

Greenhead College

Flood Risk Assessment

Galliford Try

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Executive Summary

Cundall have prepared this Flood Risk Assessment (FRA) as part of the planning submission for the proposed development at Greenhead College, Greenhead Road, Huddersfield.

The development is greater than 1 hectare in size and therefore the planning application must be supported by a site-specific FRA.

This Flood Risk Assessment has been prepared in accordance with the National Planning Policy Framework (NPPF). The proposed development is located in National Flood Zone 1, land classified as having low risk of flooding from rivers or the sea. The site has no record flooding incidents recorded.

The development is acceptable from a flood risk perspective. The vulnerability classification is compatible with the flood zone in accordance with government guidance, and all flood risks have been assessed as low from all sources. The risks considered are tidal, fluvial, artificial drainage, overland/surface water, infrastructure failure and groundwater.

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1.0

Introduction

1.0 Introduction

1.1 Reason for Report and Planning Context

Cundall have prepared this Flood Risk Assessment (FRA) to accompany the planning application for the proposed redevelopment of Greenhead College in Huddersfield.

1.2 Scope of Report

This report has been written to meet the requirements of a site-specific flood risk assessment in accordance with the National Planning Policy Framework (NPPF) and includes the following:

- An appraisal of the availability and adequacy of existing information on flood risk.
- An appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere.

1.3 Existing Site

1.3.1 Site

The site is located within the jurisdiction of Kirklees Council, to the west of Huddersfield centre. The approximate National Grid Reference SE 13735 16738 and the postcode is HD1 4ES. It has an area of approximately 2.5 hectares and slopes generally from the west to east with levels from 132m to 122m shown in the Topographical Survey in Appendix 1. The site is currently in use as Greenhead College, with the main built form at the centre of the site spanning from north to south. To the east there is an additional block and car park, to the west there is sport provision including an all weather pitch and changing facilities. A site location plan can be seen in Figure 1.

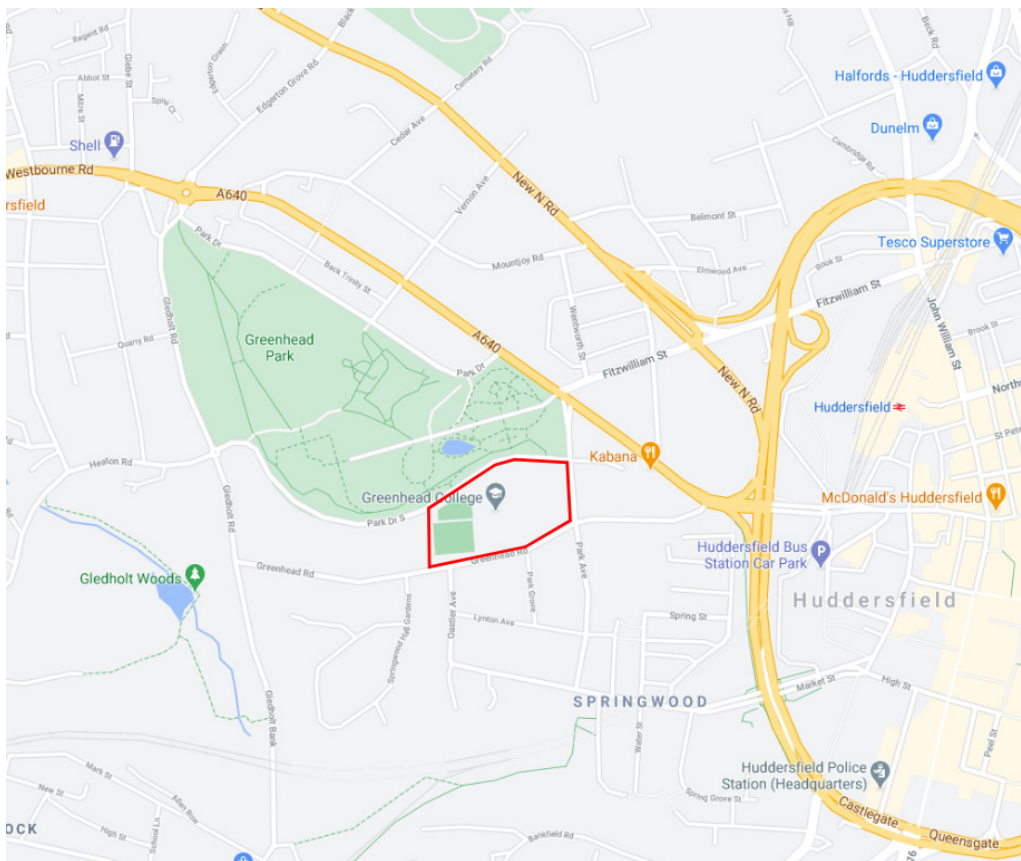


Figure 1: Site location plan (Source: Google Maps)

1.3.2 Surrounding area

The site is bound by streets to the north, east and south and housing to the west. North of the site lies Greenhead Park, which is a large park consisting of open greenery, mature trees and various water features. The other three sides of the site are residential developments. The nearest Main River, according to the Environment Agency Classification, is the River Colne which lies 550m south of the site. The elevation of the river is approximately 50m lower than the site.

1.4 Proposed Development

1.4.1 Development

The proposed development is to demolish part of the existing central building and replace it with new accommodation. The new block is a four-story building located on the existing car park located to the east of the site. At the centre of the development, in place of the demolished building, there will be a small infill building. The development can be seen in Figure 2.

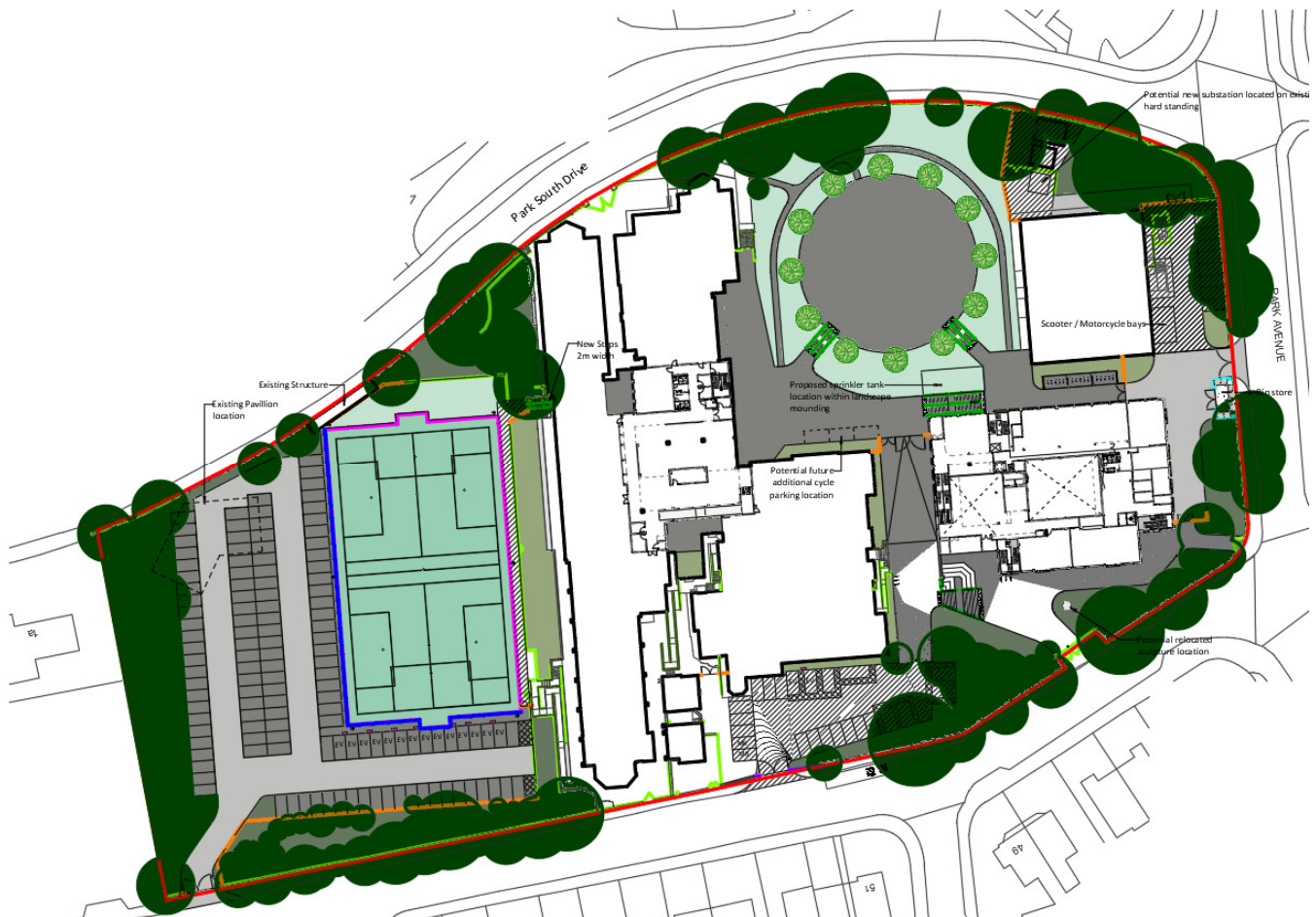


Figure 2: Proposed Development (Source: Oobe Site Plan)

1.4.2 Development Vulnerability Classification

The development lies within National Flood Zone 1 as shown in Figure 3, land with a low probability of flooding (less than 1 in 1000 annual probability of river or sea flooding in any year). Within Table 2 of the Government Guidance – Flood Zone and flood risk tables, the development is deemed 'more vulnerable'. Based on the development proposals having a 'more vulnerable' classification and being located in National Flood Zone 1 land, the proposed development is deemed appropriate and a compatible site based on Table 3 of the Guidance. The Guidance tables can be found in Appendix 2.

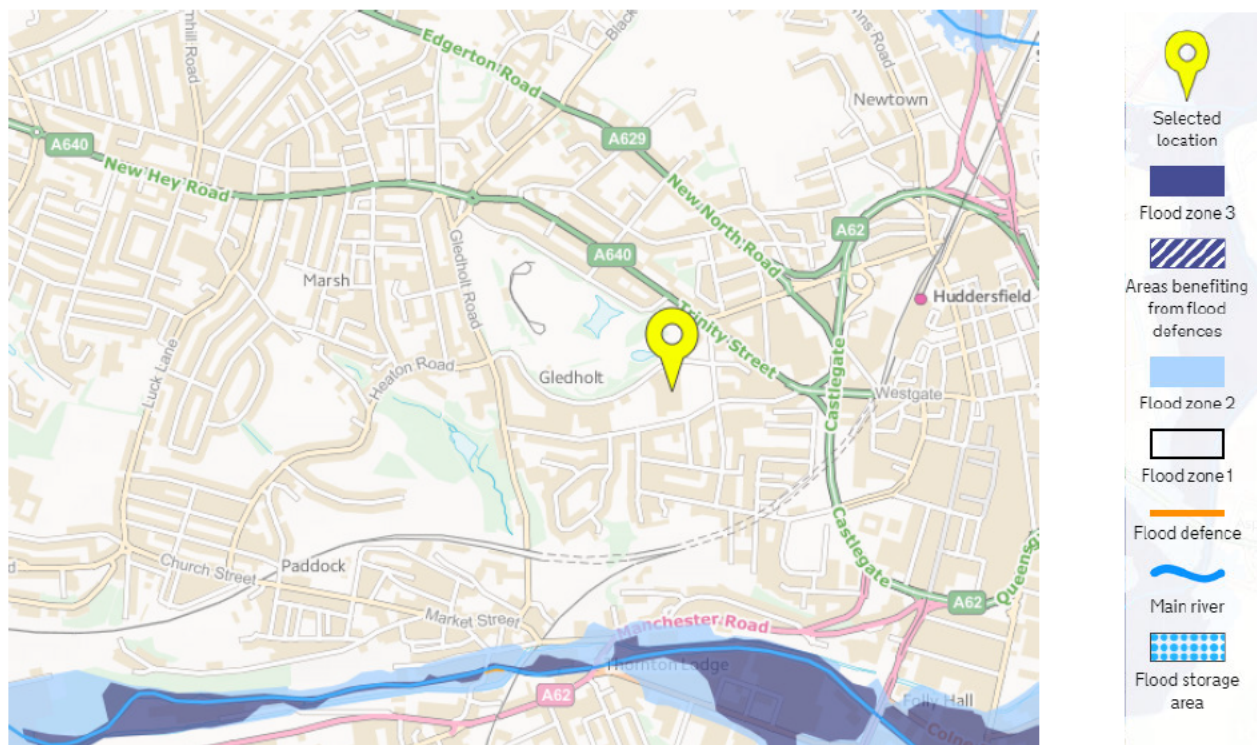


Figure 3: Flood risk to site (Source: flood map for planning)

1.5 Policy and Information Review

1.5.1 Technical Guidance to the National Planning Policy Framework (NPPF)

The Government's National Policy on Development and Flood Risk is covered by the NPPF and its associated Technical Guidance. The principal aim of the NPPF for flood risk is:

"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere".

1.5.2 Leeds City Region Sustainable Drainage Systems Guidance

The councils included in the West Yorkshire Combined Authority produced a joint sustainable drainage system guidance in February 2020 with the goal of encouraging developers to use sustainable drainage techniques. The document has the following findings:

- Brownfield sites need to provide a minimum discharge rate reduction of 30%
- Greenfield discharge rate is to be 5l/s/ha
- An additional allowance for climate change is to be 30%
- No urban creep factor required
- In line with NPPF it must be demonstrate that there will be no flooding in a 1 in 30year storm and the critical storm must be safely retained on site for a 1 in 100year +30% for climate change.

1.5.3 Kirklees Council SFRA

Kirklees Strategic Flood Risk Assessment (Volume I&II Guidance) does not report any cases of historical flooding near the site. The site is also not in a critical drainage area.

1.6 Consultations

1.6.1 Kirklees – Lead Local Flood Authority (LLFA)

At the pre application stage the LLFA gave some comments on an early design of the site. Key points include:

- The site lies in a Flood Zone 1
- No flooding has been recorded in or near the site
- A 30% betterment of the current discharge rate needs to be provided.

1.6.2 Environment Agency

The Environment Agency have not been directly consulted as there was no flood risk identified from relevant sources and discharge is not to watercourse, however their flood maps have been used extensively throughout this report.

1.6.3 Sewerage Undertaker

Cundall have submitted a pre-planning enquiry to Yorkshire Water (YW) regarding the disposal of foul and surface water. Foul water flows are permitted to the 450mm sewer in Greenhead Road. Surface water must be restricted to a reduction of 30% on existing flows and should discharge to similar points of connection as existing. Furthermore, YW have also provided existing sewer records for site review. The pre-planning enquiry response has been included in Appendix 5.

2.0 Flood Risk Identification

2.1 Tidal and Fluvial

2.1.1 Flood risk to the site

The Environment Agency's flood map shown in Figure 3 in Section 1.4.2, indicates the site to be at a low risk (0.1%> of flooding (Zone 1)).

The nearest main river (classified by the EA) is the River Colne located approximately 550m to the south of the development. A smaller unnamed water course is located 350m to the west of the development in Gledholt Woods. It is likely that this is a tributary to the River Colne. Due to the elevation difference between these rivers (75mAOD and 108m AOD estimated from google earth) and the development (125mAOD from topographical survey) these rivers pose no credible flood risk to the site.

As the site is located within Flood Zone 1 land and is not located in close proximity to any area classified as Flood Zone 2 or 3, flood risk is assessed as low.

Assessment of Impact: Low

Assessment of Probability: Low

2.1.2 Flood risk to other areas

The development is not on a fluvial flood flow route and is therefore unlikely to affect flood risk to other areas.

As the development is not located in the floodplain, there will be no loss of flood water storage and therefore there will be no increase in flood risk to other areas.

Assessment of Impact: Low

Assessment of Probability: Low

2.2 Artificial Drainage

2.2.1 Existing Drainage

An initial CCTV survey was undertaken on the 20.10.20. The survey shows that all drainage associated the main building is combined and drainage of the newer Rostron building and changing block are separate foul and surface water networks. At present there are 4 combined sewer connections to the Yorkshire Water network, two in Park Drive South and two in Greenhead Road. Further to this there are two soakaways on-site, one for the Rostron building and the other for the astro-turf pitch. Multiple impermeable areas have no visible positive drainage. The largest of these is the existing car park (where the new building has been proposed) with an area of approximately 0.2ha. There is a suspected overland flow route though the pedestrian entrance at the southeast of the college on to Greenhead Road. The peak overland flow from this area has been estimated at 32l/s using the modified rational method. The CCTV survey plan can be seen in Appendix 4. There are multiple locations in the existing network where manhole cover levels and invert levels do not match the topography and they should be surveyed before works commence on site.

High Pressure Jetting and a further CCTV survey was undertaken on the 08.04.21. This survey found multiple cracks in pipes and high levels of rooting. It is recommended that these runs be or refurbished or diverted as part of the works.

A Microdrainage Model has been created to simulate the existing network (for more information refer to Report NE8659-CCS-ZZ-XX-RT-D-0002 - Drainage Strategy Section 4.3). The model shows a total of 43.4m³ of flooding in the existing system.

Existing YW sewer records have been acquired for the site to assess development impacts on infrastructure and potential connection locations, they can be seen in Appendix 5. YW have advised that surface water must be restricted to a reduction of 30% on existing flows and should discharge to similar points of connection as existing. YW assets are located in Park Drive South, Park Avenue and Greenhead Road.

Assessment of Impact: Medium

Assessment of Probability: Medium

2.2.2 Proposed Drainage

The Proposed Drainage Strategy which accompanies this Flood Risk Assessment provides further detail, refer to report NE8659-CCS-ZZ-XX-RT-D-0002 - Drainage Strategy.

The proposed storm water system has been restricted to 149l/s (30% betterment to existing runoff rate) and discharges to the existing combined sewerage system. In accordance with local and national policies, the development will ensure no flooding for up to and including the 30-year return period and no overland flooding affecting properties onsite or offsite for up to the 100-year return period with a 30% allowance for climate change. Water quality improvements shall be provided via a green roof and permeable pavements. Surface water attenuation shall be provided via permeable paving and a geocellular tank. The proposed system is to alleviate the flood risk of the existing network.

The proposed foul drainage system is designed in accordance with the Design and Construction Guidance for foul and surface water (March 2020). Due to the levels of design and protection in the proposed drainage system, flood risk to the site and to other areas are assessed as low.

Assessment of Impact: Low

Assessment of Probability: Low

2.3 Overland

The Environment Agency's flood risk from surface water flood map, shown in Figure 4, illustrates that the surface water flood risk on site is very low. It has been noted that there is a high flood risk due to overland flooding along Gledholt Road. This poses no realistic risk to the development due to differences in elevation.

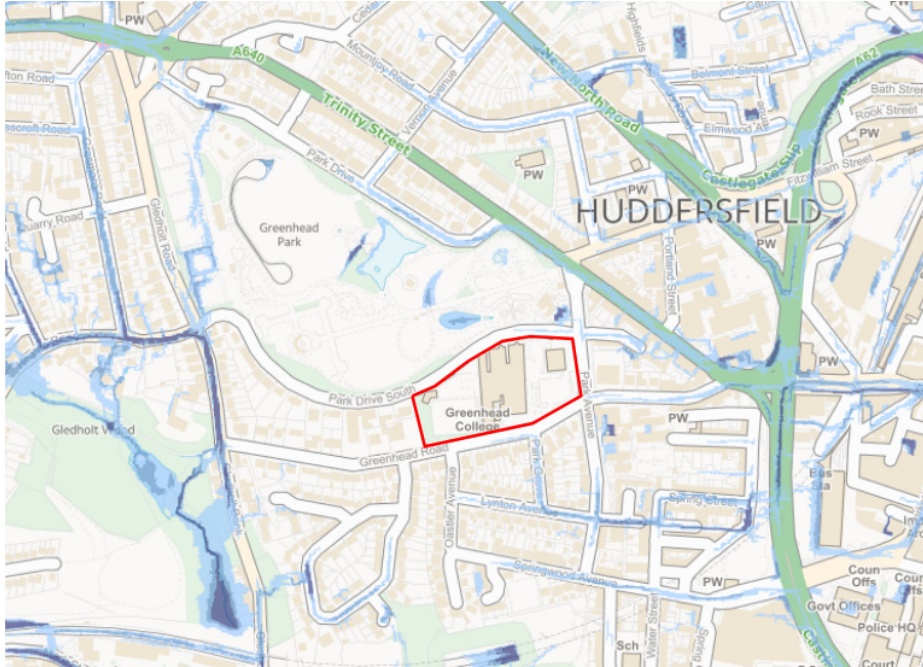


Figure 4: Extent of surface water flooding (Source: Environment Agency long term flood risk)

Assessment of Impact: Low

Assessment of Probability: Low

2.4 Infrastructure Failure

The Environment Agency's flood risk from reservoirs map (Figure 5) shows the development site is not within the maximum extent of flooding indicated in the event of reservoir failure.

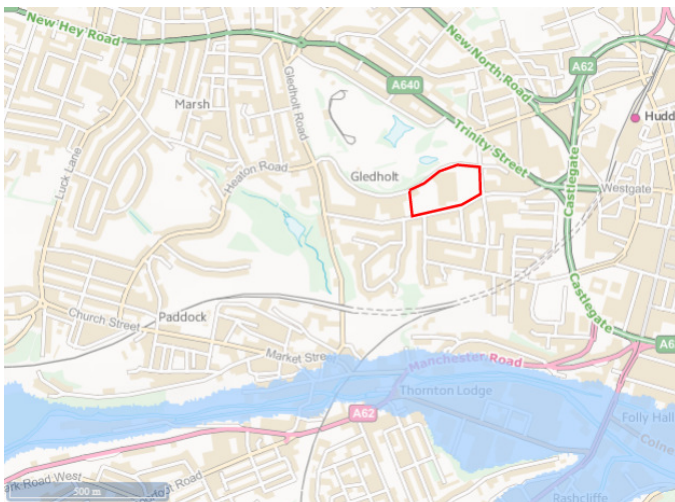


Figure 5: Flood risk from reservoirs (Source: Environment Agency long term flood risk)

Assessment of Impact: Low

Assessment of Probability: Low

2.5 Groundwater

Due to the site topography, and following statements from the relevant policy review, groundwater flooding is not considered a risk. Defra commissioned Jacobs to complete a study in 2004 on location of potential groundwater emergence throughout the UK. There was none located in Huddersfield. Furthermore, Calder Catchment SFRA volume II makes the following key statement:

“Areas Susceptible to Ground Water Flooding

The Environment Agency’s national dataset, Areas Susceptible to Groundwater Flooding (AStGWF), provides the main dataset used to assess the future risk of groundwater flooding. The AStGWF map uses four susceptible categories to show the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring. Figure 3-5 (Figure 6 in this report) illustrates the AStGWF map. It shows that the risk of groundwater emergence is very high in parts of Huddersfield, Meltham, Dewsbury, Mirfield, Ravensthorpe and Kirkburton. There could however be localised problems in other areas, which are not identified on this strategic map. KC has not specified any significant issues associated with groundwater flooding however.”

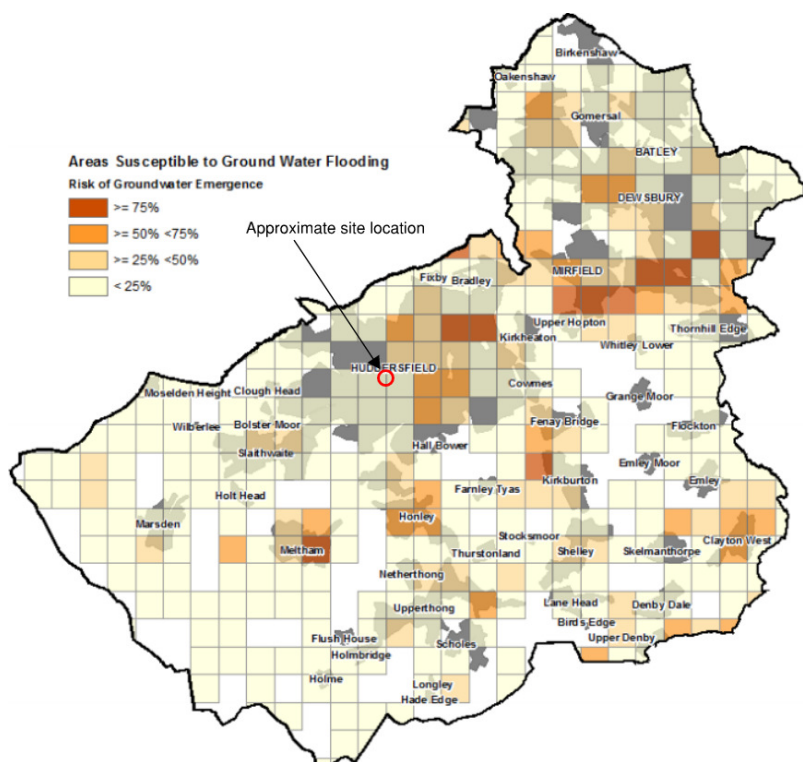


Figure 6: Risk of groundwater emergence (Calder Catchment SFRA Volume II)

Ground Investigation work conducted on site (27th November 2020) did not record any groundwater during borehole drilling activities. The investigation did however encounter groundwater at subsequent monitoring visits between 0.9m-2.5m below groundlevel. The report concludes this is likely to be perched water rather than laterally continuous groundwater body. Borehole data shows that the strata between the groundwater and surface is firm to stiff clay. Therefore, the risk of groundwater emergence is low as the covering strata is impermeable.

Assessment of Impact: Low

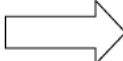
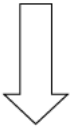
Assessment of Probability: Low

3.0 Flood Risk Analysis and Mitigation

3.1 Risk Assessment Matrix

A summary of the flood risks identified in Section 2 are shown in the table below.

Table 1: Flood Risk Assessment Matrix

RISK ASSESSMENT MATRIX				
	Impact 			
Probability of Event 		Low	Medium	High
	Low	A, C, D, E, F		
	Medium		B	
	High			

Key:

A: Tidal & Fluvial – (Section 2.1)

B: Existing Drainage – (Section 2.2.1)

C: Proposed Drainage - (Section 2.2.2)

D: Overland – (Section 2.3)

E: Infrastructure Failure – (Section 2.4)

F: Groundwater – (Section 2.5)

3.2 Mitigation of Existing Drainage Flood Risk

Flood risk will be reduced by alleviating the strain on the system by introducing surface water attenuation to the proposed system. The proposed drainage Microdrainage model included in report NE8659-CCS-ZZ-XX-RT-D-0001 section 4.3 demonstrates a reduction of flooding of approximately 75% (40m³ to 10m³).

Assessment of Impact Post Mitigation: Medium

Assessment of Probability Post Mitigation: Low

4.0 Sequential and Exception Tests

4.1 Government Flood Risk Assessment Guidance

Based on the proposals having a More Vulnerable classification, according to Table 2 from the Technical Guidance, and being located on National Flood Zone 1 land, the development is deemed as appropriate based on Table 3 from Technical Guidance. Therefore, the Sequential and Exception Tests are not required.

The Flood Risk Vulnerability Tables are shown within Appendix 2.

5.0 Conclusions and Recommendations

All forms of flood risk to and from the proposed development have been considered. These include tidal, fluvial, existing sewers, proposed drainage, overland, infrastructure failure and groundwater and have all been assessed as low risk.

The proposed development is classified as 'more vulnerable' and is in Flood Zone 1, it is therefore compatible in accordance with the NPPF.

All forms of flood risk have been classified as low and the development is considered acceptable from a flood risk perspective.

6.0 Appendices

List of Appendices

1. Topographical Survey
2. NPPF Technical Guidance Tables 2&3
3. Flood Map
4. Existing Drainage Plan
5. Yorkshire Water Sewer Plan

6.1 Appendix 1 - Topographical Survey

416800_N



416750_N

416700_N

416650_N

416850_E

416850_E

416800_E

416800_E

416750_E

416750_E

416700_E

416700_E

SURVEY STATIONS			
Name	Easting	Northing	Height
2S	415793.217	416801.543	122.546
3S	415787.543	416759.838	124.335
4S	413822.335	416695.253	122.129
5S	413760.632	416670.387	125.700
8S	413705.530	416681.824	130.185
9S	413671.599	416736.814	130.918

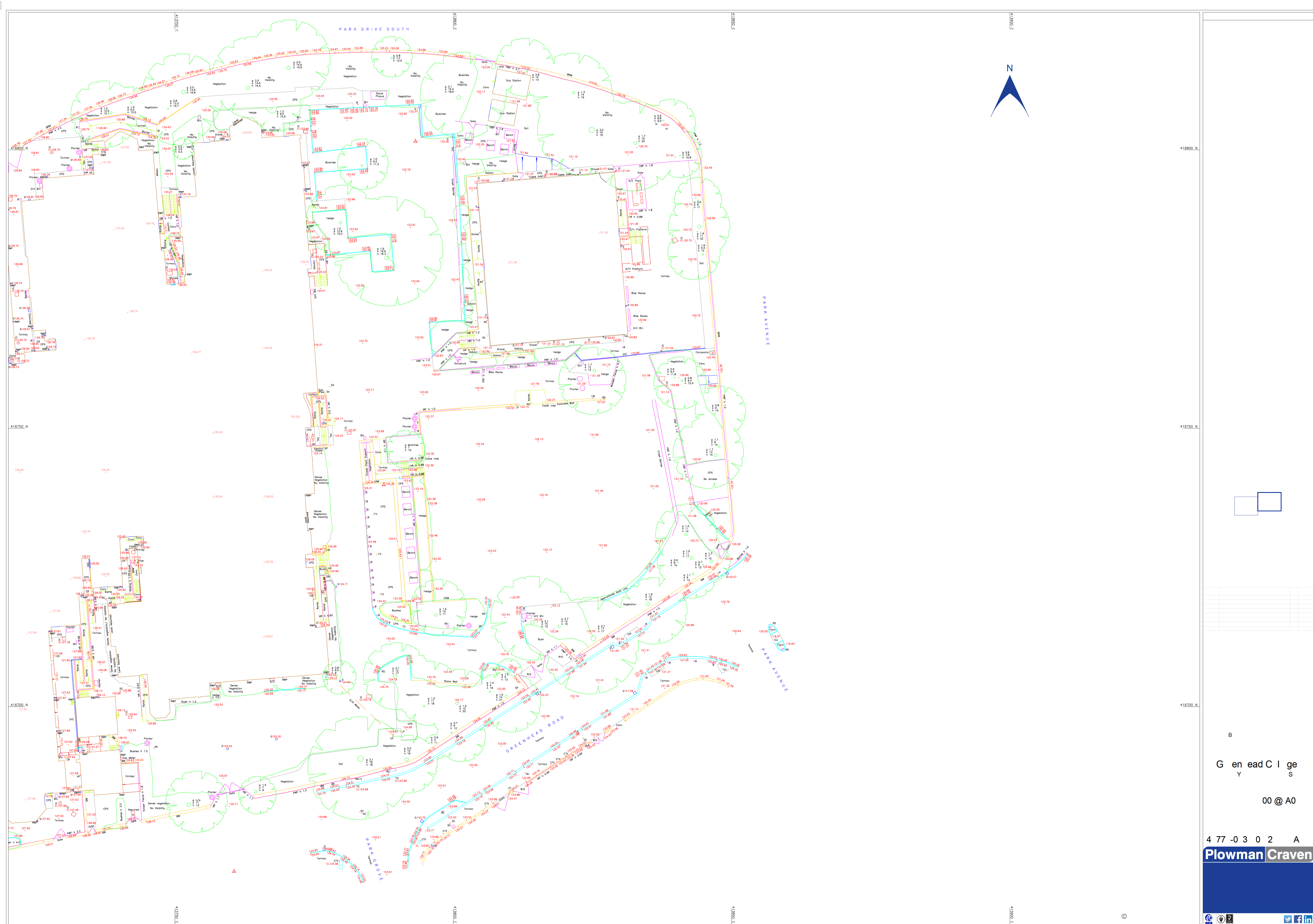
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6.2 Appendix 2 - NPPF Technical Guidance Tables 2&3

Table 2: Flood risk vulnerability classification

Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use³. • Installations requiring hazardous substances consent⁴. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure")⁵.
More vulnerable • Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste⁶. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan</i>.⁷
Less vulnerable • Police, ambulance and fire stations which are <i>not</i> required to be operational during flooding. • Buildings used for shops, financial, professional and other services,

³ For any proposal involving a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site, the Sequential and Exception Tests should be applied.

⁴ See Circular 04/00: *Planning controls for hazardous substances* (paragraph 18) at: www.communities.gov.uk/publications/planningandbuilding/circularplanningcontrols

⁵ In considering any development proposal for such an installation, local planning authorities should have regard to planning policy on pollution in the National Planning Policy Framework.

⁶ For definition, see *Planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10* at

www.communities.gov.uk/publications/planningandbuilding/planningsustainable

⁷ See footnote 3.

restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable", and assembly and leisure.

- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do *not* need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water-compatible development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, *subject to a specific warning and evacuation plan*.

Notes to table 2:

a. This classification is based partly on Department for Environment, Food and Rural Affairs and Environment Agency research on *Flood Risks to People (FD2321/TR2)*⁸ and also on the need of some uses to keep functioning during flooding.

b. Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.

c. The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
 × Development should not be permitted.

Notes to table 3:

This table does not show:

- the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
- flood risk assessment requirements; or
- the policy aims for each flood zone.

6.3 Appendix 3 - Flood Map

Flood map for planning

Your reference
Greenhead Col

Location (easting/northing)
413735/416738

Created
19 Apr 2021 9:47

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

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<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>