Chapter 12: Water Resources, Drainage and Flood Risk

Water Resources, Drainage and Flood Risk	
AUTHOR	RMA Environmental Ltd
SUPPORTING APPENDIX	***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk*** Annex 1: Legislative and Planning Policy Context; Annex 2: Flood Risk Assessment and Drainage Strategy (RMA Environmental Ltd; September 2019); and Annex 3: Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report (Jomas Associates Ltd; April 2019).
KEY CONSIDERATIONS	The potentially significant environmental effects associated with the Proposed Development (in relation to water resources, drainage and flood risk), which are considered in this chapter, are as follows: - Groundwater interruption and / or possible dewatering requirements during the demolition and construction phase; - Increase in surface water run-off and subsequent flood risk, during the demolition and construction phase; - Flood risk (associated with Hoe Stream) to the site, from the added effects of climate change during the operation of the completed Proposed Development; - Increase in surface water run-off rates and subsequent flood risk, during the operation of the completed Proposed Development; - Potential increased mains water demand during operation of the completed Proposed Development; and - Potential increased foul drainage flows during operation of the completed Proposed Development.
CONSULTATION	An EIA Scoping Report was formally issued to Woking Borough Council (WBC); following this, a meeting with WBC was undertaken to discuss the EIA and scope of the ES. The EIA Scoping Report and WBC's EIA Scoping Opinion is presented in ***ES Volume 3, Appendix: Methodology (Annex 1)***. Meetings and direct consultation have also been held with WBC, who are acting as the Lead Local Flood Authority (LLFA) for this planning application. The meetings comprised of detailed discussions with regards to the proposed drainage strategy for the site, as well as the most recent flood mapping of the Hoe Stream that should be used for the assessment. Since this meeting, email correspondence has been ongoing to confirm the strategy undertaken with regards to flood risk and drainage for the Proposed Development. Email correspondence from the LLFA is included in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***. Consultation has also been undertaken with: • The Environment Agency (EA) and this included provision of flood data that the EA hold for the site. This consultation correspondence is included in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***; • Thames Water, for a pre-development enquiry for the site, to determine the capacity of the foul sewers at the site. This is included as an appendix in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***; and • Consultation is being undertaken with Affinity Water and is an ongoing process to ensure that there is sufficient capacity in the local mains supply to serve the Proposed Development.

ASSESSMENT METHODOLOGY

Defining the Baseline

Current Baseline Conditions

Identifying the Zone of Influence

12.1 The Zone of Influence (ZoI) (also referred to as the study area) is defined as that generally within a 2 kilometre (km) radius of the site, although a number of issues are considered at a greater distance or at the river catchment level, where necessary. The appraisal of baseline conditions and assessment of effects encompasses surface water and groundwater resources (in terms of water quantity), drainage and flood risk.

12.2 In accordance with the requirements set out within Woking Borough Council's (WBC's) EIA Scoping Opinion (presented in ***ES Volume 3, Appendix: EIA Methodology***), this chapter also includes an assessment of the potential effects of the Proposed Development on nature conservation designations in relation to surface water discharges from the Proposed Development.

Survey Methodologies

12.3 This assessment has been undertaken in accordance with national Planning Practice Guidance (PPG)[1] on EIA and has involved review of the following sources of baseline data:

- Review of EA data records on groundwater Source Protection Zones (SPZs), chemical and biological river quality, ecological status, groundwater quantity and quality, and the location of indicative floodplain;
- Review of the Woking Borough Council Strategic Flood Risk Assessment (SFRA) Volume 2 Technical Report (November 2015)[2] and accompanying reports;
- Review of the accompanying Flood Risk Assessment (FRA), including a Drainage Strategy, (RMA Environmental, September 2019) for the Proposed Development (refer to ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***);
- Review of the Desk Study / Preliminary Risk Assessment Report (Jomas Associates Ltd; August 2018) prepared for the site (***ES Volume 3, Appendix: EIA Methodology (Annex 1)***);
- Review of the Groundsure report appended to the Desk Study / Preliminary Risk Assessment Report received in August 2018 for the site and up to a 2km radius; providing data on surface water and groundwater abstractions, river quality, baseline hydrogeology, groundwater vulnerability and pollution incidents (***ES Volume 3, Appendix: EIA Methodology (Annex 1)***); and
- Review of the Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report that was prepared for the site (***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk, Annex 3***).

Desk Survey

12.4 The assessment methodology has been entirely desk-based, with the exception of a site walkover undertaken at the outset of the project.

Likely Evolution of the Baseline Conditions

12.5 The principal factor with regard to the likely evolution or change to the current baseline condition in relation to water resources, drainage and flood risk is climate change. The current baseline has, therefore, been assessed with regard to existing conditions (i.e. current flood zone(s), existing rainfall intensity) and then again with the predicted impacts of climate change taken into account. The latest guidance on climate change effects is provided in 'Flood risk assessments: climate change allowances' (EA, 2016[3]).

12.6 Furthermore, this assessment has considered the existing baseline with regard to surface water and groundwater resources, and the predicted resource status or objectives for future years, as defined by the EA for the relevant river or groundwater catchment.

Impact Assessment Methodology

Demolition and Construction

12.7 The likely effects of the demolition and construction of the Proposed Development are associated with the potential contamination of surface water and groundwater, potential increase in surface water and subsequent flood risk, as well as the potential interruption of groundwater. There is no specific quantitative assessment methodology for Water Resources, Drainage and Flood Risk impact assessment. However, the significance of each potential effect has been assessed using an approach which is broadly based on the established methodology from the Transport Analysis Guidance (TAG) Environmental Impact Appraisal 2019[4]. Further details on how significance is defined are found in the 'Methodology for Defining Significance' section of this chapter.

[1] Planning Practice Guidance (2016) Ministry of Housing, Communities and Local Government.
[2] Woking Borough Council (2015). Strategic Flood Risk Assessment 2015: Volume 2.
[3] Environment Agency. (2016). Flood Risk Assessments: Climate Change Allowances.
[4] Department of Transport. (2019). TAG Unit A3 Environmental Impact Appraisal.

Completed Development

12.8 The likely effects of the completed and operational Proposed Development are associated with the potential flood risk resulting from the breach or overtopping of flood defences and the added effects of climate change, the potential contamination of controlled waters, as well as the potential demand on infrastructure and foul drainage. As noted above, there is no specific quantitative assessment methodology for Water Resources, Drainage and Flood Risk impact assessment. However, the significance of each potential effect has been assessed as per the approach set out above. Further details on how significance is defined are outlined in the 'Methodology for Defining Significance' section of this chapter.

Assumptions and Limitations

12.9 When referring to data from the Groundsure Reports, the Desk Study Report, and the Geo-Environmental and Geotechnical Assessments undertaken by Jomas, the distances and directions have been quoted directly. These distances are based on reference points within the site and, therefore, it is possible that some of the data locations are at a different distance and / or direction from the closest part of the site boundary.

12.10 The assessment of demolition, construction and operational related effects has been based on the indicative demolition and construction methodology and phasing of the Proposed Development, as described within ***ES Volume 1, Chapter 5: Demolition and Construction***.

12.11 The assessment of potential demolition, construction and operational related effects assumes that embedded mitigation (i.e. standard best practice) measures will be incorporated during the demolition and construction phase of the Proposed Development. Please note that these embedded measures are set out ***ES Volume 1, Chapter 15: Mitigation and Monitoring***.

Methodology for Defining Significance

12.12 The assessment of effects has involved the following approach:

- The sensitivity or importance of aquatic receptors has been established on the basis of their use, proximity to the site, existing quality or resource value (refer to Table 12.1);
- Evaluation of the magnitude of the potential impact on water resources, drainage and flood risk, and assessment of the sensitivity of the resource to the predicted changes (refer to Table 12.2);
- The potential effects have been given a nature (beneficial or adverse) and scale (negligible, minor, moderate or major), based on the matrix in Table 12.3 and definition set out in paragraph 12.13; and
- Based on the nature and scale of each effect, the effect in question has then been determined to be 'significant' or 'not significant', as set out in paragraph 12.14.

Table 12.1 Definition of Receptor Sensitivity

Receptor Sensitivity	Receptor Type	Sensitivity Details
High	Surface Water	• Water Framework Directive (WFD) catchment classification of 'High' or 'Good' • No pathway constraints to this receptor
	Groundwater	• Principal Aquifer
	Flood Risk	• Flood Zone 3a or 3b (high flood risk)
	Surface Water Drainage	• Critical drainage or flood storage areas
	Water Resources and Infrastructure	• Area of known major water stress / foul sewerage capacity issues
Medium	Surface Water	• WFD catchment classification of 'Moderate'
	Groundwater	• Secondary A or B Aquifer
	Flood Risk	• Flood Zone 2 (medium flood risk)
	Surface Water Drainage	• Problem (but not critical) drainage area • Medium to High surface water flood risk
Low	Water Resources and Infrastructure	• Area of known water stress / foul sewerage capacity issues
	Surface Water	• WFD catchment classification of 'Poor' or 'Bad'
	Groundwater	• Unproductive Strata, i.e. Non-Aquifer
	Flood Risk	• Flood Zone 1 (low flood risk)
	Surface Water Drainage	• No known drainage or flooding problems • Low or No surface water flood risk
	Water Resources and Infrastructure	• Area of no known water stress / foul sewerage capacity issues

Table 12.2 Methodology for Assessing Magnitude of Impact

Magnitude of Impact	Criteria for Assessing Magnitude of Impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-development) conditions such that the post-development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post-development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Table 12.3 Scale of Effect Matrix

Magnitude	Sensitivity		
	High	Medium	Low
Major	Major	Moderate to Major	Minor to Moderate
Moderate	Moderate to Major	Minor to Moderate	Minor
Minor	Minor to Moderate	Minor	Negligible to Minor
Negligible	Negligible	Negligible	Negligible

12.13 The nature of an effect can be adverse or beneficial. An effect that is considered to be adverse has a detrimental result on existing baseline conditions and an effect that is considered to be beneficial, gives rise to an improvement on existing baseline conditions.

12.14 Due to the importance and sensitivity of water resources, drainage and flood risk, those potential effects predicted to be minor, moderate or major are considered to be significant. Negligible effects are not considered to be significant.

12.15 In addition to the above, the geographic extent of the effects have also been identified. At a spatial level, 'site' or 'local' effects are those affecting the site and neighbouring receptors, while effects upon receptors in the borough beyond the vicinity of the site and its neighbours are at a 'district' level. Effects affecting Surrey are at a 'regional' level, whilst those which affect different parts of the country (or England) are considered to be at a 'national' level.

12.16 For the purposes of the ES, effects that are generated as a result of the demolition and construction works (i.e. those that last for this set period of time) have been classed as 'temporary'; these may be further classified as either 'short term' or 'medium-term' effects, depending on the duration of the demolition and construction works that generate the effect in question. Effects that result from the completed and operational Proposed Development are classed as 'permanent' or 'long-term'.

12.17 The assessment presented in this chapter has also identified whether the effect is 'direct' (i.e. resulting without any intervening factors) or 'indirect' or 'secondary' (i.e. not directly caused or resulting from something else).

12.18 Whether the effect is 'reversible' or 'irreversible' has also been identified and defined.

BASELINE CONDITIONS

Current Baseline Conditions

Surface Water

Hydrological Features

12.19 The closest watercourse to the site is the Hoe Stream which is located approximately 50m to the north-west of the site. This watercourse is classified by the Environment Agency (EA) as a 'Main River[5]'. There is also a small pond situated approximately 30m to the east of the site. From reviewing Ordnance Survey mapping, there are no other water features within the site or surrounding area.

Water Quality

12.20 Since the introduction of the WFD, the EA assigns a classification for water bodies on the basis of their 'ecological status', which encompasses chemical, biological and ecological assessment parameters.

12.21 For catchment purposes, the north-western extent of the site lies within the 'Hoe Stream (Pirbright to River Wey confluence at Woking)' surface water operational catchment and the south-eastern extent of the site lies within the 'Hoe Stream (Shalford to River Thames confluence at Weybridge)' surface water operational catchment. Both catchments had an overall ecological water body classification of 'Moderate' in 2016 with an objective of achieving 'Moderate to Good' by 2027.

Designations, Abstractions and Discharges

12.22 The site is not located within a Source Protection Zone (SPZ). However, the full extent of the site is located within a surface water drinking water safeguard zone; surface water drinking water safeguard zones are defined by the EA as *"catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water), which are at risk of failing the drinking water protection objectives".* The south-eastern part of the site is located within a surface water drinking water protected area; surface water drinking water protected areas are defined by the EA ***as*** *"areas where the land use is causing pollution of the raw water. Action is targeted in these zones to address pollution so that extra treatment of raw water can be avoided".*

12.23 From reviewing the Groundsure report (appended to the EIA Scoping Report, presented in ***ES Volume 3, Appendix: EIA Methodology (Annex 1)***), there are no records of surface water discharge consents within the site. There are three recorded surface water discharge consents within a 2km radius of the site, the closest of which is located 23 m to the north-west of the site and is a trade effluent discharge to the Hoe Stream.

12.24 There are no records of any surface water abstraction licences within the site boundary. There are 10 surface water abstraction licenses within a 2km radius of the site, the closest of which is recorded as an abstraction from River Wey at Gresham Mill, situated approximately 1.2km to the south-east of the site.

Pollution Incidents

12.25 There are no records of any pollution incidences to surface water within the site boundary. However, there is one record within a 2km radius of the site; this is located 349m to the north-east of the site and was recorded as 'other inorganic chemical or product' contamination, occurring in 2003, with a Category 4 (no impact) severity to controlled waters.

Hydrogeology and Groundwater

Geology and Hydrology

12.26 As reported on the British Geological Survey (BGS) online Geology of Britain Viewer[6], the site is underlain by the superficial deposits of Kempton Park Gravel comprising sand and gravel. This is further underlain by the bedrock geology of the Bagshot formation comprising sand.

12.27 The EA classify both the superficial and bedrock geology as Secondary A Aquifers; these are defined as "permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers."

12.28 The far south-eastern part of the site is underlain by the bedrock geology of the London Clay Formation comprising clay silt and sand and this is classified by the EA as unproductive Strata; these are defined as *"rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow."*

12.29 The Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report (presented in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 3)***) included undertaking a number of boreholes within the site. The report includes details of the ground conditions on the site, following a number of boreholes, and a summary of the ground conditions are set out in the table below.

Table 12.4 Summary of Ground Conditions On-Site

Stratum and Description	Base of Strata (m bgl)	Thickness Range (m)
Asphalt. (MADE GROUND)	0.05 – 0.20	0.05 – 0.20
Brown sandy gravelly clay with rootlets. Sand is fine. Gravel consists of flint, concrete, brick and asphalt fragments. (MADE GROUND – Topsoil) Encountered in WS4 and WS5 only	0.30 – 0.50	0.30 – 0.50
Black to brown slightly clayey sandy gravel. Sand is fine to medium. Gravel consists of flint, brick, concrete, asphalt, glass and ceramic fragments. (MADE GROUND)	0.30 – 1.10	0.18 – 1.15
Black to brown clayey gravelly sand. Sand is medium. Gravel consists of fine to coarse flint and asphalt fragments. (MADE GROUND)	0.70 – 1.40	0.25 – 0.90
Loose to very dense orange to grey silty clayey very gravelly SAND. Sand is fine. Gravel consists of flint. (KEMPTON PARK GRAVEL)	2.00 – 4.15	0.70 – 3.70
Medium to very dense grey silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION)	3.75 – 25.00	0.85 – 22.30

12.30 Falling Head Permeability Tests were undertaken on-site by Jomas in June 2019 and the results are included within ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)*** . The results show that standing groundwater level was recorded at depths of between 1.7 m and 2.7 m below ground level (bgl), generally within the Kempton Park Gravel and the borehole data indicated a hydraulic gradient (decline) in a northerly direction towards Hoe Stream, as expected.

Designations, Abstractions and Discharges

12.31 The site does not lie within a groundwater safeguard zone for drinking water, an existing or proposed groundwater Nitrate Vulnerable Zone (NVZ) or a Groundwater Vulnerability Zone.

12.32 There are no records of any groundwater abstraction licences within the site. There are two records of groundwater abstraction licences located within a 2km radius of the site, both of which are recorded 1,275 m to the south of the site and are for the use of spray irrigation.

12.33 There are no records of any groundwater discharge consents within the site or surrounding area.

Pollution Incidents

12.34 The Groundsure reports (***ES Volume 3, Appendix: EIA Methodology (Annex 1)***) indicate that there are no recorded groundwater pollution incidences within the site or surrounding area.

Flood Risk

12.35 The EA's flood map for planning indicates that the site lies entirely within Flood Zone 1 (low risk). Land located within Flood Zones 2 and 3 (medium and high risk, respectively) is located approximately 15 m to the north-west of the site. Due to the close proximity of Flood Zones 2 and 3 to the site, it is necessary to assess the risk of climate change on the flood extents for the operational lifetime of the Proposed Development (assumed to be 100 years).

12.36 Detailed flood data has been obtained from the EA and consultation has been undertaken with WBC; this has identified that the site benefits from flood defences along the Hoe Stream. Consultation has identified that WBC and the EA have been working in partnership to design and implement the Hoe Valley Restoration

[5] Main Rivers described by the EA as the following "usually larger rivers and streams".

[6] British Geological Survey (2019) Geology of Britain Viewer. [online] Available at: http://mapapps.bgs.ac.uk/geologyofbritain3d/index.html. Accessed: 3rd September 2019.

Scheme, which involves updating the EA's current 2014 modelling. WBC have provided the updated output mapping for the defended Hoe Stream scenario, including the climate change scenarios, and the in-channel defended and undefended flood levels; these levels and flood extents are included within the FRA ***(ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)).***

12.37 When assessing the crest levels of the flood defences and comparing them to the defended modelled 100-year flood level with 35% allowance for climate change for the site, it is concluded that the flood defences would provide protection for the operational lifetime of the Proposed Development.

12.38 The EA's risk of flooding from surface water flood maps identify that the majority of the site is at a very low surface water flood risk (i.e. each year, this area has less than a 1 in 1000 (0.1%) of flooding. There are a few small areas with up to a high surface water flood risk (i.e. each year, this area has more than a 1 in 30 (3.3%) chance of flooding) located within the north-west and southern parts of the site. The EA's mapping indicates that the areas of surface water flood risk on-site are limited in size and do not appear to constitute any flow paths (i.e. they originate within the site boundary). The extents of areas with up to a high surface water flood risk are located within existing areas of hardstanding surrounding the buildings and are ultimately ponded water.

12.39 The WBC's SFRA identifies that the majority of the site is located within an area with "*limited potential for groundwater flooding to occur*". The south-eastern corner of the site, however, is within an area with "*potential for groundwater flooding to occur at the surface"*.

12.40 Additionally, the site lies within a postcode area with 33 records of overloaded sewer flooding. However, the exact magnitude, extent and location of these flooding incidents are not recorded.

12.41 A review of the SFRA and EA flood maps, has identified that the site is not located within an area at risk of reservoir flooding.

12.42 The FRA (presented in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***) contains a more detailed review of EA's data and the WBC's SFRA.

Surface Water Drainage

12.43 From reviewing WBC SFRA, it is confirmed that the site is not located within a Critical Drainage Area (CDA). A CDA is generally defined as the following:

"A Critical Drainage Area (CDA) is an area that has critical drainage problems and which has been notified to the local planning authority as such by the Environment Agency in line with the National Planning Policy Framework (NPPF). In these locations, there is a need for surface water to be managed to a higher standard than normal to ensure any new development will contribute to a reduction in flooding risks in line with NPPF. These higher standards are determined by the Environment Agency".

12.44 The site is currently occupied by a football stadium (Woking Football Club, as shown in Figure 1.2 in ***ES Volume 1, Chapter 1: Introduction***); a collection of large-footprint low-rise buildings, including the Woking Snooker Centre, David Lloyd Leisure Centre (including tennis courts), and Woking Gymnastics Club; car parking; and a small number of residential properties situated in the north-western corner of the site. Currently, any surface water runoff generated within the site flows in a northerly direction towards the Hoe Stream and ponds within the external hardstanding areas surrounding the buildings on-site.

Water Resources and Infrastructure

Water Resources

12.45 The EA's Water Stressed Areas-Final Classification Report (2013) identifies that the local potable water supplier (Affinity Water) has a 2013 current and future scenario stress classification of 'Serious'.

12.46 Affinity Water asset maps are included in the Utilities Appraisal that has been undertaken for the site and is submitted as a separate report for this application and, from reviewing these maps, it is identified that distribution mains are located along Kingfield Road (the northern boundary of the site) and Westfield Avenue (the western boundary of the site).

12.47 As the site already comprises of existing uses (as stated in paragraph 12.44), a mains water supply will also already be in place, connecting to the site.

Foul Water Demand

12.48 Thames Water is the sewerage supplier for the site and their asset maps are included in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***. The asset maps identify that foul sewers run along Westfield Avenue and Kingfield Road.

12.49 Due to the existing land uses on-site, formal foul drainage will already be in place, connecting to the site.

Network Infrastructure

12.50 The Thames Water asset maps also identify a surface water sewer located along Westfield Avenue, discharging at an outfall located approximately 40m to the north of the site, into the Hoe Stream.

12.51 A Utilities Appraisal[7] has been undertaken for the site and is submitted as a standalone report to accompany the planning application. This report includes further details on the location and type of utilities that are located within and surrounding the site.

Nature Conservation and Designations

12.52 A web-based search has been undertaken of Natural England's MAGIC[8] interactive mapping and this has identified the following statutory designated sites or areas of conservation within a 10km radius of the site:

- The Surrey Hills Area of Outstanding Natural Beauty (AONB) is located approximately 7.7km to the south of the site;
- There are nine designated Local Nature Reserves (LNR) within a 10km radius of the site: Mayford Meadows LNR (900 m to the south-west of the site); White Rose Lane LNR (1.1km to the north-east of the site); Whitmoor and Rockford Commons LNR (3.8km to the south-west of the site; and Fox Corner LNR (5km to the south-west of the site) are the LNRs in closest proximity to the site
- The Chobham Common National Nature Reserve is located 7km to the north of the site and is designated for its lowland heaths;
- There are 13 Sites of Special Scientific Interest (SSSI) within a 10km radius of the site, four of which are located within 5km:
  - Smarts and Prey Heaths SSSI is located approximately 1.2km to the south-east of the site and is designated for the conservation of heathland birds;
  - Paper Court SSSI is located approximately 2.3km to the east of the site and is designated for its wetland habitats;
  - Whitmoor Common SSSI is located approximately 3.4km to the south-east of the site and is designated for its heathland habitats;
  - Horsell Common SSSI is located approximately 3km to the north of the site and is designated for its heathland habitats;
- The Thursley, Ash, Pirbright and Chobham Special Area of Conservation is located approximately 5km to the west of the site at its closest point and mostly comprises of Heath, Scrub, Maquis and Garrigue and Phygrana habitat; and
- The Thames Basin Heath Special Protection Areas (SPAs) are spilt into eight main areas surrounding the site, the closest of which is located 3km to the north of the site.

IDENTIFICATION OF RECEPTORS AND RECEPTOR SENSITIVITY

Existing

12.53 Existing receptors that have the potential to be affected by the Proposed Development are set out in Table 12.5.

[7] RMA Environmental Ltd. Utilities Appraisal.
[8] MAGIC. 2019. Natural England. Online: https://magic.defra.gov.uk/MagicMap.aspx

Table 12.5 Existing Receptors and Associated Sensitivity

Receptors	Sensitivity
Surface Water (Hoe Stream)	**High** – The site falls within the WFD 'Hoe Stream' surface water operational catchment' which had an overall ecological water body of classification of 'Moderate' in 2016 with an objective of achieving 'Moderate to Good' by 2027.
Groundwater (Secondary A Aquifer)	**Medium** – The site is situated over a Secondary A Aquifer and has relatively shallow groundwater on site.
Flood Risk (to properties and site users)	**Low –** The site is currently shown to be located within Flood Zone 1 (low risk) in accordance with the EA flood mapping.
Surface Water Drainage	**Low –** The site is not located within a CDA and the majority of the site has a very low surface water flood risk.
Water Resources and Infrastructure	**High** – Affinity Water is classified to have a 2013 current and future stress scenario of 'serious' and Thames Water have identified capacity issues within the current foul sewers.

Introduced

12.54 For the purposes of this water resources, flood risk and drainage assessment, there are no new receptors introduced as a result of the Proposed Development. All receptors to be considered within this assessment already exist.

POTENTIAL EFFECTS

Demolition and Construction

12.55 The demolition and construction of the Proposed Development has the potential to generate the following effects in relation to Water Resources, Drainage and Flood Risk:

- Potential contamination of controlled waters arising from general demolition and construction-related activities;
- Potential basement flooding due to construction below the groundwater table; and
- Potential elevated risk of groundwater flooding and/or effects on baseflow to local water bodies, due to the potential interruption of groundwater flows.

Potential Contamination of Controlled Waters Arising from General Demolition and Construction Related Activities

12.56 The operation of demolition and construction vehicles and general demolition and construction activities give rise to the potential for groundwater and/or surface water to become contaminated with hydrocarbons, silt and other demolition and construction materials. This may in turn lead to a contamination event, should site drainage be allowed to enter existing drainage infrastructure or the ground untreated.

12.57 With the incorporation of embedded mitigation measures (i.e. standard best practice) (as set out in ***ES Volume 1, Chapter 15: Mitigation and Monitoring***),the magnitude of this contamination impact is considered to be minor on surface water (high sensitivity receptor) and groundwater (medium sensitivity receptor). Consequently, it is considered that the contamination arising from general demolition and construction activities has the potential to generate a **negligible** effect on surface water and on groundwater.

Potential Basement Flooding Due to the Construction of Basements Below Groundwater Tables

12.58 From reviewing the borehole records on-site, included within the Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report, it is identified that groundwater is located between 22.22m above ordnance datum (AOD) and 23.26m AOD), which ranges between 1.7m bgl and 2.87m bgl within the Kempton Park Gravel that underlies the site and flows in a northerly direction towards the Hoe Stream.

12.59 The Proposed Development comprises the redevelopment of the existing football stadium and construction of five residential blocks, up to ten storeys in height. The two southern residential blocks (Block 4 and Block 5) include a lower ground level and a basement level. The three western blocks (Blocks 1, 2 and 3) comprise of a lower ground level only. The lowest proposed finished floor level (FFL) of the lower ground level across all of the residential blocks is 22.50m AOD. The proposed FFL of the basement levels in Block 4 and Block 5 is 20.50m ADO. There are no basement levels proposed for the football stadium.

12.60 From reviewing the falling head permeability test results, in the western portion of the site (where Blocks 1-3 are situated), groundwater was encountered between 22.22m AOD and 23.26m AOD. The proposed FFL of the lower ground level within these blocks is 22.50m AOD and, therefore, the lower ground level will be located partially below groundwater level.

12.61 Groundwater depths within the southern portion of the site (where Blocks 4 and 5 are proposed) are identified to be between 22.87 and 23.16m AOD. The proposed FFL for the basements within these blocks is 20.50m AOD and, therefore, will be located primarily within the Kempton park gravel.

12.62 Due to the shallow groundwater and proposed construction of basements on-site, groundwater will be encountered during the demolition and construction works.

12.63 Based on the above, it can be considered that the magnitude of impact on groundwater (medium sensitivity receptor), arising as a result of flooding, due to the construction of basements, is moderate. Therefore, it is considered that the groundwater interruption anticipated to arise as a result of the demolition and construction of the Proposed Development has the potential to generate a **minor to moderate adverse** effect on groundwater.

Potential Elevated Risk of Groundwater Flooding and/or Effects on Baseflow to Local Water Bodies due to the Interruption of Groundwater Flows

12.64 As detailed above, the Proposed Development includes the construction of a lower ground floor and a basement floor, both of which are likely to partially encounter the groundwater table within the site. Such groundwater interruption within the site could have adverse impacts on groundwater flow and local groundwater abstractions within the area.

12.65 As detailed within the 'Baseline Conditions' section of this chapter, there are no records of any groundwater abstraction licences within the site; however, there are two records located within a 2km radius of the site, both of which are recorded 1,27m south of the site and are used for spray irrigation.

12.66 The borehole records for the site identify that there is a hydraulic gradient in a northerly direction towards the Hoe Stream and, therefore, only those groundwater abstractions that are located between the site and the Hoe Stream could become affected by groundwater interruption resulting from the Proposed Development. Considering the two identified groundwater abstraction licences noted in paragraph 12.65 are located to the south of the site, they will not be discernibly affected by any groundwater interruption on-site.

12.67 In addition to the above, the footprint of the lower ground level and basement level of the proposed residential buildings are relatively small when compared to the remaining site area, and it is considered that any groundwater interruption on-site will not have a significant effect on groundwater flows within the site and surrounding area. As well as this, the Kempton Park Gravel Formation (in which the groundwater is generally located within), is a Secondary A aquifer and is therefore permeable, with a relatively high transmissivity (the rate at which groundwater flows horizontally through an aquifer), indicating that groundwater flows.

12.68 Given the above, it is considered that the magnitude of impact on groundwater (medium sensitivity receptor), arising from groundwater interruption (as a result of the construction of the Proposed Development), is negligible. Therefore, the Proposed Development is considered to have the potential to generate a **negligible** effect (i.e. elevated risk of flooding) on groundwater.

Completed Development

12.69 The completed and operational Proposed Development has the potential to generate the following Water Resources, Drainage and Flood Risk effects:

- External flood risk (from the breach or overtopping of flood defences) reaching the Proposed Development;
- Increase in surface water runoff (with the added effects of climate change) as a result of the Proposed Development;
- Potential contamination of local surface waters or groundwater (from the completed Proposed Development's routine site drainage or accidental spills) having an effect on nearby designated sites;
- Increase in water demand (expected to be generated by the Proposed Development) and the associated effect on the availability of local water resources; and
- Increase in foul drainage demand (expected to be generated by the Proposed Development) and the associated effect on local surface waters or groundwater.

External Flood Risk from the Breach or Overtopping of Flood Defences Reaching the Proposed Development

12.70 As previously noted within the 'Baseline Conditions' section of this chapter, as well as the site-specific FRA included within ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2),*** the site will be protected by the flood defences located along the Hoe Stream for its operational lifetime (assumed to be 100 years), taking into consideration the added effects of climate change.

12.71 It is necessary to assess the effect of a potential breach of flood defences on the Proposed Development. As detailed within the FRA, a worst-case scenario has been used to assess the effect of flood risk on the Proposed Development and future occupants i.e. the undefended 100 year flood event with a 35% allowance for climate change (a level of 25.02 metres above ordnance datum (m AOD)). It is important to note that this scenario is assuming that all flood defences within Woking would be breached and that a 100-year flood event would occur, which is considered to be a very unlikely. A breach in the flood defences protecting the site alone would result in a lower flood risk to the site when compared to the undefended scenario which would result in a higher flood risk; however, in the absence of breach modelling, the 100 year with 35% climate change allowance level is being used as a conservative measure.

12.72 In the very unlikely event, that an undefended scenario with 35% climate change allowance was to occur, then part of the site will be flooded to a maximum depth of 1m, however, all residential development is located a significant freeboard above this flood level; therefore, providing a safe refuge for future occupants.

12.73 The impact magnitude of external flood risk (from the breach or overtopping of flood defences) reaching the Proposed Development is considered to be negligible on flood risk (low sensitivity receptor), resulting in a **negligible** effect.

Increase in Surface Water Runoff (with the added effects of climate change) as a result of the Proposed Development

12.74 Currently, any surface water runoff generated within the site flows in a northerly direction towards the Hoe Stream, and ponds within the external hardstanding areas surrounding the buildings on-site. There is the potential for surface water flooding to occur as a result of the completed Proposed Development, largely due to the increase in hardstanding areas.

12.75 As detailed within the Drainage Strategy proposed for the site (presented in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***), the Proposed Development will incorporate green roofs on all residential blocks, bio-retention areas (incorporating tree-pits and rain gardens), as well as lined permeable paving. Surface water will be discharged to the public sewer, which ultimately discharges to the Hoe Stream and will be controlled by a hydro-brake. The drainage arrangement for the Proposed Development will limit runoff for all events up to and including the 100 year plus 40% climate change to approximately 80% of the 1 year rate of runoff from the site i.e. to a rate of 30 l/s. This surface water runoff is likely to be much less than the existing runoff rates for storms in excess of the 1 in 15 year return period and will not adversely affect the site.

12.76 The Drainage Strategy (incorporated as part of the Proposed Development) would ensure that the surface water runoff rates would be reduced or not increase beyond the existing rates for the operational lifetime of the Proposed Development.

12.77 The impact magnitude for the increase in surface water runoff (taking climate change into account) during the operation of the Proposed Development is considered to be minor on surface water drainage (low sensitivity receptor). Consequently, the Proposed Development would result in a **negligible to minor beneficial** effect on surface water drainage.

Potential Contamination of Local Surface Waters or Groundwater (from Routine Site Drainage) having an Effect on Nearby Designated Sites

12.78 Due to the ground conditions on-site (i.e. being impermeable), it is not feasible to discharge runoff to the ground and, therefore, groundwater is not considered to be a potential source of contamination to users on-site during the operation of the Proposed Development, as no infiltration-based sustainable drainage systems (SuDS) are to be utilised.

12.79 Whilst groundwater is not anticipated to be a potential source of contamination, the Proposed Development has the potential to contaminate surface waters from a number of sources. The potential contaminants present in routine run-off from the site could include hydrocarbons, metals and silt (largely from road runoff). Additionally, as the site will provide residential properties and a redeveloped football stadium, which includes a medical centre, the typical range of potential contaminants that could also be present on-site include vehicle-related oils and lubricants, as well as small quantities of general household chemicals. Any contaminants from the medical centre will be self-contained and disposed of appropriately; this will ensure they do not enter the drainage system.

12.80 Should the Proposed Development contaminate surface waters and groundwater, such contamination could have an adverse effect upon nature conservation areas and designations surrounding the site. It is considered that the Paper Court SSSI (located 900 m to the south-east of the site) is the only designation that has the potential to become affected by contaminated surface water and/or groundwater as a result of the Proposed Development, due to its designation for wetland habitats. The remaining nature conservation areas and designations surrounding the site are not considered to be at risk of potentially contaminated surface water or groundwater, based on their location in comparison to the site, i.e. not being located within the same catchment, or because they are at a higher elevation.

12.81 All surface runoff will be stored within the site and will discharge to the Hoe Stream, as detailed within the Surface Water Drainage Strategy. Therefore, there is the potential for the Paper Court SSSI to be affected by surface water runoff from the site, should runoff on-site not be properly treated. However, the proposed Drainage Strategy will ensure that all runoff from the site will receive an appropriate level of treatment in accordance with the SuDS Manual.

12.82 Water quality treatment will be provided by ensuring all runoff is routed through appropriate treatment. There are a range of SuDS proposed to improve water quality, these include; green roofs, bioretention (rain gardens), permeable paving and tree pits. The level of treatment provided is appropriate for the use of the area. The location and types of SuDS features are shown on the Drainage Strategy layout included in the FRA (***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)).*** Appendix D within the FRA includes a table which identified that the proposed SuDs will provide sufficient water quality treatment for the expected contamination based on the proposed site uses.

12.83 The use of SuDS techniques for drainage pollution control will ensure that surface water discharged from the Proposed Development will be of a sufficient quality in accordance with latest guidance. Therefore, any surface water discharged as a result of the Proposed Development will be of appropriate quality before entering the Hoe Stream and passing the Paper Court SSSI located downstream of the site.

12.84 The magnitude of impact of the potential contamination of local surface waters or groundwater from routine site drainage on nearby designated sites, during the operational phase of the Proposed Development (prior to mitigation), is considered to be minor on surface water (high sensitivity receptor).With the incorporation of the drainage strategy, it is anticipated that the effect of potential contamination of local surface waters or groundwater on nearby designated sites will be **negligible**.

Increase in Water Demand (expected to be generated by the Proposed Development) and the Associated Effect on the Availability of Local Water Resources

12.85 The water demand for the existing site is unknown; however, it can be assumed to be relatively large, due to the existing land use comprising of a football stadium, Woking Snooker Centre, the David Lloyd Leisure Centre, Woking Gymnastics Club and a small number of residential dwellings. The completed and operational Proposed Development has the potential to generate an increase in water demand from the site, as a result of the Proposed Development consisting of the redevelopment of the football stadium and the construction of five new residential buildings, providing 1,048 units.

12.86 Consultation has been undertaken with Affinity Water and is an ongoing process to ensure that there is sufficient capacity in the local mains supply to serve the Proposed Development.

12.87 The buildings have been designed to maximise water efficiency through measures such as using alternative sources of water, such as rainwater and greywater harvesting, where possible. Water butts could be installed to residential properties to provide water for external irrigation, with larger rainwater harvesting units for commercial and industrial development, where appropriate.

12.88 The magnitude of impact on water resources and infrastructure (high sensitive receptor), anticipated to be generated by the completed Proposed Development's increase in water demand, is considered to be minor. With the incorporation of water efficient building design, the completed Proposed Development will have a **negligible** effect on water resources and infrastructure.

Increase in Foul Drainage Demand (expected to be generated by the Proposed Development) and the Associated Effect on Local Surface Waters or Groundwater

12.89 The foul drainage demand is expected to significantly increase due to the Proposed Development increasing the residential development on-site and the football stadium capacity when compared to the existing site use.

Thames Water have confirmed that the local sewerage system has insufficient capacity within their current sewerage system for the predicted flows estimated for the Proposed Development (as set out in ***ES Volume 3, Appendix: Water Resources, Drainage and Flood Risk (Annex 2)***).

12.90 However, since the publication of the new connections and development charging rules in April 2018, drainage authorities in England are obligated to provide a point of connection and undertake any mitigation or improvement works and network reinforcements, where necessary. These will be programmed once planning consents are granted.

12.91 Therefore, the impact magnitude of increased foul drainage demand from the Proposed Development is considered to be negligible on water resources and infrastructure (high sensitive receptor), resulting in a **negligible** effect on water resources and infrastructure.

MITIGATION AND MONITORING MEASURES

Demolition and Construction

Potential Contamination of Controlled Waters Arising from General Construction Related Activities

12.92 Based on the embedded mitigation measures set out in the 'Potential Effects' section of this chapter, there are no additional mitigation or monitoring measures required beyond those embedded measures (i.e. standard best practice) that are set out above with regard to the potential contamination of controlled waters from general construction-related activities.

12.93 Given the above it is considered that the residual effect of the construction related activities on controlled waters, would remain **negligible**. This effect is not significant.

12.94 Potential Basement Flooding Due to the Construction of Basements Below Groundwater Tables

12.95 The construction of the Proposed Development's basements will need to incorporate flood resistant techniques to ensure that they would remain free from groundwater flooding. Techniques will likely include a cofferdam around the perimeter of the basement to prevent lateral ingress of groundwater; dewatering of the excavation for the Proposed Development; and retaining walls within the basement levels.

12.96 With these mitigation measures in place, it is considered that the residual effect of groundwater interruption (anticipated to arise as a result of the basement construction) on groundwater would be **negligible**. This effect is not significant.

Potential Elevated Risk of Groundwater Flooding and/or Effects on Baseflow to Local Water Bodies.

12.97 Due to the interruption of groundwater flows, as detailed in the 'Potential Effects' section of this chapter, the groundwater interruption (arising from the construction of the Proposed Development) has the potential to result in a negligible effect on groundwater. Therefore, no mitigation measures are required.

12.98 Given the above, it is considered that the residual effect of groundwater interruption (as a result of the construction of the Proposed Development) on groundwater would remain **negligible**.

Completed Development

External Flood Risk from the Breach or Overtopping of Flood Defences Reaching the Proposed Development

12.99 As detailed in the 'Potential Effects' section of this chapter, the potential effect of external flood risk (from the breach or overtopping of flood defences) reaching the Proposed Development is considered to be negligible on flood risk. Therefore, no mitigation measures are required.

12.100 Given the above, it is considered that the residual effect of external flood risk (from the breach or overtopping of flood defences) reaching the Proposed Development would remain **negligible** on flood risk**.**

Increase in Surface Water Runoff (with the added effects of climate change) as a result of the Proposed Development

12.101 The 'Potential Effects' section of this chapter identifies the potential for the operation of the Proposed Development to result in a negligible to minor beneficial effect on surface water drainage. Therefore, there are no additional mitigation and monitoring measures required with regard to the potential increase in surface water runoff (with the added effects of climate change) expected to be generated by the Proposed Development.

12.102 With the implementation of the Drainage Strategy (as noted in the 'Potential Effects' section of this chapter, it is considered that the residual effect on surface water drainage would remain **negligible to minor beneficial**.

Potential Contamination of Local Surface Waters or Groundwater (from Routine Site Drainage) having an Effect on Nearby designated sites

12.103 As detailed in the 'Potential Effects' section of this chapter, the Proposed Development is anticipated to have a negligible effect on nearby designated sites, as the proposed Drainage Strategy will ensure that all runoff from the site will receive an appropriate level of treatment and will not contaminate surface waters and groundwater. There are, therefore, no additional mitigation and monitoring measures required with regard to the potential contamination of local surface waters or groundwater from routine site drainage having an effect on nearby designated site as a result of the Proposed Development.

12.104 With the implementation of the Drainage Strategy, as noted in the 'Potential Effects' section of this chapter, it is considered that the residual effect would remain **negligible**.

Increase in Water Demand (expected to be generated by the Proposed Development) and the Associated Effect on the Availability of Local Water Resources

12.105 The 'Potential Effects' section of this chapter identifies the potential for the Proposed Development to result in a negligible effect on water resources and infrastructure. There are, therefore, no additional mitigation and monitoring measures required with regard to the potential increase in water demand as a result of the Proposed Development.

12.106 Given the above, it is considered that the residual effect on water resources and infrastructure would remain **negligible**.

Foul Drainage Demand

12.107 As detailed above, the effect of an increased foul drainage demand from the operation of the Proposed Development is considered to be negligible on water resources and infrastructure. Therefore, no mitigation measures are required.

12.108 In view of the above, it is considered that the effect of the operational Proposed Development on water resources and infrastructure would remain **negligible**. This effect is not significant.

RESIDUAL EFFECTS

12.109 The residual effects anticipated to arise from the Proposed Development are summarised in Table 12.6.

Table 12.6 Summary of Residual Effects

Receptor	Receptor Sensitivity	Residual Effect (Nature and Scale)	Geo	D I	P T	R IR	St Mt Lt
Demolition and Construction							
Potential Contamination of Controlled Water from General Construction Activities							
Surface Water	High	Negligible	L	D	T	R	St
Groundwater	Medium	Negligible	L	D	T	R	St
Potential Presence of Basements Below Groundwater Table Giving Rise to Basement Flooding							
Groundwater	Medium	Negligible	B	D	T	IR	Mt
Potential elevated risk of groundwater flooding and/or effects in baseflow of local water bodies							
Groundwater	Medium	Negligible	B	D	T	IR	Mt

Receptor	Receptor Sensitivity	Residual Effect (Nature and Scale)	Geo	D I	P T	R IR	St Mt Lt
Completed Development							
External Flood Risk							
Flood Risk	High	Negligible	B	D	P	IR	Lt
Increase in Surface Water Runoff (with the added effect of climate change)							
Surface Water Drainage	Low	Negligible to Minor Beneficial	B	D	P	IR	Lt
Contamination of Local Surface Water and Ground Water on Designated Site							
Groundwater	Medium	Negligible	B	D	P	R	Mt
Surface Water	High	Negligible	B	D	P	R	Mt
Water Demand							
Water Resources and Infrastructure	High	Negligible	B	D	P	IR	Lt
Foul Water Demand							
Water Resources and Infrastructure	High	Negligible	B	D	P	IR	Lt

Notes:
Residual Effect
- Scale = Negligible / Minor / Moderate / Major
- Nature = Beneficial or Adverse

Geo (Geographic Extent) = Local (L), Borough (B), Regional (R), National (N)
D = Direct / I = Indirect
P = Permanent / T = Temporary
R = Reversible / IR= Irreversible
St = Short Term / Mt = Medium Term / Lt = Long Term
N/A = not applicable / not assessed

LIKELY SIGNIFICANT EFFECTS

12.110 Table 12.6 above gives an overview of the assessment and summarises the residual effects anticipated to arise during both the construction and operation of the Proposed Development, as along with the associated sensitivity, nature and scale of effect.

12.111 Given the location and nature of the receptors, the overall environmental effects of the Proposed Development in relation to Water Resources, Flood Risk and Drainage following the adoption of the recommended mitigation measures are not considered to be significant.

CLIMATE CHANGE

12.112 It is necessary to consider whether the effects of the Proposed Development on water resources, drainage and flood risk will alter due to the effect of climate change. The climate change variable relevant to this assessment is the future effect and change in rainfall levels.

12.113 From reviewing the Met Offices UKCP18 future climate change projections for the medium emissions scenario for the 2080s, it is estimated that the winter average precipitation will increase by 16.23% and the summer average precipitation will decrease by 26.31% when compared to the baseline period (climatic trends from 1961 to 1990).

12.114 The receptors that have been identified within this assessment need to be considered in terms of their vulnerability (i.e. susceptibility or resilience to change) to the changes in the future climate. Table 12.7 below, gives a summary of the receptors, including their sensitivity classification and their vulnerability under these future climate conditions.

12.115 The vulnerability of a receptor is defined by the following classifications:

- **High Vulnerability** – the receptors directly dependent on existing and/or prevailing climatic factors and reliant on these specific existing climate conditions continuing in the future; or only able to tolerate a very limited variation in climate conditions;
- **Moderate Vulnerability** – the receptor is dependent on some climatic factors, but able to tolerate a range of conditions; and
- **Low Vulnerability** – Climatic factors have little influence on receptors.

Table 12.7 Summary of Receptor Sensitivity and Vulnerability for Assessment

Receptor	Sensitivity	Vulnerability
Surface Water (Hoe Stream)	High	High
Groundwater (Secondary A Aquifer)	Medium	High
Surface Water Drainage	Low	High
Water Resources	High	Medium
Flood Risk	Low	High

12.116 During the operational phase of the Proposed Development, it is considered that all of the receptors identified within the assessment, apart from water resources, are considered to be highly vulnerable to a change in precipitation as a result of climate change. Water resources are considered to have a medium vulnerability to a change in precipitation levels as a result of climate change. However, current and future baseline conditions and the impacts identified within this assessment have already considered the predicted impacts of climate change.

12.117 The proposed mitigation measures include the future effects of climate change and, therefore, once these measures are implemented, the Proposed Development will be considered safe in terms of future climate effects. The climate change resilient measures include the following:

- A climate change allowance has been included within the 1 in 100 year flood event used to assess the flood risk at the site, this flood event with climate change allowance is also used when assessing the risk of flooding the site if the flood defences were to overtop or breach (refer to the FRA);
- When assessing the site's flood risk during a 1 in 100 year event with an allowance for climate change, it is proposed that any habitable rooms and highly vulnerable land uses are located above the 1 in 100 year flood level including climate change allowance (refer to the FRA);
- When assessing the control of surface water runoff during the operational phase of the Proposed Development, storage calculations have included a 40% increase in rainfall depths in accordance with the current climate change guidance (refer to the FRA); and
- The WFD ecological status for the 'Hoe Stream (Pirbright to River Wey confluence at Woking)' surface water operation catchment and the 'Hoe Stream (Shalford to River Thames confluence at Weybridge)' surface water operational catchment was 'Moderate in 2016; however, it has a future objective of 'Moderate to Good' by 2027 and takes into account the future effect of climate change on water quality.

12.118 Overall, with the proposed mitigation measures, there will be no change in the significance of this assessment and the resulting residual effects would remain **negligible to minor beneficial**.

ASSESSMENT OF FUTURE ENVIRONMENT

Evolution of the Baseline Scenario

12.119 As previously mentioned within this chapter, the climate change variable relevant to this assessment are the future effects of increased rainfall intensity, river flows and sea level rise.

12.120 When assessing the evolution of the baseline scenario in terms of water resources and flood risk, the increase in precipitation intensity is likely to increase both surface water flood risk and groundwater flood risk within the site. Similarly, the increase in rainfall intensity will increase surface water runoff which, ultimately, can have an effect on water quality.

12.121 Water quality could improve as a result of increased rainfall entering controlled waters (surface water and groundwater) and diluting existing pollutants.

12.122 However, there is the potential for water quality to worsen, as a result of an increase in rainfall, due to climate change. This is dependent on the pathways that rainfall takes to reach the controlled water; an increase in runoff flowing through an industrial site or heavily urbanised area, will result in an increase in contamination within controlled waters and, therefore, water quality will worsen.

12.123 There will be no change in the existing baseline conditions with regard to water resources and foul drainage as a result of climate change.

Cumulative Effects Assessment

12.124 As set out in ***ES Volume 1, Chapter 2: EIA Methodology***, no cumulative schemes were identified within the surrounding area of the site; therefore, a cumulative effects assessment has not been undertaken.