



DEVELOPMENT OF A SUSTAINABLE ENERGY PLANT.

KEMSLEY PAPER MILL, SITTINGBOURNE, KENT

**ST REGIS PAPER COMPANY LIMITED & E.ON
ENERGY FROM WASTE UK LIMITED**

ENVIRONMENTAL STATEMENT
CHAPTER 10:

HYDROLOGY AND FLOOD RISK

Prepared by:
Jonathan Morley
Environmental Consultant

Checked by:
Paul Hardwick
Associate Director

34 Lisbon Street
Leeds
LS1 4LX

Tel 0113 220 6190
Fax 0113 243 9161
Email rpsld@rpsgroup.com

RPS Planning & Development



Contents

10.1	Introduction	10-1
10.2	Legislation and Planning Context	10-2
10.3	Assessment Methodology	10-6
10.4	Baseline Conditions	10-11
10.5	Incorporated Enhancement and Mitigation	10-14
10.6	Identification and Evaluation of Likely Significant Effects	10-15
10.7	Mitigation	10-18
10.8	Residual Impacts	10-22
10.9	Conclusions	10-23
10.10	References	10-24



Tables, Drawings & Appendices

Tables

Table 10.1:	Site Sensitivity Criteria
Table 10.2:	Magnitude Criteria
Table 10.3:	Unmitigated Significance Criteria
Table 10.4:	Residual Significance Criteria after Mitigation
Table 10.5:	Summary of Recommended Key Mitigation Measures
Table 10.6:	Summary of Residual Effects

Drawings

Drawing 10.1:	Site Location Plan and Surface Water Features
Drawing 10.2:	Environment Agency Flood Map

Appendices

Appendix 10.1:	Envirocheck Report
Appendix 10.2:	RPS Flood Risk Assessment
Appendix 10.3:	Environment Agency Scoping Response

10 Hydrology and Flood Risk

10.1 Introduction

10.1.1 This chapter assesses the likely significant effects on hydrology and flood risk of the proposed Kemsley Sustainable Energy Plant (SEP) within the St. Regis Paper Mill Complex, Kemsley, Kent.

10.1.2 The proposed site layout is set out within Figure 4.2.

10.1.3 This assessment covers the site preparation, construction and operation of the development, full details of which are presented in Chapter 4.

10.1.4 The aim of this chapter is to identify and evaluate those aspects of the proposal that have the potential to affect the existing baseline situation with respect to hydrology:

- Surface water drainage;
- Flooding;
- Water Quality

10.1.5 This chapter contains the following:

- Methodology – describes the process used to produce this assessment and outlines the legislation and guidance referred to;
- Baseline Assessment – a description of the existing hydrological conditions of the assessment area based on site visits, provided information and consultation;
- Impact Assessment – identifying the ways in which the hydrology of the assessment area could be affected by the proposed development; or whether these factors may affect the development and surrounds.
- Mitigation – a description of measures that will be implemented to mitigate the identified likely significant effects of the development.

10.2 Legislation and Planning Context

10.2.1 A detailed review of the development plan documents and planning context in relation to the development proposals is provided in Chapter 3.

10.2.2 This section summarises those policies that are directly relevant to hydrology and flood risk issues.

National Policy & Legislation

10.2.3 At a national level, the central government strategy document 'A Better Quality of Life – A Strategy for Sustainable Development for the United Kingdom' recognises the fundamental importance of good water quality to health and the environment and identifies the major challenges to water quality which it states are; growing demand for water supplies, pollution pressures from the new development, diffuse pollution inputs, changed weather patterns and loss of habitats. Relevant planning policy documents include PPS25 (Development and Flood Risk), and PPS23 (Planning and Pollution Control). These have been taken into consideration in assessing the hydrological effects of the proposed development.

Planning Policy Statement 23 (PPS23) –Planning and Pollution Control

10.2.4 PPS23 complements the new pollution control framework.

Planning Policy Statement 25 (PPS25) –Development and Flood Risk

10.2.5 PPS25 Development and Flood Risk, 2006 explains how flood risk should be considered at all stages of the planning and development process in order to reduce future damage to property and loss of life. It states the importance the Government attaches to the management and reduction of flood risk in the land-use planning process, acting on a precautionary basis and taking account of climate change. The aim of PPS25 is to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk.

Land Drainage Act and Water Resources Act

10.2.6 The application will need to be considered by the Environment Agency (EA) under the Land Drainage Act (1991) and the Water Resources Act (1991). Consent from the EA is required for any proposed discharges to controlled waters. Consent would also be required for any

development within 8m of a designated main river under the Environment Agency's Land Drainage Byelaws.

CIRIA Environmental Good Practice on Site (C502) (1999), CIRIA Control of Water Pollution from Construction Sites (C532) (2001)

10.2.7 These provide guidance on hydrology, flood risk and water quality for consultants and contractors.

Environment Agency Pollution Prevention Guidelines

10.2.8 Produced by the Environment Agency Pollution Prevention Guidelines (PPG's) give advice on the statutory responsibilities and good environmental practice. Each PPG addresses a specific industrial sector or activity.

Regional Policy

- The South East Plan - Regional Spatial Strategy for the South East to 2021 (May 2009)

10.2.9 The South East Plan (RSS) was adopted in May 2009 and covers the period until 2026.

10.2.10 Policy NRM1: Sustainable Water Resources and Ground water Quality states:

- *Water supply and ground water will be maintained and enhanced through avoiding adverse effects of development on the water environment. A twin-track approach of demand management and water resource development will be pursued. In preparing local development documents, and determining planning applications, local authorities will:*
 - i) *assist the UK in achieving the objectives of the Water Framework Directive by delivering appropriate actions set out in River Basin Management plans.*
 - ii) *identify any circumstances under which new development will need to be supported by water efficiency standards exceeding extant Building Regulations standards*
 - iii) *set out the circumstances under which sustainable drainage solutions should be incorporated into new development*
 - iv) *encourage winter water storage reservoirs and other sustainable land management practices which reduce summer abstraction, diffuse pollution and runoff, increase flood storage capacity and benefit wildlife and recreation*
 - v) *direct new development to areas where adequate water supply can be provided from existing and potential water supply infrastructure. In addition ensure, where appropriate, that development is phased to allow time for the relevant water infrastructure to be put in place in areas where it is currently lacking but is essential for the development to happen.*

10.2.11 Policy NMR2: Water Quality states:

Water quality will be maintained and enhanced through avoiding adverse effects of development on the water environment. In preparing local development documents, and determining planning applications, local authorities will:

- i) take account of water cycle studies, groundwater vulnerability maps, groundwater source protection zone maps and asset management plans as prepared by the Environment Agency, water and sewerage companies, and local authorities*
- ii) ensure that the environmental water quality standards and objectives as required by European Directives are met*
- iii) ensure that the rate and location of development does not breach either relevant 'no deterioration' objectives or environmental quality standards*
- iv) not permit development that presents a risk of pollution or where satisfactory pollution prevention measures are not provided in areas of high groundwater vulnerability (in consultation with the Environment Agency and Natural England).*

Local authorities will work with water and sewerage companies and the Environment Agency to:

- i) identify infrastructure needs, allocate areas and safeguard these for infrastructure development*
- ii) ensure that adequate wastewater and sewerage capacity is provided to meet planned demand*
- iii) ensure that impacts of treated sewage discharges on groundwater, inland and marine receiving waters do not breach environmental quality standards or 'no deterioration' objectives*
- iv) ensure that plans and policies are consistent with River Basin Management Plans*
- v) ensure that water cycle studies are carried out, prior to development sites being given planning permission, where investigations by the Environment Agency indicate that water quality constraints exist*
- vi) ensure that Sustainable Drainage Systems are incorporated in a manner to reduce diffuse pollution.*

Local authorities should promote land management initiatives to reduce diffuse agricultural pollution

10.2.12 Policy NRM4: Sustainable Flood Risk Management states:

The sequential approach to development in flood risk areas set out in PPS25 will be followed. Inappropriate development should not be allocated or permitted in flood zones 2 and 3 (Diagram NRM1), areas at risk of surface water flooding (critical drainage areas) or areas with a history of groundwater flooding, or where it would increase flood risk elsewhere, unless there is over-riding need and absence of suitable alternatives. Local authorities, with advice from the Environment Agency, should undertake a Strategic Flood Risk Assessment (SFRA)

to provide a comprehensive understanding of the flood risk and put in place a framework for applying the PPS25 sequential approach. This will facilitate allocating sites in a decreasing probability of flood risk. The SFRA would assess future climate change and identify appropriate types of development in accordance with the PPS25 sequential test and flood vulnerability of different land uses. Existing flood defences will be protected from development. Where development is permitted in appropriately defended floodplains it must be designed to be resilient to flooding (to minimise potential damage) and to allow for the future maintenance, realignment or management of the defences to be undertaken. In the preparation of local development documents and considering planning applications, local authorities in conjunction with the Environment Agency, should also:

- i) take account of River Basin Management Plans, Catchment Flood Management Plans, Shoreline Management Plans and Surface Water Management Plans in developing local development documents and other strategies. Where locationally specific flood risk and land management options such as flood storage, managed realignment and set back from coastal defences are identified, land should be safeguarded for these purposes and appropriate land use and land management practices should be encouraged*
- ii) consider the associated social and environmental costs and benefits to fisheries, biodiversity and the built and historic environment in assessment of new flood management schemes*
- iii) require incorporation and management of Sustainable Drainage Systems (SuDS), other water retention and flood storage measures to minimise direct surface run-off, unless there are practical or environmental reasons for not doing so*
- iv. take account of increased surface water drainage on sewage effluent flows on fluvial flood risk.*

Local Policy

10.2.13 The proposed development site falls within the administrative area of Swale Borough. The relevant Local Plan Policy for the area has therefore been reviewed.

The Swale Borough Local Plan, adopted February 2008

- Policy E2 Pollution

All development proposals will minimise and mitigate pollution impacts. Development proposals will not be permitted that would, individually or cumulatively, give rise to pollution significantly adversely affecting the following: human health; residential amenity; flora and fauna; areas or buildings of architectural or historic interest; rural areas; and water supply sources, groundwater aquifers, or local hydrology.

- Policy E4 Water

The Borough Council will not grant planning permission where acceptable sites at lesser risk of flooding are available to accommodate the development. Where there is considered to be a

risk of flooding, the Borough Council will not grant planning permission where the degree of risk of flooding, either to, or arising from, the development, would give rise to adverse impacts upon, or increased risk to, human life, ecosystems, habitats and development, including those resulting from: the impedance of, or increase in, flood flows; the loss of storage volume in the floodplain; the loss of integrity of the flood defences; and increased surface water run-off from the creation of large impermeable areas.

Where there is considered to be a risk of flooding, development proposals will be accompanied by a flood risk assessment and should a) incorporate, where necessary, sustainable drainage systems within development proposals and b) include, when necessary, new flood defence and alleviation measures installed and maintained by the developer(s).

10.3 Assessment Methodology

Relevant Guidance

10.3.1 Following best practice, this assessment has been undertaken by following relevant national policies, legislation and guidance on hydrology and flood risk assessment including:

- Planning Policy Statement 25 (PPS25): Development and Flood Risk.
- Land Drainage Act 1991.
- Water Resources Act 1991.
- PPS23: Planning and Pollution Control

10.3.2 Planning Policy Statement 23 emphasises the role of the planning system in contributing to improving water quality. PPS23 recommends the integration of land use planning with other plans and strategies to achieve control, mitigation and removal of pollution. Annex I Pollution Control, Air and Water Quality provides guidance specific to water quality.

CIRIA Environmental Good Practice on Site (C502)1999

10.3.3 C502 provides guidance on how to avoid causing environmental damage when on a construction site:

Pollution Prevention Guidelines

10.3.4 Produced by the Environment Agency, Pollution Prevention Guidelines (PPGs) give advice on statutory responsibilities and good environmental practice. Each PPG addresses a specific industrial sector or activity. Those of relevance to this assessment are listed below:

- PPG01 General guide to the prevention of water pollution.
- PPG02 Above ground oil storage tanks.
- PPG05 Works in, near or liable to affect watercourses.

- PPG06 Working at construction and demolition sites.
- PPG07 Pollution prevention guidelines refuelling facilities.
- PPG08 Storage and disposal of used oils.
- PPG13 High pressure water and steam cleaners.
- PPG18 Control of spillages and fire fighting run-off.
- PPG21 Pollution incident response planning.
- PPG26 Storage and handling of drums and intermediate bulk containers.

Methodology

10.3.5 This assessment has involved the following:

Consultation

10.3.6 As detailed in Chapter 1, a formal scoping exercise was undertaken to inform the scope of the Environmental Assessment. The formal Scoping response is included in Appendix 10.3.

- A response from Joseph Williamson, Development and Flood Risk Officer at the Environment Agency was received on 13th July 2009. He confirmed that the proposed development lies partially within Flood Zone 2 and 3a with the eastern edge of the site influenced by extreme tidal flood events.
- The EA highlighted that consideration should be given to the potential for the site to become 'tide-locked' from a predicted extreme tidal level of 5.2mAOD occurring at the same time as a 1 in 100 year extreme storm event.

10.3.7 In addition to the formal Scoping exercise, the following informal consultations and discussions have informed this chapter (see Flood Risk Assessment, Appendix 10.2 for more information):

- The Environment Agency, July 2009.
- Swale Borough Council

10.3.8 The site is located partially within a Flood Zone 2 and 3a. Following the re-profiling of the site to a finished floor level of 5.8mAOD, the site will be elevated above the area subjected to flooding.

10.3.9 As the proposed development is in excess of 1 hectare a Flood Risk Assessment will be required – this was confirmed in the formal scoping response from the Environment Agency.

10.3.10 The EA have confirmed that on-site attenuation is to be provided for a 1 in 100 year storm event, with clean run-off to be discharged directly into the Swale.

10.3.11 No run-off limits to the Swale have been recommended by the EA.

Desk Study

10.3.12 Evaluation of the hydrological site conditions was undertaken by consulting maps and published information regarding the topography, geology, and hydrogeology of the area. Much of the information was obtained from an Envirocheck Report (Appendix 10.1). In addition, the Environment Agency was consulted regarding existing licensed surface and groundwater abstractions, on the existing water quality of watercourses around the site and on an agreed methodology for the Flood Risk Assessment (FRA). A site walkover and site investigation works were also undertaken to ascertain the current site conditions and the state of nearby drainage ditches.

10.3.13 The information used to compile this section includes:

- Landmark Envirocheck Report, Reference 27464042-1-1, dated 13th March 2009;
- Ordnance Survey Explorer Map 178: Thames Estuary;
- Site Survey;
- Environment Agency Flood Maps;
- Data provided by the Environment Agency;
- Site walkover surveys undertaken by RPS on 26th June 2009;

10.3.14 Full details of these sources of information are provided within the Technical Appendices.

Water Quality Assessment

10.3.15 A qualitative assessment of potential effects on local surface water quality has been undertaken and relates primarily to the proposed changes to the surface water drainage regime. The potential effect of contaminants on local watercourses, including a review of the Envirocheck Report and Environment Agency water quality data for The Swale, is considered in Chapter 11 Ground Conditions and Hydrogeology.

Flood Risk Assessment

10.3.16 A detailed Flood Risk Assessment has been undertaken for the application site and is located in the Technical Appendix. Figure 10.2 shows the Environment Agency flood map for the proposed site. The FRA scope was agreed with the EA and meets the intent of PPS25. The key components of the FRA were as follows:

- A hydrological assessment of the surface water flows for the developed site; and

- Development of a conceptual outline of a drainage strategy for the development, which incorporates appropriate mitigation measures.

Flood Defence Assessment

10.3.17 There are flood defences noted to the south of the site. Any work within 15 m of these flood defences would require agreement from the Environment Agency.

Assessment of Significance

10.3.18 The methodology used in this assessment follows the DETR guidance *'The Environmental Impact Assessment: A Guide to Procedures'* (DETR 2000). This provides general guidance on the assessment of the significance of the potential effect of a project. The significance of the potential effects of the proposed development on site hydrology and water quality is classified by three factors:

- Sensitivity;
- Magnitude; and
- Likelihood

10.3.19 The sensitivity of the receiving environment can be defined as its ability to absorb an effect without perceptible change, and can be classified as shown in Table10.1.

10.3.20 The magnitude including the timing, scale, size and duration of the potential affects from the proposal can be classified as follows (Table10.2):

Table 10.1 – Site Sensitivity Criteria

Sensitivity	Comments
Negligible	No significant effects
Minor	The environmental equilibrium is stable and resilient to changes that are considerably greater than natural fluctuations, without detrimental effect on its existing character.
Moderate	The environmental equilibrium copes well with all natural fluctuations but would struggle to absorb some changes greater than this without affecting its present characteristics.
Major	The environmental equilibrium is precarious, struggles to adapt to natural fluctuations and cannot absorb further change without fundamentally altering its present character or sensitive use (e.g. drinking water supply, EC designated conservation site, Salmonid fishery)
Substantial	Environmental likely significant effects will be of a consistently high magnitude and frequency with Standards exceeded by a significant margin. Secondary likely significant effects also likely to have a high magnitude and frequency. Significant residual effects.

Table 10.2 – Magnitude Criteria

Magnitude	Definition
Negligible	No perceptible changes to the site hydrology
Minor	Measurable but non-material changes to hydrology
Moderate	Material but non-fundamental changes to hydrology
Major	Fundamental changes to the hydrology

10.3.21 Assessments of the sensitivity of the receiving environment together with the magnitude of the effect define the significance of the unmitigated effect (Table 10.3).

Table 10.3 – Unmitigated Significance Criteria

Magnitude Category	Sensitivity				
	Negligible	Minor	Moderate	Major	Substantial
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Minor	Negligible	Negligible	Minor	Moderate	Moderate
Moderate	Negligible	Minor	Moderate	Moderate/Major	Major
Major	Minor	Minor	Moderate	Major	Major

10.3.22 The likelihood of an event occurring is then assessed and classified as unlikely, possible or likely. Finally, the residual (or overall) significance after implementation of mitigation measures is a function of the unmitigated significance combined with the likelihood of an event occurring (with mitigation taking place) as shown in Table 10.4.

Table 10.4 – Residual Significance Criteria after Mitigation

Unmitigated Significance	Likelihood		
	Unlikely	Possible	Likely
Negligible	Negligible	Negligible	Negligible
Minor	Negligible	Negligible	Minor
Moderate	Negligible	Minor	Moderate
Major	Minor	Moderate	Major

10.3.23 This assessment concludes whether the residual significance of the likely significant effects of the proposed development will be major, moderate, minor or negligible, once appropriate

mitigation measures have been implemented. This assessment relies on professional judgement to ensure that the likely significant effects are appropriately assessed. Likely significant effects of *moderate significance or greater* are considered significant in terms of the EIA Regulations and should be taken into account in the decision-making process.

Cumulative Likely Significant Effects

10.3.24 A review of proposed or possible future third party projects that may have a cumulative impact with the development proposals has been undertaken and used to inform this Environmental Statement. Projects identified are summarised in Chapter 1.

10.3.25 In relation to hydrology and flood risk, no developments have been identified as having the potential to impact cumulatively with the proposal with respect to hydrology.

10.4 Baseline Conditions

Site Setting

10.4.1 A site walkover was carried out by RPS on the 26th June 2009. Details of this site visit are noted below.

10.4.2 The site is located at OS NGR: 592070, 166551, c.1.4km to the east of Kemsley Village Centre and c.3.2km northeast of Sittingbourne Town Centre.

10.4.3 The development area is a roughly rectangular shaped parcel of land occupying approximately 7 ha and comprises the former St. Regis Paper Mill coal store and inert waste tip.

10.4.4 Much of the former coal store area has been cleared. However, the application area incorporates numerous relatively new heaps of inert and construction waste underlain by made ground.

10.4.5 The site is accessed along the western boundary via an internal site road, which runs south to north along the eastern edge of St. Regis Paper Mill.

10.4.6 Topographical data indicates that the site slopes from the west at an elevation of approximately 7.0m Above Ordnance Datum (AOD) to approximately 4.0mAOD in the east. The lowest elevations are located within the southeast corner of the application area, 3.18 to 4.09 mAOD.

10.4.7 The majority of site is covered with a veneer of cohesive made ground comprising colliery spoil (black to grey angular gravel with occasional fragments of coal, brick, ash and clinker) and reworked natural clay deposits.

10.4.8 The site drainage is generally north and eastward with the topographical slope, but the natural drainage is affected by past surface water management at site, notably internal bunds and associated ditches in the west of the site and a perimeter ditch along the western boundary.

Surface Water

10.4.9 The location of surface water features within the site and surrounding area are illustrated in Figure 10.1 and are described below.

10.4.10 The site lies partially within Flood Zone 2 and 3a and therefore has a 1 in 200 annual probability, of flooding from tidal sources in any one year. The Swale Estuary is located to the east of the site, flowing in an easterly direction until its confluence with the North Sea approximately 16km to the east of the site.

10.4.11 Following the re-profiling of the site to 5.8mAOD, the development will have been uplifted outside the flood plain with a 'low probability' of flooding for the Swale Estuary.

10.4.12 A Flood Risk Assessment (FRA) is included at Technical Appendix 10.2.

10.4.13 A surface water ditch is located along the western boundary of the site, which flow northwards towards a number of informal attenuation and settlement ponds to the north of the proposed SEP.

10.4.14 Land to the north of the proposed site slopes to the north-eastwards, and a number of natural drainage channels confirm this. These drain into Kemsley Marsh and then flow eastwards to discharge into The Swale.

Surface Water Quality

10.4.15 The Environment Agency has not provided RPS with any information relating to the river quality monitoring of the Swale

Surface Water Abstractions and Discharges

10.4.16 There are no recorded surface water abstractions within a 1km radius of the site.

10.4.17 Records indicate that there are seventeen discharge consents within a 1km radius of the application site. Nine of licences belong to Grovehurst Energy Limited for discharge of process water, cooling water and Trade Effluent to saline estuary at locations c.0m west, c.65m south west and c.273m south, c.275m north, c.380m north, c.387m south, c.414m south, c.423m and west c.495m southwest of the site.

10.4.18 Two licences belong to Southern Water Services Ltd c.315m south for sewerage discharge to saline estuary.

10.4.19 Single licences are held by; St Regis Paper Co. c.288m north for trade effluent to freshwater stream, Niall Cormac-Walsh c.611m north for sewerage discharges to freshwater stream, Knauf Drywall c.762m north for sewage discharge to freshwater and Trevor Ellis c. 762m north for trade effluent.

10.4.20 A further two licences are held by National Grid Electricity c.857m west and c.902m west for trade effluent to freshwater sources.

Pollution Incidents to Controlled Waters

10.4.21 There have been 25 incidents to controlled waters within 1km of the site between 1992 and 1999. Eight of the incidents have been classified as a category 2 with 'significant' severity. The majority of the incidents relate to the discharge of untreated sewage to the swale from various sources.

10.4.22 The remaining pollution incidents have been categorised as a level 3 of minor severity, with no long lasting environmental impact. In all cases the pollutants were unidentified.

Groundwater

10.4.23 The site is underlain by London Clay, a non aquifer with more permeable Woolwich and Thanet beds- Major Aquifer units at depth.

10.4.24 This site is not located within a Source Protection Zone.

Flood Defences

10.4.25 The site is not within an area benefiting from the flood defences along The Swale.

Flooding

10.4.26 Correspondence with the Environment Agency indicates that the site is located within the 1 in 200 year tidal flood zone. The EA flood map shows the eastern edge of the site to be located within flood extent with an annual chance of flooding of 1 in 200 (0.5%) from the sea.

10.4.27 Following the re-profiling of the site to 5.8mAODN, 600mm above the 5.2mAODN critical flood level, the site will be located entirely within Flood Zone 1, with less than 0.1% probability of flooding from tidal sources.

10.5 Incorporated Enhancement and Mitigation

10.5.1 The following section highlights those elements which have been incorporated within the design of the site to reduce the potential effects on flood risk and water quality both at the site and to the surrounding environment. These measures include the following key elements, which are discussed in greater detail below:

- Drainage strategy including surface water outfalls;
- SUDS measures including petrol interceptors and attenuation basins;
- Design of layout.

Drainage Strategy – Surface Water Considerations

10.5.2 The surface drainage strategy for the site incorporates measures designed to minimise the effects on flood levels, water quality, river/stream morphology and habitat. Full details of the strategy are provided in the Flood Risk Assessment in Appendix 10.2.

10.5.3 Precise details of the current drainage system, with regards to the drainage network and discharge locations are not available. Information supplied from the EA indicates that areas to the north and south were subjected to flooding from The Swale in 1953.

Drainage Measures - Surface Water Quality Considerations

10.5.4 A water quality monitoring strategy will be in place to monitor outflows from the site discharge point into The Swale. This will highlight potential contaminants and suspended sediment originating from the site, which may affect the receiving watercourse. Monitoring will be carried out during the construction phase and continue throughout the lifetime of the development.

Design of Proposed Layout

10.5.5 The proposed development is for 4.6ha of the 7ha site to comprise an SEP within the former St. Regis Paper Mill coal store and inert tip.

10.6 Identification and Evaluation of Likely Significant Effects

10.6.1 The potential effects of the proposed development on surface water, flood risk, existing flood defences and water quality have been assessed for the construction and operation phases of the development. These effects are accounted for in mitigation measures incorporated within the design of the development in consideration of the environmental risks highlighted by the baseline assessment

Construction Phase

Surface Water Runoff

10.6.2 There is a potential risk of accumulations of standing water on site and also accidental discharges of run-off to surface watercourses while the development and the operational surface water drainage system is being constructed. Where unmitigated, accidental discharges of runoff may result in **minor** adverse to **moderate** adverse effects on volumes and levels in receptor watercourses. However, the sensitivity of the receptor (River Swale, wider sea environment) to these effects is negligible to minor.

Surface Water Quality

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

10.6.4 These pollutants may be present as a result of normal site activities, incorrect storage of oils and chemicals and/or accidental spillage. The significance of the incident would be dependent on the nature of the pollutant, on the mitigation measures adopted and their timing and effectiveness, and on the sensitivity of the receiving watercourse.

10.6.5 Potential effects on water quality during the construction phase could include:

- direct discharges to ground and surface water from run-off during the construction phase containing increased loads of suspended solids and/or contaminants;
- accidental spillages or leakages from storage of potentially polluting substances, affecting groundwater and surface waters;
- disposal of drainage and effluent from construction sites, and from concrete batching plants;
- direct loss, disturbance or other effects on aquatic habitats and species of nature conservation value; and

Tidal/Fluvial Flooding

10.6.6 Presently the proposed eastern site area lies partially within Flood Zone 2 and 3a and is hence at risk of tidal flood events with a return period of less than 1 in 200 years. The EA predicts extreme tidal event(s) with a water level of 5.2mAODN up to the year 2070.

10.6.7 Finished ground level plans indicate that the site is to be uplifted to 5.8mAOD thereby reducing the risk of tidal flooding at the site to **negligible**. The risk of site uplift affecting tidal levels locally or elsewhere is considered to be negligible.

10.6.8 Unmitigated effects of construction works for the proposed site would have a **minor** adverse effect on flood risk to the site should a flooding event occur during this time. Potential effects during the construction phase could include:

- affecting land drainage by stopping up of existing drains
- by compaction of soils ; and by
- increases in impermeable surfaces.

Operation Phase

Surface Water

10.6.9 Redevelopment of the site will increase the area of low permeability surfaces. Where unmitigated, this may lead to an increase in the volume and speed of surface water runoff discharged to the adjacent watercourses for a given storm event. Without attenuation, this could increase the risk of localised flooding outside the site, resulting in a **minor to moderate** adverse effect on water levels in watercourses and adjacent properties not benefiting from sufficient flood protection. However, the effects on tidal levels in the locality and elsewhere is considered to be negligible. In addition the associated discharge may result in **minor adverse to moderate adverse** effects on the morphology and ecology of the receiving watercourses, through increased erosion/sedimentation as a result of scour. However, the effects on tidal levels in the locality and elsewhere is considered to be negligible..

10.6.10 Following the re-profiling of the site to 5.8mAOD the development will be located within Flood Zone 1. The site area does not form part of the functional floodplain and raising site levels would not cause any significant loss of floodplain storage area. The effect on flood storage is therefore considered to be **negligible**.

10.6.11 Following site reprofiling and provision of a surface water drainage system and mitigation measures as outlined in Appendix 10.2 FRA, the potential effects will be reduced to **negligible to minor**. It is therefore considered that the proposed site is protected by a surface water drainage strategy to a minimum 100-year standard from on-site flooding. Consequent to this, there will be no increase in flood risk to site from tidal waters.

Surface Water Quality

10.6.12 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. These include:

- Fine particulate materials (e.g. silts and clays);
- Hydrocarbons;
- Oils and chemicals (from plant machinery and processes); and
- Process waste/trade waste.

10.6.13 These pollutants may be present as a result of normal operations, traffic, and emergency or accidental spillage. Although often at low levels, cumulatively these can result in poor water quality in rivers and streams which affects biodiversity and amenity. After rainfall, the first flush can often be highly polluting. The significance of the incident would be dependent on the nature of the pollutant, on the mitigation measures adopted and their timing and effectiveness, and on the sensitivity of the receiving watercourse.

10.6.14 No water quality data for The Swale has been provided by the Environment Agency.

10.6.15 Pollution arising from accidental spillages on site such as road traffic accidents could result in a range of effects on watercourses from **negligible to major**. The provision of permanent mitigation measures as outlined in Section 10.7 would reduce the range of potential effects to **negligible to minor**.

Fluvial Flooding

10.6.16 The proposed uplifted site will be raised above the tidal flood plain, With attenuation of site runoff, operation of the site would have a **minor to negligible** effect on the flood risk to the surrounding area should a flooding event occur during this time.

10.7 Mitigation

10.7.1 This section discusses the mitigation requirements proposed for the protection of the site from effects relating to flood risk, hydrology and water quality, over and above those already incorporated within the development design as described in section 10.5.

Surface Water volumes

10.7.2 Temporary drainage facilities are to be provided during the construction phase to ensure the controlled discharge of surface water run-off into nearby watercourses, until such time as the permanent drainage strategy is implemented. These temporary drainage facilities will prevent ponding of surface water within the development site and ensure that the risk of localised flooding is not increased.

10.7.3 The provision of temporary drainage facilities and/or early phasing of the operational water management system would result in a reduction of the likely effect on water runoff and local water levels to a **minor to negligible** effect.

Surface Water Quality

10.7.4 The potential effects identified in relation to surface water quality are applicable to most construction sites. It is common practise for the local planning authority to impose planning conditions requiring a detailed Construction Environmental Management Plan (CEMP) to be submitted for approval prior to any development occurring on the site.

10.7.5 The CEMP will draw on the CIRIA document "Control of Water Pollution from Construction Sites" and the Environment Agency document on "Sustainable Drainage Systems". All construction work should be undertaken in accordance with guidelines including; Environment Agency, Planning Policy Guidance Note 6 (PPG6): Pollution Prevention Guidelines – Working at Construction and Demolition Sites; Environment Agency, Planning Policy Guidance Note 5 (PPG5): Pollution Prevention Guidelines – Working, in, near or liable to affect watercourses;

CIRIA (C532) Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors; CIRIA – SUDS Manual.

10.7.6 The following specific mitigation measures for the protection of surface water during construction activities should be included within the CEMP prepared for the site:

- Management of construction works to comply with the necessary standards and consent conditions as identified by the Environment Agency;
- A briefing highlighting the importance of water quality, the location of watercourses, and pollution prevention included within the site induction;
- Any significant water run-off from the site during the construction phase to be filtered to remove suspended solids prior to discharge to the River Swale. All surface water discharges from construction activities to pass through sediment traps (e.g. settlement lagoons or tanks);
- Areas with prevalent run-off to be identified and drainage actively managed, e.g. through bunding and/or temporary drainage;
- Any water features, such as the potential sediment/attenuation basins to allow for the storage of water on site and for filtration and sedimentation prior to the discharge to controlled waters. The drainage network to include an interceptor system to remove potential contaminants. In this way pollution incidents such as oil releases, will be contained within the water features as required by the Environment Agency;
- Consultation with the Environment Agency to be undertaken regarding any specific consents required to discharge into The Swale;
- 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 to have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage;
- Movement of vehicles and earthworks to not take place near to water features, with disturbance to areas close to watercourses reduced to the minimum necessary for the work;
- Works using concrete to be carefully controlled and concrete wagons will be washed out in a safe area;
- Dust build up and mud deposits to be avoided and stockpiled material covered or stored within a contained area to enable run-off to be treated. This is discussed in the air quality chapter (see chapter 7);

- Excavated material and the surcharging layer 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;
- All plant machinery and vehicles to be maintained in a good condition to reduce the risk of hydrocarbon contamination and should only be active when required;
- Drainage works to be constructed to prevent surface water being affected during earthwork operations. No discharge to surface watercourses will occur without permission from the Environment Agency;
- Wheel washers and dust suppression measures to be used to prevent the migration of pollutants;
- Regular cleaning of roads of any construction waste and dirt to be carried out;
- A construction method statement to be submitted for approval by the relevant statutory authorities prior to the commencement of construction; and
- Consultation with the EA to be ongoing throughout the construction period to promote “best practise” and to improve proposed mitigation measures.

10.7.7 An emergency response plan to be followed in the event of a pollution incident would be developed in consultation with the EA. The plan would include the provision of appropriate emergency response equipment on-site and staff training in emergency procedures. The provision of temporary water quality facilities and/or early phasing of the operational water quality works and the provision of an early response plan would result in a reduction of the likely effect on water quality to a minor adverse to moderate adverse effect.

Tidal Flooding/Fluvial Flooding

10.7.8 Following the proposed uplift of the site to 5.8mAOD will raise the development from within a Flood Zone 2 and 3a to entirely within Flood Zone 1. Therefore, the proposed development will be outside the zone of influence from tidal or fluvial flooding, meaning there will be a **minor to negligible** risk of a flooding from tidal or fluvial sources.

Monitoring/Management Strategies

10.7.9 This section includes details of the management plans that will be required to ensure implementation and delivery of the incorporated and recommended mitigation measures and to monitor the environmental effect of the project. A brief description of each is supplied below

for both construction and operational phases and includes details of the timescales of each management plan and their geographical extent.

Construction Phase

10.7.10 Water quality monitoring. This should be carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediments occurs. The site drainage systems should be monitored downstream of any petrol interceptors to ensure they are removing all potential contaminants and suspended sediments; and

10.7.11 Flood management plan – This plan is applicable throughout the construction phase, and should include flood-warning measures.

Operational Phase

- Drainage maintenance plan – This plan is applicable throughout the lifetime of the development for the drainage within the site, and any connections to the surface water, or foul sewer and trade waste networks;
- Flood management plan – This plan is applicable throughout the lifetime of the development, and should include flood-warning measures. This plan applies to the site on a regional basis;
- Emergency spillage management plan. This plan is applicable throughout the lifetime of the development, and should include emergency measures. This plan applies to the site on a regional basis; and
- Water quality monitoring strategy – Ongoing water quality monitoring should be undertaken throughout the lifetime of the development. This will apply to the drainage ditches within and surrounding the site.
- Use of fire fighting water -

Table 10.6: Summary of Recommended Key Mitigation Measures

Phase	Recommended Mitigation
Construction	Temporary drainage and water quality measures, including petrol and sediment interceptors, surface water storage areas and outfalls / pumps to the nearby drainage ditches.
Construction	Flood management plan for safe site evacuation
Construction	The Code of Construction Practice adopted for the site will be applied to mitigate against potential adverse effects
Operation	Flood management plan for safe site evacuation
Operation	Emergency spillage management plan
Operation	Continued maintenance and repair of surface water drainage network
Operation	Ongoing water quality monitoring

10.8 Residual Impact

10.8.1 The residual effects associated with Hydrology, Flooding and Water Quality represent those effects that have not been assessed and mitigated against as part of the development form. The measures that are considered and assessed as part of the development form are detailed in Section 10.5 Incorporated Enhancement and Mitigation.

Surface Water Run-off Control

10.8.2 Surface water storage areas are proposed for surface water attenuation, Drawing 0301 within the Drainage Philosophy. The maintenance and management of the surface water drainage system and outfall structure(s) will be essential in preventing surface water flooding of the site. Assuming appropriate maintenance and management of the system, the residual effect from surface water flooding would be considered as **minor**.

Surface Water Quality

10.8.3 The maintenance and management of the surface water drainage and adopted emergency spill containment system will be essential in preventing pollution incidences in the receiving watercourse. The surface water drainage systems would be located on private property and its maintenance and management would need to be included in the overall Emergency Spillage Management Plan and the Water Quality Monitoring Strategies for the development. Assuming appropriate maintenance and management of the systems is undertaken, the residual effect to local water quality upon implementing a surface water quality and emergency spill containment system would be considered as **minor to negligible**.

Tidal/Fluvial Flooding

10.8.4 Following the re-profiling of the site the proposed development will not be at risk from either tidal flooding. The residual effect from tidal flooding is therefore considered to be **negligible**.

Summary

10.8.5 Residual effects, their magnitude and significance are summarised in the table below;

Table 10.7 - Summary of Residual Effects

Phase	Effect	Effect Type	Magnitude	Significance
Operation	Surface Water Runoff	Minor	Negligible	Negligible / Minor
Operation	Surface Water Quality	Minor / Negligible	Negligible	Negligible / Minor
Operation	Surface Water	Minor Adverse/	Negligible	Minor adverse

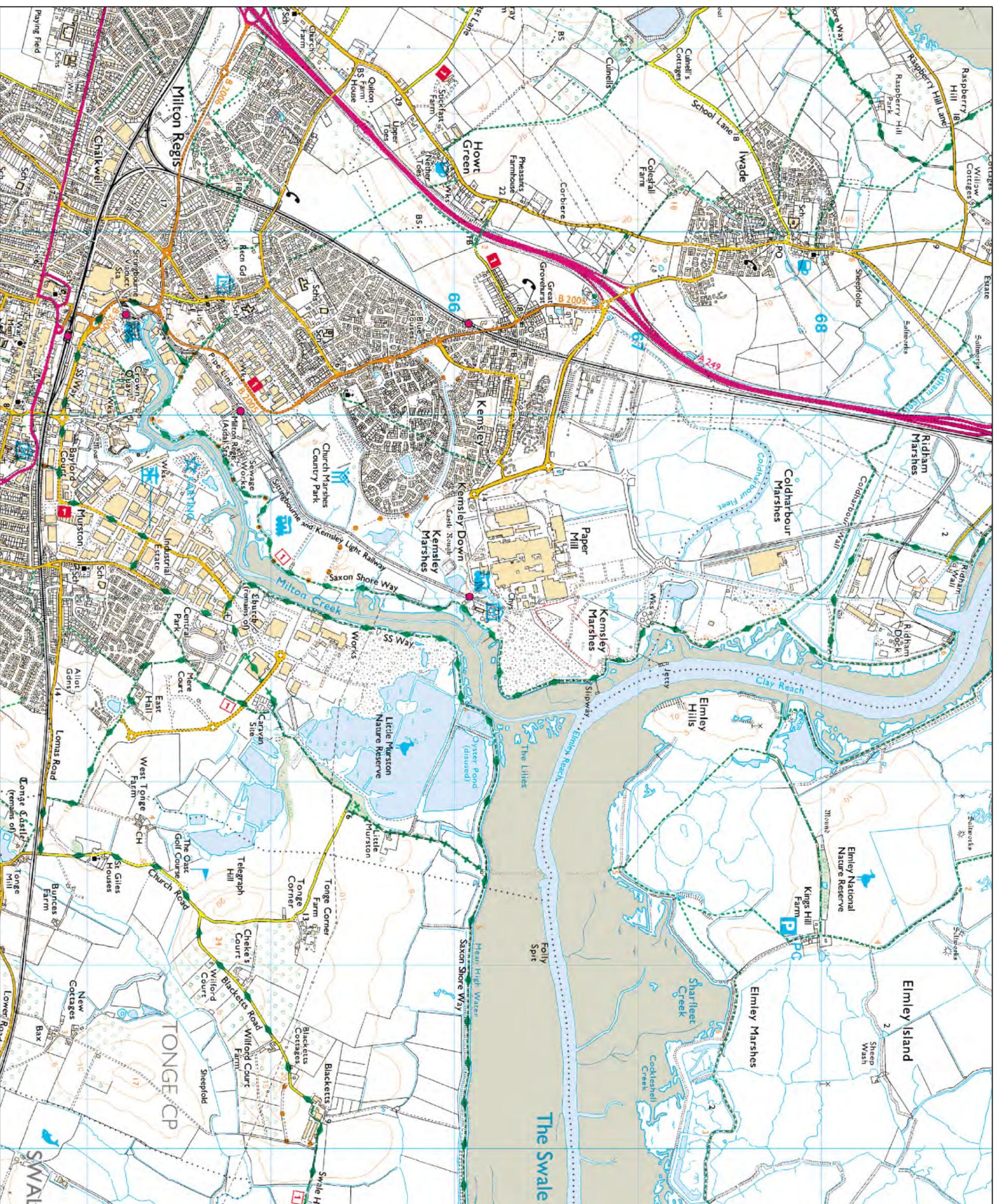
	Quality Emergency Spill	Negligible		/Negligible
--	----------------------------	------------	--	-------------

10.9 Conclusions

- 10.9.1 The site is located approximately 3km north of Sittingbourne centre and 1.3km north of Kemsley town centre. It is bounded to the southwest and west by the St Regis Paper Mill complex, and to the north and east by marsh scrubland with the Swale Estuary
- 10.9.2 A Flood Risk Assessment (FRA) for the site has been completed to meet the requirements of PPS25 and considers the hydrology, surface water, flood defence and flooding issues for the existing site and proposed development.
- 10.9.3 The site is designed to be protected against a 1 in 100 year storm runoff event coinciding with an extreme predicted tidal level (to the year 2070 and including climate change allowance with freeboard). Mitigation measures should be incorporated within the design of the development to ensure its potential effects on flood risk and water quality of the receiving environment are negligible.
- 10.9.4 A number of surface water drains are present on and near to the site, as well as informal drains located off site. Outfalls are present which discharge surface water to the Swale Estuary in times of high surface water events. The proposed development would increase the potential runoff to this watercourse. Therefore a surface drainage strategy has been prepared for the development to mitigate this potential effect. Attenuation of surface waters at the site has been calculated to total approximately 3,200m³. The incorporation of the surface drainage strategy element would result in a negligible effect on surface water flooding.
- 10.9.5 The existing site and proposed development were assessed for tidal flood risk from the Swale Estuary. Following the uplifting of the site to 5.8mAOD the proposed site is will not be at risk from tidal flooding. The effect of tidal flooding on the proposed development has been assessed as negligible.
- 10.9.6 The inclusion of water quality monitoring and flood risk mitigation at the site means that the overall hydrological effect of the proposed development will be negligible and therefore there is no likely significant effect.

10.10 References

- A Better Quality of Life: a Strategy for Sustainable Development in the UK. HMSO. 1999
- Planning Policy Statement 25: Development and Flood Risk. Department of Transport, Environment and the Regions. December 2006
- Land Drainage Act 1991. HMSO
- Water Resources Act 1991. HMSO
- Control of Water Pollution from Construction Sites. CIRIA 2001.
- Sustainable Drainage Systems – A Guide for Developers. Environment Agency
- Landmark Envirocheck Report, Reference 27464042-1-1, dated 13th March 2009;



3RD FLOOR
34 LEBON ST.
LEEDS LS1
TEL: 0113 293 6190
FAX: 0113 243 9161

THIS DRAWING IS NOT TO BE SCALED. ALL DIMENSIONS TO BE CHECKED ON SITE. DISCREPANCIES, AMBIGUITIES AND/OR QUERIES BETWEEN THIS DRAWING AND OTHERS FOR CONSTRUCTION SHOULD BE REPORTED IMMEDIATELY TO THE PROJECT MANAGER.

Kemseley Sustainable Energy Plant

TITLE
Site Location Plan and Surface Water Features

SCALE
1:20,000 @ A3

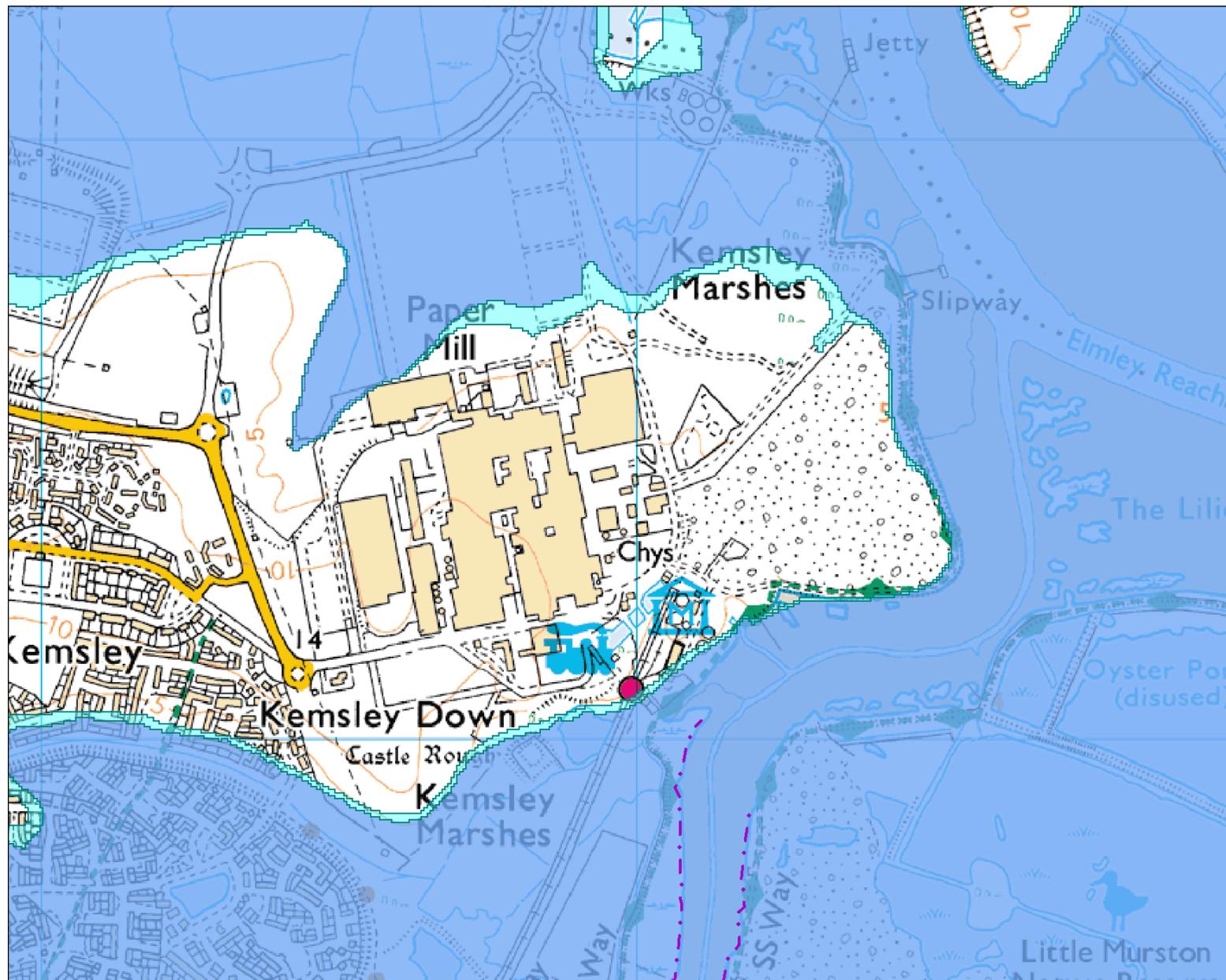
DATE
November 2009

CAD FILE

PROJECT NUMBER
DLE1726

DRAWING NUMBER
Figure 10.1

Flood Map centred on St Regis Paper Mill, Kemsley, Sittingbourne, Kent - Created 19 August 2009



Scale 1:10,001



Legend

- Flood Map - Defences
- Areas Benefiting from Flood Defences
- Flood Map - Flood Storage Areas
- Flood Map - Flood Zone 3
- Flood Map - Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.