

Site 51- Byfleet Road, New Haw

Site Number	51	Site Name	Byfleet Road, New Haw
Site Location	KT15 3LE	Grid Reference	TQ 05611 62339
<p>Location Plan</p> <p>KEY:</p> <p>Red line boundary</p> <p>Main River</p> <p>*Other Rivers</p> <p>*Where other indicates: Drains, culverts, streams, brooks etc.</p>			
Description	<p>This site is located in New Haw. The Wey Navigation forms the western boundary of the site and the Rive Ditch the southern boundary. The A318 Byfleet Road lies to the west and Fairwater Drive is to the north. The Rive Ditch is a designated main river. There are a number of pylons within the site together with overhead cables.</p>		

Risk Assessment

Defences

There are no formal raised defences that would protect this site.

Mapping

KEY:

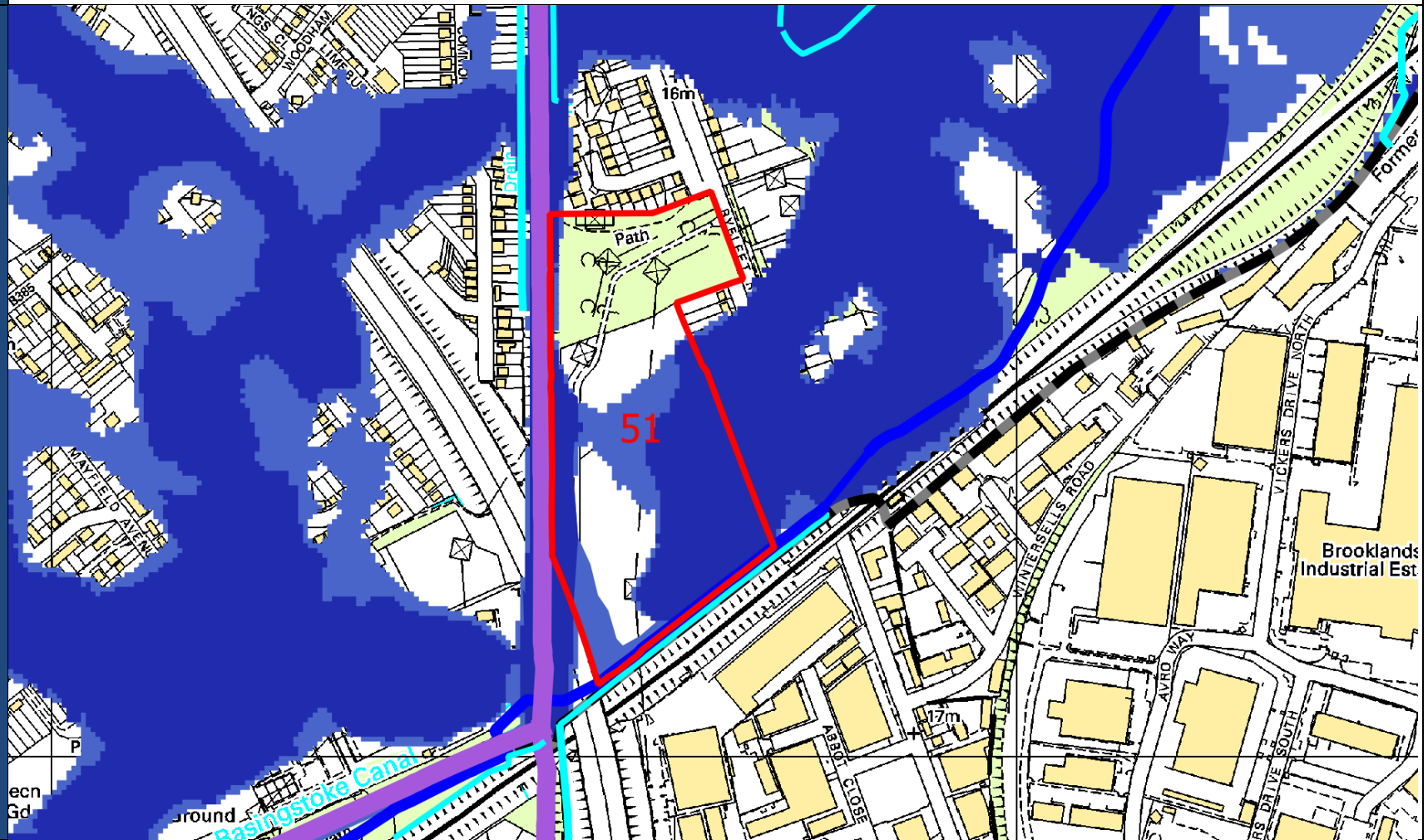
Red line
boundary

Main River

*Other Rivers

Flood Zone 2

Flood Zone 3



Flood Zones

The site is shown to lie within Flood Zones 1, 2 and 3.

Flood Zone 1	–	3.77 ha,	47.3%
Flood Zone 2	–	1.33 ha,	16.7%
Flood Zone 3	–	2.87 ha,	36.0%

Sources of Flooding

Fluvial

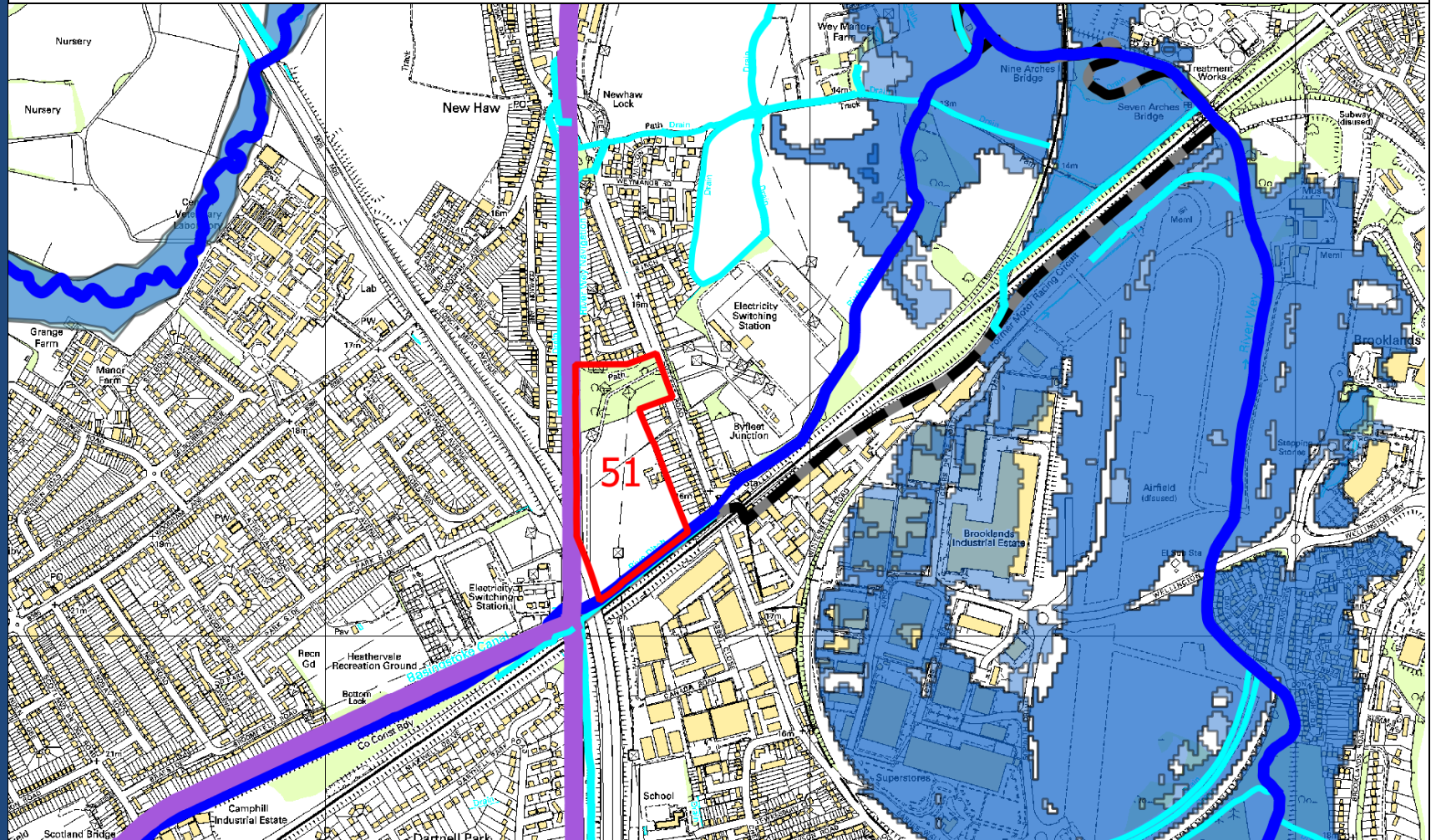
1 in 100yr +20%CC
Flood Extent



1 in 100yr Flood Extent



The site lies alongside the Rive Ditch, which is a main river. It also lies between the Addlestone Bourne and the River Wey. The detailed modelling of the latter two rivers shows that neither of these rivers floods the site. Detailed modelling of the Rive Ditch has been undertaken. This modelling is holistic, taking all sources of flooding into account. The fluvial flood extents extracted from this model have yet to be approved by the Environment Agency. However, they have accepted that the holistic model output may be used to assess this site's flood risk.

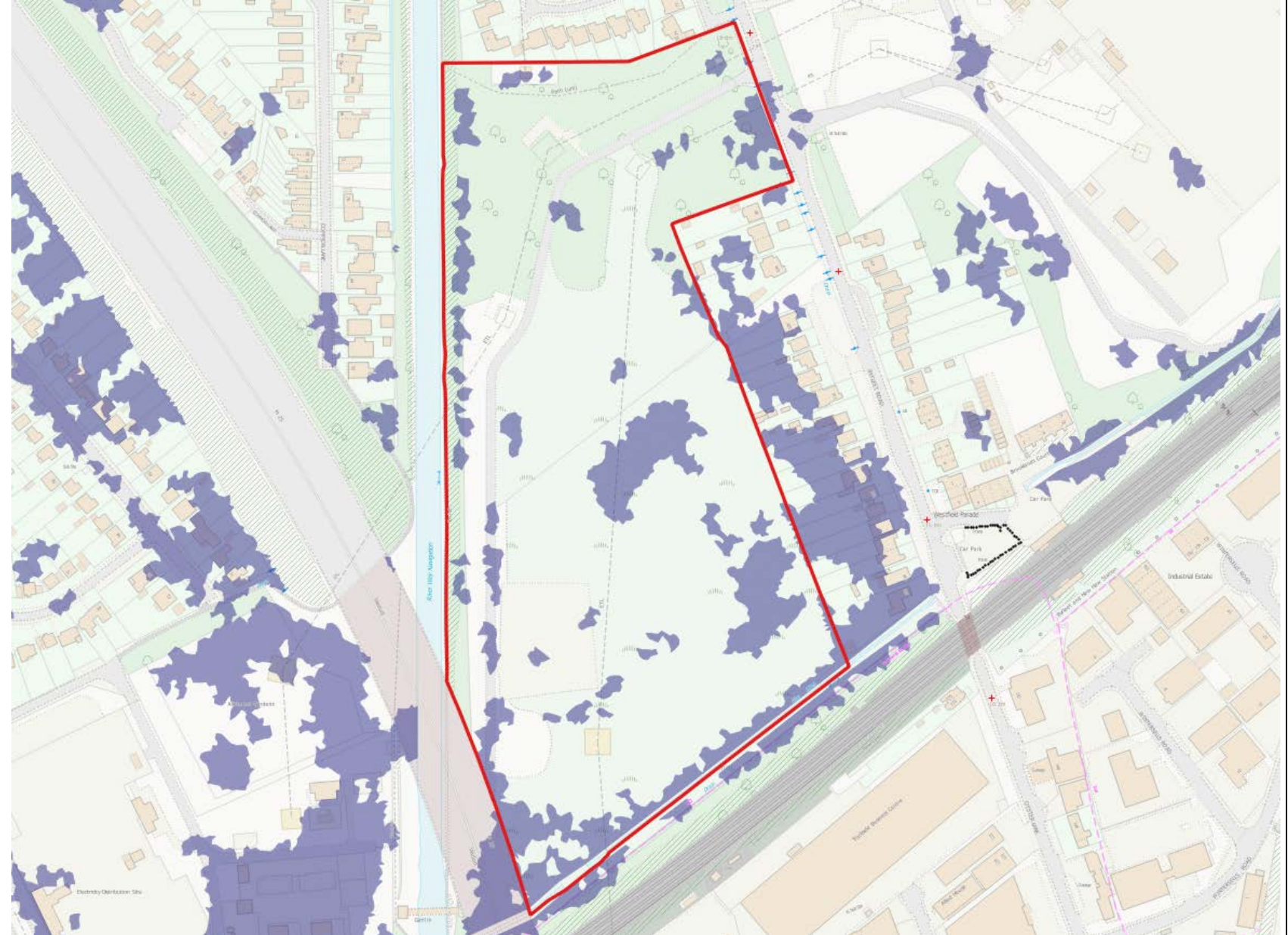


Holistic Modelling - 1 in 20 Year (5% AEP) Extent

1 in 20 year Flood
Extent



This map shows the risk of from both fluvial and pluvial sources.

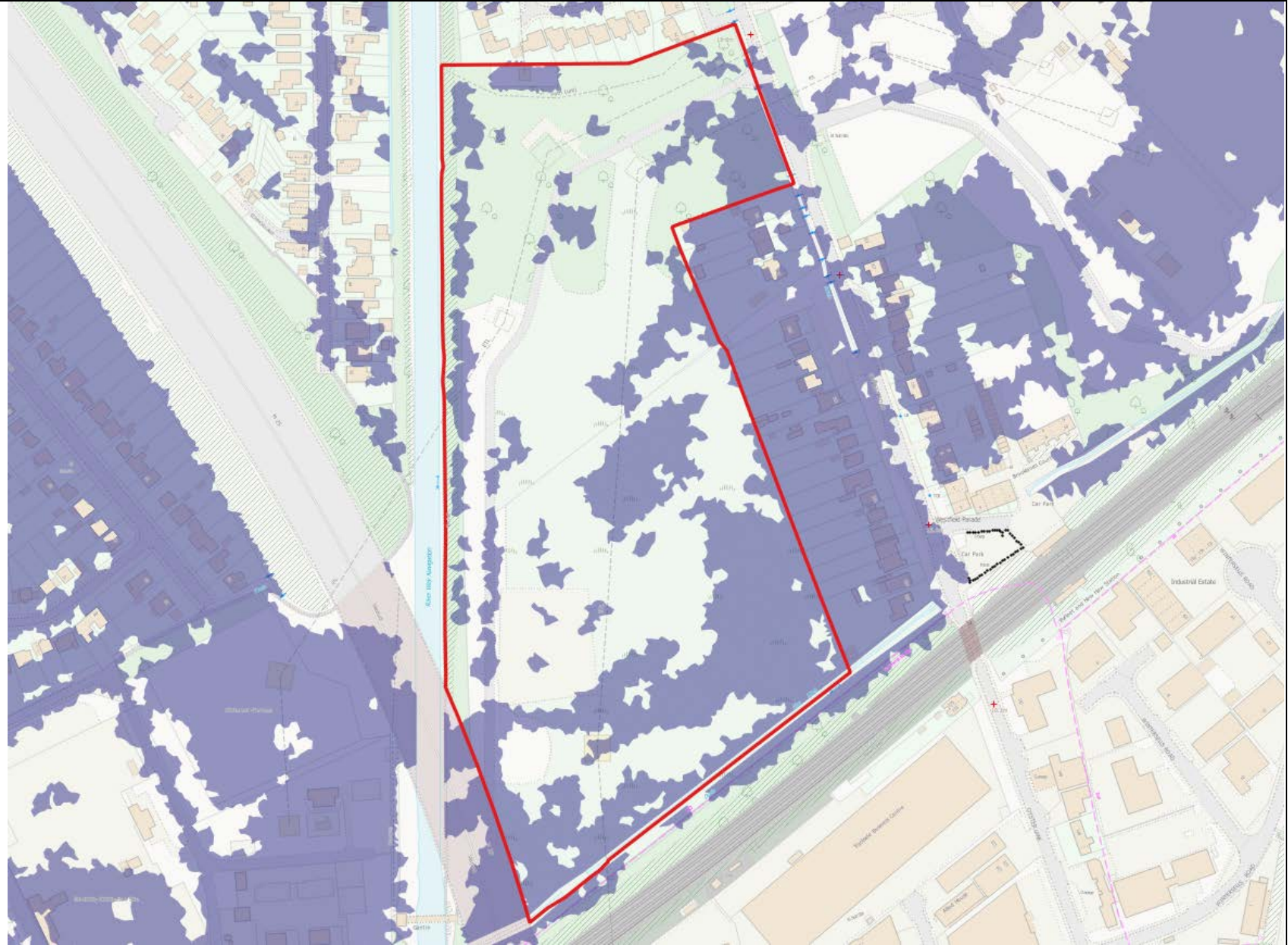


Holistic Modelling - 1 in 100 Year (1% AEP) Flood Outline

1 in 100yr Flood Extent



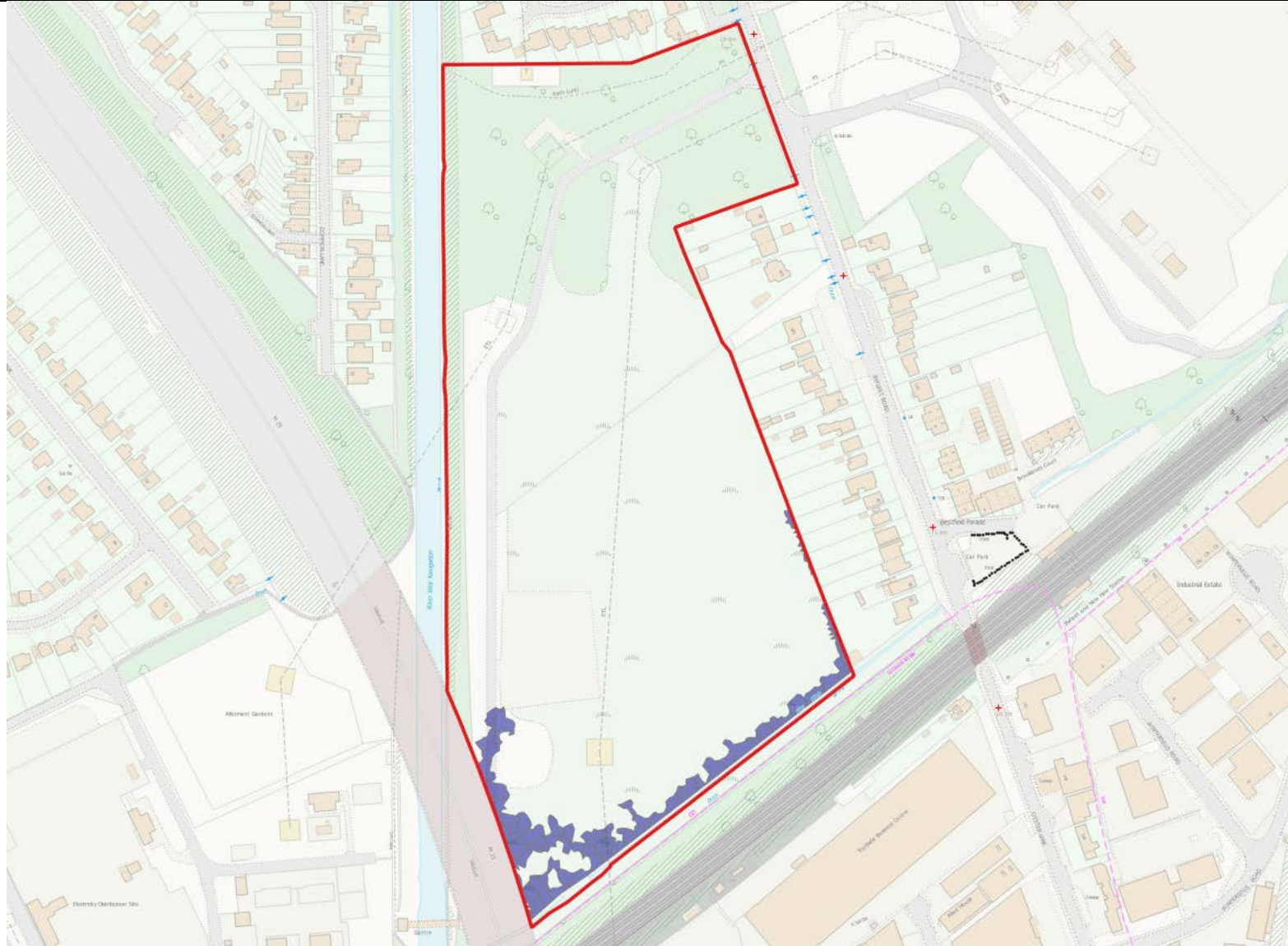
This map shows the risk of from both fluvial and pluvial sources.



Fluvial Flooding – Functional Flood Plain - 1 in 20 Year (5% AEP) Flood Outline

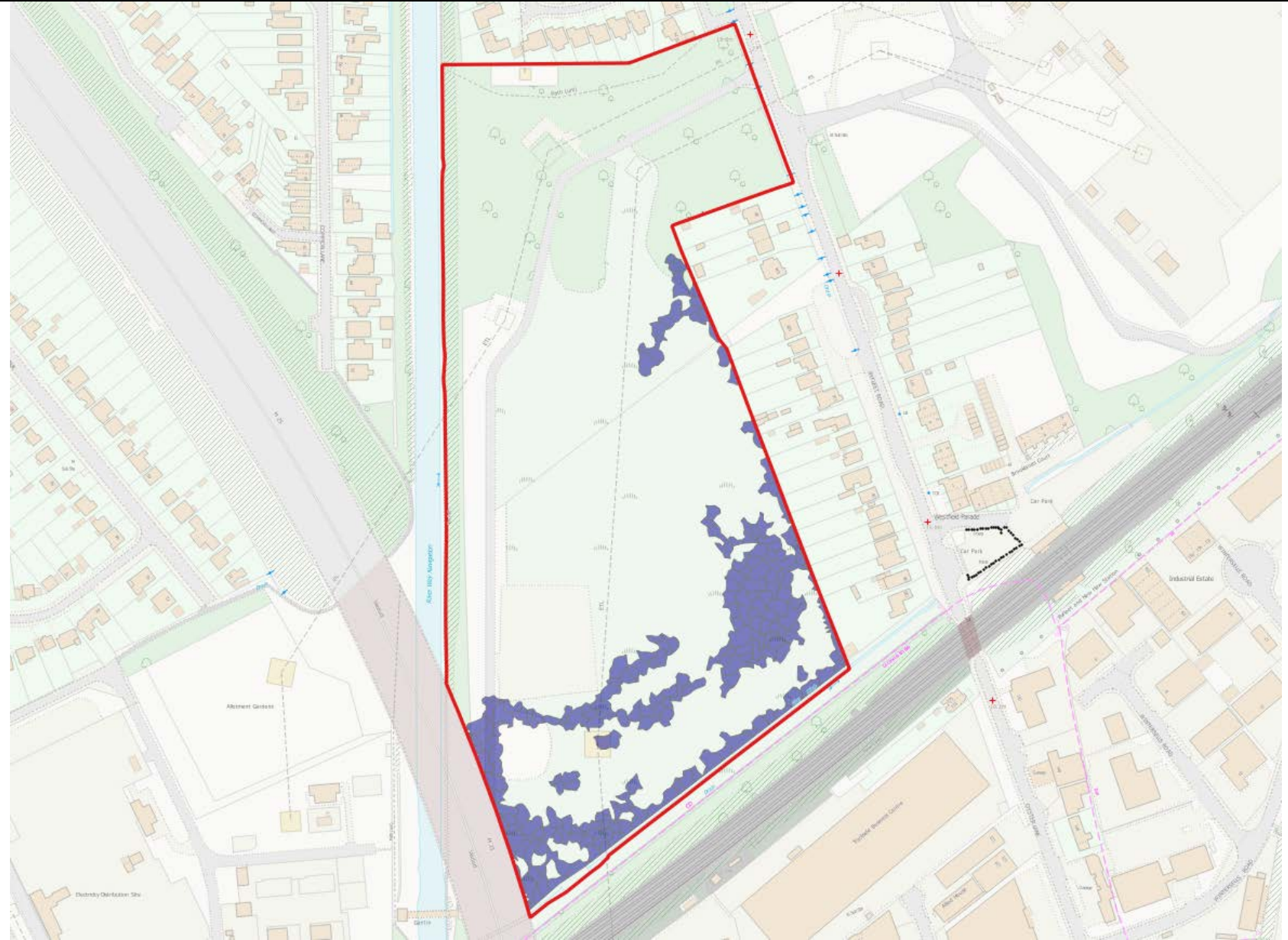
The drawings above show that some areas of flooding are directly connected to the Rive Ditch and some areas are isolated area with no interconnection. It can be assumed that those areas that are directly connected to the Rive Ditch represent the fluvial flooding of the site and those unconnected areas represent the pluvial flooding of the site. Taking this into consideration, the fluvial outlines for the 1 in 20 year (5% AEP) Functional Floodplain and the 1 in 100 year (1% AEP) flood are shown in the next two drawings

1 in 20 yr Functional
Floodplain Extent



Fluvial Flooding – 1 in 100 Year (1% AEP) Flood Outline

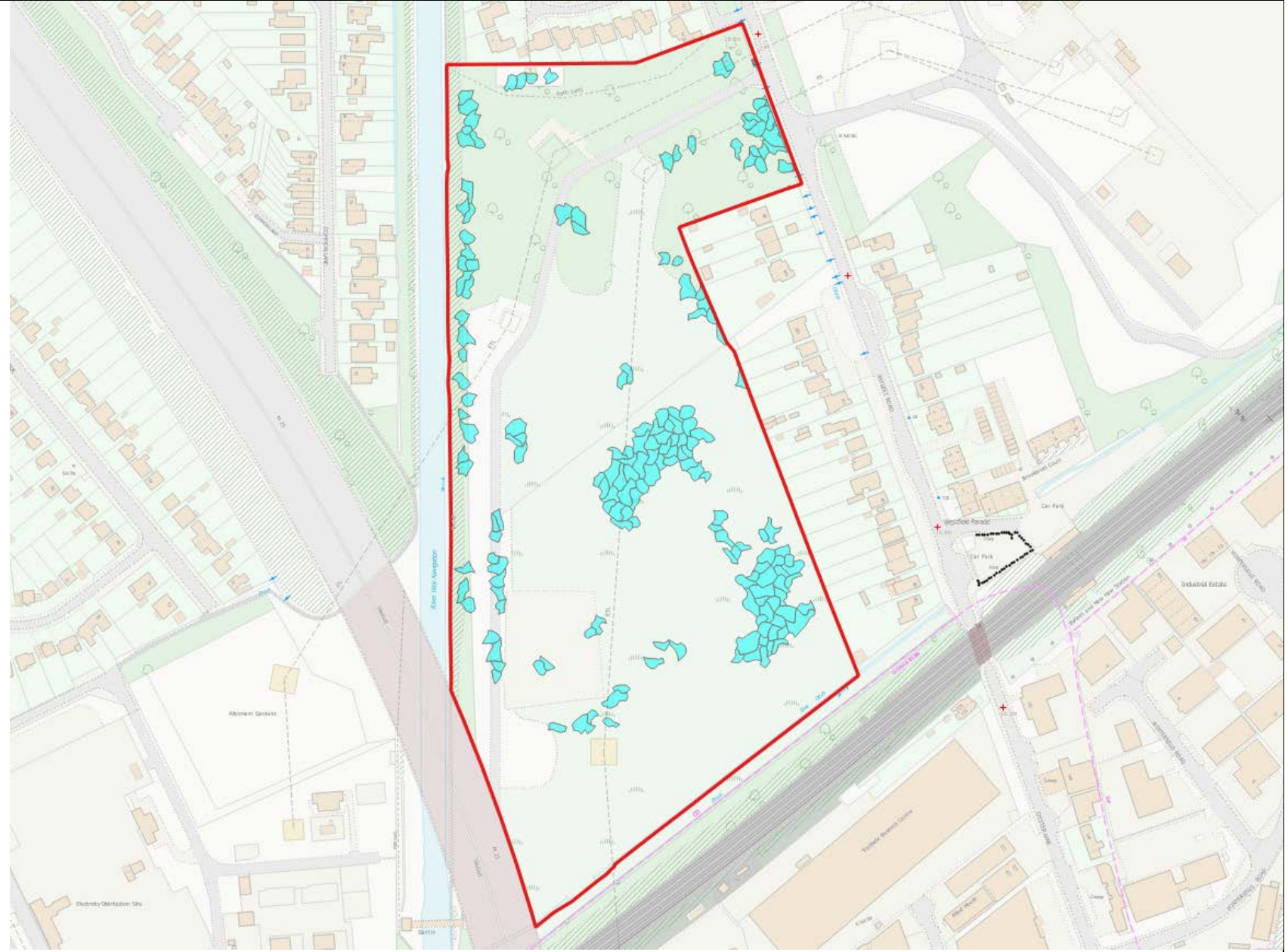
1 in 100 yr Floodplain
Extent



Pluvial Flooding – 1 in 20 Year (5% AEP) Flood Outline

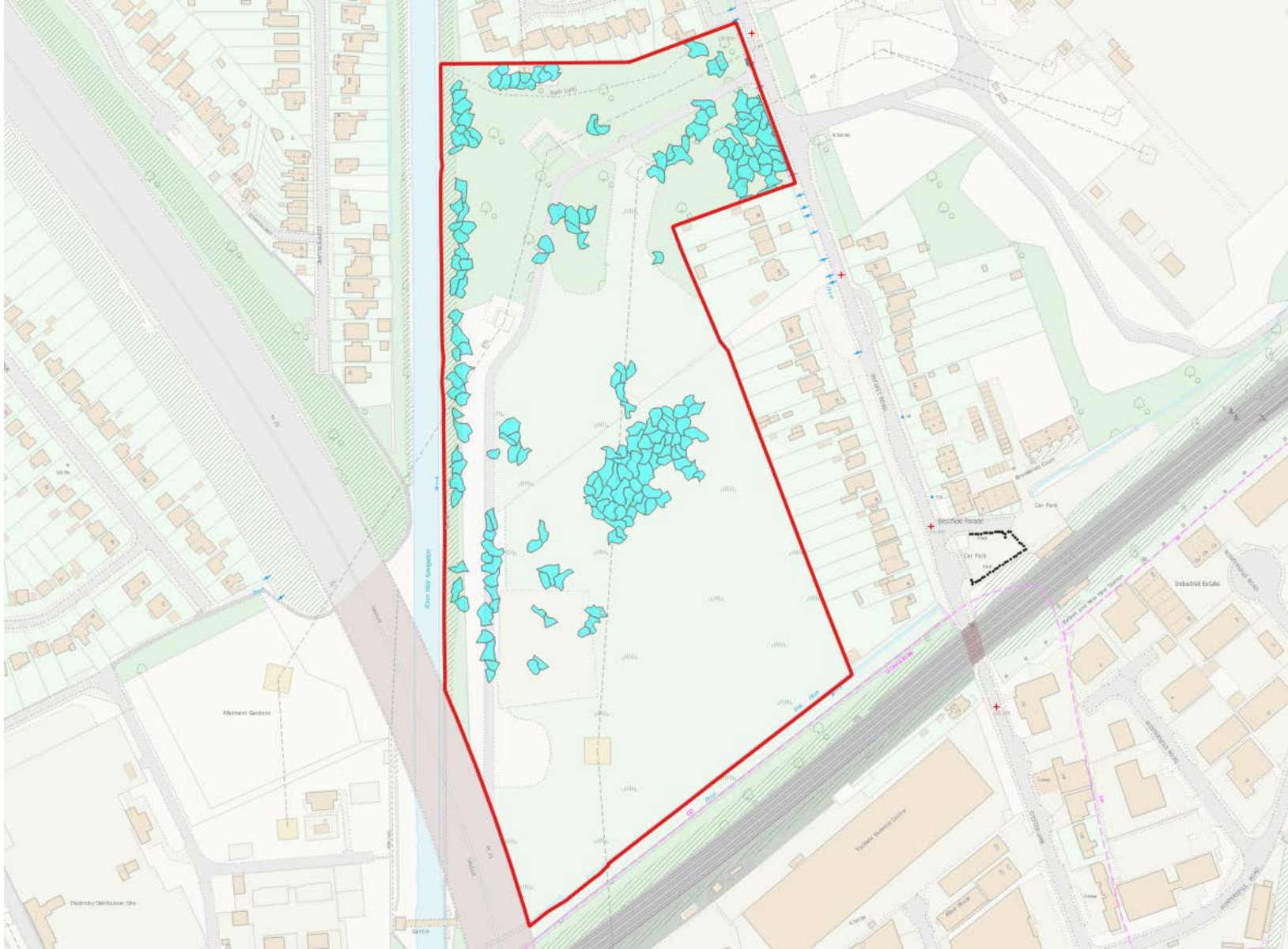
As is the case with the fluvial flood maps above, the areas of fluvial flooding have been removed from the holistic flood mapping to give the pluvial flood outlines for the 1 in 20 year (5% AEP) and 1 in 100 year (1% AEP) flood shown below.

1 in 20 yr Pluvial Flood
Extent



Pluvial Flooding – 1 in 100 Year (1% AEP) Flood Outline

1 in 100 yr Pluvial
Flood Extent



Climate Change

The development must remain safe for the lifetime of the development. In considering this fact, the effects of climate change need to be taken into consideration. Below are three drawings showing the effects on flooding for the 25%, 35% and 70% Climate Change Allowances

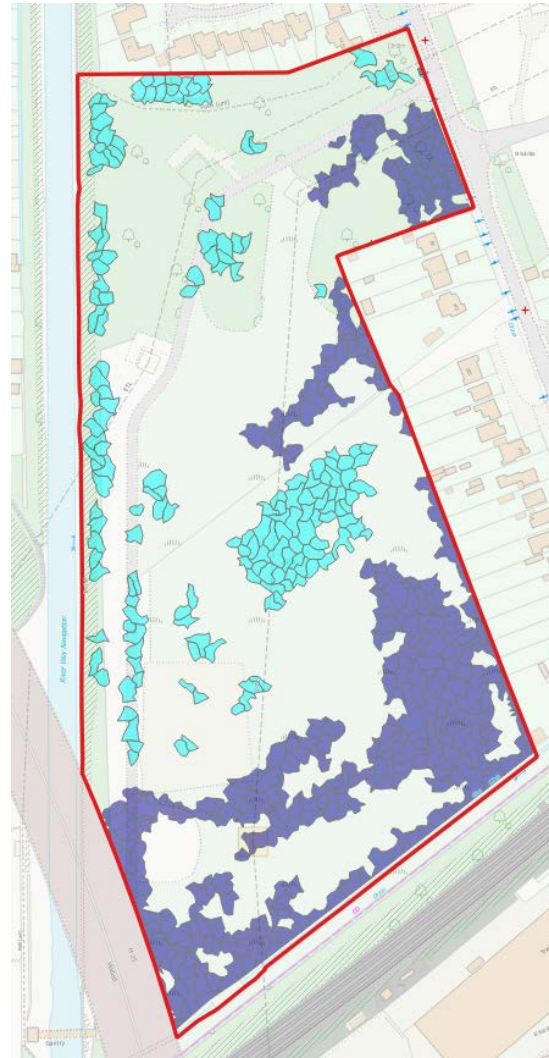
Fluvial Flooding



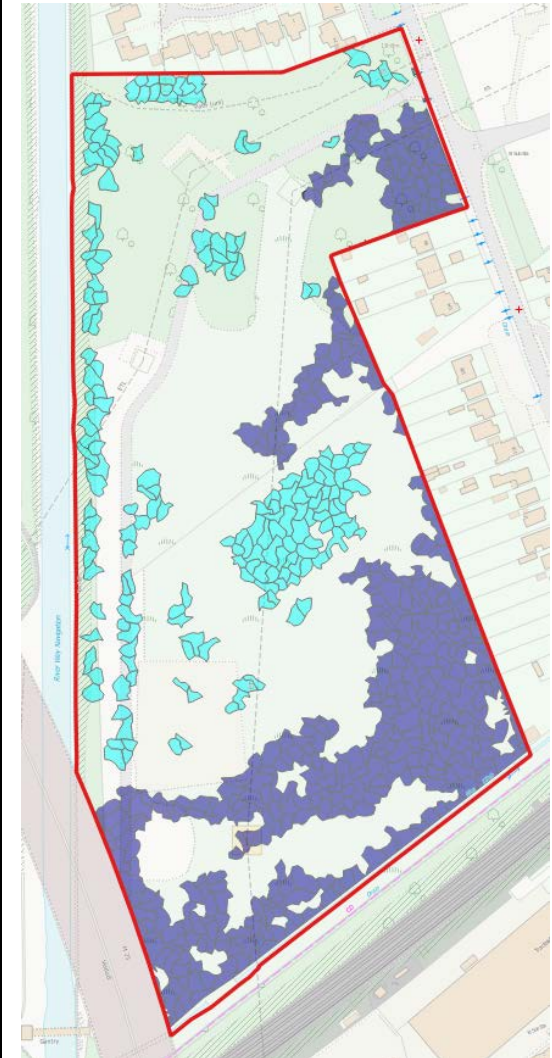
Pluvial Flooding



1 in 100 yr + 25% cc



1 in 100 yr + 35% cc



1 in 100 yr + 70% cc

Floodplain Compensation

The Rive Ditch modelling shows that the site is subject to reasonably significant amounts of both fluvial and pluvial flooding. This flooding is spread across much of the site. The site is comparatively flat. However, there is scope to undertake a level for level floodplain compensation scheme. Appropriate landscaping can be undertaken so that the fluvial flooding occurs adjacent to the Rive Ditch. Similarly, the pluvial flooding areas can be relocated to areas of the site that are less appropriate for development. In particular, there will be restrictions on what, if any development can take place below the suspended high voltage electricity cables. It may be possible to utilise these areas to accommodate the pluvial flood risk.

Below is analysis of the areas and depths of flooding to the site:

Flood Areas

Event Probability	Fluvial Flood Area m2	Pluvial Flooded Area m2	Total Flooded Area m2	Total Site Area m2	Fluvial Flood % of Total Site Area %	Pluvial Flood % of Total Site Area %	Total Flood % of Total Site Area %
5% AEP	3,879	8,392	12,271	79,640	5	11	15
1% AEP	11,683	8,910	20,593	79,640	15	11	26
1% AEP + 25% CC	17,249	8,213	25,461	79,640	22	10	32
1% AEP + 35% CC	18,575	7,870	26,446	79,640	23	10	33
1% AEP + 70% CC	21,187	8,696	29,883	79,640	27	11	38

Note: There appears to be a slight discrepancy in the areas of pluvial flooding generated by the Rive Ditch Holistic Model. However, in assessing the area of compensation for pluvial flooding the worst case of 8,910m2 has been used.

Floodplain Compensation (cont)

Flood Depths

Event Probability	Fluvial Flood Depth m.			Pluvial Flood Depth m.		
	Average	Minimum	Maximum	Average	Minimum	Maximum
5% AEP	0.19	0.05	1.02	0.09	0.05	0.21
1% AEP	0.15	0.05	1.14	0.10	0.05	0.28
1% AEP + 25% CC	0.15	0.05	1.20	0.11	0.05	0.31
1% AEP + 35% CC	0.15	0.05	1.22	0.11	0.05	0.31
1% AEP + 70% CC	0.16	0.05	1.25	0.12	0.05	0.33

Consolidated Fluvial Flood Area at Rive Ditch:

Approximate length of river bank = 200m
 Surface area of fluvial flooding for 1 in 100 year flood = 11,683m²
 Thus width of floodplain from top of the river bank is $11,683 / 200 = 58.4\text{m}$ – say 60m

The maximum flooded area for the 1 in 100 year plus 70% climate change allowance is 21,187m². Based on the fact that that the average depth of flooding is 0.16m and that the hazard will not exceed “Caution - Very Low Hazard”, it will be acceptable for the part of the site outside of the modified 1 in 100 year floodplain to flood in part to the depth of 0.16m creating an unacceptable flood hazard.

Consolidated Pluvial Flood Area at Rive Ditch:

Approximate length under cables and along existing access = 590m
 Maximum surface area of pluvial flooding = 8,910m²
 Thus width of storage trenches is $8910 / 590 = 15\text{m}$

The pluvial flooded area of 8,910m² represents represents the worst case scenario.

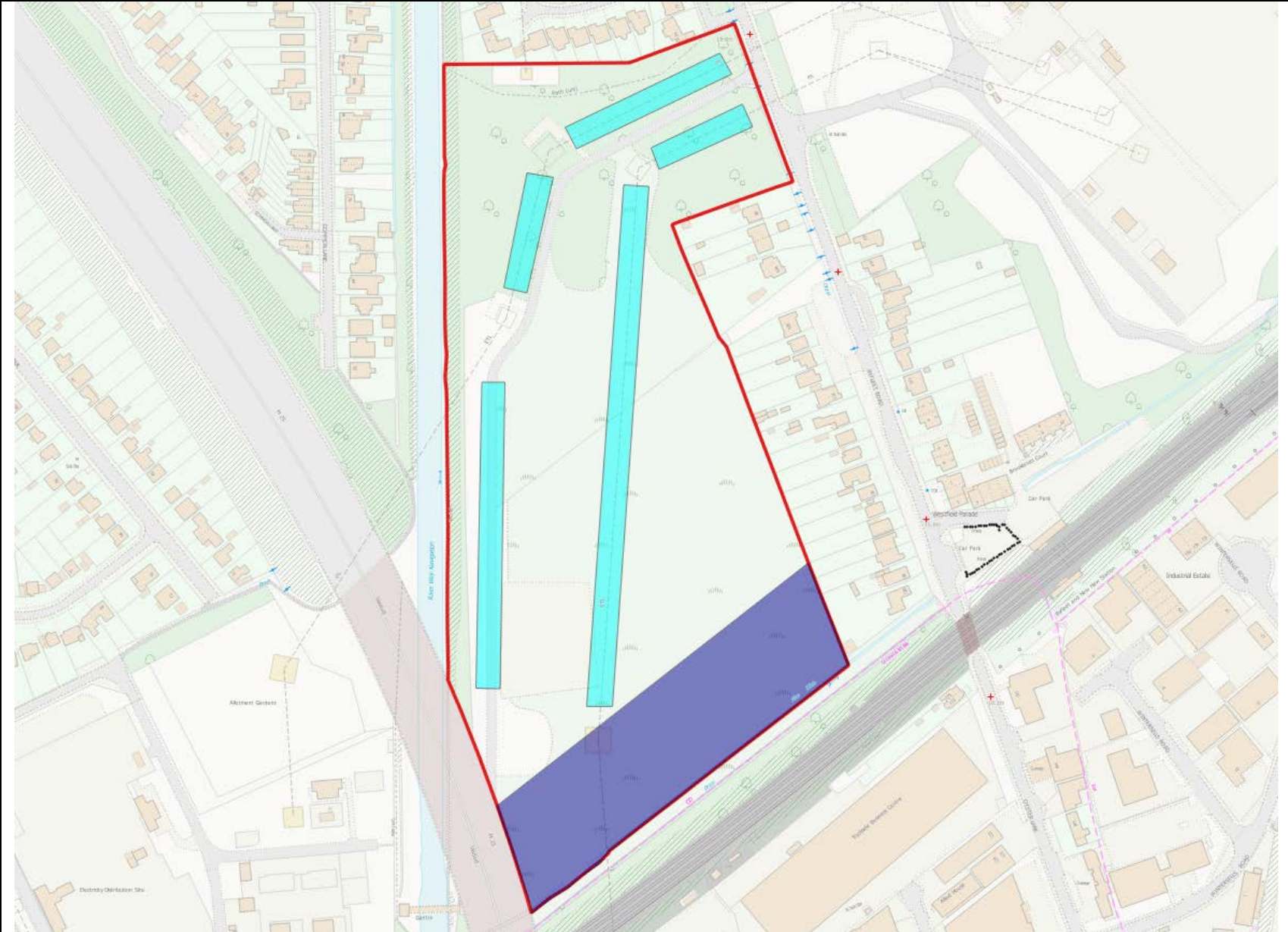
Flooded areas on average should only be flooded to depths between 0.10 and 0.15m.

Floodplain Compensation (cont)

Fluvial Flood Compensation



Pluvial Flood Compensation







Hazard Mapping

The site is subject to both fluvial and pluvial flooding across significant areas. However, with the exception of the area adjacent to the River Ditch, even at the 1 in 100 year event with 70% allowance for climate change, the flood hazard is only assessed as being "Caution – Very Low Hazard". Thus, the flood hazard does not present an obstacle to the site being safe for the life of the development.

As has already been stated, to develop the site efficiently level for level floodplain compensation should be undertaken. In developing the floodplain compensation plan, the flood hazard can also be considered such that those areas that will flood in the future will be located away from the main parts of the development.

Key

	Caution - Very Low Hazard
	Danger for Some
	Danger for Most
	Danger for All



1 in 20 yr (5% AEP) Functional
Floodplain



1 in 100 yr (1% AEP) Floodplain

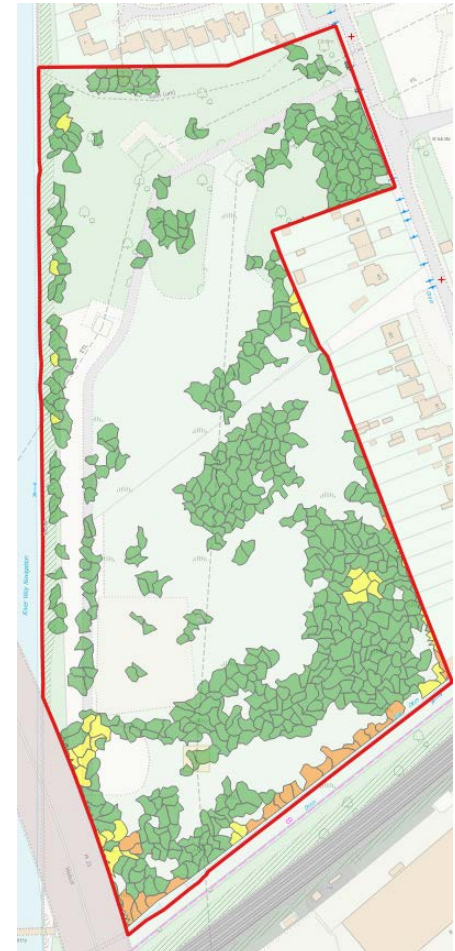
Hazard Mapping (cont)



1 in 100 yr + 25% allowance for climate change



1 in 100 yr + 35% allowance for climate change



1 in 100 yr + 75% allowance for climate change

Artificial Sources	The site lies adjacent to the Wey Navigation. The risk of flooding due to its structural failure is considered very low. The site lies outside of the area predicted to be at risk from flooding from a reservoir breach.
Summary of flood risk From all Sources of flooding	<ul style="list-style-type: none"> • Flooding from Fluvial sources – The site is divided between areas that lie in Flood Zones 1, 2 and 3. The site is not at risk from flooding from the Addlestone Bourne or the River Wey. • The Holistic Modelling output from the Rive Ditch hydraulic model shows that the site is at risk of flooding from both fluvial and pluvial flooding. In the 1 in 100 year (1% AEP) fluvial event, 1.17ha (15%) of the site floods, meaning that from a flood risk perspective 6.8ha (85%) of the site lies either in Flood Zones 2 or 1 where development is deemed to be appropriate for More Vulnerable and Less Vulnerable development. • The Holistic Modelling output shows that a further 8.9ha (11%) of the site is at risk from pluvial flooding including allowance for climate change. • Climate Change: the Holistic Modelling output shows that, at the 1 in 100 year plus 70% allowance for climate change level, a total of 2.99ha (38%) of the site is at risk of flooding from both fluvial and pluvial flooding. However, the average depth of this flooding is no greater than 0.16m. • Flood Hazard: The flood hazard mapping shows that even the 1 in 100 year plus 70% allowance for climate change level for practically the whole of the site the flood hazard does not exceed “Caution – Very Low Hazard”. • Level for Level Floodplain Compensation: It should be possible to re-landscape the site to apply level for level floodplain compensation to control the areas of the site that flood and thus optimize those areas that can be developed. • Flooding from Artificial Sources – The site lies by the Wey Navigation which presents a very low risk of flooding to the site. No risk of flooding from a reservoir breach has been identified.

Risk Management – Guidance will be provided in the following section to inform policy development

<p>Flood Risk Management Recommendations</p>	<ul style="list-style-type: none"> • The site is 100% Greenfield. • The British Geological Survey in its SuDS mapping indicates area that the ground water table is high. However, they have identified that there are opportunities for bespoke infiltration SuDS. Where infiltration is possible it should be utilised. • Any runoff from the development will need to be attenuated to greenfield runoff rates. • In accordance with the SuDS Hierarchy, if infiltration is not practicable for all or some of the surface water runoff from the site then discharge to a watercourse or other water body. The Rive Ditch to the south of the site should be used to receive any discharge that is required from the site. • The surface water drainage system should be designed to ensure that no flooding occurs up to the 1 in 30 year pluvial event and that ensure that no on site property flooding or increased off site flood risk occurs for events up to the 1 in 100 year event, including allowance for climate change. • The site is divided between all three Flood Zones. The development should be undertaken sequentially with the development taking place principally within Flood Zone 1 followed by Flood Zone 2. Where appropriate, level for level floodplain compensation will be considered in in order to rationalise the area of development. This may be particularly relevant given the overhead electricity cables over the site. These cables will create areas where development cannot take place to comply with the need to maintain a minimum clearance between the cables and any structures. • Byfleet Road is shown to flood, both at its northern and southern ends. It appears that the hazard associated with this flooding is in the main no greater than “Caution – Very Low Hazard” for the 70% climate change event. There is, however, the potential that in places the hazard is greater than this. If it is not possible to identify a safe access and egress route from the site then it will be necessary to produce a robust evacuation plan.
<p>Reasonable prospect of compliance within the Exception Test?</p>	<ul style="list-style-type: none"> • 85% of the site lies in Flood Zones 1 and 2 (outside of the 1 in 100 year / 1% AEP floodplain). Thus, for the majority of the site both More Vulnerable and Less Vulnerable development is deemed appropriate. • More Vulnerable development should not take place in Flood Zone 3.
<p>Flood Risk Suitability Score</p>	<p>4</p>