuation requirements

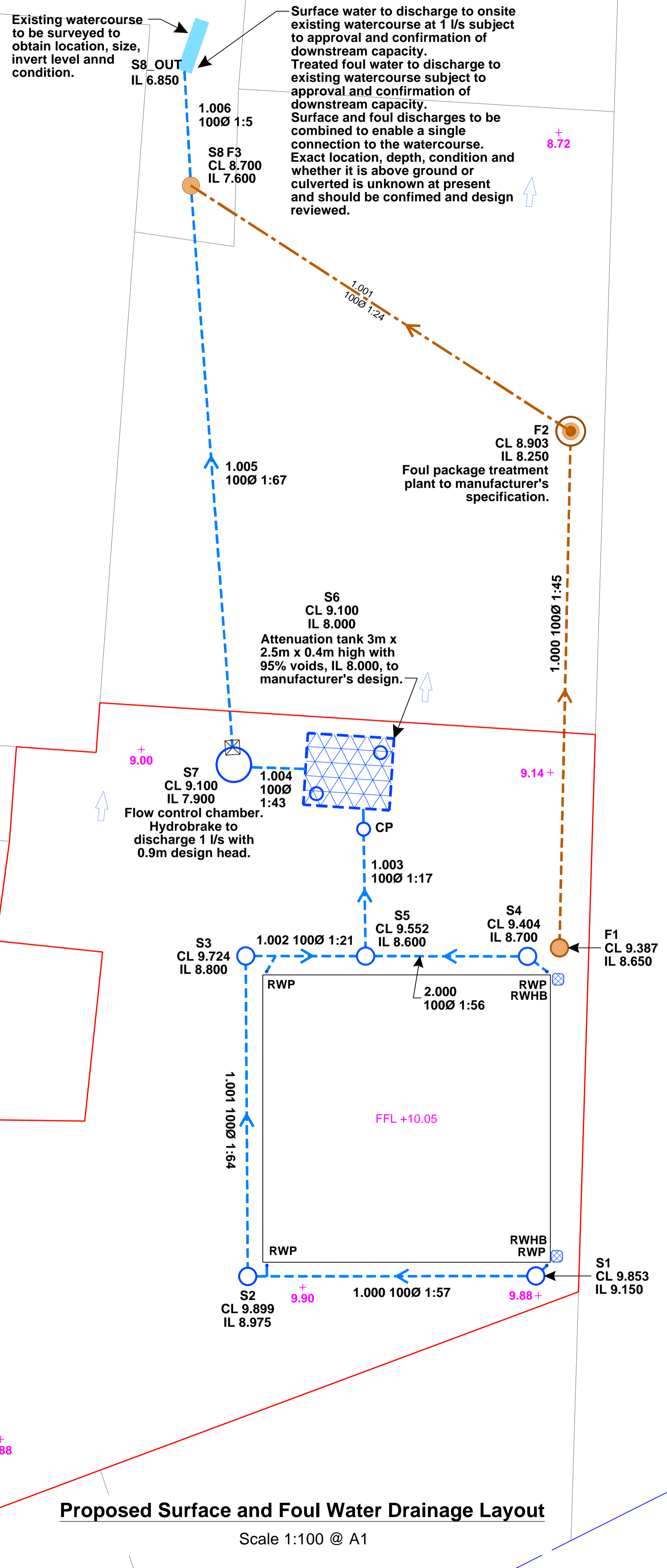
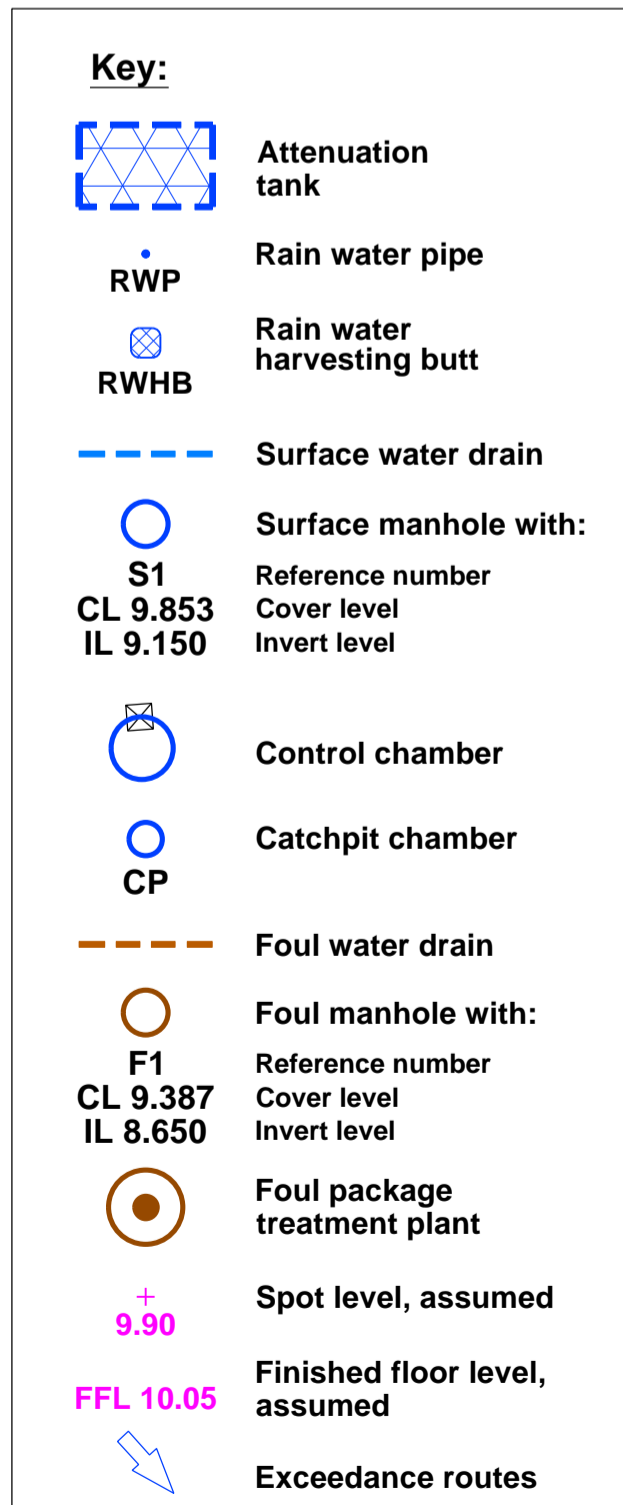
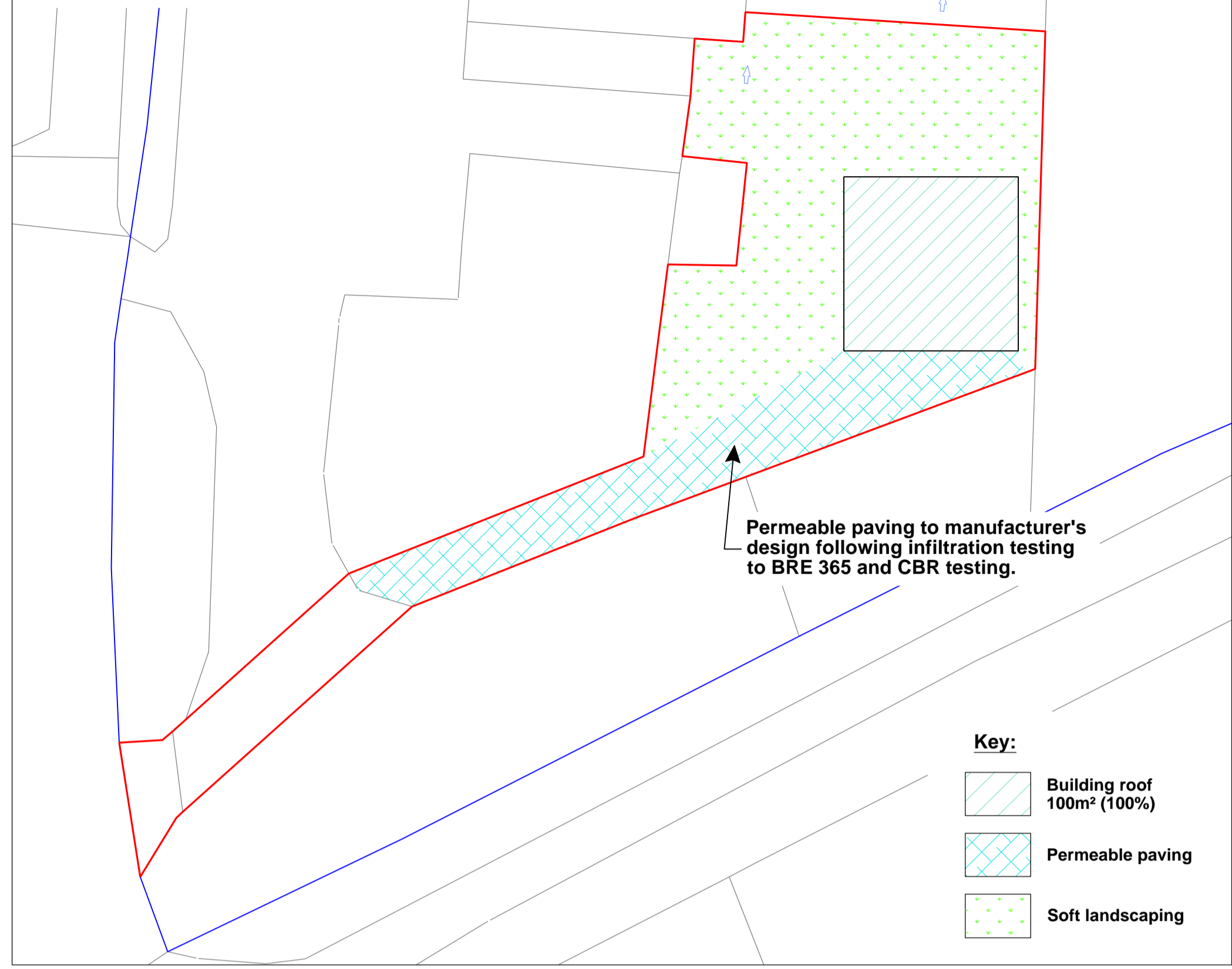
Discharging off-Site requires 2.85 m<sup>3</sup> of attenuation to be provided to ensure there is no flooding within the development in all storm events up to and including the 1 in 100 year including a 50% allowance for climate change. This volume is subject to the discharge rate being restricted to 1 l/s.

## Recommendations / Next steps

The location, capacity and condition of the nearby watercourse should be confirmed.

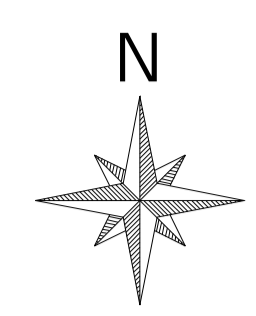
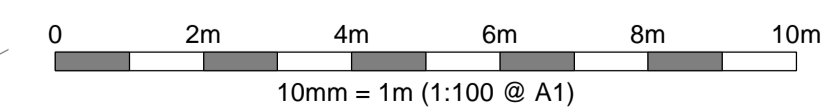
**Contributing Areas**

Scale 1:250 @ A1



**Proposed Surface and Foul Water Drainage Layout**

Scale 1:100 @ A1



- Notes:**
- Do not scale from this drawing.
  - All dimensions are in millimeters unless otherwise stated.
  - This drawing to be read in conjunction with all other relevant drawings and documents.
  - All drainage to be constructed to SSG Design and Construction Guidance, current British standards and building regulations and other relevant standards.
  - Exact locations of rain water downpipes and other internal drainage down pipes to be confirmed by architect / M&E engineer. Internal SVPs and other internal foul drainage to be designed by M&E engineer. Rain water pipe connections to have rodding access, sump and grated cover. Above ground drainage and pipes to be designed by M&E engineer.
  - Contractor to confirm locations of existing services prior to commencement on site and to arrange for any necessary diversions, lowering or protection works as required.
  - All specialist drainage components such as soakaway and package treatment plant to be designed and installed as per manufacturers requirements.
  - Cover levels and invert levels are in meters unless otherwise stated. If cover levels change from assumed then drainage design should be re-assessed, especially in regards to extreme events.
  - Extent of linear drainage channel to perimeter of building and thresholds to highway boundary to be confirmed by architect, design as per manufacturer. Linear channels to have rodding access, sump and grated cover. Linear drains to manufacturer design.
  - Infiltration features to be positioned at least 1m above ground water table and focused infiltration features to be positioned 5m from buildings and 10m from other infiltration systems unless otherwise specified by a structural / geotechnical engineer.
  - Private surface water pipes to be 100Ø with minimum fall of 1:100 unless otherwise stated.
  - Private foul pipes to be 100mm Ø with minimum fall of 1:40 unless a WC is connected then minimum gradient 1:80, unless otherwise stated.
  - Permeable paving and outlets to be as manufacturer design and recommendations.
  - Minimum cover to thermoplastic pipes in garden or patio areas 0.6m, in driveway 0.9m, in road 1.2m, otherwise concrete protection will be required.
  - Access chamber cover class A15 for garden and patio, B125 for driveway, C250 for lightly trafficked roads or small private car parks.
  - As the site has previously been developed an existing suitable discharge point may already be present on the site. A survey of existing drainage should be undertaken to confirm.
  - Discharge is to watercourse. If water levels within the watercourse rise above the outfall pipe then the system may not work as intended and may cause flooding.
  - Design is for planning purposes only and not for construction. Design should be confirmed prior to construction to ensure all available information is considered and any assumed information should be verified.
  - Design should be reviewed in light of any additional information or on validation or otherwise of any assumptions.

- Drainage Strategy:**
- Drainage strategy for new building consists of rain water harvesting butt, attenuation and controlled discharge to an on-site watercourse, subject to approval.
  - Permeable paving to be designed by manufacturer to take it's own run-off.
  - Foul water to be treated by package treatment plant prior to discharge to the on-site watercourse, subject to approval.
  - The watercourse should be surveyed to confirm the location, condition and capacity. Permission may be required from the watercourse authority.

P02	13.12.23	Change strategy to watercourse	MG	DS
P01	07.09.23	Initial issue	MG	DS
Rev	Date	Detail	Drwn	Chkd

Client:  
**Barbara Ainsworth**

Project:  
**Longhorn Stables Hagg Lane  
Upper Rawcliffe-With-Tarnacre  
Lancashire PR3 0UJ**

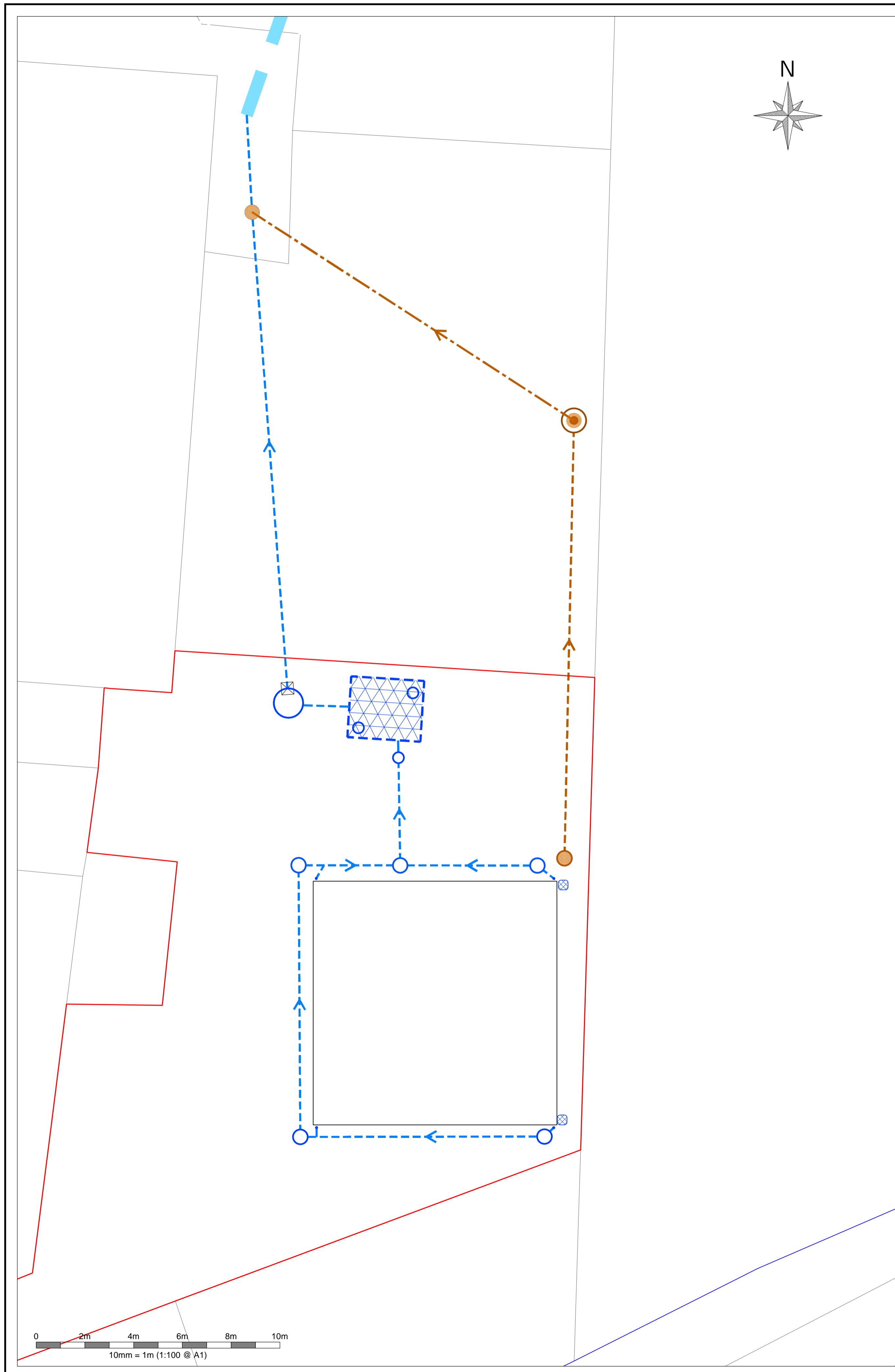
Drawing Title:  
**Proposed Surface and Foul  
Water Drainage Layout**

**GeoSmart Information**

Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU

Drawn by:	Checked by:	Date:
MG	DS	Sept. 2023
Scale:	Status:	
1:100, 1:250 @ A1	Preliminary	
Drawing No:	Issue:	
80040.01 100	P02	





	Asset type	Maintenance schedule (and frequency)	Party responsible
	Surface water underground drainage pipe network and manholes / catchpits	<p><b>Regular maintenance:</b></p> <ul style="list-style-type: none"> <li>Remove sediment and debris from pre-treatment devices and floor of inspection tube or chamber (annually)</li> <li>Cleaning of gutters and any filters on downpipes (annually)</li> <li>Trimming any roots that may be causing blockages (annually or as required)</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>Inspect silt traps and note rate of sediment accumulation (monthly in the first year and then annually)</li> </ul>	Privately owned and maintained by owners
	Rain water pipe	<p><b>Regular maintenance:</b></p> <ul style="list-style-type: none"> <li>Remove sediment and debris from grating, channel and sump (monthly or as required)</li> <li>Trimming any roots and surrounding grass blockages (as required)</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>Inspect inlets and outlets for blockages or silt accumulation (monthly or after a heavy storm)</li> </ul>	
	Rainwater harvesting butt	<p><b>Regular maintenance:</b></p> <ul style="list-style-type: none"> <li>Empty water butt and clean interior, removing any sludge, algae or sediments (annually or as required)</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>Inspect tank for debris and sediment build up (annually and following poor performance)</li> <li>Inspect inlets, outlets and overflow (annually and following poor performance)</li> </ul>	
	Attenuation tank	<p><b>Regular maintenance:</b></p> <ul style="list-style-type: none"> <li>Remove litter and debris from inlets and outlets (monthly)</li> <li>Trimming any roots and surrounding grass blockages (as required)</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>Inspect inlets, outlets and overflows for blockages (monthly or after a heavy storm)</li> <li>Inspect inlets and outlets for silt accumulation (half yearly)</li> <li>Inspect infiltration surfaces for compaction and ponding (monthly)</li> <li>Survey inside of tank for sediment build-up and remove (annually or as required)</li> </ul>	
	Hydrobrake	<p><b>Regular maintenance:</b></p> <ul style="list-style-type: none"> <li>Remove silts from the Hydrobrake chamber sump (annually)</li> <li>Remove any debris obstructing the inlet, outlet or control ensuring the emergency drain down mechanism if replaced correctly (annually)</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>Inspect the hydrobrake control from the surface for signs of blockage or damage (as required)</li> <li>Inspect the Hydrobrake chamber sump for build up of silt and the inlet and outlet for debris (annually)</li> <li>Check the emergency drain down mechanism is in good working order (annually)</li> </ul>	
	Foul water underground drainage pipe network and manholes	<p><b>Regular maintenance:</b></p> <ul style="list-style-type: none"> <li>Trimming any roots that may be causing blockages (annually or as required)</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>Inspect for signs of blockages (annually or as required)</li> </ul>	
	Foul package treatment plant	<p><b>Regular maintenance:</b></p> <ul style="list-style-type: none"> <li>Service (annually or as required / recommended by manufacturer)</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>Survey inside of tank for sludge or scum build-up and remove (annually or as required / recommended by manufacturer)</li> <li>Check the electrical components, blowers, pumps, UV-units, are operational (weekly or as required / recommended by manufacturer)</li> <li>Check air vents for obstructions (weekly or as required / recommended by manufacturer)</li> </ul> <p>Refer to manufacturers operation and maintenance manual for further details.</p>	

P02	13.12.23	Change strategy to watercourse	MG	DS
P01	07.09.23	Initial issue	MG	DS
Rev	Date	Detail	Drwn	Chkd

Client:

Barbara Ainsworth

Project:

Longhorn Stables Hagg Lane  
Upper Rawcliffe-With-Tarnacre  
Lancashire PR3 0UJ

Drawing Title:

Management and  
Maintenance Plan



Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU

Drawn by:	Checked by:	Date:
MG	DS	Sept. 2023
Scale:	Status:	
1:100 @ A1	Preliminary	
Drawing No:	Issue:	
80040.01 101	P02	



## Site location

Figure 1. Aerial Imagery (Bluesky, 2023)

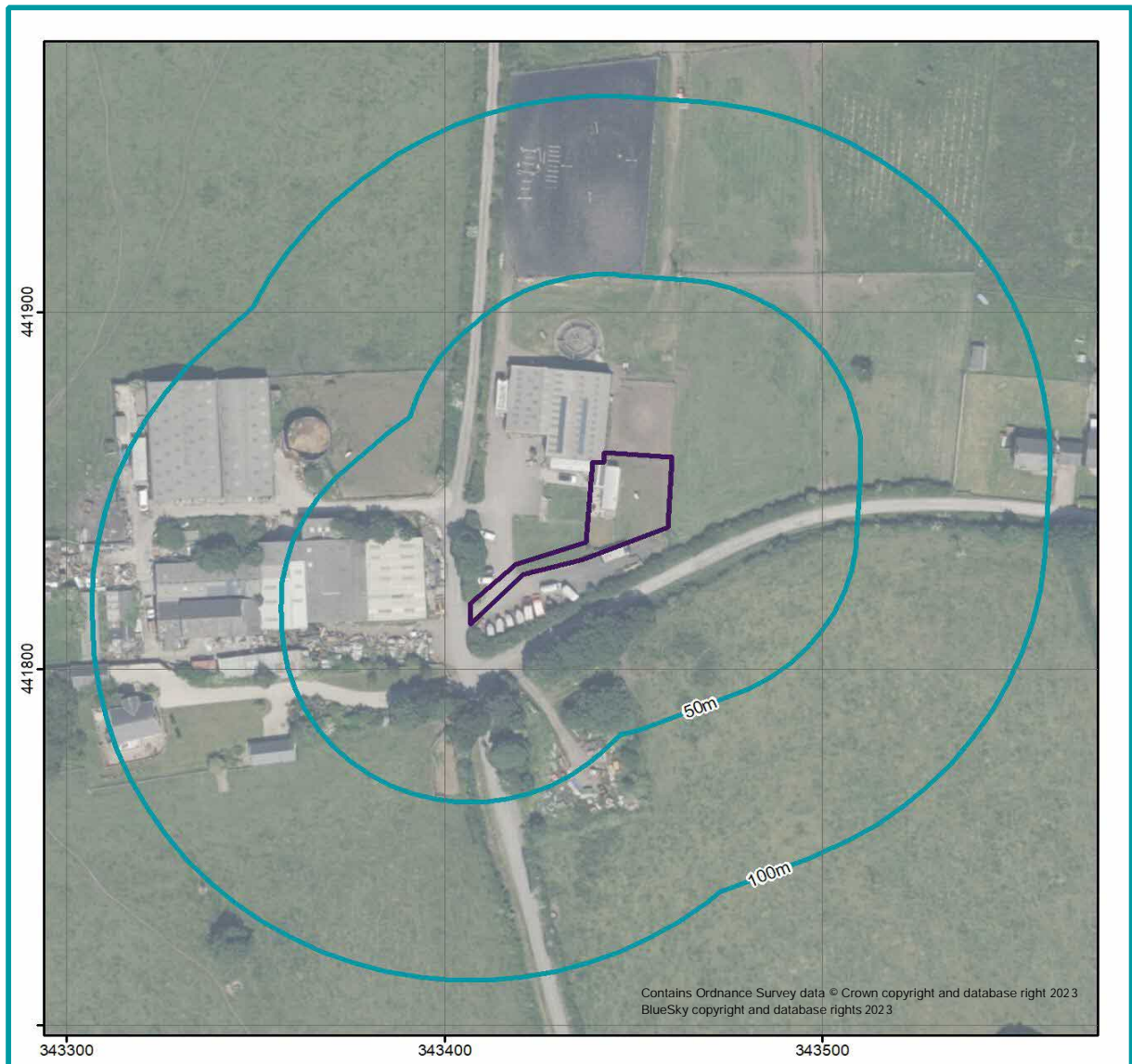
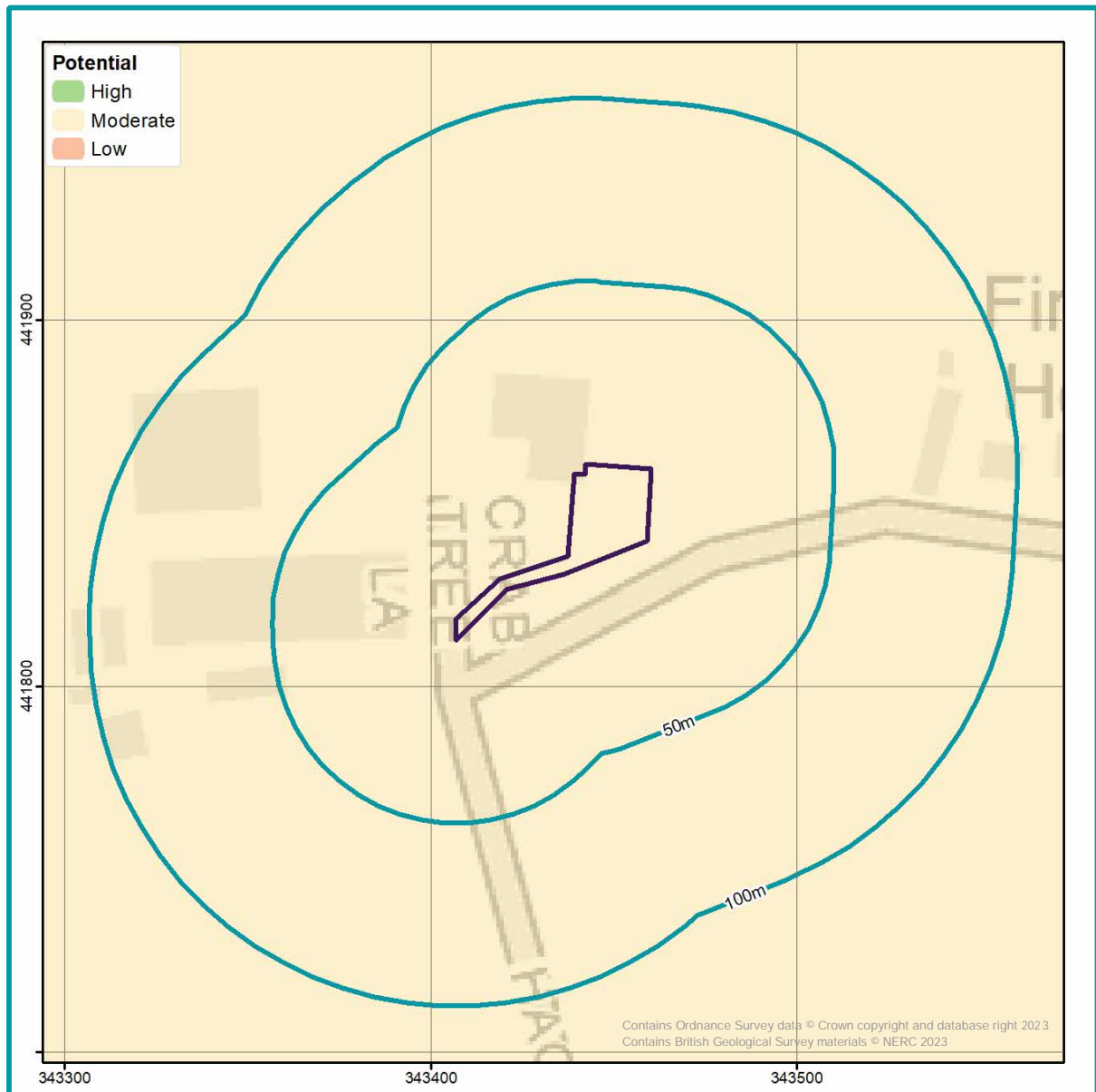


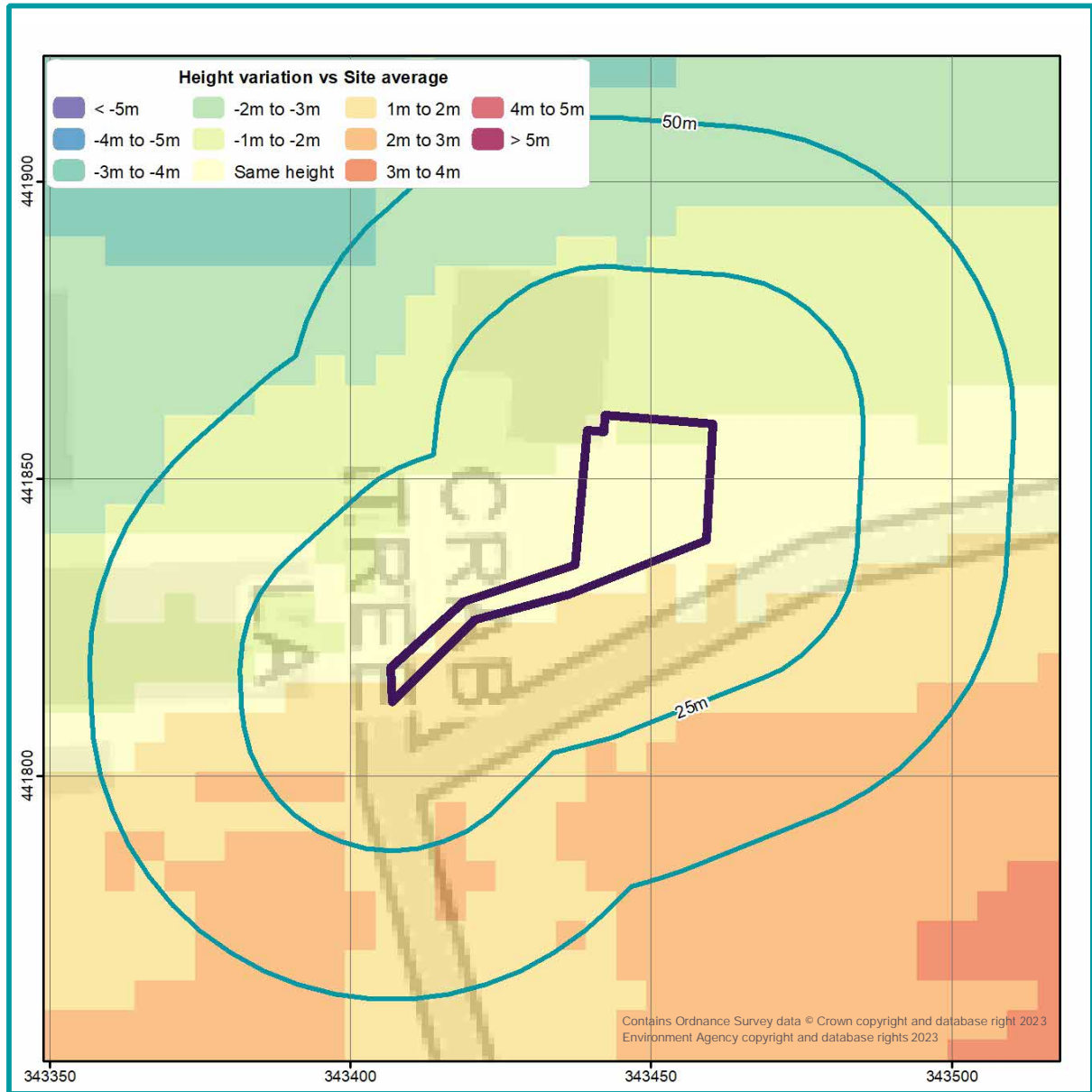
Figure 2. SuDS infiltration suitability (SD50) map (GeoSmart, 2023)



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 high permeability and an infiltration SuDS scheme should be possible at the Site. However Site investigation by Geo Environmental Engineering Ltd in November 2023 attempted infiltration testing at the Site but found water did not drain away sufficiently to calculate an infiltration rate. Infiltration to ground is therefore not considered to be feasible.

Figure 3. Site topography (GeoSmart, 2023)

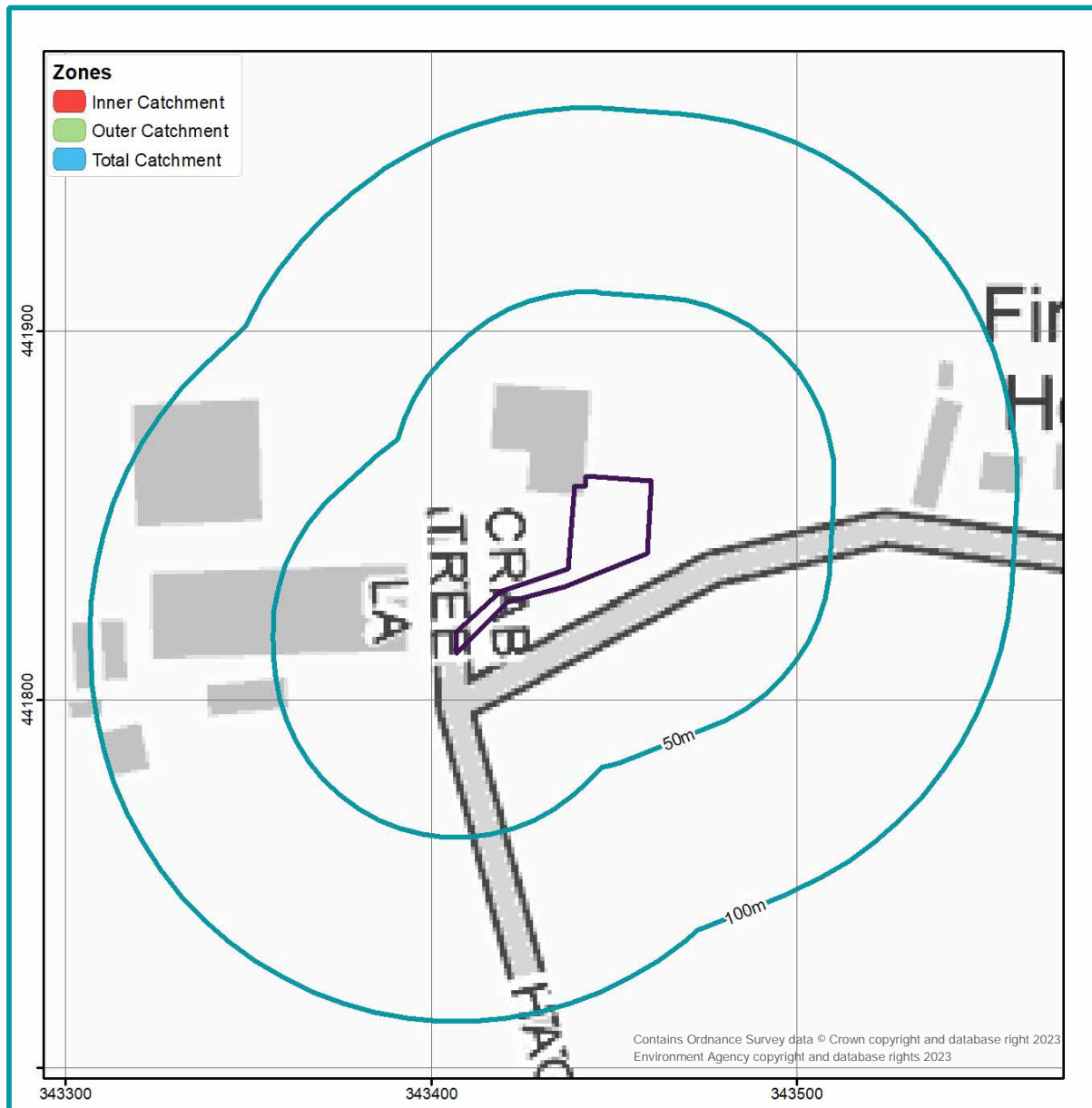


An assessment of the topography at the Site has been undertaken using LiDAR DTM5 elevation data to identify the general slope and any localized depressions. The mapping shows a comparison between average ground levels on the Site with ground levels in the surrounding area. The mapping confirms the overall Site is generally level, with the elevations to the north of the Site sloping gradually.

Further analysis could be undertaken by visiting the Site or by collecting additional topographic survey to provide further confirmation of ground levels.



Figure 4. Source protection zone map (EA, 2023)

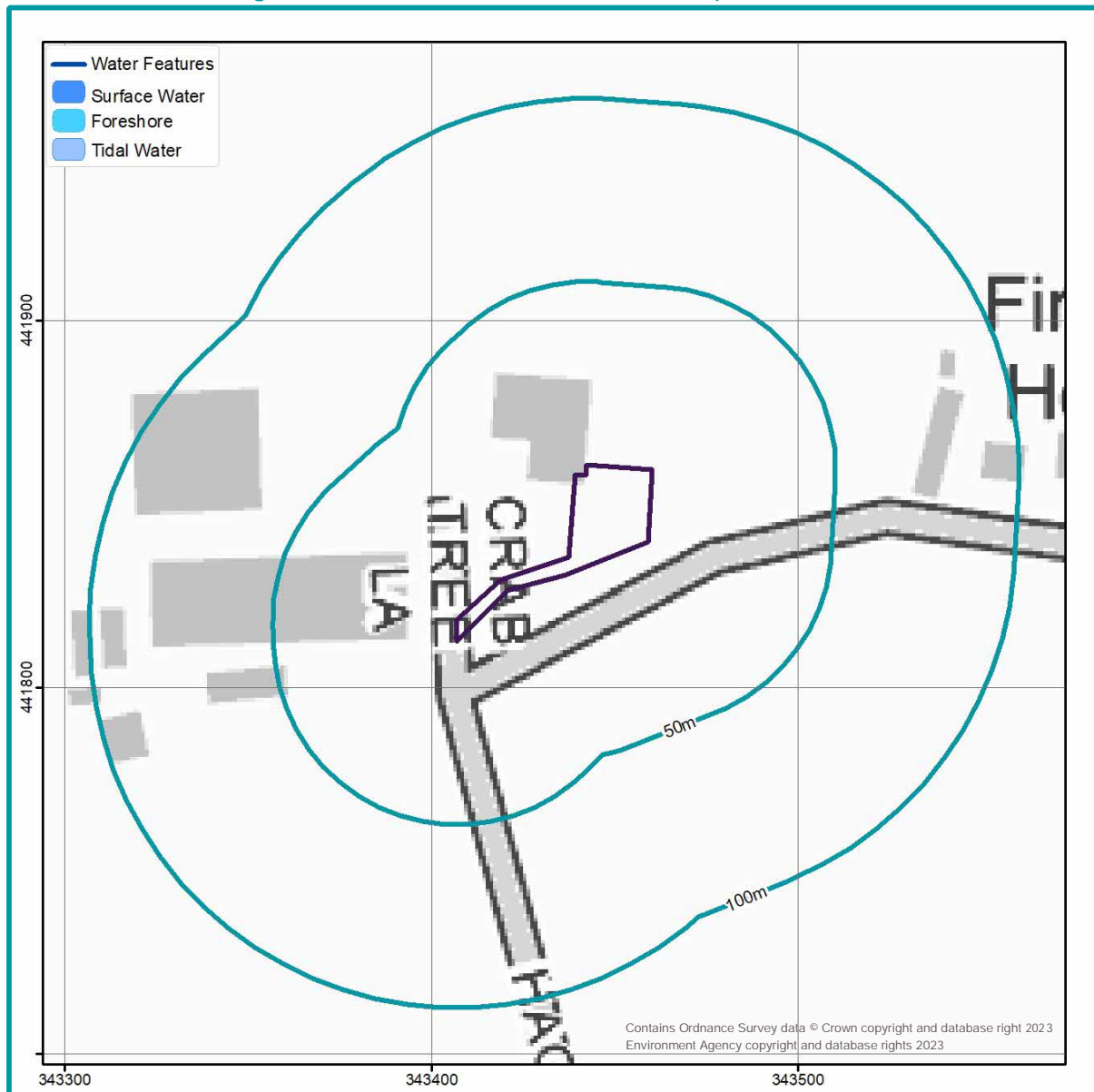


An assessment of the EA’s groundwater Source Protection Zones (SPZs) has been undertaken within the vicinity of the Site and confirms the Site is not located within an SPZ.

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 5. Surface water features map (EA, 2023)

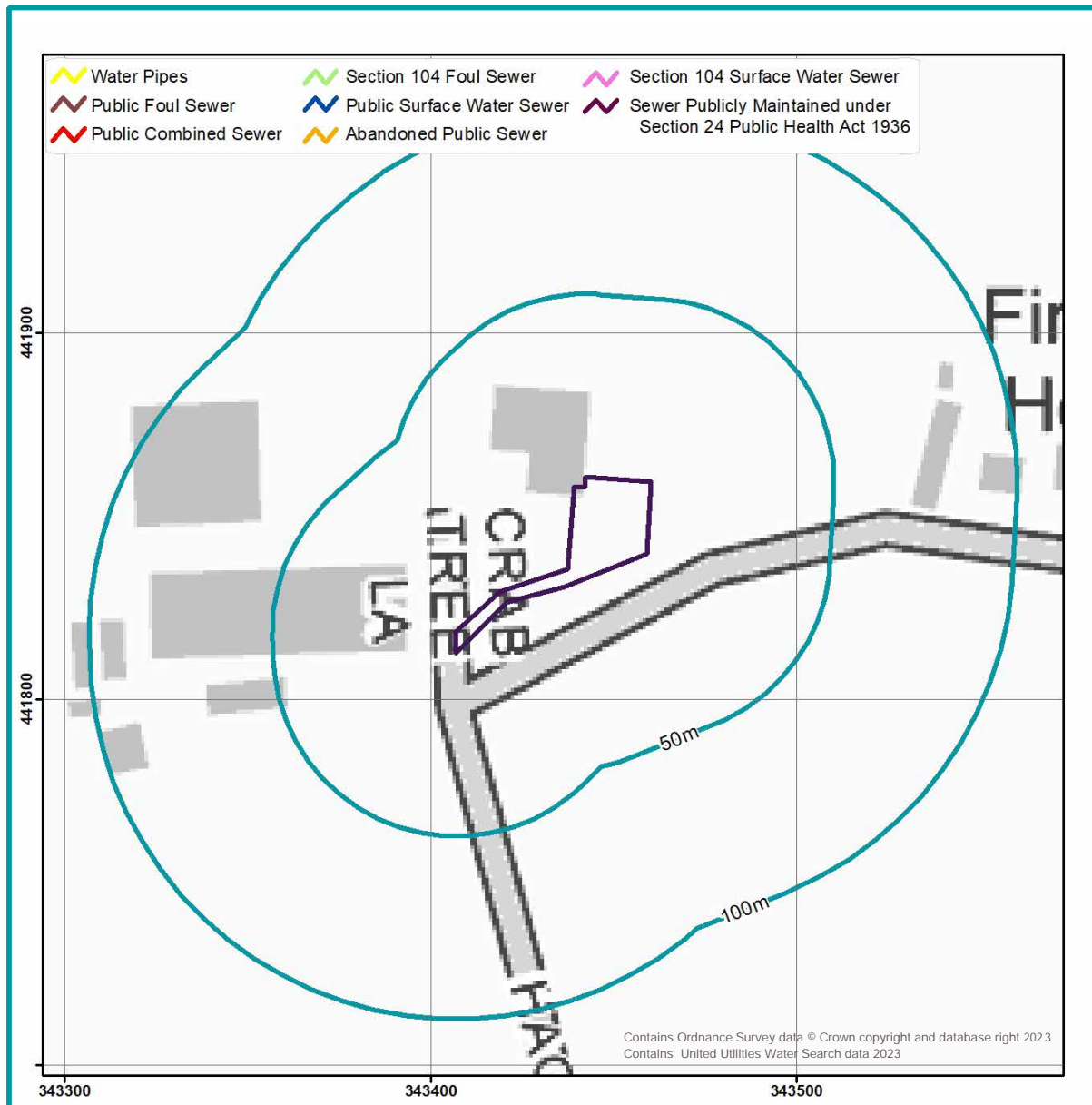


The mapping above confirms that there are no surface water features within 100 m of the Site. However, according to client information, there is a drainage network discharging to a culvert along a private road approximately 180m to the north of the Site. The proposed development may be able to utilise this utility to discharge excess surface water to this feature, subject to the confirmation of the asset owner and an assessment of the culvert capacity.

According to DEFRA's MagicMap, the Site is within 250m of a SSSI.

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 6. Sewer features map (OS & United Utilities, 2023)

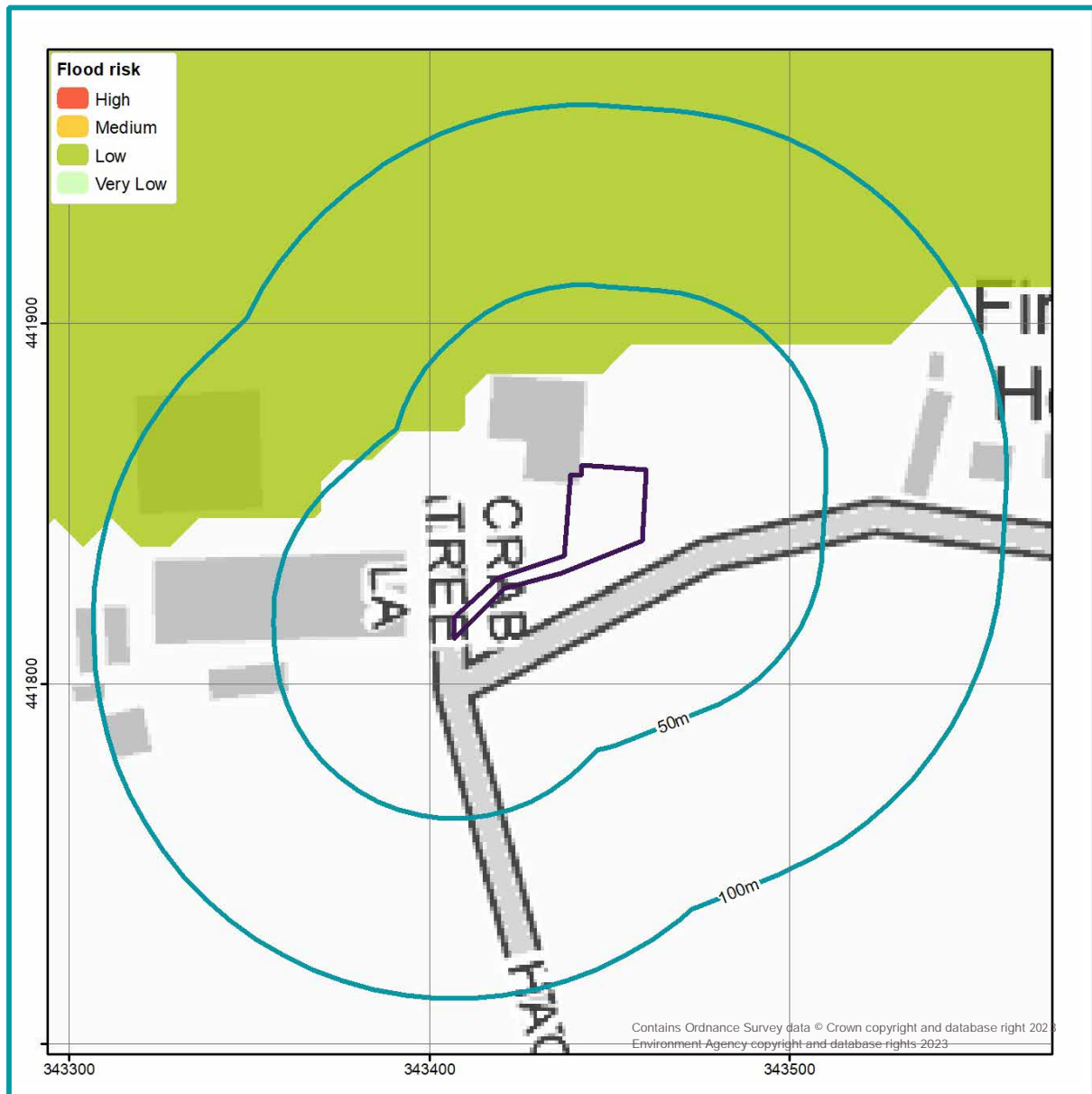


The asset location plan included in Appendix C confirms the Site is not located within 100m of the public sewer network. Due to the long distance to nearby sewers discharging surface water runoff to the sewer is not feasible.

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

Where development is proposed above or within close proximity to the public sewer network, a build-over agreement or easement may be required with the relevant utility provider.

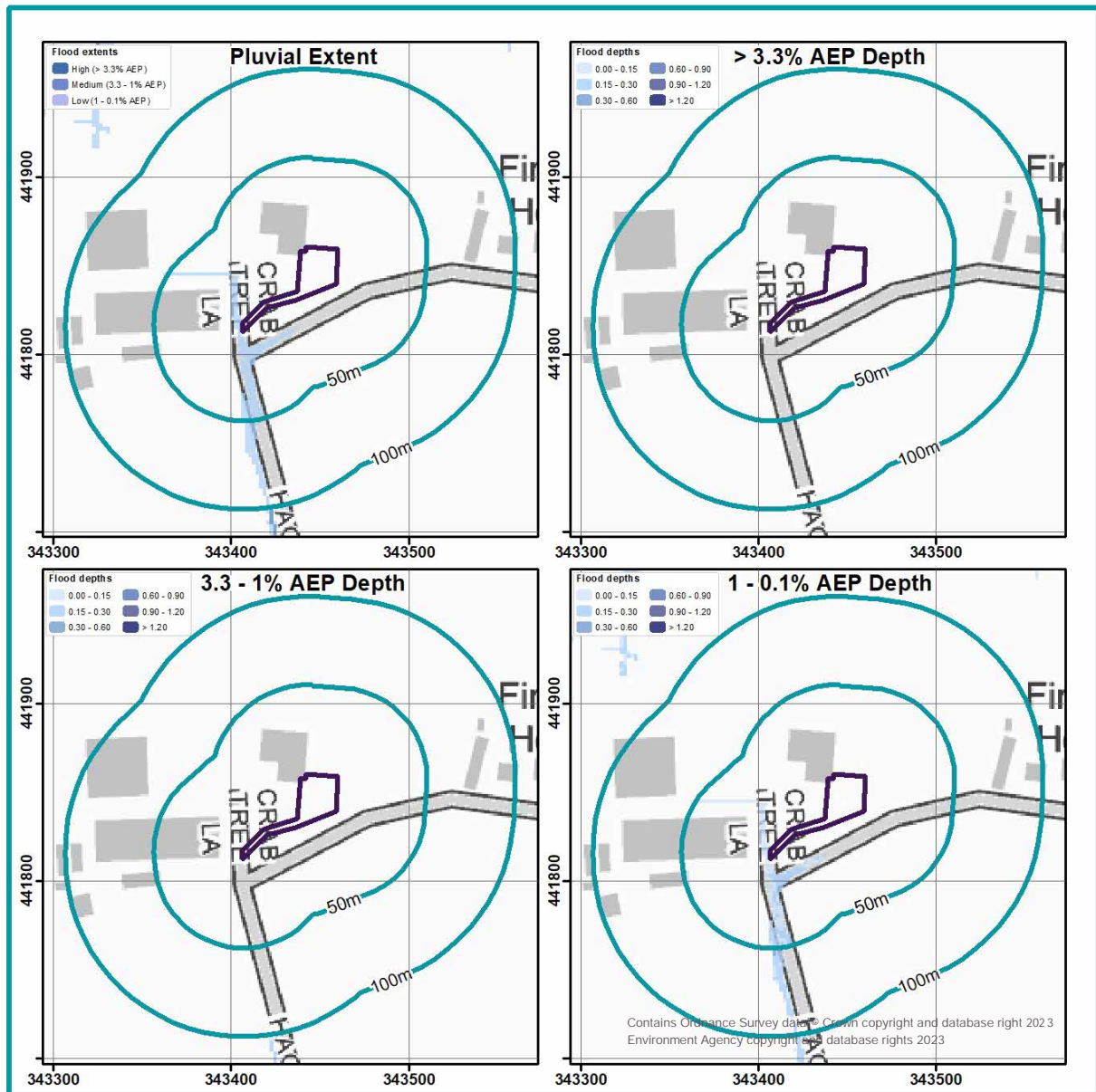
Figure 7. Risk of flooding from rivers & sea map (EA, 2023)



According to the EA's Risk of Flooding from Rivers and the Sea (RoFRS) map, the Site has a negligible risk of flooding from fluvial or coastal flooding, with less than 0.1% annual probability of flooding, therefore the SuDs design is unlikely to be affected.



Figure 8. Risk of surface water flooding map (EA, 2023)



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 above map shows the extent and depth of flooding up to the 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 9. Groundwater flood risk (GW5) map (GeoSmart, 2023)



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.



## 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 Longhorn Stables, Hagg Lane, Upper Rawcliffe-With-Tarnacre, Lancashire, PR3 0UJ (the Site). The Site is located in Ratten Row in a setting of agricultural use. The land slopes to the south from 10.34 mAOD to 8.94 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  $\pm 150$  mm. Site plans and drawings are provided in Appendix A.

## Development

The Site is currently used within a agricultural capacity. The site comprises an existing caravan which is to be retained and re-purposed and small paddock adjacent hardstanding, grassland and hedges to the edge of Hagg Lane.

Development proposals comprise the construction of 1 no essential rural workers dwelling, and change of use of land for siting of caravan for use as residential accommodation for equine students/trainees (retrospective). (Site Plans are included 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 1. Site Geology

Geology present on-Site		Potentially permeable?
Superficial geology (Figure 11)	Devensian Till (TILLD)	✓
Bedrock geology (Figure 12)	Singletone Mudstone member (SNM)	✓

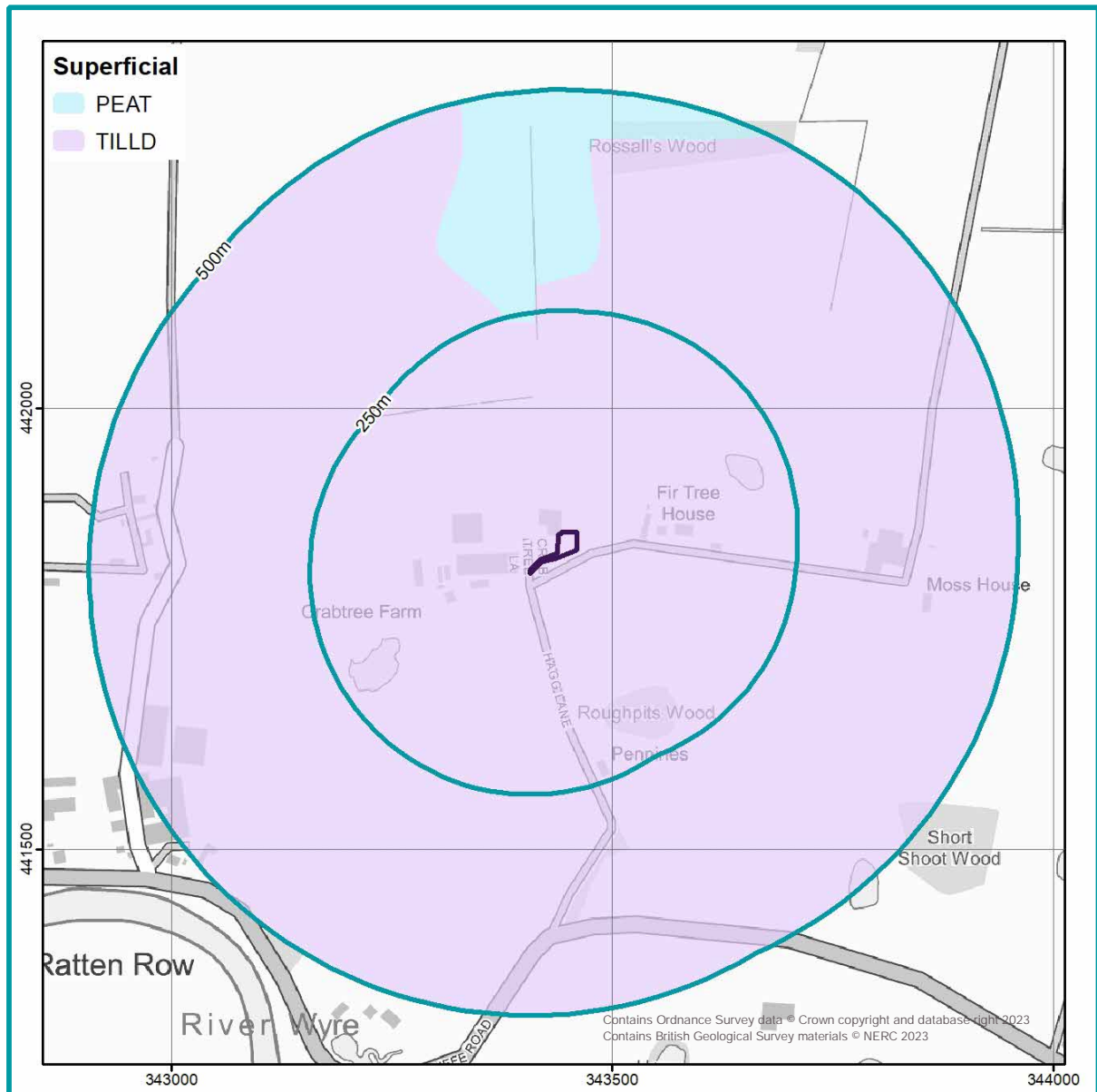
According to BGS borehole mapping, there are no boreholes within 1000m of the Site from which the underlying geology or groundwater can be determined.

Site investigation by Geo Environmental Engineering Ltd in November 2023 confirmed the underlying geology at the Site to consist of topsoil to a depth of between 0.25 and 0.30 m below ground level (mbgl) underlain by firm sandy clay to a depth of between 0.65 and 0.75

mbgl underlain by firm slightly sandy clay with occasional fine to medium gravel to a depth of 1.25 to 1.35 mbgl where the trial pits ended.

Infiltration testing was attempted at the Site but found water did not drain away sufficiently to calculate an infiltration rate. Infiltration to ground is therefore not considered to be feasible.

Figure 10. Superficial Geology (BGS, 2023)



## Depth to groundwater

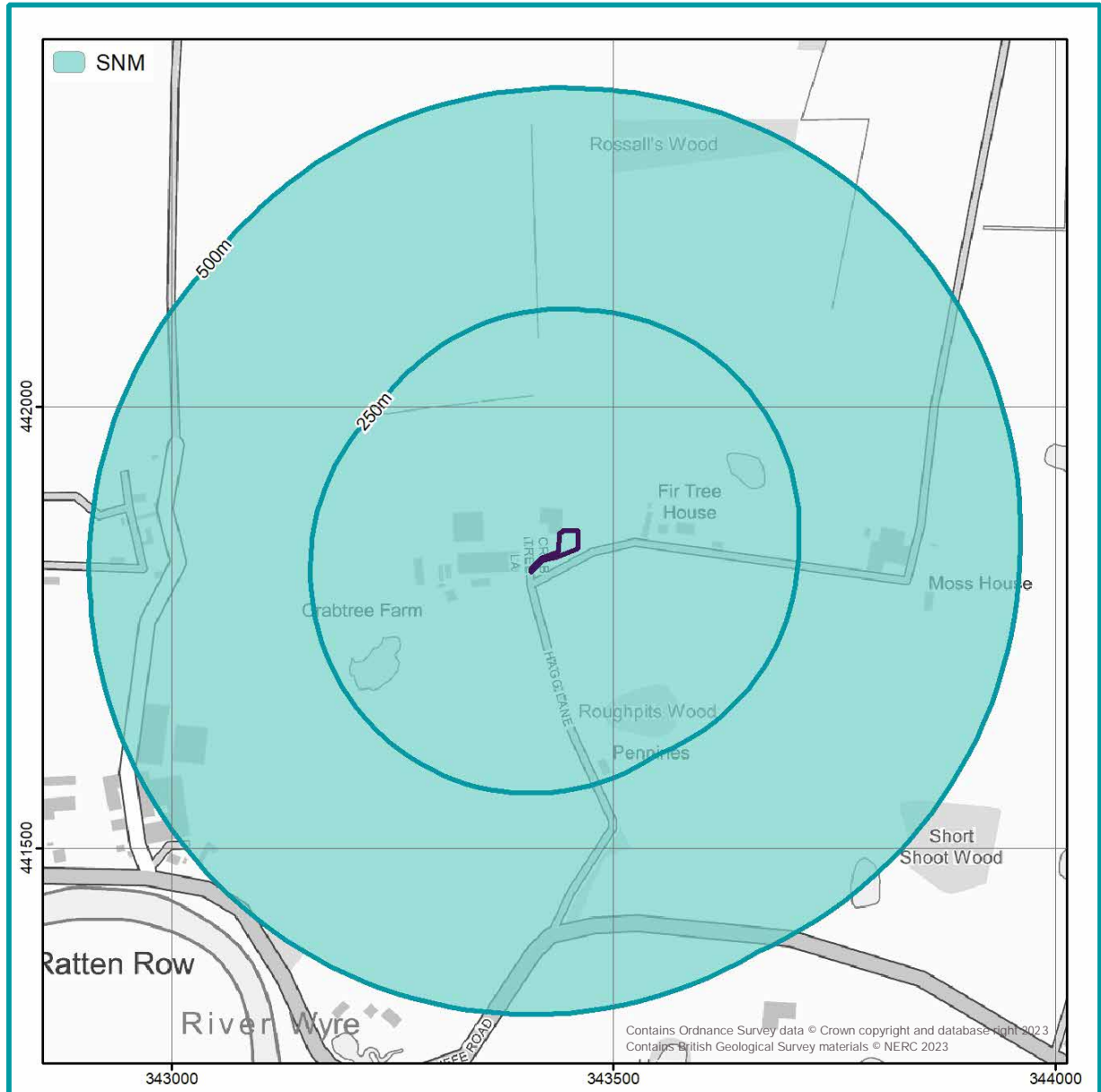
The SuDS system should be designed to operate in periods of extreme groundwater levels.

Relevant borehole records were not available within the vicinity of the Site, due to insufficient information, the groundwater level cannot be accurately determined.



Infiltration features are not proposed at the Site, given the low permeability of the underlying geology.

Figure 11. Bedrock Geology (BGS, 2023)



## Ground conditions

Infiltration SuDS features are not proposed at the Site, therefore a detailed investigation into the ground conditions is not required.

## Water quality

The Site does not lie within an SPZ and infiltration features are not proposed therefore for the purposes of the sustainable drainage assessment further consideration of the historical land uses (and any associated contamination risks) is not considered necessary.



## National Guidance

### *CIRIA SuDS Manual (C753) (2015)*

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

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

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

#### Peak Flow control

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

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

#### Volume control

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

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

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

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

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

Table 2. Lune Management Catchment peak rainfall allowances

Lune Management Catchment	3.3% Annual exceedance rainfall event		1% Annual exceedance rainfall event	
	2050s	2070s	2050s	2070s
Central	25%	35%	25%	35%
Upper end	35%	45%	45%	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.

## Sub-national Drainage Policy (i.e. county/London plan level)

### Local Policy

#### Wyre Local Policy 2011- 2031 (Updated 2022)

##### 6.3 Flood Risk and Surface Water Management

6.3.1 Wyre is a coastal borough, predominately low-lying and crossed by the River Wyre and its tributaries –the Calder and Brock. Flooding can impact on the life and wellbeing of residents and has consequences for the local economy and the environment. Flood risk from all sources and its management is a main issue in Wyre. It is important that new development manages flood risk from all sources but most critically that surface water is managed



sustainably through the use of sustainable drainage systems or schemes (SuDS). It is important to ensure that new development is not at risk of flooding and does not increase the risk elsewhere.

6.3.2 Drainage of surface water can potentially put a strain on existing water and waste water infrastructure especially during heavy rain. Policy CDMP2 establishes a hierarchy of options for dealing with surface water. Surface water draining into the public sewer should be the last resort and only if all other options have been considered and where possible implemented either wholly or in part so that the volume of surface water in to the public sewer is minimised.'

CDMP2 Flood Risk and Surface water management

Surface Water Management

5. Major category development will be expected to include proposals for, and implement Sustainable Drainage Systems (SuDS) utilising lower lying land within the site, existing natural water features and other above ground measures for the management of surface water at source, unless demonstrated to be inappropriate.

6. Where possible all development will need to achieve greenfield runoff rates and will need to comply with the options below in accordance with the hierarchy order set below, for the management of surface water:

- a) Rainwater harvesting for later use;
- b) Continue and/or mimic the site's current natural discharge process;
- c) Discharge into infiltration systems located in porous sub soils;
- d) Reduce flows to a minimum by green engineering solutions such as ponds; swales or other open water features for gradual release to a watercourse and/or porous sub soils;
- e) Attenuate by storing in tanks or sealed systems for gradual release to a watercourse;
- f) Direct discharge to a watercourse;
- g) Direct discharge to a surface water sewer;
- h) Direct discharge to highway drainage systems subject to an agreement with the Local Highway Authority; and
- i) Only as a last resort after all other options have been discounted, including evidence of an assessment, controlled discharge into the combined sewerage network where United Utilities have indicated acceptance.

Development will be required to minimise the rate of discharge to the public sewerage system as much as possible. On previously developed land, a reduction of at least 30% will be sought, rising to a minimum of 50% in Critical Drainage Areas.

Developments will be expected to drain on a separate sewerage system, with only foul drainage connected into the foul sewerage network. 7. Developments will need to consider and implement measures either wholly or in part, including in combination, higher up in the priority list and demonstrate why measures higher up in the priority list are not practical

wholly or in part including in combination, before considering measures lower down the priority list.

## 5 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 3. Storage requirements at the proposed development Site (Discharge runoff to watercourse)

Attenuation scenario		Attenuation required (m <sup>3</sup> )	Explanation
Discharge runoff to watercourse	1 in 100 year including 50% CC	2.85	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*.

\*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 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 4. Change in impermeable area associated with the development

Total Site area	600 m <sup>2</sup>
Impermeable area (and as a percentage of the total area of the proposed development footprint of 100 m <sup>2</sup> )	
Pre-development	Post-development
0 m <sup>2</sup> (0%)	100 m <sup>2</sup> (100%)
Permeable land use: 100m <sup>2</sup> landscaped areas	New impermeable land use: 100 m <sup>2</sup> residential dwelling

### 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).

Only the area intended for building development has been considered for the calculations.

## 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 5. Peak discharge rates associated with the development

Rainfall event	Greenfield runoff rates (l/s)	Existing runoff rates <sup>1</sup> (l/s)	Potential runoff rates without attenuation (l/s)	Potential minus existing (l/s)
QBAR	0.07	N/A	N/A	N/A
6 hour 1 in 1 year	0.06	0.06	0.12	0.06
6 hour 1 in 10 year	0.09	0.09	0.20	0.10
6 hour 1 in 30 year	0.12	0.13	0.27	0.14
6 hour 1 in 100 year	0.14	0.17	0.35	0.19
6 hour 1 in 100 year + 20% CC	N/A	N/A	0.43	0.26
6 hour 1 in 100 year + 50% CC	N/A	N/A	0.50	0.33

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

Relevant national, regional and local planning policy has been consulted in Section 4 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 1 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 6. Total discharge volumes associated with the development

Rainfall event	Greenfield runoff volume (m <sup>3</sup> )	Existing runoff volume <sup>2</sup> (m <sup>3</sup> )	Potential runoff volume without attenuation (m <sup>3</sup> )	Potential minus existing (m <sup>3</sup> )
QBAR	1.27	N/A	N/A	N/A
6 hour 1 in 1 year	1.19	1.19	2.53	1.34
6 hour 1 in 10 year	2.05	2.05	4.22	2.17
6 hour 1 in 30 year	2.75	2.75	5.85	3.10
6 hour 1 in 100 year	3.60	3.60	7.65	4.06
6 hour 1 in 100 year + 20% CC	N/A	N/A	9.18	5.59
6 hour 1 in 100 year + 50% CC	N/A	N/A	10.72	7.12

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

## 6 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 moderate potential for infiltration, with permeable underlying Devensian Till, however infiltration testing undertaken at the Site (see Appendix A) indicates that infiltration is not feasible on Site.

### Discharge to surface watercourse

According to OS mapping, there are no surface water features within 100m of the Site. However, according to client information, there is a drainage network discharging to a culvert along a private road approximately 180m to the north of the Site. As infiltration to ground has been proven infeasible, discharge to this watercourse is proposed, subject to the confirmation of the asset owner and an assessment of the watercourse location, depth and capacity.

### Discharge to sewer

The asset location plan included in Appendix C confirms the Site is not located within 100m of the public sewer network. Due to the long distance to nearby sewers discharging surface water runoff to the sewer is not feasible.

## 7 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 7. 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 8. 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

## 8 Client checklist



A drainage strategy should now be compiled 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 9. 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 10. 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.



## 9 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](http://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, 2021). 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.

## 10 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/>



## 11 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.

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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.

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

## Data Sources

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Bedrock & Superficial Geology	<p>Contains British Geological Survey materials © NERC 2023</p> <p>Ordnance Survey data © Crown copyright and database right 2023</p>
Flood Risk (RoFRS/Pluvial/Surface Water Features/SPZ)	<p>Environment Agency copyright and database rights 2023</p> <p>Ordnance Survey data © Crown copyright and database right 2023</p>
Flood Risk (Groundwater) and SuDS infiltration suitability (SD50)	<p>GeoSmart, BGS &amp; OS</p> <p>GW5 (v2.4) Map (GeoSmart, 2023)</p> <p>Contains British Geological Survey materials © NERC 2023</p> <p>Ordnance Survey data © Crown copyright and database right 2023</p>
Sewer Location	<p>Contains Ordnance Survey data © Crown copyright and database right 2023</p> <p>Contains United Utilities Search data 2023</p>
Topographic Data	<p>OS LiDAR/EA</p> <p>Contains Ordnance Survey data © Crown copyright and database right 2023</p> <p>Environment Agency copyright and database rights 2023</p>

## 12 Appendices



# Appendix A



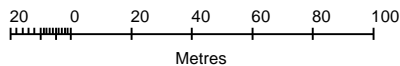
## Site plans



# Stanfords VectorMap



Scale 1:2500



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CLIENT: BARBARA AINSWORTH

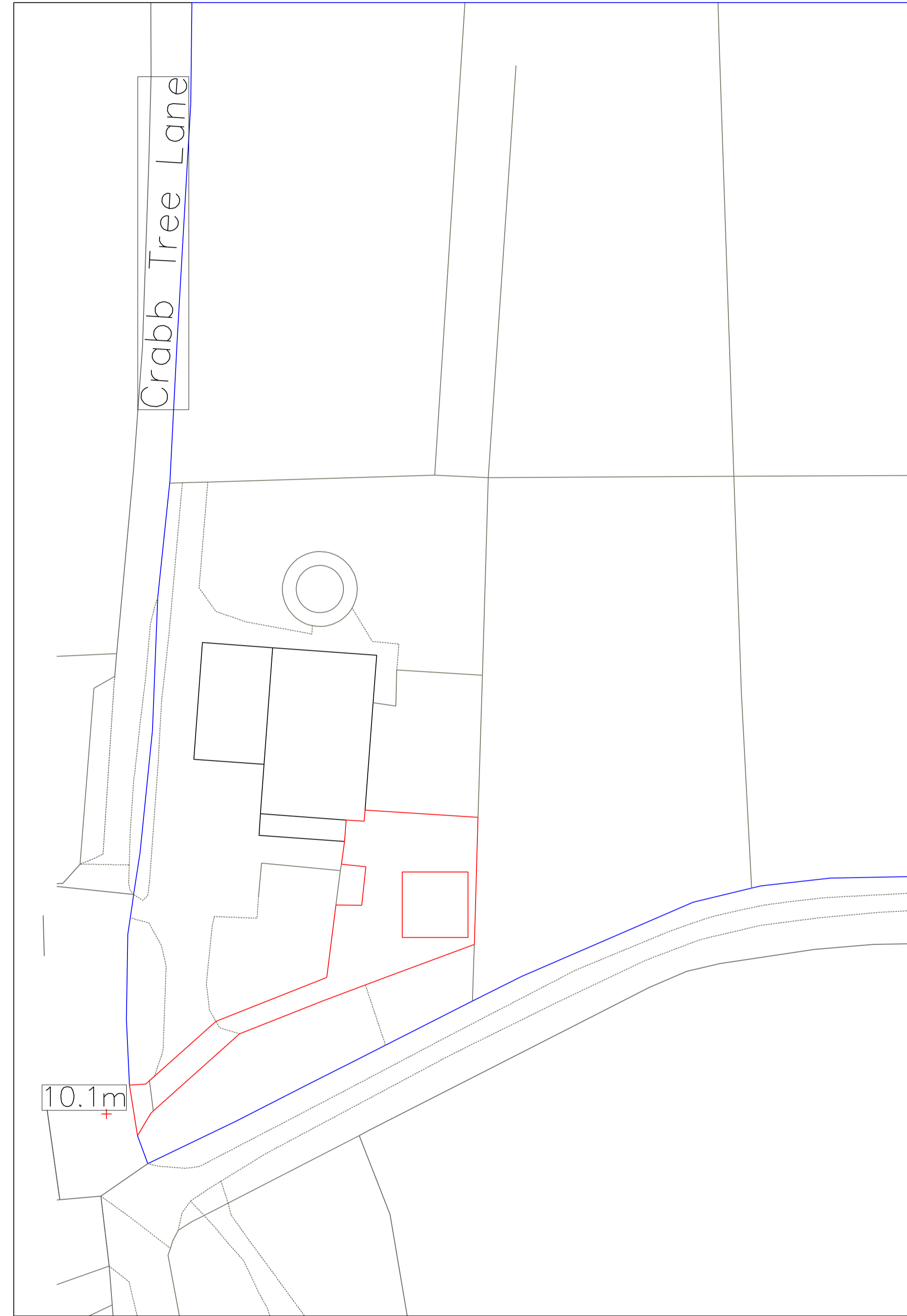
PROJECT: Outline application for 1 no essential  
rural worker's dwelling following removal of  
existing caravan (all matters reserved)  
(Resubmission of 20/01107/OUT)

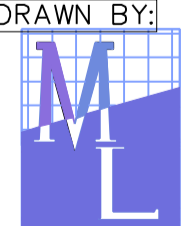
LOCATION: Longhorn Stables Hagg Lane Upper  
Rawcliffe-With-Tarnacre Lancashire PR3 0UJ

# Existing Site Plan at 1:500



# Proposed Site Plan at 1:500



<b>DRAWN BY:</b>  <b>Planning Consultancy Ltd</b> Office A Bradley Hill, Garstang Road, Cloughton on Brock, Preston PR3 0GA Telephone 01995 640135 Mobile 07813 296 287 e-mail: mel@mplanning.org	<b>CLIENT:</b> BARBARA AINSWORTH <b>PROJECT:</b> Outline application for 1 no essential rural worker's dwelling following removal of existing caravan (all matters reserved) (Resubmission of 20/01107/OUT) <b>LOCATION:</b> Longhorn Stables Hagg Lane Upper Rawcliffe-With-Tarnacre Lancashire PR3 0UJ	<b>DATE:</b> 19th May 2023 <b>DWG NO.</b> LG/BA/1938 <b>SCALE:</b> 1: 500
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Luke Godden  
M L Planning Consultancy Ltd.  
Office A  
Bradley Hill Farm  
Garstang Road  
Claughton-On-Brock  
Preston  
PR3 0GA

**Date:** 02.11.2023

**Project No:** GEO2023-5994

**Project Title:** Hagg Lane, St Michael's On Wyre, Preston

Dear Luke,

Geo Environmental Engineering Ltd (GEO) were commissioned by M L Planning Consultancy Limited on behalf of the Client, Mrs Barbara Ainsworth to carry out a ground investigation at Longhorn Stables located off Hagg Lane, St Michael's On Wyre, Preston, PR3 0UJ. The works were undertaken in order to determine the ground conditions and soil infiltration potential to aid the design of soakaway drainage for the proposed residential property.

GEO attended the site on the 01<sup>st</sup> November 2023 to carry out fieldworks. This included two mechanically excavated trial pits (SA's 01 & 02) to a terminal depths of c.1.25m and c.1.35m bcgl's. A soil infiltration test was completed in both trial pits in accordance with the BRE Digest 365 specification.

The locations were agreed with the client based on the location of the proposed residential property as well as the areas of standing water present on site. As a soakaway is not allowed within c.5m of the proposed structure, the engineer agreed the location of the proposed property and then located the soakaways outside of the c.5m exclusion pit zone. An exploratory hole location plan is attached to this report indicating the approximate trial pit locations.

### **Ground Conditions**

#### **Topsoil**

The trial pits encountered grass overlying soft brown sandy clay soil with fine roots to depths of c.0.25m and c.0.35m.

No anthropogenic debris or visual and/or olfactory evidence of any fuel/oil contamination, or any landfill, potentially biodegradable, decomposable or putrescible materials were encountered.

#### **Drift Deposits**

The natural undisturbed drift deposits comprised initially firm sandy clay to c.0.65m and c.0.75m before encountering firm slightly sandy clay with occasional fine to medium gravels to the base of the trial pits (c.1.25m and c.1.35m).

**“Without Site Investigation Ground is a Hazard”**

Site Investigation Steering Group (SISG), 1993

Prior to completion of the soakaway, the trial pits were “squared off” and measured to allow the necessary calculations to be completed. No water ingress was noted prior to undertaking the soakaway test.

### **Soakaway Analysis**


The trial pits were partially filled with water from a mobile bowser (IBC) and the water level was recorded frequently over a maximum period of 5 hours. The results of the tests are presented on the trial pit logs.

The trial pits were filled to depths of c.0.25m (SA01) and c.0.35m (SA02) below ground levels so that only the natural drift deposits were tested. The tests were completed over a period of 5 hours. During this time the water level remained relatively “static” with a fall of c.0.01 in SA01 and c.0.03m in SA02. Therefore, the water levels within the test pits did not reach the 75% to 25% effective depth to allow a permeability calculation to be completed. This is likely to be due to the impermeable nature of the drift deposits which will inhibit the infiltration of the water.

Based on the results of the test, the ground conditions are not considered suitable for soakaway drainage and an alternative drainage solution should be sought.

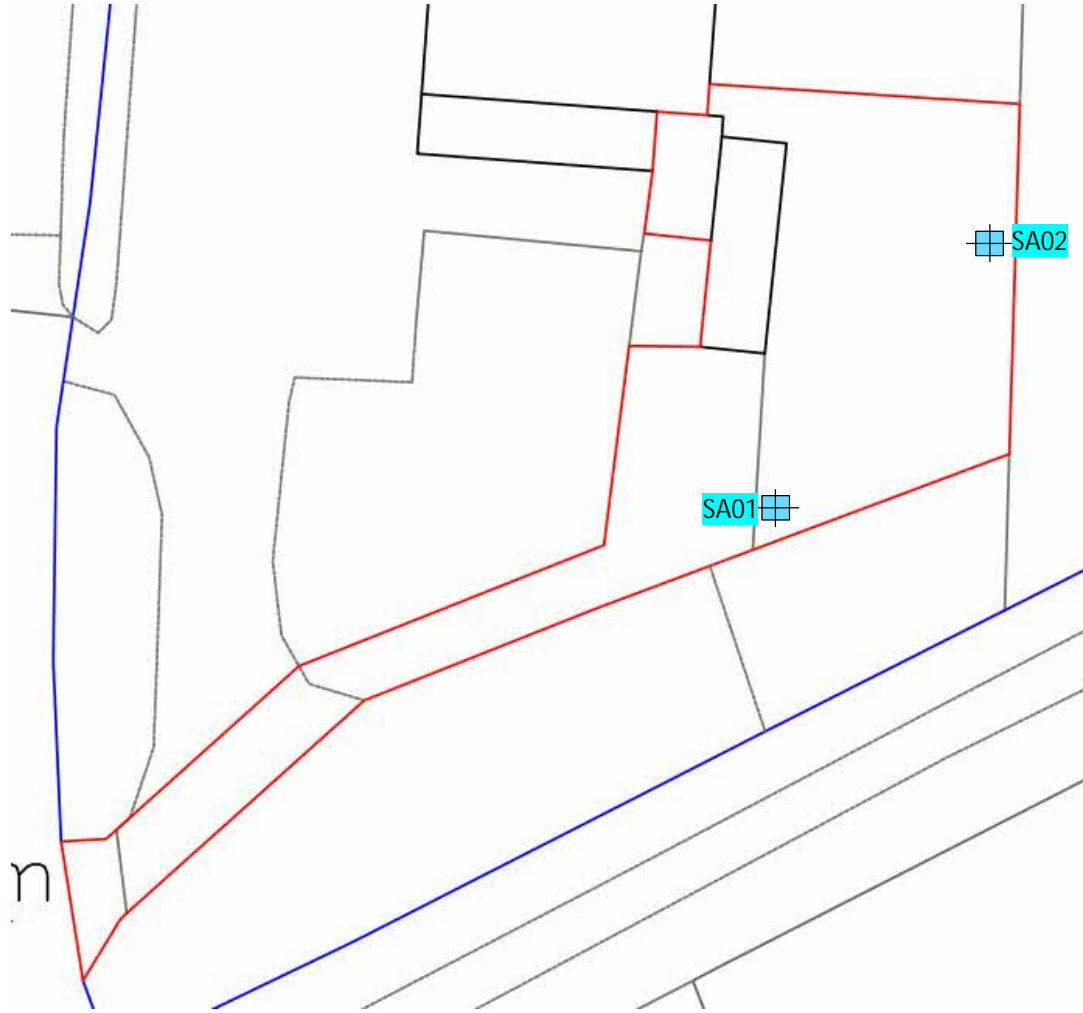
If there are any queries, please do not hesitate to contact Geo-Environmental Engineering Ltd.

Yours Faithfully

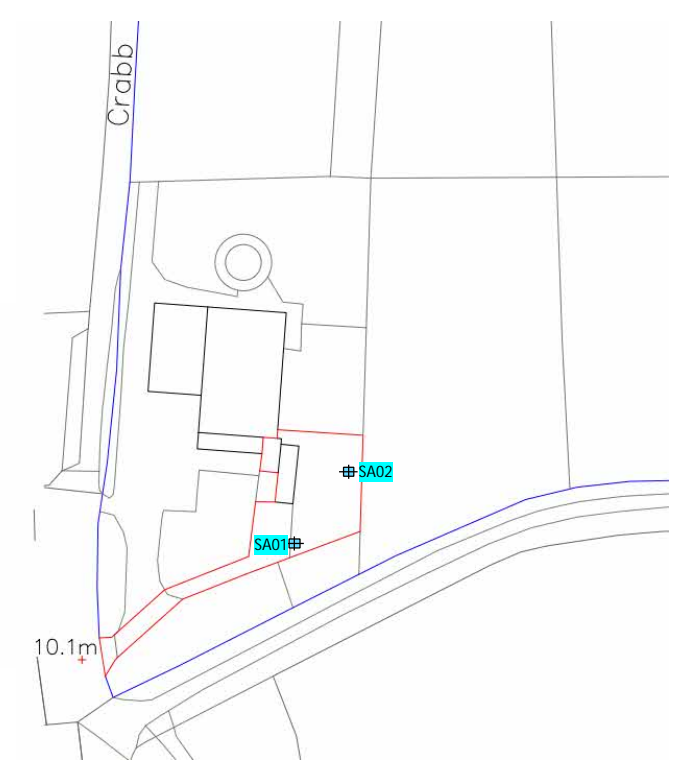


.....  
Andrew Hampson *BSc (Hons) FGS*  
Associate - Geo Environmental Engineering Ltd  
Mob: 07494 489 693

**GEO2023-5994: Exploratory Hole Location Plan – Longhorn Stables, Hagg Lane, St Micaels’s On Wyre  
(Approx Locations – Not to Scale)**



**Key:**  
Mechanically Excavated Trial Pits





**GEO2023-5994: Longhorn Stables, Hagg Lane, St Michaels On Wyre – SA01**

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.25	TOPSOIL: Grass overlying soft dark brown slightly sandy clay soil with fine roots.		
0.25	0.65	Firm light brown with occasional orange brown mottling sandy CLAY with occasional silt and fine sand lenses.		
0.65	1.25	Firm orange brown slightly sandy CLAY with occasional fine to medium gravels.		0.70 HSV: 56  1.00 T
		End of trial pit at c.1.25m to complete BRE Soakaway test. Trial pit remained dry and stable during excavation. Trial pit filled once to complete required soakaway test. The water level remained relatively “static” with a fall of c.0.01m over 5 hours and the test was deemed a “failure”. Trial pit backfilled upon completion.		Soakaway Dimensions 1.70m (L) x 0.30m (W) x 1.25m (D)
Engineer: A Hampson Site Works Date: 01.11.2023 Plant: Mini Excavator			Log Notes: B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	





**GEO2023-5994: Longhorn Stables, Hagg Lane, St Michaels On Wyre – SA02**

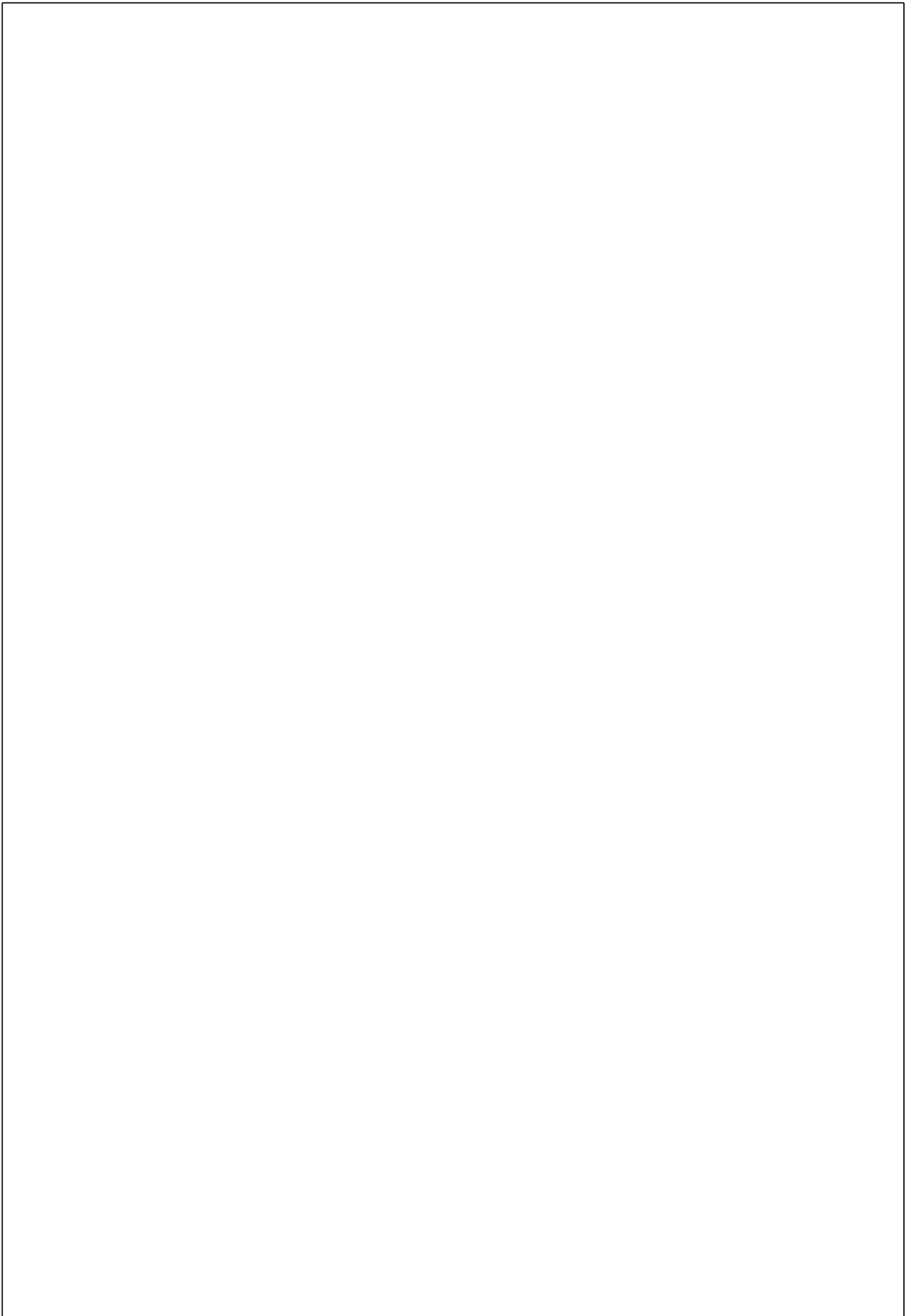
Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.35	TOPSOIL: Grass overlying soft dark brown slightly sandy clay soil with fine roots.		
0.35	0.75	Firm light brown with occasional orange brown mottling sandy CLAY with occasional silt and fine sand lenses.		
0.75	1.35	Firm orange brown slightly sandy CLAY with occasional fine to medium gravels.		1.10 T
		End of trial pit at c.1.35m to complete BRE Soakaway test. Trial pit remained dry and stable during excavation. Trial pit filled once to complete required soakaway test. The water level remained relatively "static" with a fall of c.0.03m over 5 hours and the test was deemed a "failure". Trial pit backfilled upon completion.		Soakaway Dimensions 1.70m (L) x 0.30m (W) x 1.35m (D)
Engineer: A Hampson Site Works Date: 01.11.2023 Plant: Mini Excavator			Log Notes: B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

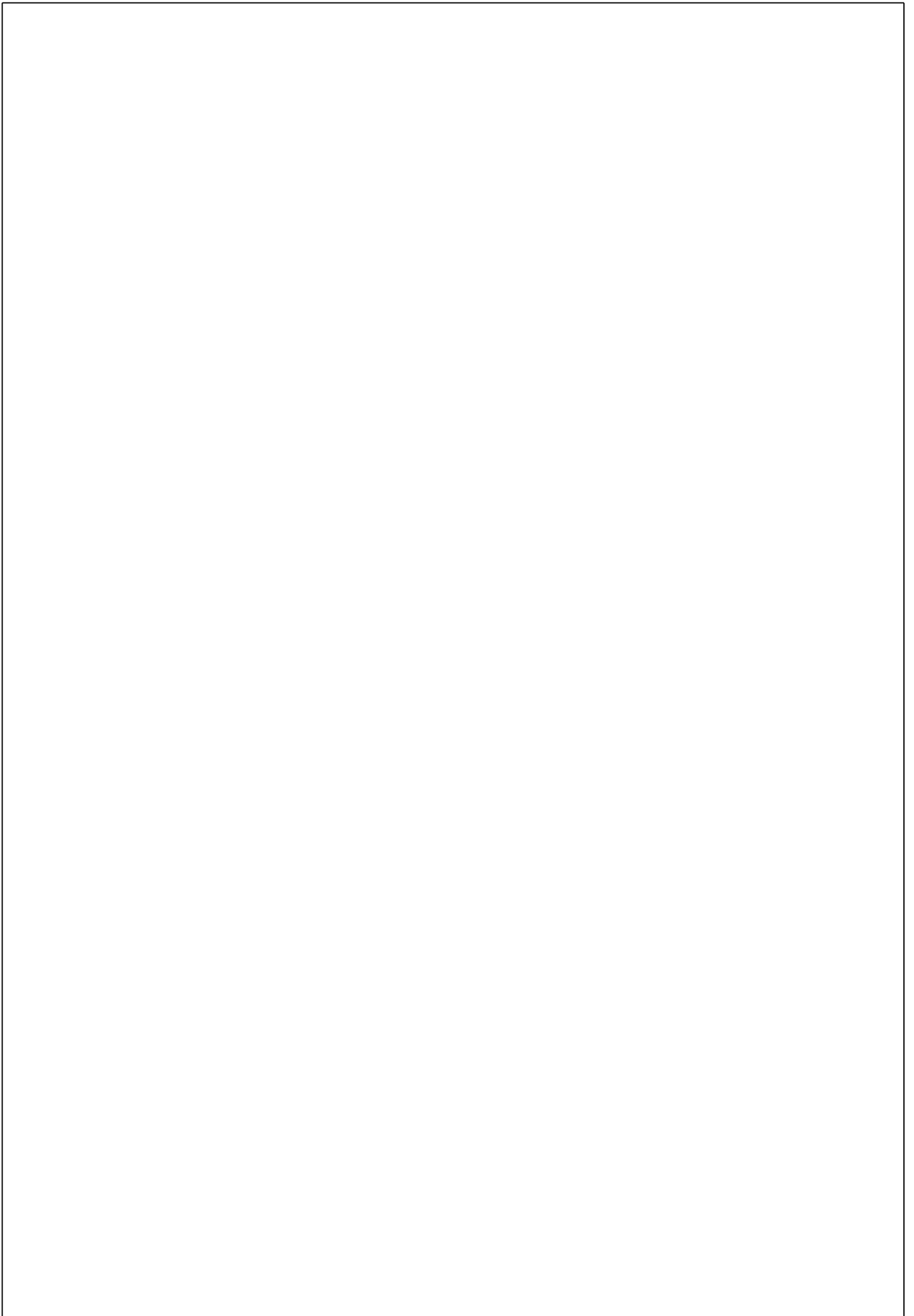


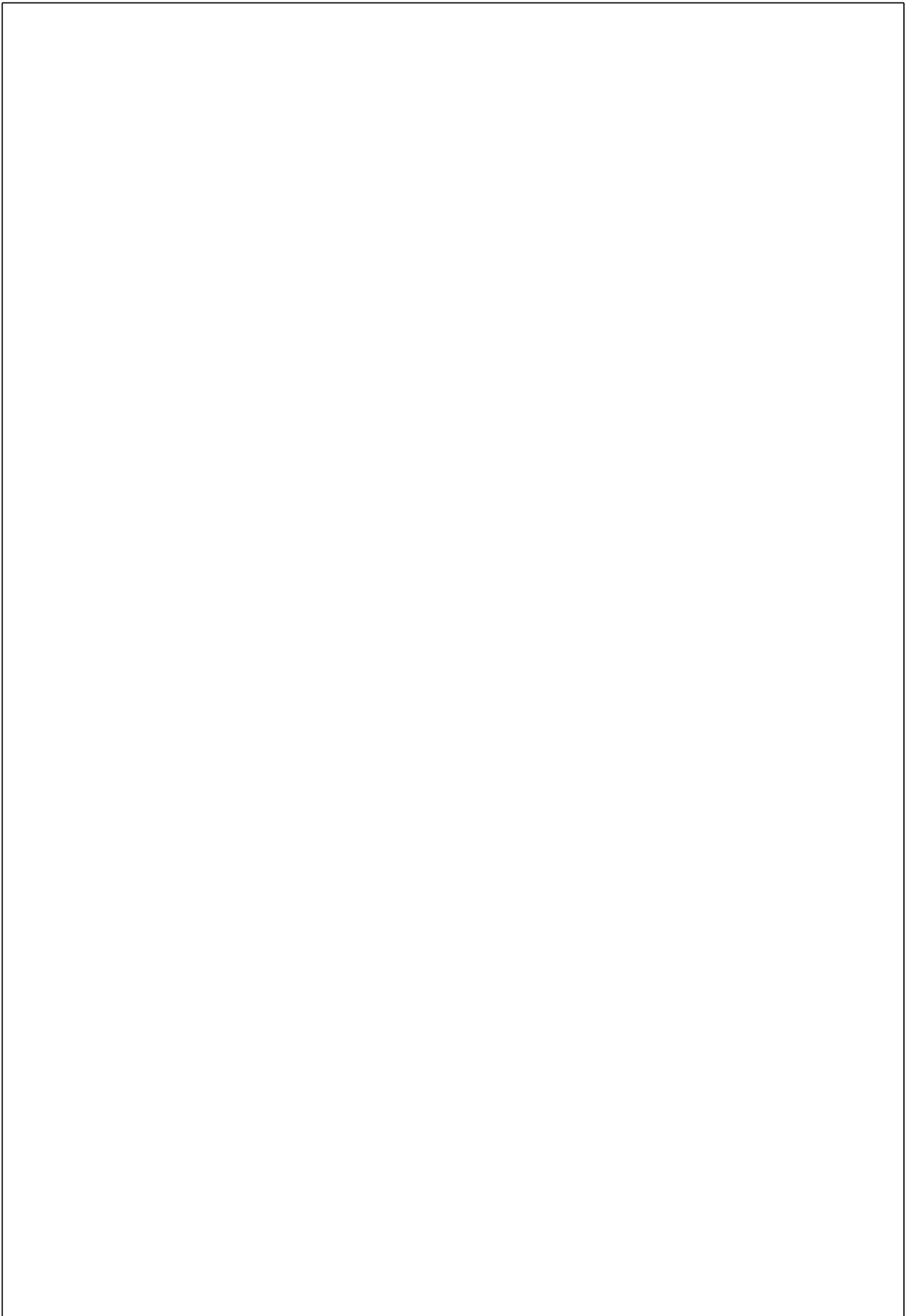
## Appendix B

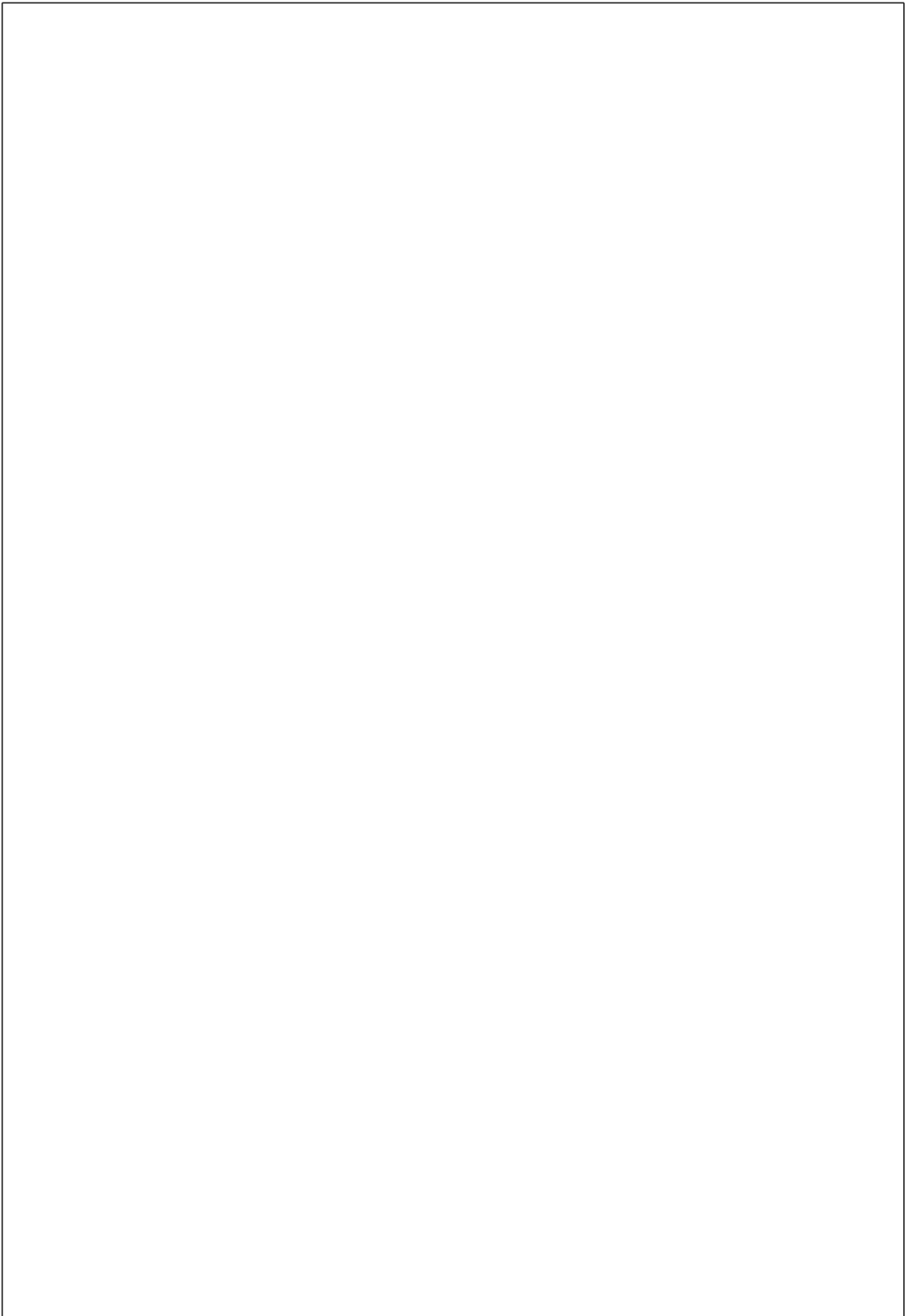


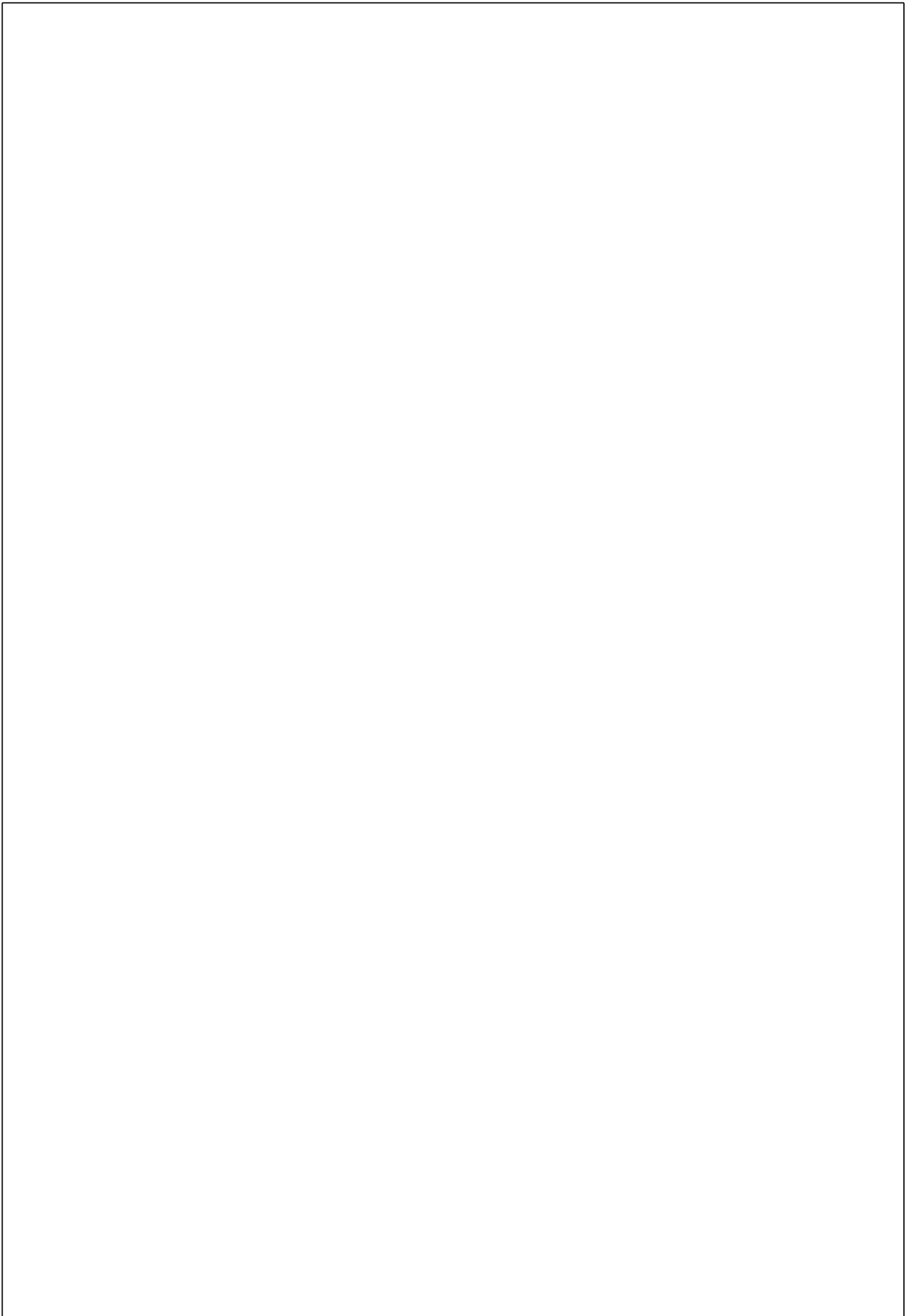
# Rainfall runoff calculations



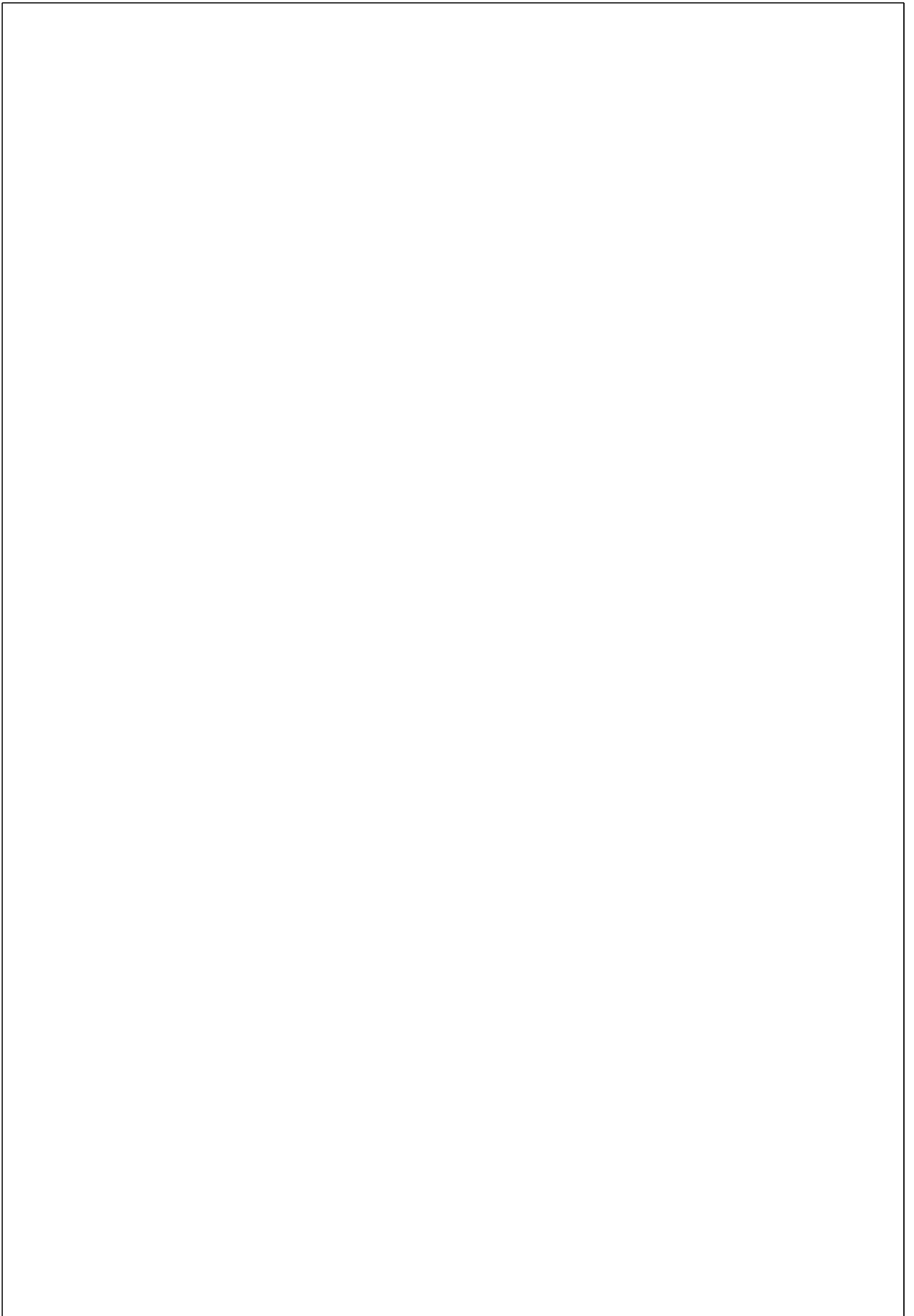


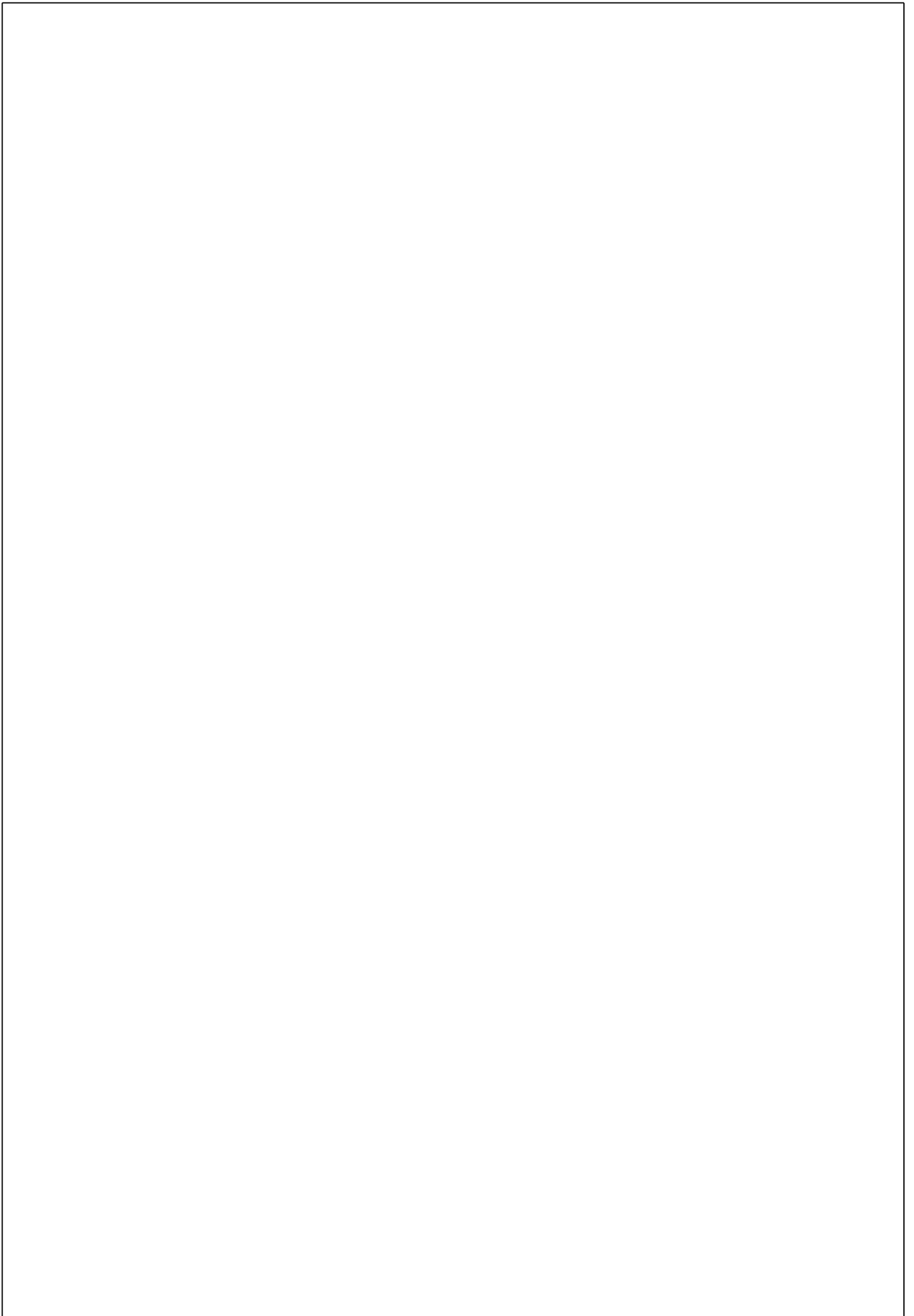












## Appendix C



# United Utilities Asset Location Plan

**GeoSmart Information Ltd**

**Suite 9-11, 1st Floor  
Old Bank Buildings, Bellstone  
Shrewsbury, Shropshire  
SY1 1HU**

**FAO:**

**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](mailto:propertysearches@uuplc.co.uk)**

**Your Ref: 80040  
Our Ref: UUPS-ORD-512082  
Date: 22/08/2023**

**Dear Sirs**

**Location: LONGHORN STABLES HAGG LANE, ST. MICHAELS, PRESTON, PR3 0UJ**

I acknowledge with thanks your request dated 21/08/2023 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

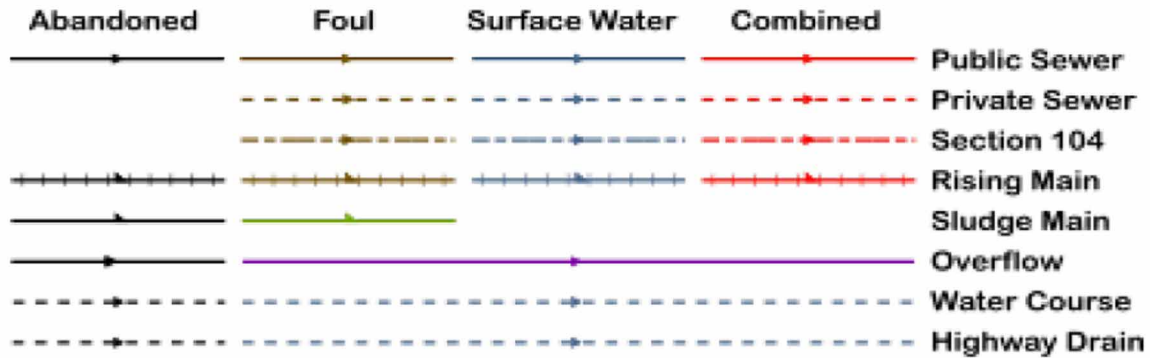
## TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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:

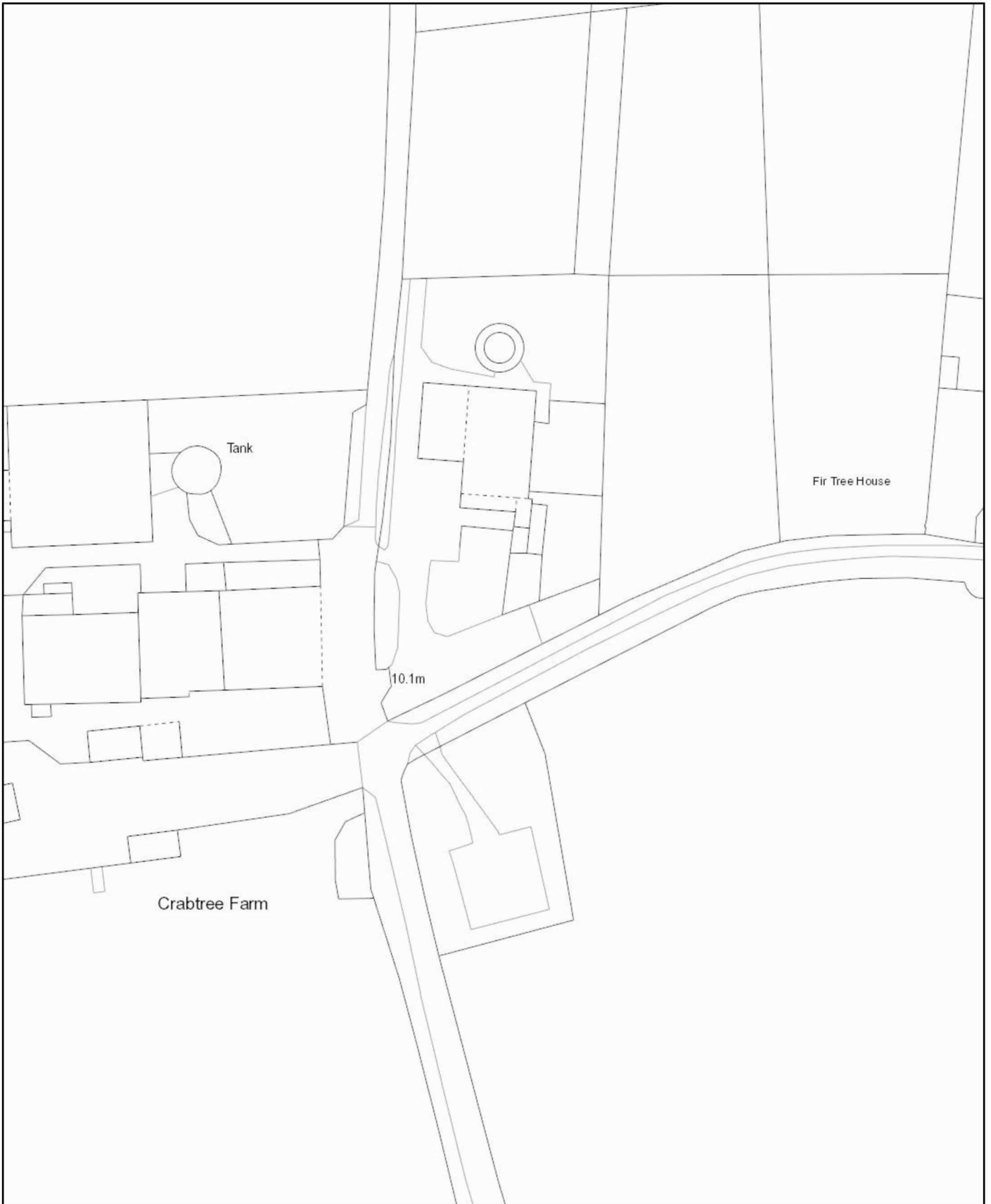
- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out 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.

## Wastewater Symbology



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

- |                  |                          |
|------------------|--------------------------|
| Manhole          | Side Entry Manhole       |
| Head of System   | Outfall                  |
| Extent of Survey | Screen Chamber           |
| Rodding Eye      | Inspection Chamber       |
| Inlet            | Bifurcation Chamber      |
| Discharge Point  | Lamp Hole                |
| Vortex           | T Junction / Saddle      |
| Penstock         | Catchpit                 |
| Washout Chamber  | Valve Chamber            |
| Valve            | Vent Column              |
| Air Valve        | Vortex Chamber           |
| Non Return Valve | Penstock Chamber         |
| Soakaway         | Network Storage Tank     |
| Gully            | Sewer Overflow           |
| Cascade          | Ww Treatment Works       |
| Flow Meter       | Ww Pumping Station       |
| Hatch Box        | Septic Tank              |
| Oil Interceptor  | Control Kiosk            |
| Summit           |                          |
| Drop Shaft       | Change of Characteristic |
| Orifice Plate    |                          |



Scale: 1:1250  
 Date: 22/08/2023

## SEWER RECORDS



Water for the North West

**Address or Site Reference:** LONGHORN STABLES HAGG LANE, ST.  
 MICHAELS, PRESTON, PR3 0UJ

**Printed by:** Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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## 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](mailto:info@geosmartinfo.co.uk)

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- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
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- 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.
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Milford House  
43-55 Milford Street  
Salisbury  
Wiltshire SP1 2BP  
Tel: 01722 333306  
Fax: 01722 332296  
Email: [admin@tpos.co.uk](mailto:admin@tpos.co.uk)

You can get more information about the PCCB from [www.propertycodes.org.uk](http://www.propertycodes.org.uk).

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

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

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

## 13 Terms and conditions, CDM regulations and data limitations



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<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/>