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Flood Risk Assessment and Drainage Strategy

Land to the North of

Upper Hoyland Road

Hoyland

Barnsley

S74 9EP

Project Number:	**19317**
Report Reference (Revision):	**REP01 (A)**
Client	AAA Property Group
Date:	October 2021

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Appendices

Revision	Date	Author	Checked by;	Comments
A	01/10/21	C McLean & S Reid	P Dixon	

1.0 INTRODUCTION

This Site-Specific Flood Risk Assessment (FRA) has been prepared to accompany a planning application for the construction of a new residential development on an existing greenfield site.

The assessment investigates the potential flood risk impacts of the proposed development in accordance with the National Policy Planning Framework (NPPF) and supporting Planning Practice Guidance.

This FRA is considered proportionate to the degree of flood risk and to the scale, nature and location of the development. This FRA has been prepared in accordance with Environment Agency Report SC030219 Rainfall Runoff Management for Developments, published October 2013, and considers the potential impacts of climate change over the lifetime of the development.

2.0 REFERENCES & STANDARDS

2.1 This Flood Risk Assessment has been carried out generally in accordance with:

- National Planning Policy Framework (Feb 2019)
- Planning Practice Guidance: Flood Risk and Coastal Change (2014)
- BS8533:2011 “Assessing and managing flood risk in development, Code of Practice”
- CIRIA Report 753 “The SUDS Manual” 2015
- Environment Agency Report SC030219 Rainfall Runoff Management for Developments

3.0 THE SITE

3.1 The site is located off both Upper Hoyland Road and Dearne Valley Parkway, in Hoyland

3.2 Historically the site appears to have been occupied by the Leeds Reformatory School and Adel Beck Secure Children's Home. The Children's Home appears to have been demolished sometime between 2013 and 2015. The site is currently occupied by the former School buildings with the extended grounds covered with grasses, vegetation, and mature trees.

3.3 The site is bounded by residential properties to the south and west, the Dearne Valley Parkway to the north and Euramax Solutions Ltd. to the east.

3.4 The approximate grid reference of the site is E436363, N.

3.5 Figure 1 shows the site location.

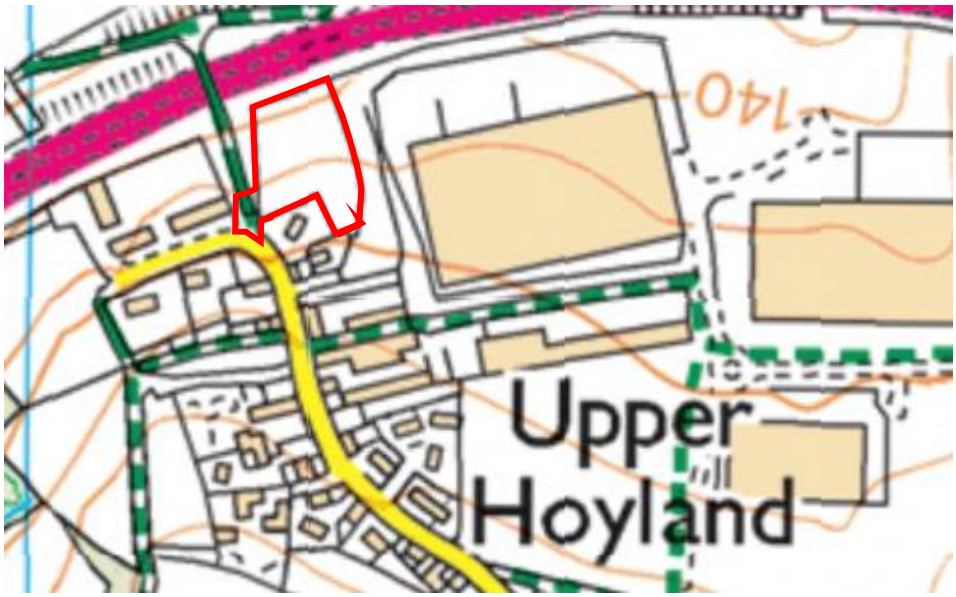


Figure 1: Site Location Plan

4.0 FLOOD RISK VULNERABILITY

The Flood Risk Vulnerability Classification has been determined in accordance with Planning Practice Guidance, Flood Risk and Coastal Change. The Flood Risk Vulnerability Classification is 'More Vulnerable'. This classification includes *buildings used for dwelling houses*.

5.0 FLOOD ZONE COMPATIBILITY

The Flood Zone Compatibility has been reviewed in accordance with Planning Practice Guidance, Flood Risk and Coastal Change, paragraph 067 - Table 3.

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 †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

Key:

✓ Development is appropriate

X Development should not be permitted

Table 1: Flood Risk Vulnerability and Flood Zone Compatibility

The site is located within Flood Zone 1. The vulnerability classification is 'More Vulnerable'.

In accordance with the above table, the proposed development is appropriate without an exception test.

6.0 SOURCES OF FLOODING AND FLOOD RISK

Flooding from Rivers (Fluvial flooding)

6.1 The most recent flood data has been obtained from the Environment Agency to develop a relevant analysis of the site location.

6.2 Fluvial flooding occurs when high flows exceed the capacity of the river channel and spill out onto the floodplain, usually after a period of prolonged or heavy rainfall.

6.3 The site is located within Flood Zone 1 which comprises land assessed as having less than a 1 in 1000 annual probability of river flooding.

6.4 The Environment Agency Flood Map for planning (fluvial flooding rivers) is shown in Figure 2. Flooding from rivers is considered as a 'Very Low' risk.

Figure 2: Flooding from rivers

Flooding from Land (Pluvial Flooding)

6.5 This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm.

6.6 The Environment Agency Flood Map showing Risk of Flooding from Surface Water is shown in Figure 3.

6.7 The map is not definitive and is based on the best information available to the Environment Agency, such as ground levels and drainage.

6.8 The map indicates that the site generally has a 'low' chance of flooding from surface water. This area has a chance of flooding of below 1 in 1000 (0.1%). The map indicates a low-risk flow path running across the northeast corner of the site and along the west boundary. This will be managed by the design of levels to ensure that the path of the flood water can be maintained but directed around the proposed properties and incorporated within acoustic defence barriers.

6.9 The finished floor levels of the proposed buildings will be set higher than the surrounding land and the ground will be designed to fall away from any proposed buildings.

6.10 The proposed development will not alter the flood routes or topography of the site.

6.11 Flooding from land is therefore considered a 'low' risk.

Figure 3: Flooding from land

Flooding from Groundwater

6.12 Groundwater flooding occurs when water levels in the ground rise above surface levels, and is more likely to occur in low lying areas.

6.13 The finished floor levels of the proposed buildings will be set higher than the surrounding land, roads and parking areas, and the ground will be designed to fall away from any proposed buildings.

6.14 Flooding from ground water is considered very low risk.

Flooding from Sewers

6.15 Flooding due to lack of capacity of the public sewerage system in the event of heavy rain also needs to be considered. Any surcharge from the existing or proposed drainage network will follow the same path as existing overland flow routes. The drainage from the site will likely be pumped, therefore the management of flood water in the event of loss of power to the pumps will need to be considered. Levels around the pump station will be managed in order to direct water away from properties on the site and neighbouring properties.

6.16 All existing sewer connections are to be unaltered.

6.17 Flooding from sewers is therefore considered low risk.

Flooding from Reservoirs

6.18 The Environment Agency flood map, Figure 4, shows that the site is outside the area of maximum extent of flooding from reservoirs.

6.19 Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925.

6.20 All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out.

6.21 Reservoirs are inspected in accordance with the Reservoirs Act 1975; it is not pragmatic to design developments to deal with the results of a reservoir failing due to how unlikely it is to occur and the extent of the resulting flooding.

6.22 However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning.

6.23 The shading illustrates that the site is not located within an area that would be affected by reservoir failure.

6.24 Flooding from reservoirs is considered a ‘very low’ risk.

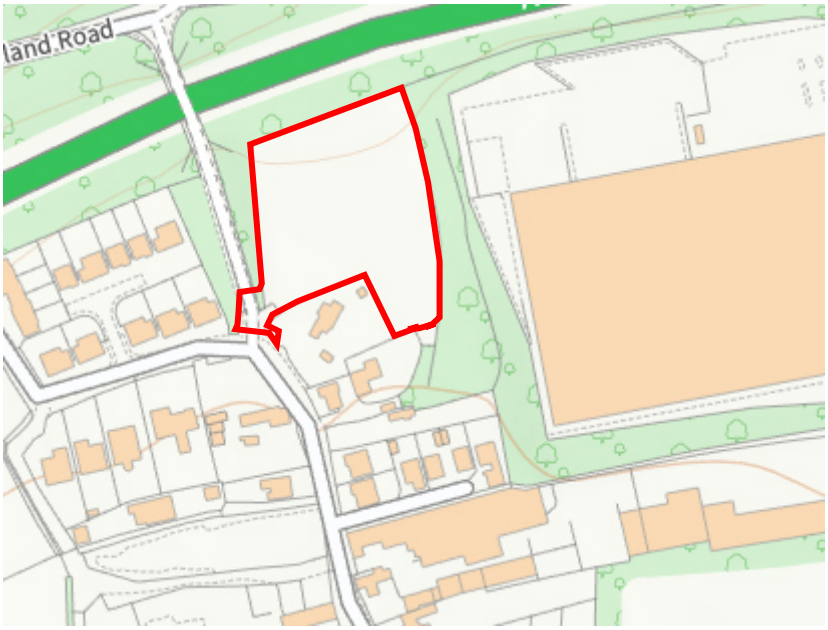


Figure 4: Flooding from reservoirs

7.0 PROPOSED DRAINAGE STRATEGY

Surface water

7.1 In accordance with NPPF, the following hierarchy of surface water drainage options has been considered:

- Discharge into the ground (infiltration);
- Discharge to a surface watercourse;
- Discharge to a surface water sewer;
- Discharge to a combined sewer.

7.2 In accordance with current policy, infiltration has been considered as the preferred method of surface water disposal. Based on local geology it is assumed that the ground conditions are clays overlaying impermeable mudstone. Nearby sites have recorded soakaway rates of around $1.5x10^{-6}$m/s, therefore soakaways are assumed not to be suitable for this site.

7.3 Opportunities for discharge to a surface watercourse has been considered. However, the site is remote from any watercourses.

7.4 There are land drains to the north, these service the dual carriageway and are assumed to be under highways ownership so not suitable for discharge.

7.5 The site is not serviced by a surface water sewer under public or private ownership.

7.6 The site is not directly serviced by a combined sewer, but there is one which can be reached with some new adoptable sewerage installed, including a pumping station.

7.7 The site is a low-risk producer of pollutants as there are no large car parking areas, or industrial or commercial uses on the site. Underground interceptors are not believed to be required and due to the site constraints and levels, swales and green infrastructure has been discounted at this stage of the design.

7.8 Surface water will need to discharge from the site at a minimum practicable discharge rate in line with the greenfield run off rate. OBAR calculations can be found within the appendices.

Foul Water

7.9 Foul water flows will be collected within the site and distributed to a new foul water pump station, designed in accordance with BS EN 752.

7.10 The foul pumps will need to store effluent, potentially with chemical dosing, and then pump at a minimum flow rate of circa 4l/s to the combined sewer via a foul water rising main and foul water gravity sewer as shown on drawing 19317-sk1 within the appendices.

7.11 An indicative layout plan of the proposed drainage solution is given in within the appendices.

8.0 MITIGATION MEASURES

8.1 Drainage apparatus associated with the development should be regularly inspected and cleared where necessary to reduce the risk of blockages and flooding.

8.2 External Surfaces should fall away from any buildings and FFLs should be set a minimum of 150mm above surrounding levels. Overland flow routes will not be affected by the development.

9.0 CONCLUSIONS

Flood Risk Assessment

9.1 The planning application proposes a residential development in Flood Zone 1 and is at a 'very low' risk of fluvial flooding. Flood zone 1 indicates that the site is in land assessed as having a less than 1 in 1,000 annual probability of river flooding (<0.1%).

9.2 The site is in an area which is considered to be at 'low' risk of pluvial flooding. This area has a chance of flooding of below 1 in 1000 (0.1%). The map indicates a low-risk flow path running through the centre of the site, with some ponding of surface water (low risk) likely due to the existing site levels. External surfaces should fall away from any buildings and FFLs should be set a minimum of 150mm above surrounding levels.

9.3 The site is in an area which is considered to be at low risk of flooding if reservoir failure was to occur. Flooding from sewers and groundwater are also low risk.

Drainage Assessment

9.4 Based on local geology the ground conditions are likely to be clay overlying mudstone, these are unlikely to be suitable for soakaways.

9.5 The existing site it greenfield and is not currently serviced by any drainage systems, the new drainage system will be designed taking into account the greenfield run off rate and minimum practicable flow rates.

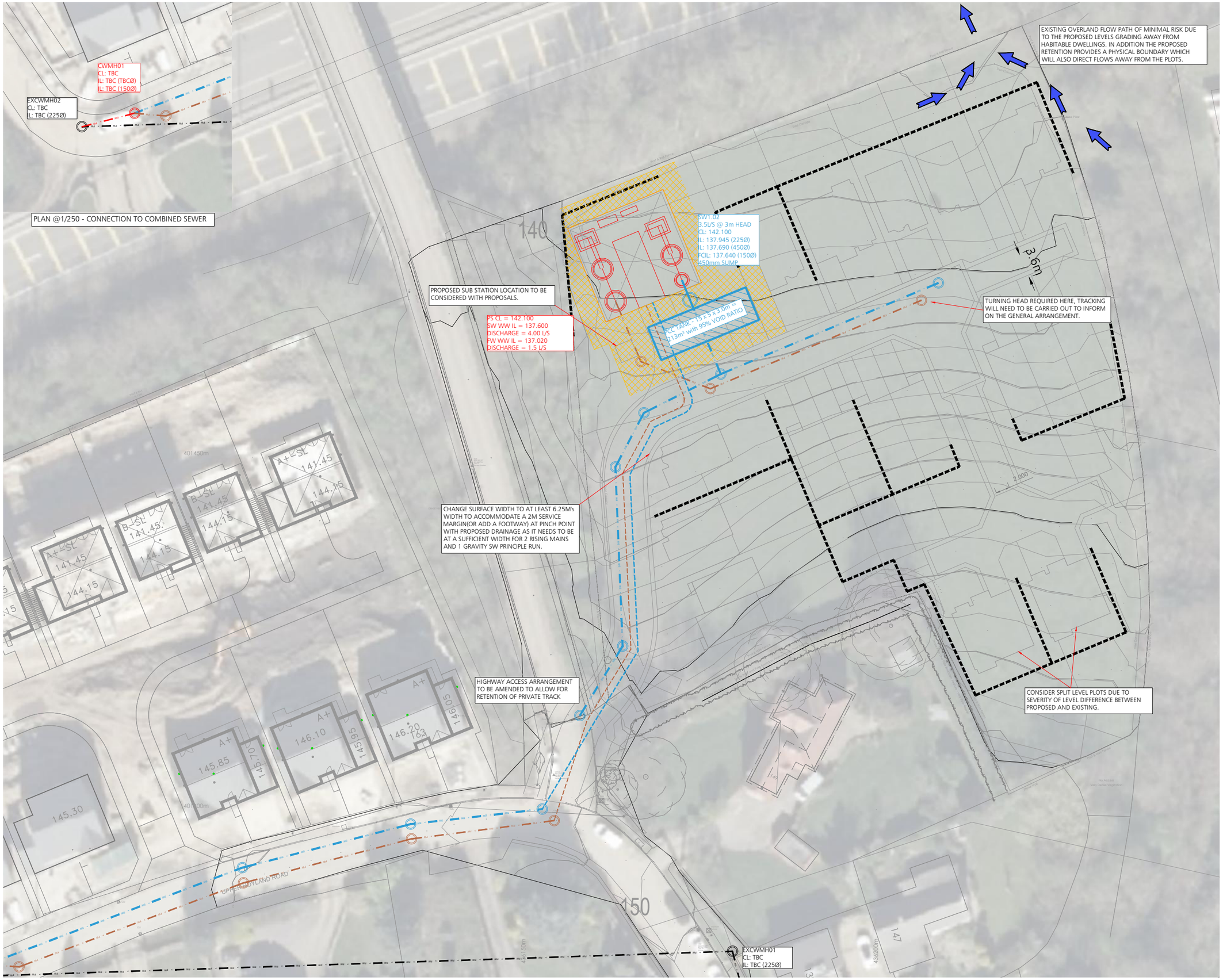
9.6 Attenuation storage will be provided on site for extreme rainfall events for the 1 in 100 year storm event with an allowance of 40% increase due to climate change. Calculations are available in the appendix.

9.7 Foul water flows will be separated from surface water and will be collected by a dedicated foul water system. We propose that foul water is pumped into a near by combined sewer. At the time of writing Yorkshire Water have not yet been approached for approval to discharge.

9.8 Plans and calculations for the proposal are in the appendices.

9.9 This FRA and Drainage Assessment confirms the proposals are suitable for residential use.

Appendix A – Drainage Calculation Pack including Impermeable Area Plan, Drainage Strategy, Hydraulic Modelling



DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

IT IS ASSUMED THAT ALL WORKS WILL BE UNDERTAKEN BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT. IN ADDITION TO THE HAZARDS TYPICALLY ASSOCIATED WITH THE TYPES OF CONSTRUCTION DETAILED ON THIS DRAWING, ANY KNOWN ABNORMAL HAZARDS SPECIFIC TO THIS DRAWING HAVE BEEN IDENTIFIED.

ABNORMAL HAZARD REFERENCE

KEY

- EXISTING CW SEWER
- PROPOSED COMBINED SEWER
- PROPOSED SW SEWER
- PROPOSED FW SEWER
- SW RISING MAIN
- FW RISING MAIN
- SW ATTENUATION TANK
- YW EASEMENT
- RETAINING WALL
- OVERLAND FLOW PATH

Date	Revision	By	Chkd	Ref
14.10.21	PRELIMINARY ISSUE	MDJ	PD	P1

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A1 v.3.0

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Title
FRA DRAINAGE STRATEGY

Scale	Paper	Drawn	Check
1:250	A1	MDJ	PD

Date	Status
OCT 21	PRELIMINARY

Job No.	Drg. No.	Rev.
19317	101	P1

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Project

Hoyland

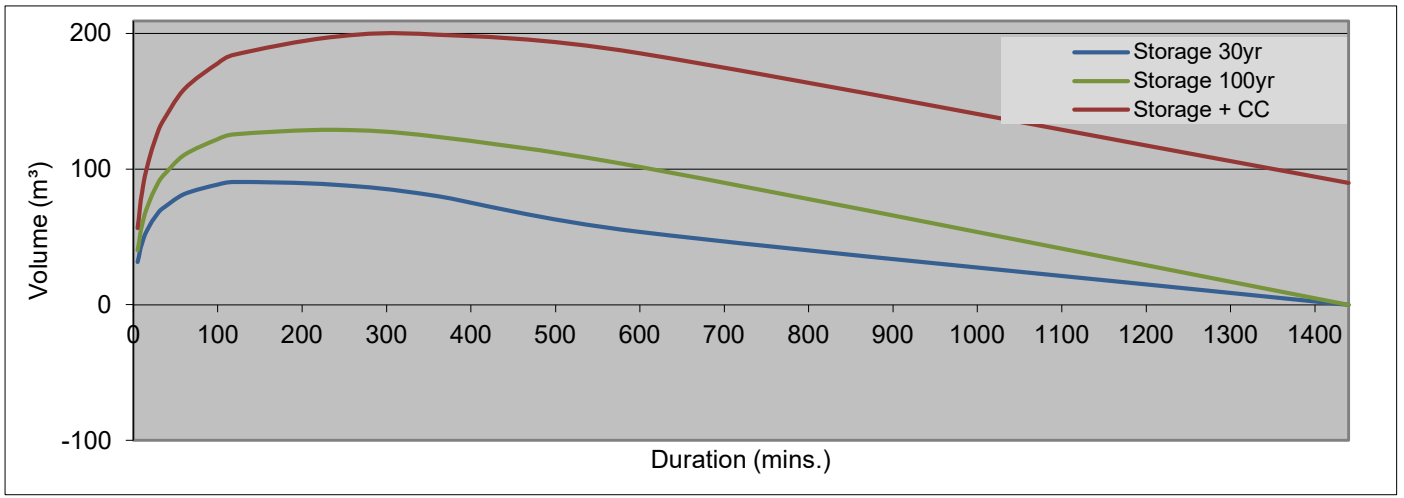
Drainage Storage

Project No.	19317
SHEET No.	C- D01
BY	SDR
DATE	Aug 2021

Drainage Calculations for 1 in 30yr, 1 in 100yr return periods & 1 in 100yr + climate change;
Storage Requirements:

Input Data

M5-60 =	**19mm**	Fig A.1	
r =	**0.4**	Fig A.2	
T =	**30 yr**	C =	**2.78**
T =	**100 yr**		
Max. Allowable Flow =		**3.00l/s**	
Contributing Area =		**3150.0m²**	**3150.0m²**
Flow/Ha =		9.52	l/s/Ha
Percentage Increase =		40%	



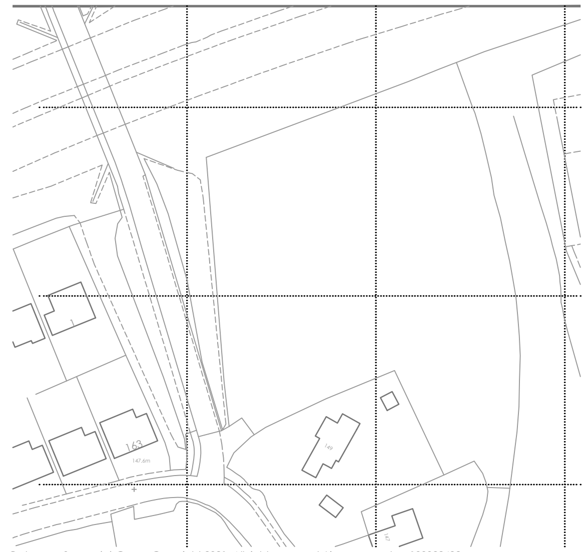
Output Data

Duration	Z1	M5-D (M5-60)*Z1	Z2 30 yr	Z2 100 yr	I (30yr) mm/h	I (100 yr) mm/h	Increased (100yr)	Qp 30 l/s	Qp 100 l/s	Increased l/s	Storage (30yr) m³	Storage (100yr) m³	Storage (+CC) m³
5	0.37	7.1	1.45	1.84	123	156	219	108	137	192	31.5	40.2	56.6
7.5	0.46	8.7	1.47	1.88	102	130	183	90	114	160	39.0	50.0	70.6
10	0.53	10.0	1.49	1.91	90	115	161	79	101	141	45.3	58.6	82.8
12.5	0.58	11.0	1.50	1.93	79	102	142	69	89	125	49.7	64.6	91.3
15	0.63	11.9	1.50	1.94	71	92	129	63	81	113	53.6	69.9	99.0
22	0.72	13.7	1.52	1.97	57	73	103	49	64	90	61.4	80.8	114.8
30	0.81	15.3	1.53	1.99	47	61	85	41	53	75	68.3	90.7	129.2
35	0.85	16.1	1.53	2.00	42	55	77	37	48	67	71.2	94.9	135.4
60	1.00	19.0	1.54	2.02	29	38	54	26	34	47	81.4	110.3	158.8
100	1.16	22.0	1.54	2.02	20	27	37	18	23	33	88.6	122.1	178.1
120	1.22	23.1	1.54	2.02	18	23	33	16	20	29	90.6	125.6	184.5
240	1.44	27.4	1.52	1.99	10	14	19	9	12	17	88.5	128.8	197.6
360	1.60	30.4	1.51	1.97	8	10	14	7	9	12	80.0	123.7	199.1
600	1.81	34.3	1.49	1.94	5	7	9	4	6	8	53.7	101.5	185.4
1440	2.22	42.2	1.46	1.87	3	3	5	2	3	4	0.0	0.0	89.8

Appendix B – Topographical Survey

Location Plan

Scale 1:1000



0 5 10 15 20 25m

SCALE 1:250

Survey Control Co-ordinates

Reference	East	North	Elevation	Description
GPS01	436153.784	401404.906	146.83	Survey Station
H02	436175.639	401381.538	148.19	Survey Station
H03	436142.157	401448.744	145.72	Survey Station
H04	436210.646	401449.388	144.07	Survey Station
H05	436194.801	401438.566	145.01	Survey Station
REF01	436200.498	401429.426	146.80	Survey Station

Site Survey Control & Datum Information

Grid Orientation:

Survey related to Ordnance Survey "OSGB36" at control point GPS01 and the survey data was processed on a plane grid. (No Scale Factor)

Level Datum:

OS Orthometric Hts

Control & Datum Information

Co-ordinates and levels are based upon OSGB 1936 National Grid (OSGB36) and Ordnance Survey Datum Newlyn (ODN).

They are derived using realtime on site GPS survey, that utilises the National Grid Transformation OSTN15GB and the National Geoid Model OSGM15GB.

The data obtained for use in this drawing involved the use of realtime GPS survey and total station survey.

Contours are shown at 0.5m intervals.

Rev	Description	By	Date

Surv.	Drawn	Date	Chkd	Date
NH	NH	19.08.21		

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Title. Site Plan

Site. Upper Hoyland Road
Hoyland
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Sth Yorkshire

COMPUTER GENERATED DRAWING - DO NOT ALTER

Dwg No. AAA_01_Upper Hoyland

Sheet No. 1

SCALE	1/250	REV.	