



Rochdale Sixth Form College

Flood Risk Assessment

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This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

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Executive Summary

This Flood Risk Assessment (FRA) has been prepared by Waterman Infrastructure and Environment on behalf of Rochdale Sixth Form College in support of a planning application for the erection of temporary classroom accommodation Rochdale Sixth Form College Site, College Rd, Rochdale OL12 6HY.

The Site consists of the existing school building, a car park, and landscaped areas. It is proposed to redevelop part of the Site for an educational end use. The development proposals include construction of a new five-storey teaching block extension to the existing college building.

According to the EA's Flood Map for Planning, the Site ownership is primarily designated as Flood Zone 3, land defined as having greater than 1% (1 in 100) annual exceedance probability (AEP) of flooding in any given year, classified as a high probability of fluvial flooding. Part of the Site is defined as functional floodplain, in particular the area at the top of the slipway and the eastern end of the car park.

The risk of fluvial flooding has been mitigated through the following measures:

- Finished floor levels of the proposed extension are set at 120.15m AOD, providing >1m freeboard above the design flood level for the Site (119.02m AOD).
- Safe access/egress is provided through the existing building and the southern end of the Asda carpark which sits outside the design flood extent and provides ramped access to Dane Street (A6060). Dane Street sits at a level of approximately 125m AOD, which is well above the design flood level of 119.02m AOD.
- Floodplain storage will be maintained by retaining existing ground levels and the use of stilts to maintain the existing flood storage beneath the proposed extension.

The proposed mitigation measures ensure that the proposed development will be safe over its lifetime and will not increase flood risk elsewhere.

The risk of flooding from pluvial, groundwater and artificial sources has been assessed and found to be low.

It is considered that the information provided within this report satisfies the flood risk requirements of the National Planning Policy Framework (part ii of the exception test) and local policy.

In line with the drainage hierarchy, surface water runoff will discharge to the River Roch to the east of the Site via the existing onsite drainage network. Source control, through the use of SuDS, is proposed to provide multiple benefits, including a reduction in the existing runoff rates from the Site.

The total roof area of the proposed extension (0.036 ha.) will drain through blue and green roofs before discharging to the existing surface water sewer that runs adjacent to the building. Storage and attenuation will be provided via a blue roof at the roof level. It is not feasible to achieve greenfield runoff rates from the blue roof as the low flow rate may lead to blockage of the system. Instead, discharge will be restricted to 1 l/s. Attenuation will be provided via a green roof in the terrace at the fifth floor level.

Foul flows from the proposed development will connect into the existing foul drainage for the Site before ultimately discharging to a United Utilities sewer downstream, subject to confirmation of capacity within their network.

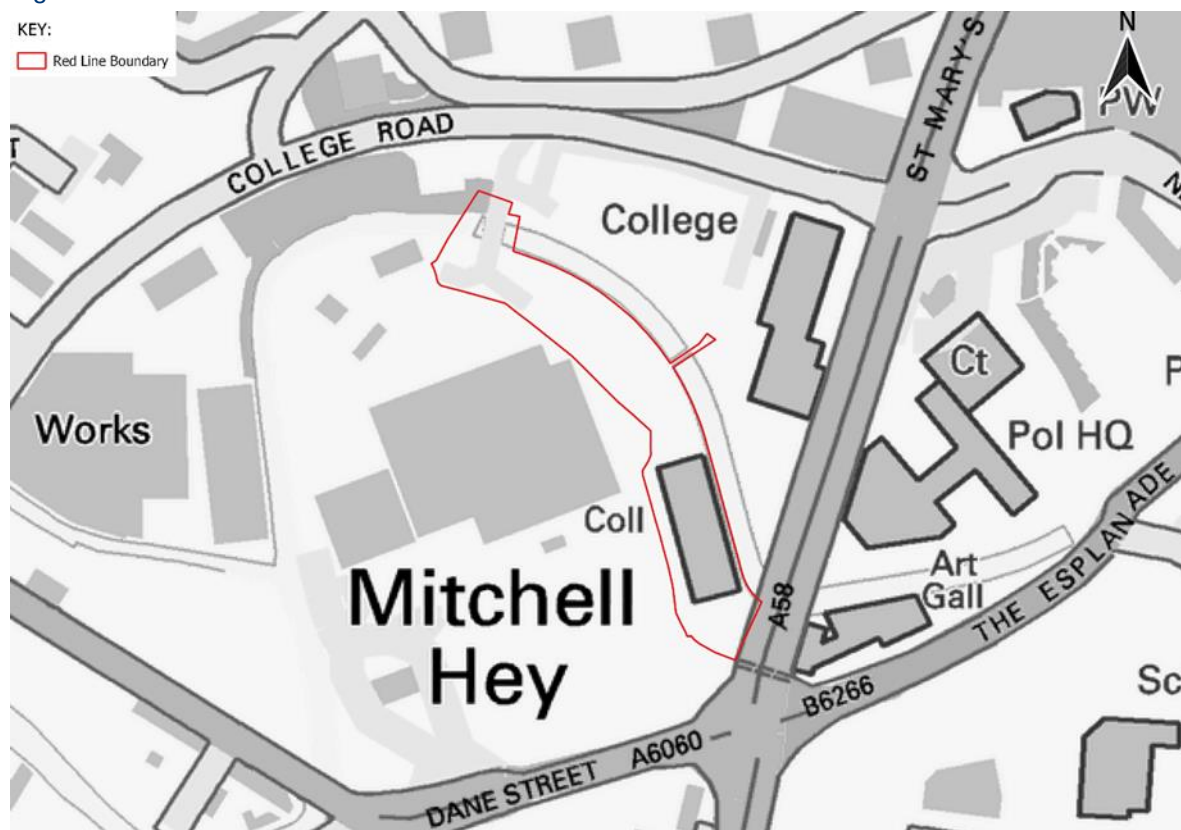
1. Introduction

- 1.1. This Flood Risk Assessment (FRA) has been prepared by Waterman Infrastructure and Environment on behalf of Rochdale Sixth Form College in support of a planning application for the erection of temporary classroom accommodation Rochdale Sixth Form College Site (hereafter referred to as the Site), College Road, Rochdale OL12 6HY.
- 1.2. The Site consists of the existing school building, a car park, and landscaped areas. It is proposed to redevelop part of the Site for an educational end use. The development proposals include construction of a new five-storey teaching block extension to the existing college building.
- 1.3. The majority of the Site ownership is within Flood Zone 3 (delineating an area at high risk from tidal or fluvial flooding), therefore in accordance with the NPPF a full FRA has been prepared for submission with the planning application.

Site Description

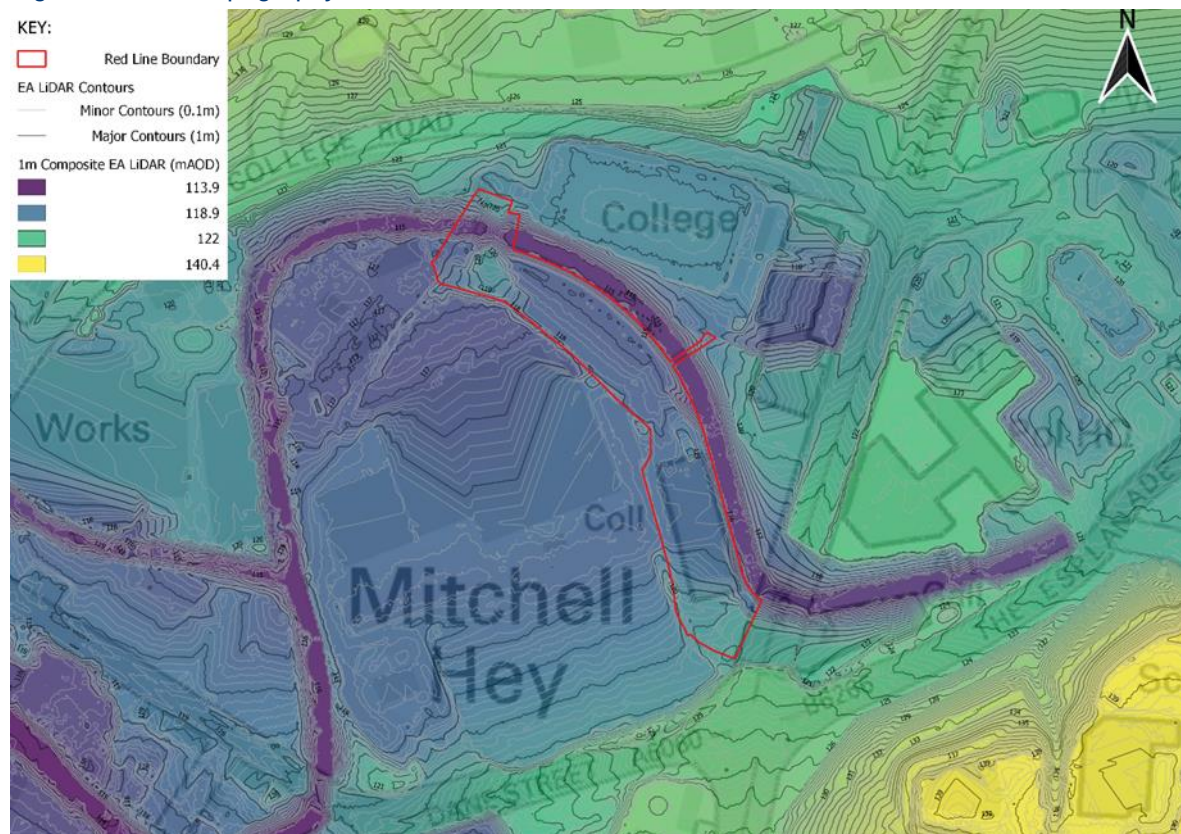
- 1.4. The Site address is Rochdale Sixth Form College, College Rd, Rochdale OL12 6HY. The Site (Figure 1) currently comprises the existing Rochdale Sixth Form College building and car park.
- 1.5. The Site is bounded by the River Roch to the east and north, Asda shopping centre and car park to the west and the A58 to the south. The campus is 2.7ha in area and is located in the centre of Rochdale. However, the footprint of the proposed extension is approximately 0.036ha.

Figure 1: Site Location



- 1.6. The topographic survey (Appendix A) indicates that existing ground levels at the Site generally fall to the north and east, towards the River Roch. Ground levels in the south of the Site are higher than the remainder of the Site, reaching a high point of 120m Above Ordnance Datum (AOD) to the south of the existing school building. Levels fall gradually to the north before levelling out at the car park, which slopes from west to east toward a low point of 117.4m AOD and the River Roch. There is an area of higher ground at the northern end of the Site, where the road rises to a level of approximately 120m AOD to cross the River Roch. An overview of Site levels, based on EA LiDAR is provided in Figure 2.

Figure 2: Site Topography



Development Proposals

- 1.7. The development proposals (Appendix B) comprise a new four-storey teaching block together with associated infrastructure and soft landscaping, expanding existing Rochdale Sixth Form College to facilitate an increased student capacity. Therefore, as an 'educational establishment', the proposed development is classified as being 'More Vulnerable' to flood risk.
- 1.8. The scope of this report is to assess the potential effects of tidal, fluvial, groundwater, pluvial and artificial sources of flooding upon the Development, in line with national and local planning policy.
- 1.9. A drainage strategy is provided as part of this assessment. It is recommended that SuDS are incorporated into the proposed strategy in order to meet local and national planning policy and best practice.

2. Planning Policy and Guidance

National Planning Policy Framework

- 2.1. The National Planning Policy Frameworkⁱ (NPPF, 2021) states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- 2.2. The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding.
- 2.3. If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives), it may be necessary to demonstrate through the Exception Test that:
 - The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
- 2.4. The NPPF states that when determining planning applications, Local Planning Authorities (LPA) should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific Flood Risk Assessment. Development should only be allowed in areas at risk of flooding where it can be demonstrated that:
 - Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
 - The development is appropriately flood resistant and resilient;
 - It incorporates Sustainable Drainage Systems (SuDS), unless there is clear evidence that this would be inappropriate;
 - Any residual risk can be safely managed; and
 - Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.
- 2.5. Major developments should incorporate SuDS unless there is clear evidence that this would be inappropriate. The systems used should:
 - Take account of advice from the lead local flood authority;
 - Have appropriate proposed minimum operational standards;
 - Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - Where possible, provide multifunctional benefits.

Planning Practice Guidance

- 2.6. The Planning Practice Guidanceⁱⁱ (PPG) provides additional guidance to LPAs to ensure effective implementation of the planning policies set out within the NPPF regarding development in areas at risk of flooding.

- 2.7. The PPG states that developers and LPAs should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of SuDS. Referencing information provided by the Environment Agency (EA), the PPG provides advice on taking account of climate change, setting out recommended contingency allowances for net sea level rise and peak rainfall intensities. It also advises on flood resilience and resistance measures when dealing with the residual risks remaining after applying the sequential approach and mitigating actions.
- 2.8. The PPG also includes advice on flood risk vulnerability and flood zone compatibility. The following flood zones refer to the probability of river and sea flooding, without the presence of defences:
- Zone 1 - low probability: less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year;
 - Zone 2 - medium probability: between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% to 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% to 0.1%) in any year;
 - Zone 3a - high probability: 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability flooding from the sea (>0.5%) in any year; and
 - Zone 3b - the functional floodplain: where water has to flow or be stored in times of flood; identification should take account of local circumstances but would typically flood with an annual probability of 1 in 30 (3.3%) or greater in any year or is designed to flood in an extreme 1 in 1,000 (0.1%) flood.
- 2.9. Flood risk vulnerability is split into five classifications in Table 2 of the PPG, as follows, and the compatibility of these within each Flood Zone is set out in Table 3 of the PPG:
- Essential Infrastructure, e.g. essential transport and utility infrastructure, wind turbines;
 - Highly Vulnerable, e.g. emergency services (those required to be operational during flooding), basement dwellings;
 - More Vulnerable, e.g. residential dwellings, hospitals, schools, hotels, drinking establishments;
 - Less Vulnerable, e.g. retail, offices, storage and distribution, leisure, restaurants; and
 - Water-Compatible Development, e.g. docks, marinas, wharves.

Sequential and Exception Test

- 2.10. The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding.
- 2.11. If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives), it may be necessary to demonstrate through the Exception Test that:
- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
- 2.12. The Site is primarily located within Flood Zone 3, land defined as having greater than 1% (1 in 100) annual exceedance probability (AEP) of flooding in any given year (high probability of flooding).

- 2.13. The NPPF states that only 'Water Compatible' development is appropriate within the functional floodplain. Therefore, the proposed expansion of the school must avoid areas of the Site that are defined as functional floodplain. The NPPF also states that 'more vulnerable' development, including educational buildings, are permitted within Flood Zone 3 but require an exception test. The development should seek to minimise the risk from flooding by avoiding areas of the Site that experience the most frequent flooding and greatest flood depth. Therefore, as far as reasonably practicable, the development should be steered towards the higher ground near the existing building from a policy perspective.

Non-statutory Technical Standards for Sustainable Drainage Systems

- 2.14. Non-Statutory Technical Standards for Sustainable Drainage Systemsⁱⁱⁱ was published in March 2015 and is the current guidance for the design, maintenance and operation of SuDS.
- 2.15. The standards set out that the peak runoff rates should be as close as is reasonably practicable to the greenfield rate but should never exceed the pre-development runoff rate.
- 2.16. The standards also set out that the drainage system should be designed so that flooding does not occur on any part of the Site for a 1 in 30 year rainfall event, and that no flooding of a building (including basement) would occur during a 1 in 100 year rainfall event.
- 2.17. It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

Water Industry Act

- 2.18. United Utilities is the local Sewerage Undertaker and provides sewerage services under the guidance of the Water Industry act 1991.
- 2.19. Under Section 106 of the Water Industry Act, the developer currently maintains the automatic right to 'communicate' with the public foul water sewer system.

Greater Manchester Spatial Framework Publication Plan 2020

- 2.20. Policy GM-S 5 Flood Risk and the Water Environment of the Spatial Framework Plan^{iv} lays out that an integrated catchment based approach will be taken to protect the quantity and quality of water bodies and managing flood risk, by:
- 1) Returning rivers to a more natural state, where practicable, in line with the North West River Basin Management Plan;
 - 2) Working with natural processes and adopting a natural flood management approach to slow the speed of water drainage and intercept water pollutants;
 - 3) Locating and designing development so as to minimise the impacts of current and future flood risk, including retrofitting or relocating existing developments, infrastructure and places to increase resilience to flooding;
 - 4) Expecting developments to manage surface water runoff through sustainable drainage systems and as close to source as possible (unless demonstrably inappropriate) so as to not exceed greenfield run-off rates or alternative rates specified in district local plans, such as those identified for areas with critical drainage issues.
 - 5) Ensuring that sustainable drainage systems:
 - i. Are designed to provide multifunctional benefits wherever possible, including for water quality,

- nature conservation and recreation;
 - ii. Avoid adverse impacts on water quality and any possibility of discharging hazardous substances to ground;
 - iii. Are delivered in a holistic and integrated manner, including on larger sites split into different phases; and
 - iv. Are managed and maintained appropriately to ensure their proper functioning over the lifetime of the development.
- 6) Securing the remediation of contaminated land and the careful design of developments to minimise the potential for urban diffuse pollution to affect the water environment;
- 7) Securing further investment in wastewater treatment to reduce the frequency of intermittent discharges of storm sewage; and
- 8) Conserving water and maximising water efficiency in new development.

Level 1 Strategic Flood Risk Assessment for Greater Manchester

- 2.21. The Level 1 SFRA is required to initiate the sequential risk-based approach to the allocation of land for development and to identify whether application of the Exception Test is likely to be necessary using the most up-to-date information and guidance. This will help to inform and provide the evidence base for the GMSF and also each individual council's local plans.
- 2.22. The SFRA assesses the spatial distribution of current and future flood risk across GM and provides the discussion and guidance required to put this information into practice when taking account of flood risk in development plans and the level of detail required for site specific Flood Risk Assessments (FRA).

Level 2 Strategic Flood Risk Assessment for Greater Manchester

- 2.23. The Level 2 SFRA aligns closely with the GMSF and will help guide policy making in the GMSF to assist in achieving sustainable development across Greater Manchester. The Level 2 SFRA follows on from the GMCA Level 1 SFRA (2019), which helped identify the high-risk sites to be assessed through this Level 2 SFRA, and the GMCA Strategic Flood Risk Management Framework (2019) which helped provide a broad spatial framework for flood risk management across Greater Manchester, highlighting the key strategic flood risks and recommending key priorities for intervention.

3. Sources of Potential Flooding

Fluvial and Tidal

- 3.1. The Site is set over 100m above sea level and over 50km from the coastline. Therefore, the risk of tidal flooding to the Site is considered to be negligible.
- 3.2. The nearest fluvial waterbody is the River Roch, which flows from south to north along the eastern Site boundary. The River Roch is designated as a Main River and is therefore managed by the Environment Agency (EA).
- 3.3. According to the EA's Flood Map for Planning (Figure 3), the Site ownership is primarily designated as Flood Zone 3, land defined as having greater than 1% (1 in 100) annual exceedance probability (AEP) of flooding in any given year, classified as a high probability of fluvial flooding.

Figure 3: Environment Agency's Flood Map for Planning



- 3.4. The Greater Manchester Combined Authority were contacted to obtain the exact definition of the functional floodplain for the Site, as laid out in their SFRA. As shown on Figure 3, part of the Site is defined as functional floodplain, in particular the area at the top of the slipway and the eastern end of the car park.

Figure 4: Definition of the Functional Floodplain



- 3.5. The latest climate change allowances for peak river flows are provided in Table 1. As part of the wider Site is within Flood Zone 3 and the flood risk classification is 'More Vulnerable', the central allowance should be used when assessing flood risk to the Site, designing safe access, escape routes and places of refuge, and calculating floodplain compensation. Therefore, a climate change allowance of +35% should be used for peak river flow on the basis of a proposed 100 year design life of the building.

Table 1: Irwell Management Catchment peak river flow allowances

Epoch	Central	Higher	Upper
2020s	12%	15%	24%
2050s	19%	26%	43%
2080s	35%	46%	75%

- 3.6. The EA have provided their Product 4 flood data for the Site (Appendix C), comprising modelled flood levels for a range of return periods. Nodes 2 and 3 are most appropriate for assessing the maximum 1D (river) flood level while node 9 is appropriate to assess the maximum 2D (floodplain) flood level. The location of these nodes is indicated on Figure 5 and a summary of flood levels at each node for a range of return periods is provided in Table 2.

Figure 5: Environment Agency Product 4 Results Node Locations

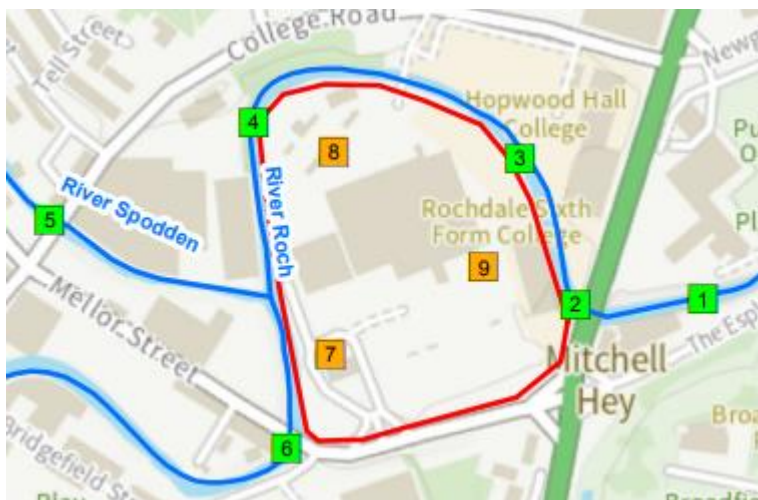
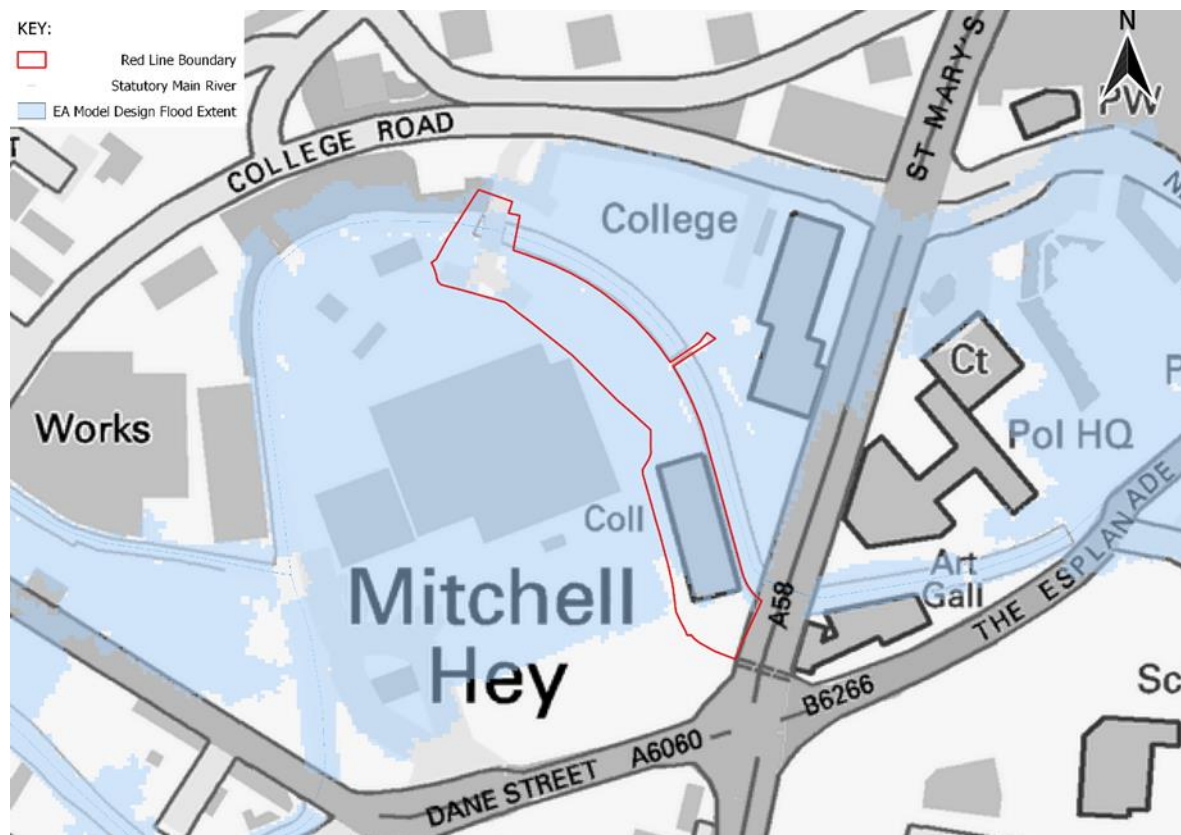


Table 2: Environment Agency Product 4 Flood Levels (m AOD)

Node	5% AEP (1 in 20 Year)	1% AEP (1 in 100 Year)	1% AEP (1 in 100 Year) + 35% CC	1% AEP (1 in 100 Year) + 70% CC
2	118.10	118.60	118.99	119.29
3	117.90	118.48	119.02	119.34
9	-	118.50	118.79	-

- 3.7. The existing ground levels (Appendix A) indicate that a larger portion of the Site would flood for the present day 5% AEP (1 in 20 year) event, which is taken to approximate to the functional floodplain in the absence data representing a 3.3% AEP (1 in 30 year flood event). During the design flood event (1% AEP plus 35% climate change) only the areas of high ground to the south of the existing school building and the road at the very north of the Site remain free of flooding. The greatest flood depths are seen within the car park, which could experience flood depths of greater than 1.5m in the design flood event. The extent of flooding during the design flood modelled by the EA is presented in Figure 6.

Figure 6: EA model design flood extent



3.8. There is a history of flooding on the Site, as shown on

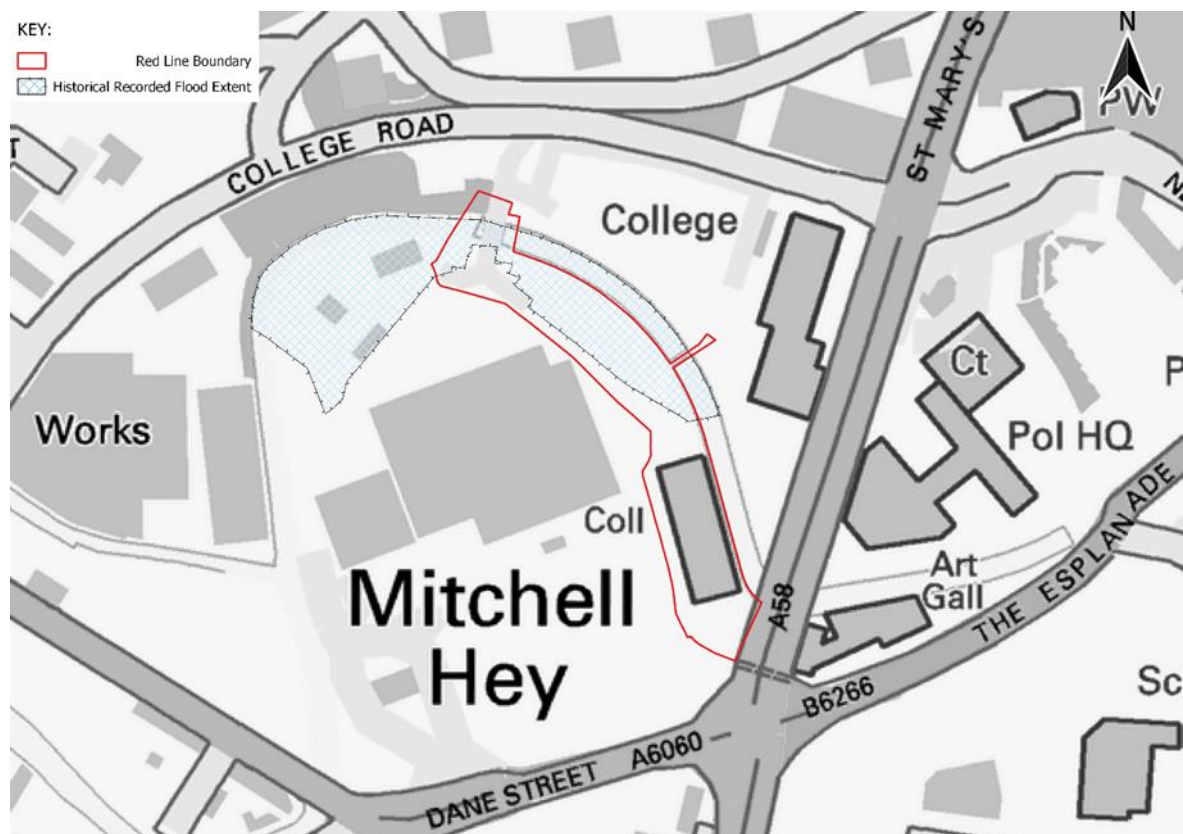
3.9.

3.10.

3.11. Figure 7, most notably at the eastern end of the car park. This is not surprising given this area of the Site is defined as functional floodplain and is subject to the greatest flood depths. Further details of historical flood events are provided in the EA flood product information (Appendix C).

3.12. The EA have advised (Appendix D) that work has started on their Rochdale and Littleborough Flood Risk Management Scheme (FRMS), a multi-phase scheme that is likely to reduce flood risk to the Site once completed. Phase 1a works are currently on-going in Littleborough upstream of the Site and Phases 1b and 2 include flood storage basins to reduce flows downstream into Rochdale town centre. However, Phase 2 is not yet fully designed and final reductions in risk are not yet known. The A advised that the overall impact will be to reduce flows and levels however, the existing sixth form college car park site is still likely to be remain at risk due to the relatively low-lying levels.

Figure 7: Historical flood extent



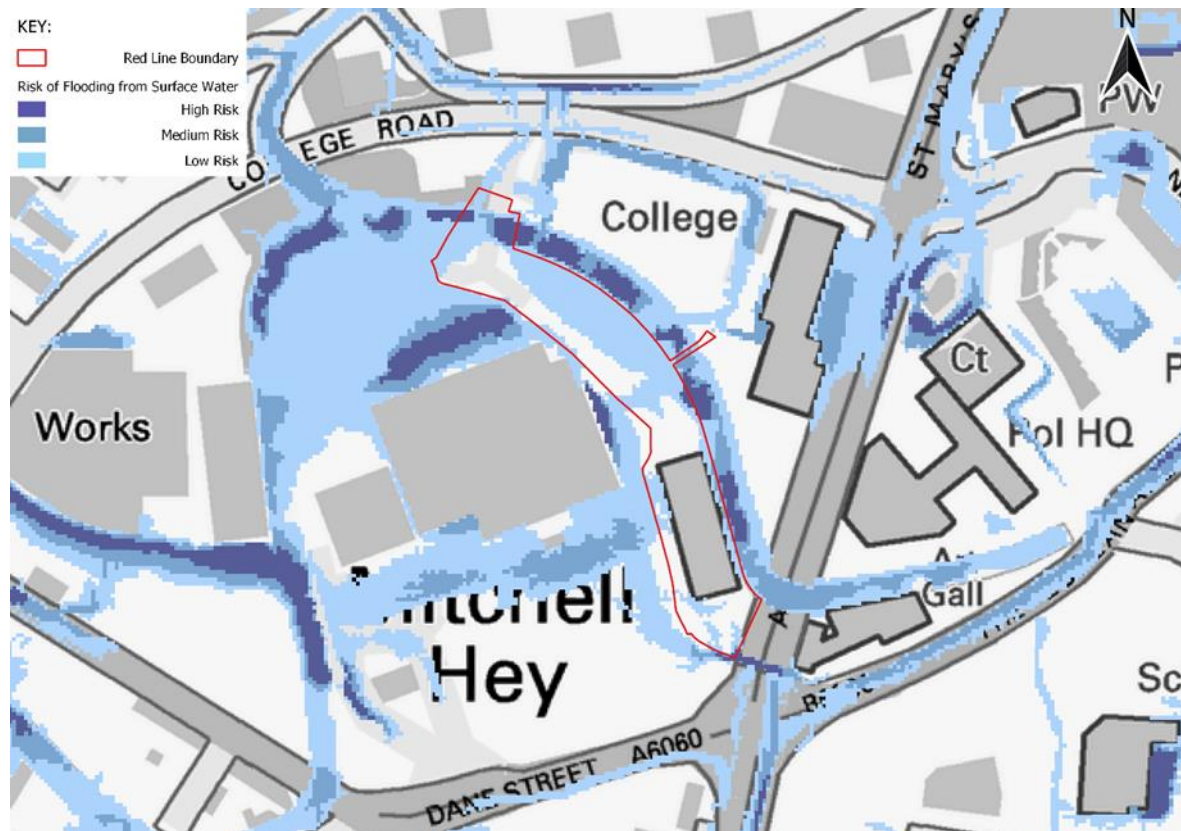
Pluvial

- 3.13. Pluvial flooding, also known as surface water flooding, occurs when natural and engineered drainage systems have insufficient capacity to deal with the volume of rainfall. Pluvial flooding can occur in urban areas during extreme, high intensity, short duration rainfall events which can overwhelm the local drainage system. This flood water would then be conveyed via overland flow routes dictated by the local topography.

Overland Flows

- 3.14. The EA's Risk of Flooding from Surface Water mapping (Figure 8, overleaf) indicates that large areas of the Site are at a 'very low' risk of surface water flooding (less than 0.1% AEP). However, the car park and to the south and west of the existing school building are shown to be at 'low' risk (between 1% and 0.1% AEP) of flooding from surface water.

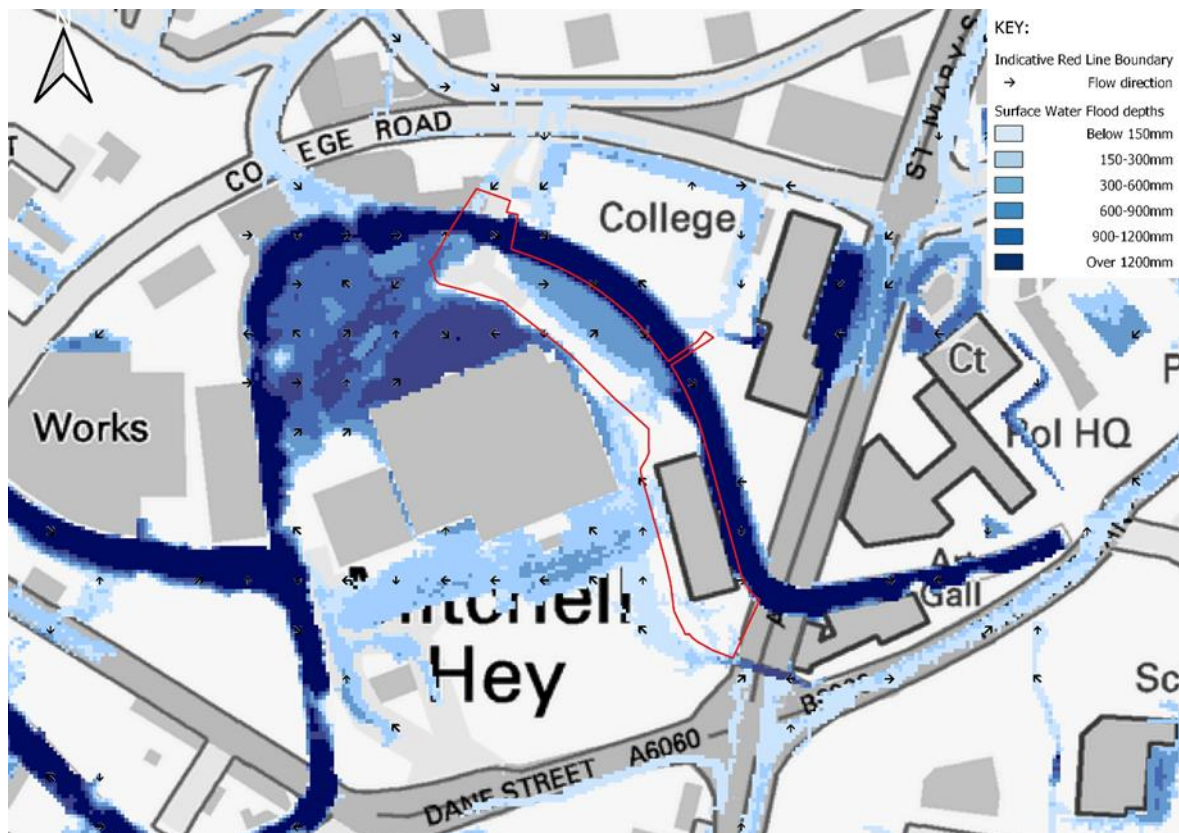
Figure 8: Environment Agency's Risk of Flooding from Surface Water Mapping



Low Risk Event

- 3.15. During the extreme 'low' risk event, there is some surface water flooding on the Site, see Figure 9. To the west and south of the existing school building, there is potentially up to 150mm depth of flooding. Within the car park there is potentially 300-600mm of flooding.
- 3.16. Due to the low probability and minor consequence (up to 150mm flood depth), surface water flood risk is determined as low. It is recommended that finished floor levels are set a minimum of 150mm above external ground levels to provide further protection in the event of an extreme rainfall event. However, the predicted flood depths are much smaller than the predicted fluvial flood depths, which the proposal building design would need to account for in any event.

Figure 9: Environment Agency's Low Risk of Flooding from Surface Water Mapping



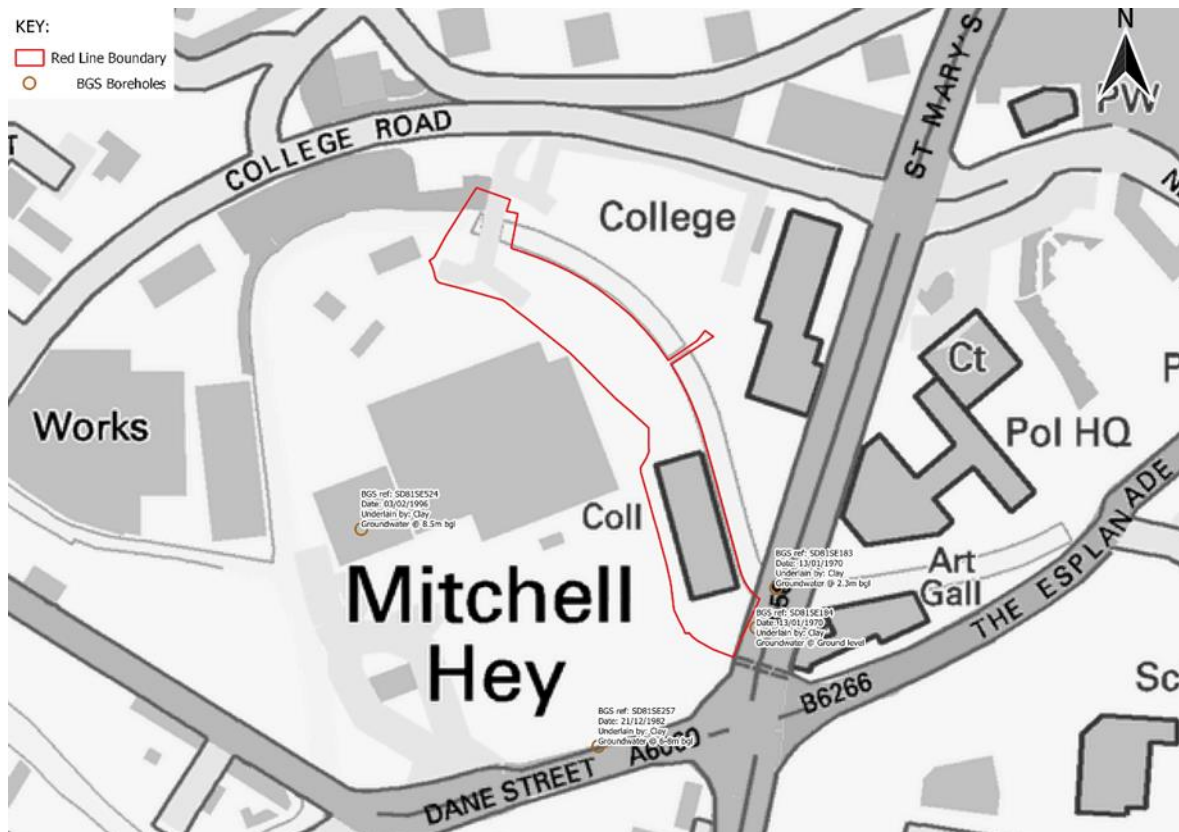
Sewers

- 3.17. Sewer flooding is typically caused by heavy rainfall or blockages within the existing sewer network.
- 3.18. United Utilities have been consulted and confirmed that they *"have no current record of sewer flooding within the vicinity of the proposed development"* (Appendix E). Therefore, the risk of flooding from sewers is anticipated to be low, however, this would be confirmed following receipt of sewer plans.

Groundwater

- 3.19. Groundwater flooding occurs in low lying areas underlain by permeable geology and aquifers that allow groundwater to rise to the surface through the permeable strata following long periods of wet weather.
- 3.20. The British Geological Society (BGS) online Geology of Britain mapping (1:50k) reveals that the underlying geology in this location is Pennine Lower Coal Measures Formation - Mudstone, siltstone and sandstone. Sedimentary bedrock formed between 319 and 318 million years ago during the Carboniferous period. The overlying superficial deposits consist of Alluvium - Clay, silt, sand and gravel. Sedimentary superficial deposits formed between 11.8 thousand years ago and the present during the Quaternary period.
- 3.21. Historic borehole records obtained from the online BGS mapping suggest that the Site is underlain by Clay. The most recent record indicate that groundwater is likely 6-8m below ground level (bgl). An overview of the BGS borehole information reviewed is shown on Figure 10.

Figure 10: Location of relevant BGS borehole scans



- 3.22. The Greater Manchester Combined Authority (GMCA) SFRA^v does not provide an assessment of flood risk from groundwater. The now superseded Bury, Rochdale, and Oldham SFRA^{vi} states that there are few reported incidents of groundwater flooding in Bury, Rochdale, and Oldham and that the EA advised that 'the risk posed by groundwater flooding is likely to remain remote within the sub-region'.
- 3.23. Due to the proximity of the Site to the River Roch, it is likely that groundwater levels will ultimately be controlled by the water level within the river. Therefore, the risk of flooding from groundwater can be considered low as it is outweighed by the far more significant risk from fluvial flooding and, therefore, groundwater is unlikely to cause a constraint to development, assuming no basements are proposed.

Artificial Sources

- 3.24. Flooding from artificial sources refers to the risk of flooding from manmade, impounded waterbodies such as reservoirs, canals, docks and other such waterbodies.
- 3.25. The EA's Risk of Flooding from Reservoirs mapping (Figure 11) presents the largest extent that may be affected in the event of a reservoir failure resulting in an uncontrolled release of water. The EA notes that this is a worst-case prediction, and any flood event is extremely unlikely to occur, and unlikely to be this large.

Figure 11: Environment Agency's Risk of Flooding from Reservoirs Mapping

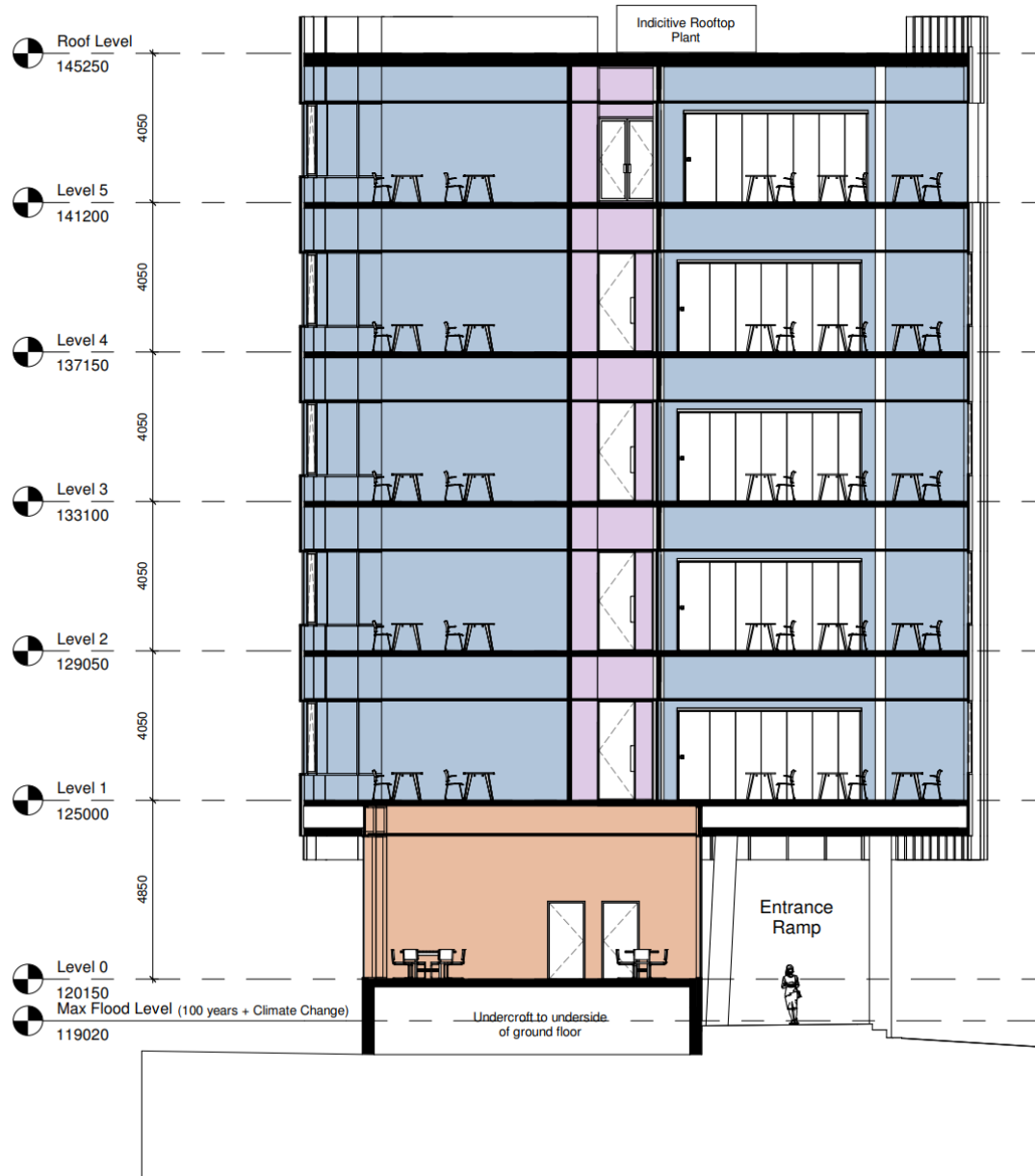


- 3.26. The mapping shows that parts of the Site could be affected by a failure in Cowm, Hollingworth Lake, Ogden, Piethorne, Blackstone Edge, Kitcliffe, Rooden, Spring Mill, Watergrove, Naden Middle, Chelburn Upper, Handing Lees, Naden Higher, and Norman Hill Reservoirs, which are all owned and operated by United Utilities. However, the proposed temporary accommodation would not be affected by reservoir flooding.
- 3.27. All large reservoirs are controlled under the Reservoirs Act 1975 and must be inspected and supervised by reservoir panel engineers to ensure that the embankments are maintained to a high standard. The GMCA SFRA confirms that the risk of flooding from reservoirs is reduced through regular maintenance by the operating authority, with reservoirs in the UK having an extremely good safety record with no incidents resulting in the loss of life since 1925.
- 3.28. Additionally, the flood extent due a reservoir failure is almost identical to that of Flood Zones 2 and 3 on the Site. Therefore, the potential consequence can be considered to be in line with that associated with fluvial flood risk, which the development will need to be mitigated against.
- 3.29. The Rochdale Canal is over a kilometre away, to the south of the Site. There is an area of high ground between the canal and the Site. Therefore, the risk of flooding from artificial sources is considered to be low and there are no constraints to development from this source of flood risk at the Site.

4. Flood Risk Mitigation

- 4.1. The NPPF states that only 'Water Compatible' development is appropriate within the functional floodplain. Therefore, the proposed expansion of the school must avoid areas of the Site that are defined as functional floodplain. The NPPF also states that 'more vulnerable' development, including educational buildings, are permitted within Flood Zone 3 but require an exception test. The development seeks to minimise the risk from flooding through a sequential approach by locating the college expansion in the area with the lowest risk of flooding.
- 4.2. Proposed finished floor levels for the proposed development should be set above the design flood level (1:100 year + CC) and allow for an additional 300mm of freeboard. Therefore, based on the Product 4 information presented in Table 2 (Appendix C), finished floor levels for the Site should be set at a minimum of 119.32m AOD. The proposed finished floor level for the extension is set at 120.15m AOD, providing >1m freeboard above the design flood level for the Site (119.02m AOD), see Figure 12.
- 4.3. The requirement to raise finished floor levels above the design flood level plus 300mm of freeboard needs to be balanced against the conflicting challenge of maintaining existing Site levels to avoid the need for floodplain compensation. Therefore, the existing ground levels will be maintained, and stilts are to be used to mitigate against any loss of floodplain. This has been discussed with the EA, who do not have an objection to such a proposal (Appendix D).
- 4.4. The River Roch is designated as a Main River and is therefore managed by the EA. The EA have confirmed the riverbank is defined as the top of the river wall, rather than the top of the grass slope. The EA would usually require a minimum maintenance offset of 8m from the top of the riverbank. However, maintenance access has been allowed for within the design as discussed with the EA and LLFA, who agree in principle with the proposals as shown in the correspondence in Appendix D.
- 4.5. Safe access/egress is provided through the existing building and the southern end of the Asda carpark which sits outside the design flood extent and provides ramped access to Dane Street (A6060). Dane Street sits at a level of approximately 125m AOD, which is well above the design flood level of 119.32m AOD. A Flood Warning and Evacuation Plan should be prepared to protect site users in the event of a flood.
- 4.6. The proposed mitigation measures ensure the development will be safe from flood risk over its lifetime.
- 4.7. The proposed development will not increase flood risk elsewhere as it does not result in restricted flows through the site or result in a loss of floodplain storage. This has been achieved by retaining existing ground levels and the use of stilts to maintain the existing flood storage beneath the proposed extension, see Figure 12.

Figure 12: Section through the proposed development



Proposed GA Section AA

5. Surface Water Drainage

Existing Drainage

- 5.1. Operation and maintenance drawing held by the college indicates that the existing surface water drainage discharges directly to the River Roch via a private outfall. Flows from the Site are restricted to 72 l/s via a hydrobrake upstream of the outfall. Surface water runoff is stored and attenuated within a 50m³ tank.

Proposed Surface Water Discharge Location

- 5.2. The existing Site is a school and associated car park. RBC would expect that the drainage design would make use of SuDS features, in line with the GMCA SFRA^v. The proposed drainage should aim to restrict surface water runoff from the Site, as close as reasonably practicable, to the greenfield runoff rate, in line with the non-statutory technical standards for SuDS^{vii}. If this is not technically feasible then evidence would need to be provided to support this argument.
- 5.3. Part H of the Building Regulations and the Planning Policy Guidance set out a hierarchy of surface water disposal, which should be adhered to in decreasing order of preference. As a key priority for sustainable management of runoff, rainwater harvesting has been included in the below hierarchy as the most preferential means of surface water disposal:
- I. Store rainwater for later use;
 - II. Discharge to ground;
 - III. Discharge to a surface water body;
 - IV. Discharge to a surface water sewer; and
 - V. Discharge to a combined sewer.
- 5.4. The development proposals comprise an expansion of the existing school building.
- 5.5. **Water re-use:** the feasibility of providing water butts will be considered for the proposed development.
- 5.6. **Infiltration:** Due to the impermeable underlying geology of the Site, discharge to ground would not be a feasible method of surface water disposal.
- 5.7. **Surface water body:** In line with the drainage hierarchy, the discharge of surface water runoff to the River Roch to the east of the site is proposed, where the Site currently discharges.

Water Quality

- 5.8. In line with policy and current best practice, attenuation should be provided in the most sustainable manner possible through the use of SuDS to ensure that pollutants are appropriately managed prior to discharge (as assessed in 3). These will allow for treatment at source, as well as providing additional attenuation volume.

Table 3: Sustainable Drainage Techniques Constraints and Opportunities

Device	Description	Constraints/Comments	✓/✗
Green / blue roofs (source control)	Provide soft landscaping at roof level which reduces surface water runoff	Green/brown/blue roofs are feasible and therefore should be considered. Dimensions are to be confirmed at detailed design.	✓
Infiltration devices & Soakaways (source control)	Store runoff and allow water to percolate into the ground via natural infiltration	Infiltration techniques are not considered to be feasible due to underlying impermeable soils.	✗
Pervious surfaces (source control)	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate and / or slowly release to sewers	Permeable paving is not feasible as there are no landscaped areas within the area of the proposed extension.	✗
Rainwater harvesting (source control)	Reduces the annual average rate of runoff from a site by reusing water for non-potable uses e.g. toilet flushing or water butts	There are no constraints for including rainwater harvesting butts. However, the reduction of surface water runoff cannot be quantified with certainty as this would be dependent on the demand for harvested rainwater.	✓
Swales (permeable conveyance)	Broad shallow channels that convey / store runoff, and allow infiltration (ground conditions permitting)	The area of the proposed extension is heavily spatially constrained which precludes the inclusion of swales within the development. Infiltration techniques are not considered to be feasible due to underlying impermeable soils.	✗
Filter drains & perforated pipes (permeable conveyance)	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration (ground conditions permitting)	Underlying soils would preclude infiltration.	✗
Filter Strips (permeable conveyance)	Wide gently sloping areas of grass or dense vegetation that remove pollutants from runoff from adjacent areas.	The area of the proposed extension is heavily spatially constrained which precludes the inclusion of filter strips within the development.	✗
Bioretention Systems / Rain Garden (end of pipe treatment).	A shallow landscaped depression which allows runoff to pond temporarily on the surface before filtering through vegetation and underlying soils	The area of the proposed extension is heavily spatially constrained which precludes the inclusion of rain gardens within the development.	✗

Device	Description	Constraints/Comments	✓/✗
Dry ponds (end of pipe treatment)	Depressions in the surface designed to store runoff without infiltration through the base	The area of the proposed extension is heavily spatially constrained which precludes the inclusion of dry ponds within the development.	✗
Attenuation underground (end of pipe treatment)	Oversized pipes or geo-cellular/sectional tanks designed to store water below ground level	Underground attenuation tanks are the least preferred option. However, they remain a potential solution if site constraints preclude the sufficient storage of stormwater within other SuDS features. Runoff will be discharged through the attenuation tank serving the existing building.	✓

Proposed Surface Water Drainage Strategy

- 5.9. The proposed development area is 0.036ha and is assumed to be fully impermeable. SuDS will be proposed for source control to provide betterment to the existing runoff rates from the Site.
- 5.10. The total roof area of the proposed extension (0.036 ha.) will drain through blue and green roofs before discharging to the existing surface water sewer that runs adjacent to the building. Storage and attenuation will be provided via a blue roof at the roof level. It is not feasible to achieve greenfield runoff rates from the blue roof as the low flow rate may lead to blockage of the system. Instead, discharge will be restricted to 1 l/s. A surface water storage volume of 12.5 m³ is provided within the blue roof to allow for restriction of flows to 1 l/s for the 1 in 100 year event plus a 45% allowance for the future effects of climate change. See Appendix G for storage and discharge calculations.
- 5.11. Attenuation will be provided via a green roof in the terrace at the fifth floor level.

Sustainable Drainage Management Plan

- 5.12. The PPG sets out the requirement for developers to consider the operation, management and maintenance of all SuDS.
- 5.13. Post construction, the on-site management company (who would be appointed post-planning) would be responsible for the SuDS included in the scheme. Table 4 outlines what maintenance would be anticipated for the proposed SuDS features.

Table 4: Sustainable Drainage Typical Maintenance Arrangements

SuDS	
Task	Frequency
Green/Brown Roofs	
Inspect system to replace dead plants as required and ensure plants are sufficiently watered (during establishment period)	As required
Inspect system to replace dead plants (post establishment period)	Annually (in autumn)

SuDS	
Task	Frequency
Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
Inspect system to ensure substrate is not eroded and inlet/outlet drains are not blocked	Annually or as required (after severe storms)
Rainwater Harvesting	
Inspect system for debris/blockages	Annually or as required
Underground Attenuation	
Inspection of silt traps, manholes and pipework, and remove any sediment/debris	Quarterly or as required
Jetting of main structure to remove any sediment build up	Annually or as required

6. Foul Water Drainage

- 6.1. The existing foul drainage connects into the United Utilities foul drainage network. Exact details of the downstream connection are not known but will be confirmed at the next design stage.
- 6.2. The proposed foul drainage would be designed in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings, BS EN 12056 – Gravity Drainage Systems Inside Buildings, and Approved Document H of Building Regulations.
- 6.3. Foul flows from the proposed development will connect into the existing foul drainage for the Site before ultimately discharging to a United Utilities sewer downstream, subject to confirmation of capacity within their network.
- 6.4. New connections made to the public sewer system would be made through an S106 Agreement with United Utilities, under the Water Industry Act 1991.

7. Conclusion

- 7.1. According to the EA's Flood Map for Planning, the Site ownership is primarily designated as Flood Zone 3, land defined as having greater than 1% (1 in 100) annual exceedance probability (AEP) of flooding in any given year, classified as a high probability of fluvial flooding. Part of the Site is defined as functional floodplain, in particular the area at the top of the slipway and the eastern end of the car park.
- 7.2. The risk of fluvial flooding has been mitigated through the following measures:
- Finished floor levels of the proposed extension are set at 120.15m AOD, providing >1m freeboard above the design flood level for the Site (119.02m AOD).
 - Safe access/egress is provided through the existing building and the southern end of the Asda carpark which sits outside the design flood extent and provides ramped access to Dane Street (A6060). Dane Street sits at a level of approximately 125m AOD, which is well above the design flood level of 119.02m AOD.
 - Floodplain storage will be maintained by retaining existing ground levels and the use of stilts to maintain the existing flood storage beneath the proposed extension.
- 7.3. The proposed mitigation measures ensure that the proposed development will be safe over its lifetime and will not increase flood risk elsewhere.
- 7.4. The risk of flooding from pluvial, groundwater and artificial sources has been assessed and found to be low.
- 7.5. It is considered that the information provided within this report satisfies the flood risk requirements of the National Planning Policy Framework (part ii of the exception test) and local policy.
- 7.6. In line with the drainage hierarchy, surface water runoff will discharge to the River Roch to the east of the Site via the existing onsite drainage network. Source control, through the use of SuDS, is proposed to provide multiple benefits, including a reduction in the existing runoff rates from the Site.
- 7.7. The total roof area of the proposed extension (0.036 ha.) will drain through blue and green roofs before discharging to the existing surface water sewer that runs adjacent to the building. Storage and attenuation will be provided via a blue roof at the roof level. It is not feasible to achieve greenfield runoff rates from the blue roof as the low flow rate may lead to blockage of the system. Instead, discharge will be restricted to 1 l/s. Attenuation will be provided via a green roof in the terrace at the fifth floor level.
- 7.8. Foul flows from the proposed development will connect into the existing foul drainage for the Site before ultimately discharging to a United Utilities sewer downstream, subject to confirmation of capacity within their network.

8. References

ⁱ Ministry of Housing, Communities and Local Government, July 2021. *National Planning Policy Framework*

ⁱⁱ Ministry of Housing, Communities and Local Government, August 2022. *Planning Practice Guidance*

ⁱⁱⁱ Department for Environment, Food and Rural Affairs, March 2015. *Non-statutory technical standards for sustainable drainage systems*

^{iv} Greater Manchester, October 2020. *Greater Manchester's Plan for Homes, Jobs and the Environment: Greater Manchester Spatial Framework Publication Plan 2020*

^v Greater Manchester Combined Authority, March 2019. *Level 1 Strategic Flood Risk Assessment for Greater Manchester – Update.*

^{vi} Bury Rochdale and Oldham Councils, November 2009. *Bury Rochdale and Oldham Strategic Flood Risk Assessment Volume II – Level 1 SFRA*

^{vii} Department for Environment, Food and Rural Affairs, March 2015. *Non-statutory technical standards for sustainable drainage systems*



APPENDICES

A. Topographic Survey



B. Development Proposals



C. Environment Agency Product 4 Data



D. EA meeting minutes and Correspondence



E. United Utilities Correspondence



F. Rochdale Borough Council Correspondence



G. SW Calculations



H. Drainage Strategy Drawing

UK and Ireland Office Locations

