D.3 Flood risk

Assessment methodology

D.3.1 This assessment criterion considers the risk of flooding at the shortlisted site areas. A screening process was undertaken to identify the existing flood risk to each of the site areas. Flood risk over the lifetime of the development has additionally been considered for all site areas using climate change data provided by the Environment Agency,.

D.3.2 The risk of flooding in relation to the treated effluent discharge arrangements are not included in this screening assessment and are dealt with in the surface water assessment (See Appendix B.4).

D.3.3 The following sources of flooding have been considered in the context of site topographic elevations and underlying geology, where appropriate, with consideration also given to historic flooding;

- Fluvial/Tidal (existing and future, including climate change)
- Surface water
- Groundwater
- Sewer
- Residual Risk (reservoirs, defence breach, overtopping)

D.3.4 The RAG categories developed for this assessment are provided in Table D.82. The RAG evaluations for the individual flood risk assessed components have been combined to provide a single RAG evaluation per shortlisted site area. The final RAG score per site is conservative and is based on the worst-case flood risk element per site.

Table D.82: Flood Risk RAG categories

Flood Risk	Green	Amber	Red
Fluvial/Tidal	EA Flood Zone 1. Unimpacted by Environment Agency climate change projections.	EA Flood Zone 1. Potential FZ2 or FZ3 in future according to Environment Agency climate change projections.	Currently located in EA Flood Zone 2 or 3
Surface Water	Majority of site at “Very Low” or “Low” risk of surface water flooding (EA RoFSW data).	Majority of site at a “Medium” risk of surface water flooding (EA RoFSW data).	Majority of site at “High” risk of surface water flooding (EA RoFSW data).
Groundwater	No EA or SFRA recorded incidents of groundwater flooding within vicinity of site.	Recorded EA or SFRA incidents of groundwater flooding within vicinity of site.	Recorded EA or SFRA incidents of groundwater flooding on site.
Sewer	No recorded EA or SFRA incidents of sewer flooding within vicinity of site.	Recorded EA or SFRA incidents of sewer flooding within vicinity of site.	Recorded EA or SFRA incidents of sewer flooding on site.
Residual Risk	Low risk of flooding from reservoirs, or from breached flood defences (EA data). In the unlikely event of flooding from these sources, the FD2320 ‘flood hazard to people’ would be low.	Medium risk of flooding from reservoirs, or from breached flood defences (EA data). In the unlikely event of flooding from these sources, the FD2320 ‘flood hazard to people’ would be low.	Low, medium or high risk of flooding from reservoirs, or from breached flood defences (EA data). For a medium to high risk event from these sources, the flood hazard to people may be low, medium or high. For a low-risk event, the FD2320 ‘flood hazard to people’ would be medium or high.

Assessment of unmitigated options

D.3.5 The detailed flood risk screening assessment for each site area is provided in Appendix I. A summary of the assessments and the resulting RAG evaluation are provided below.

Site area 1

D.3.6 Site area 1 is located entirely within Environment Agency (EA) Flood Zone 1 (See Appendix I.1). The site is a minimum of 1.7km north-west of the River Cam, which is an EA main river, and is a minimum of 3.7km south-east of the Great Ouse, which is also an EA main river.

D.3.7 The closest EA Flood Zone 2 and 3 areas are located approximately 360m north west of site, associated with the ordinary watercourses/drain network which drains to the Great Ouse.

D.3.8 Given that the site is located entirely within Flood Zone 1 the fluvial/tidal flood risk to site is considered to be low.

D.3.9 According to the EA Risk of Flooding from Surface Water (RoFSW) extents maps (See Appendix I.1), the risk of surface water flooding on site may be considered “Very Low” to “Low”. Therefore, the risk of surface water flooding is considered to be low.

D.3.10 Bedrock in this area is considered to have essentially no groundwater. The site is not located within an EA groundwater Source Protection Zone. The South Cambridgeshire and Cambridge City Level 1 Strategic Flood Risk Assessment (SFRA) (South Cambridgeshire District Council & Cambridge City Council, 2010) states that groundwater flooding has occurred within the district, but there is no indication that the area to the west of Milton has previously been affected by groundwater flooding. Therefore, the risk of flooding from groundwater is considered to be low.

D.3.11 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of sewer flooding on site, based on information provided by the Highways Agency, parish councils and Anglian Water Services DG5 register. Therefore, the risk of flooding from sewer sources is considered to be low.

D.3.12 The site is not located with an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection. Therefore, the risk to the site in the event of a breach of defences is considered to be low.

D.3.13 The EA Risk of Flooding from Reservoirs map demonstrates that the site is not located within an area considered at risk in the event of reservoir failure.

Site area 2

D.3.14 Site area 2 is located entirely within EA Flood Zone 1 (See Appendix I.2). The site is a minimum of 2.1km north-west of the River Cam, which is an EA main river, and is a minimum of 2.8km south-east of the Great Ouse, which is also an EA main river.

D.3.15 The closest EA Flood Zone 2 and 3 areas are approximately 1km north-west of site, associated with a public drain, which in turn drains to the Great Ouse.

D.3.16 Given that the site is located entirely within Flood Zone 1 the fluvial/tidal flood risk to site is considered to be low.

D.3.17 According to the EA Risk of Flooding from Surface Water (RoFSW) extents maps (See Appendix I.2), the risk of surface water flooding on site may be considered “Very Low”. Therefore, the risk of surface water flooding is considered to be low.

D.3.18 Bedrock in this area is considered to have essentially no groundwater. The site is not located within an EA groundwater Source Protection Zone. The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) states that groundwater flooding has occurred within the district, but there is no indication that the area to the west of Milton has previously been affected by groundwater flooding. Therefore, the risk of flooding from groundwater is considered to be low.

D.3.19 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of sewer flooding on site, based on information provided by the Highways Agency, parish councils and Anglian Water Services DG5 register. Therefore, the risk of flooding from sewer sources is considered to be low.

D.3.20 The site is not located with an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection. Therefore, the risk to site in the event of a breach of defences is considered to be low.

D.3.21 The EA Risk of Flooding from Reservoirs map demonstrates that the site is not located within an area considered at risk in the event of reservoir failure.

Site area 3

D.3.22 Site area 3 is located entirely within EA Flood Zone 1 (See Appendix I.3). The site is a minimum of 430m west of Quy Water which drains to the Rive Cam, both of which are EA main rivers. The site is a minimum of 600m south-east of the River Cam.

D.3.23 The closest EA Flood Zone 2 and 3 areas are approximately 450km north-west of site, associated with the River Cam and 200m east of site, associated with Quy Water. As the site is located entirely within Flood Zone 1, the fluvial/tidal risk to site is considered to be low.

D.3.24 EA guidance states that “Water Compatible” developments which are currently located within Flood Zone 1 but may be in Flood Zones 2 or 3 in the future, should apply the Central Allowance for peak river flow. In the Anglian catchment, the Central peak river flow allowance is 25%.

D.3.25 The EA has supplied the modelled flood extents for the 1% Annual Exceedance Probability (AEP) including a 20% Climate Change (CC) peak river flow allowance (See Appendix I.3). The supplied data is from the Cam Urban model, which includes a blanket 20% climate change peak river flow allowance. Modelled flood extents and depths for the Central Allowance (25%) are not currently available from the EA (August 2020). The 1%AEP+20%CC flood extent may be considered indicative only of potential flooding in the 1%AEP+25%CC event.

D.3.26 In a 1%AEP+20%CC event, the modelled flood level at the closest modelled upstream node to site (BL7420D, See Appendix I.3) would be 6.42mAOD. The average elevation on site is 9.07mAOD (according to Environment Agency 2m LiDAR data). EA modelled flood extents for the 1%AEP+20%CC event demonstrates that the site would not be inundated in this event.

D.3.27 Confirmation of 1%AEP+25%CC flood levels, flows and extents should be sought where possible, availing of EA JFlow models, prior to development on this site.

D.3.28 As the Cam Urban model demonstrates the site not to be inundated in the 1%AEP+20%CC event, the fluvial /tidal risk to site in the future is considered to be low.

D.3.29 According to the EA Risk of Flooding from Surface Water (RoFSW) extents maps (See Appendix I.3), the risk of surface water flooding on site may be considered “Very Low”. Therefore, the risk of surface water flooding is considered to be low.

D.3.30 The chalk bedrock below the site area is classified on a regional scale as a Principal aquifer. However, in this area, important aquifer horizons are absent in chalk. The site is not located within an EA groundwater Source Protection Zone. The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) states that groundwater flooding has occurred within the district, but the closest recorded incident of groundwater flooding occurred approximately 1km east of site area. Therefore, the risk of flooding from groundwater is considered to be low.

D.3.31 The site area is not located within an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection. Therefore, the risk to site in the event of a breach of defences is considered to be low.

D.3.32 The EA Risk of Flooding from Reservoirs map demonstrates that the site is not located within an area considered at risk in the event of reservoir failure.

RAG summary

D.3.33 The table below summarises the RAG evaluation for flood risk at each site and confirms that the overall risk of flooding is low for all three sites.

Table D.83: Flood risk RAG assessment

Parameter	Site area 1	Site area 2	Site area 3
Fluvial/Tidal present day	Low Risk	Low Risk	Low Risk
Fluvial/Tidal Including climate change	Low Risk	Low Risk	Low Risk
Surface Water	Very Low to Low Risk	Very Low Risk	Very Low Risk
Groundwater	Low Risk	Low Risk	Low Risk
Sewer	Low Risk	Low Risk	Low Risk
Residual Risk	Low Risk	Low Risk	Low Risk
Overall flood risk	Low Risk	Low Risk	Low Risk

Incorporating feedback

D.3.34 Phase one non-statutory consultation was held in order to share the proposals for relocating the WWTP with the public and stakeholders. This section provides a summary of the feedback received from the public in relation to flood risk and how the concerns, issues and opportunities raised have been considered within the assessment criteria for Stage 4 final site selection.

Table D.84: Flood risk feedback

Sub-Theme	Site (if specific)	Comment Summary	Response
Flood Risk	General	Feedback shows some concern regarding an increase to flood risk in the local area.	During Stage 1 of site selection, the EA flood zones were used as a primary constraint so that no sites proposed would be in an area at a high risk of flooding. A high-level flood risk screening assessment has also been carried out on the three shortlisted sites within the Stage 4 assessment, which has demonstrated that all of the site area options have a low risk of flooding from all potential sources. A flood risk assessment will be carried out for the chosen site during the EIA stage to ensure that any risk of flooding from the site itself is mitigated through design and operation of the new WWTP.
	Site area 2	Specific comment received that Site 2 area is prone to flooding (from a non-technical stakeholder).	The high-level flood risk screening assessment carried out during Stage 4 has indicated that site area 2 has a low risk of flooding from all sources. However, were this site area to be chosen a flood risk assessment would be carried out during the EIA stage to ensure that any risk of flooding is mitigated through design and operation of the new WWTP.

Assessment of mitigated options

D.3.35 As the assessment of unmitigated options resulted in a low flood risk it is not deemed necessary to identify mitigation measures for the purposes of the final site selection assessment. Therefore, an assessment of mitigated options in relation to flood risk has not been undertaken. A flood risk assessment will be carried out during the EIA stage to further assess the risk for the chosen site and identify if any mitigation measures are required to manage the risk of flooding from the site and associated infrastructure.