9. WATER RESOURCES AND FLOOD RISK

Introduction

9.1 This chapter of the ES assesses the likely significant effects of the Development on the environment in respect of water resources and flood risk. The keys issues identified to be addressed within this assessment relate to the potential effects of the Development on local flood risk (including effects of site drainage), effects on groundwater, effects on wastewater conveyance and treatment networks and effects on water resources, including water quality, flow regimes and availability of water supply.

9.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the Site and in the surrounding area; the potential future baseline conditions; potential environmental effects on the water environment arising from the Development; the mitigation measures implemented as part of the Development to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. Any further mitigation or monitoring requirements are identified.

9.3 This chapter has been prepared by RPS Group (Angus Kerry MCIWEM, 5 years' experience and Jonathan Morley with 15 years' experience) with specific reference and reliance on Flood Risk Assessment works undertaken by S M Foster in 2017 and 2019, along with updated model information supplied by the Environment Agency (EA) and an updated Flood Risk Assessment produced by RPS Group in 2021. These documents are provided as Appendices.

Policy Context

National Planning Policy

National Planning Policy Framework[i]

9.4 The National Planning Policy Framework (NPPF) was released in March 2012, most recently updated in June 2019 and sets out the Government's planning policies for England and how they are expected to be applied. In terms of Water Resources and Flood Risk, the NPPF sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow, with a view to achieving sustainable development. The document advises of the requirements for a site-specific Flood Risk Assessment (FRA) in a number of scenarios.

9.5 Footnote 50 to the updated NPPF states that a site-specific FRA is required for:

- *'All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);*
- *All proposals of 1 hectare (ha) or greater in an area located in Flood Zone 1 (low probability);*
- *All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA);*
- *Land identified in a strategic flood risk assessment as being at increased flood risk in future; and*
- *Where proposed development may be subject to other sources of flooding, where its development would introduce a more vulnerable use.'*

9.6 Paragraph 165 of the updated NPPF identifies that major developments (comprising developments of 10 homes or more and major commercial development) should incorporate Sustainable Drainage Systems (SuDS) unless there is clear evidence that this would be inappropriate. The SuDS used should:

a) 'Take account of advice from the Lead Local Flood Authority;
b) Have appropriate proposed minimum operational standards;
c) Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
d) Where possible, provide multifunctional benefits.'

9.7 Defra published its 'Non-statutory technical standards for sustainable drainage systems' in March 2015. These technical standards are supported by the revised NPPF and advise the following procedures should be taken into account:

'Flood Risk Outside the Development

S1 Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3 below) and volume control technical standards (S4 and S6 below) need not apply.

Peak Flow Control

S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

Volume Control

S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

Flood Risk within the Development

S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.

S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.'

Planning Practice Guidance[ii]

9.8 To accompany the updated NPPF, the web-based Planning Practice Guidance (PPG) provides additional technical guidance on flood risk and coastal change. The PPG retains key elements of former Planning Policy Statement (PPS) 25 Development and Flood Risk[iii] (rescinded on adoption of the NPPF) as an interim measure, pending a wider review of guidance to support planning policy. The original technical guidance published in 2012 has now been replaced by this web-based resource.

9.9 In terms of the general planning approach to development and flood risk, the Flood Risk and Coastal Change PPG sets out the following main steps to be followed:

- Assess Flood Risk;
- Avoid Flood Risk; and
- Manage and Mitigate Flood Risk.

9.10 The guidelines also state that in plan-making, local planning authorities should apply a sequential approach to site selection so that development is, as far as reasonably possible, located where the risk of flooding (from all sources) is lowest, taking account of climate change and the vulnerability of future uses to flood risk. In plan-making, this involves applying the 'Sequential Test' to Local Plans and, if needed, the 'Exception Test' to Local Plans.

Guidance on when and how should the 'Sequential' and 'Exception' Tests be applied to planning applications is also provided in the PPG.

9.11 In addition, the guidelines reiterate that local planning authorities and developers should seek flood risk management opportunities (e.g. safeguarding land), and to reduce the causes and impacts of flooding (e.g. through the use of SuDS in developments).

9.12 Additionally, the guidelines note that when considering a major development, as defined in the Town and Country Planning (Development Management Procedure) (England) Order 2015, SuDS should be provided unless demonstrated to be inappropriate.

9.13 The PPG also contains a section on water supply, wastewater and water quality. This guidance indicates that water supply is unlikely to be a consideration for most planning applications as water supply is normally addressed through the Local Plan. With regards to water quality, the guidance states that it is only likely to be a significant planning concern when a proposal would:

- Involve physical modifications to a water body such as flood storage areas, channel diversions and dredging, removing natural barriers, construction of new locks, new culverts, major bridges, new barrages/dams, new weirs (including for hydropower) and removal of existing weirs; and/or
- Indirectly affect water bodies, for example:
  - As a result of new development such as the redevelopment of land that may be affected by contamination, mineral workings, water or wastewater treatment, waste management facilities and transport schemes including culverts and bridges; and
  - Through a lack of adequate infrastructure to deal with wastewater.

Environment Agency - Flood Risk Assessments: Climate Change Allowances[iv]

9.14 In July 2020, the EA updated its advice on climate change allowances to support the NPPF. This new guidance requires that flood risk assessments and strategic flood risk assessments consider, where appropriate, increases in rainfall intensity, peak river flows and sea level rise.

9.15 Table 0.1 below identifies the range of increase per epoch for peak rainfall intensity. The guidance states that an assessment should assess both the central and upper end allowances to understand the range of impact. The range of allowances for peak rainfall intensity are based on percentiles (i.e. the proportion of possible scenarios that fall below an allowance level). The allowances are based on the following:

- Central allowance is based on the 50th percentile; and
- Upper end allowance is based on the 90th percentile.

Table 0.1: Peak Rainfall Intensity Allowance in Small (less than 5km^2) and Urban Drainage Catchments (based on a 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for 2015 to 2039	Total potential change anticipated for 2070 to 2115	Total potential change anticipated for 2040 to 2069
Upper End	10%	20%	40%
Central	5%	10%	20%

9.16 Table 9.2 outlines the anticipated sea level rise associated with climate change per defined epoch. The range of allowances for sea level rise are based on the following:

- Higher central allowance is based on the 70th percentile; and
- Upper end allowance based on the 95th percentile.

9.17 The EA expects sea level rise to increase the rate of coastal erosion. For Nationally Significant Infrastructure Projects (NSIPs) or development such as new settlements or significant urban extensions, the EA would require that the high impact climate change scenario (H++) is assessed. This is to ensure development can be adapted to large-scale climate change over its lifetime. However, as the Development is classed as `less vulnerable' according to Table 3 of the PPG to the NPPF and is located within a brownfield site, it is determined that the H++ scenario does not need to be assessed within this ES and corresponding Flood Risk Reports (Appendix 9.1, 9.2 and 9.4).

Table 0.2: Sea Level Allowance for Each Epoch (mm) Per Year (based on a 1981 to 2000 baseline)

Area of England South East	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres
Higher central	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)	1.2
Upper End	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)	1.6
H++	N/A	N/A	N/A	N/A	1.9

9.18 The climate change guidance notes that the allowances provided have been derived from national scale research. There may be cases where local evidence supports the use of other local climate change allowances.

Local Planning Policy

Medway Local Plan 2003[v]

9.19 The Site is located within the Medway Council administrative area which is covered by the Medway Local Plan which was adopted in May 2003. The Local Plan stipulates policies development must abide by. Policies relating to flood risk and drainage are given below.

Policy CF13: Tidal Flood Risk Areas

9.20 Development will not be permitted within a tidal flood risk area if:-

i. it harms the integrity of the flood defences; or
ii. it fails to provide for a means of escape for people in the event of a flood; or
iii. it introduces residential living and sleeping accommodation below the estimated flood level; or
iv. it introduces mobile homes or caravans; or
v. it introduces new holiday accommodation between October and May.

New Medway Local Plan

9.21 The Medway Local Plan (May 2003) is currently in the process of being replaced by the new Medway Local Plan (2019 to 2037). The new local plan is currently in the development stage, with the Regulation 19 plan expected to be published for consultation in 2021.

9.22 A development strategy report[vi] was published in March 2018 as part of the Regulation 18 plan to allow consultation with local key stakeholders to comment on the potential new development policies for the new Medway Local Plan. The potential new policies related to flood risk are set out below.

Policy NE7: Flood and Water Management

'The Local Plan will seek to reduce flood risk, promote water efficiency measures, and protect and enhance water quality through the following mechanisms:
Flood Risk Management

- *Ensuring that development has a positive or nil impact on flood risk management interests*
- *Development that would harm the effectiveness of existing flood defences or prejudice their maintenance or management will not be permitted.*

- *Where development benefits from an existing or proposed flood infrastructure, the development should contribute towards the capital costs and/or maintenance of these defences over the lifetime of the development.*

Sustainable Urban Drainage

Development should enable or replicate natural ground and surface water flows and decreased surface water runoff, via the use of Sustainable urban Drainage systems (SUDS), utilising green infrastructure where possible and as guided by relevant national (and/or local standards) and guidance.

Where SuDs are provided, arrangements must be put in place for their management and maintenance over their full lifetime.

Water Supply

Development within Groundwater Source Protection Zones and Principal Aquifers will only be permitted provided that it has no adverse impact on the quality of the groundwater resource and it does not put at risk the ability to maintain a public water supply.

Water Quality

All new development should have regard to the actions and objectives of appropriate River Basin Management Plans (in Medway, this is the Thames River Basin District) in striving to protect and improve the quality of water bodies in and adjacent to the district, as well as ecology, geomorphology, and water quantity. Developers shall undertake thorough risk assessments of the impact of proposals on surface and groundwater systems and incorporate appropriate mitigation measures where necessary.

Adaptation to Climate Change

Development will be required to be designed to be resilient to, and adapt to the future impacts of, climate change through the inclusion of adaptation measures. These include:

- *Incorporating water efficiency measures, such as the use of grey water and rainwater recycling, low water use sanitary equipment.*
- *Minimising vulnerability to flood risk by locating development in areas of low flood risk and including mitigation measures including SuDs in accordance with (SuDs policy above).*

- *Optimising the use of multi-functional green infrastructure, including tree planting for urban cooling, local flood risk management and shading.*
- *Seeking opportunities to make space for water and develop new blue infrastructure to accommodate climate change.*
- *Where possible watercourses and wetland features will be adequately buffered from development commensurate with the designation and/or ecological value of those features so that they can be safeguarded and managed sustainably in perpetuity.*
- *Provision for buffering, mitigating and extending habitats and green corridors to ensure that wildlife populations are more resilient for a changing climate.'*

9.23 The Medway Strategic Flood Risk Assessment (SFRA)[vii] was produced in August 2006. The SFRA was produced to identify areas within the Medway which are at risk of flooding. The SFRA provided the Council with necessary data to undertake the sequential test, to identify development opportunities within the administrative area.

9.24 An addendum to the 2006 SFRA was produced in February 2011. The Medway Flood Defence Strategy Strategic Flood Risk Assessment Addendum[viii] defines functional floodplain as *'Flood Zone 3b associated with a 1 in 20 event, where water has to flow or be stored in times of flood'*. However, areas which would naturally flood with an exceedance probability of 1 in 20 year or greater but are prevented from flooding due to existing flood defence infrastructure or solid buildings, will not normally be defined as functional floodplain. Functional floodplain should be determined considering the effects of defences and other flood risk management infrastructure.

Legislative Context

Water Framework Directive, 2000[ix]

9.25 The Water Framework Directive 2000/60/EC (WFD) applies to all European Union (EU) water bodies and aims to make sure they are protected from further deterioration, and that improvements in water quality are made. The assessment and protection of water bodies should be undertaken irrespective of political or administrative boundaries by implementing River Basin Management Plans to be prepared within a formal series of six-year cycles, following the identification of River Basin Districts. In general terms, there is an onus on developers to protect and, if possible, enhance water bodies close to proposed developments.

9.26 The Water Framework Directive act was adopted into UK law before Brexit through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The

upcoming Environment Bill (initial Draft 2020) will look to bring about urgent and meaningful action on the natural environment and will include development of processes similar to that outlined within the Water Framework Directive. It should be noted that the EU-UK Trade and Cooperation Agreement includes a non-regression clause which includes an agreement to not weaken environmental legislation. It is therefore likely that much of the aims outlined within the Water Framework Directive 2000/60/EC and the Flood Directive 2007/60/EC will be incorporated into the upcoming Environmental Bill.

Flood Directive, 2007[x]

9.27 The Flood Directive 2007/60/EC came into force in November 2007. This Directive requires Member States to assess whether water courses and coastlines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. The Directive requires Member States to carry out a preliminary assessment of flood risk by 2011, to draw up flood risk maps by 2013 and to establish flood risk management plans focused on prevention, protection and preparedness by 2015. The Directive is to be implemented in co-ordination with the Water Framework Directive.

Land Drainage Acts, 1991 and 1994[xi]

9.28 The Land Drainage Acts set out the responsibilities given to the EA, Internal Drainage Boards, Local Authorities (LAs) and riparian landowners in regard to land drainage. Under the Acts, the EA and LAs have discretionary powers of management and maintenance for 'Main Rivers' and 'Ordinary Watercourses' respectively. It is the riparian owner, i.e. the owner of the land through which the watercourse flows, who is ultimately responsible for the maintenance of the relevant section of the watercourse.

Water Resources Act, 1991 (Amendment) (England and Wales) Regulations, 2009[xii]

9.29 The Water Resources Act (as amended by the Water Resources Act 1991 Regulations 2009) relates to the control of the water environment. The main aspects of the Act (as amended) which are relevant to the Development include provisions concerning land drainage, flood mitigation and controlling discharges to watercourses to prevent water pollution. It also outlines the functions and responsibility of the EA in regulating the water environment.

Water Industry Act, 1991[xiii]

9.30 The Water Industry Act consolidates previous legislation on water supply and sewerage

services and covers a wide range of activities required of the privatised water companies that were created in 1989. The main relevant provisions relate to trade effluent discharges made to sewer for which the privatised companies act as the regulatory authorities.

Water Act 2003 [xiv]

9.31 The Water Act 2003 amends the Water Resources Act 1991 and the Water Industry Act 1991. The Act brings about a number of changes, including streamlining arrangements for flood defence organisation and funding and changes to the types of abstraction licences, and places a duty on water companies to conserve water and prepare for drought.

Water Environment (Water Framework Directive) (England and Wales) Regulations 2017[xv]

9.32 This transposes the requirements of the WFD into UK law. Eleven River Basin Districts have been identified in England and Wales. The Regulations include a requirement for water bodies (categorised as: 'rivers'; 'lakes'; 'transitional waters'; 'coastal waters'; or 'groundwaters') to achieve 'good' status with respect to ecology and water chemistry by 2021. Progress is monitored by the EA in its role as the 'competent authority'.

Flood and Water Management Act, 2010[xvi]

9.33 The Flood and Water Management Act implements the recommendations from Sir Michel Pitt's Review of the floods in 2007 and places a series of responsibilities on County and Unitary Councils as Lead Local Flood Authorities (LLFAs) with the intention of improving flood risk management. It also removes the automatic right of connection into public water sewers and places the onus on LAs to adopt SuDS.

The Building Regulations 2010[xvii]

9.34 The building regulations guidance document H3 'Drainage and Waste Disposal' (2015) is the requirements issued by the Government in respect to rainwater which falls onto roofs and paved areas. The regulations outline that the rainwater is required to be carried away from the surface to discharge to one of the following:

- An adequate soakaway or infiltration system, or
- A watercourse; or
- A sewer.

Environment Act 1995[xviii]

9.35 The Environment Act 1995 (Section 57) makes provisions for a risk-based framework for the identification, assessment and management of contaminated land within the UK. The provisions of the Act came into effect in April 2000 and are aimed at ensuring that actions taken with respect to contaminated land are directed by a technical assessment of risk that exists in the source/pathway/receptor scenario (pollutant linkage). This extends to preventing the contamination of controlled waters.

Assessment Methodology

9.36 There are no specific EIA guidelines in relation to assessing the impact of developments on water resources, hydrology and flood risk. The assessment methodology is therefore adapted from the guidance provided in the Design Manual Road and Bridges LA104 Revision 1: Environmental assessment and monitoring[xix], and specific assessment techniques detailed in LA113: Road Drainage and the Water Environment[xx].

9.37 The assessment of potentially significant effects from the Development on water resources and flood risk takes account of the impacts on the prevailing hydrological, surface water drainage, flooding, groundwater, wastewater conveyance and treatment and water quality environments.

Baseline Methodology

9.38 Determination of the baseline conditions and baseline assessment has included a review of available historical information, available data and technical reports relating to the Site, the surroundings and environmental sensitivity. The baseline assessment is based on data sourced from a number of different organisation / authorities including:

- BGS 1:50,000 geological mapping;
- BGS Geoindex Onshore [http://mapapps2.bgs.ac.uk/geoindex/home.html];[xxi]
- BGS Aquifer Designation Maps;
- EA websites (2020) [www.environment-agency.gov.uk][xxii];
- Landmark Group, Envirocheck reference X_A04671 April 2008;
- Met Office: Climate Data (2020) (www.metoffice.gov.uk);[xxiii]
- Medway Council (Medway Strategic Flood Risk Assessment 2006);
- Medway Council (Medway Flood Defence Strategy Strategic Flood Risk Assessment Addendum 2011);

- Kent County Council (Sustainable drainage in planning)[xxiv];
- Lower Medway Internal Drainage Board (IDB);
- Natural England;
- Ordnance Survey;
- Southern Water; and
- The Centre for Ecology and Hydrology (CEH).

9.39 The following studies have been used to inform the baseline conditions:

- S M Foster Associates Ltd, February 2017. Kingsnorth Power Station Flood Risk Assessment (Appendix 9.1);
- S M Foster Associates Ltd, May 2019. Proposed Development at Kingsnorth Power Station Flood Constraints Analysis (Appendix 9.2);
- RPS, September 2019. Initial Flood Risk and Drainage Appraisal (Appendix 9.3); and
- RPS, January 2021. Kingsnorth Flood Risk Assessment and Concept Drainage Strategy (Appendix 9.4).

9.40 In addition to the above, site specific hydrological data has been obtained via consultation with the EA, Medway Council as Lead Local Flood Authority (LLFA), and other stakeholders. An environmental data request was submitted to the EA with the responses attached within the supporting S M Foster FRA (Appendices 9.1 and 9.2) and RPS FRA 2021 (Appendix 9.4), along with specific reference to updated EA modelled data within this chapter.

Consultation

9.41 Formal consultation was undertaken on the proposed scope of this assessment during the EIA Scoping process and comments on the assessment were provided in Medway Council's adopted EIA Scoping Opinion (Appendix 2.2 of the ES). Additional consultation has been undertaken also been undertaken. Table 9.3 sets out consultation responses received in relation to hydrology and flood risk and how comments have been addressed.

Table 9.3: Consultation Responses Relevant to this Chapter

Date	Consultee	Response and / or Issues Raised	How / Where Addressed
22nd June 2020	Environment Agency	The EA responded to an initial product 4 data request sent in June 2020. The EA supplied North Kent Coast Model and flood defence information.	The EA data has been used to inform the RPS FRA (Appendix 9.4) and Baseline conditions of this ES.
4th September 2020	Environment Agency	The EA provided the following response in relation to the EIA scoping report submitted for the	The S M Fosters flood risk reports have been used as a basis for the baseline

		Development with the Scoping Opinion (MC/20/1807). *'Flood Risk Assessment:* *The principles within the FRA are acceptable, where it breaks down the flood risk at each parcel of land and highlights that the exception test will need to be passed depending on the type of development. The FRA highlights acceptable mitigation measures on the Site such as ground raising and increasing the level of the site access road over the 1:200-year flood level which would work towards part B of the exception test. Given that the majority of the Site is located in flood zone 3, we would expect robust measures to be considered that ensure the development is safe from flooding for its lifetime (with no increase in flood risk to the surrounding area) and that there is sufficient access/egress for the site occupants during a flood event. The FRA appears to be based on product 4 information from 2016 which is outdated and we would recommend requesting the latest product 4 data for the Site as the flood modelling in this area was updated in 2018. This would allow the Site to be assessed based on the most up to date flood information data.'*	conditions assessment of the ES. Further assessment based on new EA flood model data has been added to the baseline conditions section which give a more up to date representation of the present and future flood risk at the Site. A Drainage Assessment has also been undertaken (Appendices 9.3 and 9.4)
18th September 2020	Medway Council	Medway Council provided comments on flood risk and drainage based on the Flood Constraints Analysis report submitted with the Scoping Report. The detailed comments are outlined below: *'These comments are based on review of Flood Constraints Analysis (S M Foster Associates Limited, ref 031/30/KINO/FCA/0519, May 2019) Section 4.14 states that due to the proximity to the estuary, there is no requirement for peak or volume control, and therefore no expectation for surface water attenuation and hence no sustainable drainage impact on land availability.* *This is not strictly true; any proposal to discharge into the watercourse(s) will need to consider onsite capacity under a tide locked scenario for a range of events up to and including the 100 year +40% climate change event.*	A Flood Risk Assessment and Drainage Assessment has been undertaken for the Development (Appendix 9.3, 9.4 and 9.5). These reports provide information on potential food risk and drainage techniques. Discussions were undertaken with the LLFA and the EA outlining the proposed drainage strategy to discharge into the Medway Estuary. General agreement in principle was achieved during these discussions. A confirmation e-mail from the LLFA regarding the agreement in principle is included within Appendix 9.4. Updated Micro Drainage Runoff / Attenuation Storage modelling based on the maximum development area outlined in the Parameter Plan and proposed drainage strategy are also appended to Appendix 9.4.

		Further in accordance with National Planning Policy and Guidance, Sustainable Drainage Systems (SuDs) should be employed. For example, to intercept the 'first flush' rainfall, which tends to have higher pollutant loads, and to reduce demand on potable water supplies (via the use of rainwater harvesting and grey water recycling). Depending on the design of the building, the use of green roofs should be considered, which may achieve wider planning objectives. *Any Flood Risk Assessment accompanying a planning application of the Site, should explore this further, and provide further evidence (via suitable modelling). Conditions for any application will be centred on the submission of detailed information, the management and maintenance of any unadoptable parts of the system, how surface water management will take place through any phased construction, and the management of surface water during construction.* *Note that whilst the Lead Local Flood Authority would be a Statutory Consultee for any planning application at this Site, the watercourses in the vicinity are under the remit of the Lower Medway Internal Drainage Board. Any works within the channel of the watercourse including for example construction of a culvert or flow control structure requires prior consent from the Lower Medway Internal Drainage Board under the Land Drainage Act 1991, in addition to the benefit of any planning consent.'*	Additional hydraulic modelling was provided by the EA following consultation. This modelling has been reviewed as part of the FRA (Appendix 9.4).
18th September 2020	Medway Council	Medway Council provided recommendations within a Scoping Opinion (MC/20/1807). The Council's flood risk and drainage officer outlined the following: *'Raise no objection. Detailed advice has been given on the need to consider onsite capacity under a tide locked scenario for a range of events up to and including the 100 year +40% climate change event, SuDS and the need to intercept first flush rainfall, rainwater harvesting and green roofs within the flood risk assessment.'*	An FRA and Drainage Assessment has been undertaken for the Development (Appendices 9.3, 9.4 and 9.5). These reports provide information on potential food risk and drainage techniques.

Assessment Criteria and Assignment of Significance

9.42 The criteria for determining the significance of effects is a two-stage process that involves defining the sensitivity of the receptors and the magnitude of the impacts of those receptors. This section describes the criteria applied in this chapter to assign values to the sensitivity of receptors and the magnitude of potential impacts. The terms used to define sensitivity and magnitude are based on best practice methodology, which is described in further detail in Chapter 2 EIA Methodology of the ES.

9.43 The significance of an effect is determined based on the magnitude of an impact and the sensitivity of the receptor affected by the impact of that magnitude. This section describes the criteria applied in this chapter to characterise the magnitude of potential impacts and sensitivity of receptors.

9.44 The criteria for defining sensitivity in this chapter are outlined in Table 9.4 below.

Receptor Sensitivity/Value

Table 9.4: Definitions of Sensitivity or Value

Sensitivity	Typical Descriptors
Very High	Receptor is high value or critical importance to the local, regional or national economy. Receptor is highly vulnerable to impacts that may arise from the Development and recoverability is long term or not possible. ***Surface water and Wastewater Conveyance:*** Water Framework Directive (WFD) Current Overall Status of High. ***Flood Risk:*** Land within Flood Zone 3 or more than one hundred residential properties protected from flooding by flood defence infrastructure or by natural floodplain storage. ***Groundwater:*** The site is within a Source Protection Zone (SPZ) Inner Zone (IZ) and within a Principal Aquifer area
High	Receptor is of moderate value with reasonable contribution to the local, regional or national economy. Receptor is generally vulnerable to impacts that may arise from the Development and recoverability is slow and/or costly. ***Surface Water and Wastewater Conveyance:*** WFD Current Overall Status of Good. ***Flood Risk:*** Land within Flood Zone 3 and/or 2 or between one and one hundred residential properties or industrial premises protected from flooding by flood defence infrastructure or by natural floodplain storage. ***Groundwater:*** The site is located within a Principal Aquifer Area (no SPZ IZ)
Medium	Receptor is of minor value with small levels of contribution to the local, regional and national economy. Receptor is somewhat vulnerable to impacts that may arise from the Development and has moderate to high levels of recoverability. ***Surface Water and Wastewater Conveyance:*** WFD Current Overall Status of Moderate. ***Flood Risk:*** Land within Flood Zone 2 and/or 1 or limited constraints and a low probability of flooding of residential and industrial properties. ***Groundwater:*** The site is located within a Secondary Aquifer A area.

Low	Receptor is of low value with little contribution to the local, regional or national economy. Receptor is not generally vulnerable to impacts that may arise from the Development and/or has high recoverability. ***Surface Water and Wastewater Conveyance:*** WFD Current Overall Status of Poor ***Flood Risk:*** Land within Flood Zone 2 and/or 1 or limited constraints and a very low probability of flooding of residential and industrial properties. ***Groundwater:*** The site is located within a Secondary Aquifer B area.
Negligible	Receptor is of negligible value with no contribution to local, regional or national economy. Receptor is not vulnerable to impacts that may arise from the Development and/or has high recoverability. ***Surface Water and Wastewater Conveyance:*** WFD Current Overall Status of Bad. ***Flood Risk:*** Flood Zone 1 over 250m from assessed flood risk area. ***Groundwater***: The site is located within an unproductive strata or Secondary (undifferentiated) area.

9.45 The criteria for defining magnitude in this chapter are outlined in Table 9.5.

Magnitude of Impact

Table 9.5: Definitions of Magnitude

Magnitude	Typical Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

9.46 Impact magnitude must take into account the impact duration. The following definitions have been used in the assessment:

- Temporal Scale
  - Short Term: A period of months, up to one year;
  - Medium Term: A period of more than one year, up to five years;
  - Long Term: A period of greater than five years.
- Adverse or Beneficial – whether the nature of the effect increases or decreases potential

contamination risks to sensitive receptors;

- Temporary – effects that persist for a limited period only (due for example, to particular activities taking place for a short period of time);
- Permanent – effects that result from an irreversible change to the baseline environment (e.g. land-take) or which persist for the foreseeable future (e.g. noise from regular or continuous operations or activities);
- Direct – effects that arise from the impact of activities that form an integral part of the Development (e.g. direct employment and income generation);
- Indirect – effects that arise from the impact of activities that do not explicitly form part of the Development (e.g. off-site infrastructure upgrades to accommodate the Development);
- Reversible/irreversible effect: effects can be reversed by mitigation measures or by natural environmental recovery within reasonable timescales (5-10 years following cessation of construction);
- Secondary – effects that arise as a consequence of an initial effect of the Development (e.g. induced employment elsewhere);
- Cumulative – effects that can arise from a combination of different effects at a specific location or the interaction of different effects over different periods of time; and
- Geographical scale: whether the effect would be experienced at the local, regional or national level.

Significance of Effects

9.47 The significance of predicted effects has been determined using publicly available environment data to take into account of the sensitivity of the receptor and the magnitude of each impact. Table 9.6 below is used to inform the evaluation of the significance of effects.

Table 9.6: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

9.48 The overall significance of an effect is expressed as negligible, minor, moderate, major or

substantial. For the purposes of this assessment, any effect that is moderate, major or substantial is considered to be significant. Any effect that is minor or below is not significant.

Development Specific Assessment Parameters

9.49 The Water Resources and Flood Risk assessment presented below is based on a realistic worst-case assumption of the potential use classes which will make up the Site. It is proposed that the Development will consist of a mixture of use classes within the Site ranging from Sui Generis (energy use) to E(g)(iii). Table 9.7 below sets out the maximum floorspace that could be implemented for each use class as part of the Development. The built floorspace for the Development shall not exceed 315,000 square metres (sqm) gross internal area (GIA) or 324,450 sqm gross external area (GEA), excluding the lorry park.

9.50 It should be noted that the potential use classes outlined in
9.51 Table **0.3** which comprise the Development are classified as 'less vulnerable' as outlined in Table 2 of the PPG within the NPPF. This outlines that the mixed-use classes are considered appropriate within Flood Zone 3.

Table 0.3 Maximum Use Class Floorspace

Use Class	Max Use Class Floorspace (GIA)	Max Use Class Floorspace (GEA)
E(g)(iii)	33,000 sqm	33,990 sqm
B2	157,500 sqm	162,225 sqm
B8 (non-data centre)	315,000 sqm	324,450 sqm
B8 (data centre)	87,379 sqm	90,000 sqm
B8 (parcel distribution only)	60,000 sqm	61,800 sqm
Sui generis (energy uses)	60,000 sqm	61,800 sqm
Sui generis (lorry park / layover)	40 – 50 spaces with associated facilities (site area up to 1ha)	

9.52 The Parameter Plan (Figure 3.2 of the ES) identifies that each specific parcel is suitable for development with a specified development height as outlined below. Large areas of the Development would comprise green infrastructure, including SuDS, landscape and ecological enhancement.

Parcel 1

9.53 The eastern extent of Parcel 1 is designated as being an area suitable for development up to 15m in height above finished floor level. The Parameter Plan (Figure 3.2 of the ES) indicates a ground level change of +/- 1.0m. The western extent of the Site is would comprise green infrastructure.

Parcel 2

9.54 The majority of Parcel 2, surrounding areas of existing development are designated suitable for development up to 15m in height above finished floor level. The area suitable for development will incorporate a ground level change of +/- 1.0m. The area surrounding the built Development is would comprise green infrastructure.

Parcel 3

9.55 Parcel 3 will incorporate two distinct areas of development separated by a 20m wide green corridor. The western extent of the Parcel is suitable for development up to 45m in height above FFL. Also suitable for maximum 100m stack height above FFL. The eastern extent of the Parcel is suitable for development up to 25m in height above FFL. Both areas of development will incorporate a ground level change of +/- 3.0m. The very southern extent of the parcel, bordering the River Medway would comprise green infrastructure.

Parcel 4

9.56 The western and central extent of Parcel 4 is suitable for development up to 45m in height above FFL. Also suitable for maximum 100m stack height above FFL. The Development area will incorporate a ground level change of +/- 1.0m. The eastern extent of the Parcel is designated for green infrastructure. A 40m wide ecological buffer zone (area of no buildings) is present on the eastern edge of the Development area within Parcel 4.

Limitations and Assumptions

9.57 The hydrological site setting presented within this chapter is based on information provided within two FRA reports prepared by S M Foster Associates Limited in 2017 and 2019, as well as an updated FRA undertaken by RPS to include updated modelling obtained from the EA. RPS has reviewed the reports and where possible has corroborated information provided within the reports through publicly available data obtained from the EA, BGS, Southern Water and Medway Council, along with commercial data supply companies. Additional information was also supplied from stakeholders during the scoping stage.

9.58 The information outlined within the FRA reports and publicly available searches is considered sufficient to characterise the baseline environment.

9.59 It is also noted that the EA Flood Zone maps do not take into account the impact of local flood defences and climate change on flooding, and do not provide information on flood depth,

speed or volume of flow. The maps do not show flooding from other sources such as groundwater, direct runoff from surrounding areas or overflowing sewers. However, a description of these sources of flooding is provided within the FRAs (Appendices 9.1 and 9.2), such that sufficient baseline information is available.

9.60 In December 2019, the EA released updated climate change allowances for sea level rise. The update takes into account outputs from the UKCP18 climate change projection project. As both S M Foster FRA reports were prepared prior to December 2019, they have not considered the potential impact associated with the latest climate change allowances. To ensure the latest allowances are fully considered within the development design, an updated FRA has been prepared which has used the most up to date modelling information supplied by the EA.

9.61 The assessment is limited by a lack of detailed information on:

- Flow data for surrounding watercourses and drainage channels;
- Detailed groundwater flow information; and
- Detailed flood defence information.

9.62 Notwithstanding the above, overall a moderate to high level of certainty has been applied to the baseline and assessment presented in this chapter. Where available, catchment data regarding water quality has been used to information the assessment. The information which was available is considered sufficient to establish the baseline within the hydrology and flood risk study area, therefore, there are no data limitations that affect the conclusions of this assessment.

Baseline Conditions

9.63 This section describes the hydrological resources and flood risk within the water resources and flood risk study area. The baseline data sets have been collated to inform the assessment of the potentially significant environmental effects from the Development. Current baseline conditions were ascertained through a desk-based assessment utilising publicly available data including OS mapping, EA data and utility plans (where available). This provided information on the surface water features and the existing land use of the hydrological features within the immediate vicinity of the Site.

Study Area

9.64 The proposed study area for the Development has been defined to reflect the nature and

extent of the proposed activities during the construction and operational phases. The study area is characterised as the Site (Parcels 1 – 4) and extends to include a 500m radius around the parcel boundaries. A 500m study area buffer is considered appropriate for data collection, taking into account the nature of the Development and likely zone of influence on hydrological receptors. Given the landscape surrounding the Site and the local land use activities, it is difficult to ascertain the exact source of any impact on hydrological conditions beyond a 500m radius from the parcel boundaries.

Site Description

9.65 As identified in Chapter 3 Site and Development Description of the ES, the Site comprises primarily previously developed land formerly predominantly occupied by Kingsnorth Power Station, extending to approximately 111 hectares (ha). The Site is located immediately north of the River Medway, approximately 7.2km to the north east of Rochester Castle, within Medway. The Site comprises four parcels of land (refer to Figure 3.1 of the ES). Each parcel area is described below.

9.66 The majority of this land is designated Flood Zone 3 on the current EA Flood Map for Planning and is therefore considered to be at high risk of flooding from the River Medway. Two localised areas within Parcel 3 are designated as Flood Zone 2, at medium risk of flooding from the River Medway. One area is located along the southern boundary of Parcel 3 and is associated with the former coal field. The other area is located within the north western extent of Parcel 3, immediately north of Damhead Creek, and is associated with a soft landscaped area. The EA Flood Map for Planning indicates that large areas of the Site benefit from protection provided by existing coastal flood defences.

9.67 Although the Site is within a high-risk flood zone, the effect of flood risk on the development potential of the Site is influenced by the source of flooding, the frequency of flooding, in particular, the potential depth of flood water and presence of flood defences.

9.68 A topographical survey conducted in June 2019 indicated that the Site has a varying ground level with each Parcel being as follows.

Parcel 1

9.69 Parcel 1 is located immediately to the north west of the existing Site entrance, and to the south of Eschol Road. It contains the existing site access road, which runs through the centre and is covered by asphalt surfacing. The remainder of the parcel consists of previously developed land, which is presently covered by grassland with low scrub to the east of the

existing Site access road and mature woodland to the west. No evidence of existing surface water drainage was recorded during the S M Foster site visit.

9.70 The topographical survey indicates that the parcel slopes from approximately 4.00 mAOD in the northeast to approximately 3.00 mAOD in the south.

Parcel 2

9.71 Parcel 2 is located within the western extent of the former Kingsnorth Power Station site, immediately east of the western boundary drainage and flood defence system. The parcel contains a mixture of soft landscaping, hardstanding, building cover and internal roads. The parcel is located within Flood Zone 3, at high risk of flooding from the River Medway, but is encapsulated within the coastal defence network at the Site.

9.72 The topographical survey indicates that the parcel is relatively flat, sloping from approximately 3.86 mAOD in the north to approximately 3.52 mAOD in the south. The western extent of the parcel is at a greater elevation at approximately 6.17 mAOD, associated with the secondary Kingsnorth earth embankment flood defences.

Parcel 3

9.73 Parcel 3 is located within the southern extent of the Site, with the eastern and central extents being previously occupied by the former Kingsnorth Power Station, which has been demolished.

9.74 Large areas of hardstanding and concrete platforms are currently present within the parcel, with the existing surface water drainage system still in place. The western extent of the parcel was utilised as a coal field with water tanks, which supplied the former Power Station, located towards the eastern extent of the parcel. These areas are now occupied by concrete hardstanding.

9.75 The topographical survey indicates that the western section of the parcel is relatively flat, sloping from approximately 4.22 mAOD in the south to approximately 3.75 mAOD in the north. The eastern section of the parcel is also relatively flat, sloping from approximately 2.30 mAOD in the east to approximately 2.10 mAOD in the west in close proximity to the previous coal fields. No level information for the coal field has been provided.

Parcel 4

9.76 Parcel 4 is located within the northern extent of the Site, immediately north of the former Kingsnorth Power Station buildings and to the south east of Parcel 1. The parcel consists of previously undeveloped grassland, with flood defences present to the north, east and south. No surface water drainage systems were found during the S M Foster site visit.

9.77 The topographical survey indicates that the parcel is bound along its northern extent by an earth embankment with levels c.5.8 mAOD. The embankment merges with an access road to the east at c.6.2 mAOD, and from there, the embankment runs parallel to Damhead Creek with crest levels c.6.0 mAOD. The parcel itself is relatively flat sloping from approximately 2.95 mAOD within the northern central area of the parcel to approximately 2.0 mAOD and 1.75 mAOD at the southwest and northeast corners respectively.

9.78 The hydrology and flood risk study area sits within the EA's Catchment Data Explorer Thames TraC management catchment and the Medway Swale Estuary Operational Catchment (as designated by the EA), which covers an area from Rochester to Sheerness.

Hydrological Setting

9.79 The hydrology and flood risk study area include a number of catchments associated with EA designated main rivers and LLFA ordinary watercourses. Definitions of these hydrological features are provided below:

- Main Rivers – watercourses where the EA has permissive powers over their management;
- Ordinary watercourses – includes rivers, streams, ditches, drains which do not form part of a main river and are managed by Medway Council, as LLFA; and
- IDB drains – IDB's primary role is to manage water levels and reduce the risk from flooding within their districts. Their work involves the maintenance and improvement of watercourses and related infrastructure such as pumping stations, weirs, culverts and embankment. The IDB drainage are managed by the Lower Medway Internal Drainage Board.

9.80 The main water features in close proximity to the Development is the River Medway, which is an EA designated main river and the Damhead Creek which is designated as an Ordinary watercourse.

9.81 The River Medway which flows west to east, rises in the High Weald, Sussex and flowing

through Kent before discharging into the Thames Estuary / North Sea via the Medway Estuary. The River has a total length of around 70 miles, and a catchment area of approximately 930 square miles. The Medway has a number of major and minor tributaries including the River Bourne, River Eden and Damhead Creek. A majority of the Medway catchment is protected by EU and UK landscape designations, with the estuary being one of the most important natural wetlands in Europe[xxv]. The catchment has a varied topography and a ranging geology, creating a high gradient watercourse in the Upper Medway and a lower gradient watercourse in the Lower Medway[xxvi].

9.82 The River Medway in proximity to the Site flows west to east into the Medway Estuary. The Medway forms the southern boundary of the Site, with the surface water drainage networks from the existing Kingsnorth Power Station discharging into the Medway. A minor tributary is present to the north east of the Site, being the Damhead Creek, which is present to the east of Parcel 3 and 4. The Damhead Creek catchment is relatively small, as the tributary only stretches approximately 1.92 km in length. The Creek is likely only receiving water from the surrounding area. The Creek flows in a north easterly direction before discharging into the River Medway / Medway Estuary 1.62 km to the north east of the existing Power Station site. The location of the Site in relation to the River Medway and Damhead Creek is shown on the Site Location Plan (Figure 1.1 of the ES).

Fluvial and Tidal Flood Risk

9.83 The EA Flood Zone risk maps use four categories to describe the risk of flooding. These categories are set out in Table 9.8.

Table 9.8: EA Flood Zone Definitions

Flood Zone	Flood Zone Definition
Flood Zone 1	This land comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
Flood Zone 2	This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5 – 0.1%) in any year.
Flood Zone 3(a)	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone 3(b)	This zone comprises land where water has to flow or be stored in times of flood.

9.84 The Site is located on the northern bank of the River Medway at the upstream end of the Medway Estuary. As a consequence of the Site's proximity to the Medway Estuary, the dominant source of flood risk at the Site is tidal.

9.85 The EA undefended flood map for planning (Figure 9.1) indicates that the majority of the Site

is situated within Flood Zone 3, with the area benefitting from flood defences. A localised area of Parcel 3 has been assessed as Flood Zone 2. This is likely associated with elevated ground, potentially caused by the former coal stockpiles. It is noted that ground levels in the former coal stocking area are now comparable to adjacent land following removal of coal stocks.

9.86 Flood Zone 3 can be separated into Flood Zone 3a, the undefended 1:200yr tidal flood limit, and Flood Zone 3b, the functional floodplain defined by the 1:20yr tidal flood limit. The undefended flood extents map at Figure 9.1 indicate that all areas of the Site designated Flood Zone 3 would be inundated during a 1:20yr flood event if no defences were present. However, the PPG confirms that *'areas that would naturally flood, but which are prevented from doing so by existing defences and infrastructure or solid buildings, will not normally be identified as functional floodplain.'* The same approach is reconfirmed in the Medway SFRA Addendum. Full details of the specific Flood Zone for Parcels 1 to 4 are shown on Figure 9.1.

9.87 Figure 9.1 shows the EA Flood Map for Planning for the hydrology and flood risk study area. The maps are the first stage in identifying the flood risk for a particular location and depict the 'no defence' scenario. A detailed description of tidal flood risk and other flood sources (i.e. groundwater, direct runoff from fields or overflowing sewers) is presented below.

Flood Defence Information

9.88 EA online mapping identifies that formal flood defences are present along the bank of the River Medway comprising a mix of earth embankment, seawall, rock revetment and sheet piling. EA records indicate that the defences provide flood protection for events with up to a 1 in 1,000 year event probability.

9.89 The Medway and Swale Shoreline Management Plan (SMP)[xxvii] outlines that the EA's policy is to 'hold the line' within the Kingsnorth area for timescales of at least 100 years. 'Hold the line' refers to maintaining the current standard of protection. It is therefore determined that the EA will undertake works to the flood defences as necessary to maintain the existing 1:1,000 years standard of protection to at least 2115. Such work would fully mitigate the effects of climate change at the Site.

9.90 In addition to the coastline flood defences, there are secondary concrete and sheet piled flood defences present along Damhead Creek to the east and around the perimeter of the former Kingsnorth Power Station (Parcels 2, 3 and 4). A review of the EA standardised flood defence dataset and site-specific topographical data record coastal flood defence heights along the River Medway at approximately 6.4 mAOD, the Damhead Creek flood defences as

approximately 6.2 mAOD and the flood defences surrounding Parcels 2, 3 and 4 as having crest levels of approximately 5.90 mAOD. These flood defences are present in the area to defend key infrastructure in the vicinity of the Development, which includes an existing national grid substation, the Damhead Creek Power Station and the Kingsnorth Industrial Estate. As outlined above, the EA's policy for these defences is to maintain their standard of protection of at least 1:1,000 years in order that the flood risk to the key infrastructure does not increase.

9.91 Parcels 2, 3 and 4 are surrounded by a network of flood defences which are outlined as embankments, flood gates and walls and give a standard of protection up to the 1,000 year event. The Kingsnorth Power Station complex was situated within the areas of Parcels 2, 3 and 4 with Parcel 1 being outside the secondary flood defence line. Parcel 1 is defended by the Coastal flood defences which are present north of the River Medway and are outlined as wall and embankments. A full review of the flood defences (based on topographical information) within each parcel is presented below.

Parcel 1

9.92 Parcel 1 is located in the northern part of the Site and is split down the centre by the existing access road. The Parcel is located outside the former Kingsnorth Power Station complex which is defined by a secondary Kingsnorth flood defence system. Flood Defences comprising earth embankments are present immediately to the south of the parcel are EA maintained, and were constructed to give protection to the power station from coastal flooding. The EA standardised flood defence dataset for this location indicates that the flood defence gives protection up to the 1,000 year event, with an actual crest height of 5.9 mAOD. However, a topographical survey conducted by RPS (August 2019) gives more detailed information on the existing crest height. The topographical survey indicates that the crest height of the flood defences to the south of Parcel 1 vary from 5.78 mAOD in the eastern extent, 5.78 mAOD on the ramp at the entrance to the power station and 6.26 mAOD in the western extent. The crest height increases further west from the edge of Parcel 1.

9.93 In the event of a breach of the coastline flood defences, it is likely that the defences which surround Parcels 2, 3 and 4 would have a limited effect on Parcel 1. Coastal flood waters are likely to travel into Parcel 1 from the western extent, as the water propagates along the flood defences surrounding the western extent of Parcel 2. As the flooding would occur in a breach event, the risk to Parcel 1 is residual.

Parcel 2

9.94 Parcel 2 is present in the western extent of the Site, where the former Kingsnorth Power Station complex was located. The parcel is located within the secondary Kingsnorth power station flood defence system, with earth embankments flood defences to the north, west and, concrete wall and sheet piled defences to the south. The defences are maintained by the EA, outlined as embankments and wall and were constructed to give protection to the power station from coastal flooding. The EA standardised flood defence dataset for Parcel 2 indicates that the flood defences give protection up to the 1,000 year event, with an actual crest height in the northern extent of 5.9 mAOD associated with an embankment and 6.1 mAOD in the southern extent associated with a wall. A 'flood gate' is also present within the southern extent of the parcel which offers a degree of tidal flood protection to the area. The flood gate is privately owned and has an effective crest level of 4.75 mAOD. This is significantly lower than the Site's wider flood defence measures and a potential vulnerable location.

9.95 A topographical survey has been conducted by RPS (August 2019) which identifies a concrete wall flood defence is present along the western extent of Parcel 2, extending approximately 194 m north from the River Medway Estuary, is recorded as having a crest height of 6.17 mAOD. A grassed embankment flood defence is present immediately north of the concrete wall and extend along the rest of the western and the northern extent of Parcel 2. The grassed embankment is shown to have varying crest heights along its section, ranging from 6.17 mAOD along the northern (east) extent to 6.26 mAOD along the northern (west) extent. The crest height of the embankment along the western extent of the parcel vary from 6.24 mAOD (north), 6.29 mAOD (central) and 6.09 mAOD (south). The River Medway coastal flood defences are also present approximately 25 m to the south of the Parcel and give protection to the Parcel up to the 1,000 year event. The parcel is therefore protected from all sides up to the 1,000 year event.

Parcel 3

9.96 Parcel 3 is located within the southern extent of the Site and is defended along the southern and eastern boundaries by the River Medway coastal sea defences and the secondary Kingsnorth flood defence network. The defences are present along Damhead Creek to the east and along the Medway estuary to the south. The topographical survey at the Site indicates that the defences along the eastern extent of the Parcel associated with Damhead Creek are a metal and concrete sea wall. The defence is shown to have a varying crest level from 6.23 mAOD in the east to 6.21 mAOD in the west in close proximity to the former power station. The EA standardised flood defence dataset indicates that the coastal flood defences immediately north and east of the Parcel give protection up to the 1,000 year event, with an

effective crest level of 5.64 mAOD. No topographical survey data is available for flood defences immediately to the east of Parcel 3, however the furthest eastern level records a top of wall of c.6.20 mAOD in the southeast corner and c.6.23 mAOD in the northeast corner.

9.97 The topographical survey at the Site also surveyed the southern extent of Parcel 3 in proximity to the Medway Estuary. The survey identified that the flood defences along the Medway Estuary are a concrete sea wall with crest heights varying from 6.20 mAOD within the south east, 6.21 mAOD in the central extent and 6.24 mAOD within the south west. Survey mapping identifies a gap in the flood defence in the southwest corner, this is associated within a gated entrance. No information on the gate has been provided, and therefore should be considered as a potential vulnerable location.

Parcel 4

9.98 Parcel 4 is located within the northern extent Site, within the Kingsnorth secondary flood defence network. The parcel is shown to be defended along the northern, eastern and the southern extent, associated with defences along Damhead Creek (east and south) and along a small field drain to the north. The topographical survey undertaken for the Site, along the small drain to the north, indicates that the defence along the northern extent of Parcel 4 is an earth embankment and has a crest height varying from 5.95 mAOD (west) to 5.64 mAOD (east). The EA standardised flood defence dataset indicates that the coastal flood defences immediately north of the Parcel give protection up to the 1,000 year event, with an effective crest level of 5.9 mAOD.

9.99 The topographical survey undertaken for the Site, along Damhead Creek, indicates that the defences along the eastern extent of Parcel 4 are characterised as a metal and concrete sea wall, with a crest height varying from 6.23 mAOD (north), 6.23 mAOD (central) to 6.20 mAOD (south). The EA standardised flood defence dataset indicates that the coastal flood defences immediately east of the Parcel give protection up to the 1,000 year event, with an effective crest level of 5.64 mAOD.

9.100 The flood defences which are present along Damhead Creek to the south of the Parcel are outlined within the topographical survey as the same concrete wall which is present along the eastern extent. The crest height along the wall is outlined as 6.20 mAOD. The EA standardised flood defence dataset indicates that the coastal flood defences, partially along the southern extent of the Parcel, gives protection up to the 1,000 year event with an effective crest level of 5.64 mAOD. Full details of the EA standardised flood defence details in close proximity to the Site are present within Table 9.9 below and shown within Figure 9.2.

9.101 The preferred options for flood defences going forward is outlined in the Medway Estuary and Swale Coastal Flood and Erosion Risk Strategy (MEASS)[xxviii]. The strategy identifies a preferred option to maintain the current defences for the first seven years to the current Standard of Protection (SoP) offered. Following this, the defences are to be raised to 5.3m AOD and then raised again in year 50 to 6.6m AOD to ensure a 0.1% SoP in 100 years taking account of sea level rise.

9.102 Future scheme for the Kingsnorth Benefit Area (BA) includes a managed realignment at Abbots Court. The MEASS concluded that Abbots Court is needed to help deliver against the EA's obligations under the Habitats Regulations to create saltmarsh to replace that being lost to sea-level rise. Abbots Court is one of six such sites proposed for the near future in the Medway and Swale, with the EA aiming to undertake the managed realignment in 2029.

9.103 'Managed realignment' refers to constructing new defences further inland and removing a section of the existing defence, allowing the tide in and new intertidal habitat to develop. Prior to the works being progressed the EA will have to gain the appropriate approvals, in particular the internal approval of a business case, and planning permission from the council.

9.104 Plans presented in the MEASS indicate that the realignment scheme would extend the existing defences on the western boundary of Parcel 2 towards Eshcol Road, with the aim of providing a 1 in 1,000 year (0.1%) SoP. Should the realignment scheme be progressed a SoP equivalent to the wider Site (1 in 1,000 year AEP) would be provided to Parcel 1 and the access road. However, funding has not been confirmed and given a potential low partnership funding score may be reliant on private funders to support. Therefore, the assessment has assumed these particular defences are not confirmed and therefore absent.

9.105 Taking into account current knowledge, further works may be required but at a point in time too distant to be reasonably assessed now. Therefore, the impacts of the Development on the environment have been assessed and mitigated and any future changes to the baseline flooding position in 2050 will be addressed by appropriate bodies with statutory responsibilities at that time.

Table 9.9: EA Standardised Flood Defence Data

Asset ID	Defence Type	Protection Type	Maintaining Authority	Actual Defence Condition	Target Condition	Design Standard (yrs)	Effective Crest Height (mAOD)
149914	Embankment	Tidal	Environment Agency	2	3	1000	5.12
137523	High Ground	Tidal	Environment Agency	4	9	1000	5.81
138680	Wall	Tidal	Environment Agency	2	3	1000	6.42
148831	Embankment	Tidal	Environment Agency	5	9	1000	5.9
138650	Wall	Tidal	Environment Agency	3	3	1000	6.44
183859	Wall	Tidal	Environment Agency	3	3	1000	6.1
330761	Flood Gate	Tidal	Private	-	-	-	4.75
138649	Embankment	Tidal	Environment Agency	4	9	1000	5.9
137030	Wall	Tidal	Environment Agency	2	3	1000	6.42
148666	Wall	Tidal	Environment Agency	2	3	1000	5.12
137005	High Ground	Tidal	Environment Agency	3	3	1000	6.14
136989	Wall	Tidal	Private	2	3	1000	5.64

9.106 Formal flood defences are given an actual rating by the EA based on a grading system for their condition[xxix]. A summary of the definitions of condition grades in the assessment manual is outlined in Table 9.10.

Table 9.10: EA Standardised Flood Defence Data

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no effect on performance
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce the performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset
5	Very Poor	Severe defects resulting in complete performance failure

9.107 The target condition of a flood defence is defined as '*the condition which defines the limit of acceptability of an asset condition*'[xxx]. The target condition is calculated using a weighting which ranges from 1 (elements that do not have a flood or coastal risk reduction function) to 9 (critical elements whose failure would lead to the immediate or imminent failure of the whole asset or its failure to perform its intended function).

Flood Risk Data / Modelling

9.108 As the Site is located within Flood Zone 3, the EA has been consulted to provide more detailed flood data to verify the sites flood zone and determine flood frequency. The EA provided modelled flood data extracted from the North Kent Coat Modelling and Mapping study, 2018. The defended and undefended tidal flood levels have been assessed within each land parcel against the topography.

9.109 The EA also provided the flood model and outputs for the North Kent Coast Model Updates Domain 2: St Mary Hoo to Seasalter, including the tidal River Medway to Allington Lock undertaken by JBA Consulting in January 2019. The model generated outputs for a number of Annual Event Probabilities (AEP) for tidal flood risk. The model also considered the 1:200 year event under climate change conditions at the 2070 and 2115 base years for two different guidance documents:

- Adapting to Climate Change: guidance for risk management authorities guidance (2011) referred to as UKCP09; and
- Flood risk assessment: climate change allowances (2017) referred to as NPPF.

9.110 The results for each parcel are outlined below.

Parcel 1

9.111 Parcel 1 is designated Flood Zone 3 and considered to be at high risk of flooding from the River Medway. The area benefits from protection provided by existing tidal flood defences.

9.112 EA flood modelling indicates that, with flood defences at existing crest levels, the risk of coastal flooding to Parcel 1 would increase in response to climate change resulting in a flood frequency of 1:200yr by 2070.

9.113 The topographic survey confirms that the majority of the ground level within Parcel 1 ranges from approximately 3.52 mAOD within the north to approximately 2.9mAOD in the south. A localised section within the north west corner of the Parcel is at approximately 5.62 mAOD. Based on the above an average ground level of approximately 3.25 mAOD can be taken within the Parcel. Modelled outputs indicate a defended present day still water 1:1,000 year flood level of up to 4.25 mAOD and a defended 1:200 year flood level of 5.05 mAOD and 5.98 mAOD for climate change timescales of 2070 and 2115 respectively.

9.114 The EA provided Ascii grids (elevation data files) from the North Kent Coast Model Updates Domain 2: St Mary Hoo to Seasalter, including the tidal River Medway to Allington Lock undertaken by JBA Consulting in January 2019. The modelling depth data has been assessed for a number of scenarios within Parcel 1, concentrating on the existing access road. As outlined above, Parcel 1 does not flood up to the 1:200 year (2016) event. The maximum flood depth along the access road during a 1 in 200 year event for a 2070 and 2115 scenario (NPPF) is 1.94 m and 2.57 m respectively. Full details of the flood depths along the access road for a number of nodes is provided in Table 9.11 below, with the nodes presented in Figure 9.3.

Table 9.11: North Kent Coast Model Update Defended Model Flood Depths

Node	Defended Modelled Flood Depth Scenarios (m) along Access Road				
	1000 Year (2016 present Day)	200 Year (2070 UKCP09)	200 Year (2115 UKCP09)	200 Year (2070 NPPF 2017)	200 Year (2115 NPPF 2017)
1	1.10	0.73	1.51	1.24	1.87
2	1.21	0.85	1.63	1.36	1.99
3	1.38	1.01	1.79	1.52	2.16
4	1.31	0.95	1.73	1.45	2.09
5	1.60	1.23	2.01	1.94	2.57
6	1.57	1.21	1.99	1.71	2.35
7	1.49	1.12	1.90	1.62	2.27
8	1.41	1.05	1.83	1.54	2.19
9	0.58	0.23	1.01	0.71	1.37
10	N.D.	N.D.	0.04	N.D.	0.46

N.D. – No Data.

9.115 The EA also provided defended flood extents within North Kent Coast Model updates (January 2019). The flood extents provided are for scenarios up to the 1:200 year 2115 scenario (NPPF). The EA modelled extents indicate that Parcel 1 would remain flood free up to the 1:200 year present day (2016) event. However, based on the position of the flood defences and the average ground level within the Parcel, should a breach event occur, it is likely that the Parcel would be flooded in events above the 1:200 year present day (2016) event, as seen within Figure 9.4. The flood depths within Parcel 1 for the Defended 0.5% AEP (NPPF) 2070 Scenario can be seen within Figure 9.5.

9.116 The MEASS (October 2018) identifies as a consequence of the proposed managed defence realignment a new flood defence would potentially be located towards the western boundary of Parcel 1. The defence would be constructed to provide a 0.1% (1 in 1,000 year) SoP. As these defences are proposed at present, they have not been included within the baseline and

are presented for information purposes.

Parcel 2

9.117 Parcel 2 is designated within the EA Flood Map for Planning as Flood Zone 3, at high risk of flooding from the River Medway. The area benefits from protection provided by coastal flood defences.

9.118 The topographical survey undertaken by RPS indicates that the Parcel is relatively flat sloping from approximately 3.86 mAOD in the north to approximately 3.52 mAOD in the south. An average ground level of approximately 3.65 mAOD has been taken for the Parcel. Flood Defences are present encapsulating the Parcel and give protection up to the 1:1,000 year event. This is confirmed by the modelled extents (2019) which indicates that the Parcel would not be flooded during the 1:200 year, 1:1,000 year or during the 1:200 year flood event with climate change allowance to 2070. The modelled flood extents (2019) indicates that the Parcel would be partially flooded during the 1:200 year flood event with climate change allowances to 2115 (NPPF).

Parcel 3

9.119 Parcel 3 is outlined within the EA Flood Map for Planning as being within Flood Zone 3, at high risk of flooding from the Tidal River Medway but benefitting from coastal flood defences.

9.120 The topographical survey undertaken by RPS (Appendix 9.4) indicates that the western section of the parcel is relatively flat, sloping from approximately 4.22 mAOD in the south to approximately 3.75 mAOD in the north. The eastern section of the Parcel is also relatively flat, sloping from approximately 2.30 mAOD in the east to approximately 2.10 mAOD. Flood defences are present along Damhead Creek to the east and along the Medway estuary to the south. The defence is shown to have a varying crest level from 6.23 mAOD in the east to 6.21 mAOD in the west. The survey also identified that the coastal flood defences along the Medway Estuary are a concrete sea wall with crest heights varying from 6.20 mAOD within the south east, 6.21 mAOD in the central extent and 6.24 mAOD within the south west.

9.121 EA modelling outputs indicate a defended present day flood level of up to 3.67 mAOD for the 1:1,000 year and a defenced 1:200 year level of 3.70 mAOD and 4.33 mAOD for climate change timescales of 2070 and 2115 respectively.

9.122 Modelled flood extents (2019) provided by the EA indicates that the Parcel remains flood free up to the 1:1000 year present day (2016) event. This included a 1:200 year 2070 climate

change (NPPF) event. The parcel is shown to flood during the 1:200 year 2115 climate change events (UKCP09 and NPPF).

Parcel 4

9.123 Parcel 4 is designated as Flood Zone 3, at high risk of flooding from the Tidal River Medway. The area is shown on the EA Flood Map for Planning to be protected by existing coastal defences.

9.124 The topographical survey undertaken by RPS indicates that Parcel 4 slopes from approximately 2.95 mAOD along the southern and northern extents to approximately 1.75 mAOD within the centre of the parcel. An average ground level across the parcel can be taken as 2.20 mAOD, with localised higher areas. Flood Defence crest heights varying within the parcel from crest 6.23 mAOD (north), 6.23 mAOD (central) to 6.20 mAOD (south). Due to the presence of flood defences surrounding the parcel, flood modelling outputs indicates that the parcel would not be flooded during the 1:200 year. Flood modelling indicates that with climate change (up to the 2070 scenario) the Parcel would be flooded with levels being 2.80 mAOD and 4.33 mAOD for the 1:200 year and 1:1,000 year events respectively.

9.125 Modelled flood extents (2019) provided by the EA indicates that the Parcel would remain flood free up to the 1:200 year present day (2016) scenario. A localised area within the north west corner of the parcel would be flooded during the 1:1000 year present day (2016) scenario. This is likely due to a localised low topography area within the model. A larger proportion of the western extent of the parcel is shown to flood during the 1:200 year 2070 (NPPF) climate change event. The flood extents during the 1:200 year 2115 (UKCP09 and NPPF) cover the entire western section of the parcel, with the NPPF scenario flooding the entire parcel.

9.126 Full details of the flood modelled levels, depths and extents with the parcels can be found within the Flood Risk Reports (Appendices 9.1 – 9.4). An extract of the Defended 0.5% AEP (NPPF) 2070 depth Scenario for the Site can be found in Figure 9.6.

9.127 The EA flood map for planning indicates that all areas of the Site designated Flood Zone 3 would be inundated during a 1:20yr flood event if no defences were present. However, PPG confirms that 'areas that would naturally flood, but which are prevented from doing so by existing defences and infrastructure or solid buildings, will not normally be identified as functional floodplain'. As the majority of the Site is defenced by a secondary flood defence it can therefore be determined that the Site is located within Flood Zone 3a.

Historic Flood Events

9.128 EA historic flood risk map supplied within the Product 4 indicates that the Site was flooded during the February 1953 flood event. The 1953 flood event is shown to propagate from the River Medway and flood the entire Site and the surrounding areas. It is not known is any sea defences were present along the River Medway in 1953, with the current sea defences appearing to have been constructed more recently. RNAS Kingsnorth, which was a First World War Airship base, was present at the Site before construction of the power station. It is unlikely that any secondary defences were constructed at the Site before the power station development, for which the Site was raised during its construction.

9.129 Discussions undertaken by SM Foster with the existing Site management indicated that since construction of the former power station, there are no records of coastal flooding having occurred in any area of the Site.

Surface Water Flood Risk

9.130 The EA's surface water flood map indicates that the majority of the Site, including the main site roadways and drainage channels, is at low to very low risk of flooding from surface water sources, with very low risk having a change of flooding each year of less than 1 in 1,000 (0.1% AEP).

9.131 The highest risk within the Site is seen within Parcel 1, where the risk of surface water flooding in relation to localised ponds is determined to be high. The EA Flood Risk from Surface Water map, provides a tool to look at the velocity and direction of flow that is likely to occur from any areas of identified surface water flood risk. This mapping indicates that a surface water flood route flows through Parcel 1 from Burnt House Cottages / Eshcol Road in the north, travelling south into two man made ponds below discharging into a drainage ditch within Parcel 1.

9.132 On the basis of the information outlined above and Figure 9.7, it is not considered that there is a significant risk of flooding from surface water sources within the existing power station area (Parcels 2 to 4). There is a low to medium risk of flooding from surface water sources within Parcel 1.

Reservoir Flood Risk

9.133 The EA long term flood risk map indicates that the entire Site is not within the maximum extent of flooding from reservoir failure.

9.134 The EA stipulates that a reservoir dam failure is an unlikely event. All large reservoirs are inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoir Act 1972 in England, the EA ensure that reservoirs are inspected regularly, and essential safety work is carried out where required. It is therefore determined that there is at low risk of flooding from reservoir failure with each parcel and therefore reservoir flood risk is not considered further.

Geology

9.135 Reference to the BGS Geology of Britain Viewer Online Mapping[xviii] (1:50,000 scale) indicates that the Site is situated on superficial deposits consisting of River Terrace Deposits (Clay and Silt), Alluvium (Clay, Silt, Sand and Peat) and Beach & Tidal Flat Deposits (Clay, Silt and Sand). The superficial deposits are underlain by bedrock consisting of the London Clay Formation (bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay).

9.136 BGS online mapping indicate that a number of boreholes (TQ87SW75/B) have been undertaken within the Site to a maximum depth of approximately 13 metres below ground level (mBGL). The boreholes indicated the following.

- Made Ground down to 2 mBGL;
- Silty Clay with Gravel beds to 13.10 mBGL; and
- Groundwater was encountered at 5.0 mBGL.

Hydrogeology / Groundwater Flooding

9.137 The EA Aquifer Designation Maps[xxxi] indicate that the superficial deposits are a Secondary (undifferentiated) Aquifer. These formations have varying characteristics in different locations. The London Clay Formation is classified as an Unproductive Aquifer. These formations are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. The Site is not located within a groundwater Source Protection Zone (SPZ).

9.138 The EA Groundwater Vulnerability Map indicates the groundwater at the Site is at a medium to low vulnerability of pollutant discharged at ground level. Medium groundwater vulnerability is expressed as areas that offer some groundwater protection. Intermediate between high and low vulnerability.

9.139 The soils below the Site are described as 'Loamy and clayey soils of coastal flats with naturally high groundwater' by the National Soils Research Institute.

9.140 The superficial Alluvium deposits are varying in thickness and location which is thought to prevent development of laterally continuous groundwater systems. The London Clay formation has no significant potential for storage or transmission of groundwater.

9.141 The Medway Council Strategic Flood Risk Mapping (2012) provides further confirmation of local geology and vulnerability of the Site to groundwater flooding. The study confirms that the Site is not considered to be vulnerable to groundwater flooding.

Existing Drainage

9.142 Kingsnorth Power Station has an extensive internal surface water drainage system that ultimately discharges to the River Medway via a series of coastal outfalls. Parcel 4 is currently undeveloped land and therefore it is determined that no formal drainage systems are present within this parcel. Parcel 1 contains the existing access road and is therefore partially developed. However, the utility surveys provided within the Drainage Strategy (Appendix 9.4) indicate that no formal surface water drainage was provided for the road.

9.143 The surface water drainage network within Parcels 2 and 3 is designed to drain surface water via a series of gravity drains and pumped drainage systems. The drainage network within Parcel 2 drains in a southerly direction to Pumphouse No. 1 from where water is pump discharged to an outfall on the River Medway. The drainage network within Parcel 3 drains northwards to Pumphouse No. 2, from where it is pump discharged to a drain along the northern extent of the parcel. The drain flows in an east to west direction to a culvert beneath the north west of the parcel. The culvert outfalls to the western boundary drain which flows in a southerly direction to a manually controlled penstock coastal outfall at the south western corner of the Site. In the event the boundary drain becomes full, water overtops the channel and floods the marshland to the west of the Site. Water is held on the marshland and then gradually discharged during low tides via the penstock.

9.144 Two further pumped outfalls serve drainage systems associated with the former coal stocking area and the former cooling towers area. Both outfalls are equipped with interceptors.

9.145 The surface water drainage networks have been designed to limit the effects of the tidal location of the Site. All the drainage outfalls incorporate a system which prevents backflow of water from the River Medway during high tide conditions.

9.146 It is assumed that the on-Site drainage within Parcels 2 and 3 was constructed to provide adequate capacity for the area and remain unblocked during a number of extreme storm events. Due to the extensive nature of the drainage network, the risk of surface water flooding due to drainage infrastructure failure is low. However, should a pump failure occur on-site flooding via the surface drainage network is possible. Further details of the existing surface water drainage network within the Site can be found within the Kingsnorth Power Station Flood Risk Assessment (2017) undertaken by SM Foster (Appendix 9.1).

Surface Water Abstractions

9.147 The abstraction licence records taken from Landmark data records indicate that there are no surface water abstraction licences within 500m of the Site boundary. The closest abstraction licences are detailed below.

Table 9.12: Surface Water Abstraction Licence within a 500m search area of the Site boundary

Name of Holder	Licence Number	Grid Reference (x,y)	Distance from site (m)	Maximum daily volume (m^3)
E On Uk Plc	9/40/02/0067/Sr	580960, 171750	571	-
Powergen Plc	9/40/02/0067/Sr	580960, 171750	571	-

Surface Water Quality

9.148 Table 9.12 lists the watercourse and associated WFD classification grades within the hydrology and flood risk study area. The objective dates are explained as follows:

- 2015: status matches the predicted future status or potential. The main environmental objective is to prevent deterioration in status between 2015 and 2021;
- 2021: there is confidence that as a result of the programme of measures, the water body will improve from its 2015 status to achieve the predicted future status by 2021. The environmental objective is for water bodies and elements to make an improvement from the reported 2015 status to achieve the predicted future status by 2021; and
- 2027: the deadline for achieving the status or potential has been extended to 2027. For a 2027 date, there is currently not enough confidence that the improvement in status can be achieved by an earlier date.

Table 9.13: WFD Water Quality Data

Name of Catchment	Overall Status 2013	Overall Status 2014	Overall Status 2015	Overall Status 2016	Overall Status 2027
Medway	Moderate	Moderate	Moderate	Moderate	-

9.149 In summary, the records show that the watercourses within the hydrology and flood risk study area have a WFD status of Moderate. However, all lower status waterbodies have objectives to improve, with most aiming to achieve Moderate to Good status by 2027, and many of the measures needed to achieve the improvement in status are either already in place or will be in place by 2021.

Discharge Consents

9.150 The discharge consents records taken from Landmark data records indicates that there are 9 discharge consents within 500m of the Site boundary detailed below.

Table 9.14: Surface Water Discharge Consents within a 500m search area of the Site

Name of Holder	Permit Number	Grid Reference	Approximate Distance from the Site (m)	Effluent Type	Effective Date
Powergen Plc (Hmip)	AI8935/AJ6521	581310, 172310	114	Trade Effluent Discharge – Condensate Water	7th April 1993
Powergen Plc (Hmip)	Aa3000	581310, 172310	114	Trade Effluent Discharge – Process Water	7th April 1993
Kingsnorth Power Station	N00153	581310, 172310	114	Trade Effluent	22nd March 1985
Powergen Plc (Hmip)	AI8935/ AJ6521	581310, 172315	116	Trade Effluent Discharge – Treated Effluent	7th April 1993
Powergen Plc (Hmip)	AI8935/ AJ6521	581315, 172305	117	Trade Effluent Discharge – Filter Backwash	7th April 1993
Powergen Plc (Hmip)	AI8935/ AJ6521	581315, 172310	119	Trade Effluent Discharge – Site Drainage	7th April 1993
Powergen Plc (Hmip)	AI8935/ AJ6521	581315, 172315	121	Trade Effluent Discharge – Treated Effluent	7th April 1993
Kingsnorth Power Station	K00013	581600, 172500	459	Sewage Discharges - Final/Treated Effluent - Not Water Company	22nd March 1985
Kingsnorth Power Station	K00013	581650, 172390	462	Sewage Discharges - Final/Treated Effluent - Not Water Company	9th May 1995

Pollution Incidents

9.151 Pollution incident mapping has been used to identify if the quality of watercourses within the

hydrology and flood risk study area may have been affected by pollution.

9.152 A review of Landmark data identified no historic pollution incidents to controlled water within the 500m study area.

Ecological Designations

9.153 According to the MAGIC Map (DEFRA database 2020), the Site is not located within any ecologically designated areas. However, the Medway Estuary and Marshes, which is designated as a Special Protection Area (SPA), a Site of Special Scientific Interest (SSSI) and a Ramsar site is present immediately south, east and west of the Development.

9.154 Further details on ecological receptors at the Site and in the surrounding area are set out in Chapter 8 Biodiversity of the ES.

Future Baseline Conditions

9.155 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) requires that *'A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge'* is included within the ES.

9.156 In the event that the Development does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

9.157 The main change to the hydrology and flood risk future baseline is associated with the potential effects of climate change, which may impact on future peak river flow rates and rainfall intensity. A summary of potential climate change allowances as outlined by the EA (2016, updated 2020) is presented below.

9.158 The Development lies within undefended Flood Zone 3, and therefore considered to be at high risk of flooding from tidal sources. However, the Site is protected by defences with a present day 1 in 1,000 year SoP. This would remain the case for EA modelled period 2070. Surface water runoff within the Development would be directed towards a suitably designed drainage network discharging to the River Medway at an agreed upon rate.

9.159 Damhead Creek ll is a consented power station located immediately to the north of Parcel 4.

Unmitigated, the development of Damhead Creek ll would have the potential to materially change the local hydrological and drainage regime, in turn potential changing the future baseline conditions at the Site. However, as outlined in Local and National planning policy, any new development should seek to reduce the overall level of flood risk in the area and will not cause any increase in off-site flood risk or dramatically change the hydrological regime. A Water Management Plan (April 2014[xxxii]), a proposed Drainage Scheme / addendums (2012[xxxiii], 2015[xxxiv] and 2019[xxxv]) and Scheme of Water Efficiency Measures (October 2016)[xxxvi] were submitted in support of the Damhead Creek II project, which seek to address any potential changes in habitat and hydrological regime. The reports have been accepted by the EA and LLFA, indicating sufficient mitigation measures will be in place to ensure that the development will not impact on the surrounding environment.

Likely Significant Effects

9.160 The likely significant effects of the Development have been assessed in relation to the water resources and flood risk within the defined study area. The identified potentially significant environmental impacts arising from the construction and operational phases are listed below.

Construction Phase

9.161 The likely significant effects of the Development have been assessed in relation to hydrology and flood risk within the defined study area. The identified potentially significant environmental impacts arising from the construction of the Development are listed below.

9.162 The temporary impacts of the Development may occur during the construction phase. These impacts are mainly due to alteration to the current surface water flow regimes as a consequence of the Development and proposed new access road. The temporary impacts assessed within this chapter are as follows:

- Impacts which may affect temporary (construction) flood risk;
- The impact on surrounding ecologically designated sites;
- The impacts on groundwater;
- The impact of wastewater generation on surface water and surrounding ecologically designated sites;
- The impact on surface water resources; and
- The impact on existing on-site drainage networks.

9.163 A description of the significance of impacts upon hydrology and flood risk receptors caused

by each identified impact is given below.

Impacts which may affect temporary (construction) flood risk

9.164 The majority of the Site (Parcels 1, 2, 4 and sections within Parcel 3) has been assessed as being at 'high' risk (Flood Zone 3) of tidal flooding, with the area benefitting from flood defences.

9.165 As outlined in the current baseline conditions, Parcels 2 and 3 which are proposed for construction activities are currently underlain by made ground. Parcel 1 and 4 are currently grassed areas. An increase in less permeable and impermeable surfacing is likely to occur due to the construction compounds which may increase the temporary flood risk at the Site and surrounding area.

9.166 Any increase in permanent low permeable surfacing within the Site (asphalt pavement, concrete pavement and building areas etc.) will increase run-off rates, increasing surface water flood risk within the Site and to adjacent land area.

9.167 The land adjoining the Site consists of agricultural land and the Medway Estuary and Marshes SSSI. Sensitive receptors include ecological sensitive land to the south and west, agricultural land and existing workers within the Damhead Creek Power station to the north. Staff and workers are considered to be of high value, medium vulnerability and slow recoverability, with medium to high overall sensitivity.

9.168 Impacts on flood risk arise from any temporary change in less permeable areas, in turn changing run-off rates/characteristics over areas affected during construction. The initial preparation associated with construction of the Development will change the natural hydrological characteristics of the Site.

9.169 The impact is predicted to be at a local spatial extent, medium term in duration, and intermittent, with the potential for temporary loss of the use of land for agriculture. The magnitude is considered to be medium adverse.

9.170 The overall significance of the effects on temporary flood risk prior to the implementation of mitigation measures is assessed as moderate adverse significance, which is significant.

Impact on Surrounding Ecological Areas

9.171 The Medway Estuary and Marshes SSSI is present to the west of the Site. The proposed

construction activities could increase the surface water runoff from the Site with a potential increase in sediment being present within the runoff. Any increase in runoff may increase the potential pathway for dirty (sediment laden) water discharging into the ecologically designated sites which may cause ecological degradation in the protected areas.

9.172 The SSSIs are considered to have a medium vulnerability and high value and its sensitivity is considered to be high.

9.173 An increase in uncontrolled off-site flow may occur during construction activities during the construction phase of the Development. The uncontrolled off-site flows are likely to be laden with an increase in sediment (turbid runoff) which are likely to reduce water quality in the SSSIs and affect ecological habitats. The impact is predicted to be of local spatial extent, medium term in duration, intermittent and of slow recoverability. The magnitude is therefore, considered to be medium to high adverse.

9.174 Prior to the implementation of mitigation measures, the significance of effects of any construction activities on the local ecologically designated sites would be major adverse, which is significant.

Impacts on Groundwater

9.175 Process during the construction phase of the Development, including excavation and piling, could create a pathway for contaminants to groundwater sources. BGS borehole logs indicates that groundwater was encountered at 5.0 mBGL.

9.176 The sensitivity of the groundwater source is depended on the type of aquifer below the surface. The superficial deposits below the Site are classified by the EA as Secondary (undifferentiated) aquifer. The London Clay below the superficial deposits is an unproductive stratum with no significant potential or storage or transmission of groundwater. The Site is not located on a SPZ. Noting the potential for groundwater to be encountered during construction, the sensitivity of the receptors is negligible.

9.177 Activities associated with machinery during construction could lead to an increase in contamination mobilisation through the strata below the Site. This gives rise to an overall low adverse magnitude of impact as the consequences are considered to be medium-term, temporary.

9.178 The significance of effects in relation to potential contamination mobilisation into groundwater, prior to the implementation of mitigation measures, is considered to be minor

adverse, which is not significant.

Impact of Wastewater Generation on Surface Water and Ecologically Designated Sites

9.179 Direct contamination of surface water and surrounding ecologically designated sites may occur due to the potential generation of wastewater during construction. Wastewater may be generated through the use of unsuitable material, substances, equipment or construction techniques.

9.180 Surface water resources and significant ecologically designated sites surrounding the Site are considered to be highly vulnerable, slowly recoverable and high value. Noting the River Medway has a substantial flow and mixes with the sea at its estuary, the sensitivity is nonetheless considered to be high.

9.181 Activities associated with machinery during construction could lead to an increase in turbid runoff and spillages/leaks of fuel, oil etc. This could cause a direct loss, disturbance and effect on surrounding aquatic habitats and species of nature conservation value. The magnitude is therefore considered, to be medium to high adverse.

9.182 The significance of effects in relation to the generation of wastewater during construction, prior to the implementation of mitigation measures, is considered to be major adverse, which is significant.

Impact on Surrounding Water Resources

9.183 During construction, there is a potential risk of accumulation of standing water on-Site and accidental discharge of untreated run-off to the existing on-Site drainage network and surrounding surface watercourses.

9.184 The sensitivity of watercourses are dependent on the nature of the specific watercourse. There are a number of potential pollutants which could arise during construction, and hence which may affect the water quality of receiving watercourses. These are outlined below:

- Fine particulate materials (i.e. silts and clays);
- Cement;
- Oil and chemicals (from plant machinery and processes); and
- Other wastes such as wood, plastics, sewage and rubble.

9.185 These pollutants may be present as a result of normal construction activities, incorrect storage of oils and chemicals and/or accidental spillage. As outlined above, the significance of the incident is dependent on the nature of the pollutant, the timing of reporting of the pollution incident and on the sensitivity of the receiving watercourse.

9.186 Surface water resources surrounding the Site are considered to be highly vulnerable, slowly recoverable and high value. Noting the River Medway has a substantial flow and mixes with the sea at its estuary, the sensitivity is nonetheless considered to be high.

9.187 Activities associated with machinery during construction could lead to an increase in turbid runoff and spillages/leaks of fuel, oil etc. This could cause a direct loss, disturbance and effect on surrounding aquatic habitats and species of nature conservation value. The magnitude is therefore considered, to be medium to high adverse.

9.188 The significance of effects in relation to runoff from construction sites and spillages into surrounding surface water resources, prior to the implementation of mitigation measures, is considered to be major adverse, which is significant.

Impact on Existing on-Site Drainage Networks

9.189 The current on-site drainage systems within the Site are present to reduce the potential for any increase in surface runoff for the existing site layout. The on-site drains have a moderate vulnerability, moderate to high recoverability and a minor value. They are of medium overall sensitivity.

9.190 The existing on-Site drainage network is present to effectively attenuate the impermeable areas within the Site and will incorporate a system to treat any dirty water produced on site. Construction activities, including dust creation or soil erosion, may cause blockage of existing drainage, in turn increasing the flood risk to the Site and the surrounding area. Any blockage of the existing drainage will also increase surface water runoff within the Site, potentially increasing turbid runoff to surrounding watercourses and significant ecological habitats. The construction processes may require new buildings or associated infrastructure to be built over the existing drainage network. The process of building over an existing drain or sewer may cause unintended damage to pipes, resulting in potential access issues, unknown leaks or blockages. The potential for unknown leaks could lead to an increase in uncontrolled discharge of surface water or foul water to surrounding ecological habitats and surface watercourses.

9.191 The impacts of construction activities could cause direct loss and disturbance to the surrounding aquatic habitats and also increase flooding to surrounding commercial properties.

The magnitude is considered to be medium to high adverse.

9.192 The significance of effects on the existing on-site drainage network, prior to the implementation of mitigation measures, is considered to be moderate adverse, which is significant.

Operational Phase

9.193 The likely significant effects of the operation and maintenance of the Development has been assessed in relation to hydrology and flood risk within the defined study area. The environmental impacts arising from the operation and maintenance of the Development are listed below and have been assessed.

9.194 Operational, longer term and permanent impacts are those which occur as a result of the Development's operation. The longer-term impacts assessed within this chapter are as follows:

- Impact of operation on flood risk;
- Impact of operation on on-site drainage;
- Impact of operation on surrounding water resources and ecological areas;
- Impact of operation on groundwater; and
- Impact of operational discharge of untreated wastewater to the surrounding environment.

9.195 A description of the significance of effects upon hydrology and flood risk receptors caused by each identified impact is given below.

Impact of Operation on Flood Risk

9.196 The majority of the Site (Parcel 1, 2 4 and partially 3) has been assessed as being at 'high' risk (Flood Zone 3) of tidal flooding, with the area benefitting from flood defences. The flood defences provide up to a 1 in 1,000 year standard of protection for the present day scenario, therefore the risk of flooding within the majority of the Site is considered to be residual. Modelled flood level data has been obtained from the EA and is described within the baseline conditions section and RPS FRA, 2021 (Appendix 9.4).

9.197 It is likely that prior to the implementation of mitigation measures, the flood risk to the Development would increase as a consequence of climate change, along with degradation of the structural integrity of the existing flood defences. Furthermore, increases in low

permeable surfacing would increase the risk of surface water flooding at the Site and to the surrounding area.

9.198 The land adjoining the Site consists of agricultural land, SSSIs and commercial buildings to the north. Therefore, sensitive receptors include staff, workers, agricultural animals and ecologically designated sites. The receptors are considered to be of medium vulnerability, medium recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

9.199 Site operational and maintenance works could lead to an increase in flood risk. The impact is predicted to be of local spatial extent affecting the Site and local receptors, long term duration with potential to cause significant proportional damage to key components surrounding units and intermittent occurrence. The impact of the Development is therefore considered to be high.

9.200 The significance of effects of the Development, prior to the implementation of mitigation measures, is predicted to be major adverse, which is significant. The nature of effect of the Development on flood risk is determined to be long-term reversible due to the lifetime of the development and the potential recoverability of the receptors.

Impact of Operation on on-Site Drainage

9.201 On-Site drains are considered to be of moderate vulnerability, moderate to high recoverability and minor value. The sensitivity of the receptor is therefore, considered to be medium.

9.202 The operational activities of the Development may increase the soil erosion within the Site, which may block the on-Site drainage network, leading to an increase in turbid runoff and flood risk to surrounding areas. The effect of operation on on-Site drainage is predicted to be of local spatial extent, long-term duration and potential to cause damage to surrounding ecological habitats and on-Site components. The magnitude is therefore, considered to be medium adverse.

9.203 The significance of effects on on-Site drainage networks, prior to the implementation of mitigation measures, is predicted to be long-term moderate adverse, which is significant.

Impact of Operation on Surrounding Surface Watercourses and Ecological Areas

9.204 During the operation of the Development there are a number of potential pollutants, which may give rise to water quality effects on the surrounding surface watercourses and significant

ecological areas. These include:

- Fine particulate materials (e.g. silts and clays);
- Oils and chemicals; and
- Wastewater.

9.205 These pollutants may be present as a result of normal operation, traffic and emergency or accidental spillage. Surface water resources and ecologically designated sites are considered to be of high value, medium vulnerability and slow recoverability. The significance of any such incident would be depended on the nature of the pollutant and on the sensitivity of the receiving habitat. The sensitivity of the receptor is therefore, considered to be high.

9.206 Pollution arising from accidental spillages on-site, such as road traffic accidents, could result in a range of impacts on surface watercourses and ecological areas. Activities from large HGVs could lead to an increase in turbid run-off and spillages/leaks of oils that could affect nearby watercourses and significant ecologically designated sites. Based on the distance of the River Medway and surrounding SSSIs, the magnitude of impact has been assessed as high.

9.207 The significance of effects of the Development, prior to the implementation of mitigation measures, is predicted to be major adverse, which is significant. The nature of effects of the Development on the surrounding watercourse and ecological areas is considered long-term reversible due to the lifetime of the development and potential receptors.

Impact of Operation on Groundwater

9.208 The construction of foundations may crease a direct pathway to groundwater during operation. The potential for foundations to disrupt the existing groundwater flow pathway is also present.

9.209 The sensitivity of the groundwater source is depended on the type of aquifer below the surface. The superficial deposits below the Site are classified by the EA as Secondary (undifferentiated) aquifer. The London Clay below the superficial deposits is an unproductive stratum with no significant potential or storage or transmission of groundwater. The Site is not located on an SPZ. Noting the potential for groundwater to be encountered during construction, the sensitivity of the receptors is negligible.

9.210 The operational activities of the Development may increase the potential for contamination of groundwater. However, as the Site is situated above am aquifer which is characterised as

unproductive with no significant potential for storage of groundwater, the magnitude of impact has been assessed as low.

9.211 The significance of effects of the Development, prior to the implementation of mitigation measures, is predicted to be minor adverse, which is not significant. The nature of effects of the Development on groundwater is considered long-term reversible due to the lifetime of the Development and the potential for foundations to block existing groundwater pathways.

Impact of Operational Discharge of Untreated Wastewater to the Surrounding Environment

9.212 During the operation of the Development, a number of potential pollutants may occur, which would give a rise to potential deterioration to the surround watercourse and ecologically designated areas. These include:

- Hydrocarbons;
- Oils and Chemicals (from plant machinery and processes); and
- Process wastewater.

9.213 Surface water resources and ecologically designated sites are considered to be of high value, medium vulnerability and slow recoverability. The significance of any such incident would be depended on the nature of the wastewater discharge and on the sensitivity of the receiving habitat. The sensitivity of the receptor is therefore, considered to be high.

9.214 The pollutants within the wastewater may be present as a result of normal operation and should untreated wastewater be discharged to the surrounding environment it may result in a deterioration of the ecological and chemical WFD classifications within the catchment. Based on the distance of the River Medway and surrounding SSSIs, the magnitude of impact has been assessed as high.

9.215 The significance of effects of the Development, prior to the implementation of mitigation measures, is predicted to be major adverse, which is significant. The nature of effect of the Development through the operation discharge of untreated wastewater is long-term reversible as the production of wastewater will be present through the lifetime of the Development.

Mitigation Measures

9.216 The section details the mitigation measures that are proposed during the construction and operational phases of the Development.

9.217 Potentially significant impacts to the water environment would be avoided where practicable through careful consideration of the drainage design at the reserved matters stage of the Development, construction techniques and operational best practices. The EA and LLFA will be consulted through the construction works and planning process to ensure appropriate permits and consents are in place.

9.218 As part of the design process, a number of mitigation measures have been proposed to reduce the potential for impacts on water resources and hydrology. These measures are considered best practice for the development type and therefore have been incorporated in the Development design as assessed with the potential impacts.

Construction Phase

9.219 Construction mitigation measures outlined below will be incorporated into the Construction Environment Management Plan (CEMP), which will be secured by planning condition. The CEMP will be implemented to ensure good practice guidance is adhered to throughout the construction phase and to ensure that likely effects during the construction phase are mitigated as far as reasonably possible. The CEMP will specify pollution prevention/ construction best practice methods as mitigation measures to be incorporated into the development design.

Construction Drainage Systems

9.220 The construction phase of the Development will include temporary drainage mitigation techniques, including, but not limited to, run-off interceptor channels installed prior to the construction of the formal drainage to ensure that discharge from the Development is controlled in quality and volume during construction. The construction drainage system will be designed that any wastewater produced will be treated before being discharged to the surrounding environment. This may include the use of settling tanks and/or ponds to remove sediment, temporary interceptors and hydraulic brakes. Any drainage service runs will be surrounded by appropriate granular bedding material to reduce any potential leaks from infiltrating into the below groundwater body. Wherever possible, any damage to the temporary drainage network will be repaired.

Construction Techniques and Processes

9.221 Dust suppression equipment will be used to reduce the spread of sediment within the Site, so that any dust created during construction will be diverted into specific drainage systems equipped with sediment interceptors.

9.222 Construction material and/or spoil within construction compounds will be positioned away from existing drainage systems or surface watercourses / significant ecological areas (where available) and no hazardous substances will be stored within close proximity of the drainage network.

9.223 Any area at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) will be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage systems, the local watercourses and significant ecological areas. Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into surrounding watercourses and significant ecological habitats following any potential leakage/spillage event.

Excavation and Piling Mitigation Measures

9.224 Mitigation measures will be incorporated into the construction techniques to ensure the continued protection of groundwater flow and quality. During any piling and foundation excavation the area will be isolated from surface water until completed. Should any groundwater be encountered during excavation, appropriate dewatering methods will be considered. Any water arising from excavations will be disposed through the temporary drainage system (if uncontaminated) and following removal of silt. Should contamination be encountered during excavation, work will be stopped until appropriate measures are in place to prevent mobilisation. Best practice construction techniques and design will be used for any excavation and piling undertaken during the installation of foundations.

Water Quality Monitoring

9.225 Water quality monitoring will be carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediment occurs. A water quality monitoring methodology and schedule will be determined at the detailed design stage.

Best Practice Measures

9.226 The following measures have been determined as best practice measures based on local and national guidance. Construction work will be undertaken in accordance with the Code of Construction Practice which will inform the CEMP, and Guidance some of which have been withdrawn but still provide useful advice, including, where appropriate:

- EA guidance for discharge to surface water and groundwater environmental permits[xxxvii];

- EA guidance for oil storage regulations for businesses[xxxviii];
- EA guidance for work on a river, flood defence or sea defence[xxxix];
- EA Pollution Prevention Guidance, which although now withdrawn, still provides useful best practice guidance:
- EA, Pollution Prevention Guidance Note 6: Pollution Prevention Guidelines – Working at Construction and Demolition Sites[xl];
- EA, Pollution Prevention Guidance Note 5:– Working in, near or liable to affect watercourses[xli];
- Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors CIRIA (C532)[xlii];
- CIRIA - SuDS Manual[xliii];
- CIRIA (C741) Environmental good practice on site guide[xliv];
- CIRIA (C648) Control of water pollution from linear construction projects[xlv];
- Prevent surface water being affected during earthwork operations. No discharge to surface watercourses will occur without permission from the EA (SuDS Manual);
- Wheel washers and dust suppression measures to be used as appropriate to prevent the migration of pollutants (SuDS Manual);
- Regular cleaning of roads of any construction waste and dirt to be carried out (SuDS Manual);
- A construction method statement to be submitted for approval by the responsibly (SuDS Manual); and
- Defra / Environment Agency, October 2005. Flood Risk Assessment Guidance for New Development, Phase 2 FD2320/TR2[xlvi].

Pollution Prevention Measures

9.227 Refuelling of machinery will be undertaken within designated areas where spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition.

9.228 Any tanks and associated pipe work containing substances included in List 1 of the Groundwater Directive (2006/118/EC) will be double skinned and be provided with intermediate leak detection equipment.

9.229 The following specific mitigation measures for the protection of surface water during construction activities will be implemented:

- Management of construction works to comply with the necessary standards and consent conditions as identified by the EA and LLFA;

- A briefing for all staff highlighting the importance of water quality, the location of watercourses and pollution prevention included within the site induction;
- Areas with prevalent run-off to be identified and drainage actively managed, e.g. through bunding and / or temporary drainage;
- Areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) to be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or the local watercourses. Additionally the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage / spillage. Bunds used to store fuel, oil etc. are to have a 110% capacity of the volume of fuel, oil etc. to be stored;
- Disturbance to areas close to watercourses reduced to the minimum necessary for the work;
- Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses;
- Construction materials to be managed in such a way as to effectively minimise the risk posed to the aquatic environment;
- Plant machinery and vehicles to be maintained in a good condition to reduce the risk of fuel leaks;
- Drainage works to be constructed to relevant statutory guidance and approved via the LLFA prior to the commencement of construction; and
- Consultation with the EA to be ongoing throughout the construction period to promote best practice and to implement proposed mitigation measures.

Operational Phase

Flood Defences

9.230 EA and topographical survey data indicate that existing flood defence provide a present day 1 in 1,000 year SoP, this will decrease over time with the SoP reducing to protection against a 1 in 200 year event in 2070.

9.231 To ensure the present-day SoP of protection against a 1 in 1000 year event is maintained the EA has identified for the next 7 years the current SoP will be maintained, following which defences are to be raised to 5.3 mAOD and the raised again in year 50 to 6.6 mAOD. Therefore, based on the existing flood defence levels for the Site it is likely that a degree of flood defence works will be required in year 50 to ensure the 1 in 1,000 year SoP is maintained. Furthermore, specific attention will be required at potential flood defence

vulnerable location, such as flood gates and access points to ensure a similar level of protection as the wider defences is provided.

9.232 Future defences works are considered as a mitigation measure. With respect to funding, the Partnership Funding score is low because the benefits associated with defence works are concentrated on commercial and industrial activities. Discussions with the industries around funding for the defences will be required before a capital scheme is taken forward.

9.233 The Applicant has proposed that a new flood defence will be constructed along the western boundary of Parcel 1, which will tie into the existing defences. The flood defence will be designed to give Parcel 1 a SoP against the 1 in 1,000 year event and will have a crest height (level) of 6.60 mAOD. The flood defences works will be undertaken in line with the EA MEASS programme.

Outline Drainage Strategy

9.234 A proposed surface water drainage conceptual strategy to support the Development is presented in Appendix 9.4. In summary, it is proposed that surface water is attenuated in a series of pond and swale features located strategically across the Site. The position of the ponds will be cognisant of ecological enhancement and biodiversity net gain targets. It has been established that the gravity drain system is subject to frequent 'locking' therefore a pump dominated system has been proposed based on existing pump rates of 1,500 l/s. At the reserved matters stage of the Development, the surface water conceptual strategy will include a maintenance and/or monitoring schedule and procedure of on-site drains and gullies to reduce the risk of blockage.

9.235 The incorporation of ecological enhancement features, settlement ponds and managed outflows, will provide an overall betterment to the current surface water management regime.

Operational Wastewater Treatment

9.236 Two distinct strategies are being investigated for the treatment and disposal of operational wastewater within the Development. The first strategy is for the construction of an on-Site wastewater treatment facility. This would incorporate the construction of an on-Site wastewater treatment plant within Parcel 3, where all wastewater would be directed. The facility would treat the water to a sufficient standard before discharging to Damhead Creek. The construction of an on-Site wastewater treatment plant would include the development of a foul drainage system.

9.237 The second strategy would be discharging the on-Site wastewater northwards to a new connection within the local utility network, where it would be treated within their wastewater system. This will incorporate local agreement with Southern Water to connect to the local network.

Operational Procedures and Measures

9.238 A number of operational procedures will be developed for the Development which will look to prevent any increase in pollutants to the surrounding environment. Under the Environmental Permit, an emergency spill response procedure and a site storage procedure will outline how a spill will be cleaned when the Site is operational and where any potential pollutants will be stored. This will be available within an operational management plan which will be kept in the main office with technical notes of important procedures available within each area of the Site.

9.239 Any potential contaminated operational material (waste) will be positioned away from sensitive areas and the areas will be bunded to limit the potential migration of contaminants into surrounding watercourses and significant ecological habitats.

9.240 The Development would incorporate water efficiency measures such as water efficient fixtures and fittings (dual flush WCs, white goods with low demand), and noting the extensive roof areas and demand for water in the process and amenity areas, use of greywater or rainwater harvesting to reduce potable / mains water consumption would be considered at the detailed design stage.

Residual Effects

9.241 A range of potential impacts on water resources and flood risk have been identified above which may occur during the construction and operation / maintenance of the Development. The impacts outlined above have been assessed based on a realistic worst-case Development design. The assessment below outlines the potential residual effects of the Development following the implementation of mitigation measures as set out in the mitigation section above.

Construction Phase

9.242 The temporary impacts of the Development occurring during construction on water resources and flood risk are outlined below. These effects are assessed with the incorporation of

standard / design-in mitigation measures outlined above. The impacts are mainly due to an increase in less permeable area of the Development and the potential for increased turbid runoff. The impacts assessed below are (as above) outlined as:

- Impacts which may affect temporary (construction) flood risk;
- The impact on surrounding ecological areas;
- The impact of wastewater generation on surface water and ecologically designated sites;
- The impact on surface water resources; and
- The impact on existing on-site drainage networks.

9.243 A description of the significance of effects upon water resources and flood risk receptors caused by each identified impact is given below.

Impacts which may affect temporary (construction) flood risk

9.244 The Site has been assessed as being mainly with Flood Zone 3, at 'high' risk of Tidal flooding from the River Medway.

9.245 The Site is a mixture of impermeable surfacing and grass surface, therefore during construction a temporary increase in less permeable area may occur due to the construction compounds, potentially increasing the temporary flood risk to the surrounding area.

9.246 Any increase in permanent low permeability surfacing within the Site (asphalt pavement, concrete pavement and building area etc.) will increase site specific run-off rates, increasing the surface water flood risk within the Site and to the adjacent land area.

9.247 The access road is an existing development, with only small amendments needed to gain access to undeveloped areas. The amendments will not cause a significant change to the current flood risk baseline. The access road has been identified to be at risk of tidal flooding, however appropriate flood mitigation techniques to manage the risk posed to stored equipment will be implemented as outlined in the mitigation section above.

9.248 The land adjoining the Site consists of commercial units, a SSSI and agricultural land. The existing staff within the existing units are considered to be of high value, medium vulnerability and slow recoverability, with medium to high overall sensitivity.

9.249 Impacts on flood risk would arise from any temporary change in less permeable area, in turn changing the run-off rates/characteristics over areas affected during construction. The

excavation of foundations associated with the Development is likely to change the natural hydrological characteristics of the Site.

9.250 The construction methodologies will ensure that off-site surface water flows during construction are not increased during Development. Construction phase mitigation measures will be implemented to reduce the flood risk caused by the construction phase.

9.251 The impact is predicted to be of local spatial extent and short term in duration, intermittent and reversible. With the above construction phase mitigation methods adopted as part of the Development, it is predicted that the impact will not affect surrounding local receptors directly. The magnitude is therefore, considered to be low adverse.

9.252 The overall significance of the effect on temporary flood risk based on the implementation of the construction phase mitigation measures outlined above is assessed as minor adverse significance, which is not significant.

Impact on Surrounding Ecological Areas

9.253 The Medway Estuary and Marshes SSSI is present to the west of the Site. The proposed construction activities could increase the surface water runoff from the Site with a potential increase in sediment being present within the runoff. Any increase in runoff may increase the potential pathway for dirty (sediment laden) water discharging into the significant ecological area.

9.254 The SSSIs are considered to have a medium vulnerability and high value and its sensitivity is considered to be high.

9.255 An increase in uncontrolled off-site flow may occur during construction activities during the construction phase of Development. Construction methodologies and temporary construction drainage networks around construction compounds will ensure that no off-site surface water runoff occurs. Construction phase mitigation methods will be implemented to reduce any increase in turbid runoff. This will include a surface water quality monitoring regime to be agreed with the regulators which will confirm that the appropriate mitigation measures are in place. The impact is predicted to be of local spatial extent, short term duration and intermittent. The magnitude is therefore, considered to be low adverse.

9.256 The significance of effects of any construction activities, with the implementation of the construction phase mitigation methods outlined above, on the local ecologically designated sites would be minor adverse, which is not significant.

Impact of Wastewater Generation on Surface Water and Ecologically Designated Sites

9.257 During construction, there is a risk of wastewater generation on-Site due to the incorrect construction techniques and materials. The untreated discharge of this wastewater during construction before any operational surface water drainage strategy is yet to be completed would cause deterioration to the surround environment.

9.258 The sensitivity of the surrounding watercourse (the River Medway) and ecologically designated sites are considered to be highly vulnerable and high value. The sensitivity of the receptor is therefore, considered to be high.

9.259 As outlined above, activities associated with construction could lead to untreated discharge of wastewater to the surrounding environments. Construction processes would be included within a CEMP which would include the design of the temporary surface water drainage system to intercept run-off and ensure that the discharge from the Site is controlled in quality. Water quality monitoring will be carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediment occurs. The impact is predicted to be of local spatial extent, short term duration, intermittent and highly reversible. The magnitude is therefore, considered to be low adverse.

9.260 The significance of effects in relation to construction wastewater discharge, including the integration of construction mitigation measures outlined above, would be minor adverse, which is not significant.

Impact on Surface Water Resources

9.261 During construction, there is a potential risk of accumulation of standing water on Site and accidental discharge of untreated (turbid) run-off whilst the Development is under construction and the operational surface water drainage strategy is yet to be completed.

9.262 As outlined above, the sensitivity of watercourses are dependent on the nature of the specific watercourse. There are a number of potential pollutants which could arise during construction, including:

- Fine particulate materials (e.g. silts and clays);
- Cement;
- Oil and Chemicals (from plant machinery and processes); and
- Other wastes such as wood, plastics, sewage and rubble.

9.263 Surface water resources (including the River Medway) are considered to be highly vulnerable and high value. The sensitivity of the receptor is therefore, considered to be high.

9.264 Activities associated with construction could lead to an increase in turbid run-off and spillages/leaks of fuel, oil etc, which could affect nearby watercourses. Construction processes would be included in the design of the temporary surface water drainage system to intercept run-off and ensure that the discharge from the Site is controlled in quality. Water quality monitoring will be carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediment occurs. The impact is predicted to be of local spatial extent, short term duration, intermittent and highly reversible. The magnitude is therefore, considered to be low adverse.

9.265 The significance of effects in relation to run-off from construction sites and spillages, including the integration of construction mitigation measures outlined above, would be minor adverse, which is not significant.

Impact on Existing on-Site Drainage Networks

9.266 The current on-site drainage systems within the Kingsnorth Power Station are present to reduce the potential for any increase in surface runoff for the existing site layout. The on-site drains have a moderate vulnerability, moderate to high recoverability and a minor value. They are of medium overall sensitivity.

9.267 The construction of the Development may remove / disrupt the on-site drainage network within the Site, in turn increasing the flood risk to the Site and the surrounding receptors. Construction methods would look to limit the disruption of the on-site drainage network and/or include temporary construction drainage within the Site. The impact is predicted to be of local spatial extent with a minor shift away from the hydrological of the local receptors, short term duration and intermittent occurrence. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low adverse.

9.268 The significance of effects on on-site drainage networks, which includes the integration of construction mitigation measures outlined above, is considered to be Minor adverse, which is not significant.

Operational Phase

9.269 Operational, longer term and permanent impacts are those which occur as a result of the Development operation. These effects are assessed with the incorporation of standard /

design-in mitigation measures outlined above. The longer-term impacts assessed within this chapter are as follows:

- Impact of operation on flood risk;
- Impact of operation on on-site drainage; and
- Impact of operation on surrounding water resources and ecological areas.

9.270 A description of the significance of effects upon water resources and flood risk receptors caused by each identified impact is given below.

Impact of Operation on Flood Risk

9.271 The majority of the Site (Parcel 1, 2 4 and partially 3) has been assessed as being at 'high' risk (Flood Zone 3) of tidal flooding, with the area benefitting from flood defences. The flood defences provide up to a 1 in 1,000 year standard of protection on a present day scenario, therefore the risk of flooding within the majority of the Site is considered to be residual. Modelled flood level data has been obtained from the EA and is described within the baseline conditions section and FRA (Appendix 9.4). In the absence of flood defence upgrades to account for climate change tidal modelling indicates that the Development would be at risk of flooding from events with a 1 in 200 year AEP in 2070. Therefore, defence works will be required to mitigate the flood risk by year 50, achieving a crest level of 6.6 mAOD or greater to accord with the EA MEASS.

9.272 Furthermore, the Development will increase the impermeable surfacing within the Site and along with site operational and maintenance works could lead to an increase surface water flood risk to the Site and the surrounding area.

9.273 The land adjoining the Site consists of agricultural land, SSSIs and commercial buildings to the north. Therefore, sensitive receptors include staff, workers and agricultural animals. The receptors are considered to be of medium vulnerability, medium recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

9.274 Site operational and maintenance works could lead to an increase in flood risk. The impact is predicted to be of local spatial extent affecting the Site and local receptors, long term with the potential to cause significant proportional damage to key components of surrounding units.

9.275 Operational activities would incorporate appropriate drainage solutions in the design of the Development. It is proposed to provide an enclosed drainage system within the Site, whereby

any increase in surface water runoff will be attenuated, so that no off-site discharge or surface water runoff would be generated by the Development.

9.276 The impact of the Development subject to the implementation of the standard mitigation measures, including flood defence upgrades, set out above is predicted to be of local spatial extent, short term duration, intermittent and highly reversible. With operational measures, it is predicted that the impact will not affect surrounding local receptors directly. The impact is therefore considered to be negligible.

9.277 The significance of the effects of the Development on flood risk with operational mitigation measures implemented is considered to be minor adverse, which is not significant.

Impact of Operation on on-Site Drainage

9.278 On-site drains are considered to be of moderate vulnerability, moderate to high recoverability and minor value. The sensitivity of the receptor is therefore, considered to be medium.

9.279 The operational activities of the Development may increase the soil erosion within the Site, which may block the on-site drainage network, leading to an increase in turbid runoff and flood risk to surrounding areas. Frequent maintenance of the on-site drainage network will be undertaken during the operational activities of the Development which will reduce any risk of blockage. The effect of operation on on-site drainage, with the implementation of operational maintenance measures, is predicted to be of local spatial extent, short term duration and reversible. The magnitude is therefore, considered to be low adverse.

9.280 The significance of effects on on-site drainage networks, with the implementation of operational mitigation measures, is predicted to be minor adverse, which is not significant.

Impact of Operation on Surrounding Water Resources and Ecological Areas

9.281 During the operation of the Development there are a number of potential pollutants, which may give rise to water quality effects on surrounding watercourses and significant ecological areas. These include:

- Fine particulate materials (e.g. silts and clays);
- Oils and chemicals;
- Wastewater.

9.282 These pollutants may be present as a result of normal operation, traffic and emergency or accidental spillage. Surface water resources and ecological areas are considered to be of high value, medium vulnerability and slow recoverability. The significance of any such incident would be depended on the nature of the pollutant and on the sensitivity of the receiving habitat. The sensitivity of the receptor is therefore, considered to be high.

9.283 Pollution arising from accidental spillages on-site such as road traffic accidents could result in a range of impacts on watercourses from negligible to high. Based on the Medway Estuary SSSI the magnitude of impacts without any operational measures is assessed as high. The provision of operational measures (outlined above), including the provision of an enclosed on-site drainage network, emergency spill procedures and a surface water quality monitoring regime (to be undertaken for at least 3 year from the commencement of operation), would reduce the range of potential impacts to negligible.

9.284 The provision of permanent operational measure (outlined above) would reduce the significance of effects to minor adverse, which is not significant.

Impact of Operational Discharge of Untreated Wastewater to the Surrounding Environment

9.285 During the operation of the Development, a number of potential pollutants may occur, which would give a rise to potential deterioration to the surround watercourse and ecologically designated areas. These include:

- Hydrocarbons;
- Oils and Chemicals (from plant machinery and processes); and
- Process wastewater.

9.286 Surface water resources and ecologically designated sites are considered to be of high value, medium vulnerability and slow recoverability. The significance of any such incident would be depended on the nature of the wastewater discharge and on the sensitivity of the receiving habitat. The sensitivity of the receptor is therefore, considered to be high.

9.287 Pollutants arising from untreated discharge of wastewater to the surround environment could result is high adverse impact on local receptors. Based on the Medway Estuary SSSI the magnitude of impacts without any operational measures is assessed as high. The provision of operational measures, including an on-site wastewater facility and foul drainage network, would reduce the range of potential impacts to negligible.

9.288 The provision of permanent operational measure would reduce the significance of effects to minor adverse, which is not significant.

Cumulative Effects

9.289 This section considers the inter-project cumulative effects of the Development on water resources & hydrology in conjunction with the other developments set out in Chapter 2 EIA Methodology of the ES.

9.290 The potential cumulative impacts with other developments have been identified outlining likely significant effects (if any) and assessing against the baseline position, including the built and operational development.

9.291 A review of approved and proposed developments within a 500m search area from the Development has been undertaken. A 500m search area is considered appropriate for data collection taking into account the nature of the development and likely zone of influence on hydrological receptors. Given the landscape surrounding the development, current and ongoing activities, as well natural baseline fluctuations, it will be difficult to ascertain the exact source of any impacts on flood risk and / or water quality beyond 500m.

9.292 The review of approved and proposed development established that there are four cumulative developments within the defined 500m study area of the Development outlined below. The other schemes listed in Chapter 2 EIA Methodology of the ES have been scoped out due to their distance from the Site, limiting their effect on the Development.

Table 0.4: Assessment of Potential Cumulative Effects - Water Resources and Flood Risk

Scheme	Planning Reference	Status	Distance from the Site (m)
Damhead Creek II Power Station	DAM/B/2.4/S36c MC/16/1014	Section 36 Electricity Act variation to consent	Adjacent to northern boundary
Kingsnorth Quarry Lane to the south of Stoke Road	MC/12/0020	Approved January 2013 (work ongoing until 2024)	Approximately 200m to the west
Kingsnorth Industrial Estate	MC/08/0370	Approved 2011 (currently being built)	Approximately 500m to the north
Gridlink Interconnector Ltd, Kingsnorth Power Station	MC/20/2738	Approved March 2021	Within the Site boundary
	MC/21/0028	Approved March 2021	

Construction Phase

9.293 Construction of the Development could occur simultaneously with the four developments listed

above. For the purposes of this cumulative assessment, it has been assumed that all development will occur during the same time period.

9.294 It is assumed, where relevant, in accordance with the National Policy Statement (NPS) and/or NPPF and Planning Practice Guidance ID7 – Flood Risk and Coastal Change, the new developments will be required to attenuate surface water run-off, where practicable, to the greenfield run-off rate and provide appropriate management techniques to treat potentially contaminated run-off prior to discharge into the local drainage network. The developments will be required to implement a series of construction mitigation measures, resulting in the residual effects to be minor and not significant.

9.295 Any works undertaken within 8m of a watercourse and / or flood defence and within 16 m of tidal defence will require consent. For the consent to be provided the developer is required to demonstrate that the risk of flooding during the lifetime of the development could be mitigated to a level acceptable to the EA, LLFA and / or IDBs. Therefore, the cumulative impacts on water resources & hydrology are predicted to not be significant.

9.296 Therefore, it has been determined that no significant cumulative construction effects on water resources & hydrology receptors are likely.

Operational Phase

9.297 The operational phase of the Development is likely to occur simultaneously with the four developments listed. The developments listed would be subject to local and national policy, including the NPS, the NPPF and PPG and the Medway Local Plan. Under these policies, the developments will be required to demonstrate that the operational phase has a limited affect on water quality and will not increase flood risk to the site or the surrounding area. Without this, the four developments would not achieve planning permission and therefore never be in operation.

9.298 The four developments will therefore have a series of operational mitigation and management measures which will limit any adverse effects on the Development. This would therefore result in a residual effect of the operational phase which is classified as not significant.

9.299 Therefore, it has been determined that no significant cumulative operational effects on water resources & hydrology receptors are likely.

Summary

9.300 This chapter details the assessment of potential likely significant impacts of flood risk and water resources associated with the Development.

Methodology

9.301 The chapter has been guidance-led, and the assessment has been based on Development parameters to inform the assessment of likely significant environmental effects. The assessment presented in this chapter was undertaken in a staged approach in order to determine the context and extent of flood risk information which needed to be covered within the ES.

Baseline Conditions

9.302 The majority of the Site is designated Flood Zone 3, considered to be at high risk of flooding from the River Medway. The closest watercourse to the Site is the River Medway, which is an EA designated main river and is present immediately to the south of the Site. The Damhead Creek which is designated as an ordinary watercourse is also present, immediately to the east of the Site. The EA also provided defended flood extents within North Kent Coast Model updates (January 2019). The flood extents during the 1:200 year 2115 (UKCP09 and NPPF) cover the entire western section of the Parcel, with the NPPF scenario flooding the entire parcel.

9.303 EA mapping identifies that formal flood defences are present along the bank of the River Medway with a protection for events up to a 1 in 1,000 year event probability. Secondary flood defences are also present along Damhead Creek and around the perimeter of the former Kingsnorth Power Station.

9.304 The majority of the Site is currently at very low risk of flooding from surface water, with localised areas at low risk of flooding from surface water. No other significant risk of flooding was identified.

Construction Phase Effects

9.305 The construction activities of the Development have the potential to have a significant effect on flood risk through the increase in impermeable areas within the construction compounds.

9.306 The construction phase of the Development has potential to have a detrimental effect on water quality of nearby watercourses and ecological habitats through introducing sediments or spilt contaminants (stored oils / fuels / chemicals) into these environments. This may be due to excavation, wheel washing, and dust and mud on site. Suspended sediments can reach surface waters through rainfall runoff. Without any mitigation measures implemented, it was assessed that the Development's construction phase would have a moderate to major effect on the surrounding environment and/or receptors, which was determined to be significant.

9.307 Construction mitigation measures have been identified to reduce the effects on flood risk and hydrology to an acceptable level.

9.308 In terms of construction phase mitigation, a Construction Environmental Management Plan (CEMP) will be produced by the contractor at the implementation stage. The CEMP will include measures to control runoff from the construction works and thereby mobilisation of sediment into the water bodies and drainage infrastructure. Spill procedures and use of spill kits, together with appropriate drainage systems and containment, would be employed. Appropriate storage and siting of stockpiles during construction would be used, including bunding of areas, to prevent blockage of watercourses and allow unrestricted passage of surface water.

9.309 All construction compounds will include temporary construction drainage in order that no increase in surface water is caused. They will be located away from the ecological habitats and the River Medway / Medway Estuary.

9.310 With the proposed mitigation measures outlined, the residual effect of the construction work on on-site and off-site receptors with regards to water resources and flood risk is expected to be minor adverse and therefore not significant.

Operational Phase Effects

9.311 The operational impacts of the Development were determined to be caused by an increase in impermeable surfacing on-site, which would increase surface water runoff rates, in turn increasing surface water flood risk. The operational activities of the Development may also increase soil erosion within the Site, which may block the on-site drainage networks, increasing flood risk and turbid runoff to the surrounding ecological habitats. The significance of effects of operational actives, without any design-in mitigation measures, was predicted to be moderate to major adverse, which is significant.

9.312 A surface water drainage strategy has been developed which will attenuate any increase in

runoff caused by the Development, with an allowance for additional runoff caused by climate change.

9.313 Pollutants (including fine particulate materials, waste water, oils and chemicals) may be present as a result of normal operations, traffic and emergency or accidental spillage. Without any management the pollutant may adversely impact surrounding surface watercourses and ecological habitats. The proposed surface water drainage strategy will incorporate oil separators and sediment management measures in order that water discharged into the Medway Estuary has low concentrations of suspended solids and oils.

9.314 Operational management plans will be in place throughout the Development's operational phase, which will incorporate emergency spill procedures and ongoing water quality monitoring to ensure that no adverse pollution is caused to surrounding habitats.

9.315 Operational mitigation measures include:

- The surface water drainage network providing attenuation storage on-Site;
- Oil interceptors will be present within the on-site drainage network;
- Bunding of any exposed ground and stockpiles; and
- A surface water monitoring regime will be in place for at least three years following commencement of operational activities.

9.316 With the implementation of mitigation measures, it is predicted that the residual effects of the operational/ maintenance activities on water resources and flood risk will be minor adverse, which is not significant.

9.317 Table 9.16 contains a summary of the likely significant effects of the Development.

Table 9.16: Table of Significance – Water Resources and Flood Risk

Potential Effect	**Nature of Effect** (Permanent/Temporary)	**Significance** (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	**Mitigation / Enhancement Measures**	**Geographical Importance***							**Residual Effects** (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
				I	UK	E	R	C	B	L	
Construction Phase											
Impacts which may affect temporary (construction) flood	Temporary	Moderate Adverse	Temporary drainage mitigation techniques.							*	Minor Adverse
The impact on surrounding ecological areas;	Temporary	Major Adverse	Temporary drainage mitigation techniques, dust suppression techniques and bunding of all construction areas and material storage areas.							*	Minor Adverse
The impact on surface water resources	Temporary	Major Adverse	Temporary drainage mitigation techniques including bunding of all construction areas and material storage areas.							*	Minor Adverse
Impacts on Groundwater	Temporary	Minor Adverse	Piling and foundation excavation areas will be isolated from surface water until completed. If groundwater is encountered during excavation, appropriate dewatering methods will be considered.							*	Minor Adverse

The impact of wastewater generation on surface water and ecologically designated sites	Temporary	Major Adverse	Temporary / Construction drainage system							*	Minor Adverse
The impact on existing on-site drainage networks	Temporary	Moderate Adverse	Assessment of potential construction areas in relation to the existing drainage systems and construction methods (dust suppression) which will reduce blockages.							*	Minor Adverse
Completed Development											
Impact of operation on flood risk	Long-Term	Major Adverse	Outline surface water drainage strategy (Appendix 9.4) and operational management techniques (maintenance schedule etc).							*	Minor Adverse
Impact of operation on on-site drainage	Long-Term	Moderate Adverse	Operational management techniques (maintenance schedule etc).							*	Minor Adverse
Impact of operation on surrounding water resources and ecological areas.	Long-Term	Major Adverse	Outline surface water drainage strategy (Appendix 9.4) and operational management techniques (maintenance schedule etc).							*	Minor Adverse
The Impacts of operation on Groundwater	Long-Term	Minor Adverse	None required.							*	Minor Adverse

Impact of operational discharge of untreated wastewater to the surrounding environment.	Long-Term	Major Adverse	An on-site wastewater treatment facility or offsite connection to the local wastewater utility network and operational management systems. The type of wastewater treatment (on-site or off-site) will be determined at detailed design stage.							*	Minor Adverse
*** Geographical Level of Importance** I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local											

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