Reservoir Flood Risk

Figure 13.44 View A

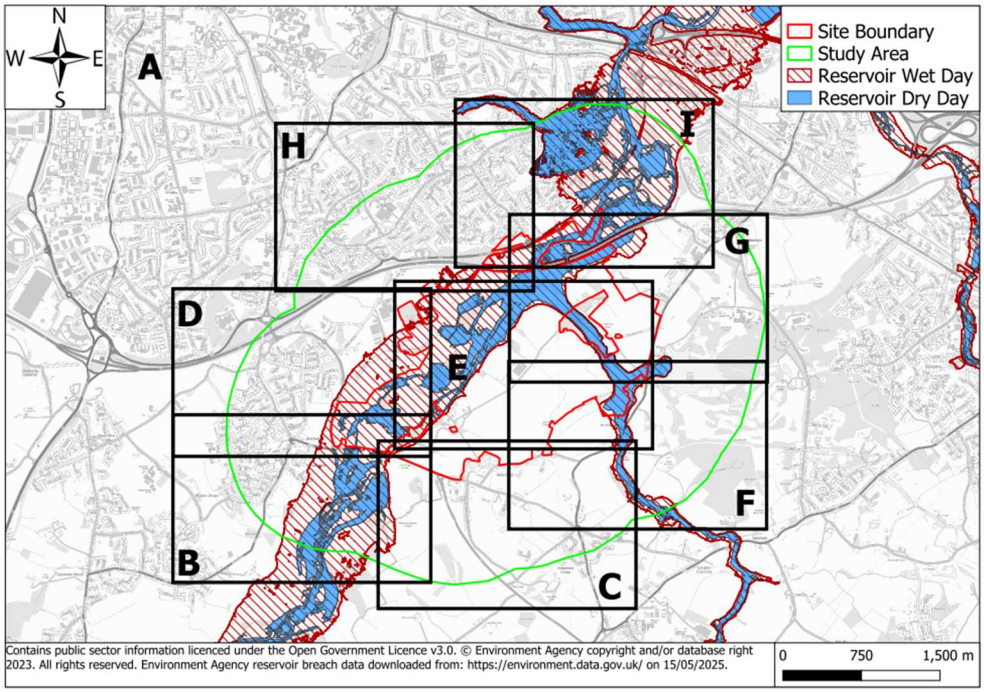


Figure 13.45 View B – School Green

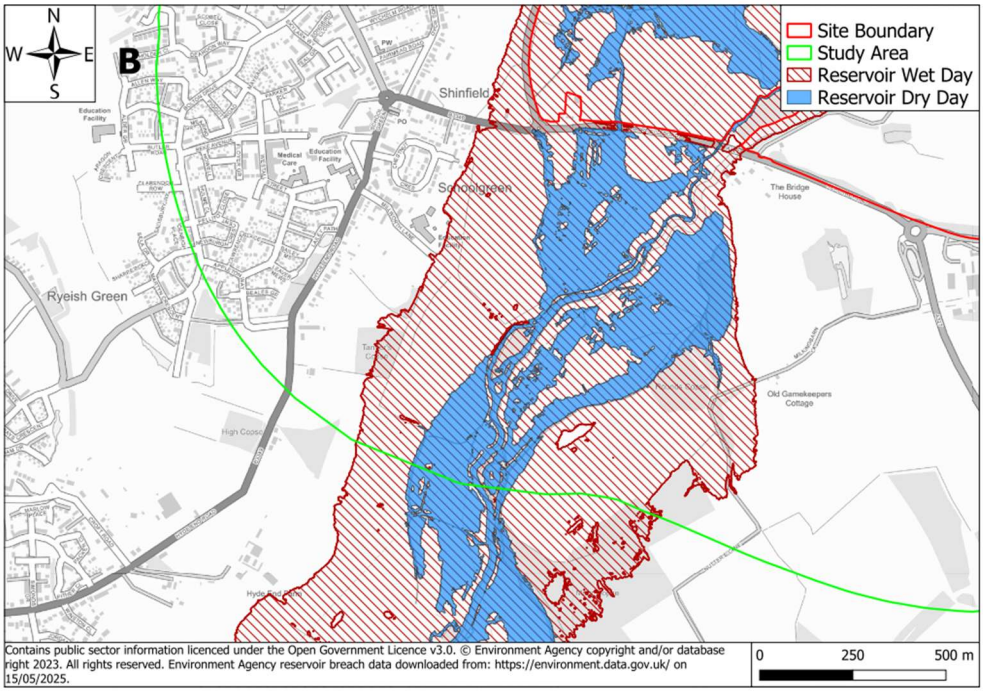


Figure 13.46 View C – Arborfield

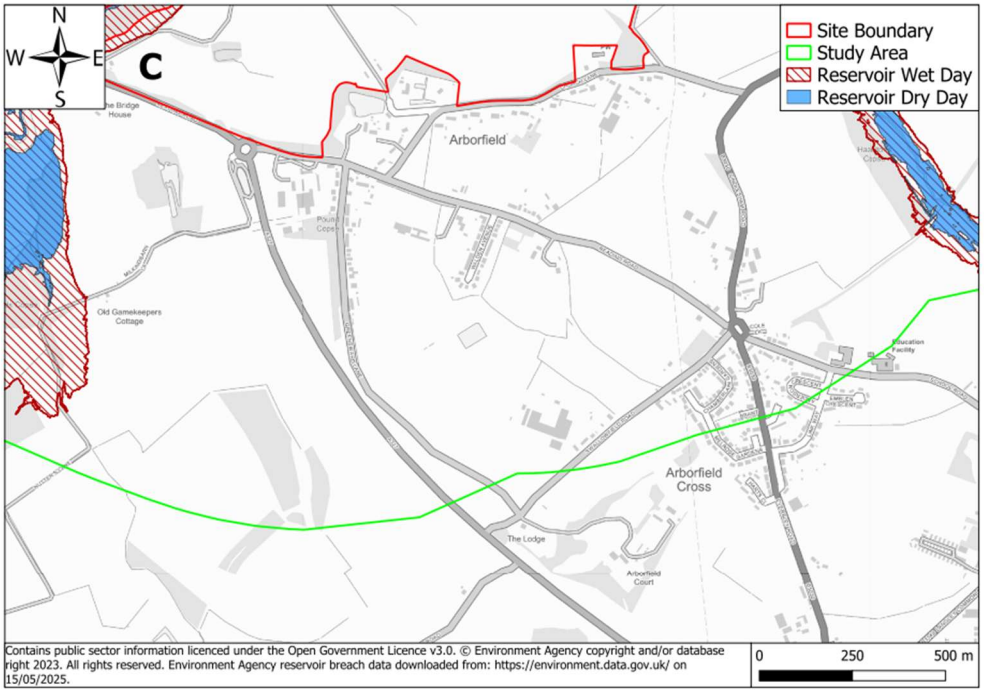


Figure 13.47 View D – Western Watercourses

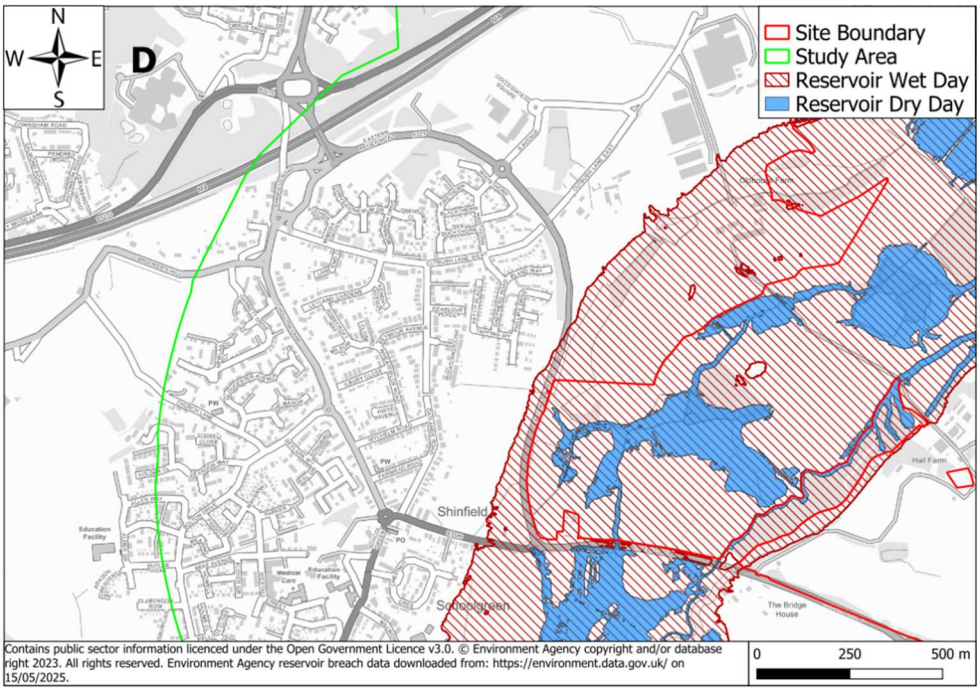


Figure 13.48 View E – Hall Farm

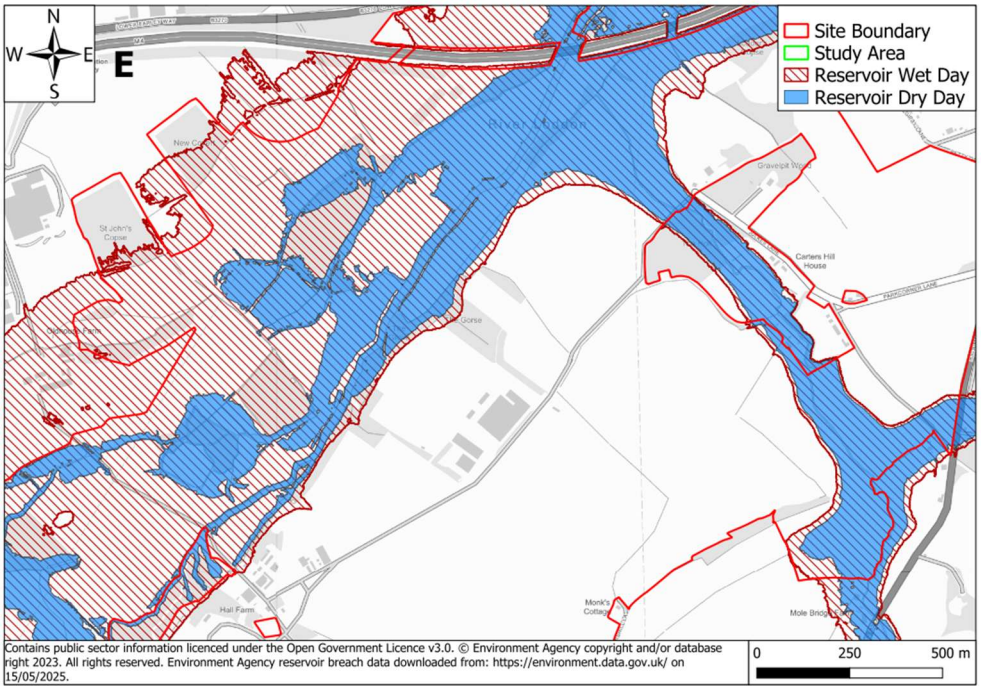


Figure 13.49 View F – Barkham Brook

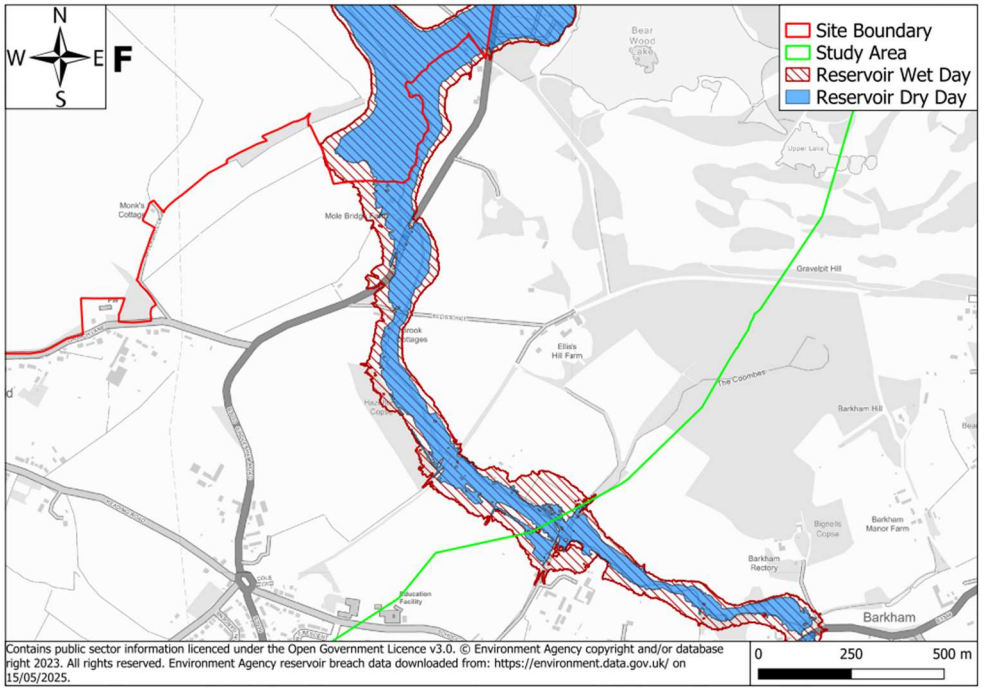


Figure 13.50 View G – Barkham Brook

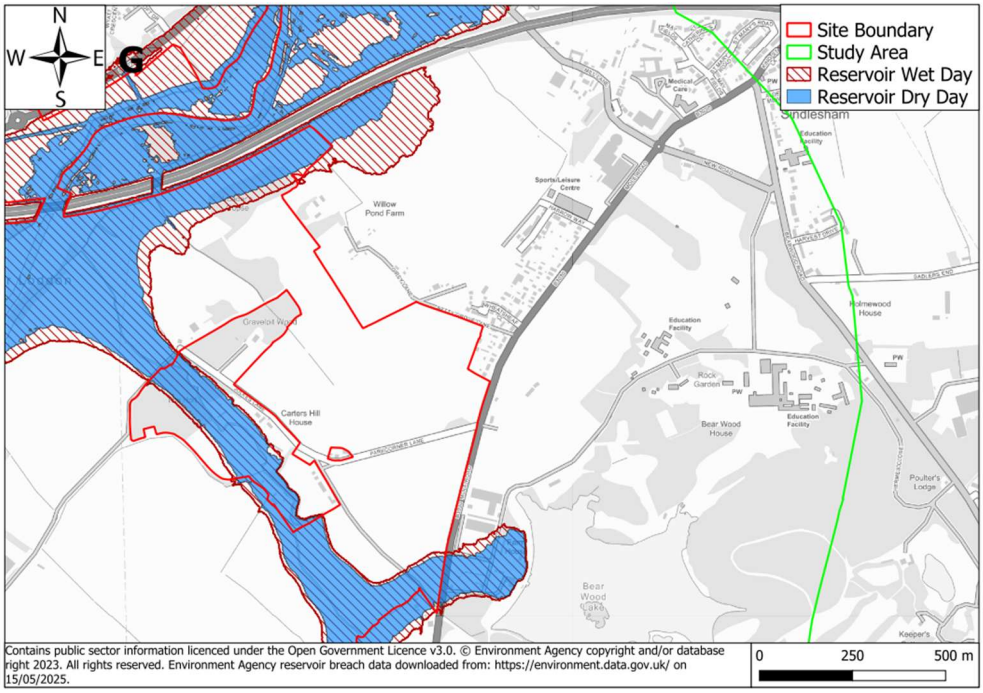


Figure 13.51 View H – Lower Earley Way

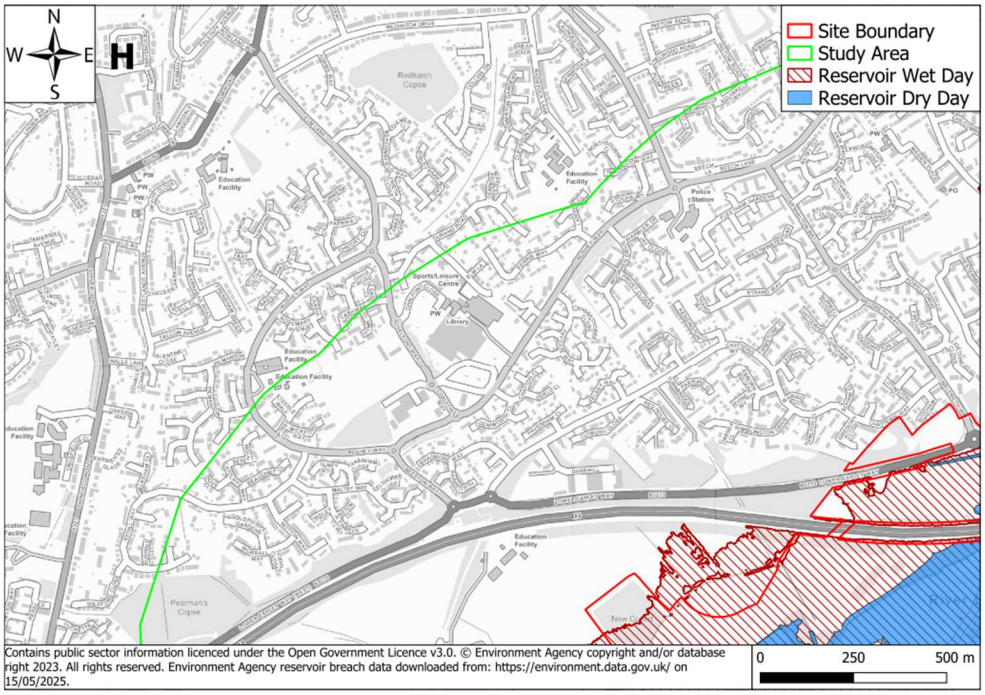
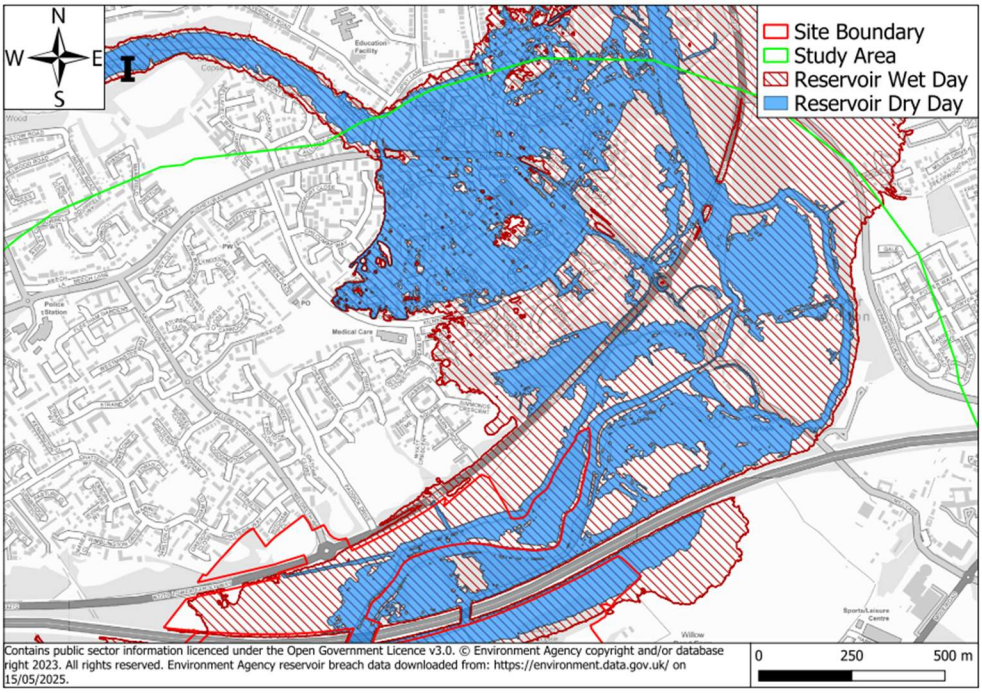


Figure 13.52 View I – Lower Earley Way



13.3.30 The EA flood risk from reservoirs mapping indicates areas that would be at risk of flooding in the event of a reservoir breach.

13.3.31 The mapping shows that areas within the some areas within the study area could be impacted by reservoirs flooding on both wet and dry days.

13.3.32 The closest reservoir to the Site is Bearwood Lake, which lies approximately 130m to the east of the Site boundary and Mole Road. Bearwood Lake, situated to the east of the Site area (**View G** and **View F**). The primary flow path from this reservoir flows north-west before diverging at the north-west border. A smaller flow path flows south around Gravel pit Hill.

13.3.33 The area directly to the west of this reservoir is predicted to be impacted by a reservoir breach in both wet and dry day events. This area then extends and follows the flow route of the Barkham Brook.

13.3.34 The main area that is predicted to be impacted by reservoir flooding is a section that runs from the north of the Site across the southwestern corner of the Site, following the general area and proximity of the River Loddon (**View B, View D, View E, View H** and **View I**)

13.3.35 This area of reservoir flooding, in areas has a width of approximately 900m across at the widest area. This is predominately reservoir wet day event with some reservoir dry day event data within this.

Sewer Flood Risk

13.3.36 When exceeded, surcharged sewer networks can lead to flooding from backed up manholes and gully connections.

13.3.37 Thames Water Asset Location Plans confirm that there are very few sewers within the Site itself. A copy of the Thames Water Asset Plans is included within the FRA.

13.3.38 DG5 records have been reported in the WBC SFRA. This suggests that since 2000, there have been 60 recorded incidences of sewer flooding within the area of interest. These have occurred along Mole Road to the east of the Site, and Arborfield Road along the southern boundary.

13.3.39 Since 2000, there are over 386 recorded incidences of sewer flooding within 500m of the Site. The majority of these occurred on the urban centres of Lower Earley, Shinfield, Winnersh and Sindlesham.

13.3.40 Thames Water have also identified clusters of flooding within the Arborfield STW catchment. Thames Water recognise that Arborfield and Wokingham Sewage Treatment Works will reach quality and/or flow exceedance over the coming periods for maintenance and capital works. Thames Water is obliged to address these matters.

13.3.41 Overall sewer flooding is a low risk to the Site.

Historical Flood Risk

13.3.42 Table 13.6 outlines the dates of recorded historical flood events, which is based on historic flood mapping, EA recorded flood outlines, and LLFA historic flood points. The events are within the areas of Arborfield, Arborfield Green, Barkham, Earley, Shinfield and Swallowfield.

Table 13.9 Historical Flood Events

Date	Location	Flood Source	Description
July 2025	Western boarder of the River Loddon & Northeast of M4	Fluvial	Channel capacity exceeded
July 2007	Western boarder of the River Loddon	Fluvial	Channel Capacity exceeded
February 1991	Eastern Boarder of the River Loddon, and Blackwater River to the south-east	Fluvial	Channel capacity exceeded
January 1991	Western boarder of the River Loddon & Northeast of M4	Fluvial	Channel capacity exceeded
February 1990	Eastern Boarder of the River Loddon, and Blackwater River to the south-east	Fluvial	Channel capacity exceeded
January 1981	Northeast of M4	Fluvial	Channel capacity exceeded
August 1977	Earley & Woodly	Fluvial	Channel Capacity exceeded
January 1974	Northeast of M4	Fluvial	Channel capacity exceeded
November 1974	Eastern Boarder of the River Loddon, and Blackwater River to the south-east	Fluvial	Channel capacity exceeded
September 1968	Eastern Boarder of the River Loddon, and Blackwater River to the south-east	Fluvial	Channel capacity exceeded
January 1947	Northeast of M4	Fluvial	Channel capacity exceeded

EA Historic Flood Outlines

13.3.43 **Figures 13.53-58** shows the recorded flood outlines records held by the EA. The recorded flood outlines show records of historic flooding from rivers, the sea, groundwater and surface water. Each individual Recorded Flood Outline contains a consistent list of information about the recorded flood.

Figure 13.53 1947 Flood Event

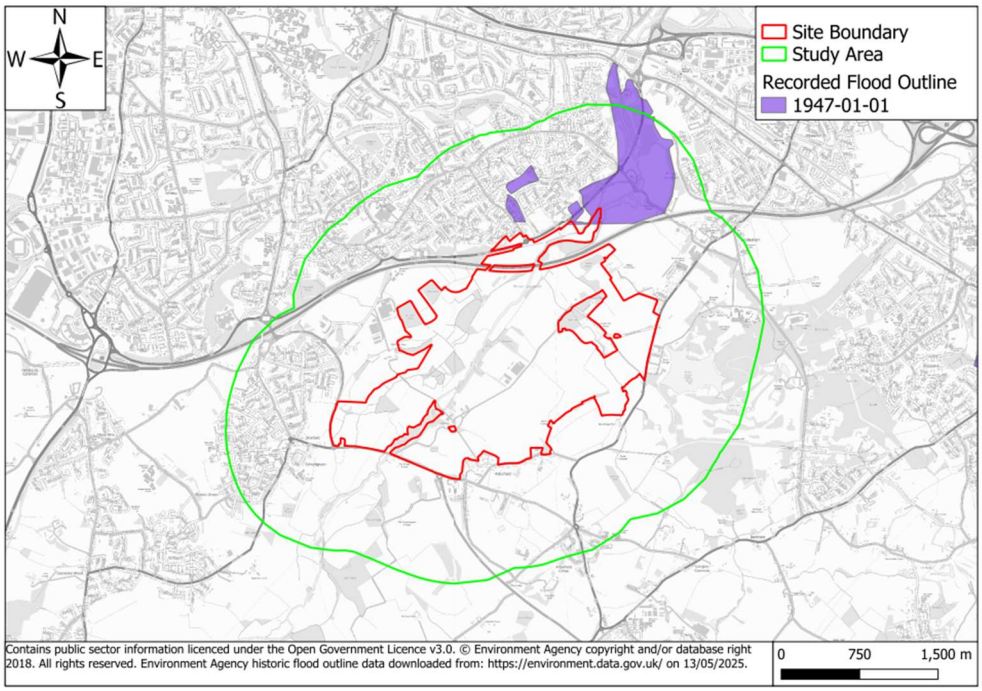


Figure 13.54 1974 Flood Event

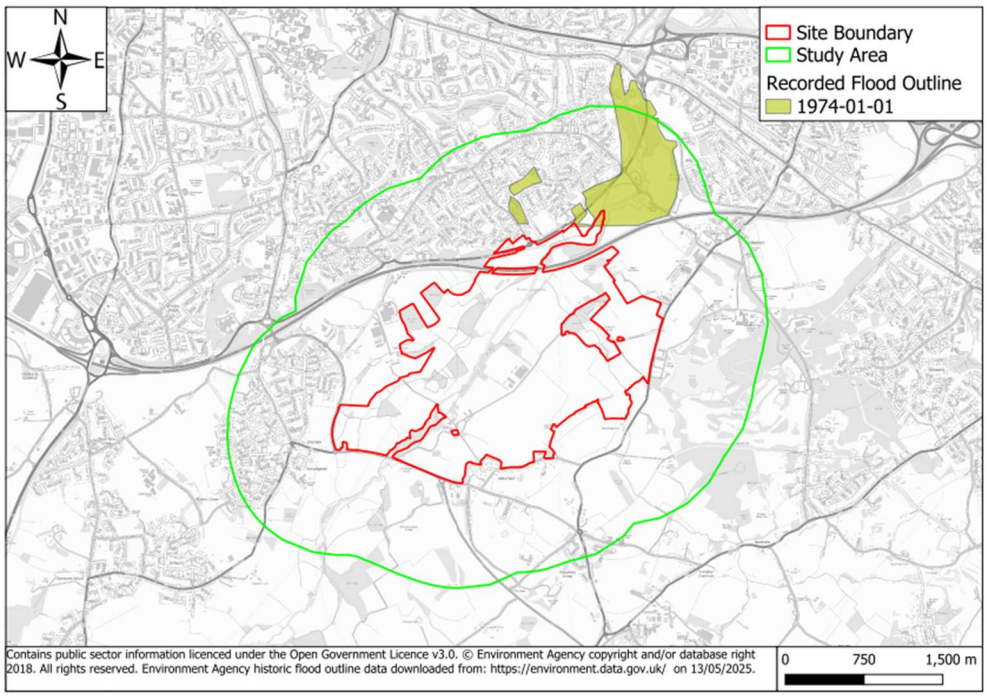


Figure 13.55 1981 Flood Event

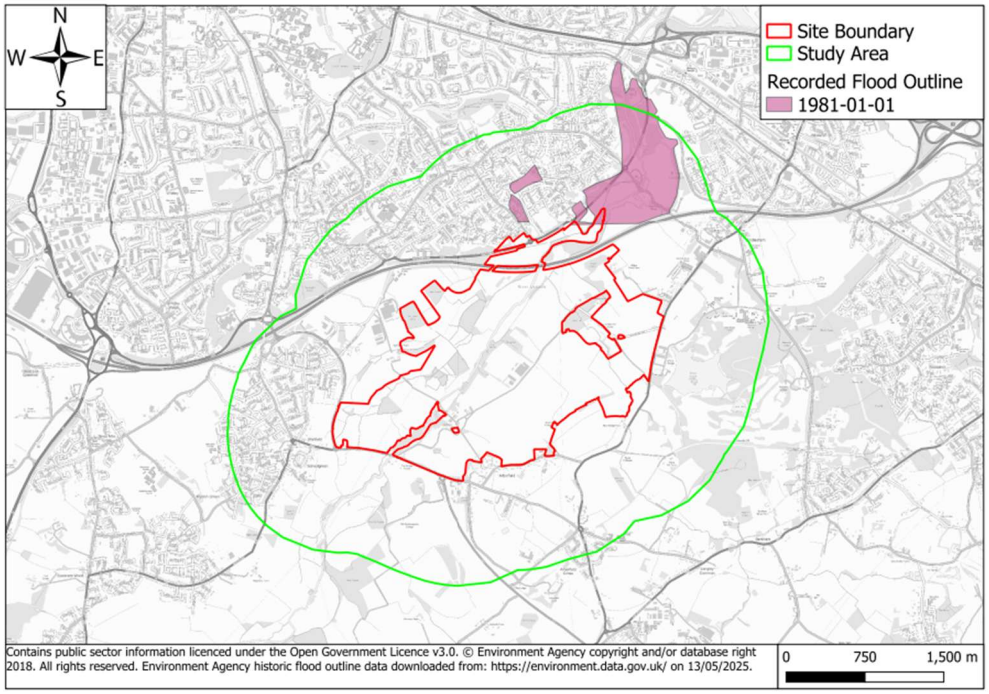


Figure 13.56 1990 Flood Event

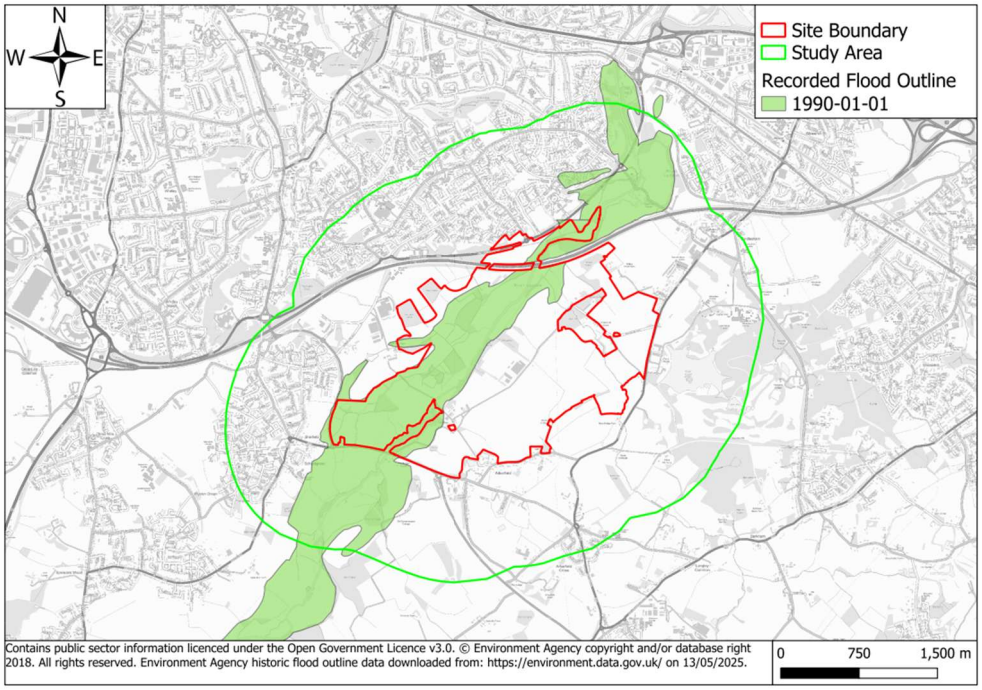


Figure 13.57 1991 Flood Event

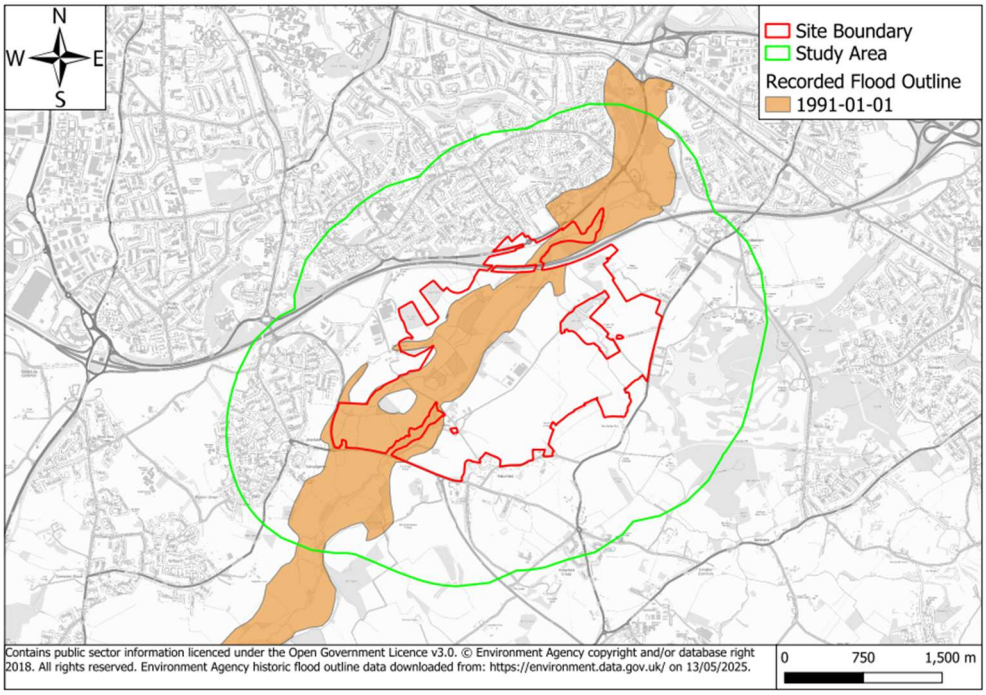
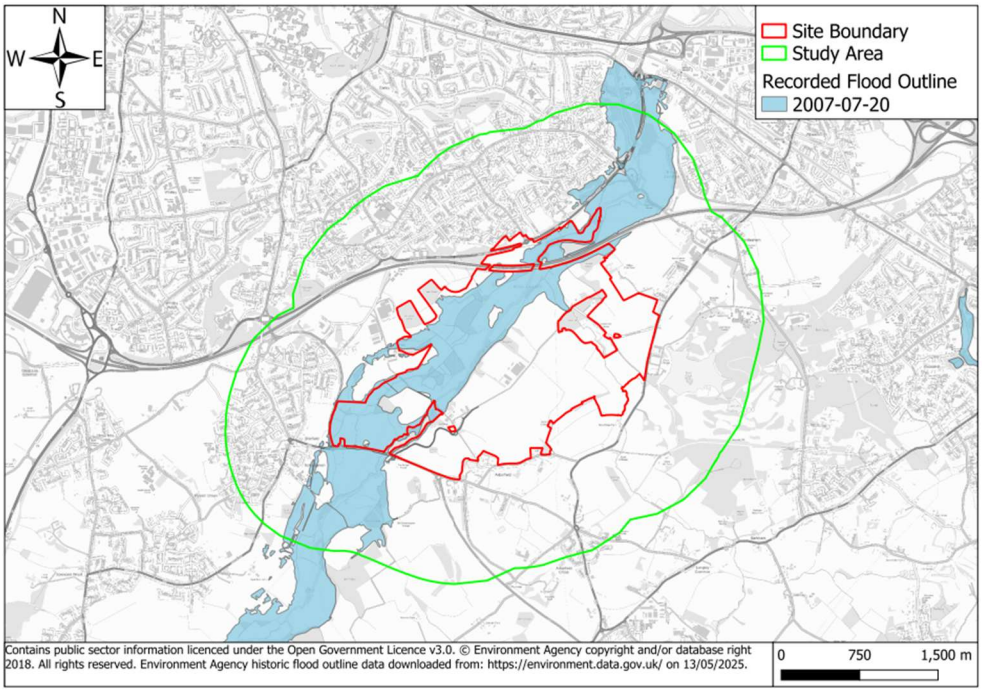


Figure 13.58 2007 Flood Event



13.3.44 The data for historic flooding confirms the findings of the fluvial modelling and that, in this reach of the Loddon, flooding has been contained primarily within the Loddon corridor and the area to the west of the Loddon.

13.3.45 This data also aligns with observations of the local flooding regime made during site walkovers and from consultation with local organisations and residents.

Drainage

13.3.46 The Site is primarily a greenfield site with some farm and research buildings. The Site's surface water drainage is heavily influenced by natural watercourses, most notably the River Loddon and Barkham Brook, which both bisect the Site. The River Loddon flows from the southwest to the northeast, while Barkham Brook runs from southeast to northwest, eventually discharging into the River Loddon. These watercourses play a significant role in the Site's drainage, with much of the water flowing through these channels.

13.3.47 In addition to these major water bodies, the Site also has a complex network of field drainage features and unnamed watercourses. These smaller watercourses drain into both the River Loddon and Barkham Brook, particularly in the north and northwest parts of the Site. The drainage in the southeast flows towards Barkham Brook, while the northern and far southern areas drain towards the River Loddon.

13.3.48 The topography of the Site, which generally slopes towards the River Loddon and Barkham Brook, further enhances the drainage patterns, with water moving naturally towards these lower-lying areas. However, this also creates areas of flood risk, particularly around the watercourses. The Site's natural drainage is affected by both fluvial flooding from the rivers and surface water accumulation during heavy rainfall. There is also a raised motorway (M4) running through the northern part of the Site, which can act as a barrier and cause localised ponding of surface water runoff.

13.3.49 The soils are a mixture of loamy and clayey types, with naturally high groundwater levels, which can influence drainage efficiency. Sustainable Drainage Systems (SuDS) have been proposed as mitigation, but site-specific investigations are necessary due to the risk of groundwater ingress affecting the hydraulic capacity of any below-ground structures. The use of infiltration methods may also be limited due to poor soil permeability and the presence of groundwater source protection zones.

13.3.50 In summary, the existing drainage condition of Site relies heavily on its natural watercourses and drainage networks, which direct water towards the River Loddon and Barkham Brook. However, the Site is prone to both fluvial and surface water flooding due to its topography and the presence of impermeable infrastructure like the M4.

13.3.51 There are no public foul water sewers within the Site. Localised systems serve the farms and research buildings.

Baseline Hydrogeology

13.3.52 The BGS Geological Map of Reading (BGS, 2000) has been used to analyse the geology at the Site, alongside borehole records mentioned below.

13.3.53 Superficial deposits at the Site include alluvium, which runs along the River Loddon and Barkham Brook. West of the Loddon lies the Brickearth Formation, comprising clay, silt and sand, and on all sides River Terrace Deposits are found. River Terrace Deposits comprise sand and gravel, possibly with lenses of silt, clay or peat.

13.3.54 Generally, these superficial deposits can be described as sandy, with some silt and clay, and are likely to be permeable in nature. The River Terrace deposits are classed as a Secondary (A) Aquifer, while the Brickearth Formation is classed as a Secondary (B) Aquifer.

13.3.55 The entirety of the Site is underlain by clays, silts and sands of the London Clay Formation. This formation is described as poorly laminated, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. The London Clay is not a productive unit. There may also

be thin beds of pockets of sand in the area. There are also areas of sandstones of the Bagshot Formation in the area, although not within the Site boundary.

13.3.56 The Chalk lies underneath the London Clay. This is the major aquifer of southern and eastern England, with yields of around 150 l/s. Fractures are most dense and enlarged in the top 80 – 100m of the aquifer.

13.3.57 The BGS Hydrogeological Map of the South West Chilterns and the Berkshire and Marlborough Downs (BGS, 1978) shows the direction of groundwater movement is to the northeast. This is in line with topography and the local surface water flow of the Loddon, towards the Thames.

13.3.58 The Chalk Aquifer is the major aquifer unit in the area, being targeted by a number of Private Water Supplies (PWS) in the area. However, the London Clay is estimated to be approximately 30m thick in the area and will act as an aquitard which will prevent the transport of groundwater in the area to the Chalk. The Chalk itself outcrops just north of Reading, some 6km northwest of the Site, where it recharges.

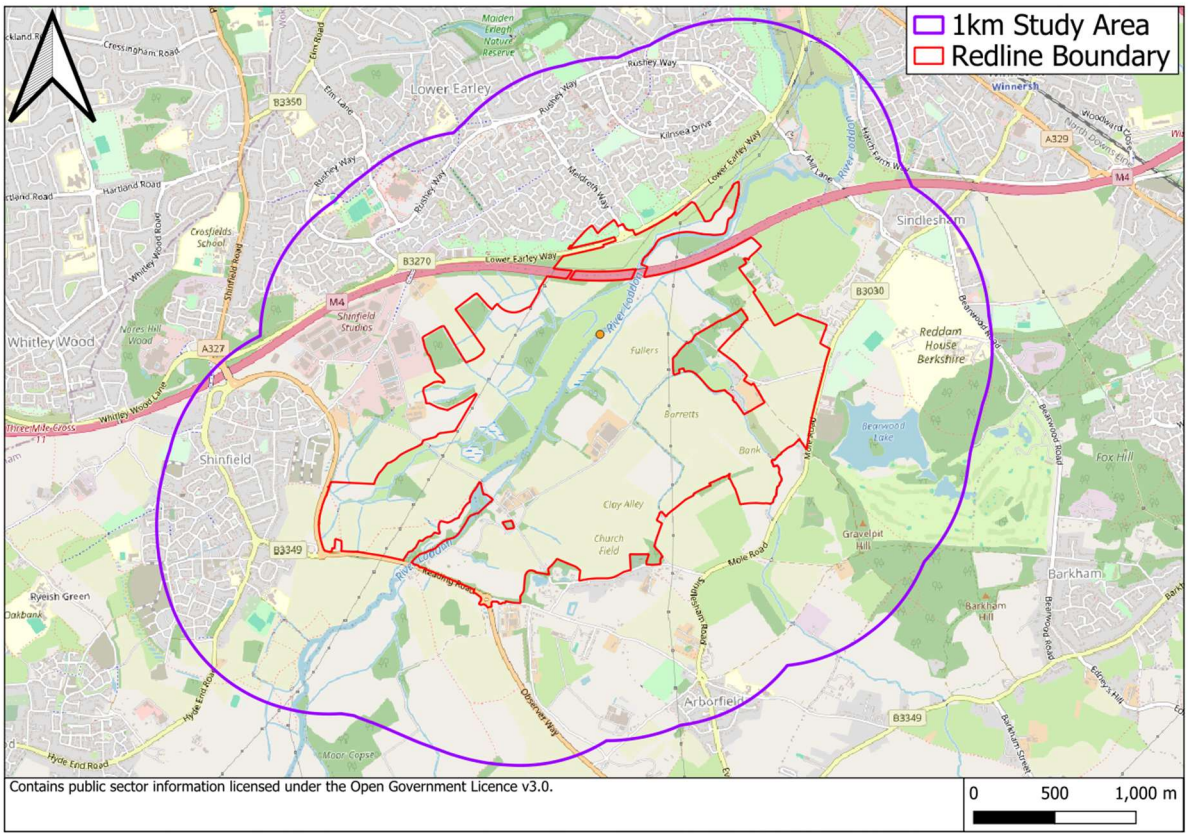
13.3.59 Groundwater will be present in superficial deposits at the Site, especially in the River Terrace Deposits and the Brickearth Formation, both of which are Secondary Aquifers.

Baseline Water Framework Directive

13.3.60 The study area is presented within Figure 13.59, and takes into account the range of potential impacts arising from activities associated with the Proposed Development. The zone of influence is deemed appropriate by the impacts expected to arise from the Proposed Development. Based on the above, the study area is defined as:

- The area of land to be temporarily or permanently occupied during the construction and operation of the Proposed Development in addition to;
- A 1km buffer applied to the Site Boundary.

Figure 13.59 WFD Study Area



13.3.61 The development may interact with surface water bodies, therefore, it is vital that the potential impacts of the development on local waterbodies is assessed.

13.3.62 For the purpose of this WFD assessment, water bodies that are within, intersect or are hydrologically connected to the Study Area, have been identified and considered as relevant water bodies.

13.3.63 The Site is located entirely within the Loddon WFD Operational Catchment. The study area extends slightly into the Kennet Operational Catchment in its western extent. The WFD surface water bodies which overlap with the study area and their WFD status are included in the tables, below.

Table 13.10 WFD ID

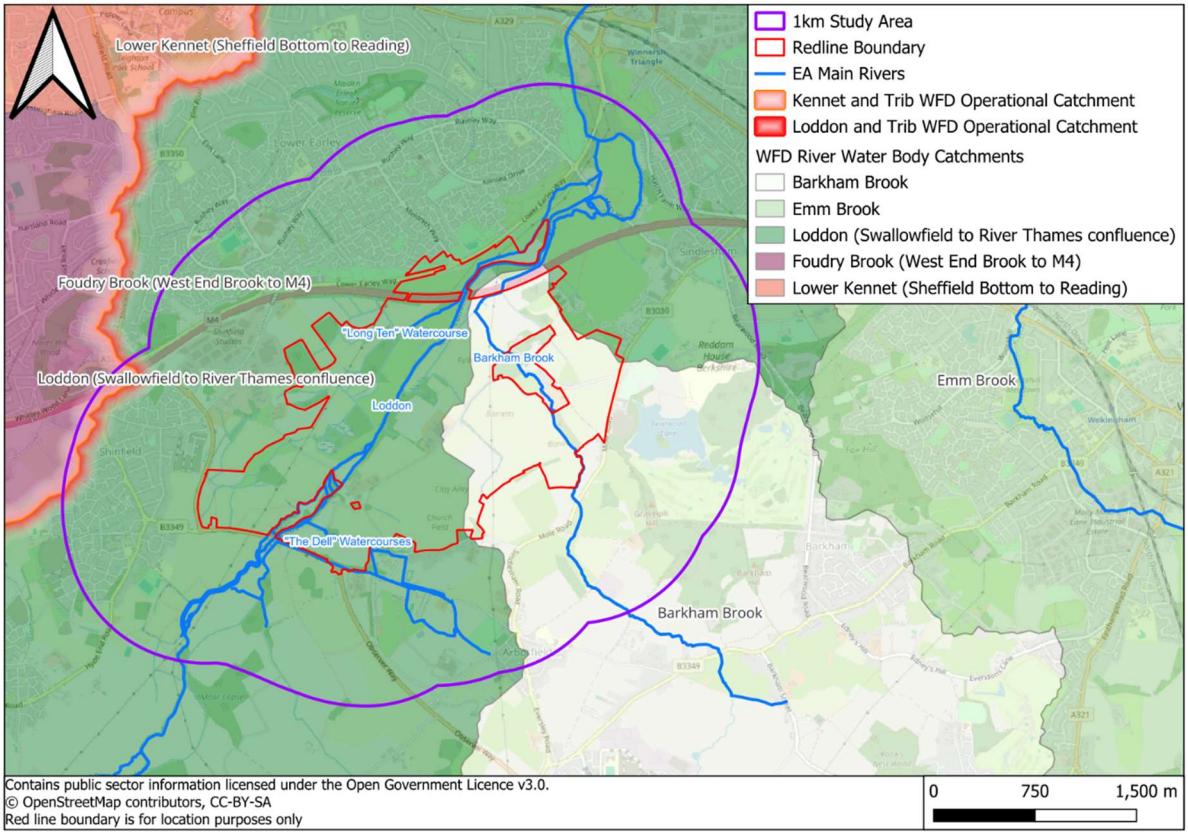
Name (WFD ID)	Management Catchment	Operational Catchment	Waterbody type
Loddon (Swallowfield to River Thames Confluence) (ID: GB106039023160)	Loddon and Tributaries	Loddon	River (5,189.4 ha catchment area)
Barkham Brook (ID: GB106039017400)	Loddon and Tributaries	Loddon	River (1871.46 ha catchment area)
Foudry Brook (West End Brook to M4) (ID: GB106039017380)	Kennet and Tributaries	Kennet	River (2351.19 ha catchment area)

Table 13.11 WFD Status

Name (WFD ID)	Artificial or Heavily Modified	Overall Classification	Ecological Status	Biological Quality Elements	Hydromorphological Supporting Elements	Specific Pollutants	Chemical Status	Priority Hazardous Substances
Loddon (Swallowfield to River Thames Confluence) (ID: GB106039023160)	No	Moderate	Moderate (2019/2022)	Moderate (2019/2022)	Supports Good (2019/2022)	High (2019/2022)	Fail (2019)/ Does Not Require Assessment (2022)	Fail (2019)/ Does Not Require Assessment (2022)
Barkham Brook (ID: GB106039017400)	No	Moderate	Moderate (2019/2022)	Moderate (2019/2022)	Supports Good (2019/2022)	High (2019/2022)	Fail (2019)/ Does Not Require Assessment (2022)	Fail (2019)/ Does Not Require Assessment (2022)
Foudry Brook (West End Brook to M4) (ID: GB106039017380)	No	Poor	Poor (2019/2022)	Poor (2019/2022)	Supports Good (2019/2022)	High (2019/2022)	Fail (2019)/ Does Not Require Assessment (2022)	Fail (2019)/ Does Not Require Assessment (2022)

13.3.64 The majority of the Site and its study area is located within the Loddon (Swallowfield to River Thames) waterbody catchment, with a smaller area in the southeast surrounding Barkham Brook being located in the Barkham Brook catchment. Barkham Brook is a tributary of the River Loddon, therefore any works on one of the two rivers may have an impact on the WFD status of the other. A very small section of the study area overlaps with the Foudry Brook WFD catchment, a tributary of the River Kennet, which is in turn, a tributary of the Thames.

Figure 13.60 WFD Surface Water Bodies

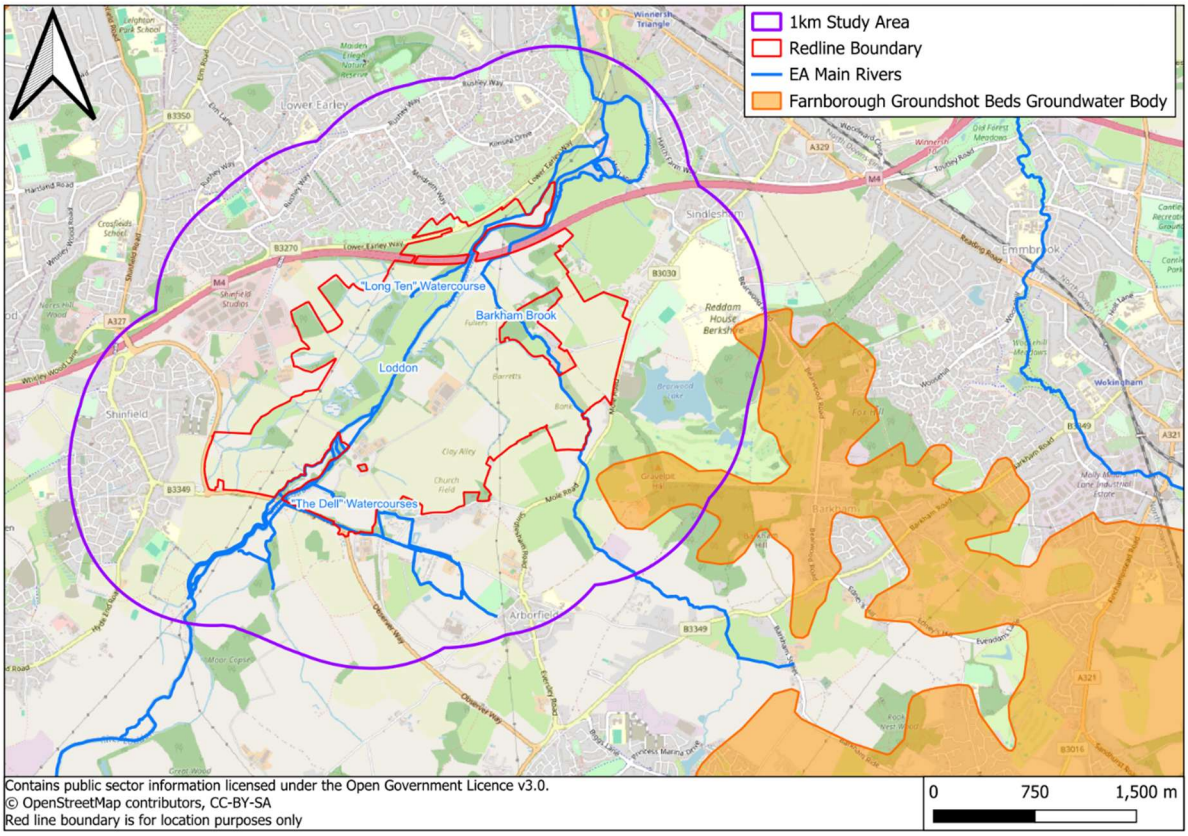


13.3.65 The entirety of the Site is not located within a groundwater body. A small section on the east of the study area is underlain by the Farnborough Bagshot Beds groundwater body. While the Chalk Group Aquifer (a principal aquifer) is present at depth within the study area, there is a significant cover of London Clay (unproductive strata), therefore WFD effects on this groundwater body have not been considered. Information on the Bagshot Beds groundwater body is included in the table below.

Table 13.12 WFD ID - Groundwater

Name (WFD ID)	Management Catchment	Operational Catchment	Waterbody type
Farnborough Bagshot Beds (ID: GB40602G601300)	Thames GW	Farnborough Bagshot Beds	Groundwater body (22304.293 ha)

Figure 13.61 WFD Groundwater Bodies



13.3.66 Watercourses which may be affected by the development were screened based upon the criteria outlined in the table below. The screening criteria have been based upon a conservative approach, to ensure all WFD impacts are given appropriate consideration.

Table 13.13 Watercourse Screening Criteria

Watercourse Category	Criteria	Screening Outcome	Receptor Value
No channel present	No evidence of presence of surface water feature (no defined channel present or evidence of historical channel but is now in filled)	Out	N/A
Channel with no baseflow* / Minor Tributary	Ordinary Watercourse Minor tributary (within WFD water body catchment). Artificially created drainage channel or small natural headwater or ephemeral channel. Channel with little or no baseflow. Absence of flowing water for majority of year / limited connection to water table (potential to dry out). Shallow, ponded water present at times. No regular fluvial geomorphological processes or features present Low potential to support freshwater fish, macroinvertebrate, and/or macrophyte species Riparian zone typically impacted by land use / regular vegetation management Low overall aquatic habitat and hydromorphological value	Out	Low
Channel with limited baseflow** / Moderate Tributary	Ordinary Watercourse or Main River that is a tributary of the WFD water body main river line	In	Moderate

Watercourse Category	Criteria	Screening Outcome	Receptor Value
	Moderate tributary (within WFD water body catchment). Artificially created drainage channel or small natural channel. Channel with limited baseflow. Typically, shallow low flows. Non-definable morphological flow types, except in localised and isolated reaches. Limited and discrete active fluvial geomorphological processes and features. Limited potential to support freshwater fish, macroinvertebrate, and/or macrophyte species. Riparian zone may be impacted by land use / regular vegetation management in some Cases. Moderate overall aquatic habitat and hydromorphological value.		
Channel with limited baseflow** / Moderate Tributary within a Sensitive Area	As above Located within an area Designated SSSI, SAC or SPA	In	High
"Modified' channel with permanent baseflow*** / Primary Watercourse	Main River or a significant Ordinary Watercourse. WFD water body main river line. Modified natural channel with permanent baseflow. Likely designated as Heavily Modified Water Body (HMWB) under WFD. Definable flow types (but diversity impacted by modifications) Active fluvial geomorphological processes and features (but functionality and diversity impacted by modifications) Potential to support some freshwater fish, macroinvertebrate, and/or macrophyte species (but habitat value impacted by modifications) Riparian zone typically impacted by land use / regular vegetation management Aquatic habitat and hydromorphological potential (but currently restricted by modifications)	In	High
"Functioning' channel with permanent baseflow*** / Primary Watercourse within a sensitive area	As above Located within an area Designated SSSI, SAC or SPA	In	Very High

* Sites typically assessed has having Q95 (the 5 percentile, low flow) flow ≤0.002m3/s

** Sites typically assessed has having Q95 flow >0.002m3/s to ≤0.01m3/s

*** Sites typically assessed has having Q95 flow >0.01m3/s

Screening Assessment

13.3.67 The following receptors have been screened against the screening criteria set out above. The receptors were identified during the water feature survey of the Site and are discussed in Appendix 13.5.

- River Loddon – Screened In – The Loddon has been screened in for WFD assessment, with a receptor value of “Very High”. Whilst the stretch of river within the study area does not include any designated sites, SSSIs are located upstream and downstream

of the Site (Stanford End Mill and River Loddon SSSI and Lodge Wood and Sandford Mill SSSI) which are hydrologically connected to the Loddon on Site.

- Barkham Brook – Screened In – Barkham Brook has been screened in for WFD assessment, with a receptor value of "High". Whilst Barkham Brook is affected by agricultural pressures, which have impacted the hydromorphological regime of the river, the watercourse is a Main River and WFD Waterbody Watercourse.

- "Long Ten" Watercourse – Screened In – The "Long Ten" Watercourse is categorised as a Main River in EA mapping, and while there is limited morphological activity and the watercourse is heavily impacted by agricultural pressures, it appears to be groundwater fed and therefore, likely remains wet year-round. Therefore, "Long Ten" has been screened in with a receptor value of "Moderate".

- "Arborfield Cut" – Screened In – The "Arborfield Cut" has been categorised as a Main River in EA mapping and has therefore been screened in for assessment. The watercourse appears to act as a seasonally wet flood channel / field drain, and was observed to be dry during a Water Feature Survey undertaken by RPS in June 2025.

- Seasonal Ditches – Screened Out – These ditches have no baseflow and as such are screened out.

- Groundwater Fed Ditch – Screened Out – This is an artificial channel which is disconnected from the rest of the surface water environment.

- Foudry Brook – Screened Out – A small portion of the study area in located within the catchment area of Foudry Brook. This river is not hydrologically connected to the Site, and as such not sensitive to the development.

- Farnborough Bagshot Beds – Screened Out – The far extents of the Farnborough Bagshot Beds WFD groundwater body underlies a section of the study area. Water on Site is not hydrologically connected to the Farnborough Bagshot Beds, as the Beds are separated from the Site by elevation and the impermeable London Clay Formation.

Baseline Water Resources

13.3.68 Thames Water, is the regional undertaker for foul water and surface water infrastructure. The location of the existing Thames Water infrastructure in relation to the Site is included as part of the Drainage Strategy report.

13.3.69 There are no public foul water sewers within the Site. Localised systems serve the farms and research buildings.

13.3.70 In respect of Potable Water Supply, distribution mains are pipes that domestic connections are supplied from. Trunk mains are pipes carrying water from a source of supply to treatment plant or reservoir or from one treatment plant/reservoir to another. A trunk main can also be a pipe transferring water in bulk to smaller water mains for supplying individual connections.

13.3.71 A 9" diameter trunk main is shown to be located within the A327 Reading Road. This main initially sits to the south of the carriageway, but switches to the northern side of Observer Way Roundabout

13.3.72 In the south-western corner of the Site, this trunk main extends into the Site at a 10" diameter main initially on the western side of the River Loddon, before transferring eastwards towards a

pump station situated adjacent to a backchannel of the Loddon next to Hall Farm/Arborfield Mill House.

13.3.73 A 3” diameter main is shown emanating out the pump station south-eastwards through Hall Farm on to Church Lane. Small diameter private mains are shown into the Site.

13.3.74 A 180mm diameter main is shown to be located to the north of the B3270 Lower Earley Way/Meldreth Way roundabout.

Future Baseline

13.3.75 Ignoring the effects of climate change, if the Proposed Development was not brought forward, the baseline conditions for the Site would remain similar to present with regards to flood risk, drainage and water resources. This assumes that any existing drainage infrastructure and/or watercourses continue to be well maintained and the current level of protection continues.

13.3.76 The volume and intensity of rainfall events is expected to increase with the effects of climate change. The increase in precipitation volume and intensity may cause an increase in fluvial and surface water flooding and increase the pressure on sewage infrastructure. Groundwater levels could increase with an increase in the overall volume of rainfall. The impact of climate change would occur with or without the Proposed Development.

13.4 Inherent design mitigation

Flood Risk and Drainage

13.4.1 A sequential approach to the layout of the development has been applied during the masterplanning for the Site. For example, the built development avoids both the fluvial floodplains and indicative surface water flow routes and floodplain areas. The built development is also set back appropriately from the Main Rivers and Ordinary Watercourses within the Site. This is detailed further in the Flood Risk Assessment (FRA).

13.4.2 New crossings of the River Loddon and of the other watercourses are proposed as part of the development strategy and, necessarily, some elements of these crossings and their associated infrastructure (roads and embankments) will be located in areas currently within the floodplain of the Loddon and other watercourses. However, as part of the design for the crossings, the floodplain storage compensation strategy has also been developed. This is detailed further in the FRA which confirms that there is no impact on flooding upstream or downstream of the Site.

13.4.3 The implementation of a surface water drainage strategy incorporating SuDS will include infiltration and conveyance, attenuation and controlled discharge surface water runoff, thus mimicking existing greenfield conditions and reducing flood risk both on and off site.

13.4.4 Finished floor levels will set a suitable freeboard above the design flood event including an appropriate allowance for climate change. This will be subject to detailed design.

Hydrogeology

13.4.5 Development at the Site is concentrated outside of floodplain areas and outside of the alluvial aquifer system which supports groundwater dependant ecosystems and provides baseflow to the River Loddon and Barkham Brook.

13.4.6 The proposed surface water drainage system will route drainage to the River Loddon and Barkham Brook meaning flows in these watercourses will not be reduced.

Water Framework Directive

Thames River Basin Management Plan

13.4.7 The Thames RBMP states that the Significant Water Management Issues (SWMIs) in the district are: physical modifications, pollution from wastewater, pollution from towns and cities, pollution from metal mines, pollution from rural areas, changes to the natural flow and level of water, and negative effects of non-native invasive species.

13.4.8 The Thames River Basin District Management Plan sets out an overview of the planned improvements for the Thames River Basin District.

13.4.9 The Plan outlines the measures to achieve the priorities for the area. Some of the key measures are detailed below:

13.4.10 Methods to manage physical modifications are the following:

- Habitat restoration or creation;
- River restoration and fish pass improvements;
- Removal of barriers to fish passage;
- Riparian tree planting and fencing.

13.4.11 Methods to manage pollution from wastewater, from towns, cities and transport, and from metal mines are the following:

- Pollution control initiatives.

13.4.12 Methods to manage pollution from rural areas are the following:

- Reduce diffuse pollution at source;
- Mitigate/remediate diffuse pollution impacts on the receptor;
- Reduce diffuse pollution pathways.

13.4.13 Methods to manage natural flow and levels are the following:

- Control pattern/timing of abstractions;
- Water demand management;
- Improvement to condition of channel/bed and/or banks/shoreline;
- Use alternative source/relocate abstraction or discharge.

13.4.14 Methods to manage non-native invasive species are the following:

- Mitigation, control and eradication;

- Building awareness and understanding;
- Early detection, monitoring and rapid response;
- Prevent introduction.

13.4.15 Methods to restore peatland are the following:

- Implementation of tried and tested methodologies in line with the England Peat Action Plan.

13.4.16 Measures from the above list which are relevant to the pressures impacting the waterbodies will be considered within the mitigation/improvements.

WFD Scoping Assessment

13.4.17 It is necessary to identify the impacts associated with the activities which will take place in relation to the construction and operation of the Proposed Development. The identified impacts will be considered alongside the embedded mitigation of the proposed development to scope in impacts that will not be managed by the embedded mitigation and may need further assessment and mitigation.

13.4.18 The scoping assessment has been applied based on the maximum design. The identified impacts will be considered alongside the embedded mitigation of the Proposed Development to scope in impacts that will not be managed by the embedded mitigation and may need further assessment and mitigation.

Proposed Works

13.4.19 The required works which form part of the proposed development, have been assessed to determine which have the potential to result in the greatest effect on an identified receptor or receptor group. Therefore, this comprises a conservative assessment of a worst-case scenario. The following works have been identified:

- Enabling works including site clearance, temporary access, erection of fences and security provisions;
- Installation of three crossings of the River Loddon;
    - A new open span bridge to serve the interior road and active travel route network, at the north of the Site;
    - A new pedestrian and cycle bridge, towards the centre of the Site; and
    - Refurbishment of an existing bridge, towards the south of the Site;
- Installation of two new water crossing points across Barkham Brook;
    - Design of these crossing points is yet to be determined, so for the purposes of this WFD assessment, it has conservatively been assumed that they will take the form of oversized culverts;
- Installation of an active travel path alongside the River Loddon. In its southern extent, this travel route will be of mown grass and in the north of the Site this will take the form of a shared footway / cycleway;

- Residential development of land situated upon a Secondary A aquifer with groundwater levels of approximately 1 mbgl;
- Ground remediation and earthworks in the floodplain and riverbank;
- Construction of drainage network and outfalls;
- Movement of materials, waste and people to and from the Site; and
- Ongoing management measures.

Water Resources

13.4.20 The Proposed Development strategy will include design considerations to help realise opportunities for water efficiency measures across the Site.

13.4.21 The on-site foul water strategy utilises the topography and the layout where practicable to minimise foul water pumping stations to reduce the long-term maintenance requirement.

13.5 Potential effects prior to additional mitigation

Construction Phase

Flood Risk and Drainage

13.5.1 There are areas of known and potential flood risk within the Site but the Proposed Development avoids these areas in most cases. However there is the potential for construction areas such as compounds and temporary works and facilities to be located in areas of potential flood risk.. Where possible this will be avoided; however, there will be some elements of the development which necessitate construction to take place within the floodplain, such as elements associated with the proposed Loddon crossing. This could be a Minor or Moderate effect on construction workers.

13.5.2 Where construction activities are necessary within the floodplain or potential flood risk areas the risk can be mitigated and managed through a suitable flood management plan. This will reduce the magnitude of the impact to Negligible or Minor.

13.5.3 There is the potential for both direct and indirect contamination to local drainage channels and watercourses from a pollution incident with the use and storage of machinery, equipment and materials on-site during construction. Key potential pollution sources from construction activities include:

- Mobilisation and deposition of fine materials (e.g. silts and clays) from the use of machinery and vehicles (e.g. access routes, construction compounds, storage areas);
- Pollution risk in relation to the use of certain materials (e.g. cement, lubricants);
- Accidental leaks or spills during transportation, storage and maintenance;
- Creation of new access tracks for construction related traffic – and with the movement of vehicles within the Site;

- Soil erosion and increased sediment loading from localised changes to catchment hydrology (e.g. compaction of soil surfaces and the excavation of material);
- Concentrated flows of water and the increased potential from erosion and mobilisation, such as along temporary drains in areas with steep gradients; and/or
- Provision of temporary on-site sanitary facilities for construction site staff could also introduce a source of pollution, which is not currently present in the catchment.

13.5.4 The impacts on watercourses could be minor or moderate adverse, though with the implementation of the CEMP, this is reduced to Negligible to Minor.

13.5.5 Construction works on undeveloped areas have the potential to increase surface water runoff rates and volumes, alter drainage patterns and thereby affect localised and catchment-wide flood risk. The introduction of access tracks, construction and storage compounds, permanent and temporary structures, and the laying of infrastructure can all have an effect. Earth movement and ground re-profiling (e.g. with the creation of attenuation basins in the surface water drainage strategy as well as foundation excavation) could introduce a different material to the surface area of parts of the Site, which may have different soil infiltration or water quality properties. In addition, such works could alter the conveyance rate and possibly also the conveyance route of surface water runoff. Changes in the surface water flow regime could result in a Minor to Moderate impact on construction workers and on existing development within the area of interest. However, with the implementation of the CEMP and a Flood Management Plan (FMP) this would be reduced to Negligible to Minor

13.5.6 Key potential increases in surface water and flood risk from construction activities include:

- Alteration to the rate and route of surface water runoff in temporary drains while the operation surface water drainage system is being constructed;
- Stripping of soil or the import of fill affecting surface water runoff potential and drainage patterns through the compaction and smearing of soils; and/or
- Alteration to the surface water runoff regime through the re-profiling of the ground surface and with the introduction of temporary drainage channels.

13.5.7 The adverse effect on surface water and flood risk is dependent upon rainfall events occurring during the construction phase and will therefore be intermittent. With the implementation of the CEMP, these impacts will be managed to ensure that effects are both short term and are reduced to Minor to Negligible.

Hydrogeology

13.5.8 There is the potential for pollution incidents during construction to affect water environment receptors via mobilisation through groundwater, particularly in relation to the use of fuels and lubricants for machinery.

13.5.9 Construction works have the potential to reduce groundwater recharge and therefore affect baseflows in rivers and to groundwater dependant ecosystems where drainage patterns are altered.

Water Framework Directive

13.5.10 It is anticipated that potential hydrological impacts from the construction phase can be managed by the implementation of appropriate construction practices.

13.5.11 For the nature of the Proposed Development and potential associated impacts, an Outline Construction Environmental Management Plan (CEMP) will be prepared and submitted with the application. The CEMP would include industry good practice measures to ensure prevention of contaminated water run-off from all construction areas.

13.5.12 An Outline Pollution Prevention Plan (PPP) will be prepared and submitted with the application. The PPP will include details of emergency spill procedures. Good practice guidance detailed in the EA's Pollution Prevention Guidance will be followed where appropriate, or the latest relevant available guidance.

13.5.13 The Construction Drainage Strategy will incorporate pollution prevention and flood response measures to ensure that the potential for any temporary effects on water quality or flood risk are reduced as far as practicable during the construction stage. Such measures would be implemented through the CEMPs and associated Construction Method Statements, including but not limited to the following:

- installation of suitable facilities to remove material (e.g., mud and dust) from wheels;
- use of sediment fences along the existing watercourses/waterbodies when working nearby to reduce sediment load;
- covers for lorries transporting materials to/from site to prevent releases of dust/sediment to watercourses/drains;
- bulk storage areas to be secured and provided with secondary containment (in accordance with the Oil Storage Regulations and best practice);
- storage of oils and chemicals away from existing watercourses, including drainage ditches or ponds;
- concrete to be stored and handled appropriately to prevent release to drains;
- treatment of any runoff water that gathers in the trenches would be pumped via settling tanks or ponds to remove any sediment;
- obtain consent for any works (e.g., discharge of surface water) that may affect an existing watercourse. The conditions of the consent will be specified to ensure that construction does not result in significant alteration to the hydrological regime or an increase in fluvial risk;
- use of a documented spill procedure and use of spill kits kept in the vicinity of chemical/oil storage;
- storage of stockpiled materials on an impermeable surface to prevent leaching of contaminants and use of covers when not in use to prevent materials being dispersed and to protect from rain; and
- stockpiles to be kept to minimum possible size with gaps to allow surface water runoff to pass through.

13.5.14 Relevant permits will also be sought for the proposed works which have the potential to impact the watercourses within the vicinity of the Proposed Development.

Scoping of Construction Impacts

13.5.15 The following potential construction impacts have been scoped in or out of further assessment based upon the efficacy of the embedded mitigation. For those which have been scoped in as requiring further assessment, the elements of construction they affect have also been included.

13.5.16 Temporary dewatering to enable construction – Scoped Out – The construction of the Proposed Development will adhere to best practice guidance and risk assessment method statements, including measures to avoid and/or minimise disturbance of the water environment. Site investigation and monitoring will also be implemented before, during and after dewatering and excavation activities, in order to protect the integrity of nearby surface water features.

13.5.17 Footprint (e.g. the area of channel impacted by works in the vicinity of the channel) – Scoped In – The construction of the Proposed Development will adhere to best practice guidance and risk assessment method statements which include measures to avoid and/or minimised disturbance to the water environment. However, works are proposed within the channel which have the potential to impact the existing situation.

13.5.18 Pollution risk and altered drainage patterns from general construction activities – Scoped Out – The construction of the Proposed Development will adhere to best practice guidance and risk assessment method statements which include measures to avoid and/or minimised disturbance to the water environment. Construction activities will be temporary in nature.

13.5.19 Creating or altering of pathways along which existing poor quality groundwater can migrate – Scoped Out – The construction of the Proposed Development will adhere to best practice guidance and risk assessment method statements which include measures to avoid and/or minimised disturbance to the water environment. Construction activities will be temporary in nature.

13.5.20 Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream – Scoped In – The Proposed Development has sought to reduce hydromorphological impacts as far as reasonably practicable by minimising in-channel works. However, works are proposed within the channel which have the potential to impact the existing situation.

13.5.21 The construction elements which may require work within the channel, and therefore cause impacts on the water environment via footprint and changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream, are drainage outfalls, open span bridges and bridging culverts.

13.5.22 Drainage Outfalls – Drainage outfalls may be construction on all watercourses within the Site. Construction impacts will be managed via best practice method statements, however localised loss of existing river habitats which may extend beyond construction could have an adverse effect and require further mitigation. Removal of sediment or introduction of unnatural substrates during construction may impact the natural sediment regime post-construction.

13.5.23 Open Span Bridges – Open span bridges are proposed to provide water crossing points on the River Loddon. Whilst the footings of the open span bridges are to be set back 10 m from river banks, work in the channel which may be required to construct the bridge, may result in loss of habitat.

13.5.24 Culverts – Construction of culverts is only proposed for Barkham Brook, to facilitate active travel routes on Barkham Brook. Impacts will be managed via best practice method statements, however localised loss of existing river habitats which may extend beyond construction could have an adverse effect and require further mitigation. Removal of sediment or introduction of unnatural substrates during construction may impact the natural sediment regime post-construction.

13.5.25 Based upon the above summary, the following specific impacts have been identified:

- disturbance of floodplain/riparian habitats and processes;
- disturbance of in-channel habitats/processes.

Water Resources

13.5.26 The provision of on-site welfare facilities for construction staff is a legal requirement. There should be one toilet per 7 persons per 40 hour working week. Any wastewater generation is likely to be routed to a temporary septic tank that will require periodic emptying therefore demand to the existing wastewater network will be nil. This will mitigate any significant effects on the existing wastewater network during the Construction Phase. The impact of this on the existing network is Negligible.

13.5.27 A temporary build supply would normally be required in order to supply clean water to a site compound. This will place a demand on the local Thames Water Potable Water Supply network. The likely impact will be assessed by Thames Water in term of its significance, although given the residential location and the presence of adjacent potable water mains, this is likely to be minor. If a temporary build supply is not possible, the use of bowsers is a last resort. The impact of this is Negligible or, in some cases, Minor adverse but short term.

Operational Phase

Flood Risk and Drainage

13.5.28 The baseline flood risk overview confirms that the vast majority of the Site is at little or no risk of flooding from any source. However, some parts of the Site, particularly on the western side of the River Loddon, and also the watercourse corridors for the Barkham Brook and its tributaries, may be prone to fluvial and pluvial flooding. The masterplanning approach for the Proposed Development has been heavily influenced by an understanding of these areas and the nature of the potential flooding.

13.5.29 A sequential approach, as set out in NPPF has been applied across the Site, with both more vulnerable uses such as residential development and less vulnerable development such as commercial development and educational uses located in the areas with lower potential for flooding.

13.5.30 The FRA provides a full assessment of the Proposed Development and impacts on flood risk across the Site. This details the mitigation strategy to address any impacts on the floodplain flow and functionality and to ensure safe access.

13.5.31 Changes to the fluvial flooding regime will have a Negligible impact on existing properties and residents as well as future properties and residents.

13.5.32 Existing pluvial flooding within the development areas will be largely designed out as part of the surface water drainage strategy. Any flood water will be contained within the highway extents

of the internal roads and follow the site contour towards the proposed on-site attenuation basin and watercourse.

13.5.33 Changes to the pluvial flooding regime will have a Negligible impact on existing properties and residents as well as future properties and residents.

13.5.34 The Development contains large area of hardstanding over which silt and sediment can collect over time. A build-up of silt and sediment may affect the drainage of surface water from the Site, having an adverse effect on localised flood risk. This potential impact on watercourses and site users is deemed to be Minor adverse to Negligible with the implementation of good design.

Hydrogeology

13.5.35 There is potential for the operational phase of the development to reduce groundwater recharge and therefore baseflow to groundwater dependant receptors where infiltration rates are reduced in areas of hardstanding and drainage is re-routed.

13.5.36 Where excavate and replace occurs in the floodplain of the River Loddon or Barkham Brook, for example to facilitate the construction of roads, the volume of aquifers supporting wetland ecosystems may be depleted.

Water Framework Directive

13.5.37 It is anticipated that potential hydrological impacts from the operation phase can be managed by the implementation of drainage management and adhering to requirements of the Environment Agency, Local Planning Authority and Lead Local Flood Authority.

13.5.38 The Proposed Development will attenuate runoff and restrict off-site flows with a consideration of climate change events.

13.5.39 It is anticipated that the Proposed Development will accommodate flows via attenuation basins across the Site.

13.5.40 Additional rural SuDS features (swales, bunds, attenuation features) upstream of the Site and within retained greenspace areas will contain and control greenfield runoff to further reduce the overall site discharge rates from the existing rates.

13.5.41 The SuDS will store water and release it slowly allowing for attenuation. The drainage will be designed in accordance with National and Local Planning Policy.

13.5.42 It is anticipated that the drainage strategy for the development will include features to appropriately treat surface water prior to discharge. The Simple Index Approach (SIA), as outlined within the SuDS Manual (CIRIA C753) should be followed.

Scoping of Operational Effects

13.5.43 The following potential operational impacts have been scoped in or out of further assessment based upon the efficacy of the embedded mitigation. For those which have been scoped in as requiring further assessment, the elements of construction they affect have also been included.

13.5.44 Footprint (e.g. the area of channel impacted by works in the vicinity of the channel) – Scoped In – The design of the Proposed Development has sought to reduce the length of impacted

river channel as far as reasonably practicable. However, scheme components will result in a localised loss of existing river channel habitat.

13.5.45 Shading due to the presence of a structure – Scoped In – A 10m buffer will be maintained between the banks of ordinary watercourses, water dependent ecosystems, Main Rivers and temporary and permanent built development associated with the Proposed Development. This will mitigate the effect of shading for all structures outside of the watercourses, but there will be shading from water crossing points.

13.5.46 Changes to drainage patterns discharging to surface water body – Scoped Out – The design of the Proposed Development will adhere to best practice method statements, including measures to appropriately manage surface water and sediment runoff prior to discharge to the watercourse. The drainage strategy will ensure the incorporation of suitable drainage systems (including attenuation basins) to intercept, attenuate and discharge runoff from the highway and other proposed infrastructure in a manner that will not significant adversely impact upon the existing flow regime or water quality of receiving watercourse.

13.5.47 Altering of groundwater processes – Scoped Out - Whilst there may be minor changes in the existing groundwater regime as a result of the development, due to passive dewatering of the River Terrace Deposits to facilitate construction, the only receptors for this groundwater are Barkham Brook and the River Loddon. The drainage network will be designed to direct all groundwater that has been dewatered to these watercourses, maintaining overall flow.

13.5.48 Changes to hydrology leading to changes in processes and habitats upstream and downstream – Scoped In – The Proposed Development has sought to reduce hydromorphological impacts as far as reasonably practicable by minimising in-channel works. However, works are proposed within the channel which have the potential to impact the existing situation.

13.5.49 The operational elements which may cause impacts on the water environment via footprint, shading, and changes to hydrology leading to changes in river processes and habitats upstream and downstream, are drainage outfalls, open span bridges, bridging culverts and active travel routes.

13.5.50 Drainage Outfalls – The footprint of drainage outfalls will extend into the channel of WFD waterbodies, resulting in a minor loss of habitat. The proposed drainage outfalls may cause a localised loss of riparian habitats. The anticipated effect upon flow dynamics, sediment regime, connection to floodplain, general channel structure, turbidity and dissolved oxygen will be dependent upon the dimensions, technique used and hydromorphological baseline within the locality of the outfall.

13.5.51 Open Span Bridges – Crossings will be designed so there is no footing in the watercourse. No realignment of watercourses are proposed. Footings and associated earthworks in riparian zone may have minor impact on floodplain connectivity and riparian zone loss due to land take, but unlikely to be significant. The shading of the channel by the bridge has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. If macrophyte cover is lost, shading may have indirect effect on macroinvertebrates.

13.5.52 Culverts – Likely to lead to localised but permanent loss of habitat due to landtake and shading. Increase in flow velocities and localised loss of riparian and flood plain connectivity likely to have minor localised negative impact. Minor negative impact anticipated on sediment regime as culverts may lead to localised increase in flow velocity. Loss of flood plain and riparian zone due to landtake. Culverts are only proposed on Barkham Brook and will serve as crossing points for active transport routes. As such it is anticipated that they will not be greater than 5 times the width of the watercourse.

13.5.53 Active Travel Routes – Where possible active travel routes are set back 20 m from the channel and water dependent ecosystems and are not anticipated to impact WFD biological elements. Sections of hard standing cycle and footways are proposed within 10 m of the watercourse along the northern section of the Loddon within the Site boundaries.

13.5.54 Based upon the above summary, the following specific impacts have been identified:

- disturbance of floodplain/riparian habitats and processes;
- disturbance of in-channel habitats/processes; and
- disturbance of wider hydromorphological processes.

Water Resources

13.5.55 There are no existing foul sewers within the Site and therefore new points of connection will need to be established. Thames Water sewers are located in Reading Road to the south of the Site. This includes a gravity network discharging to a local pump station with flows ultimately being pumped to the Arborfield Sewage Treatment Works which is located approximately 2km from the Site.

13.5.56 Due to the topography of the Site and location of the public foul sewer network, wastewater from the Site cannot flow entirely by gravity to the receiving public sewer and a number of pump stations will be required.

13.5.57 Thames Water determines capacity and a suitable point of practical connection to the public sewerage through their Pre-Planning Enquiry process. This includes a high-level internal hydraulic analysis to establish if the development can be accommodated within its sewer network and sewage treatment works, whilst still within their allowable discharge and treatment rates.

13.5.58 This initial Pre-Planning Enquiry to Thames Water has established inadequate sewer capacity within the immediate vicinity and known performance issues at the Arborfield Sewage Treatment Works.

13.5.59 Discussions are ongoing with Thames Water regarding the extent of additional off-site sewers or improvements to existing sewers that will be required to provide sufficient capacity to service the development.

13.5.60 Without inclusion of mitigation measures, the potential effects relate to possible increased demands on water supplies and increased usage of the foul water infrastructure. There may be an increased demand on the end point wastewater treatment plant resulting in a rise of treated effluent discharge. This is considered to be of minor adverse significance due to the medium to low sensitivity and the low magnitude of the effect.

13.5.61 With regards to potable water, discussions are ongoing with Thames Water in respect to the provision of new supplies, and a Deed of Undertaking has been entered into in order to instigate the pre-requisite network modelling needed to establish a solution prior to a planning decision being made.

13.5.62 Thames Water envisage the provision of a Capacity Position Statement during August 2025, although have confirmed that an initial phase of development adjacent to the A327 Reading Road could be served off the existing 9” main without undue effect on supply.

13.5.63 Future mains would be located beneath the proposed footway/cycleway adjacent to the proposed internal access roads serving the Proposed Development. The configuration would reflect the typical NJUG (National Joint Utility Group) profile.

13.5.64 Water reuse, such as rainwater harvesting for toilet flushing, sports pitch irrigation and other non-potable uses can help to reduce the overall water demand. Given the scale of the development, such measures would need to be undertaken with a local, building by building approach rather than through sitewide infrastructure. This could be explored at future stages.

13.5.65 Without inclusion of mitigation measures, the potential effects relate to possible increased demands on water supplies causing detriment to existing users, and the completed Development may require a greater provision of services from Thames Water Utilities Limited than at present. As such, this is considered to be of minor adverse significance due to the medium to low sensitivity and the low magnitude of the effect.

13.6 Additional Mitigation

Construction Phase

Flood Risk and Drainage

13.6.1 A Flood Management Plan (FMP) will be produced to cover each phase of the development. This will detail the areas of potential flood risk and the availability of flood warnings for these areas. This will provide information and an action plan to ensure the safety of construction workers during the construction phase as well as to ensure that the methods for construction, location of compounds etc do not compromise floodplain functionality. The FMP covers construction works within the areas of flood risk or where there are any construction activities, compounds or storage within those areas.

13.6.2 A Construction Environmental Management Plan (CEMP) will also be produced for each phase of the development. Whilst this primarily addresses environmental safeguarding this will also cover the management of flood risk.

Hydrogeology

13.6.3 Best practice measures should be put in place to control pollution and minimise effects on receptors, particularly from fuels and oils during construction. A pollution prevention plan (PPP) should be established to outline methods for controlling groundwater pollution risk.

13.6.4 Basic groundwater level monitoring should be in place during construction with a response zone at least 1 meter below the deepest excavation level to identify construction induced changes to groundwater levels or quality. Where groundwater is identified that may intersect with excavations, this should be managed in line with construction best practice measures. Any discharge/abstraction licenses required for this management should be obtained prior to excavation.

Water Framework Directive

13.6.5 As highlighted above, the specific construction impacts identified for detailed assessment as part of the WFD assessment are the footprint due to the works in the vicinity of the channel and changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream.

13.6.6 The following specific impacts have been identified:

- disturbance of floodplain/riparian habitats and processes;
- disturbance of in-channel habitats/processes; and
- disturbance of wider hydromorphological processes.

13.6.7 The following specific measures are suggested to mitigate the construction impacts of the drainage outfalls, open span bridges and culverts:

13.6.8 Drainage Outfalls – Reinstate any bed and bank habitat lost during construction with native substrates and emergent planting.

13.6.9 Open Span Bridges – Reinstate any bed and bank habitat lost during construction with native substrates and emergent planting.

13.6.10 Culverts – Reinstate any bed and bank habitat lost during construction with native substrates and emergent planting. Ensure gradient of channel bed in culvert is equal to natural bed after reinstatement.

Water Resources

13.6.11 Appropriate strategies such as provision of an on-site septic tank for the welfare facilities will ensure that there is nil demand on the existing wastewater network and therefore provides sufficient mitigation.

13.6.12 Consideration for the inclusion of measures that improve the efficiency of water use and disposal would be utilised during the construction phase, including rainwater harvesting and measures to reduce water usage, such as efficiency measures.

13.6.13 Notwithstanding this, following the legislation change introduced in April 2018, any capacity improvements necessary as a result of any proposed additional flows/increased demand will be an obligation Thames Water would be required to meet, under the Water Industry Act. As a statutory consultee, Thames Water will be provided the opportunity to determine capacity and their preferred strategy for accommodating the Development.

Operational Phase

Flood Risk and Drainage

13.6.14 The mitigation strategy outlined in the FRA satisfies the NPPF and local policy requirements, and as such ensures no residual impacts. No further mitigation is required.

13.6.15 The surface water drainage strategy is presented in detail in the Drainage Strategy. By virtue of meeting the requirements under NPPF and for the LLFA, this strategy does not need to be supplemented by any further mitigation.

Hydrogeology

13.6.16 The mitigation strategy outlined in the Hydrogeological Conceptual Model and in the construction phase mitigation satisfies the legislative requirements. No further mitigation is therefore required.

13.6.17 Where excavate and replace must occur within the floodplain of the River Loddon or Barkham Brook, the material added should preserve the hydraulic characteristics of the excavated material.

Water Framework Directive

13.6.18 The specific operational impacts identified for additional assessment are the footprint due to the works in the vicinity of the channel, shading and changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream.

13.6.19 The following specific impacts have been identified:

- disturbance of floodplain/riparian habitats and processes;
- disturbance of in-channel habitats/processes; and
- disturbance of wider hydromorphological processes.

13.6.20 The following specific measures are suggested to mitigate the operational impacts of the drainage outfalls, open span bridges, culverts and active travel routes:

13.6.21 Drainage Outfalls – Install suitable fish and invertebrate refuge structures at each outfall (i.e. rock rolls, backwaters etc.), Utilise open channel style outfalls with inverts graded to channel bed slope and roughened linings to prevent local scour. The overall minor loss of riparian zone associated with landtake will be offset by improvements in quality of the riparian zone up to 20 m.

13.6.22 Open Span Bridges – Impact of open span bridges is anticipated to be very minor. Span the watercourse on piles set back 10 m from the bank, leaving the entire watercourse bed in shade-gap light. Widening of the floodplain in the vicinity of the bridges, providing a wetland/marshland area to compensate for the shadowing.

13.6.23 Culverts – Embed box culverts with 150 – 300 mm of natural substrate bed. Include a low flow channel within the culvert to maintain a wetted perimeter and provide fish passage during low flow conditions. Provide betterment across the riparian zone with natural planting and removal of invasive species to mitigate for the loss in watercourse and riparian zone length. Total length of channel lost to culverts should be reinstated elsewhere in watercourse via introduction of WFD areas.

13.6.24 Active Travel Route – Retain and enhance a 20 m vegetated buffer of native shrubs and trees along both banks of watercourses and around water dependent ecosystems. The change in land use will mitigate any loss to habitat quantity in the section of Site with a hardstanding active travel route in the riparian zone, by providing a substantial increase in habitat quality across the Site.

13.7 Residual effects

Construction Phase

Flood Risk and Drainage

13.7.1 With the implementation of measures outlined in the FRA and Drainage Strategy as well as the requirements within the CEMP and FMP, there will be no residual effects on flood risk and drainage.

Hydrogeology

13.7.2 Provided the mitigation measures outlined in the Hydrogeological Conceptual Model are implemented there are no anticipated residual affects with regards to hydrogeology.

Water Framework Directive

13.7.3 Based upon implementation of the above proposed measures, the residual effects on WFD are as follows:

- Drainage Outfalls – Reinstatement and improvement of riparian zone and river bed lost during construction will fully mitigate construction impacts, leaving no anticipated residual effects.
- Open Span Bridges – Reinstatement and improvement of riparian zone and river bed lost during construction will fully mitigate construction impacts, leaving no anticipated residual effects.
- Culverts – Reinstatement and improvement of riparian zone and river bed lost during construction will mitigate and construction impacts. Ensuring culvert dimensions reflect channel dimensions as far as possible will minimise the effect of the culvert on flow behaviours. There is no anticipated residual construction impact due to the introduction of culverts.

13.7.4 Overall, with best practice construction and targeted ecological and hydromorphological mitigation, the remaining impacts on WFD elements are anticipated to not result in a downgrading of WFD classification of the watercourses, and will not prevent reaching “Good” ecological rating in the future.

Water Resources

13.7.5 During construction the impacts on potable and foul water networks will be mitigated such that the residual impact is considered to be short term Minor to Negligible.

Operational Phase

Flood Risk and Drainage

13.7.6 With the implementation of measures outlined in the FRA and Drainage Strategy, there will be no residual adverse effects on flood risk and drainage.

Hydrogeology

13.7.7 Provided the mitigation measures outlined in the Hydrogeological Conceptual Model are implemented there are no anticipated residual affects with regards to hydrogeology.

Water Framework Directive

13.7.8 Based upon implementation of the above proposed measures, the proposed impacts on WFD are as follows:

- Drainage Outfalls – It is anticipated that a small amount of river bank habitat will be lost for landtake of each outfall. However, improvements in the riparian zone across the entire Site, associated with the change in land use from agricultural land will provide a substantial overall improvement in quality of riparian and riverbank habitat. Additionally, the inclusion of fish and macroinvertebrate refuges will offset any interruption in channel habitat. Appropriate pre-treatment of surface water runoff in the SuDS network and a HydroBrake maintaining greenfield runoff rates will mitigate any impact on the physiochemical, chemical and hydromorphological WFD elements of the waterbody.

- Open Span Bridges – Without mitigation, open span bridges may slightly reduce photosynthetic activity due to shading and cause minor riparian zone loss, but careful design, improved riparian planting, and widening of the floodplain in the vicinity of the bridges will minimize impacts.

- Culverts – Whilst there will be a loss in habitat associated with the footprint of the culverts, improvements to the riparian zone will provide an overall benefit to the habitat. The impact of the culverts on flow dynamics will be mitigated through the inclusion of natural substrates at the bed of the culvert and maintaining the gradient of the channel. Additional habitat in the form of WFD areas will provide mitigation for lost channel length due to culverting. With appropriate mitigation, it is anticipated there will be negligible overall impact on the WFD objectives of the waterbodies due to the introduction of culverts.

- Active Travel Routes – The proposed active travel routes located within the riparian zone will provide a net benefit to the riparian zone, due to the conversion of agricultural land to naturalised, less managed land types. It is anticipated there will be a negligible positive impact on the WFD objectives of the Loddon (Swallowfield to Thames Confluence) and Barkham Brook due to the introduction of the active travel routes.

13.7.9 Overall, with best practice construction and targeted ecological and hydromorphological mitigation, the remaining impacts on WFD elements are anticipated to not result in a downgrading of WFD classification of the watercourses, and will not prevent reaching “Good” ecological rating in the future.

Water Resources

13.7.10 There are no residual effects on the wastewater and potable water scheme, provided the foul water drainage strategy is implemented as designed and through promotion of water efficiency measures respectively. Hence the effect is negligible. Any works required to the wider network will be delivered by Thames Water and their design will be subject to the standard requirements with regards to environmental impacts.

13.8 Implications of Climate Change

Flood Risk and Drainage

13.8.1 Inherent to the FRA is a requirement to assess the impacts of climate change on flood risk and on drainage, both in assessing the baseline conditions and in assessing the design parameters for the Proposed Development and any mitigation measures.

13.8.2 The EA provides guidance on how climate change allowances should be used in flood risk assessments. This has been applied to flow estimate for the fluvial modelling and to rainfall estimates for surface water flood modelling and for surface water drainage design. Data from has been taken from the EA website for this Site which is within the Loddon and tributaries Management Catchment.

Hydrogeology

13.8.3 The impacts of climate change are not anticipated to alter the outcome of the hydrogeology assessments undertaken or the effectiveness of the mitigation measures proposed.

Water Framework Directive

13.8.4 The impacts of climate change are not anticipated to alter the outcome of the WFD assessment undertaken or the effectiveness of the mitigation measures proposed.

Water Resources

13.8.5 The development of potable water and foul water drainage strategies will account for any current guidance relating to climate change.

13.9 Cumulative effects

Loddon Valley Garden Village Strategic Development Location

Flood Risk and Drainage

13.9.1 Under NPPF and local policy as well as LLFA requirements, each development must ensure no impact on flood risk elsewhere. As such there will be no cumulative effects of the wider LGV development.

Hydrogeology

13.9.2 Water bearing strata in the development area are all isolated superficial deposits with flowpaths not exceeding 1.5km, there is no interaction between the Proposed Development and regional aquifer systems and therefore no potential for cumulative hydrogeological effects.

Water Framework Directive

13.9.3 It is considered that the mitigation proposed will suitably prevent and compensate for any impact on the WFD waterbodies within the Proposed Development. As such there will be no cumulative effects on the wider LGV development.

Water Resources

13.9.4 Wastewater and potable water demand is catchment wide as opposed to site specific. Without inclusion of mitigation measures, the potential effects relate to possible increased demands on water supplies and increased usage of the foul water infrastructure. The completed Development may require a greater provision of services, both wastewater and potable water, from Thames Water Utilities Limited than at present, and as such, this is considered to be of minor adverse significance due to the medium to low sensitivity and the low magnitude of the effect.

13.9.5 Notwithstanding this, following the legislation change introduced in April 2018, any capacity improvements necessary as a result of any proposed additional flows/increased demand will be an obligation Thames Water would be required to meet, under the Water Industry Act. As a statutory consultee, Thames Water will be provided the opportunity to determine capacity and their preferred strategy for accommodating the Development. Therefore, the cumulative effects would be same as for the Operational phase.

13.9.6 Based on this assessment, there is likely to be a change of small magnitude on receptors of medium sensitivity without mitigation, leading to a long term slight adverse effect that will not be significant. However, with mitigation such as the implementation of the foul water drainage strategy and the promotion of water use efficiency measures there are no residual cumulative effects anticipated and the significance is therefore considered to be negligible.

Wider Committed Development

Flood Risk and Drainage

13.9.7 Under NPPF and local policy as well as LLFA requirements, each development must ensure no impact on flood risk elsewhere. As such there will be no cumulative effects of the wider developments.

Hydrogeology

13.9.8 Water bearing strata in the development area are all isolated superficial deposits with flowpaths not exceeding 1.5km, there is no interaction between the Proposed Development and regional aquifer systems and therefore no potential for cumulative hydrogeological effects.

Water Framework Directive

13.9.9 Under the Water Framework Directive legislation, developments must not cause a failure to meet surface water 'Good Ecological Status' or 'Good Ecological Potential', or result in a deterioration of surface water Ecological Status/Potential. Nor can it institute changes which will permanently prevent or compromise the Environmental Objectives being met.

13.9.10 The proposed mitigation methods are considered sufficient to suitably offset and detrimental effects on WFD elements during development. It is not anticipated that there will be an impact on the wider WFD environment due to the Loddon Garden Village development.

Water Resources

13.9.11 Wastewater and potable water demand is catchment wide as opposed to site specific. Without inclusion of mitigation measures, the potential effects relate to possible increased demands on water supplies and increased usage of the foul water infrastructure. The completed Development may require a greater provision of services, both wastewater and potable water, from Thames Water Utilities Limited than at present, and as such, this is considered to be of minor adverse significance due to the medium to low sensitivity and the low magnitude of the effect.

13.9.12 Notwithstanding this, following the legislation change introduced in April 2018, any capacity improvements necessary as a result of any proposed additional flows/increased demand will be an obligation Thames Water would be required to meet, under the Water Industry Act. As a statutory consultee, Thames Water will be provided the opportunity to determine capacity and their preferred strategy for accommodating the Development. Therefore, the cumulative effects would be same as for the Operational Phase.

13.9.13 Based on this assessment, there is likely to be a change of small magnitude on receptors of medium sensitivity without mitigation, leading to a long term slight adverse effect that will not be significant. However, with mitigation such as the implementation of the foul water drainage

strategy and the promotion of water use efficiency measures there are no residual cumulative effects anticipated and the significance is therefore considered to be negligible.

13.10 Summary

Flood Risk and Drainage

13.10.1 The potential flood risk across the Site is well understood and the development strategy has been heavily influenced by this. As such the sequential approach and location of built development and key infrastructure outside areas of potential flood risk has been adopted for the Proposed Development. In the areas where infrastructure is necessary within the floodplain there is suitable mitigation. With regards to flood risk, to be compliant with NPPF the development must have no adverse impact off site.

13.10.2 Likewise, the surface water drainage strategy for the Proposed Development must ensure that there is no adverse impact off site.

13.10.3 Through designing the Proposed Development to satisfy both the flood risk and drainage requirements, the potential effects are negligible as there is no adverse impact off site.

13.10.4 During construction there may be temporary effects, although these can be largely managed and mitigated through the implementation of a CEMP and a FMP.

Hydrogeology

13.10.5 Groundwater on the Site is situated entirely within the superficial deposits including river terrace deposits and alluvium within the corridor of the River Loddon. There is no interaction between the Proposed Development and bedrock aquifer systems.

13.10.6 The area of the Site that will undergo development is outside of the Loddon floodplain and therefore does not interact with aquifers that support water environment receptors. All private water supplies within 1km of the Site draw from the chalk aquifer.

13.10.7 Risk to hydrogeological receptors has been assessed as being low to moderate in the Hydrogeological Conceptual Model (Appendix 13.4), meaning that mitigations outside of best practise measures are not required. The risk posed to hydrogeological receptors is not likely to be influenced by external developments or climate change.

13.10.8 More detail on the Hydrogeological Conceptual Model and the accompanying risk assessment can be found in the full report included in Appendix 13.4.

Water Framework Directive

13.10.9 Disruptions to habitats, biological processes and hydromorphological/hydrogeological processes, have limited mitigation options, however, by following best practice guidance, selecting environmentally sensitive design options, and introducing protection and enhancement measures it is unlikely that 'Good' status will be prevented in the future.

13.10.10 The Proposed Development has the potential to provide local improvement techniques to be incorporated into the design, such as the inclusion of wetland areas. Inclusion of such features has the potential to provide a beneficial effect resulting in some localised improvement and also feeds into the wider RBMP objectives.

13.10.11 The Proposed Development will not cause failure to meet surface water 'Good Ecological Status' or 'Good Ecological Potential', result in a deterioration of surface water Ecological Status/Potential.

13.10.12 There are no changes which will permanently prevent or compromise the Environmental Objectives being met.

Water Resources

13.10.13 With respect to wastewater and potable water supply mitigation measures include on site efficiencies and fully implemented Thames water capacity studies to ensure adequate supplies and off site infrastructure.

13.10.14 A summary of the assessment is set out in Table 13.12 overleaf.

13.11 References

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- Thames River Basin District River Basin Management Plan (Updated 2022)
- Groundwater control: design and practice (C750), CIRIA. Available at: ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductcode=C750
- The Groundwater (England and Wales) Regulations 2009. Available at: legislation.gov.uk/ukdsi/2009/9780111480816
- The Water Resources Act 1991. Available at: legislation.gov.uk/ukpga/1991/57/contents
- The Water Supply (Water Quality) Regulations 2016. Available at: legislation.gov.uk/uksi/2016/614/contents
- The Water Supply (Water Quality) Regulations 2018. Available at: legislation.gov.uk/wsi/2018/647/contents

- Wokingham Borough Core Strategy Development Plan Document (2010). Available at: wokingham.gov.uk/sites/wokingham/files/2023-06/Final_adopted_Core_Strategy%5B1%5D.pdf
- Wokingham Borough Council Emerging Local Plan Update (2025). Available at: wokingham.gov.uk/planning-policy/emerging-local-plan-update

13.12 Assessor information

Table 13.14 Assessor Information

Chapter	Responsibility	Name	Qualifications	Assessor information
Hydrology	Abley Letchford	Emma Philpott	CEng C.WEM BEng	Emma has been with Abley Letchford for over 2 years and has over 25 years experience in Hydrology, Flood Risk, Flood Defence, River Processes and Drainage. She leads the Flood and Water Management Team and has completed hundreds of FRAs and provided input to dozens of Environmental Impact Assessments as well as working within both the EA and secondments with a number of LLFAs.
Hydrology	Abley Letchford	Maya Levita Elliott	BSc	Maya has been with Abley Letchford for 1 year and has experience in Hydrology and Flood Risk. She has completed hydrological assessments to ifnorm flood modelling and produced FRAs for a number of sites.
Hydrology	RPS	Tom Hancox	BSc, PGCert, GradCIWEM	Tom has two years of experience in the hydrology sector, with prior research in industrial wastewater treatment. Tom has experience with completing WFD assessments for national infrastructure projects as well as residential developments of varying sizes.
Hydrology	RPS	Bryn Kearsey	BSc, MCIWEM, FGS	Bryn has 3 years of experience in hydrology and has completed hydrogeological risk assessments for large infrastructure projects, residential developments and new water supply sources.

Table 13.15 Summary of effects

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction Phase					
Flood Risk					
Construction workers and construction facilities	Medium	Potential flooding within areas of construction activities	Location of construction areas and facilities outside known flood risk areas; implementation of a FMP	Minor adverse	Not significant
Construction workers and construction facilities	Medium	Temporary and short term changes to flooding regime (fluvial and/or pluvial) resulting from construction activities	Implementation of CEMP and a FMP	Minor adverse	Not significant
Existing properties and residents within Site area	Medium	Temporary and short term changes to flooding regime (fluvial and/or pluvial) resulting from construction activities	Implementation of CEMP	Negligible	Not significant
WFD					
Superficial aquifers and surface water features which interface with them.	Low to Very High	Temporary dewatering to enable construction.	The construction of the Proposed Development will adhere to best practice guidance and risk assessment method statements, including measures to avoid and/or minimise disturbance of the water environment. Site investigation and monitoring will also be implemented before, during and after	No anticipated residual effect.	Not significant.

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
			dewatering and excavation activities, to protect the integrity of nearby surface water features.		
The River Loddon and Barkham Brook	Medium to Very High	Footprint (e.g. the area of channel impacted by works in the vicinity of the channel)	The construction of the Proposed Development will adhere to best practice guidance and risk assessment method statements which include measures to avoid and/or minimise disturbance to the water environment. Works proposed within the channel which have the potential to impact the existing situation will have additional mitigation, including replanting of any lost habitat.	Works within and around the channel will result in loss and damage to habitat. However, mitigations will suitably reduce any impacts to be minor adverse in magnitude.	Not Significant
Entire Water Environment	Low to Very High	Pollution risk and altered drainage patterns from general construction activities	Installation of suitable facilities to remove material (e.g., mud and dust) from wheels; use of sediment fences along the existing watercourses/waterbodies when working nearby to reduce sediment load into the water environment; covers for lorries transporting materials	No anticipated residual effect.	Not Significant

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
			to/from Site to prevent releases of dust/sediment to watercourses/drains;		
Superficial aquifers and surface water features which interface with them.	Low to Very High	Creating or altering of pathways along which existing poor quality groundwater can migrate	The only receptors for dewatered groundwater are Barkham Brook and the River Loddon. The drainage network will direct all groundwater that has been dewatered to these watercourses, maintaining overall flow.	Minor changes in the groundwater regime.	Not Significant.
All surface water features	Low to Very High	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	The Proposed Development has sought to reduce hydromorphological impacts as far as reasonably practicable by minimising in-channel works. However, works are proposed within the channel which have the potential to impact the existing situation. To mitigate these, sediment and turbidity controls will be implemented to prevent WFD deterioration.	Works within and around the channel can result in mobilisation and deposition of sediments, controls will reduce impact to temporary, minor negative impact.	Not Significant
Superficial aquifers, the River Loddon, Barkham	Low to Very High	Mobilisation of pollutants through groundwater, particularly from the use of fuels or lubricants.	Development of a pollution prevention plan (PPP) to establish methods for	No anticipated residual impacts.	Not Significant

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Brook and wetlands surrounding the Loddon			controlling groundwater pollution risk.		
Superficial aquifers, the River Loddon, Barkham Brook and wetlands surrounding the Loddon	Low to Very High	Reduction of groundwater recharge and therefore reduction in baseflow to rivers and groundwater dependant ecosystems.	Basic groundwater level monitoring with a response zone 1m below deepest excavation level. Management of groundwater in line with construction best practise. Required discharge or abstraction permits must be obtained prior to construction.	No anticipated residual impacts.	Not Significant
Operation Phase					
Flood Risk					
Existing properties and residents within Site area	Medium	Changes to flooding regime (fluvial and/or pluvial) resulting from development	Mitigation strategy within FRA including floodplain compensation measures etc	Negligible	Not significant
Future properties and residents	Medium	Changes to flooding regime (fluvial and/or pluvial) resulting from development	Mitigation strategy within FRA including floodplain compensation measures etc	Negligible	Not significant
WFD					
The River Loddon and Barkham Brook	Medium to Very High	Footprint (e.g. the area of channel impacted by works in the vicinity of the channel)	The design of the Proposed Development has sought to reduce the length of impacted	Minor adverse impact anticipated,	Not Significant

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
			river channel as far as reasonably practicable. Some scheme assets must be located within or nearby the watercourses, causing a loss of channel length and / or riparian zone. Improved planting, widening of the watercourse/floodplain through WFD areas will mitigate for lost habitat.	localised to asset locations.	
The River Loddon and Barkham Brook	Medium to Very High	Shading due to the presence of a structure	A 10m buffer will be maintained between the banks of ordinary watercourses, water dependent ecosystems, Main Rivers and temporary and permanent built development associated with the Proposed Development. Shading from water crossing points will be mitigated through widening of the floodplain, to provide better quality habitat.	Negligible adverse impact anticipated due to shading.	Not Significant
All surface water features	Low to Very High	Changes to drainage patterns discharging to surface water body	The design of the Proposed Development will adhere to best practice method statements, including	No anticipated residual impacts.	Not Significant

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
			measures to appropriately manage surface water and sediment runoff prior to discharge to the watercourse. The drainage strategy will ensure the incorporation of suitable drainage systems (including attenuation basins) to intercept, attenuate and discharge runoff from the highway and other proposed infrastructure in a manner that will not significant adversely impact upon the existing flow regime or water quality of receiving watercourse.		
Superficial aquifers and surface water features which interface with them.	Low to Very High	Altering of groundwater processes	Whilst there may be minor changes in the existing groundwater regime as a result of the Proposed Development, due to passive dewatering of the River Terrace Deposits to facilitate construction, the only receptors for this groundwater are Barkham Brook and the River Loddon. The drainage network will direct all	No anticipated residual impacts.	Not Significant

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
			groundwater that has been dewatered to these watercourses, maintaining overall flow and ensuring no sediment disturbance and scour due to the dewatering.		
All surface water features	Low to Very High	Changes to hydrology leading to changes in processes and habitats upstream and downstream	The Proposed Development has sought to reduce hydromorphological impacts as far as reasonably practicable by minimising in-channel works. Where in-channel works are unavoidable, V-Cut ditch outfalls to minimise scour and maintaining existing catchment mechanics has been implemented to prevent deterioration.	Negligible minor adverse impact.	Not Significant
Superficial aquifers, the River Loddon, Barkham Brook and wetlands surrounding the Loddon	Low to Very High	Reduction of groundwater recharge where hardstanding replaces permeable land cover and subsequent reduction of baseflow in rivers and groundwater dependant ecosystems.	Water re-routed from superficial aquifers by the drainage system will be discharged into the River Loddon or Barkham Brook where appropriate, preserving existing flows in watercourses and surrounding wetlands.	No anticipated residual impacts.	Not Significant

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Superficial aquifers, the River Loddon, Barkham Brook and wetlands surrounding the Loddon	Low to Very High	Reduction in the volume of superficial aquifers and subsequent reduction of baseflow in rivers and groundwater dependant ecosystems.	Where excavation and replacement must occur in water bearing superficial deposits, replacement material should preserve hydraulic characteristics of the removed material wherever possible.	No anticipated residual impacts.	Not Significant

13.13 Mitigation commitments Summary

Table 13.16 Summary for Securing Mitigation

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	Means by which mitigation may be secured (e.g. planning condition / legal agreement)	Delivered by	Auditable by
Construction Phase				
Construction workers and construction facilities	Avoid location within flood risk areas Prevent impact of any temporary changes to fluvial and pluvial flooding regimes	CEMP, FMP	Contractor/Applicant	Contractor / LPA
Existing properties and residents	Prevent impact of any temporary changes to fluvial and pluvial flooding regimes	CEMP, FMP	Contractor	Contractor / LPA
The Surface Water Environment				
Watercourses – Landtake	Reduce/Offset: Design structures for minimum landtake. Reinstate lost river habitats post-construction; implement best practice construction methods	Planning Condition (e.g. CEMP); Legal Agreement	Contractor	Contractor / LPA

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	Means by which mitigation may be secured (e.g. planning condition / legal agreement)	Delivered by	Auditable by
Watercourses – Hydrological Regime	Prevent: Implementation of sediment and turbidity controls during construction and operation.	Planning Condition / S.106 Agreement	Contractor / Applicant	Contractor / LPA
Superficial aquifers, the River Loddon, Barkham Brook and wetlands surrounding the Loddon	Development and implementation of a pollution prevention plan to establish methods for controlling groundwater pollution risk	Construction Environmental Management Plan (CEMP)	Contractor	Applicant and the Local Planning Authority
Superficial aquifers, the River Loddon, Barkham Brook and wetlands surrounding the Loddon	Groundwater monitoring in water bearing superficial deposits with a response zone at least 1m below the deepest excavation level. Management of groundwater in line with construction best practise.	Construction Environmental Management Plan (CEMP)	Contractor	Applicant and the Local Planning Authority
Operation Phase				
Existing properties and residents	Prevent impact of any changes to fluvial and pluvial flooding regimes	Mitigation strategy within FRA	Contractor/Applicant	Contractor / LPA
Future properties and residents	Prevent impact of any changes to fluvial and pluvial flooding regimes	Mitigation strategy within FRA	Contractor/Applicant	Contractor / LPA
Watercourses – Culverting	Prevent/Reduce: Embed culverts with natural substrate and low flow channel; minimize length of channel interventions.	Planning Condition / Maintenance Agreement	Applicant / Contractor	LPA
Watercourses – Habitat loss	Enhance: Retain and enhance 20 m vegetated buffer of native shrubs and trees along watercourses and ecosystems.	Planning Condition / Maintenance Agreement	Applicant / Contractor	LPA

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	Means by which mitigation may be secured (e.g. planning condition / legal agreement)	Delivered by	Auditable by
	Offset: Replace lost habitat with a ratio of 2:1. Compensate shading with floodplain widening to create wetland/marshland.			
Superficial aquifers, the River Loddon, Barkham Brook and wetlands surrounding the Loddon	Water diverted from superficial aquifers by the surface water drainage system to be discharged in line with existing groundwater flow paths to preserve baseflows.	Planning Condition	Contractor	Applicant and the Local Planning Authority
Superficial aquifers, the River Loddon, Barkham Brook and wetlands surrounding the Loddon	Where excavation and replacement of water bearing superficial deposits must occur, replacement material will preserve the hydraulic characteristics of the removed material wherever possible.	Planning Condition	Contractor	Applicant and the Local Planning Authority