



WILLIAM MORRIS

Legal & Corporate Communications

Flood Risk Assessment for Mitchell Mill

Applicant:

Nu Fit Design Ltd,
60 Tweedale Street,
Rochdale,
OL11 1HH

Agent:

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Application Site

Mitchell Mill,
College Road,
OL12 6AE

Application Details:

Change of use of part property from B2 & B8 to 'E', Light Industrial (highlighted in light green)

Includes New staircase to elevation D and new first floor window to elevation.

This report takes into account the particular
Instructions and requirements of our client.
It is not intended for and should not be relied
Upon by any third party and no responsibility
Is undertaken to any third party.

Job number 127-WM

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William Morris
Sheaf Street • Suite 43 • Leeds

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1.0 INTRODUCTION

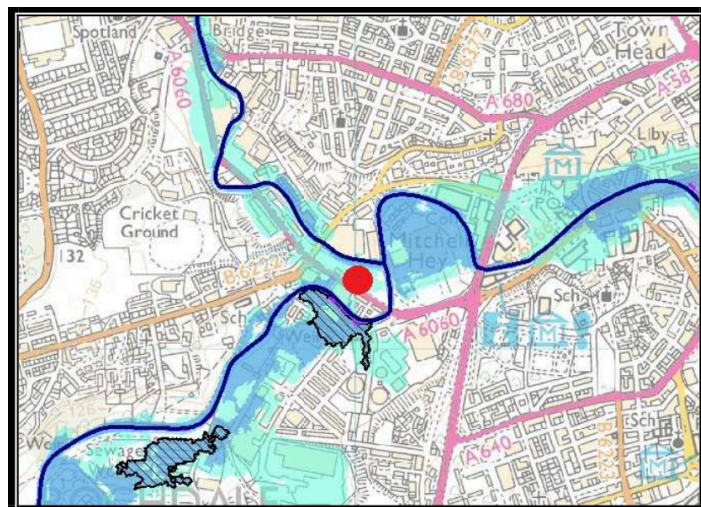
1. William Morris has been commissioned to undertake a flood risk assessment for this site in accordance with the requirements of National Planning Policy Framework (NPPF) and, in particular, Planning Practice Guidance (PPG).
2. The aim of the application is to redevelop a currently redundant and dilapidated mill into a commercial viable asset enjoyed by both commercial tenants and future employees bringing jobs onto the area as well as a myriad of business that are paying business rates to the local authority.
3. The proposal seeks to retain the existing street scenes on all four elevations save for the newly installed spiral staircase to elevation D on the plans. Minor alterations to the fenestration on all elevations (new UPVC windows) will be proposed to be undertaken for EPC purposes.
4. The existing access points to the site will be retained.

2.0 SITE & CONTEXT

1. The site is located on college road near the centre of Rochdale.
2. The building were used for B8 & B2 uses with ancillary storage to the rear.
3. The financial viability of the mill has severely declined over several years with the business being sold to the current applicants in 2021.
4. The forecourt adjacent to the front elevation can be accessed by vehicles from College Road and provides 25 No. off road parking spaces in a shared parking space of 50. It is proposed that these parking spaces will be used in conjunction with the proposed mixed commercial use being applied for.
5. The site lies within Rochdale Town Centre and possess excellent access to frequent bus services. In addition to a range of retail and commercial services the district centre contains amenities such as a medical centre (ash worth street surgery, and Dawes Family Practice), library (Riverside) and community centre (Sparth) as well as access to other facilities such as places of worship and housing within the adjacent area. The site is therefore ideally placed for mixed use refurb/change of use which will benefit the regeneration and renewal of the district centre and provide sustainably located commercial space within Rochdale.
6. The provision of sustainable located development is a keynote object which binds together national and local plan policy, particularly with regard to mixed use schemes such as the proposed development. The proposed development Will be entirely in accordance with this aim.
7. The commercial use on offer within the proposal will complement and enhance the viability and vitality of the district centre with development occurring on previously developed land. The proposed development

therefore accords with the prioritisation given to recycling and efficient use of the application site, particularly when occupying a sustainable location.

8. The site currently has a negative impact on the town centre and surrounding locality, comprising an underused and quickly dilapidated building of unprepossessing appearance. The negative aspect of the site is accentuated by the sites prominent location. The proposed refurbishment representing the opportunity to enhance the beautiful setting of the districts antibody chain and sadly tissues Brownfield land into beneficial use.
9. The proposed refurbishment, in terms of its content and location, represents highly sustainable and appropriate development which is fully complaint with national and local plan policies.
10. The site was previously occupied by a tenant who left some years ago. Since that time the site has remained vacant, with exposed roofing and floor slabs and security vents including a somewhat sadly appearance. Redevelopment and refurbishment of the site will have a positive impact and provide the opportunity to enhance the appearance of the building oneself as well as the locality.
11. The subject site, irregularly shaped in plan and of approximately 0.84 hectares area, is located at NGR 389019E, 413198N site centre. College Road forms the western boundary of the site, from which principal access is gained. The River Spodden abuts the south of the site, with the River Roch to the east and their confluence at the north eastern corner of the site. Open land, with Mellor Street beyond, lies to the south.
12. Reference to the extract of the on-line Flood mapping below shows the site within a zone classified by The Environment Agency as Flood Zone 2.



13. Reference to the online version of The British Geological Survey sheets below confirms the site to be covered by Alluvium - Clay, Silt, Sand and

Gravel.



14. The site area is generally level, with ground levels in the range 118.00 – 119.00m, and with embankments sloping down toward the river on the north and eastern edges.
15. Using WinDes software by MicroDrainage, rainfall intensities (I) have been generated for short storms of 1-year, 30-year and 100-year return. These are shown below and at Appendix B.

	YR1 (50%)	YR30 (3.33%)	YR100 (1%)
Rain Intensity I mm/hour	25.546	62.416	80.437

16. Using With an estimated drained impermeable area on site of $A = 0.65$ hectares and adopting the expression $Q = AkI$ (where impermeability factor k is taken at say 90%) unattenuated previous run off from rainfall events below would have been:-

	YR1 (100%)	YR30 (3.33%)	YR100 (1%)
Peak run-off Q litres/sec	41	101	131

3.0 GENERAL DEVELOPMENT PROPOSALS.

1. A proposed site plan is attached at Appendix A.
2. Development on site will comprise construction of a new staircase for emergency egress only.
3. This development type is classified in Table 2 of PPG below as within the “Highly Vulnerable” category in consideration of flood risk.

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,
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 <i>not</i> 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).

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.

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)*⁵ 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.

4. Table 3 of PPG below confirms the anticipated development type as compatible with a location within Flood Zone 2 with an exception test required.

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:

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

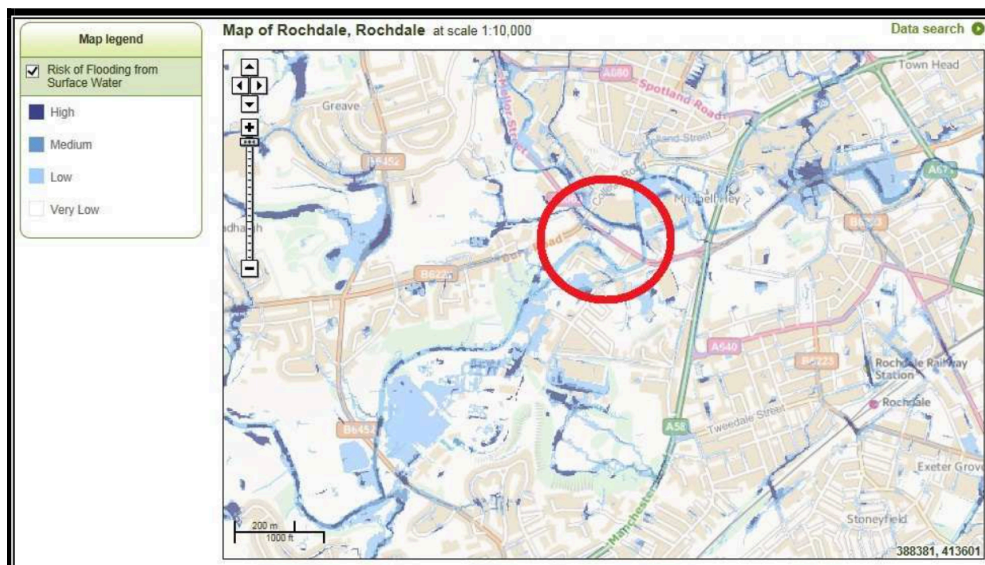
4.0 DEFINITION OF FLOOD HAZARD

1. Reference has been made to the Bury, Rochdale and Oldham Strategic Flood Risk Assessment (SFRA) dated Nov/Dec 2009.
2. Vehicle The site could be at risk of flooding as a result of flooding from local main river watercourses or other open bodies of water or of coastal inundation. Reference has been made to online Environment Agency mapping and to the SFRA for any recorded history. Information has been requested from The Environment Agency.
3. The site could be at risk of flooding caused by flooding from local sewers that are blocked or have insufficient capacity. Reference has been made to the SFRA for any recorded history.
4. The site could be at risk of flooding caused by flooding from highways drains and local ordinary watercourses. Reference has been made to the SFRA for any recorded history.
5. The site could be at risk of flooding from surface waters flowing to the site from other areas. Reference has been made to online Environment Agency mapping and the SFRA for any recorded history.
6. The site could be at risk of flooding as a result of groundwater levels reaching and exceeding existing ground levels on site. There is no site specific ground investigation information available at this time and reference has been made to the SFRA for any recorded history.
7. The site could be at risk of flooding caused by failure of local infrastructure such as mains water pipes or failure of other local industrial processes.
8. Any increase in impermeable areas within the development site will increase the risk of overland flooding.
9. The site could be at risk of flooding caused by site drainage which is not properly maintained or which is subjected to flows greater than those for which it was designed.

5.0 PROBABILITY OF FLOODING

1. The site is classified as within Flood Zone 2. Table 1 of PPG confirms that Flood Zone 2 – Medium Probability is representative of land having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of river or sea flooding in any one year. Flood Risk data has been requested from the Environment Agency. This will be set out in a separate email to the planing department.

2. Reviewing node positions in closest proximity to the site, it is considered that recorded levels at nodes 2 and 4 are likely to be most representative of any flood levels experienced on site. With 1% AEP levels at nodes 2 and 4 varying between 117.62 - 117.74 and 0.1% AEP levels varying between 118.68 – 118.90, these confirm The Environment Agency classification at Flood Zone 2.
3. There is no record in the SFRA of site flooding from rivers. The Environment Agency has also confirmed having no record of flooding affecting the site.
4. Reference to the online Environment Agency surface water flooding mapping, extract below, suggests the risk of surface water flooding on site and in adjacent Mellor Street is “low to very low”



5. There is no visible evidence of groundwater issues on site. The SFRA makes no reference to any local flooding as a result of groundwater levels reaching or increasing above existing ground level. The risk of flooding on site from groundwater reaching or increasing above existing ground level is therefore considered to be low.
6. Any new infrastructure water mains will be designed and installed to current standards thereby presenting only low risk of flooding as a result of bursts. There are no local industry activities identified whose infrastructure failure could cause flooding on site.
7. There are several reservoirs on the Roch and Spodden river systems upstream of the site. Reference to the Environment Agency on-line mapping confirms a broad swathe of Rochdale adjacent the Roch and Spodden could be affected in the event of reservoir failure. However, The Environment Agency has also confirmed that the risk of any reservoir failure is very low. There are no other local bodies of open water likely to present risk of flooding on site.
8. The developed site will have a gross impermeable area nominally greater than that of the former developed site and on that basis without mitigation measures the risk of overland flooding will increase accordingly as a consequence of the development.

9. A properly designed and maintained site drainage system will meet the requirements of the sewerage provider in that the pipelines will not flood at the critical 30-year (3.33%) rainfall event. NPPF requires that all exceedance flows either infiltrate to ground or are contained safely on site or within underground storage such that there will be no risk of flooding of vulnerable or critical areas on site and there will be no risk of flows from the site causing flooding to other nearby areas.

6.0 CLIMATE CHANGE

1. It is anticipated that Climate Change will bring about an increase in rainfall intensities in the future.
2. See Table 2 of Environment Agency “Climate Change Allowances for Planners” dated September 2013 below.

Table 2: Recommended national precautionary sensitivity ranges for peak rainfall intensity, peak river flow, offshore wind speed and wave height

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Notes to table 2:

You can derive peak rainfall between 2025 and 2055 by multiplying the rainfall measurement (in mm per hour) by 10 per cent and between 2055 and 2085 by 20 per cent. So, if there's a 10mm per hour event, for the 2025 to 2055 period this would be 11mm per hour; and for the 2055 to 2085 period, this would be 12mm per hour. Other parameters in table 2 are treated similarly.

3. With an estimated design life of not exceeding 50 years for commercial establishments, any necessary on-site designs for drainage, soakaways or other sustainable disposal methods will incorporate rainfall intensities that have been increased by 20% to take account of the effects of climate change up until the year 2085.
4. River flood flows provided by The Environment Agency will have been increased by 20% to take account of the effects of climate change up until the year 2115.

7.0 DEVELOPMENT PROPOSALS

1. Proposed site plan is attached at Appendix A
2. It is Environment Agency, United Utilities, Building Regulations and Lead Local Flood Authority policy for all surface water systems for development sites to be designed/refurbished using Sustainable Drainage Systems (SuDS) wherever possible.
3. Whilst the geological information currently available suggests that ground conditions on site should be suitable to support onsite disposal, conditions will be investigated in order to establish what sustainable methods of surface water disposal are feasible. Subject to favourable infiltration testing results it is possible that private vehicular pavings could also be designed as porous, disposing of run-off via infiltration through paving formation. However, the required duty and anticipated nature of site pavings may preclude this.
4. Run-off from private roof areas may be discharged to ground using either individual lined soakaway structures or combined infiltration structures, ponds or basins within suitable areas.
5. With the River Spodden abutting to the north, if on-site disposal via infiltration is ruled out due to unsuitable ground conditions, there will be the opportunity to discharge surface water to the river. There is evidence of existing surface water outfall from the site to a point close to the two rivers' confluence. This outfall construction and condition will be investigated to establish any potential for re-use.
6. In order to reduce flood risk within the catchment generally, the User Guide to the SFRA sets out a requirement of a target 30% reduction in run-off from brownfield sites and therefore peak run-off should be limited to not exceeding:-

	YR1 (100%)	YR30 (3.33%)	YR100 (1%)
Peak run-off Q litres/sec	29	71	92

7. WinDes software has estimated the required storage volumes for disposal at 70% previous rates for the 1 year (100%), 30 year (3.33%) and 100 year cc (1%+cc) storms with corresponding permissible pass forward flows.
8. Whilst any necessary attenuation storage to protect the site against flooding for all events up to and including the YR30 (3.33%) rainfall event must be provided underground, additional attenuation storage up to the YR100 (1%) + climate change event may be provided on the drained surface of the site provided it does not present risk of flooding to buildings or other vulnerable areas or risk of overland flows from the site.
9. Foul flows from the development will be directed toward the existing combined sewer in Mellor Street, subject to the approval of United Utilities.

8.0 FLOOD RISK MANAGEMENT MEASURES

1. In the event of extreme emergency the local authority and other emergency services have contingency plans for dealing with the consequences of flooding.
2. From a site within Flood Zone 2 there will always be clear uninterrupted pedestrian access from the site above the 100-year flood level.
3. Setting finished floor level of the buildings at least 150mm above surrounding external ground, shedding surface water away from the buildings, will avoid the risk of damage to buildings and contents as a result of overland flood flows around the site.
4. The design of surface water drainage should ensure that there are no uncontrolled off-site overland flood flows created by the proposed development. Where possible, site surfaces should be modelled so that flood flows generated on site from events beyond the stipulated drainage design criteria will flow to, and be contained on site within, landscaped or paved areas such that there is no increased risk of flooding to buildings and other vulnerable areas. Such flood flows should not be allowed to flow from the site onto adjoining property or highways.
5. Commercial development owners will be responsible for the maintenance of private drainage systems to ensure satisfactory performance. United Utilities will be responsible for the maintenance of any public sewers adjacent the site.
6. Any flood flows onto the site from adjoining property will either be retained on site safely or be encouraged to pass across the site such that there is no increased risk of flooding to buildings and other vulnerable areas.

9.0 OFF-SITE IMPACTS

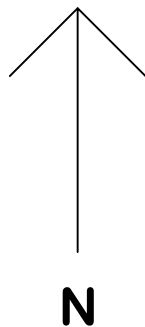
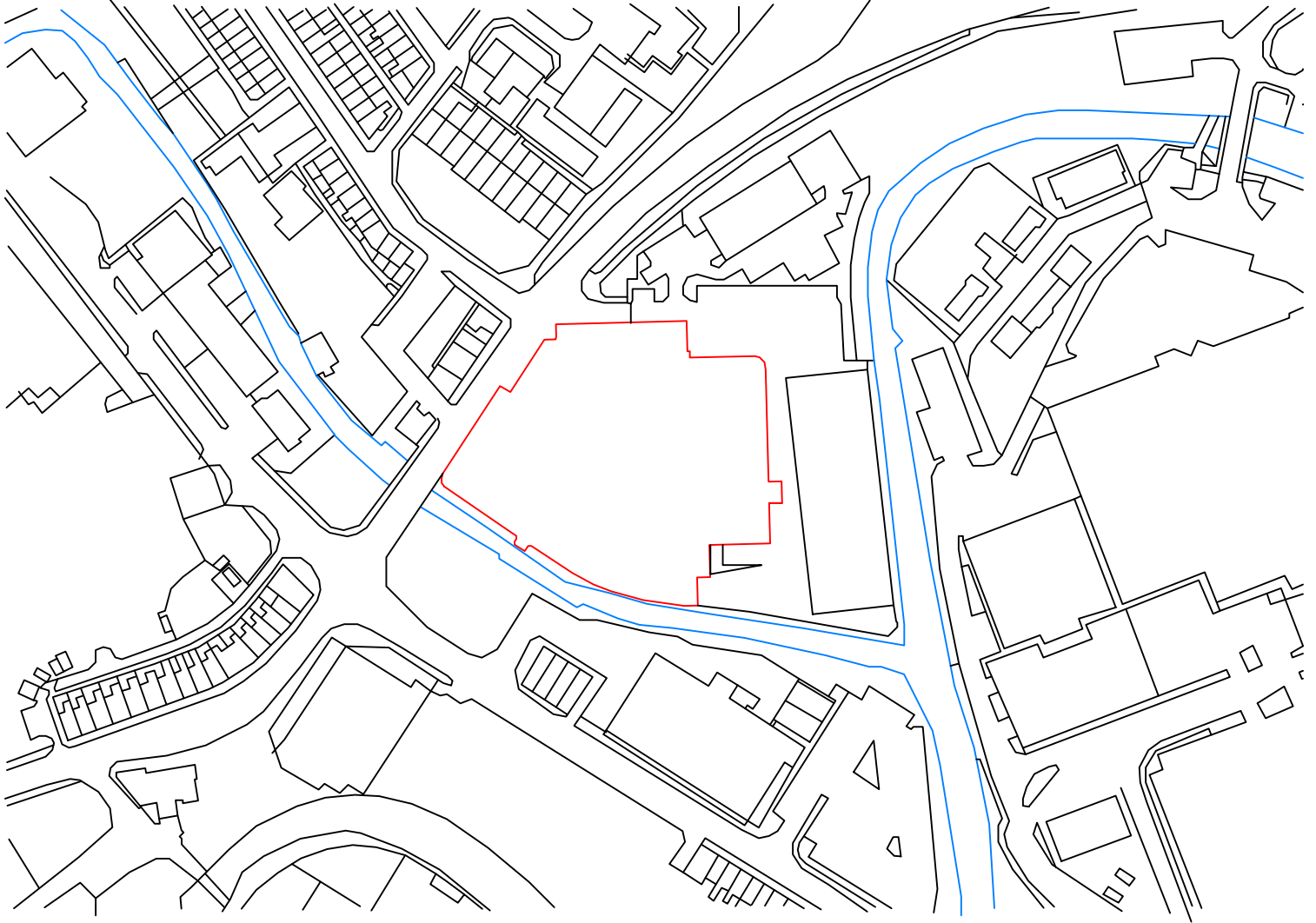
1. Proposed on-site drainage will be designed and constructed in accordance with Building Regulations.
2. All on-site roofs and pavings are to drain into the designed surface water drainage system, thereby ensuring there will be no off-site flood flows generated by the development.
3. There will be no significant off-site impacts as a result of this development.

10.0 RESIDUAL RISKS

1. The risk of flood flows entering and leaving the site will remain after development. This risk will be reduced as far as possible because the drainage designs will be such that there will be no flooding during all rainfall events up to and including the critical YR30 storm and no overland flows from the site up to the critical YR100 storm with appropriate allowance for increase in rainfall intensity as a result of future climate change.
2. By implementation of the flood procedures and by careful design of the flood protection measures as described above, all residual flood-related risks will be minimized as far as possible after the development has been completed.

Appendix A Development Plan

SITE LOCATION PLAN
AREA 2 HA
SCALE 1:1250 on A4



NOTE TO ALL CONTRACTORS: DO NOT SCALE FROM THIS DRAWING

EXISTING SITE PLAN
1:500 @ A0

www.nufitdesign.com

RIBA STAGE 2 ☐ RIBA STAGE 3 ☐ RIBA STAGE 4 ☐

ADDRESS
mitchell hey mill, rochdale

PROJECT

proposed change of use

REV. REVISION DETAILS

NOTE TO ALL CONTRACTORS: DO NOT SCALE FROM THIS DRAWING

PROPOSED SITE PLAN
1:500 @ A0

www.nufitdesign.com

RIBA STAGE 2	☐	RIBA STAGE 3	☐	RIBA STAGE 4	☐
ADDRESS					
mitchell hey mill, rochdale					
PROJECT					
proposed change of use					
DEV/	REVISION DETAILS				

Appendix B Rainfall intensities



Quick Storage Estimate

Variables

FSR Rainfall ▼

Return Period (years)

Region England and Wales ▼

M5-60 (mm)

Ratio R

Cv (Summer)

Cv (Winter)

Impermeable Area (ha)

Maximum Allowable Discharge (l/s)

Infiltration Coefficient (m/hr) 

Safety Factor

Climate Change (%)

Enter Maximum Allowable Discharge between 0.0 and 999999.0



Quick Storage Estimate

Results

Global Variables require approximate storage of between 11 m³ and 42 m³.

These values are estimates only and should not be used for design purposes.

Enter Maximum Allowable Discharge between 0.0 and 999999.0

Appendix C Environment Agency Flood Risk Data

GMMC286845AB Response attached from the Environment Agency

Dear Customer,

Thank you for your enquiry which was received on 10/11/22.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please find attached the data requested and my colleague's supporting comments below;

We have records of flooding affecting this site. The area was previously flooded in:
2008
2015
2019

We recommend that you also contact United Utilities and Rochdale District Council who may hold additional information (the former especially in relation to sewer flooding).

The Environment Agency offers an Insurance Related Letter, which outlines the risk of flooding from rivers and the sea and surface water. This may help when obtaining suitable insurance. If you would like to receive an Insurance Related Letter, please request this in your reply to this enquiry.

For further information on your property's flood risk, visit:

Long term flood risk website: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

Flood Map for Planning: <https://flood-map-for-planning.service.gov.uk/>

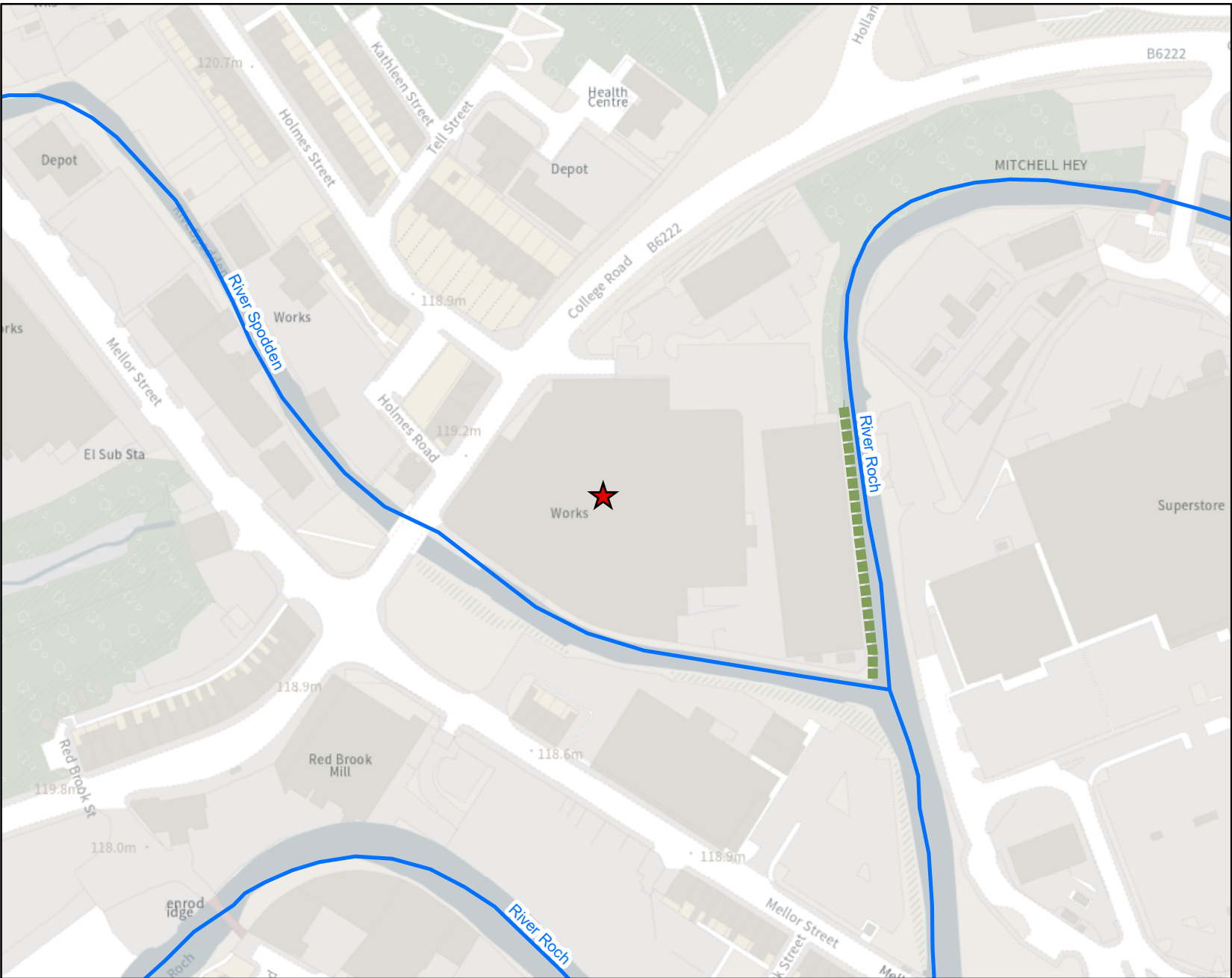
For additional flood risk information, advice and support in your area, please visit: <https://thefloodhub.co.uk/>

The National Flood Forum also offers advice on obtaining insurance, particularly for those properties deemed at high risk. This is helped by the government-backed scheme 'Flood Re' which enables those at risk to shop around for affordable insurance. They also offer advice on property resilience, flood prevention and mitigation measures which we hope you will find useful. For this information please visit: <http://www.nationalfloodforum.org.uk/>

For surface water information please use link: <https://check-long-term-flood-risk.service.gov.uk/map?easting=362125.07&northing=388310.97&map=SurfaceWater>

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

Flood Defence Map centred on College Road, Rochdale, OL12 6AE. Created on 15/11/2022 [GMMC286845AB]



1:2,000



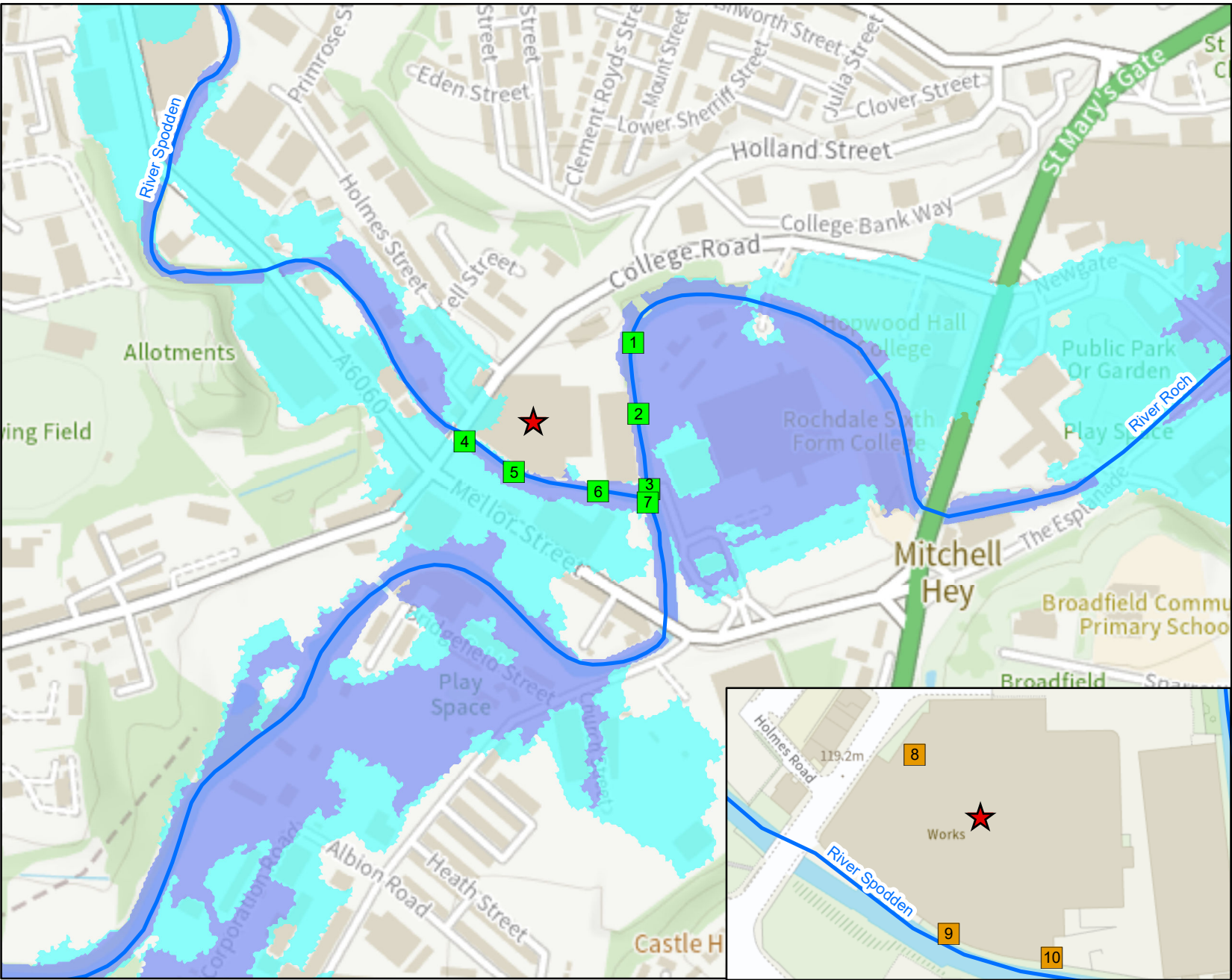
Legend

- ★ Site Location
- Main River

Defences

Asset ID
63750

Detailed Flood Map centred on College Road, Rochdale, OL12 6AE. Created on 16/11/2022 [GMMC286845AB]



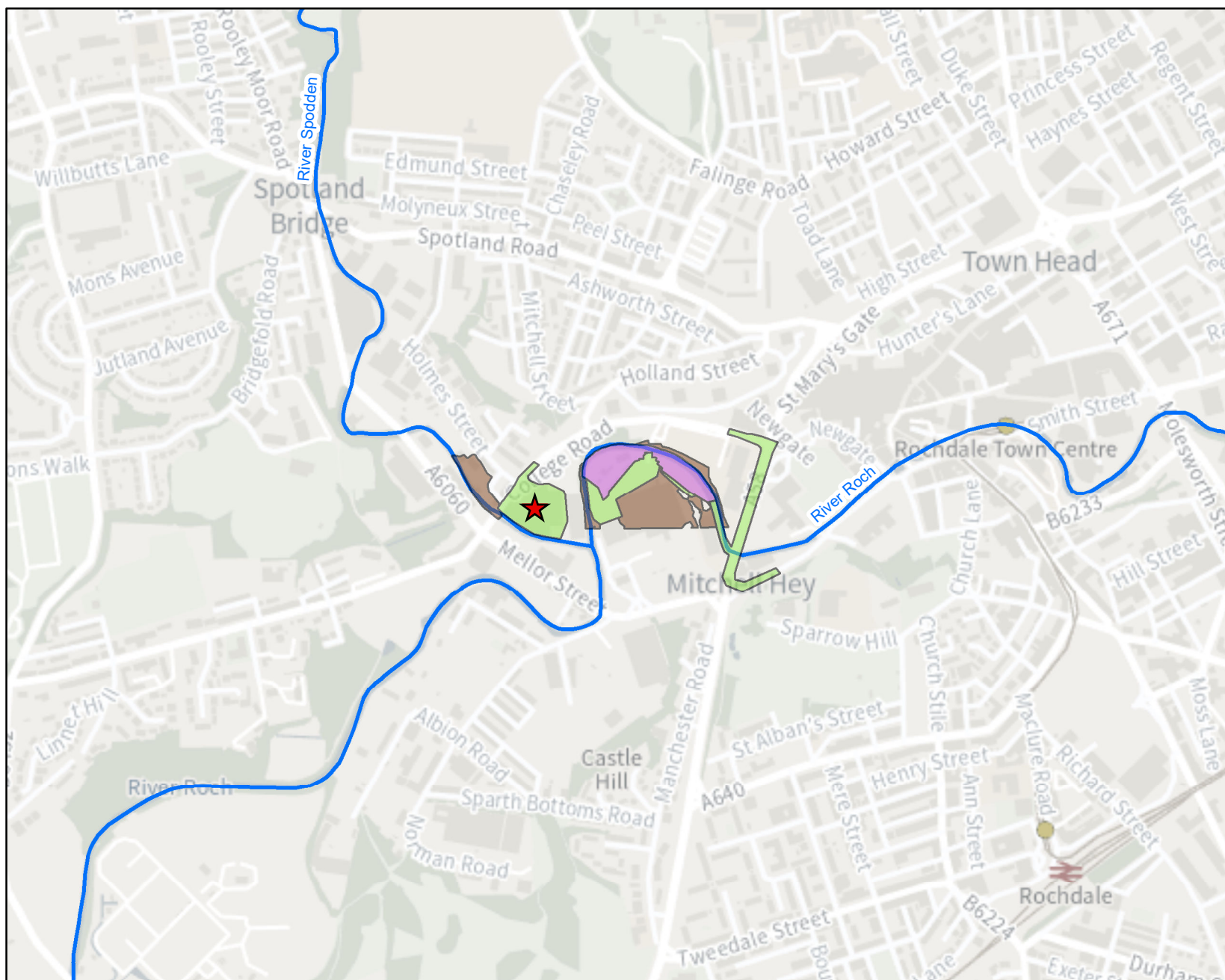
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Legend

- ★ Site Location
- Model Measurements
- 2D Measurements
- Main River
- Flood Zone 3
- Flood Zone 2

Recorded Flood Outline Map centred on College Road, Rochdale, OL12 6AE. Created on 16/11/2022 [GMMC286845AB]



1:10,001



Legend

★ Site Location

— Main River

Recorded Flood Outlines

Start Date

21/01/2008

26/12/2015

16/03/2019

28/07/2019

Map Reference	Model Node Reference	Easting	Northing	Data	Undefended							Defended						
					5 % AEP (1 in 20 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	5 % AEP (1 in 20 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)
1	ea013_0180_RCHM_1466_1i	389068	413358	Modelled Water Level (m aodN)	117.40	117.88	118.00	118.72	119.15	118.33	119.22	117.47	118.00	118.14	118.95	119.37	118.40	119.26
				Modelled Flow (cumecs)	53.64	54.66	54.50	44.16	43.47	54.99	44.08	53.58	54.82	54.68	42.16	41.42	54.83	41.63
2	ea013_0180_ROCHd4_1385	389073	413294	Modelled Water Level (m aodN)	117.25	117.65	117.76	118.60	119.08	118.13	119.17	117.31	117.81	117.97	118.87	119.32	118.26	119.22
				Modelled Flow (cumecs)	58.45	69.14	71.07	65.69	65.04	73.40	64.92	58.86	66.20	67.66	58.26	57.59	69.59	58.33
3	ea013_0180_ROCHd4_1235	389083	413228	Modelled Water Level (m aodN)	117.22	117.58	117.66	118.28	118.75	117.93	118.87	117.28	117.72	117.85	118.59	119.00	118.08	118.95
				Modelled Flow (cumecs)	58.46	72.80	78.28	106.40	115.78	92.36	115.36	58.88	71.21	74.97	104.47	116.76	89.04	108.89
4	ea013_0180_SPOd01_0184	388919	413270	Modelled Water Level (m aodN)	117.29	117.67	117.77	118.36	118.76	118.08	118.89	117.35	117.80	117.96	118.61	118.98	118.19	118.94
				Modelled Flow (cumecs)	25.22	36.33	39.53	43.54	44.99	42.98	50.58	25.19	36.25	39.43	43.70	45.23	43.35	51.00
5	ea013_0180_SPOd01_0125	388963	413243	Modelled Water Level (m aodN)	117.27	117.64	117.74	118.38	118.77	118.09	118.90	117.33	117.78	117.96	118.62	118.99	118.20	118.94
				Modelled Flow (cumecs)	23.65	33.74	36.32	40.28	41.54	39.57	45.11	23.53	33.26	35.55	40.13	41.20	39.40	44.64
6	ea013_0180_SPOd01_0048	389037	413225	Modelled Water Level (m aodN)	117.18	117.51	117.59	118.15	118.67	117.78	118.75	117.24	117.66	117.74	118.52	118.94	117.96	118.85
				Modelled Flow (cumecs)	26.31	39.23	42.74	52.37	54.58	53.36	64.38	26.48	39.49	45.84	53.11	56.11	56.20	62.74
7	ea013_0180_SPOd01_000	389061	413216	Modelled Water Level (m aodN)	117.22	117.58	117.66	118.28	118.75	117.93	118.87	117.28	117.72	117.85	118.59	119.00	118.08	118.95
				Modelled Flow (cumecs)	25.32	36.49	39.71	44.29	45.90	43.29	51.76	25.22	36.36	39.68	44.17	45.40	44.85	51.12

Map Reference	Model Node Reference	Easting	Northing	Data	Undefended			
					1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.1 % AEP (1 in 1000 year)
8	2D Levels	389557	413310	Modelled Water Level (m aodN)				119.57
9		389869	413247	Modelled Water Level (m aodN)	117.73	118.36	118.76	118.89
10		389005	413238	Modelled Water Level (m aodN)	117.65	118.24	118.71	118.81

Model data taken from Rochdale and Littleborough 2013

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

Notes: *Climate Change Scenario - 35% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.

Recorded Flood Outlines

Flood Event Code	Name	Start Date	End Date	Source of Flooding	Cause of Flooding
25184	EA01327_21 January 2008_River Spodden_Rochdale	21/01/2008	22/01/2008	Main River	Unknown
4079735	Rochdale Aada/College	26/12/2015	26/12/2015	Unknown	Unknown
4079741	Mellor Street	26/12/2015	26/12/2015	Unknown	Unknown
4085995	St Marys Gate	16/03/2019	16/03/2019	Drainage	Local drainage/surface water
4085996	ASDA, Rochdale Town Centre	16/03/2019	16/03/2019	Unknown	Unknown
4086003	College Road	16/03/2019	16/03/2019	Drainage	Local drainage/surface water
4087059	ROCH	28/07/2019	31/07/2019	Main River	Channel capacity exceeded (no raised defences)

Flood Defences

Start Date	Asset Type	Asset ID	Standard of Protection	Upstream Actual Crest Level (m aod)	Downstream Actual Crest Level (m aod)
01/01/2005	Engineered High Ground	63750	100	116.23	116.62

Appendix D WinDes Storage Estimates



Quick Storage Estimate

Variables

FSR Rainfall ▼

Return Period (years)

Region England and Wales ▼

M5-60 (mm)

Ratio R

Cv (Summer)

Cv (Winter)

Impermeable Area (ha)

Maximum Allowable Discharge (l/s)

Infiltration Coefficient (m/hr) 

Safety Factor

Climate Change (%)

Enter Maximum Allowable Discharge between 0.0 and 999999.0



Quick Storage Estimate

Results

Global Variables require approximate storage of between 11 m³ and 42 m³.

These values are estimates only and should not be used for design purposes.

Enter Maximum Allowable Discharge between 0.0 and 999999.0

Quick Storage Estimate

Variables

FSR Rainfall Cv (Summer)

Return Period (years) Cv (Winter)

Region Impermeable Area (ha)

M5-60 (mm) Maximum Allowable Discharge (l/s)

Ratio R Infiltration Coefficient (m/hr)

Safety Factor

Climate Change (%)

Enter Maximum Allowable Discharge between 0.0 and 999999.0

Quick Storage Estimate

Results

Global Variables require approximate storage of between 27 m³ and 94 m³.

These values are estimates only and should not be used for design purposes.

Enter Maximum Allowable Discharge between 0.0 and 999999.0

YR100cc



Quick Storage Estimate

Variables

FSR Rainfall	Cv (Summer)	0.750
Return Period (years)	Cv (Winter)	0.840
100	Impervious Area (ha)	0.675
Region	Maximum Allowable Discharge (l/s)	92
Map	M5-60 (mm)	19.000
Ratio R	Infiltration Coefficient (m/hr)	0.00000
0.261	Safety Factor	2.0
	Climate Change (%)	20

Analyse **OK** **Cancel** **Help**

Enter Maximum Allowable Discharge between 0.0 and 999999.0



Quick Storage Estimate

Results

Global Variables require approximate storage of between 59 m³ and 170 m³.

These values are estimates only and should not be used for design purposes.

Analyse **OK** **Cancel** **Help**

Enter Maximum Allowable Discharge between 0.0 and 999999.0

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