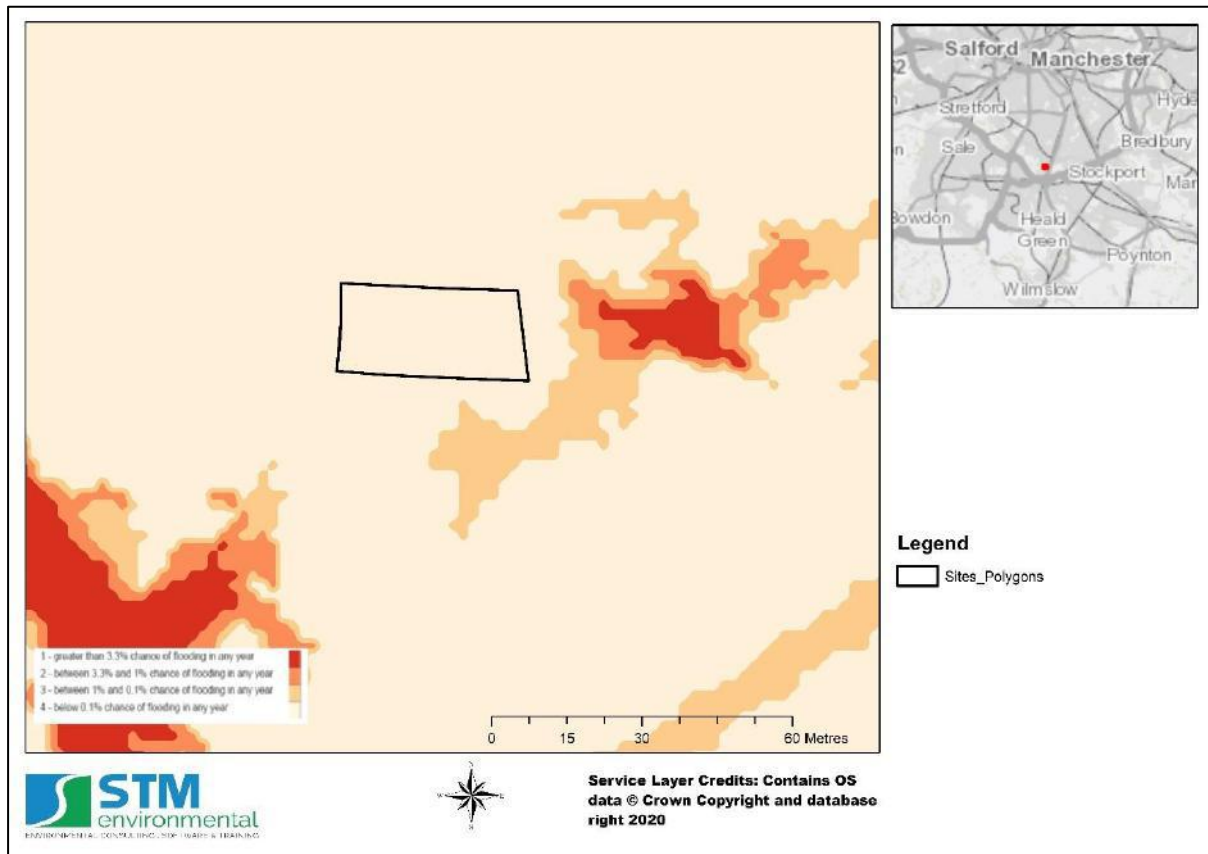




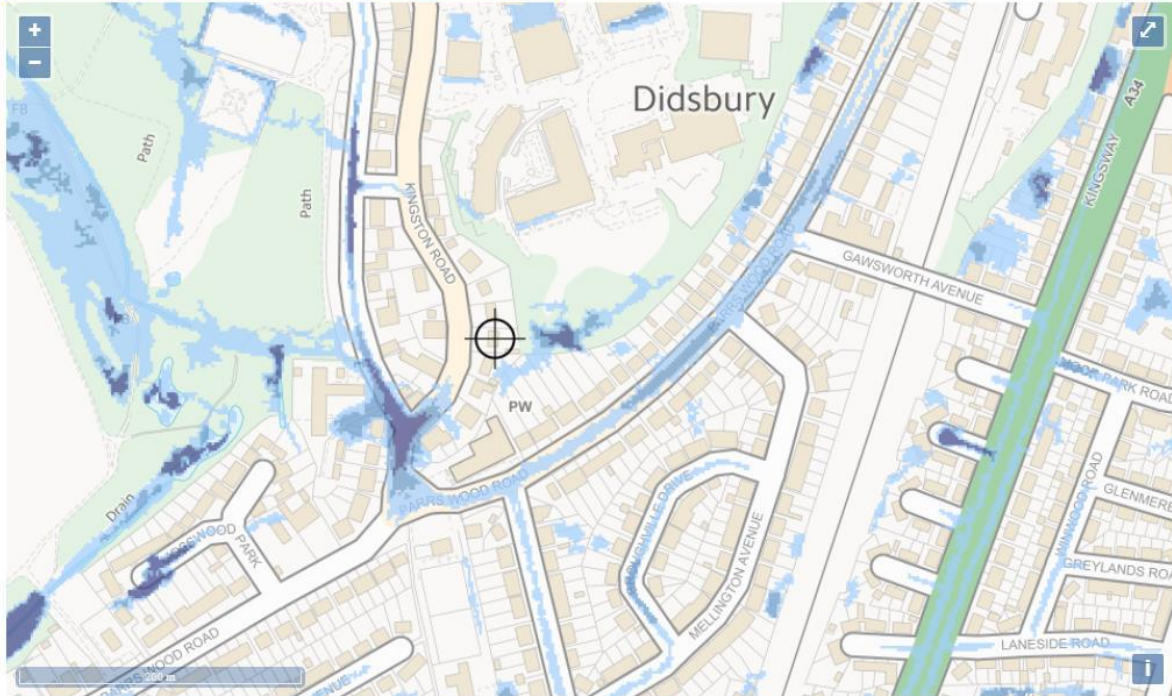
17.8.2 Long Term Flood Risk Maps

Flood risk

Extent of flooding

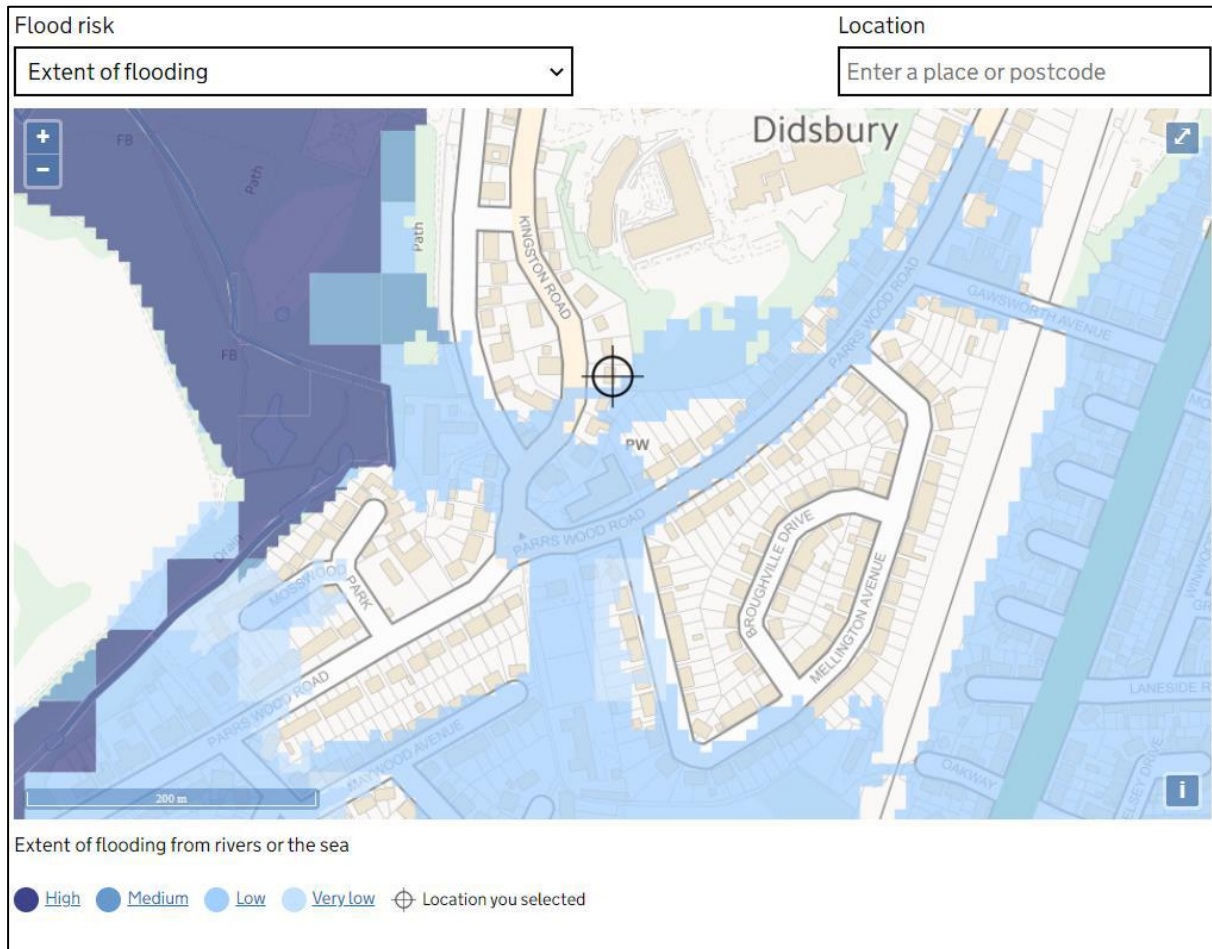
Location

Enter a place or postcode

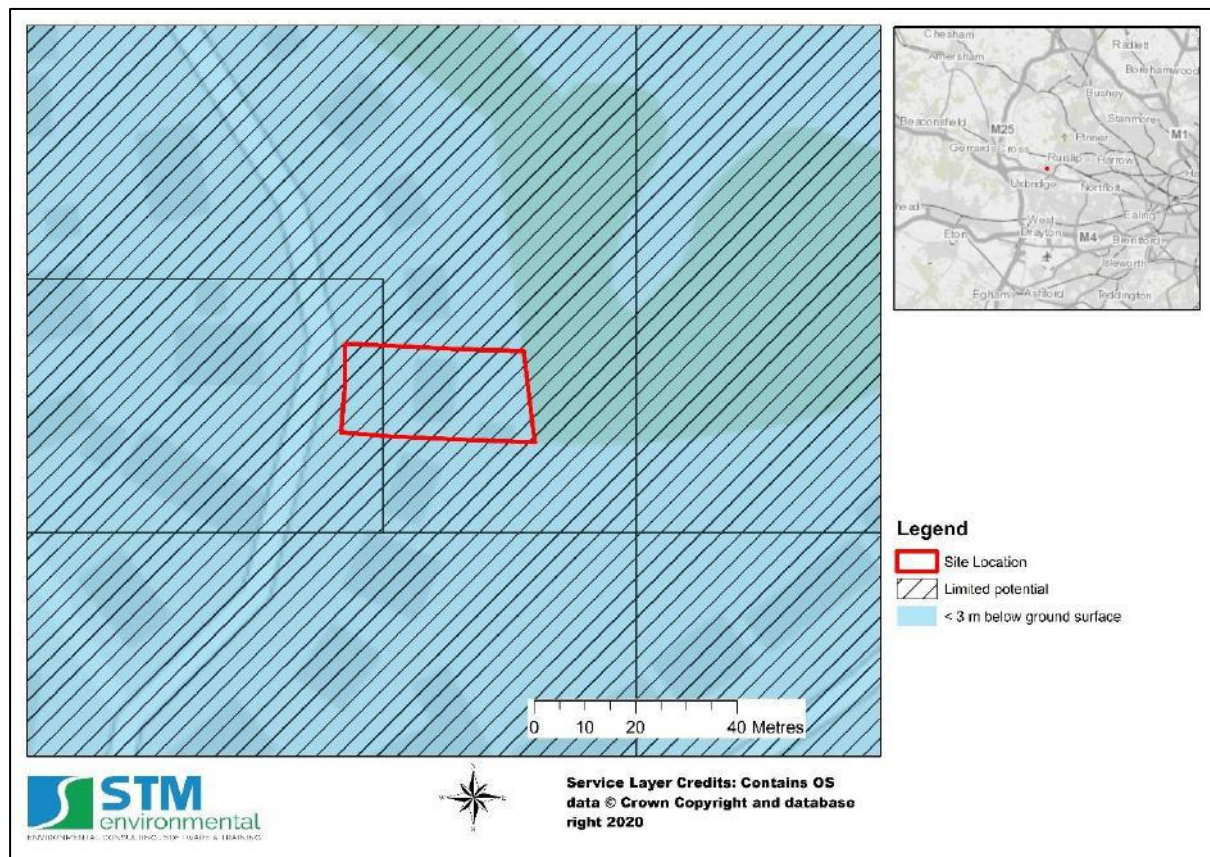


Extent of flooding from surface water

● High
 ● Medium
 ● Low
 ● Very low
 ⊕ Location you selected

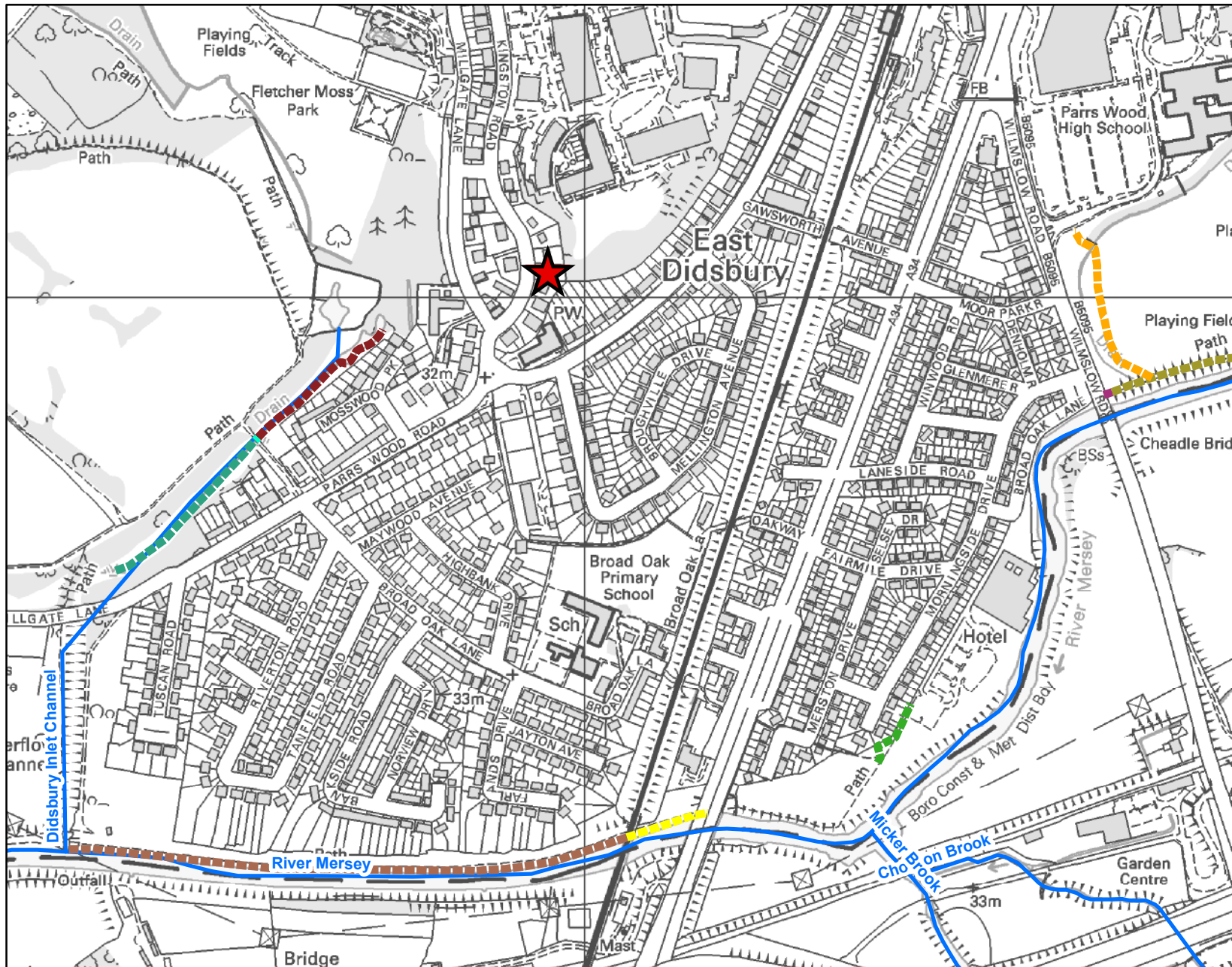


17.9 Appendix 9 – Groundwater Flood Susceptibility Map



17.10 Appendix 10 - EA Product 4 (Detailed Flood Risk) Data

Flood Defence Map centred on Kingston Road, Manchester, M20 2SB. Created on 19/03/2021 [GMMC206470CC]



1:6,250



Legend



Site Location

Defences

Asset Id

37537

37538

59337

122331

122332

146505

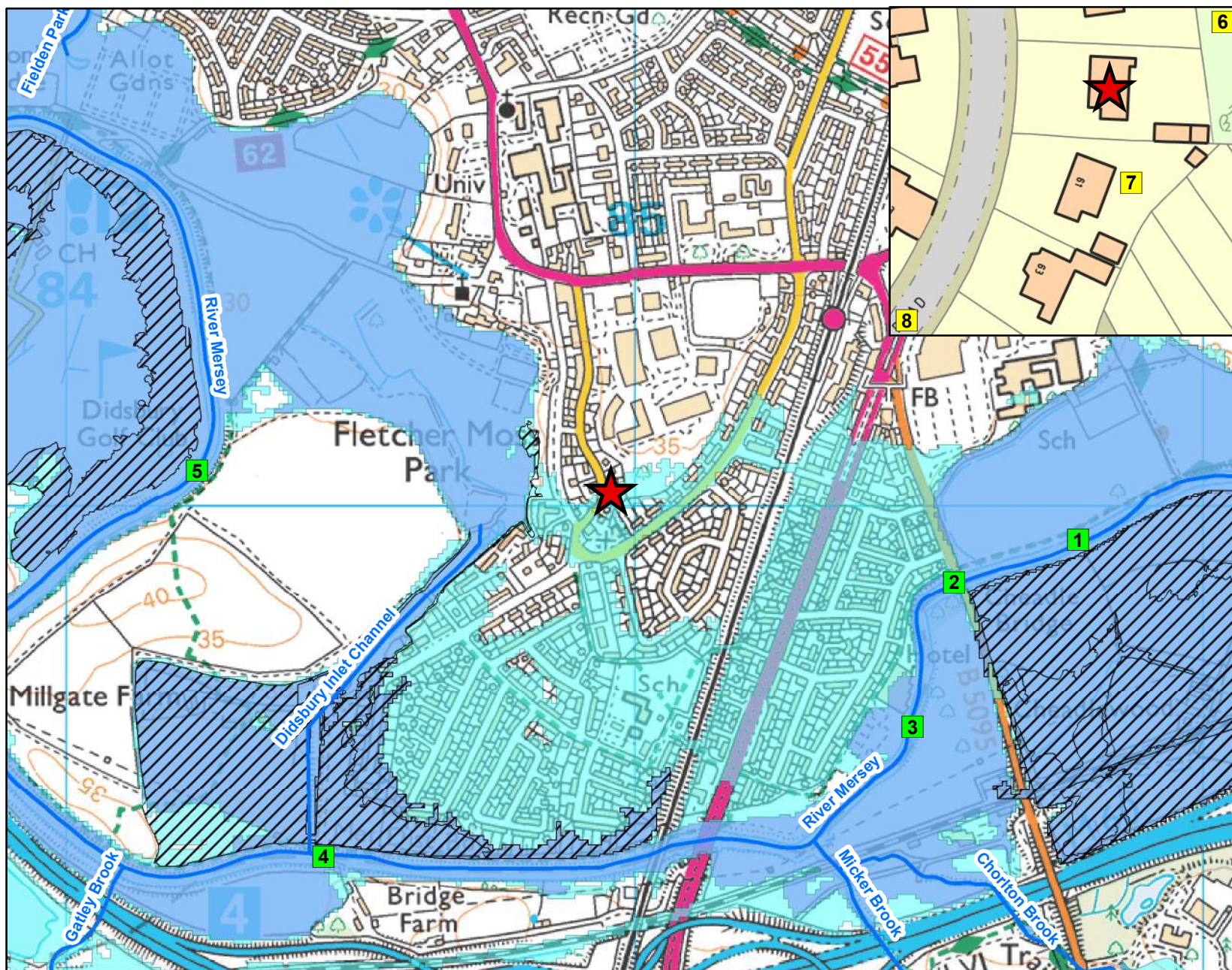
146506

146507

178849

Main River

Detailed Flood Map centred on Kingston Road, Manchester, M20 2SB. Created on 19/03/2021 [GMMC206470CC]

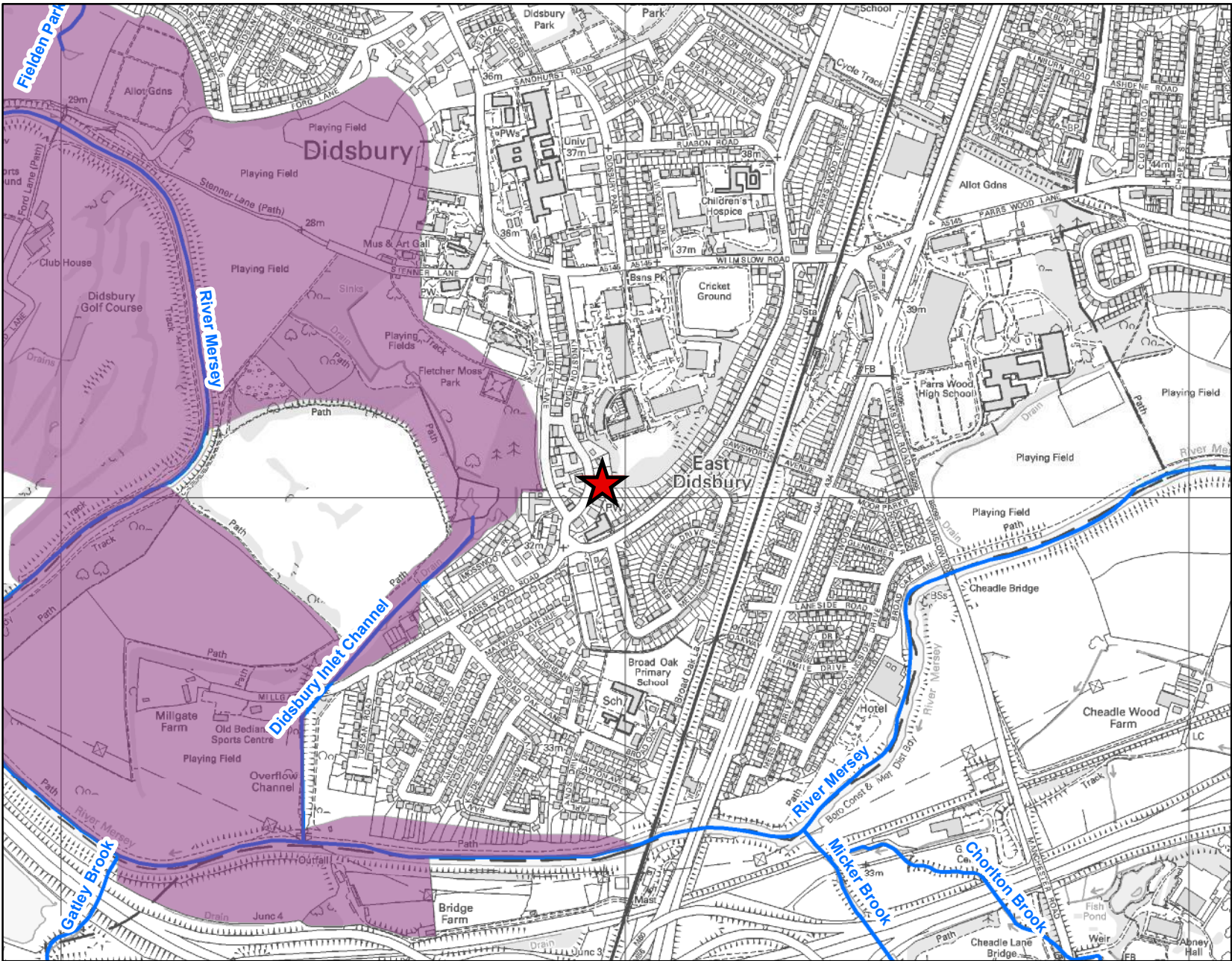


1:10,001



Legend

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



1:10,001



Legend

★ Site Location

Recorded Flood Outline

Start Date

01/01/1964

— Main River

Flood risk assessments: Climate change allowances

Application of the allowances and local considerations

Greater Manchester, Merseyside & Cheshire

1) The climate change allowances

The [National Planning Practice Guidance](#) refers planners, developers and advisors to the Environment Agency guidance on considering climate change in Flood Risk Assessments (FRAs). This guidance was updated in February 2016 and is available on [Gov.uk](#) and should be read in conjunction with this document. The guidance can be used for planning applications, local plans, neighbourhood plans and other projects. It provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, rather than a single national allowance. It advises on what allowances to use for assessment based on vulnerability classification, flood zone and development lifetime.

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		

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.

The assessment approach should be agreed with the Environment Agency as part of pre-planning application discussions to avoid abortive work.

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

Use of these allowances will only be accepted after discussion with the Environment Agency.

4) Fluvial food risk mitigation

Read the guidance on [Gov.uk](https://www.gov.uk) to find out which allowances to use to **assess** the impact of climate change on flood risk.

For planning consultations where we are a statutory consultee and our [Flood risk standing advice](#) **does not** apply we use the following benchmarks to inform flood risk **mitigation** for different vulnerability classifications. **These are a guide only. We strongly recommend you contact us at the pre-planning application stage to confirm this on a case by case basis. Please note you may be charged for this advice.** For planning consultations where we are not a statutory consultee or our [Flood risk Standing advice](#) applies we recommend local planning authorities and developers use these benchmarks but we do not expect to be consulted.

- For development classed as '[Essential Infrastructure](#)' our benchmark for flood risk mitigation is for it to be designed to the '**upper end**' climate change allowance for the epoch that most closely represents the lifetime of the development, including decommissioning.
- For [highly vulnerable](#) in flood zone 2, the '**higher central**' climate change allowance is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **upper end** allowance.
- For [more vulnerable developments](#) in flood zone 2, the '**central**' climate change allowance is our minimum benchmark for flood risk mitigation, and in flood zone 3 the '**higher central**' climate change allowance is our minimum benchmark for flood risk

mitigation. In sensitive locations it may be necessary to use the **higher central** (in flood zone 2) and the **upper end** allowance (in flood zone 3).

- For [water compatible](#) or [less vulnerable](#) development (e.g. commercial), the 'central' climate change allowance for the epoch that most closely represents the lifetime of the development is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **higher central** (particularly in flood zone 3) to inform built in resilience.

There may be circumstances where local evidence supports the use of other data or allowances. Where you think this is the case we may want to check this data and how you propose to use it.

END.

					Undertended																	Defended																
Map Reference	Model Node Reference	Easting	Northing	Data	20 % AEP (1 in 5 year)	10 % AEP (1 in 10 year)	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	3.33 % AEP (1 in 30 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase Flow	1 % AEP (1 in 100 year) + 35% increase Flow	1 % AEP (1 in 100 year) + 70% increase Flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	0.1 % AEP (1 in 1000 year) + 30% increase Flow	20 % AEP (1 in 5 year)	10 % AEP (1 in 10 year)	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	3.33 % AEP (1 in 30 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase Flow	1 % AEP (1 in 100 year) + 35% increase Flow	1 % AEP (1 in 100 year) + 70% increase Flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	0.1 % AEP (1 in 1000 year) + 30% increase Flow						
1	ea013_0243_MERS04_5299	385783	399943	Modelled Water Level (m asdN)	33.11	33.55	33.83	33.96	34.08	34.33	34.50	34.62	35.16	35.21	35.40	34.82	35.46	35.83	33.32	33.64	34.14	34.27	34.36	34.56	34.71	34.87	35.34	35.37	35.48	35.14	35.55	36.12						
				Modelled Flow (cumecs)	211.96	222.21	226.67	227.79	228.57	230.15	231.22	231.81	269.70	276.99	389.56	236.72	417.21	547.04	220.39	251.12	264.69	267.21	268.47	271.57	273.66	273.82	324.82	326.05	436.96	275.46	462.82	562.12						
2	ea013_0243_MERS04_5068	385563	399663	Modelled Water Level (m asdN)	32.84	33.13	33.33	33.40	33.47	33.65	33.78	33.81	34.44	34.55	35.01	34.00	35.12	35.76	32.06	32.32	32.67	32.76	32.82	32.95	34.04	34.12	34.72	34.94	35.21	34.27	35.32	35.89						
				Modelled Flow (cumecs)	211.02	248.50	275.18	296.47	296.31	319.04	327.07	350.98	270.67	370.89	379.22	376.78	392.16	392.80	220.67	259.86	286.44	297.89	307.61	322.70	351.52	366.64	402.27	402.01	396.67	385.62	402.87	425.22						
3	ea013_0243_MERS04_4990	385493	399613	Modelled Water Level (m asdN)	32.70	32.98	33.19	33.25	33.32	33.50	33.63	33.70	34.32	34.45	34.92	33.85	35.03	35.71	32.94	32.19	32.54	32.64	32.69	32.82	32.91	34.00	34.69	34.80	35.17	34.16	35.29	35.85						
				Modelled Flow (cumecs)	211.02	248.46	275.11	296.45	296.27	319.26	326.29	348.67	264.02	354.70	371.29	369.62	374.99	372.22	220.18	259.89	285.28	296.26	305.99	320.61	344.08	357.04	381.52	382.46	392.06	370.77	388.24	407.16						
4	ea013_0243_MERS04_3613	384405	399385	Modelled Water Level (m asdN)	31.54	31.71	31.82	31.85	31.87	31.96	32.01	32.05	32.22	32.29	32.74	32.16	32.82	32.29	32.90	32.02	32.32	32.42	32.49	32.64	32.72	32.78	32.19	32.22	32.40	32.98	32.42	32.61						
				Modelled Flow (cumecs)	155.62	218.77	239.75	245.50	252.29	272.05	291.12	304.42	287.80	401.05	466.95	337.70	482.22	585.69	242.17	271.60	311.29	322.22	322.76	361.92	382.77	399.08	477.29	482.37	557.12	422.72	576.01	699.99						
5	ea013_0243_MERS04_2225	384225	399068	Modelled Water Level (m asdN)	29.29	29.45	29.52	29.56	29.59	29.65	29.71	29.75	29.96	30.00	30.42	29.84	30.47	30.72	30.72	30.85	31.12	31.19	31.22	31.28	31.31	31.32	31.47	31.48	31.52	31.40	31.54	31.67						
				Modelled Flow (cumecs)	168.75	182.19	192.80	195.48	198.22	207.02	212.71	215.79	261.46	298.82	350.41	226.22	361.82	427.51	225.12	248.12	284.18	297.61	307.82	322.97	348.01	357.99	441.24	452.15	450.64	395.05	469.14	552.46						
6	2D Measure	384982	399041	Modelled Water Level (m asdN)											No data	No data	32.47											No data	No data	No data								
7	2D Measure	384984	399011	Modelled Water Level (m asdN)											No data	No data	32.44											No data	No data	32.36								
8	2D Measure	384922	399984	Modelled Water Level (m asdN)											No data	No data	32.55											No data	No data	32.52								

Model data taken from Upper Mersey 2017

AEP - Annual Exceedence Probability

m asdN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

Notes:

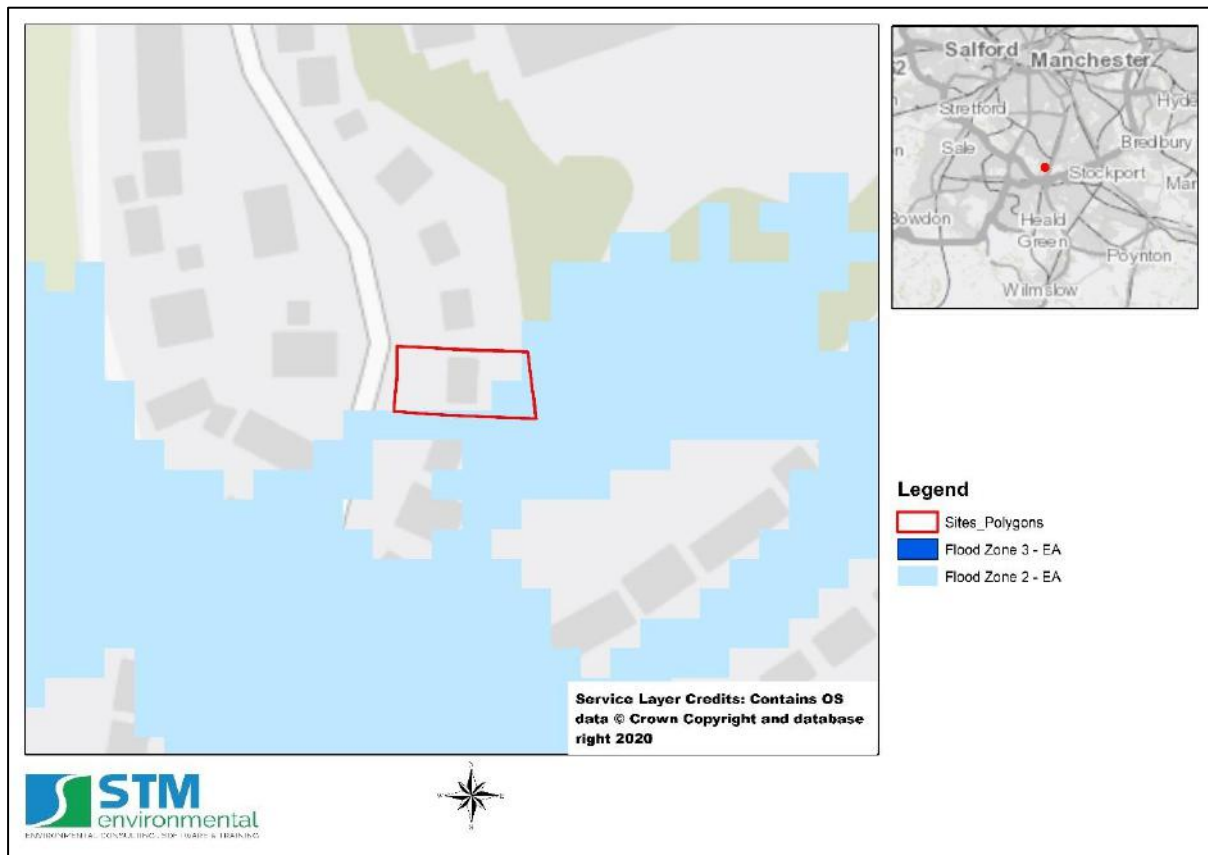
*Climate Change Scenario - 30%, 35% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) 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
18122	MERS	02/01/1964	02/01/1964	Unknown	Unknown

Flood Defences					
Start Date	Asset Type	Asset ID	Standard of Protection	Upstream Actual Crest Level (m asd)	Downstream Actual Crest Level (m asd)
01/01/2005	embankment	59237	50	32.14	32.28
01/01/2005	embankment	122321	50	34.02	32.92
01/01/2005	embankment	122322	100	34.27	32.59
01/01/2005	wall	37527	50	35.72	35.64
01/01/2005	embankment	37528	50	35.62	35.82
Unknown	high_ground	146505	75	29.62	29.22
Unknown	high_ground	146506	75	29.22	30.4
Unknown	high_ground	146507	75	30.4	29.59
01/01/2005	wall	178849	50	34.62	35.17

* Overall condition of the asset based on the (weighted) condition of each element of the latest inspection of the asset. See the attached document "Visual Condition Grading of FCRM Assets" for interpretation of score given.

17.11 Appendix 11 – Safe Egress to Flood Zone 1 Map



Flood zone 1 available on site.

17.12 Appendix 12 – Calculation of Flood Hazard Rating

Table 5: Flood Hazard Rating Scores – based on DF score of 0

Velocity	Depth									
	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.0	2.25	2.50
0.0	0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13	1.25
0.5	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
1.0	0.38	0.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.75
1.5	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
2.0	0.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
2.5	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
3.0	0.88	1.75	2.63	3.50	4.38	5.25	6.13	7.00	7.88	8.75
3.5	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
4.0	1.13	2.25	3.38	4.50	5.63	6.75	7.88	9.00	10.13	11.25
4.5	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50
5.0	1.38	2.75	4.13	5.50	6.88	8.25	9.63	11.00	12.38	13.75

Table 6: Summary of Scores

	Score From	Score To	Flood Hazard	Description
	<0.75	0.75	Low	Exercise Caution
Class 1	0.75	1.5	Moderate	Danger for some
Class 2	1.5	2.5	Significant	Danger for most
Class 3	2.5	20.0	Extreme	Danger for all

Table 7: Values for Debris Factor for different flood depths

Depths	Pasture/Arable Land	Woodland	Urban
0 to 0.25	0	0	0
0.25 to 0.75	0.5	1	1
d>0.75 and/or v > 2	0.5	1	1

-  The “danger to some” category includes vulnerable groups such as children, the elderly and infirm. “Danger: Flood zone with deep or fast flowing water”
-  The “danger to most” category includes the general public.

 The danger to all category includes the emergency services.

A flood emergency plan is considered to be an acceptable way of managing flood risk where the flood hazard has been given a “very low hazard” rating. In some instances, flood emergency plans may also be acceptable where the rating is “danger for some”. However, it is unlikely to be an acceptable way of managing residual flood risk where the hazard to people classification is “danger for most” or “danger for all”.