Avie Consulting Ltd
Unit 6 Killingbeck Court
Killingbeck Office Village
Killingbeck Drive
Leeds, LS14 6FD

Residential Accommodation off Chapel Lane, Moldgreen

Skyline Funding

Flood Risk Assessment and Drainage Strategy Statement

May 2025

P4540

Avie Consulting Ltd
Unit 6 Killingbeck Court
Killingbeck Office Village
Killingbeck Drive
Leeds, LS14 6FD

Revision History			
Initial Issue	14 May 2025		
Prepared By:		Checked:	
	Tony Cooper Senior Engineer		Steve Bowles Associate

Rev No	Date	Description	By	Checked
0	14.05.2025	Initial Issue	TC	

Avie Consulting Ltd
Unit 6 Killingbeck Court
Killingbeck Office Village
Killingbeck Drive
Leeds, LS14 6FD

Contents

Avie Consulting Ltd
Unit 6 Killingbeck Court
Killingbeck Office Village
Killingbeck Drive
Leeds, LS14 6FD

1 INTRODUCTION

Avie Consulting Ltd has been commissioned by Skyline Funding to carry out a Flood Risk Assessment and Drainage Strategy report to support a Full Planning Application for a new residential development on land off Chapel Lane, Moldgreen.

The aim of this report is to allow the Planning Authority to assess the site in accordance with the National Planning Policy Framework published by the Department of Communities and Local Government.

2 PROPOSED DEVELOPMENT

The site is brownfield with an existing property on site with a hardstanding car park. The proposed end use is residential.

Please refer to Appendix A for-Site Development Proposals.

The site is located some 1.28km southeast of Huddersfield town centre at Ordnance Survey grid reference SE156163, with the nearest post code being HD5 9BG.

The site is bounded as follows:

To the North – Woodland area.

To the East – Existing building then Chapel Street.

To the South – Grass verge then A629 Wakefield Road.

To the West – Chapel Lane and woodland

Site levels vary between roughly 81.78m and 80.50m AOD with the site falling towards Chapel Lane from its high point on the north of the site.

The site location plan is shown in Figure 1

Figure 1

3 FLOOD RISK ASSESSMENT CRITERIA

The EA flood data was obtained, the site under consideration is within Flood Zone 1 according to the latest version of the Indicative Floodplain Map produced by the Environment Agency.

Indicative Floodplain Map for the site is shown in figure 2 below.

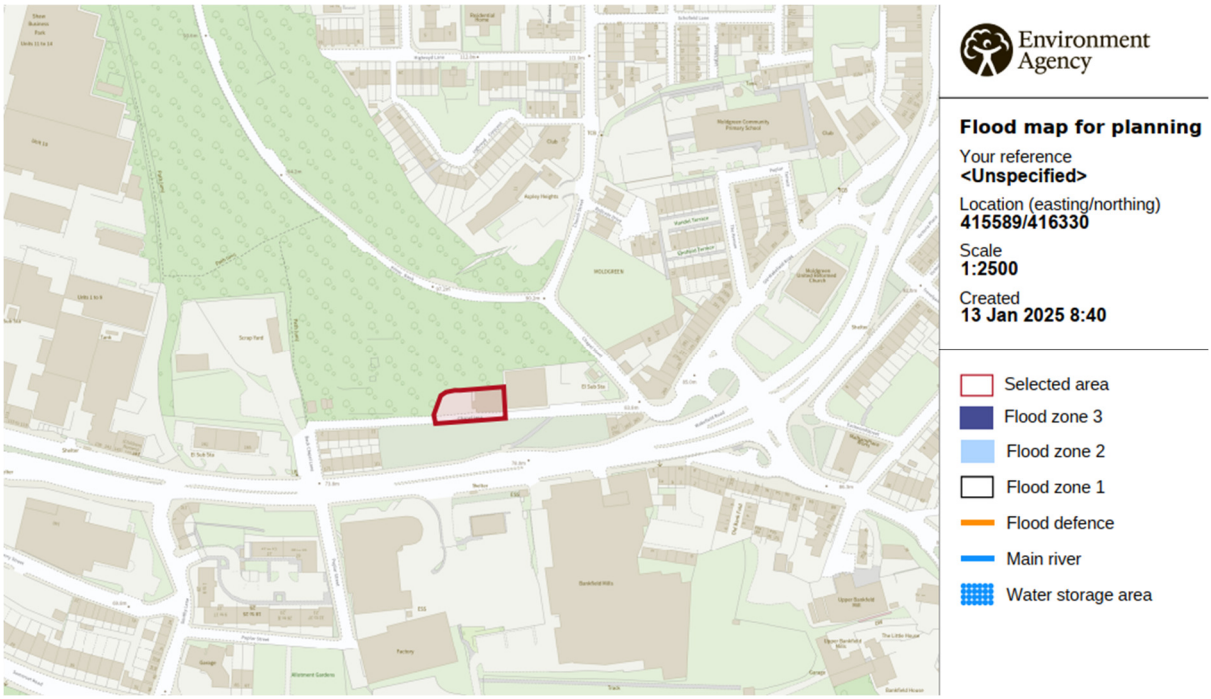


Figure 2

As the site lies entirely within Flood Zone 1 the flood risk assessment needs to consider the following:

- Flooding from other sources such as rivers, tidal, sewers and overland flooding
- The potential for the development to increase flooding elsewhere through the addition of hard surfaces
- The effect of the new development on surface water run-off
- EA data set accuracy

4 EXISTING FLOOD DEFENCES

The site does not benefit from any flood defences, nor does it require any.

5 SOURCES OF FLOODING

As part of the flood risk assessment consideration should be given to the following sources of flooding and what effect these could have on the development.

5.1 Flooding from Rivers / Watercourses

The indicative floodplain map extract shown in figure 2 shows the site to lie entirely within Flood Zone 1. The lower edge of the site is some 10m higher than the River Colne.

The risk of flooding from rivers and watercourses is considered to be **VERY LOW.**

5.2 Flooding from the Sea

The site is approximately 82km from the sea, as such the risk of flooding from this source is **VERY LOW**.

5.3 Flooding from Land

The effect of intense rainfall needs to be considered, and the local Topography of the land assessed.

The site is brownfield. The site falls towards Chapel Lane from a level of some 81.78m AOD which sits atop the hardstanding area running approximately north to southwest across the site down to a level of some 80.50m AOD on the Southwestern corner of the site adjacent to Chapel Lane. The site also falls to the southeast of the hardstanding towards the existing property at a minimum level approaching 80.90m AOD. The risk of flooding from surface water map available on the Gov.UK website does not show a surface water flood risk on, or associated with, the site. The risk of flooding from land is considered to be **LOW**.

The long-term flood maps obtained from the GOV.UK website (see figure 3) show that the site is not known to be at risk of surface water flooding.

It is recommended that plot FFLs are raised 150mm above general site levels to ensure that any overland flows that may occur within the proposed development do not adversely affect the plots.

As such the risk of flooding from this source is **LOW**.

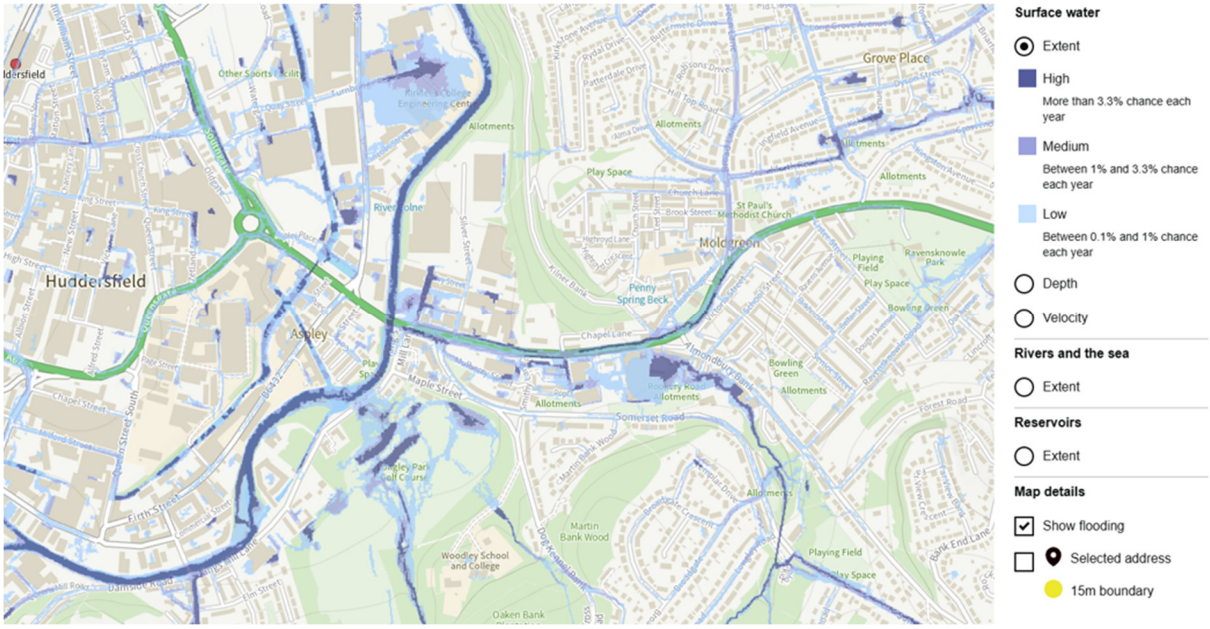


Figure 3

5.4 Flooding from Groundwater

Groundwater flooding occurs when water levels in the ground rise above surface elevations, particularly in low lying areas. On the basis that the bedrock geology in the area is identified as Pennine Lower coal measures overlain with mudstone, siltstone and sandstone, groundwater flooding is not expected to be an issue.

.

As such the risk of flooding from this source is considered to be **LOW.**

Figure 5

5.5 Flooding from Sewers

Sewer records have been obtained from Yorkshire Water for the site area and its immediate surroundings. There is a 225mm diameter combined water sewer recorded in Chapel Lane. The Yorkshire Water sewer record plan contained in Appendix B, shows a public combined sewer in Chapel Lane.

There are no recorded incidents to the local sewers and, given the sites topography, we consider the risk of flooding from this source to be **VERY LOW**.

6 FLOOD RISK SUMMARY

Sources of Flooding	Risk			Control Measures
	High	Medium	Low	
Rivers:			X	None
Sea			X	None
Land			X	Plot FFL's to be 150mm above existing ground levels
Groundwater			X	None
Existing sewers			X	None

7 INCREASE TO OFFSITE FLOODING

The development should be designed to limit the surface water run-off to existing surface water discharge flow rates or better.

The site is classified as Brownfield Development. However, in accordance with local planning guidance, Greenfield runoff rates have been calculated, and it is proposed that the discharge rate is to be restricted as close to the 1 in 1 year greenfield runoff rate as possible. Therefore, there is no significant increase to offsite flooding.

8 FLOOD RISK VULNERABILITY

The vulnerability of the proposed development is assessed in accordance with the Technical Guidance to the National Planning Policy Framework published by the Department for Communities and Local Government in March 2012.

The report should consider if the development is acceptable for the Flood Zone Classification in accordance with Annexe 3 within the NPPF.

The proposed development is Residential and is classified as **"More vulnerable"** according to the NPPF.

The site is indicated on the flood maps to be in Flood Zone 1.

Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification (from Table 2)		**Essential Infrastructure**	**Water compatible**	**Highly Vulnerable**	**More Vulnerable**	**Less Vulnerable**
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b	Exception Test required	✓	×	×	×

✓ Development is appropriate
× Development should not be permitted.

Utilising the Flood Zone Compatibility Table above, the development is deemed appropriate for the site and flood risk classification Flood Zone 1

As part of the assessment the following development constraints require consideration and recommendation made as to how to mitigate any flood risk appropriately.

8.1 Finished Floor Levels

The flood map extracts obtained from the GOV.UK website indicate that the site is in Flood Zone 1 and therefore at negligible risk of flooding from rivers or the sea, surface water or reservoir failure.

To mitigate against localised flooding caused by heavy / intense rainfall events, it is recommended that the internal ground floor level of the plots is set a minimum of 150 mm above external levels to ensure that any short-term surface water issues are prevented from causing damage to the dwellings.

8.2 Existing Flood Volumes

No loss of existing flood volume will occur as a result of the proposed development as it is within flood zone 1 according to the indicative flood maps and level information.

8.3 Flood Routing

Flood Routing paths are to be maintained on site by ensuring levels allow flows to move through the site without affecting properties. This is expected to be mainly along the proposed development infrastructure as the plots will be raised above the existing ground levels to afford them protection from the passage of surface water through the site.

8.4 Emergency Access

The site is in flood zone 1 according to the flood maps reviewed and as such, emergency access is not anticipated to be an issue and no specific route is required to be identified.

9 CLIMATE CHANGE ALLOWANCES

The EA have published revised climate change allowances for rainfall intensity, such as the climate change allowance as follows in Table 2.

Aire and Calder Management Catchment peak rainfall allowances

3.3% annual exceedance rainfall event

Epoch

	Central allowance	Upper end allowance
2050s	20%	35%
2070s	25%	40%

1% annual exceedance rainfall event

Epoch

	Central allowance	Upper end allowance
2050s	25%	40%
2070s	30%	45%

*Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

Table 2.

The proposed surface water drainage and attenuation systems will need to be designed to accommodate a 45% climate change allowance.

10 PROPOSED DRAINAGE STRATEGY

10.1 Surface Water

The Lead Local Flood Authority (LLFA) for the Kirklees Area is Kirklees Council. The Surface Water drainage proposals for the site will discharge surface water to the public combined sewer and consider severe storm events up to and including 1 in 100 year return period events with additional allowances for Climate Change (45%) and urban creep (10%). The provision of a rigorous treatment train will need to be included in the detailed design of the surface water drainage system in accordance with best practice and council policies.

Discharge to Ground
Infiltration is typically provided by the inclusion of soakaways and permeable paving within drainage systems. Infiltration has been excluded as a possible solution due to the site constraints. BRE Digest suggests a minimum 5m standoff distance from infiltration feature is required from building or structure. In the absence of an intrusive site investigation report and any infiltration testing, the BGS website indicates whilst there may be some infiltration capacity site constraints of the building and existing structures (retaining wall) does not permit the use of Soakaways in accordance with BRE Digest 365. A minimum of 5m standoff distance is required from all buildings and structures. This is not achievable, and soakaways would undermine any structures. Therefore, infiltration as a means of surface water disposal will be discounted.

Discharge to a Surface Water Body
The nearest Surface Water body is River Colne, some 446m to the west of the site. River Colne is an ordinary watercourse with a known history of flooding issues in Moldgreen. Therefore, due the distance of the watercourse from site this method of surface water discharge has been discounted.

Discharge to Surface Water Sewer
There are no surface water sewers located in the vicinity of the site. This method of discharge has been discounted.

Discharge to Combined Sewer
The local sewerage authority (Yorkshire Water) records have been obtained for the site and its immediate surrounds. These records show that there is a combined sewer located in the carriageway of Chapel Lane to the south of the site. The disposal of surface water flows from the site considers discharging to the public combined sewer.

The foul flows generated by the new development are proposed to be connected to the public combined sewer located in Chapel Lane.

11 PROPOSED DRAINAGE SCHEME

The proposed surface water drainage network has followed the hierarchy of discharge as described above and concluded that the collected surface waters should be attenuated on site and discharge to the public combined sewer located in Chapel Lane to the south of the site.

The proposed development area has been assessed as 408.080m^2 (448.888m^2 including an additional 10% Urban creep allowance for roof areas). The plan in Appendix D shows the proposed impermeable areas.

The proposed surface water design incorporates a traditional gravity surface water drainage system with oversized pipes, to provide the volume of attenuation needed to discharge flows to the public combined sewer at 3L/s. The drainage is to remain private and maintained by either the householders or a management company on their behalf. The surface water network including the oversized pipes have been sized to accept the runoff anticipated from the identified impermeable areas for severe storm events up to and including 100-year return period events with an additional 40% allowance for climate change.

Volume of Runoff
Restricting the surface water discharge to 3L/s from site requires 5.5 cubic metres of attenuation of surface water attenuation run-off will be reduced to nothing by the proposed below-ground drainage system.

12 DRAINAGE IMPACT

Utilising a discharge rate of 3.0 L/s for all storms up to 1 in 100 yr plus CC event using a single vortex flow control outfall will have little to NO impact on the downstream system.

13 GENERAL REMARKS

This report is for the sole use of Skyline Funding and immediate advisors in connection with the development of the subject site for residential use. It shall not be reproduced in whole or in part or relied upon by third parties for any use whatsoever without the express permission of Avie Consulting Ltd. Avie Consulting Ltd shall have no liability for any use of this report other than for the purposes for which it was originally prepared.

14 RECOMMENDATIONS / CONCLUSIONS

- The site under consideration is located in Flood Zone 1 according to the Indicative Floodplain Map on the GOV.UK website, as such in Flood Risk terms, the proposed development is appropriate for the site.
- Residential Development is classified as “More Vulnerable” and is appropriate under the National Planning Policy Framework on this site in terms of Flood Risk in flood zone 1.
- It is recommended that finished floor levels are set at a minimum of 150mm above the lowest proposed ground level.
- Flood Routing paths are to be maintained on site by ensuring levels allow flows to move through the site without affecting properties.
- Surface water flows generated from the site should discharge to the existing public sewer located to the south of the site in Chapel Lane.
- Foul water flows generated from the site should discharge to the existing public sewer located to the south of the site in Chapel Lane.

APPENDIX A

Site Development Proposals

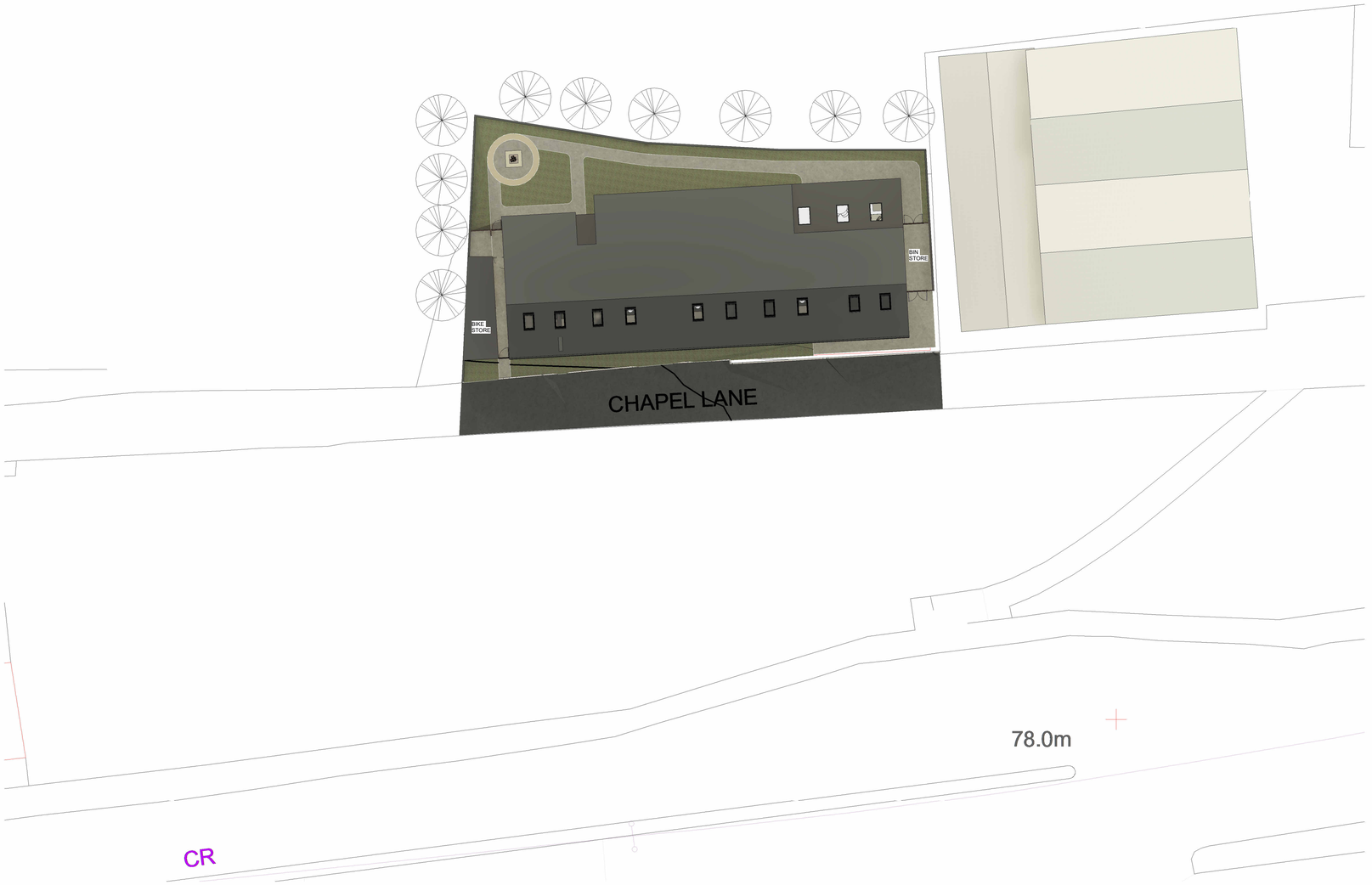
Only figured dimensions should be used.

Scaled dimensions should be checked with the Architect.
This drawing together with the design, is the property and copyright of the Architect and must not be reproduced without written permission

N

0 4 8 12 16 20

GRAPHIC SCALE: 1:200



1 PROP. SITE PLAN
1 : 200

rev	description	drwn	auth	date
A	Amended bike store and bin store areas. . Added new entrance to the building off the bike store elevation.	AO	JC	01.04.25

DO NOT SCALE OFF THIS DRAWING

ACUMEN
Designers & Architects
acumenarchitects.co.uk 01484 546 000
Headrow House, Old Leeds Road, Huddersfield, Huddersfield HD1 1SG

Client: SKYLINE LTD

Project: LAND AT CHAPEL LANE, MOLDGREEN, HUDDERSFIELD

Project No	Drawing No	Rev
2917	(100)03	A

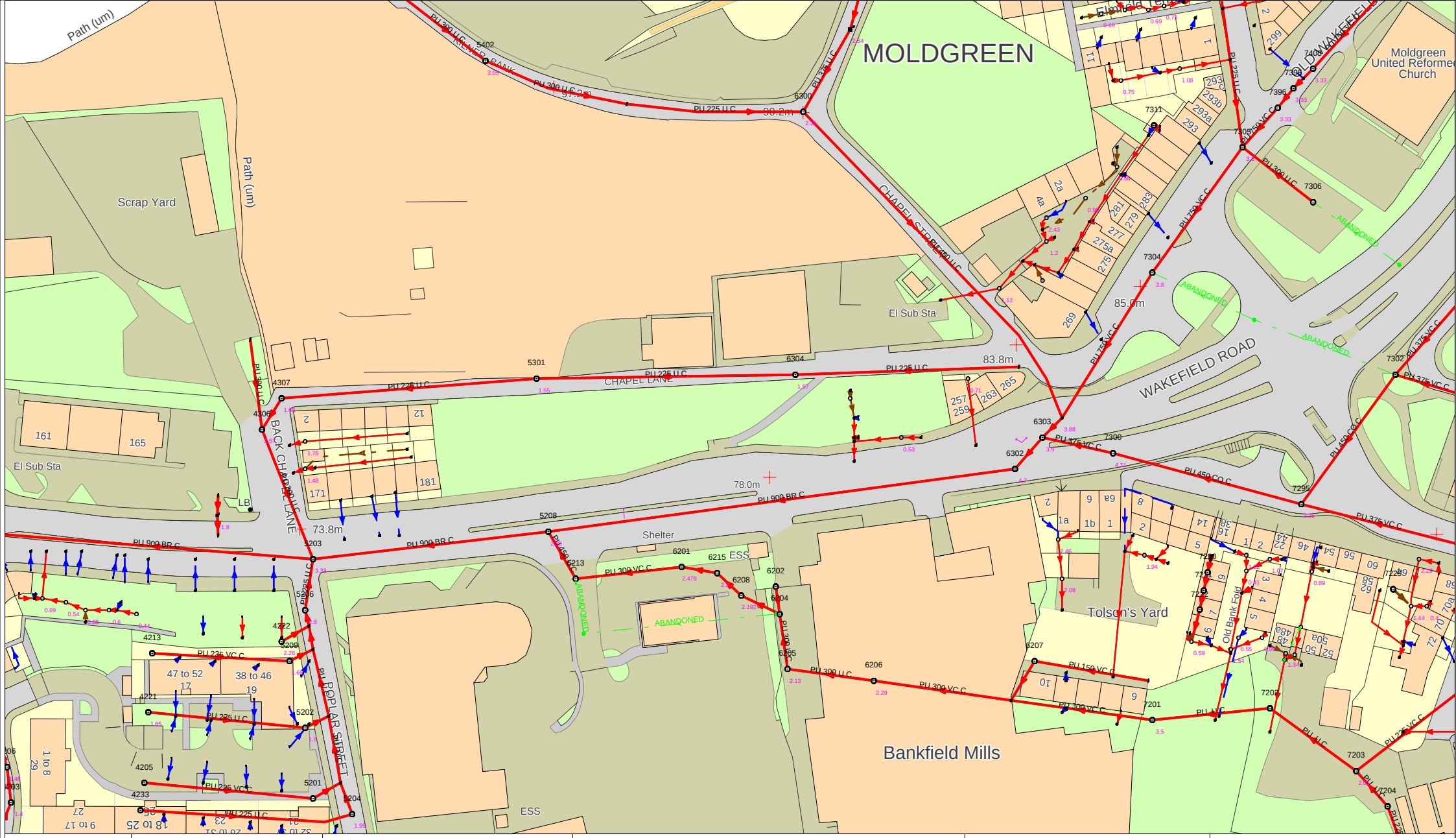
Description: PROPOSED SITE PLAN

Scale	Date Drawn	Drawn By	Authorised By
1 : 200 @ A1	FEB 25	HB	JC

Purpose of Issue
Planning ● Building Regs ○ Tender ○ Construction ○ Comment ○ Info ○

APPENDIX B

Yorkshire Water Sewer Records



415538 : 416271	Map Name : SE1516SW	Title	Partial Key Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS
Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : G Mullaney Contact Tel :		Notes (Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2024. All rights reserved Ordnance Survey Licence number AC0000813445	This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.
			Date Req : 16/04/2025, 15:47:32 Source : Sewer Network Enquiry
			Date Gen : 16/04/2025, 15:49:58

UPN: Undefined Originator: G Mullaney, ,

APPENDIX C

Proposed Impermeable Areas and Drainage Strategy

OS GRID REFERENCE
415599, 416336

Any existing live services will require diverting to accommodate future development if any present.

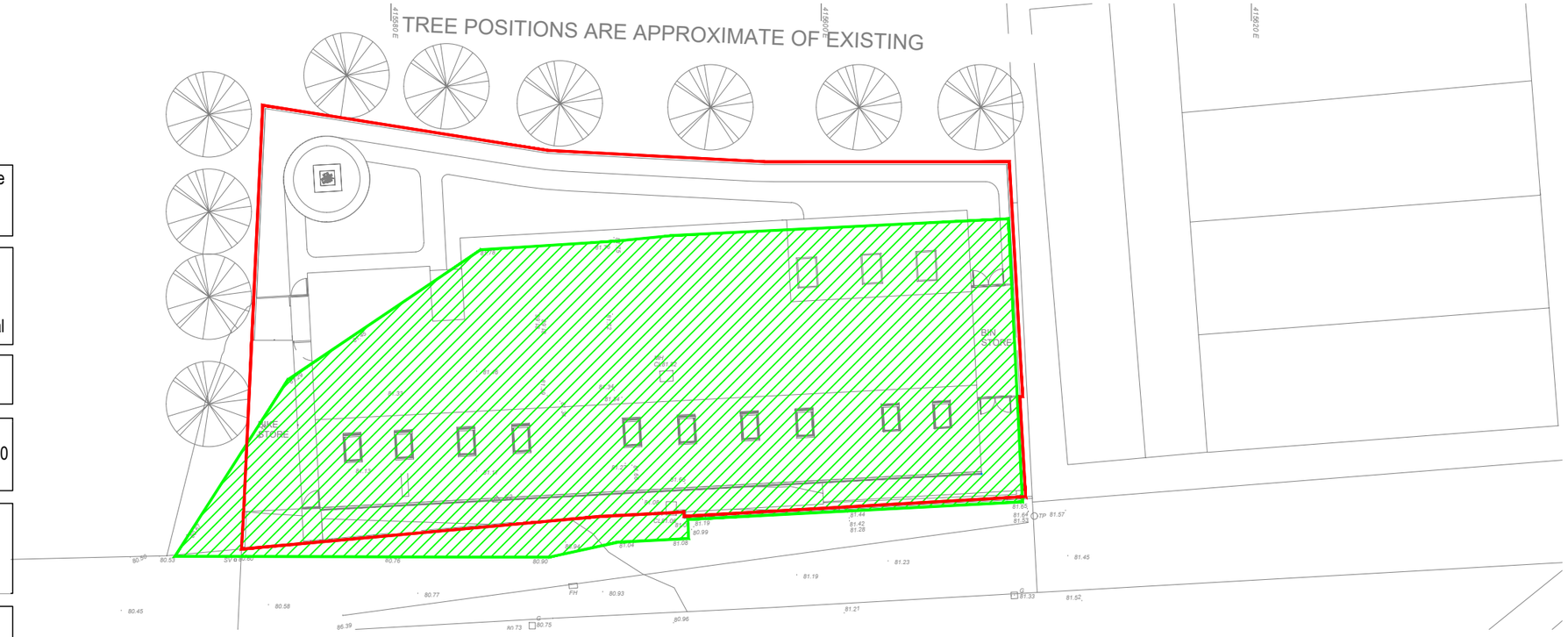
Surface Water drainage proposals are based on greenfield runoff rate. Discharge rate and point of connection subject to LLFA approval

External Levels and falls subject to detailed design.

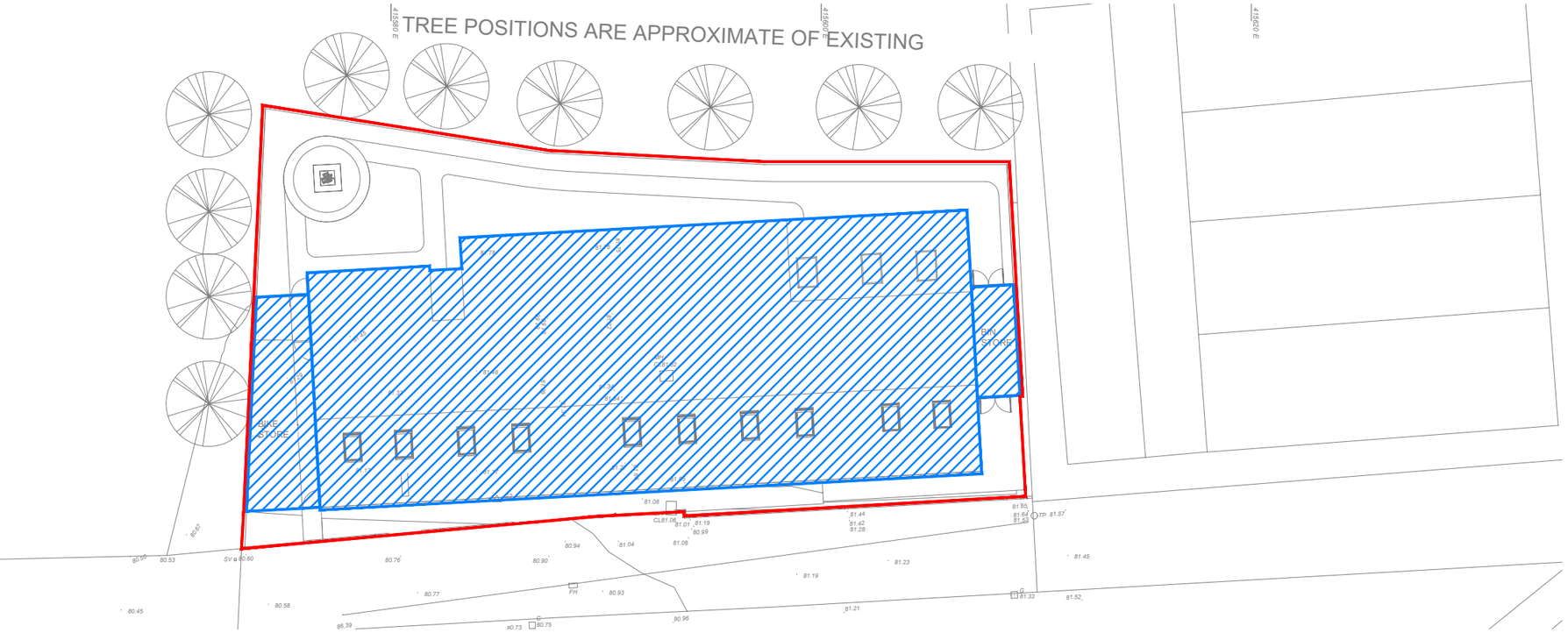
All manholes located in trafficked areas to be PCC with minimum D400 covers.

TOPOGRAPHIC SURVEY INFORMATION TAKEN FROM VISIONGEOMATICS DRAWING **MC_67_SP** DATED 11.07.2024.

DRAWINGS BASED ON ACUMEN DRAWINGS PACKAGE **P2917-(100)03 Rev A** DATED 01/04/2025.



Existing Impermeable Areas



Proposed Impermeable Areas

Notes-

All dimensions are in millimetres unless noted otherwise

DO NOT SCALE THIS DRAWING - IF IN DOUBT ASK

1. All dimensions & levels to be checked by the contractor prior to commencement of work, any discrepancy shall be reported immediately to Avie Consulting Ltd
2. All work shall be carried out in accordance with Local Authority, statutory authority, health & safety requirements and regulations.
3. The drawings shall be read in accordance with all other contract documents relevant at that time of issue and during the period of the contract.
4. The contractor must ensure the overall stability of the works is adequate at all stages of the construction.
5. No allowance has been made for cutouts, holes, notches, etc. for services. All of these are to be agreed prior to the start of the works.
6. RWP locations are illustrative in the absence of a detailed roof drainage design.
7. Soil stack locations are indicative only and subject to detailed design.

Impermeable Areas

- SITE BOUNDARY
- EXISTING 460.384m2 - (0.046ha)
- PROPOSED 408.080m2 - (0.040ha)

PLANNING ISSUE

Rev	Details	By	Chk	Date
P01	Initial issue	S.T.P.	S.A.B.	29.04.2025

AVIE CONSULTING LTD
6 Killingbeck Court,
Killingbeck Office Village,
Killingbeck Drive,
Leeds LS14 6FD.
Tel: 0113 249 7416
www.avie-consulting.co.uk

Client:
ACUMEN

Project:
Land at Chapel Lane, Moldgreen, Huddersfield

Title:
Existing & Proposed Impermeable Areas

Drawn:	Checked:	Date:	Scale:	Original dwg size
S.T.P.	S.A.B.	April 2025	1:250	A3

Drawing Number: P4540-02
Rev: P01

OS GRID REFERENCE
415599, 416336

Any existing live services will require diverting to accommodate future development if any present.

Surface water drainage proposals are based on greenfield runoff rate. Discharge rate and point of connection subject to LLFA approval

External levels and falls subject to detailed design.

All manholes located in trafficked areas to be PCC with minimum D400 covers.

All foundations are to be designed to ensure no loadings are imposed on the drainage structures.

HYDROBRAKE
REF: SHE-0077-3000-1400-3000
DISCHARGE: 3.0 L/s
HEAD: 1.4m
NON-RETURN FLAP VALVE TO BE INSTALLED TO ENSURE COMBINED FLOWS DO NOT ENTER THE SURFACE WATER SYSTEM.

DRAINAGE CCTV SURVEY WAS UNDERTAKEN BY JETAIRE ON 14/03/2025 REF: FJ00401962. REPORT IDENTIFIED A NUMBER OF DEFECTS WITH THE EXISTING 225Ø COMBINED SEWER THAT SHOULD BE JETTED, CLEARED & REPAIRED PRIOR TO CONSTRUCTION.
DEFECTS FOUND:

EX MH C01 DOWNSTREAM
- 8.51m - Fracture
- 21.76m - Crack
- 41.37m - Joint displaced, large.

EX MH C02 UPSTREAM
- 0.19m - Fracture
- 9.83m - Crack
- 14.52 - Settled deposits.

SURFACE WATER

The site is currently an office building and classed as Brownfield. However, in accordance with local planning guidance, Greenfield runoff rates have been calculated and offered to restrict the Surface Water discharge from site.

The existing site area is 460.384m^2 (0.041ha) this provides the following greenfield runoff rates in accordance with 'HR Wallingford Greenfield Runoff Estimation'

- 1 in 1 year = 0.22 l/s
- 1 in 30 year = 0.44 l/s
- 1 in 100 year = 0.53 l/s

It is proposed that the discharge rate is to be restricted to 3 l/s in order to limit the discharge as close to the 1 in 1 year without creating a significant blockage risk due to the orifice size required.

In accordance with the requirement H3 of the Building Regulations 2010, the preferred hierarchy for surface water disposal should be followed. Due to the size of the development and limited open space, it is not possible to achieve a 5m offset from any structure for any possible infiltration. As a result of this, soakaway testing has not been carried out on site.

The closest culverted watercourse is located approximately 50m to the south. However, this is on the opposite side of the A629 and is deemed unfeasible to drain to due to the amount of excavation needed.

There is currently a 225mm diameter combined sewer adopted by Yorkshire Water running along the southern boundary of the site within Chapel Lane. At present, the current building drains to this sewer. It is proposed to discharge both Surface and Foul water flows to this sewer.

Surface Water storage has been sized to accommodate a 1 in 100-year storm event + 40-year climate change. Due to the limited amount of open space on site, it is proposed that the attenuation is achieved through the inclusion of oversized pipes within the system.

TOPOGRAPHIC SURVEY INFORMATION TAKEN FROM VISIONGEOMATICS DRAWING **MC_67_SP** DATED 11.07.2024.

DRAWINGS BASED ON ACUMEN DRAWINGS PACKAGE **P2917-(100)03 Rev A** DATED 01/04/2025.

Notes-

All dimensions are in millimetres unless noted otherwise

DO NOT SCALE THIS DRAWING - IF IN DOUBT ASK

1. All dimensions & levels to be checked by the contractor prior to commencement of work, any discrepancy shall be reported immediately to Avie Consulting Ltd
2. All work shall be carried out in accordance with Local Authority, statutory authority, health & safety requirements and regulations.
3. The drawings shall be read in accordance with all other contract documents relevant at that time of issue and during the period of the contract.
4. The contractor must ensure the overall stability of the works is adequate at all stages of the construction.
5. No allowance has been made for cutouts, holes, notches, etc. for services. All of these are to be agreed prior to the start of the works.
6. RWP locations are illustrative in the absence of a detailed roof drainage design.
7. Soil stack locations are indicative only and subject to detailed design.

DRAINAGE KEY-

- SITE BOUNDARY
- XXX.XXX — PROPOSED GROUND FLOOR SLAB LEVELS
- EXISTING 225Ø COMBINED YORKSHIRE WATER SEWER
- PROPOSED SURFACE WATER DRAIN / MANHOLE
- PROPOSED FOUL WATER DRAIN / MANHOLE
- EXISTING COMBINED DRAIN TO BE ABANDONED
- DC — PROPOSED DRAINAGE CHANNEL
- G — TRAPPED POLYPROPYLENE FOUL GULLY (CONNECTION PIPE 110Ø)
- SOIL PIPE (CONNECTION PIPE 110Ø). NOTE: HEAD OF ALL FOUL RUNS TO BE VENTED.
- RAIN WATER PIPE (CONNECTION PIPE 110Ø)

PLANNING ISSUE

Rev	Details	By	Chk	Date
P01	Initial issue	S.T.P.	S.A.B.	29.04.2025

AVIE CONSULTING LTD
6 Killingbeck Court,
Killingbeck Office Village,
Killingbeck Drive,
Leeds LS14 6FD.
Tel: 0113 249 7416
www.avie-consulting.co.uk

Client: ACUMEN

Project: Land at Chapel Lane, Moldgreen, Huddersfield

Title: Proposed Drainage Strategy

Drawn:	Checked:	Date:	Scale:	Original dwg size:
S.T.P.	S.A.B.	April 2025	1:250	A3

Drawing Number: P4540-01 Rev: P01

APPENDIX D

Surface Water Drainage Calculations

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

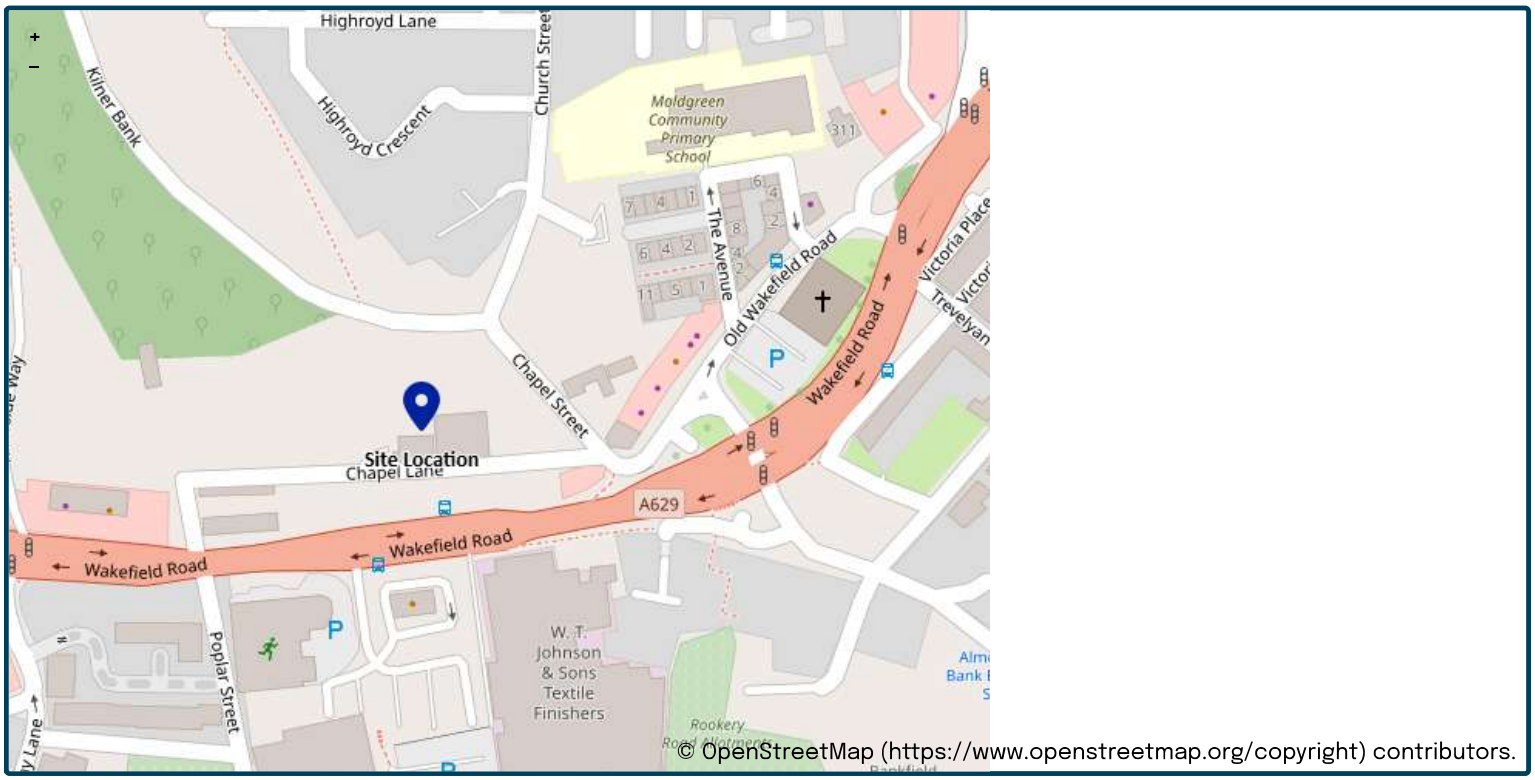
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	28/04/2025
Calculated by	S Plunkett
Reference	P4540 - Chapel Lane, Moldgreen
Model version	2.0.0

Location

Site name	P4540 - Chapel Lane, Moldgreen
Site location	Huddersfield



Site easting	415603
Site northing	416332

Site details

Total site area (ha)	0.041 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	865 mm		865
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	0.25 l/s		

Growth curve factors

	My value		Map value
Hydrological region	3		3
1 year growth factor	0.86		
2 year growth factor	0.94		
10 year growth factor	1.45		
30 year growth factor	1.75		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

Method	IH124
Flow rate 1 year (l/s)	0.22 l/s
Flow rate 2 year (l/s)	0.24 l/s
Flow rate 10 years (l/s)	0.37 l/s
Flow rate 30 years (l/s)	0.44 l/s
Flow rate 100 years (l/s)	0.53 l/s
Flow rate 200 years (l/s)	0.6 l/s

Disclaimer

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.325	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE1	0.020	5.00	81.650	600	415606.371	416341.804	0.450
MH1	0.004	5.00	81.000	600	415575.590	416340.119	0.600
MH2	0.013	5.00	81.000	900	415608.141	416328.312	1.050
MH3	0.003	5.00	81.000	1200	415575.878	416326.535	1.670
OUTFALL			80.900		415575.950	416324.328	1.778

Links

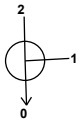
Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	RE1	MH1	30.827	0.600	81.200	80.400	0.800	38.5	150	5.32	50.0
1.001	MH1	MH3	13.587	0.600	80.400	80.250	0.150	90.6	150	5.53	50.0
2.000	MH2	MH3	32.312	0.600	79.950	79.330	0.620	52.1	450	5.19	50.0
1.002	MH3	OUTFALL	2.208	0.600	79.330	79.122	0.208	10.6	150	5.54	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.626	28.7	3.8	0.300	0.450	0.020	0.0	37	1.129
1.001	1.056	18.7	4.6	0.450	0.600	0.024	0.0	51	0.876
2.000	2.821	448.6	2.5	0.600	1.220	0.013	0.0	23	0.764
1.002	3.110	55.0	7.6	1.520	1.628	0.040	0.0	38	2.201

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE1	415606.371	416341.804	81.650	0.450	600				
						0	1.000	81.200	150
MH1	415575.590	416340.119	81.000	0.600	600	1	1.000	80.400	150
									
						0	1.001	80.400	150
MH2	415608.141	416328.312	81.000	1.050	900				
						0	2.000	79.950	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
MH3	415575.878	416326.535	81.000	1.670	1200		1	2.000	79.330	450
							2	1.001	80.250	150
							0	1.002	79.330	150
OUTFALL	415575.950	416324.328	80.900	1.778			1	1.002	79.122	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	19.000	Drain Down Time (mins)	720
Ratio-R	0.325	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	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 %)
1	0	0	0
30	0	0	0
100	40	0	0

Node MH3 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	79.330	Product Number	CTL-SHE-0077-3000-1400-3000
Design Depth (m)	1.400	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE1	10	81.230	0.030	2.5	0.0084	0.0000	OK
15 minute winter	MH1	11	80.441	0.041	2.9	0.0116	0.0000	OK
15 minute winter	MH2	10	79.969	0.019	1.6	0.0124	0.0000	OK
15 minute winter	MH3	14	79.493	0.163	4.8	0.1843	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	79.122	0.000	2.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE1	1.000	MH1	2.4	0.787	0.085	0.0969	
15 minute winter	MH1	1.001	MH3	2.9	0.758	0.155	0.0519	
15 minute winter	MH2	2.000	MH3	1.5	0.386	0.003	0.8595	
15 minute winter	MH3	Hydro-Brake®	OUTFALL	2.5				2.3

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE1	10	81.247	0.047	6.1	0.0132	0.0000	OK
15 minute winter	MH1	11	80.467	0.067	7.2	0.0191	0.0000	OK
30 minute winter	MH2	27	79.981	0.031	3.2	0.0199	0.0000	OK
30 minute winter	MH3	27	79.978	0.648	9.8	0.7332	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	79.122	0.000	2.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE1	1.000	MH1	6.0	0.990	0.210	0.1889	
15 minute winter	MH1	1.001	MH3	7.2	0.963	0.383	0.1010	
30 minute winter	MH2	2.000	MH3	3.2	0.335	0.007	2.6365	
30 minute winter	MH3	Hydro-Brake®	OUTFALL	2.7				7.6

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE1	10	81.264	0.064	11.1	0.0182	0.0000	OK
60 minute winter	MH1	48	80.778	0.378	7.4	0.1069	0.0000	FLOOD RISK
60 minute winter	MH2	48	80.779	0.829	10.8	0.5274	0.0000	FLOOD RISK
60 minute winter	MH3	48	80.772	1.442	11.4	1.6314	0.0000	FLOOD RISK
15 minute summer	OUTFALL	1	79.122	0.000	2.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE1	1.000	MH1	11.0	1.137	0.382	0.2979	
60 minute winter	MH1	1.001	MH3	7.4	0.970	0.396	0.2392	
60 minute winter	MH2	2.000	MH3	-6.9	0.394	-0.015	5.1196	
60 minute winter	MH3	Hydro-Brake®	OUTFALL	3.0				18.1