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Ref: 6757/R1

Pendle Street East
Sabden
Lancashire

Flood Risk Assessment

April 2025

HIGHALL Developments

Client: Highall Developments, Unit 2, St. Georges Court, Kirkham, PR4 2EF

REPORT DETAILS

Site Name: Land off Pendle Street East, Sabden, Lancashire

Report Title: Flood Risk Assessment

Report Number: 6757/R1

Revision	Date	Status
-	April 2025	For Planning Submission

Client: Highall Developments

Client Contact: Caius Colfer

Prepared By: [redacted]

CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Lees Roxburgh have been instructed by Highall Developments to carry out a Flood Risk Assessment (FRA) for development of land off Pendle Street East, Sabden, Lancashire.

1.2 This report has been prepared to accompany a detailed planning application for 19 No. houses.

1.3 The site lies within an area designated on EA Flood mapping as Flood Risk Zone 1 and therefore comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (< 0.1%).

1.4 *The National Planning Policy Framework (NPPF)* and the accompanying *National Planning Policy Guidance* set out the requirements for addressing flood risk with respect to potential development sites.

1.5 The purpose of an FRA is to address the following;

- The potential for the proposed development to be affected by flooding either from the development proposal or external sources.
- The potential for the proposed development to increase the flood risk elsewhere.
- That mitigation measures introduced to deal with any risks identified can be successfully managed.
- That the site can be developed and occupied safely.

The NPPF indicates that an assessment of flood risk should be proportionate to the risk and appropriate to the scale, nature and location of the development. This report reflects the requirements of the NPPF in this regard.

1.6 This report has been prepared specifically for Highall Developments for the sole purposes of the planning application and any reliance on its contents must be read in conjunction with the requirements of any subsequent planning conditions.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Location

2.1.1 The site is centred on National Grid references 377872, 437161 and is approx. 0.57 ha in area **(Appendix 1)**.

2.1.2 The site is located within the Sabden settlement boundary some 5km to the south west of Clitheroe.

2.2 Access and Surrounding Land Use

2.2.1 Access to the site is currently achieved and is proposed to the development from Pendle Street East to the north.

2.2.2 Immediately to the north of the site flanking the proposed access route and to the north east is residential property off Pendle Street East and Pendleside Close respectively with a commercial property to the north west.

2.2.3 To the east is a playing field and residential property and to the west beyond the commercial area is a primary school, a recreation ground and commercial property taking access off Watt Street.

To the north beyond Pendle Street East is Sabden Bowling Club and predominantly residential property with Sabden Brook running in a wooded valley beyond.

2.2.4 Extending south is open countryside with an extensive area of woodland extending south westerly from Padiham Road.

More generally, surrounding Sabden is open countryside with moorland and Pendle Hill beyond, and of particular note Churn Clough Reservoir to the north north west about 1¼ km from the site.

2.3 Site Description

2.3.1 The site comprises an area of land off Pendle Street East via which access will be gained and which currently comprises an area of mixed paving between Nos. 27 and 29 with a number of garages to the rear.

2.3.2 The site then opens out into a scrubby, regular shaped field which is flanked by Pendleside Close to the east, by the recreation ground to the west and open countryside to the south.

2.4 Topography

2.4.1 Reference should be made to the topographical survey **(Appendix 2)**.

2.4.2 Levels are summarised as;

- South west corner… 153.0m AOD
- South east corner… 152.5m AOD

- North west corner main site area… 148.2m AOD
- North east corner main site area… 148.3m AOD
- At Pendle Street East… 146.7m AOD

These levels result in an overall fall from the south boundary to where the access road enters the main body of the site of about 1 in 20 easing to about 1 in 30 down to Pendle Street East.

2.5 Existing Drainage

2.5.1 As noted, Sabden Brook is located beyond Sabden Bowling Club to the north and flows in a westerly direction outfalling into the River Calder some 4.5km to the south west of the site **(Appendix 1B).**

There is a ditch system within the field to the south which it is understood is culverted under the track to the south draining in a north easterly direction towards the playing field from where it is assumed it makes its way down to the brook.

2.5.2 There are foul, combined and surface water sewers in the area of the site including a combined sewer to the rear of Nos. 29 and 42 Pendle Street East turning north via the proposed development access into Pendle Street East **(Appendix 3).**

These systems are discussed more fully in Section 3.3.2.

2.5.3 There are gullies located in Pendle Street East including at the proposed site entrance.

There is no evidence of a separate highway drainage system in Pendle Street East on which basis it is concluded that the highway is drained via the gullies into the foul/combined sewer network.

Further, there is a significant impermeable area comprising paving and buildings from which surface water runoff must drain into Pendle Street East and then also into the foul/combined sewer network **(Appendix 4B).**

3.0 FLOOD RISK

3.1 Flood Mapping

3.1.1 Gov.UK Flood Map for Planning

3.1.1.1 Reference to the Flood Map for Planning **(Figure.1)** identifies that the site is situated within a Flood Zone 1 Area of flood risk. This is defined within the NPPF as land assessed as having a less than 1 in 1000 annual probability of flooding (<0.1% in any year).

All uses of land are appropriate in this zone.

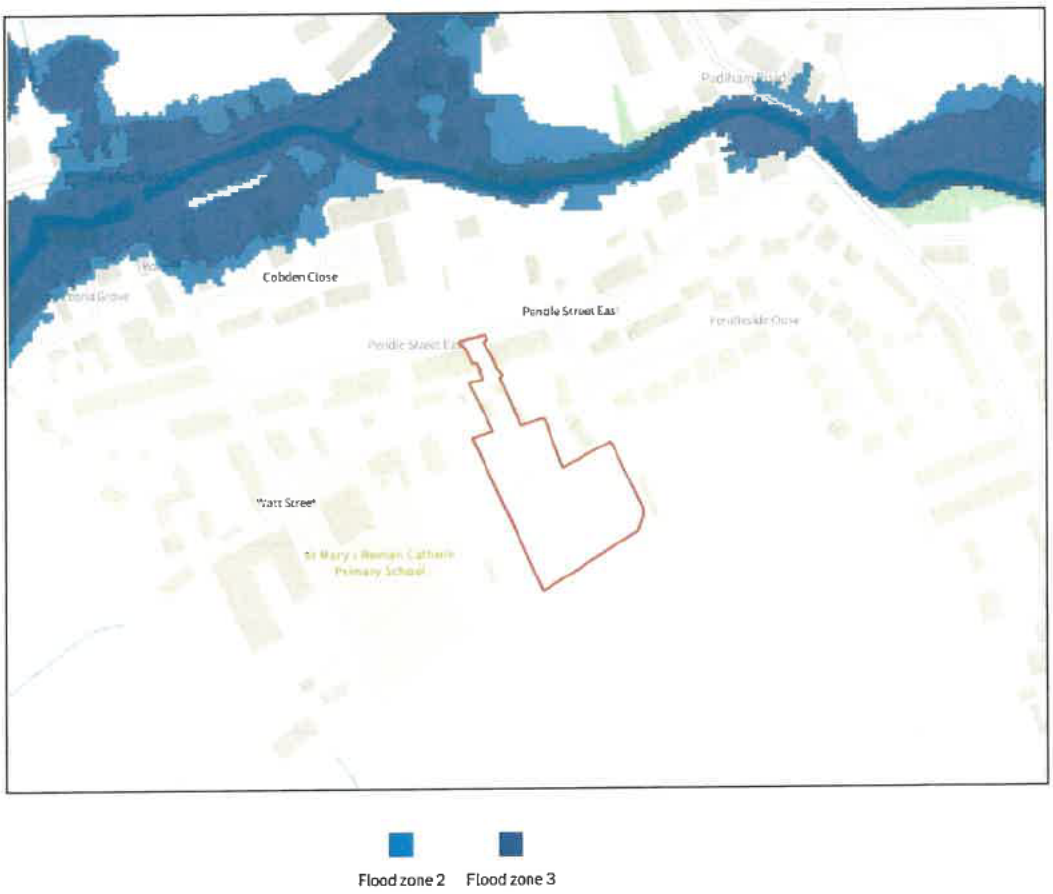


Figure 1: Gov.UK Flood Map for Planning

3.1.2 Gov.UK Surface Water Flood Risk

3.1.2.1 Reference to the 1 in 100 Annual Likelihood of Flooding from Surface Water Map **(Figure 2)** identifies sporadic areas of risk within the general area but not affecting the site.

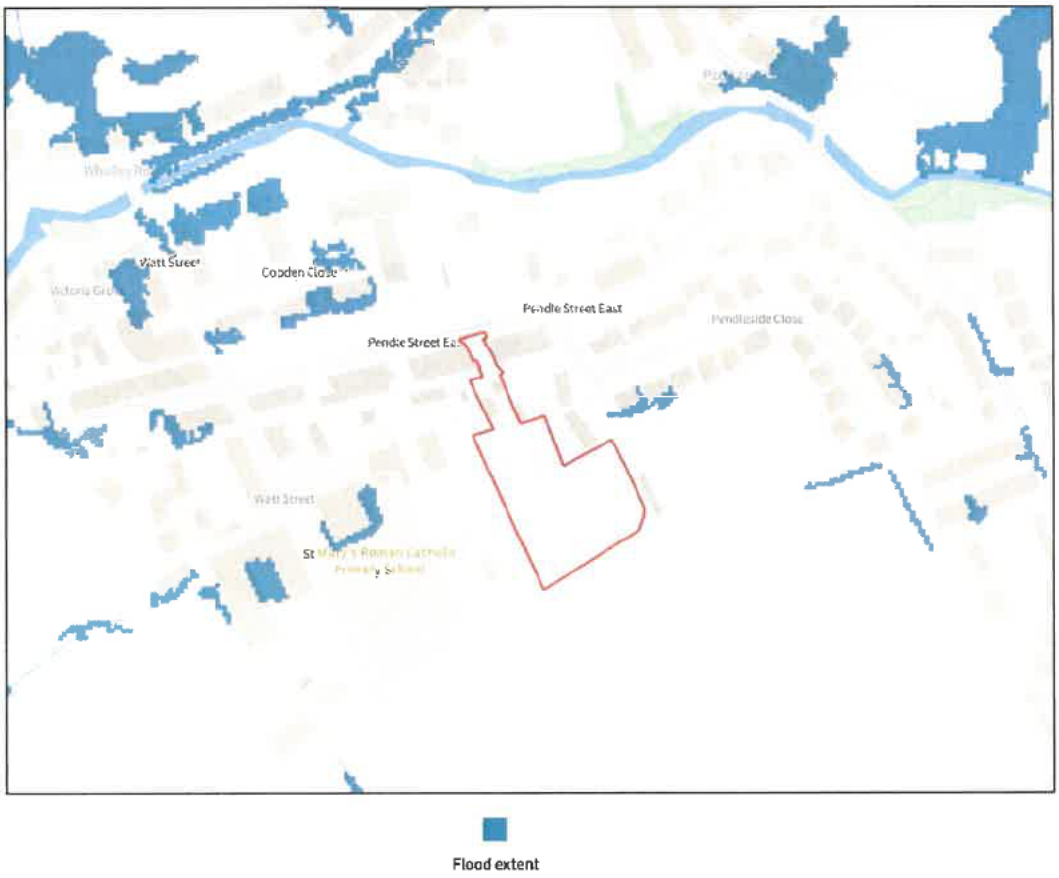


Figure 2: Gov.UK 1 in 100 Annual Likelihood of Flooding from Surface Water

3.1.3 Gov.UK Extent of Flooding from Reservoirs

3.1.3.1 Reference to the Gov. UK Extent of Flooding from Reservoirs Map **(Figure 3)** identifies an extensive area of risk immediately to the north associated with Churn Clough Reservoir to the north north west.

Whilst the site is not identified as being at risk it is considered that in any event the risk of a failure or overtopping of the reservoir is so low as can be discounted for the purposes of granting consent to development proposals.

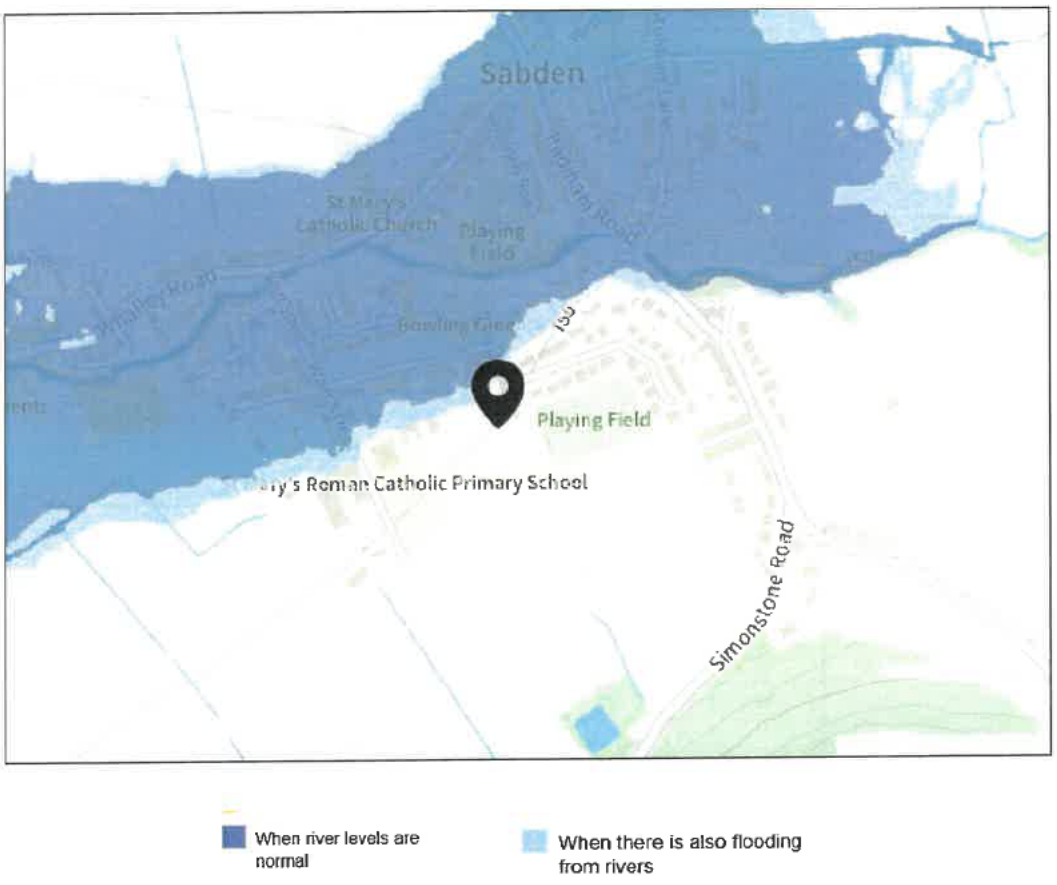


Figure 3: Gov. UK Extent of Flooding from Reservoirs

3.1.4 Extent of Groundwater Flooding

3.1.4.1 Reference to the GW5 Groundwater Flood Risk Map (GeoSmart 2024) **(Figure 4)** identifies that the site is negligible risk of flooding from groundwater.

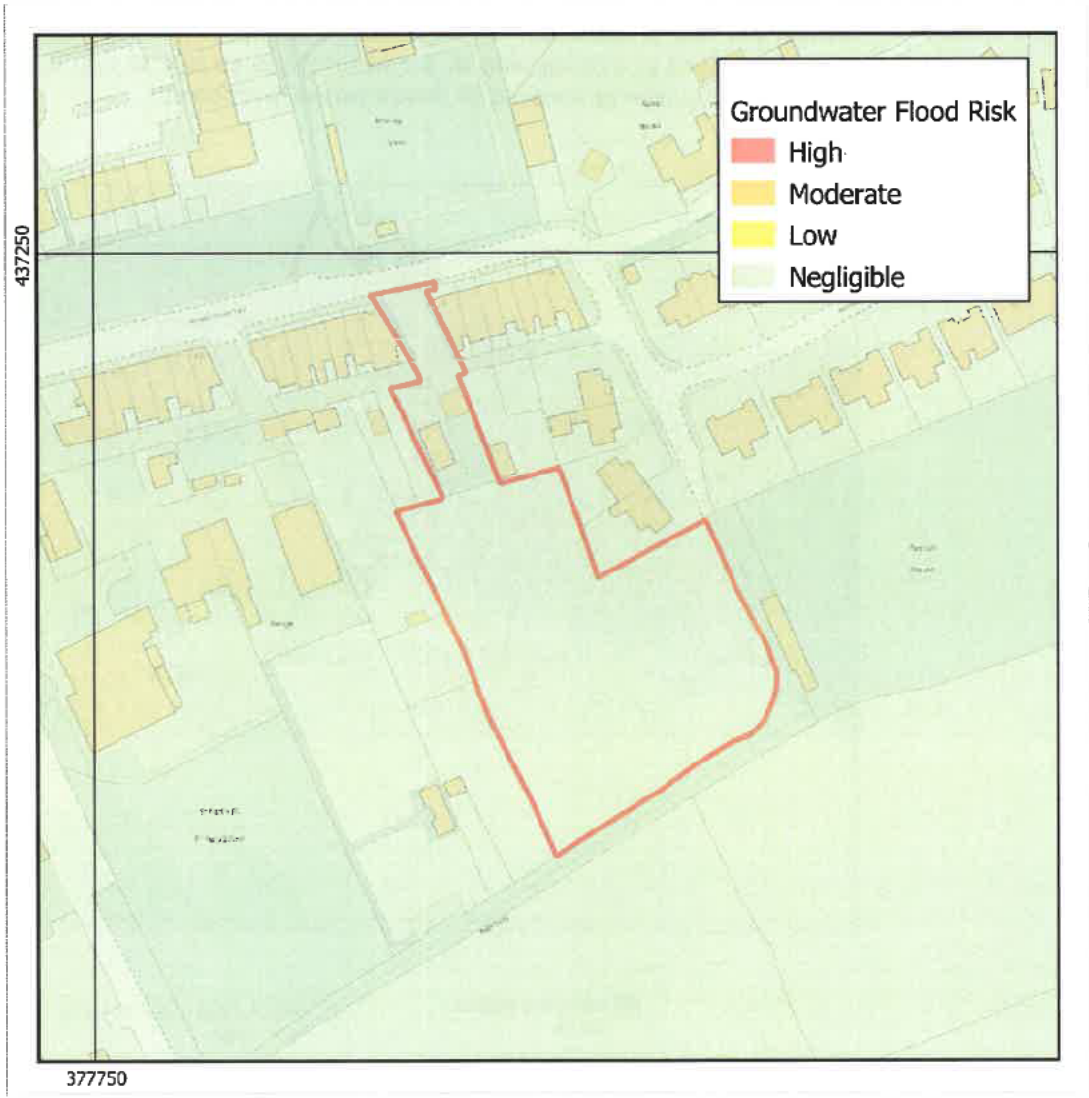


Figure 4: GW5 Groundwater Flood Risk Map (GeoSmart 2024)

3.2 Land Use Vulnerability Classification and Sequential and Exception Tests

3.2.1 As set out in the NPPF, the sequential test is a risk based approach which should be applied at all stages of the planning process in order to steer new development to areas at risk from the lowest probability of flooding, in the first instance from areas mapped as Flood Zones 2 and 3 to Flood Zone 1.

The sequential test should also be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site specific Flood Risk Assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable

elements would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).

3.2.2 The NPPF Planning Practice Guidance incorporates a list of appropriate land uses in each flood zone dependent on the vulnerability of the proposed development to flooding. Table 2 of the guidance classifies the proposed development as 'More Vulnerable'.

Reference is made to the table below, reproduced from Table 3 of the guidance, which sets out the Flood Risk Vulnerability Classification.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

3.2.3 The proposed development is classified in the NPPF as 'More Vulnerable' and is located within a Zone 1 area of flood risk.

This FRA will conclude built development within the site boundary can be delivered so as not to be at risk of flooding from any source having regard to reasonably foreseeable potential changes in flood risk. On this basis the sequential and exception tests will not apply.

3.3 Sources of Flood Risk

3.3.1 Water Bodies, Watercourse Systems and Surface Water and Groundwater Flooding

3.3.1.1 Whilst mapping has identified flooding from Churn Clough Reservoir as a potential source of risk, such risk is considered so low as can be discounted for the purposes of granting planning consent.

3.3.1.2 The nearest watercourse system is Sabden Brook to the north and which sits well below the site area and does not present a source of risk.

There is a ditch system however within the field to the south and which is understood to be culverted into the area of the adjacent playing field from where it is reasonably concluded it then drains down to the brook. The presence of this system needs to be considered.

3.3.1.3 Reference to surface water flood mapping has identified sporadic areas of risk in the area but none affecting the site.

However the presence of high ground to the south does present a potential source of risk which needs to be considered in conjunction with the ditch system noted above.

3.3.1.4 Reference to the groundwater flood mapping identifies that the site is at negligible risk.

3.3.1.5 On this basis it is concluded that the risk of flooding from water bodies and groundwater can be discounted but that from the ditch system and surface water flooding to the south needs to be considered.

3.3.2 **Existing Sewers and Drainage**

3.3.2.1 Copies of United Utilities public sewer records have been obtained and identify the presence of adopted drainage infrastructure in the area of the site. These records have been incorporated in **Appendix 3.**

3.3.2.2 Records identify;

- Surface water system to the north east which turns north down Pendleside Close as 525mm in diameter and then continues down as 600mm in diameter to the east of the bowling green and outfalling into Sabden Brook.

- Foul system to the north east which runs alongside the surface water system as above but then turns west along Pendle Street East as 225mm in diameter across the proposed access location where it is briefly identified as combined and picks up a system from the rear alley to Nos. 29 to 41 Pendle Street East.

3.3.2.3 None of these systems are considered as presenting a source of risk.

3.3.3 **Comment**

3.3.3.1 On the basis of the assessment of the potential sources of flood risk described above, it is considered that the risk associated with the following needs to be considered by this FRA;

- Ditch system and surface water flooding from the south

- Development drainage proposals

4.0 SURFACE WATER RUNOFF

4.1 Requirements for Surface Water Drainage of the Site

4.1.1 The NPPF recommends that surface water generated by the development site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development.

4.1.2 Proposals should ensure that peak flow rates of surface water leaving the developed site are no greater than those prior to development, reducing surface water run off where possible.

4.2 Site Area

4.2.1 The site occupies an area of 0.567 ha.

4.3 Existing Run Off

4.3.1 Run off rates have been calculated for the site area on this basis **(Appendix 4A)** using the FEH-13 method and these are as follows;

- Q_{bar}... 8.6 litres/sec
- Q_{1}... 7.4 litres/sec
- Q_{30}... 14.6 litres/sec
- Q_{100}... 17.8 litres/sec

4.3.2 The surface water flows generated by the developed site will need to be restricted based on the rates noted above.

4.4 Surface Water Run Off from the Developed Site

4.4.1 The development plan is incorporated in **Appendix 6B**.

4.4.2 Measures need to be incorporated to mitigate flood risk associated with the development proposals.

These are discussed under Section 6.2.

5.0 DRAINAGE HIERARCHY

5.1 National Planning Practice Guidance

5.1.1 National Planning Practice Guidance states the aim that surface water run off should be discharged as high up the drainage hierarchy as reasonably practicable;

- Into the ground (infiltration)
- To a surface water body or watercourse
- To a surface water sewer, highway drain or other drainage system
- To a combined sewer

The following measures have therefore been considered and identified.

5.2 Potential for Ground Infiltration Based Drainage

5.2.1 A Phase 1 Preliminary Risk Assessment by bEk Enviro Ltd Ref. BEK-23103-1 of August 2023 has identified that the site is underlain by clay deposits and ground conditions are therefore such that infiltration drainage will not be suitable to discharge surface water runoff.

5.2.2 On this basis a positive surface water outfall from the development is required.

5.3 Surface Water Outfall

5.3.1 A number of options have been assessed. Refer to **Appendix 5** and below.

Note for all options a connection from the development will need to pass under the existing UU combined sewer at the site entrance.

5.3.2 The ability to deliver a gravity connection to the brook via a route to the west of the bowling green could be problematic. Irrespective, this route will be ransomed by third party land.

5.3.3 On this basis, the feasibility of a connection from the site to the existing 600mm diameter UU surface water sewer just upstream of the outfall to the brook has been assessed. If feasible, this option would permit the intervening third party land ownership to be overcome by an S98 sewer requisition of United Utilities.

However, this outfall is higher than a direct outfall to the west and as a result, and bearing in mind the constraint presented by the existing sewer across the site entrance, cannot be delivered by gravity.

5.3.4 Given the narrow site access arrangements and the small size of the proposed development, it is considered that the introduction of a surface water pumping station would be unrealistic, not to mention counterintuitive given the topography.

5.3.5 The area of private unadopted access between Nos. 27 and 29 Pendle Street East, and indeed impermeable features generally along the route of the proposed access road, all drain down and into Pendle Street East where there are gullies but no evidence of a separate highway drainage system.

On this basis, it is concluded that this area can only drain into the UU foul/combined sewer network and that whilst the system in Pendle Street East is mapped as part foul, it is effectively combined. In this regard it is noted that two sections of this system are already identified as being combined.

An assessment of the contributing impermeable area and surface water runoff from this area is incorporated in **Appendix 4B** and has identified a 1 in 100 year plus 50% cc flow of some 17.25 litres/sec which makes its way into the foul/combined sewer network.

5.3.6 In summary, In the absence of a technically and/or legally deliverable connection to either the watercourse or the public surface water sewer network, a connection to the combined sewer network represents the only option identified for delivering a gravity surface water outfall from the development.

Provided the discharge rate is limited to less than 17.25 litres/sec this would represent a betterment as compared with the existing situation.

The specific proposals in this regard are discussed under Section 6.0.

6.0 MITIGATION MEASURES

6.1 Ditch System and Surface Water Flooding to the South

6.1.1 The ditch system and the potential for surface water flooding from the south needs to be considered.

6.1.2 Development levels will therefore need to be set to provide a flow path through the proposed properties forming the southern area of the site and into and down the proposed site access road.

6.2 Development Drainage Proposals

6.2.1 **Surface Water Drainage Strategy**

6.2.1.1 Connection is proposed to the combined sewer network.

6.2.1.2 It is proposed that flows will be restricted to 8.6 litres/sec being the greenfield Qbar rate and which will represent a 50% reduction in flows from the 17.25 litres/sec assessed as currently draining uncontrolled into the UU network for the design storm event. This will deliver betterment with respect to offsite flood risk.

6.2.1.3 The surface water system will be designed to contain flows up to the 1 in 100 year event plus allowance for 50% climate change within the pipe system supplemented by offline attenuation within geocell units.

6.2.2 **Future Maintenance**

6.2.2.1 The piped system will be adopted by United Utilities with the geocell units to be maintained by a management company.

6.2.3 **Water Quality**

6.2.3.1 The risk to water quality from this development is categorised as very low. The incorporation of trapped gullies will nonetheless provide one level of treatment.

6.2.4 **Proposed Drainage Layout**

6.2.4.1 The drainage proposals for the development have been prepared accordingly and are incorporated in **Appendix 6B**.

6.3 Exceedance Flows

6.3.1 Setting of floor levels a minimum of 0.15m above external ground level will ensure any flows generated by an exceedance event (i.e. greater than the 1 in 100 year plus climate change design event) will not impact on the development.

6.3.2 Indicative routing is shown in **Appendix 6B.**

7.0 CONCLUSIONS

7.1 The proposed residential development is classified in the NPPF as 'More Vulnerable' and is located within a Zone 1 area of flood risk.

Potential sources of flooding from water bodies and groundwater have been considered and found to be negligible and can be discounted. The potential risk from the ditch and surface water flooding to the south will be mitigated by setting of levels to provide a flow path through the development.

This FRA has therefore concluded that built development within the site boundary can be delivered so as not to be at risk of flooding from any source having regard to reasonably foreseeable potential changes in flood risk. On this basis the sequential and exception tests will not apply.

7.2 Geoenvironmental Assessment work has established that ground conditions are not suitable for the introduction of ground infiltration based drainage and a positive surface water outfall is required.

An assessment of levels in conjunction with third party land ownership has discounted the ability to deliver a gravity connection to Sabden Brook either direct or via the existing UU sewer network.

It has been concluded that the existing private unadopted access and additional impermeable features which will be occupied by the development proposals currently drain into the existing UU combined sewer network. It is therefore proposed to make a connection down Pendle Street East to the UU combined sewer network at a point where the level of the system facilitates a gravity connection.

The flow rate from the development will be restricted to the Q_{bar} rate of 8.6 litres/sec which will be less than that currently assessed as draining into the network and will therefore provide up to 50% betterment as compared with the existing situation.

7.3 The surface water system will be designed to contain flows up to the 1 in 100 year event plus allowance for 50% climate change within the pipe system supplemented by offline attenuation within geocell units.

7.4 The piped system will be adopted by United Utilities with the geocell units to be maintained by a management company.

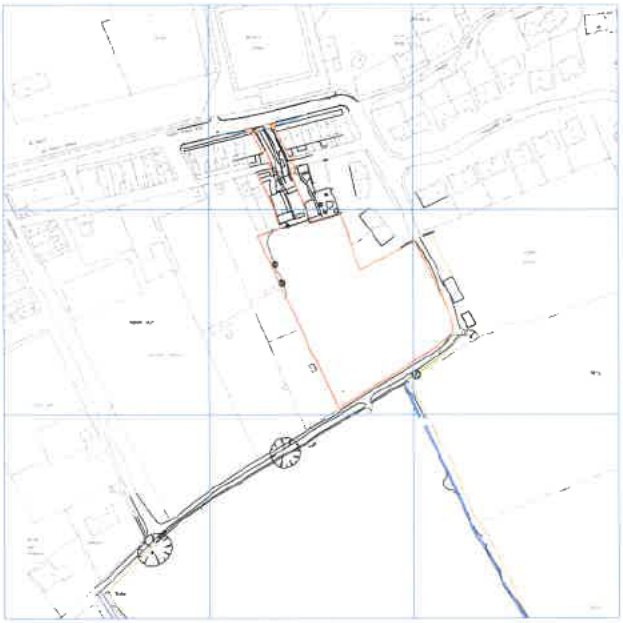
7.5 The risk to water quality from this development is categorised as very low. The incorporation of trapped gullies will nonetheless provide one level of treatment.

7.6 Setting of the floor levels a minimum of 0.15m above external ground level will ensure any flows generated by an exceedance event (i.e. greater than the 1 in 100 year plus climate change design event) will not impact on the development.

7.7 It is therefore concluded that the development can be delivered in accordance with the NPPF so as not to be at risk of flooding from external sources or from within the development, and so as not to increase flood risk to the surrounding area and development is therefore appropriate.

Appendix 1: Site Details

Appendix 1A: Site Location Plan



0 50 100

HIGHALL Developments

PROJECT TITLE	PENDLE STREET, EAST SABDEN
DRAWING DETAIL	LOCATION PLAN
DRAWN: CC	DATE: 04.11.24
CHECKED: -	SCALE: 1:1250@A2
DRAWING NUMBER: PSES.P.LP.01	REVISION: -

Appendix 1B: Watercourse Systems

WATERCOURSE NETWORK: NTS

PENDLE STREET EAST, SABDEN

Appendix 2: Topographical Survey


Works
Bowling
Green
Aureol
House
PENDLE STREET EAST
Gardens

6757 - 1:250 @ A0

Appendix 3: United Utilities Sewer Records

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

Lees Roxburgh Ltd

The Genesis Centre
Science Park South, Birchwood
Warrington, Cheshire
WA3 7BH

FAO:

Your Ref: 6757
Our Ref: UUPS-ORD-628011
Date: 28/01/2025

Dear Sirs

Location: East Sabden

I acknowledge with thanks your request dated 23/01/2025 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,

[redacted]

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

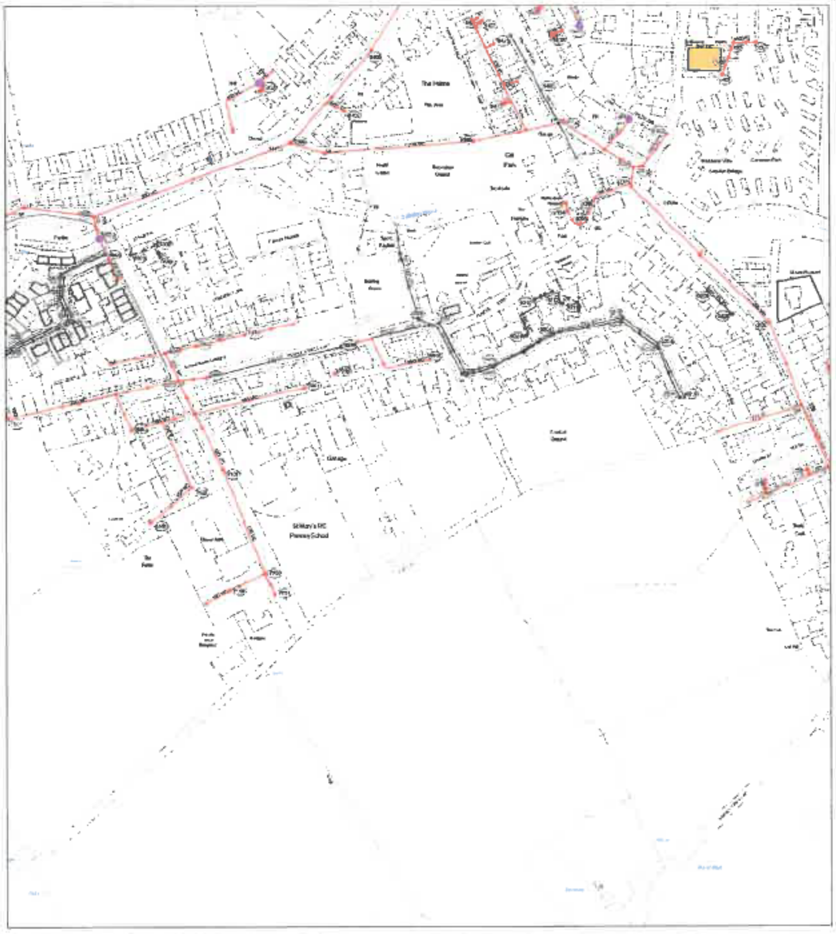
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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



LEGEND

Address or Site Reference:

East Sabden.

Scale: 1:1250 Date: 28/01/2025

Sheet: 1 of 1

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

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.

Appendix 4: Existing Surface Water Run Off

Appendix 4A: FEH-13 Method for Full Development Area

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Simulation Settings

Rainfall Methodology	FEH-13	Skip Steady State	x	1 year (l/s)	7.4
Summer CV	1.000	Drain Down Time (mins)	240	30 year (l/s)	14.6
Winter CV	1.000	Additional Storage (m³/ha)	20.0	100 year (l/s)	17.8
Analysis Speed	Normal	Check Discharge Rate(s)	✓	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 %)
100	0	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.70
Greenfield Method	FEH	Growth Factor 100 year	2.08
Positively Drained Area (ha)	0.567	Betterment (%)	0
SAAR (mm)	1255	QMed	8.0
Host	1	QBar	8.6
BFIHost	0.355	Q 1 year (l/s)	7.4
Region	10	Q 30 year (l/s)	14.6
QBar/QMed conversion factor	1.075	Q 100 year (l/s)	17.8
Growth Factor 1 year	0.87		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Maximum Backdrop Height (m)	1.500
Node Losses	✓	Full Bore Velocity	✓
Link Size	✓	Minimum Full Bore Velocity (m/s)	
Minimum Diameter (mm)	150	Maximum Full Bore Velocity (m/s)	3.000
Link Length	✓	Proportional Velocity	✓
Maximum Length (m)	100.000	Return Period (years)	
Coordinates	✓	Minimum Proportional Velocity (m/s)	0.750
Accuracy (m)	1.000	Maximum Proportional Velocity (m/s)	3.000
Crossings	✓	Surcharged Depth	✓
Cover Depth	✓	Return Period (years)	
Minimum Cover Depth (m)		Maximum Surcharged Depth (m)	0.100
Maximum Cover Depth (m)	3.000	Flooding	✓
Backdrops	✓	Return Period (years)	30
Minimum Backdrop Height (m)		Time to Half Empty	x

Appendix 4B: Existing Impermeable Area and Surface Water Run Off Draining into Pendle Street East

Lees Roxburgh Drg. No. 6757/01-01

Notes

Existing Impermeable Area within Development Proposals = 395m²

Existing Run Off Rates:
Q2 - 0.014 x 395 = 5.53L/Sec
Q30 - 5.53 x 1.7* = 9.4L/Sec
Q100 - 5.53 x 2.08* = 11.5L/Sec
Q100+50%CC - 11.5 x 1.5 = 17.25L/Sec

*Growth factors

Rev	REVISION	By	Date

HIGHALL Developments

Pendle Street East
Sabden
Lancashire

Existing Impermeable Area and Surface Water Run Off Draining into Pendle Street East

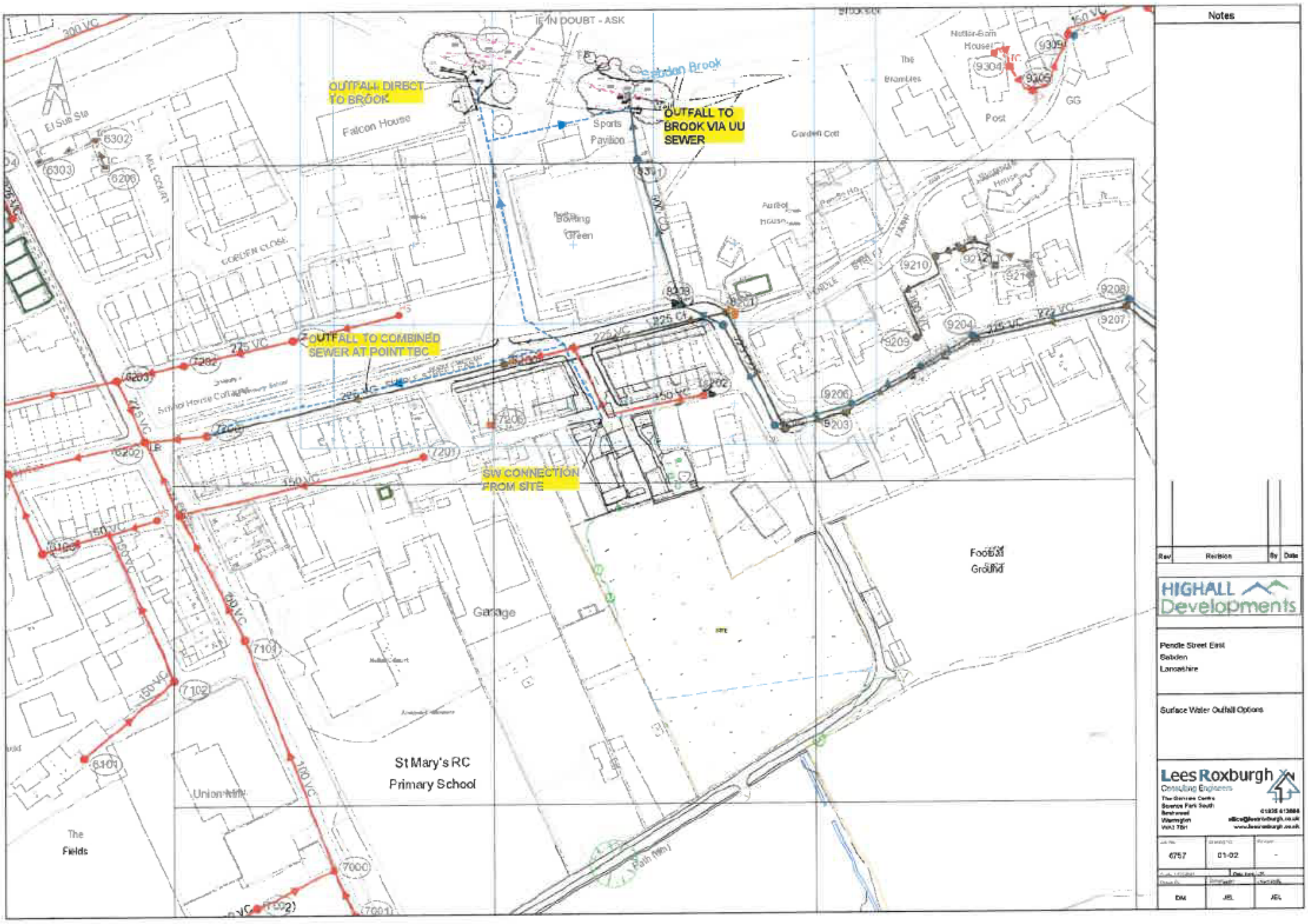
Lees Roxburgh
Consulting Engineers
The Genesis Centre Science
Park South
Birchwood
Warrington
WA3 7BH
01925 812898
office@leesroxburgh.co.uk
www.leesroxburgh.co.uk

Job No.	Drawing No.	Revision.
6757	01-01	-

Scale	1:250@A3	Date	April 2025
Drawn By		Designed By	Checked By
DM		JEL	JEL

Appendix 5: Surface Water Outfall Options

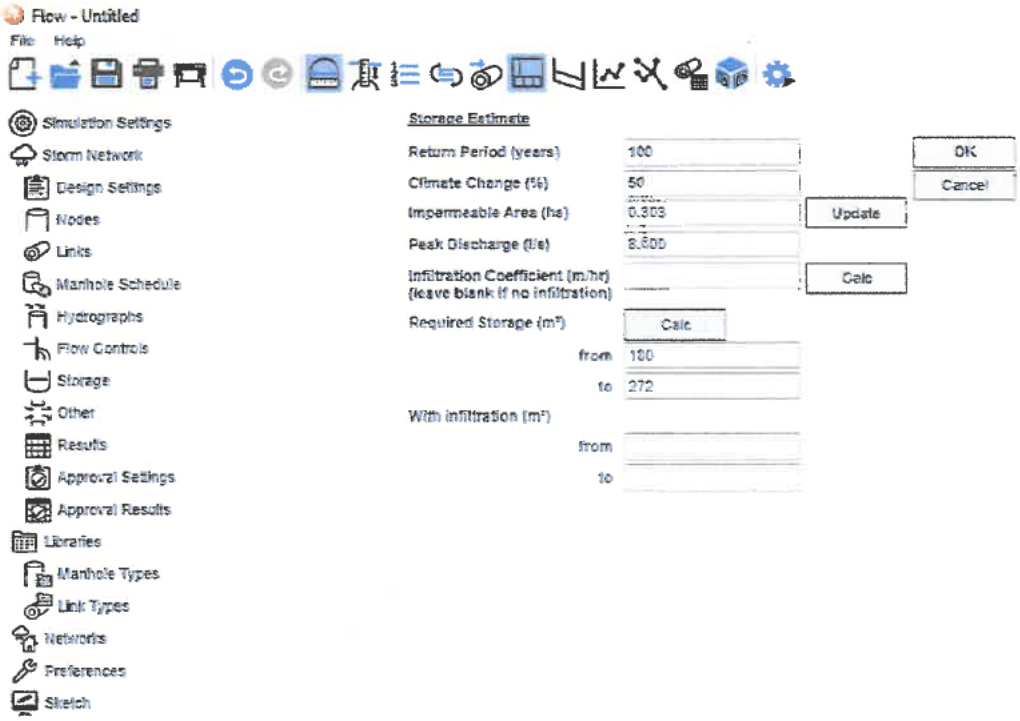
Lees Roxburgh Drg. No. 6757/01-02



OUTFALL DIRECT TO BROOK
OUTFALL TO BROOK VIA UU SEWER
OUTFALL TO COMBINED SEWER AT POINT TBC
SW CONNECTION FROM SITE
IF IN DOUBT - ASK
Falcon House
Sports Pavilion
Bowling Green
Garden Cott
St Mary's RC Primary School
Garage
Union Mill
The Fields
Football Ground
Post
GG
Notes
Rev
Revision
By
Date
HIGHALL Developments
Pendle Street East
Sabden
Lancashire
Surface Water Outfall Options
Lees Roxburgh
Consulting Engineers
6757
01-02
-
DM
JBL
JBL

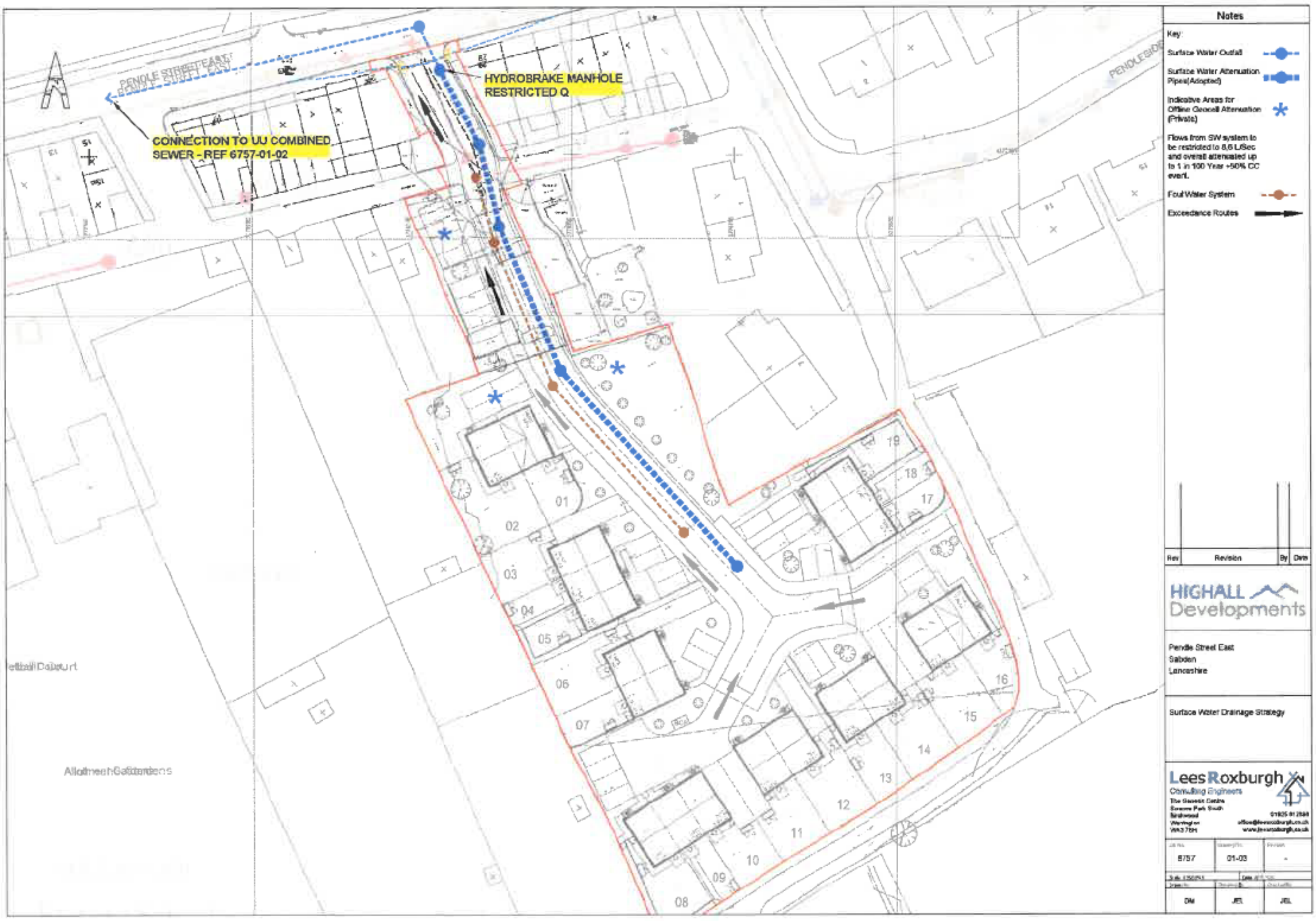
Appendix 6: Surface Water Drainage

Appendix 6A: Preliminary Surface Water Attenuation Calculations


Flow - Untitled
File Help
Simulation Settings
Storm Network
Design Settings
Nodes
Links
Manhole Schedule
Hydrographs
Flow Controls
Storage
Other
Results
Approval Settings
Approval Results
Libraries
Manhole Types
Link Types
Networks
Preferences
Sketch
Storage Estimate
Return Period (years) 100
Climate Change (%) 50
Impermeable Area (ha) 0.303
Peak Discharge (l/s) 8.800
Infiltration Coefficient (m/hr) (leave blank if no infiltration)
Required Storage (m³)
from 180
to 272
With infiltration (m³)
from
to
OK
Cancel
Update
Calc
Calc

Appendix 6B: Surface Water Drainage Strategy

Lees Roxburgh Drg. Ref. 6757/01-03


PENDLE STREET EAST
CONNECTION TO UU COMBINED SEWER - REF 6757-01-02
HYDROBRAKE MANHOLE RESTRICTED Q
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
Notes
Key:
Surface Water Outfall
Surface Water Attenuation Pipes(Adopted)
Indicative Areas for Offline Geocell Attenuation (Private)
Flows from SW system to be restricted to 8.6 L/Sec and overall attenuated up to 1 in 100 Year +50% CC event.
Foul Water System
Exceedance Routes
Rev
Revision
By
Date
HIGHALL Developments
Pendle Street East
Sabden
Lancashire
Surface Water Drainage Strategy
Lees Roxburgh
Consulting Engineers
6757
01-03
-
DM
JEL
JEL