

Flood Risk Assessment.

PROPOSED RESIDENTIAL DEVELOPMENT Former Oakenrod School & Mill Sites Bury Road Rochdale OL11 5EU

Author: Daniel Slattery
Client: Hallmark Developments Ltd
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T J Booth Associates.
20A Eastgate St,
Rochdale,
Lancs,
OL16 1DH.
Tel: 01706 868288.
Email: office@tjba.co.uk

Flood Risk Assessment.

PROPOSED RESIDENTIAL DEVELOPMENT

Former Oakenrod School & Mill Sites

Bury Road

Rochdale

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Flood Risk Assessment.

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1 FRA 3.

Purpose of Flood Risk Assessment:

The purpose of the assessment inform & accompany a planning application for a residential development on the former adjacent Oakenrod School & Oakenrod Mill Sites.

Reference:

National Planning Policy Framework and the Planning Practice Guidance (flood risk & coastal change notes).

EA mapping data identifies the Application Site as being in Flood Zones 2 & 3, refer to EA Flood Zone Map in appendix. Flood Zone 2 is defined as land assessed as having between a 1:100 & 1:1000 or greater annual probability of river flooding (0.1-1%) in any year (land shown in light blue on the EA Flood Map). Flood Zone 3 is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any year (land shown in dark blue on the EA Flood Map).

The Planning Practice Guidance indicates the Flood Risk Vulnerability Classification (Table 2) for the proposed residential development end use to be 'More Vulnerable'. The Flood Risk 'Vulnerability' and Flood Zone 'Compatibility' matrix (Table 3) indicate that the exception test should be passed for more vulnerable development in flood zone 3 areas.

A flood risk assessment was previously undertaken for the Site c2007 by RPS Group. However, flood model data for the Roch valley has since been updated.

Preliminary or Full Flood Risk Assessment:

Full to support planning application.

1.1 Plans.

1.1.1 Location Plan.

See Location Plan in Appendix showing the area features.

The Site is made up of two former separate properties - Oakenrod School adjacent to Bury Road, and the former Oakenrod Mill adjacent the River Roch to the south.

Access to the Site is off Bury Road to the northeast corner. The access track is between the two nominally central to the Site.

The River Roch flows NE-SW past the Site, flowing over a weir nominally halfway along the south boundary.

1.1.2 Site plan.

Refer to Proposed Plans in the appendix.

Oakenrod Mill historically abstracted water from the upper reach of the River Roch via sluices and storage reservoirs, driving 2No. water wheels initially (later replaced with a single turbine generator),



with an outlet to the lower reach of the weir central to the south boundary. The mill proper was demolished in the late 1960s/early 1070s, with some smaller units remaining until the early 2000s. Most of the sluices and channels were infilled at the time of demolition.

The School was demolished c2013 in readiness for planning applications for development.

The Application Site now encompasses both Sites.

The proposal is for a residential housing development, accessed via a new road approximately in place of the former access through the centre of the Site. The dwellings are to be laid out around the central access and comprise semi-detached, detached, and apartment buildings generally with driveways to the front and garden areas to the rear.

Refer to Proposed Plan in appendix.

1.2 Derivation of Data, Surveys and Models.

1.2.1 Existing and proposed topography.

A topographic survey for the Site was most recently undertaken c2008, and critically for a flood risk assessment – levels presently remain the same as in 2008 to the south part of the Site in areas of flood risk.

Only in the location of the former school, away from areas at risk of flooding, have changes occurred – with demolition of the school building c2013.

With particular significance to the flood risk assessment is the north bank of the Roch which forms the perimeter of the Application Site. Due to the presence of the weir in this location, there are both upper and lower reaches with associated flood levels for each.

The upper reach of the Roch has a top of bank level to the northeast of the Site (at Oakenrod Bridge) of approx. 117.00m aOD down to approx. 116.40maOD close to the weir. The top of the retaining wall to the former sluices of the mill adjacent the weir is between 115.91-116.00maOD, and the adjacent weir crest is set at 113.74m aOD. The downstream bank level is approximately 114.50m aOD.

1.3 Assessments.

1.3.1 Existing surface water system.

The main body of the Site shall be calculated as greenfield with contributing existing hard standing areas, subject to allowable overland flow up to and including the 100yr rainfall event.

Site total area: 1.75Ha.

ESTIMATED GREENFIELD RUNOFF

ATTENUATION DESIGN

In accordance with CIRIA publication C753 - The SUDS Manual

Tedds calculation version 1.0.04

Pre post runoff method

Site characteristics

Location	Manchester
Hydrological region	10
Soil type (Wallingford Procedure W.R.A.P map)	4
Standard percentage runoff	SPR = 0.47
Average annual rainfall	SAAR = 1147 mm
5 year return period rainfall of 60 minute duration	M5_60min = 20.0 mm
Ratio 60-minute to 2 day rainfalls of 5 year return	r = 0.30
Rainfall intensity increase due to global warming	p _{climate} = 0%
Routing coefficient	C _r = 1.30
Volumetric runoff coefficient	C _v = 0.75

Catchment details

Subcatchment	Name	Area (ha)	PIMP (%)	Impermeable area (ha)
1	Oakenrod	1.75	18.0	0.32

Subcatchment	Name	Area (ha)	PIMP (%)	Impermeable area (ha)
Total		1.75	18.0	0.32

Greenfield runoff rates

Catchment area

Greenfield runoff rate (50 hectare site)

Greenfield runoff rate

Greenfield runoff rate per unit area

AREA = **50.00** hectare

$Q_{rural} = 0.00108m^3/s * (AREA/1km^2)^{0.89} * (SAAR/1mm)^{1.17} * SPR^{2.17} = 430.2 \text{ l/s}$

$Q = Q_{rural} / AREA * A = 15.1 \text{ l/s}$

$Q_A = Q / A = 8.6 \text{ l/s/hectare}$

Estimated site discharges

FSR growth rate (1 year)

Discharge (1 year)

FSR growth rate (30 year)

Discharge (30 year)

FSR growth rate (100 year)

Discharge (100 year)

FSR_{1yr} = **0.87**

Q_{1yr} = $Q * FSR_{1yr} = 13.1 \text{ l/s}$

FSR_{30yr} = **1.70**

Q_{30yr} = $Q * FSR_{30yr} = 25.6 \text{ l/s}$

FSR_{100yr} = **2.08**

Q_{100yr} = $Q * FSR_{100yr} = 31.3 \text{ l/s}$

In accordance with the BRO Strategic Flood Risk Assessment, and national drainage guidelines, the Site should achieve as closely as possible existing greenfield flow rate in the proposed development up to and including the 100yr rainfall event.

Pass forward flow rates should be restricted to a maximum flow rate of ~31l/s for the 100yr rainfall event.

1.3.2 Proposed surface water system.

The proposed Site will comprise impermeable access roads to adoptable RMBC specification. Roof areas will also be impermeable.

Smaller areas of hardstanding such as patios, pathways, and drives can be made permeable to mimic natural subsurface flows.

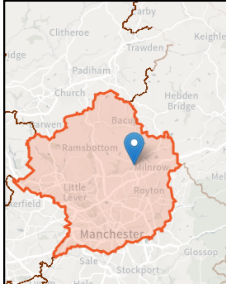
Permeable areas of hardstanding offer SUDS compliant systems in accord with the NPPF/NPPG, and allow slow groundwater percolation through subbase materials reducing the reliance on attenuation systems required and reserved for totally impermeable areas.

1.3.3 Climate change impacts.

Estimates should be made of climate change impacts on probabilities. The assessment should ensure that the development meets an acceptable level of flood defence for the design life of the development.

As identified in Section 1, the vulnerability of the development is 'More Vulnerable'.

Predominantly the Site is within Flood Zone 1, however a small portion of the southwest part of the Site is within Flood Zone 3. EA guidance specifies climate change allowances by management catchment areas specific to the catchment the Site is within. Peak Flow River Maps have been produced which specify the climate change allowances to be used in a flood risk assessment.



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

The EA guidance indicates the peak flow rates that should be used for the vulnerability classification:

- essential infrastructure – use the higher central allowance.
- highly vulnerable – use central allowance (development should not be permitted in flood zone 3a).
- more vulnerable – use the central allowance.
- less vulnerable – use the central allowance.

- water compatible – use the central allowance.

Given the 'More Vulnerable' risk category, the central allowance climate change multiplier should be used as the basis for assessment. With the development proposal for a residential end use, the 2080s timeline is appropriate, which indicates a 35% climate change allowance should be used on peak river flows as a minimum.

The Environment Agency have provided data with a 35% increase for climate change allowance on the 100yr return period event.

1.3.4 Fluvial morphological impacts.

The Site contours are to be retained with above ground rubble mounds removed, and small hollows such as former tanks below bank level infilled etc. There will be no net loss of floodplain as a result of development.

1.3.5 Potential sources of flooding.

Flood risk maps and flow/level data were obtained from the Environment Agency, (refer to appendix).

a. Fluvial flooding from main rivers.

The flood depth maps provided by the EA suggest the main source flooding locally is from the adjacent River Roch.

Due to the weir central to the S boundary of the Site, the upper and lower reaches have two different flood levels.

Flood data obtained from the Environment Agency indicated the following:

- Node 4 - adjacent to the northeast corner of the Site adjacent Oakenrod Bridge and nominally representative of the upstream reach
- Node 5 - nominally central to the downstream reach and representative of this area.

Due to the distance to the weir from the Node 4, an estimate of flood level has been derived from Node 3 & 4 levels to give a more accurate estimate of flood flows at the upper edge of the weir, which will impact the lower reach of the Site due to overland flow.

As the Site does not have traditional flood defences, the undefended model has been used.

RIVER ROCH UNDEFENDED MODEL		
Return Period	100yr	100yr +35%
Node 4 Oakenrod Bridge	116.21	116.36
Level at weir (upper)	115.97	116.07
Node 3 downstream reach	114.15	114.76

The upstream reach of the development is generally protected with the riverbank top nominally 117.00-116.40maOD which accounts for the 100 & 100yr+CC events.

The break between the upstream side of the Site and the downstream side is controlled by the weir and the adjacent (higher) former sluice structure from the historic mill the top of structure level is between 115.91-116.00maOD. Due to the flood levels estimated in this part of the Site, approximately 60mm of water overflowing the sluice structure will occur in the 100yr event, and approximately 160mm in the 100+cc event. Due to the fall in level downstream of this point, the floodwater routes around and back into the river. This flood flow routing corroborates the Flood Zone outline noted on the Environment Agency Flood Maps.

The lower part of the Site is mostly protected from 100yr flood levels in the lower reach, with the top of bank within 50m of the weir generally above 114.20maOD, and a large rubble bund in this location up to 118.00maod. The last 20m of the Site is slightly lower, with top of bank & GL in

this area between 113.5-114.20maOD, and so some flooding occurs in the 100yr level, however, only amenity public open space is proposed in this area.

- b. Fluvial flooding from minor watercourses / drainage channels.

Minor watercourses do not impact the development.

- c. Surface Water Risk.

The main surface water risk is considered in the above fluvial flooding from main rivers due to the proximity of the watercourse from the development and the subsequent effect of overland flow from the river. No other sources are considered to pose a particular risk to Site.

- d. Overland flow.

Overland flow will start to occur approximately in the 100yr fluvial flood event, overflowing the former mill sluice wall and back into the downstream reach of the river.

Flow paths will be maintained within the development as no construction is proposed in this area.

- e. Loss of Floodplain.

There will be no loss to the floodplain caused by the development. The flood maps show much of the upper and lower levels of the Site to be outside of Flood Zones 2 & 3.

There is a small part of the lower Site within Flood Zones 2 & 3 which is mainly due to the overland flow element from the upper reach of the weir in flood conditions. However, only amenity public open space is proposed in this area.

- f. Springs and high groundwater levels.

It is likely that ground water levels are controlled primarily by river levels in the local area and therefore present no more of a risk.

- g. Surcharging of local drainage & sewerage systems.

The Site is not within a Critical Drainage Area and thus no surcharging of sewers or drainage systems is known to exist locally.

- h. Artificial Watercourse/Canals.

The Rochdale Canal is the closest artificial watercourse but is 1.5km distant.

- i. Reservoirs.

There is a risk of reservoir flooding in this area, however, the Environment Agency indicates the risk from of flooding is highly unlikely. In addition, flooding from reservoirs is thought to be a much lower risk than that from fluvial sources such as the River Roch, which is the primary risk factor in the area.

Reservoirs that could potentially affect this area are:

Naden Higher, Spring Mill, Hollingworth Lake, Piethorn, Chelburn Upper, Kitcliffe, Ogden, Cowm, Blackstone Edge, Watergrove, Rooden.

1.4 Design.

The 100+35% fluvial flood level has been given as the design level for the Site. Given the proximity of the watercourse, and the end use of the Site, it will be prudent to fix design water levels at least 300mm above the 100+35% flood level to ensure no flooding occurs to property in these events and as a precaution. The properties should be protected by the banks in this event also.

Flood levels for each reach are given below:

Upper Reach:

- 100yr+35% fluvial flood level 116.36maOD + 300mm = 116.66maOD FFL.

Lower Reach:

- 100yr+35% fluvial flood level 114.76maOD + 300mm = 115.06maOD FFL.

2 Emergency Evacuation Plan

2.1 Section 1-4. Scope, Location, Risk & Mitigation

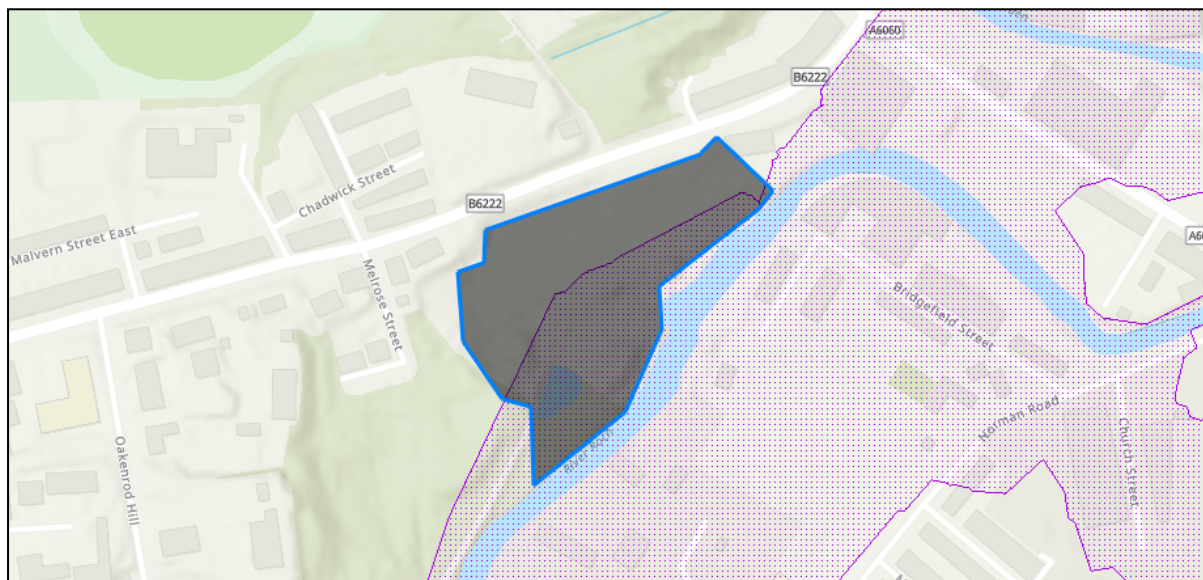
The Adept/Environment Agency guidelines indicate the requirements for flood risk emergency plans (EP) for new development. An EP would generally contain the following sub-sections:

- Section 1. Scope, Objectives and Background.
- Section 2. Location and Proposal.
- Section 3. Risk Summary.
- Section 4. Mitigation Measures.
- Section 5. Flood Warnings and Associated Actions.
- Section 6. Safe Access and Escape.
- Section 7. Temporary Refuge.
- Section 8. After the Flood.
- Section 9. List of Roles.
- Section 10. Plan Upkeep and Awareness.

The previous sections of this report have covered the information required for sub-sections 1-4 noted above required for an EP, and thus this EP section shall start at subsection 5 – Flood Warnings & Associated Actions.

2.2 Section 5. Flood Warnings and Associated Actions

The Site is within a flood risk warning area, refer to flood alert map below:



FLOOD INFORMATION SERVICE

Dwellings or businesses in England can sign up for the Environment Agency free flood alert service by phone, email or text message, if either homes or businesses are at risk of flooding.

The Site is within the Environment Agency Flood Warning Area and it is strongly advised that the Owner/Tenant, must sign up to receive flood warnings via the Environment Agency Flood Information Service.

The current & simple to follow flood alert/warnings used by the Environment Agency, including a simple/easy to understand statement of what is required for each as follows:

Flood alert - Prepare



- prepare a bag that includes medicines and insurance documents
- check flood warnings

Flood warning - Act



- turn off gas, water and electricity
- move things upstairs or to safety
- move family, pets and car to safety

Severe flood warning - Survive



- call 999 if in immediate danger
- follow advice from emergency services
- keep yourself and your family safe

The Flood Information Service can be found on the internet using the following URL: <https://flood-warning-information.service.gov.uk/warnings>.

FLOODLINE

Alternatively, people at risk from flooding and without access to the internet can register for flood alert warnings & get in touch by calling Floodline on telephone: 0345 988 1188 OR Type talk: 0345 602 6340 (for the hard of hearing), which is a 24hr service.

For flood alerts/warnings, people will need to provide the following information:

- the address to be registered.
- a phone number for the person or people requesting the service can be contacted on 24hrs a day.
- an email address for the person or people requesting the service.

FLOOD WARDENS

Flood Wardens operate in some areas to provide alerts to the local community when flood warnings are issued. Contact Floodline on 0845 988 1188 to find out if this service is available in the area.

SIRENS/LOUDHAILERS

Sirens/loudhailers operate in some areas at risk from extreme flooding to alert residents that a flood warning is in force. Contact Floodline on 0845 988 1188 to find out if this service is available in the area.

GENERAL MEDIA

Media such as the Flood Information Service website details maps and current (up-to-date) area specific advice for all areas of England, including the type of flooding and flood alert/warning level in force for those areas. Other websites such as the Met Office have their own flood alert service. TV & radio news channels give warnings.

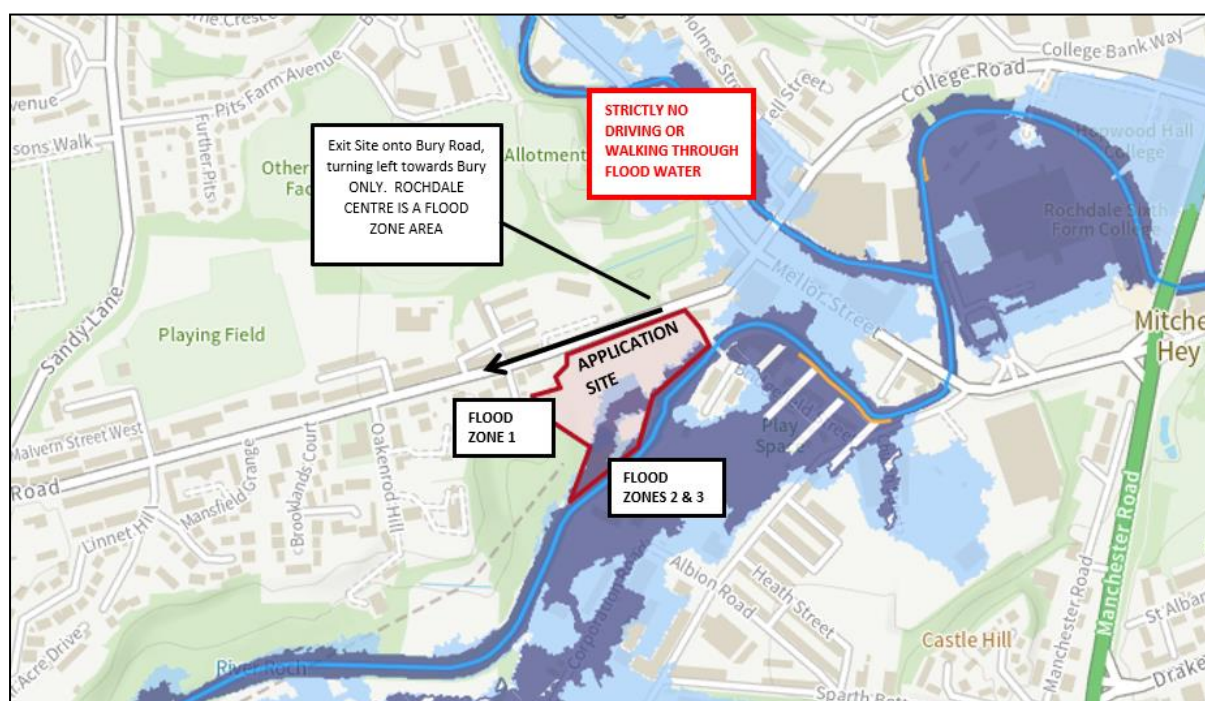
2.3 Section 6. Safe Access and Escape

In flood risk areas, safe access and exit from new developments should be in accordance with the Adept EP guidance, and that of the referenced background documentation Defra/EA R&D Technical Report FD2320/TR2 and should be in the following order of preference:

- Safe dry route for people and vehicles.
- Safe dry route for people.
- If a dry route for people is not possible, a route for people where the flood hazard (in terms of depth and velocity of flooding) is low and should not cause a risk to people.
- If a dry route for vehicles is not possible, a route for vehicles where the flood hazard (in terms of depth and velocity of flooding) is low to permit access for emergency vehicles. However, the public should not drive vehicles in floodwater.

Much of the Site is within Flood Zone 1, as is the local and wider area to the west/northwest thus the escape route is given as a safe dry route for people & vehicles.

It is important that when evacuating the Site, that habitants only exit to the west towards Bury and do not try to travel through the town centre which may well be inundated with flood waters, refer to Evacuation Plan below:



The Environment Agency guidance is clear: when a flood alert to PREPARE is issued, preparations should be enacted in case a further flood warning to ACT is given, and business owners should be ready for this scenario.

When a flood warning to ACT is issued, people should follow instructions to evacuate as per the above Emergency Evacuation Route Plan— assuming a flood event could be imminent.

This route provides the simplest path for pedestrians, users with specific needs such as wheelchair users or those with pushchairs as well as vehicular users prior to surface flooding.

HOWEVER - DRIVING OR PEDESTRIAN MOVEMENTS SHOULD NOT BE ATTEMPTED THOROUGH FLOOD WATERS.

2.4 Section 7. Temporary Refuge

The Site is suitable for temporary refuge in an extreme storm event if required, as proposed floor levels are to be set above the design flood level.

The Site should not need evacuation prior to a flood event, but people should be vigilant and prepared to ACT by the Flood Warning Service.

If flood advice is required as an emergency, the Environment Agency has specially trained Flood Support Officers who provide information and advice during and after floods. Call Floodline (24-hour service) on 0345 988 1188 or type-talk (for the hard of hearing) on 0345 602 6340 to find out if they are active locally.

2.5 Section 8. After the Flood

Clean-up will be required following an extreme storm event, and the following procedures should be followed:

- Contact your insurance company.
- Cleaning and repairing the property.

Specialist advice will likely be required and may need to be undertaken in accordance with insurance company requirements.

Photographs to document damage and record the flood water height.

Flood water can be hazardous and contain sewage, chemicals, and animal waste. Care should be taken with personal protective equipment.

Contact the LPA about disposing of large flood damaged items.

- Stay healthy – ensure services are running properly and potable water does not have a change in colour, taste or smell. Ensure food touched by flood water is disposed of.
- Get help via Floodline if required.
- Get emotional support if required from family, friends, GP, or charity organisations.
- Apply for financial aid if required. Apply to the local council for eligibility.

2.6 Section 9. List of Roles

It is the Owner/Tenants responsibility to follow this EP and keep up to date with current flood warning advice.

2.7 Section 10. Plan Upkeep and Awareness

The Owner/Tenant should ensure they are familiar with the Evacuation Plan and procedures and keep up to date with latest Environment Agency Guidance.

3 Conclusion & Residual risks.

Only parts of the southwest corner of the Site are in the likely flood zones and liable to flooding in extreme events. However, these areas are to be taken up by public open space and amenity areas, free from construction.

No floodplain, or flood flow routes will be lost due to development.

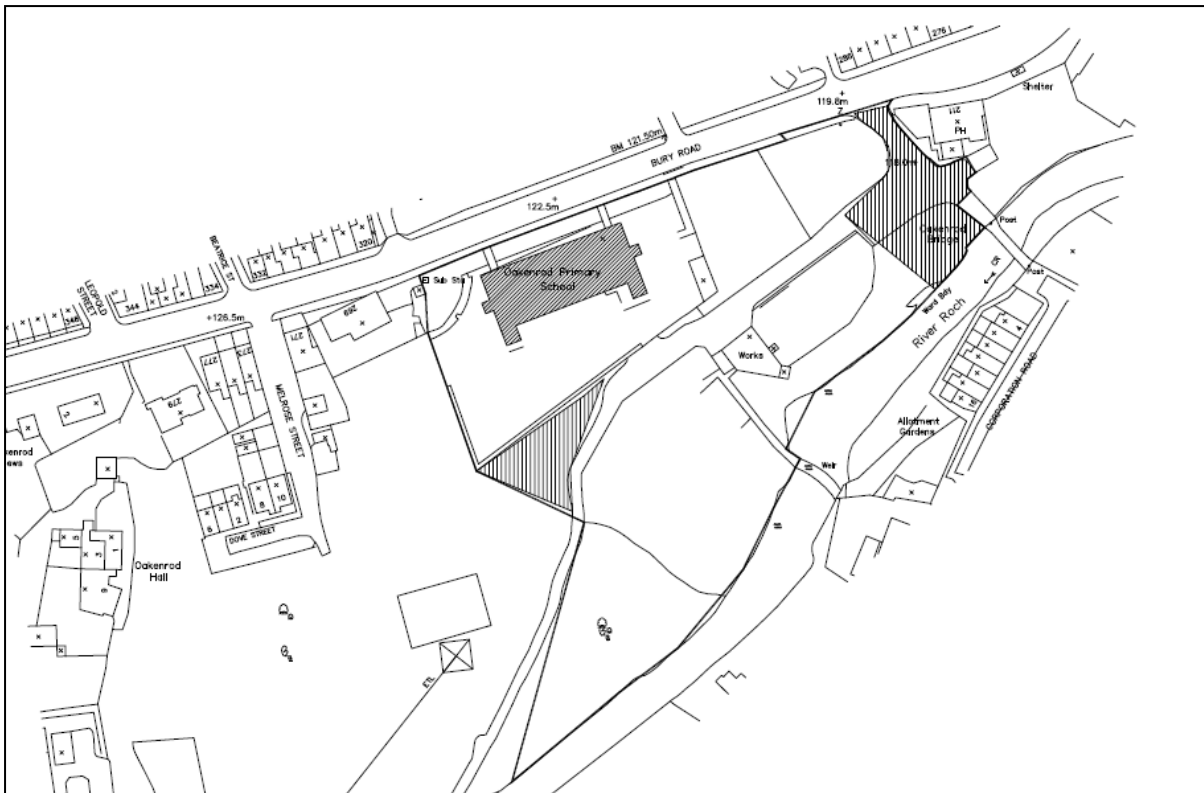
Dwelling finished floor levels are to be above the 100yr+35% flood level ensuring properties are safe from flooding though the lifetime of the development.

An Evacuation Plan is in place should it be required, and to inform developers and residents of the local flood risk, and safe escape routes if required.

No other residual risks.

4 Appendix.

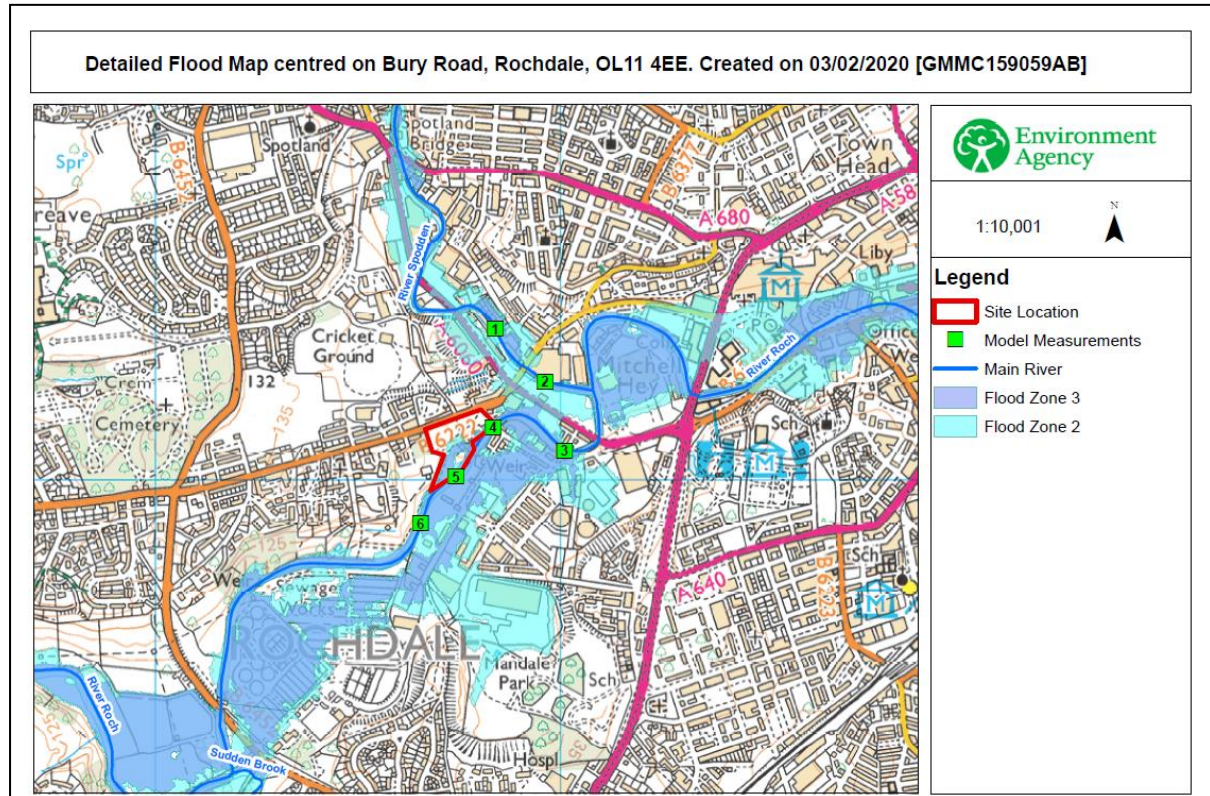
4.1 Location Plan.



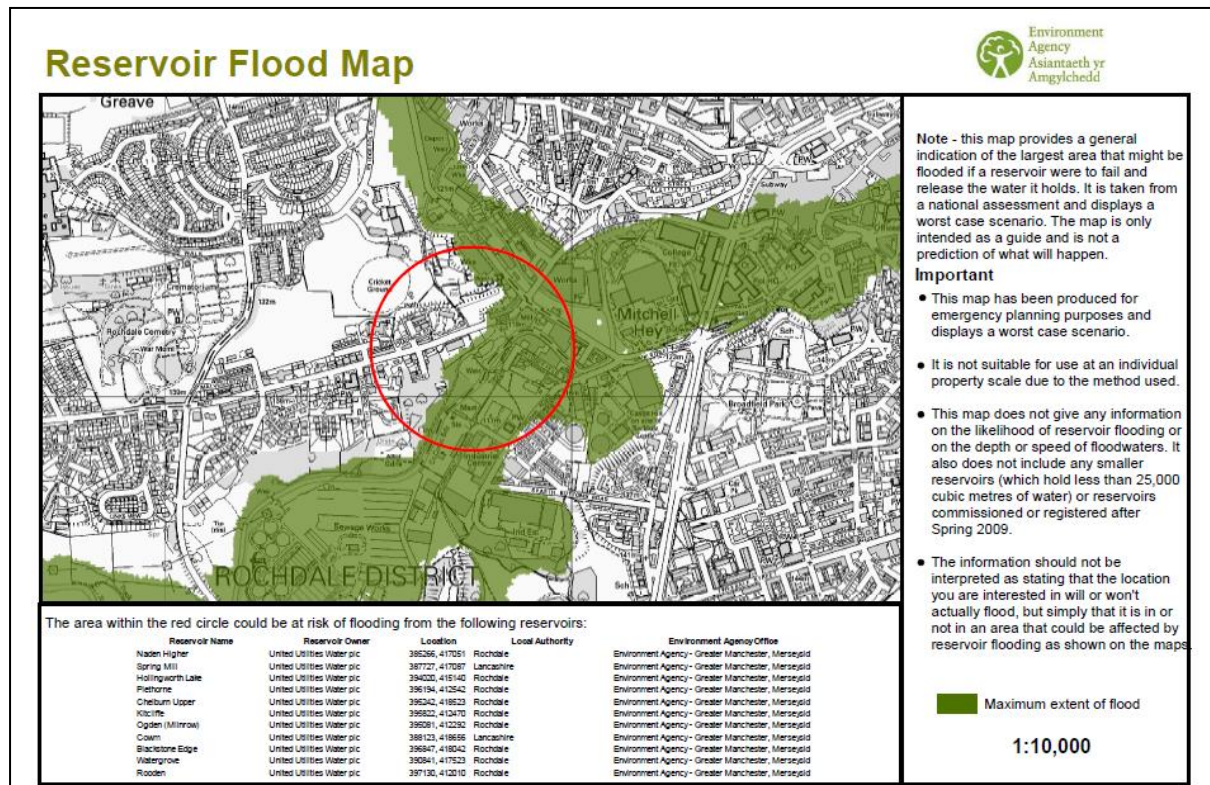
4.2 Proposed Plans.



4.3 Environment Agency Flood Zone Map & Level Data for the Site.



4.4 Environment Agency Reservoir Flood Map.



4.7 NPPF Planning Practice Guidance Table 1.**Table 1: Flood Zones**

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's [Flood Map for Planning \(Rivers and Sea\)](#), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

4.8 NPPF Planning Practice Guidance Table 2.**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 waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

4.9 NPPF Planning Practice Guidance Table 3.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	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 should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and **Exception Tests** do not need to be applied to **minor developments** and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.



4.10 Environment Agency Climate Change Allowances.

Table 1 peak river flow allowances by river basin district (use 1961 to 1990 baseline)

River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
North West	Upper end	20%	35%	70%
	Higher central	20%	30%	35%
	Central	15%	25%	30%

In flood zone 2

- essential infrastructure – use the higher central and upper end to assess a range of allowances
- highly vulnerable – use the higher central and upper end to assess a range of allowances
- more vulnerable – use the central and higher central to assess a range of allowances
- less vulnerable – use the central allowance
- water compatible – use none of the allowances

In flood zone 3a

- essential infrastructure – use the upper end allowance
- highly vulnerable – development should not be permitted
- more vulnerable – use the higher central and upper end to assess a range of allowances
- less vulnerable – use the central and higher central to assess a range of allowances
- water compatible – use the central allowance

4.11 Application of Precautionary Allowances.

2) Assessment of climate change impacts on fluvial flooding

Table A below indicates the level of technical assessment of climate change impacts on fluvial flooding appropriate for new developments depending on their scale and location. This should be used as a **guide only**. Ultimately, the agreed approach should be based on expert local knowledge of flood risk conditions, local sensitivities and other influences. **For these reasons we recommend that applicants and / or their consultants should contact the Environment Agency at the pre-planning application stage to confirm the assessment approach, on a case by case basis.** Table A defines three possible approaches to account for flood risk impacts due to climate change, in new development proposals:

- **Basic:** Developer can add an allowance to the 'design flood' (i.e. 1% annual probability) peak levels to account for potential climate change impacts. The allowance should be derived and agreed locally by Environment Agency teams.
- **Intermediate:** Developer can use existing modelled flood and flow data to construct a stage-discharge rating curve, which can be used to interpolate a flood level based on the required peak flow allowance to apply to the 'design flood' flow.
- **Detailed:** Perform detailed hydraulic modelling, through either re-running Environment Agency hydraulic models (if available) or construction of a new model by the developer.

Table A – Indicative guide to assessment approach

VULNERABILITY CLASSIFICATION	FLOOD ZONE	DEVELOPMENT TYPE		
		MINOR	SMALL-MAJOR	LARGE-MAJOR
ESSENTIAL INFRASTRUCTURE	Zone 2	Detailed		
	Zone 3a	Detailed		
	Zone 3b	Detailed		
HIGHLY VULNERABLE	Zone 2	Intermediate/ Basic	Intermediate/ Basic	Detailed
	Zone 3a	Not appropriate development		
	Zone 3b	Not appropriate development		
MORE VULNERABLE	Zone 2	Basic	Basic	Intermediate/ Basic
	Zone 3a	Basic	Detailed	Detailed
	Zone 3b	Not appropriate development		
LESS VULNERABLE	Zone 2	Basic	Basic	Intermediate/ Basic
	Zone 3a	Basic	Basic	Detailed
	Zone 3b	Not appropriate development		
WATER COMPATIBLE	Zone 2	None		
	Zone 3a	Intermediate/ Basic		
	Zone 3b	Detailed		

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NOTES:

- Minor: 1-9 dwellings/ less than 0.5 ha | Office / light industrial under 1ha | General industrial under 1 ha | Retail under 1 ha | Gypsy/traveller site between 0 and 9 pitches
- Small-Major: 10 to 30 dwellings | Office / light industrial 1ha to 5ha | General industrial 1ha to 5ha | Retail over 1ha to 5ha | Gypsy/traveller site over 10 to 30 pitches
- Large-Major: 30+ dwellings | Office / light industrial 5ha+ | General industrial 5ha+ | Retail 5ha+ | Gypsy/traveller site over 30+ pitches | any other development that creates a non residential building or development over 1000 sq m.



3) Specific local considerations

Where the Environment Agency and the applicant and / or their consultant has agreed that a 'basic' level of assessment is appropriate the figures in Table B below can be used as a precautionary allowance for potential climate change impacts on peak 'design' (i.e. 1% annual probability) fluvial flood level rather than undertaking detailed modelling.

Table B – Local precautionary allowances for potential climate change impacts

Watercourse	Central	Higher Central	Upper
All	0.15m	0.24m	0.48m

4.12 References.

- i. Environment Agency Flood Maps.
- ii. Environment Agency Flood & Flow Data.
- iii. Government Planning Practice Guidance.
- iv. EA/DEFRA - Flood Risk Assessment: Standing Advice.