FLOOD RISK ASSESSMENT

Kemsley SEP, Sittingbourne, Kent

On Behalf of

WTI

JER6846
Kemsley SEP, Sittingbourne, Kent
V0
03 May 2019

rpsgroup.com

QUALITY MANAGEMENT

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Date:	May 2019	
Revision:	1	
Project Number:	JER6846	
Document Reference:		
Document File Path:		

AMENDMENT RECORD

Revision No.	Date	Reason for Change	Authors Initials
Rv1	03/05/2019	Project Amendments	JM

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1 INTRODUCTION

1.1 Background

1.1.1 RPS Consulting UK and Ireland (RPS) has been instructed to carried out a site-specific Flood Risk Assessment (FRA), produced in accordance with the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) ID7 to support an application seeking Non-Material Amendments (NMAs) associated with thee granted Sustainable Energy Plant (SEP), adjacent to Kemsley Paper Mill, Sittingbourne. The site is located to the north of Kemsley, adjacent to the Paper Mill complex (Drawing 1) operated by DS Smith Plc.

1.1.2 Condition 16 of the planning permission (granted in 2012) requires the development to be carried out strictly in accordance with the original FRA and Surface Water and Foul Drainage Statement submitted in support of that development.

1.1.3 Non-material amendments were granted to the approved plans and drawings including the site layout in 2013, 2015, 2017 and 2018.

1.1.4 Following the appointment of the Engineering, Procurement and Construction (EPC) contractor in August 2016 a number of refinements to the site layout and buildings have been designed. An application seeking the approval of the approval of non-material amendments[1] to the approved plans and drawings of the planning permission including the site layout was granted by the planning authority (Kent County Council) on 21st December 2018 (application Ref SW/18/503317/R).

1.1.5 This FRA is prepared in support of an application[2] to discharge Condition 16 in order to allow the development to be carried out in accordance with the non-material amendments approved in 2018 and a revised Surface Water and Foul Drainage Statement prepared in respect of the amended site layout and variations to the original drainage management.

1.1.6 The key objectives of the FRA are:

- To assess the flood risk to the proposed development and to demonstrate the feasibility of appropriately designing the development such that any residual flood risk to the development and users would be acceptable;
- To assess the potential impact of the proposed development on flood risk elsewhere and to demonstrate the feasibility of appropriately designing the development such that the development would not increase flood risk elsewhere; and

[1] Made in accordance with the provisions of section 96A of the Town and Country Planning Act 1990

[2] Made in accordance with the provision of section 73 of the Town and County Planning Act 1990

- To satisfy the requirements of NPPF and Planning Practice Guidance which require FRAs to be submitted in support of planning applications for development over 1 ha in area.

1.1.7 Developments that are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. Current guidance on development and flood risk identifies several key aims for a development to ensure that it is sustainable in flood risk terms. These aims are as follows:

- The development should not be at a significant risk of flooding and should not be susceptible to damage due to flooding;
- The development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, is threatened;
- Normal operation of the development should not be susceptible to disruption as a result of flooding;
- Safe access to and from the development should be possible during flood events;
- The development should not increase flood risk elsewhere;
- The development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences;
- The development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk. The responsibility for any operation and maintenance required should be clearly defined;
- Future users of the development should be made aware of any flood risk issues relating to the development;
- The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues;
- The development should not lead to degradation of the environment; and
- The development should meet all of the above criteria for its entire lifetime, including consideration of the potential effects of climate change.

1.1.8 The FRA is undertaken with due consideration of these sustainability aims.

1.2 Project Scope

1.2.1 In order to achieve the aims outlined above a staged approach has been adopted in undertaking this FRA in accordance with current best practice. First, a review of the original FRA prepared by RPS in support of the application was undertaken, as well as new legislation/guidance, EA flood

risk data and BGS geological map for the updates Kemsley SEP site layout to determine any potential flood risk and attenuation requirements. The aim of the study is to review all available information and provide a qualitative assessment of the flood risk to the site and the impact of the site on flood risk elsewhere.

1.3 Report Structure

1.3.1 This FRA has the following report structure:

- Section 2 identifies the sources of information that have been consulted during the FRA;
- Section 3 gives a description of the application area including the existing and proposed development;
- Section 4 provides a hydrological review off the site and undertakes a flood risk assessment of the proposed development scheme;
- Section 5 describes the sites vulnerability status in line with the NPPF and Planning Practice Guidance
- Section 6 describes / highlights the site drainage and any potential impacts of the proposed development on surface water drainage;
- Section 7 describes / determines the risk management options available to reduce and manage the flood risk at the site; and
- Section 8 provides a summary and conclusions to the report.

2 SOURCES OF INFORMATION

2.1 Introduction

2.1.1 Table 1 below lists the information sources consulted during the preparation of this report:

Table 1: Information Sources Consulted during the preparation of the Report

Consultee	Source	Information consulted/ provided
Ordnance Survey	OS Mapping 1: 50 000 Sheet 178: Thames Estuary. Environment Agency.	Area information, rivers and other watercourses, general site environs, built environment, catchment Information.
British Geological Survey.	BGS (online) Geology of Britain Viewer. Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html	Site and area geology.
Environment Agency (EA).	EA data holdings, customer service and engagement team.	Current flood risk, local flood defences, flood levels, supplementary geology and groundwater information.
Local Planning Authority (LPA). Swale Borough Council	Swale Borough Council: Local Plan	Flood Zoning Local Development Framework.
Water Utility Company.	Thames Water	Water and sewerage assets in the vicinity of the site
UK Government: Department for Communities and Local Government.	National Planning Policy Framework (NPPF). Planning Practice Guidance.	Flood Risk Assessment and Planning Guidance. Flood zoning for the site as used by the EA in England.

2.1.2 The reports consulted during the preparation of this document are listed below:

Table 2: Reports consulted during preparation of the document

Consultee	Source	Information Consulted/ Provided
Swale Borough Council	Swale Borough Council, Strategic Flood Risk Assessment for Local Development Framework (October 2009)	Current Flood Zone / risk to the site including historical flooding locations. Any relevant flood modelling complete for the site.
	Swale Borough Council Local Plan	Flood Zoning Local Development Framework.
EA	Environment Agency, North Kent Rivers Catchment Flood Management Plan.	Flood risk management policies.

2.2 Legislation and Guidance

National Planning Policy Framework, February 2019.

2.2.1 The NPPF sets out Government planning policies for England and how these are expected to be applied. The framework acts as guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications.

2.2.2 Paragraphs 99-104 set out the need for an appropriate assessment of flood risk. Guidance on the minimum requirements for such as assessment is contained in PPG ID7.

2.2.3 The NPPF requires the application of a sequential risk-based approach to determining the suitability of land for development in flood risk areas, and that flood risk assessment should be carried out to the appropriate degree, at all levels of the planning process.

Planning Practice Guidance, online.

2.2.4 PPG ID7 Flood Risk and Coastal Change provides guidance to ensure the effective implementation of the NPPF planning policy for development in areas at risk of flooding.

2.2.5 PPG ID7 states that a site specific FRA is required for all proposals for new development in Flood Zones 2 and 3 and for any proposal of 1 hectare or greater in Flood Zone 1. An FRA should consider vulnerability to flooding from other sources as well as from river and sea flooding, and also the potential for any increased risk of flooding elsewhere resulting from a development.

Kent County Council: Minerals and Waste Local Plan 2013 – 2030 (July 2016)

2.2.6 The overarching framework and planning policies set out in this Plan will help the County Council decide whether to allow new development for mineral extraction, importation and waste recycling. It will set a framework for the management of all waste streams that are generated or managed in Kent. The policies seek to ensure that the natural landscapes of Kent are preserved, and the highest standards of site restoration are achieved. The Plan will also help district and borough councils take minerals and waste considerations into account when making decisions on other forms of development.

2.2.7 The policies relevant to hydrology and flood risk are outlined below;

Policy DM1: Sustainable Design

2.2.8 Proposals for minerals and waste development will be required to demonstrate that they have been designed to:

- Minimise greenhouse gas emissions and other emissions;
- Minimise energy and water consumption and incorporate measures for water recycling and renewable energy technology and design in new facilities where possible;

- Maximise the re-use or recycling of materials;
- Utilise sustainable drainage systems wherever practicable;

Policy DM10: Water Environment

2.2.9 Planning Permission will be granted for minerals or waste development where it does not:

- Result in the deterioration of physical state, water quality or ecological status of a water resource and waterbody, including rivers, streams, lakes and ponds;
- Have an unacceptable impact on groundwater Source Protection Zones; and
- Exacerbate flood risk in areas prone to flooding and elsewhere, both now and in the future.

2.2.10 All minerals and waste proposals must include measures to ensure the achievement of both no deterioration and improved ecological status of all waterbodies within the site and/or hydrologically connected to the site. A hydrogeological assessment may be required to demonstrate the effects of the proposed development on the water environment and how there may be mitigated to an acceptable level.

Swale Borough Council: Local Plan (Adopted July 2017)

2.2.11 The document sets out detailed planning policies and proposals for the Swale Borough Council.

2.2.12 The Local plan is a strategic document providing broad guidance on the scale and distribution of development and the provision of supporting infrastructure. It contains 'higher level' policies for delivering the spatial vision, guiding broad patterns of development and constraint. It also contains policies setting out the criteria to be taken into account by the Local Planning Authority in determining proposals for development and the use of land and buildings.

2.2.13 The policies relevant to hydrology and flood risk are outlined below;

Policy CP 4: Requiring good design

2.2.14 All development proposals will be of a high quality design that is appropriate to its surroundings. Development proposals will, as appropriate:

2.2.15 Maximise opportunities for including sustainable design and construction techniques use of recycled and recyclable materials, sustainable drainage systems, carbon reduction and minimising waste.

Policy DM 21: Water, flooding and drainage

2.2.16 *When considering the water-related, flooding and drainage implications of development, development proposals will:*

- Accord with national planning policy and planning practice guidance;

- Avoid inappropriate development in areas at risk of flooding and where development would increase flood risk elsewhere;
- Provide site specific flood risk assessments, as required, carried out to the satisfaction of the Environment Agency and, if relevant, the Internal Drainage Board. These will, where necessary, include details of new flood alleviation and flood defence measures to be installed and maintained by the developer;
- Include, where possible, sustainable drainage systems to restrict runoff to an appropriate discharge rate, maintain or improve the quality of the receiving watercourse, to enhance biodiversity and amenity and increase the potential for grey water recycling. Drainage strategies (including surface water management schemes) for major developments should be carried out to the satisfaction of the Lead Local Flood Authority;
- Integrate drainage measures within the planning and design of the project to ensure that the most sustainable option can be delivered, especially where, exceptionally, development is to be permitted in an area of flood risk;
- Within areas at risk of flooding, submit a suitable flood warning and emergency plan that has been approved by the relevant emergency planning regime and, where appropriate, the emergency services;
- Where necessary, demonstrate that adequate water supply and wastewater connection and treatment infrastructure is in place before construction commences and that these details have been approved by the appropriate water company and funded by the development where appropriate;
- Ensure future unconstrained access to the existing and future sewerage and water supply infrastructure for maintenance and up-sizing purposes;
- Make efficient use of water resources and protect the yield of local public water supplies. For new residential development, all homes to be designed to achieve a minimum water efficiency of 110 litres per person per day, in line with the Government's Housing Optional Technical Standard for water efficiency; and
- Protect water quality, including safeguarding ground water source protection zones from pollution, to the satisfaction of the Environment Agency.

Climate Change

2.2.17 The National Planning Policy Framework (NPPF) sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. NPPF and supporting planning practice guidance on Flood Risk and Coastal Change explain when and how flood risk assessments should be used. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

2.2.18 In February 2019 the EA updated advice on climate change allowances to support NPPF. New guidance requires that flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances (Table 3) to understand the range of impact.

Table 3: Peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

2.2.19 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. With specific reference to changes to extreme rainfall LIT 5707 notes that UKCP09 provides useful information on change to rainfall across the UK.

2.2.20 RPS has added 20% to all attenuation / runoff calculation for the development to account for climate change.

3 SITE SETTING

3.1 Site Location

3.1.1 The proposed development 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 Kemsley Paper Mill complex, operated by DS Smith Plc and to the north and east by marsh scrubland with the Swale Estuary beyond.

3.1.2 The National Grid Reference of the site is 592070, 166551. The location plan is shown in Drawing 1.

3.2 Pre - Existing Site

3.2.1 The application area encompassed a roughly rectangular shaped parcel of land of approximately 7 ha. The site is currently under construction, with the attenuation pond and outline foundations in place (Drawing 3). The site previously consisted of vegetated marshland, a number of spoil heaps approximately 1-2m in height and areas of construction waste materials.

3.3 Proposed Development

3.3.1 This FRA is prepared in respect of the Sustainable Energy Plant granted planning permission in March 2012, as amended by the Non-Material Amendment application approved in 2018. The non-material amendments include a revised site layout as shown on Figure 4.3D, revised drainage layout as shown on Figure 4.24D and 4.25D.

3.3.2 A site concept plan has been developed for the proposed development site and is shown in Drawing 1.

3.4 Topography

3.4.1 The area surrounding the SEP site is levelled to a minimum 5.8m AOD with foundation slabs raising the finished development level to 6.3m AOD.

4 FLOOD RISK

4.1 Hydrological Overview

4.1.1 The nearest watercourses to the proposed development site are a number of drain networks, which lie to the north and south of the site. OS data and information obtained from a site visit by an RPS hydrologist notes a culverted drain beneath the site access road on the northwest edge of the site. The drain flows south to north and converges with a number of other drainage networks and then flows east into The Swale, the watercourse that separates the Kent mainland from the Isle of Sheppey.

4.1.2 The tidally dominated Swale is approximately 55m to the north east of the proposed development site and has been classified by the EA as the main source of flooding. Therefore, fluvial flooding has not been assessed further within this report.

4.1.3 The North Kent Rivers Catchment Flood Management Plan (CFMP) indicates that the site is located within a Policy Option 3 area (Areas of low to moderate flood risk where we are generally managing existing flood risk effectively).

4.1.4 The Environment Agency's (EA) flood map (Figure 1) indicates that the majority of the site lies primarily within Flood Zone 2 and 3a (FZ2 and FZ3a), with FZ2 having a 'medium' probability of flooding. A section within the western extent of the site is defined as being within Flood Zone 1.

4.1.5 The Swale Borough Council SFRA (2010) indicates that the southern and eastern boundaries are within Flood Zone 3a (Appendix 2).

4.1.6 The EA map indicates that areas within FZ3a benefit from flood defences.

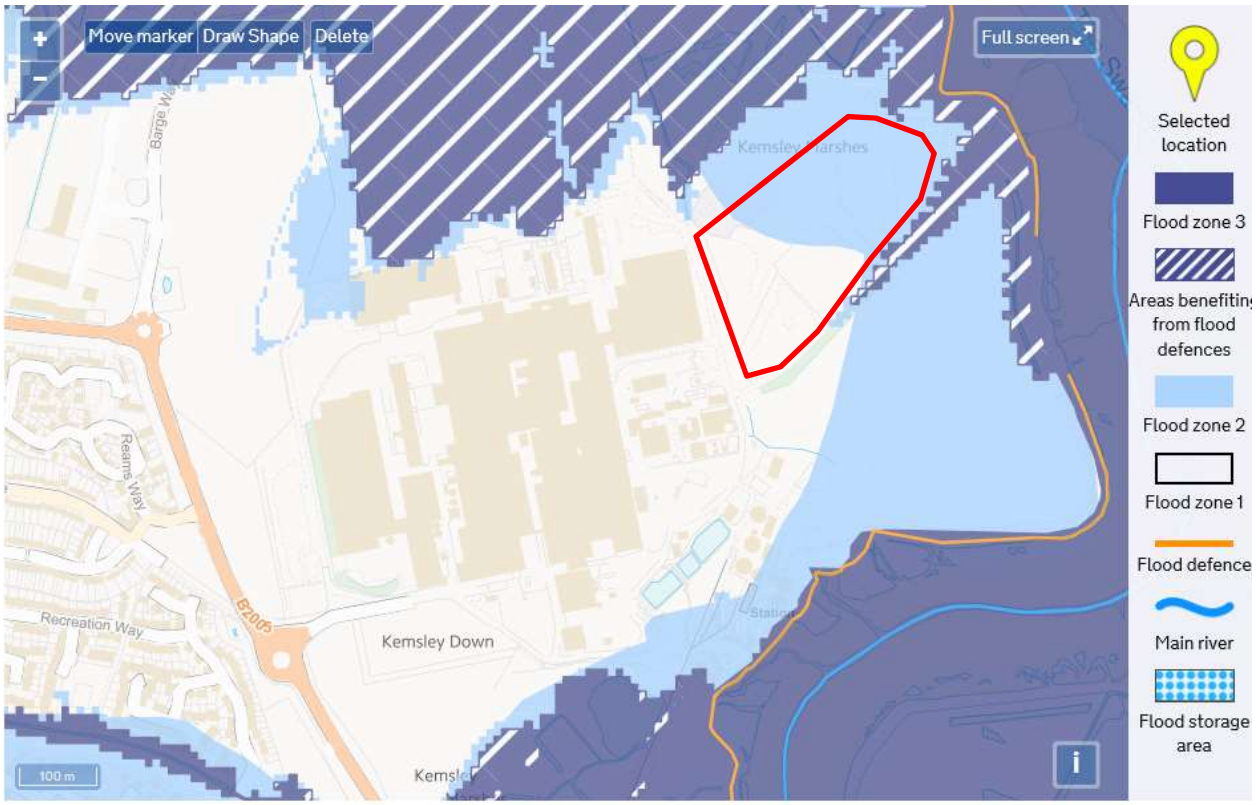


Figure 1: EA Flood Map for Planning (Rivers and Sea)

Tidal Flooding

4.1.7 In line with the consented SEP scheme (March 2012) and per EA advice provided during the NMA pre application meeting (24th November 2016) the profiled site level has been assessed against tidal flood modelling data up to and including 2070 climate change scenarios.

4.1.8 Data supplied by the EA (Appendix 1) from the North Kent coast Modelling and Mapping Study (JBA Consulting August 2013) indicates that during the 'worst-case' undefended 0.5% AEP 2070 event tidal water would reach a level of 5.28 mAOD. The relevant information supplied by the EA is presented below:

Table 4: Defended modelled Tidal Flood Levels

Node Location ID	Modelled Tidal Flood levels for Annual Exceedance Probability (mAOD)					
	National Grid Ref		Defended			
	Easting	Northing	5% AEP 2012	0.5% AEP 2012	0.5% AEP 2070	0.1% AEP (2012)
3	592174	166953	0.00	0.00	0.00	0.00

6	592170	166731	0.00	0.00	0.00	0.00
8	592145	166588	0.00	0.00	0.00	0.00

Table 5: Undefended modelled Tidal Flood Levels

Node Location ID	Modelled Tidal Flood levels for Annual Exceedance Probability (mAOD)					
	National Grid Ref		Undefended			
	Easting	Northing	5% AEP 2012	0.5% AEP 2012	0.5% AEP 2070	0.1% AEP (2012)
3	592174	166953	4.07	4.71	5.28	5.17
6	592170	166731	0.00	0.00	0.00	0.00
8	592145	166588	0.00	0.00	0.00	0.00

4.1.9 Undefended tidal flood model outlines indicate that part of the southern and eastern extent of the site would be flooded during the 0.5% AEP (2070) undefended flood event with tidal levels reaching 5.28 mAOD. The proposed development will be profiled to a minimum of 5.80 mAOD and therefore would remain flood free for the lifetime of the development.

4.1.10 RPS considers the consented scheme to be elevated above the tidal flood risk and effective within Flood Zone 1.

4.2 Flood Defence Details

4.2.1 Existing flood defences along the eastern extent of the site (Appendix 1) are made up of raised walls and embankments. These flood defences provide a 1 in 1,000 year standard of protection.

4.2.2 The EA currently has no planned improvement works to these defences.

4.3 Groundwater Flooding

4.3.1 The EA has confirmed that they have no record of groundwater flooding at the proposed development site.

4.3.2 Previous ground investigations have noted a shallow water table within the superficial deposits at the site (Alluvium – clay Silty, Peaty and sandy), which maybe in hydraulic continuity with nearby water courses and may therefore fluctuate with the tide. The superficial deposits are classified as a secondary (undifferentiated) aquifer. A site investigation conducted by RPS (July 2009) indicates wide spread seepage within the made ground and alluvium layers. It is likely that this

represents a perched system. A deeper groundwater system (most likely in continuity with the Swale estuary) was encountered at a depth of 14 m below existing ground level.

4.3.3 The superficial soils are underlain by a bedrock geology comprising Eocene-aged London Clay, a negligibly permeable non-aquifer. The London Clay is generally regarded as containing insignificant quantities of groundwater, but is underlain by more permeable Eocene Woolwich and Thanet sand beds. These are major aquifer units that can provide significant quantities of groundwater for abstraction.

4.4 Source Protection Zones

4.4.1 EA records indicate that the nearest source protection zone 3 is located 1.4km to the southwest of the southernmost point of the site.

4.5 Surface Water Flooding

4.5.1 Surface Water flooding occurs when rainfall precipitation rates exceed ground infiltration rates, causing rainfall to run off across the ground surface. This is common on low permeability surfaces such as asphalt and concrete, on saturated ground, and on compacted or low permeability natural soils such as the clayey soils that occur within site. It is often localised with flows being conveyed into natural surface channels or artificial drainage systems.

4.5.2 Surface water flood mapping produced by the EA (Figure 2 below) indicates that the majority of the site is at ‘very low’ risk with a chance of flooding each year of less than 1 in 1000 (0.1%). Localised areas within the site are defined as being at low risk (between 1 in 1000 (0.1%) of surface water flooding.

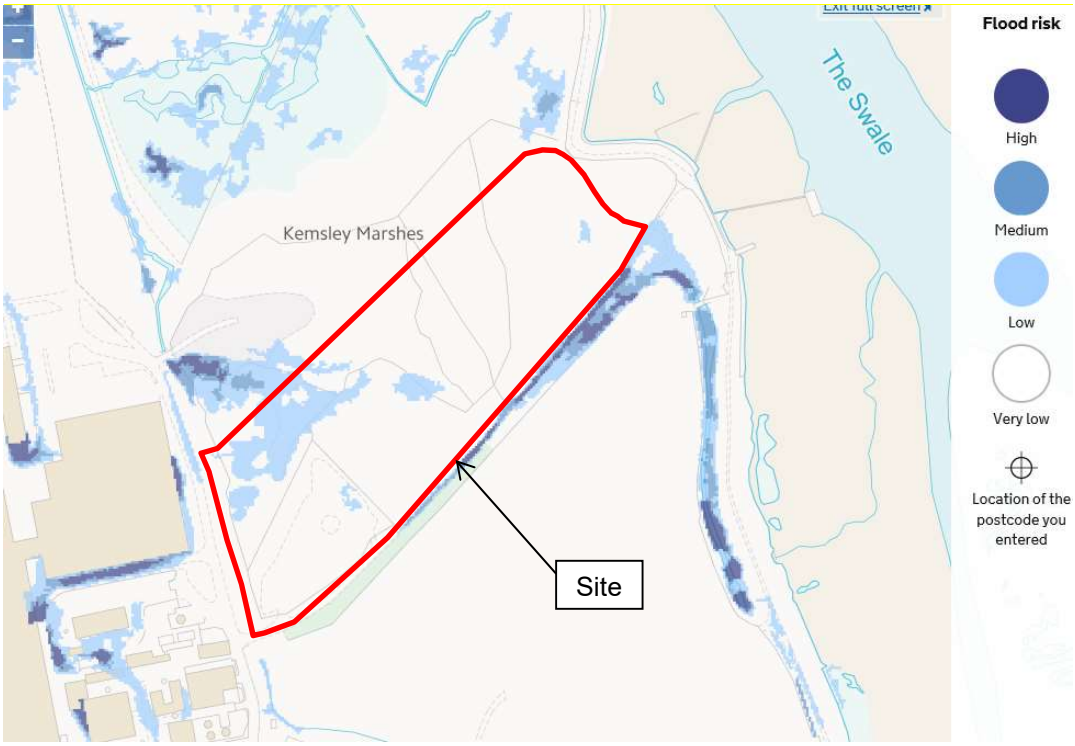


Figure 2: EA Surface Water Flood Map

4.6 Flooding due to infrastructure failure

4.6.1 No potential sources of flooding from artificial drainage systems, sewers, ponds or reservoirs have been identified and none have been reported.

4.7 Other Sources of Flooding

4.7.1 No other potential sources of flooding have been identified.

4.8 Historical Flood Events

4.8.1 Historical flood data received from the EA (Appendix 1) indicates that the site was flooded during February 1953.

4.9 Current Flood Risk

4.9.1 The EA flood map indicates that the only significant source of flooding is from the tidally dominant Swale.

4.9.2 The proposed development site lies within Flood Zone 1, 2 and 3 as shown on the EAs flood Map, therefore has a 'low to high probability' of flooding from extreme tidal events. Flood modelling undertaken for the North Kent coast Modelling and Mapping Study noted the site would be flooded up to a level 5.28 mAOD during a 2070 undefended tidal event.

4.9.3 As the site has been levelled to provide a finished floor level of a minimum of 5.80 mAOD, RPS consider the site to be within Flood Zone 1, at low risk of flooding from all sources.

5 FLOOD RISK VULNERABILITY CLASSIFICATION

5.1.1 In accordance with the Flood Risk Vulnerability Classification in Table 2 of the Planning and Practice Guidance Flood Risk and Coastal Change, the proposed SEP development is classified as 'Essential Infrastructure' to be located on land reprofiled to be within Flood Zone 1.

5.1.2 Table 3 of Planning Practice Guidance (Table 8 of this report) indicates that 'Essential Infrastructure' uses are appropriate for the locations in Flood Zone 1, with no requirement for a sequential test.

Table 6: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability classification (see Table 3 of Planning Practice Guidance)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Yes	Exception test required	Yes	Yes
Zone 3a	Exception test required	Yes	No	Exception test required	Yes
Zone 3b Functional Floodplain	Exception test required	Yes	No	No	No

Key: Yes: Development is appropriate, No: Development should not be permitted

6 SITE DRAINAGE

6.1 Surface Water Drainage

6.1.1 The sustainable management of surface water is an essential element of reducing future flood risk to the site and its surroundings.

6.1.2 Undeveloped sites generally rely on natural drainage to convey or absorb rainfall, the water soaking into the ground or flowing across the surface into watercourses.

6.1.3 The effect of development is generally to reduce the permeability of at least part of the site, which markedly changes the site's response to rainfall. Without specific measures to manage surface water the volume of water and peak flow rate are likely to increase. Inadequate surface water drainage arrangements can threaten the development itself and increase the risk of flooding to others.

6.1.4 Surface water arising from a developed site should as far as is practicable be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development while reducing the risk of flooding at the site and elsewhere, taking climate change into account.

6.1.5 The site will drain directly into The Swale, and hence the EA has not required a reduced run-off rate following the site development. However, the EA has requested that the proposed development incorporates attenuation facilities that can store site run-off for a 1 in 100 year storm event coinciding with an extreme tidal flood event.

6.2 Legislative background

6.2.1 Following the implementation of the Flood and Water Management Act 2010 local flood risk has become the responsibility of the Local Planning Authority. The Act places new duties on upper tier Councils, by designating them as Lead Local Flood Authorities (LLFAs) for the coordination of local flood risk management in their respective administrative areas.

6.2.2 From April 6 2015 the responsibility for drainage and surface water management design approval resides with the local planning authority and the design of the drainage and surface water management should be submitted as part of the planning process.

6.2.3 The local planning authority has responsibility for the approval of proposed drainage systems in new developments and redevelopments. Approval must be given before any developer can commence construction. In order to be approved, the proposed drainage system would have to meet national standards for sustainable drainage.

6.2.4 The local planning authority is also responsible for adopting and maintaining SuDS which serve more than one property, which they have approved. The Highways Authorities will be responsible for maintaining SuDS in public roads to National Standards.

6.2.5 The National Standards set out the criteria by which the form of drainage appropriate to any particular site or development can be determined, as well as requirements for the design, construction, operation and maintenance of SuDS.

6.2.6 Additional guidance for the use of SuDS is provided via CIRIA and BRE in the following:

- C753 – The SuDS Manual, 2015.
- C522 Sustainable Drainage Systems- Design Manual for England and Wales
- C523 Sustainable Drainage Systems- Best practice
- C156 Infiltration Drainage – Manual of Good practice
- BRE365 Soakaway design

6.3 Discussion with Regulators

6.3.1 Joseph Williamson, a Development and Flood Risk Officer at the Environment Agency was contacted in June 2009 to discuss the nature and scale of flood risk at the site. EA data indicates that the majority of the site is located within Flood Zone 1.

6.3.2 RPS were provided with the latest EA flood model data (2013) and understood that the 0.5% AEP (2070) flood level would be 5.28mAOD. Reprofiling of the site to a minimum of 5.8 mAOD would bring the site above the tidal flood level and therefore not at flood risk. This approach had been agreed with the EA at the pre-application stage for the current IBA facility application. The EA also stated that the North Kent Model is currently being updated but is not expected change in respect of the site.

6.3.3 To ensure that the site does not become ‘tide locked’ the EA has requested that appropriate SUDS techniques are implemented to attenuate a 1 in 100 year with climate change (20%) storm event coinciding with the extreme tidal event. As the site is tidally influenced the EA has not specified any maximum discharge rates.

6.3.4 Subsequent to the above RPS outlined the Non Material Amendment’s and methodology applied to assessing the development against new hydrological model data during a meeting with the EA in November 2016. Following the meeting the EA has provided a letter (Appendix 1) stipulating, no objection to:

- Variation 1 – Single pipe system.
- Variation 2 – Bypass interceptors.
- Variation 3 - Change of outfall level.

- Variation 6 - Unrestricted discharge rate to the Swale Estuary.
- Variation 7 – New enhanced ditch.
- Variation 8 – Dedicated process drainage network for effluent.
- Variation 9 - Removal of the automated vehicle wash.

6.3.5 The remaining NMAs have been directed to Kent County Council with no objections raised (Appendix 1).

6.4 Current Runoff Rate

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

6.5 Proposed Runoff Rate

6.5.1 Correspondence with the EA's Development and Flood Risk Officer has determined that given the locality of the proposed development to a tidally influenced water source that no reduction in discharge rates will be applicable for the proposed development, as noted in by the EA below:

6.5.2 "*…as it [is] likely that it [the proposed development] is intended to discharge the surface water directly to the tidal creek, it is unlikely that we [EA] will require attenuation of the surface water to reduce the rate at which water flows to this watercourse. However, we [EA] would advise that SuDS are utilised and that space is made available for the attenuation of water should an extreme rainfall event coincide with an extreme tidal event, resulting in the site becoming tide-locked. We [EA] would advise that the 100yr rainfall event (plus climate change 20%) be investigated as the critical event*."

6.6 Sustainable Drainage Options

6.6.1 The NPPF and associated Planning Practice Guidance, CIRIA C753 SuDS Manual (2015) and also the Swale Borough Council Local Plan (2008) promote sustainable water management through the use of SuDS. A hierarchy of techniques is identified:

1. **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
2. **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
3. **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).

4. **Regional Control** – management of runoff from several sites, typically in a detention pond or wetland.

6.6.2 It is generally accepted that the implementation of SuDS as opposed to conventional drainage systems, provides several benefits by:

- reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed sites;
- improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources;
- reducing potable water demand through rainwater harvesting;
- improving amenity through the provision of public open spaces and wildlife habitat; and
- replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

6.6.3 RPS has prepared a Surface Water Management and Foul Drainage Design Philosophy Statement, Ref NK016315, December 2016, (Appendix 3), the Philosophy incorporates the NMA's submitted as part of the S73 application and indicates that water storage ponds allowing the gravity controlled discharge of 'clean/treated' surface to the Swale would be the most appropriate SuDS competent solution and that direct infiltrating SuDS are deemed inappropriate. The storage pond will also provide protection against flooding of the site during design rainfall and tidal events. It is proposed that the detailed design of the final scheme would be agreed with the EA.

6.6.4 The Surface Water Management and Foul Drainage Design Philosophy Statement (Appendix 3) outlines the mitigation measures that would be implemented during the operation phase of the SEP development in order to reduce the pollution/aquifer contamination risk. A summary of the Philosophy is outlined below.

Basic Criteria for Design

6.6.5 The surface water drainage system will be designed in accordance with the following basic criteria:

- All network pipework will be designed for no surcharging above pipe soffit for 1 in 2 year design storms.
- The system shall be designed not to flood (as defined above) for 1 in 100 year +20% climate change design storms.
- The site drainage serving the roofs and external areas will discharge freely to the storage pond for all rainfall events.

- The drainage networks will be designed, and flooding simulated using MicroDrainage software. All drainage will generally be designed in accordance with BS EN 752-2008: Drain and Sewer Systems outside buildings and the recommendation outlined in the 7th Edition of Sewers for Adoption.
- The roof drainage for the various buildings comprising the facility shall be siphonic drainage systems designed to provide category 3 protection (as described in BS EN12056:3) and a 25-year design life. The siphonic drainage systems and gutters will therefore be designed for 1 in 100 year return period storms.

6.6.6 For the main buildings, a single primary siphonic system is proposed. This will be designed to take rainfall intensities of up to 231 mm/hr and discharge directly to the underground drainage system. Overflows will also be implemented such that in the event of an exceptional rainfall event or blockage the water can still be discharged from the gutter.

6.6.7 Full details of the surface water drainage design can be found in the Surface Water Management and Foul Drainage Design Philosophy Statement, Ref NK016315, December 2016.

Coincidence of Design Rainfall and Tidal Events

6.6.8 As stated, the EA has not imposed any specific requirements to restrict offsite surface water flow rates are entering the Tidal Swale Estuary. Due to the tidal nature of the outfall, the outfall from the proposed site will not have any impact on flood risk in the Tidal Swale Estuary.

Tidal Range

6.6.9 UK Hydrographic Office Admiralty Tide Table data indicate that the mean fortnightly semi-diurnal spring tide high water level is approximately 2.9 mAOD. An outfall invert at 2.65 mAOD will be submerged for a maximum period of 5.8 hrs.

6.6.10 The total rainfall that falls on the site during the 5.8 hrs (360 minute) timeframe when the outfall is submerged for a 1 in 100 year rainfall event during has been calculated as 73.7mm (based on FEH version 3) and 88.5 mm including 20% climate change.

6.6.11 The impermeable surfacing for Kemsley SEP is 3.4 ha, combined with the area occupied by the attenuation pond (c.5000 m^2) storage is proposed to accommodate runoff from a total 3.9 ha.

6.6.12 This generates a total runoff volume requirement during the 360 minute when the outfall is submerged for a 1 in 100 year + 20% climate change rainfall event of 3500 m^3.

6.6.13 Full details of the attenuation scheme is presented in the Surface Water Management and Foul Drainage Design Philosophy Statement, Ref NK016315 and Drawings 16315 / A0 / 0250 and 16315 / A0 / 0301.

Sustainable Drainage Systems (SuDS)

6.6.14 With reference to NPPF and CIRCA SuDS Manual C753 a sustainable approach to the management of surface water drainage is to be adopted:

- The perimeter of the storage pond will be vegetated and will hold, slow down and contribute to treatment of the run-off water. The pond will prevent uncontrolled discharge water entering areas of land adjacent the site.
- The water reclamation systems indicated, represent additional source control in addition to providing a useable resource.

6.6.15 The ground conditions comprising essentially cohesive impermeable strata to considerable depth and the presence of perched water table preclude the use of infiltration devices.

Process Drainage

6.6.16 The following measures will be implemented to deal with waste process water generally. In the tipping hall and bunker it is not intended that any dedicated internal drainage is provided with all water draining into the bunker and soaking into the waste. The bottom ash storage will drain to the dedicated process drainage network in which effluent is collected, treated and recirculated inside the plant.

- Buildings or equipment areas where waste water is generated or the risk of spillage of fuel, oil, condensate etc. is present will be provided with internal building drainage as necessary.
- It is envisaged that waste water associated with the boiler process will be recycled for slag cooling purposes.
- Level entry doors will be provided with threshold channel drains discharging to the foul system. Perimeter upstands and ramped access to ensure all spillages, leaks, etc. remain with the building footprint.

Foul Drainage

6.6.17 Foul drainage will discharge (rates to be agreed with the receiving sewer owners and/or the Water Authority) to the existing foul sewer located within Ridham Avenue. The remoteness of some of the areas requiring connection to the foul system will require that a pumping station and rising main are provided to discharge foul water to the receiving sewer at self-cleansing velocities.

6.6.18 The new site foul drainage will be designed in accordance with BS EN 752, 7th Edition of Sewers for Adoption and the requirements of the Building Regulations.

7 FLOOD MANAGEMENT

7.1 Introduction

7.1.1 EA undefended 0.5% AEP (2070) tidal flood modelling indicates tidal flood level would reach 5.28 mAOD. The site would be profiled to a minimum of 5.80 mAOD; therefore, the site would remain flood free.

7.2 Flood Warning

7.2.1 The EA aims to provide up to 12 hours before the issue of a Flood Warning. It is recommended that the site operator liaises with and registers on the EA Flood Warning System and implement on site management strategies to ensure that they can communicate flood warnings efficiently in order that the site can be evacuated.

7.2.2 It is recommended that a Flood Evacuation Plan is developed as land surrounding the site would be at risk of flooding. Staff training would also be required, with the plan including information on what to do upon receipt of a flood warning, together with evacuation procedures and routes.

7.2.3 Flood Plans should be practiced regularly in order to minimise the risk to people.

7.2.4 Suitably trained staff would need to convey flood warning information and emergency procedures to occupants. All site personnel and contracted night security services would be required to be familiar with the flood action plan. Appropriate signage across the site (i.e. exits and assembly points) should be installed.

7.2.5 Additional information on the Environment Agency Flood Warnings and advice on what each warning can be found at the flood information surface (https://flood-warning-information.service.gov.uk/).

7.3 Safe Access/Egress

7.3.1 As noted in section 7.2 there is likely to be up to 12 hours before floodwater impact upon the site. Therefore, there should be sufficient time for occupants to safely evacuate the site.

7.3.2 In the unlikely event that the site would be flooded, flood water would propagate across the site from the east. Occupants would evacuate the site heading west to the Kemsley Paper Mill site and then out onto Swale Way in an area located within Flood Zone 1.

7.3.3 The incorporation of flood resistance and resilience measures at the site, together with the implementation of a flood evacuation plan, would reduce the risk of damage and ensure the safety of occupants.

7.4 Proposed Surface Water Management

7.4.1 The following recommendations regarding construction phase pollution control have been included within the Surface Water Management and Foul Drainage Design Philosophy Statement (Appendix 3) and outlined below:

Construction Phase Pollution Control

7.4.2 Safeguards shall be implemented during the construction phase to minimise the risk of pollution and detrimental effects to the water interests around the site. The following general mitigation measures shall be implemented.

- Works on site shall generally follow the best practice guidelines outlined in Section 5 and 6 of CIRIA C532 – Control of Water Pollution from Construction Sites.
- Temporary foul drainage to serve the contractors welfare facilities will be provided at the start of works on site.
- Refuelling and maintenance of machines shall be strictly controlled, and oil storage tanks confined to locations remote from the perimeter of the site. All leaking or empty oil drums shall be immediately removed from site.
- Well-constructed and designated storage areas shall be provided located more than 20m away from the site perimeter. Chemical or fuel storage shall comprise of impermeable boxes and appropriate bunding.
- On site concrete batching plants (if utilised) are to be located more than 20m away from the site perimeter. The washing out of any concrete mixing plant or cleaning of ready-mix concrete tankers shall be strictly controlled. The effluent from such cleaning shall be tankered off site or suitably treated using sedimentation tanks before the run-off is discharged.
- A strict waste management system will be incorporated to prevent the disposal of construction or domestic rubbish entering the adjacent marshland areas. Waste materials will be properly stored on site.
- Fill material imported to upfill to site will be sourced with due regard to leachate characteristics to the approval of the EA and Natural England. It is anticipated that the storage pond required for the permanent works will be constructed in advance of the earthworks operations such that construction phase storage and settling pond capabilities are available from the start of the works, and to provide tidal inundation protection to the construction site.
- Regular cleaning of roads of any construction waste and dirt will be carried out.
- A construction method statement will be submitted for approval by the relevant statutory authorities prior to the commencement of construction.

Water Quality during Operation

7.4.3 Surface water runoff can contain a wide range of contaminants such as oil, organic matter and toxic metals. 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.

Mitigation during Operation

7.4.4 The CIRIA SuDS Manual highlights the fact that to remove the major proportion of pollution, it is therefore necessary to:

1. Capture and treat the runoff from frequent, small events.
2. Capture and treat a proportion of the initial runoff (first flush) from larger and rarer events.

7.4.5 This will ensure that any runoff discharged to the receiving watercourse is of improved quality compared to a direct discharge from a traditional drainage system.

8 SUMMARY AND CONCLUSIONS

8.1 Summary

8.1.1 A site-specific Flood Risk Assessment (FRA) in accordance with the NPPF and Planning Practice Guidance has been undertaken for the proposed c.4.6 ha Sustainable Energy Pant adjacent to the Kemsley Paper Mill complex, operated by DS Smith Plc.

8.2 Flood Risk

8.2.1 In terms of tidal flooding the EA flood map indicates that the majority of the application area lies within Flood Zone 2 and 3a, therefore has a 'medium probability' of flooding from tidal sources. A section of the western extent of the site is located within Flood Zone 1.

8.2.2 Tidal flood modelling presented by the EA indicates that during the undefended 0.5% AEP (2070) tidal water levels would reach 5.28 mAOD.

8.2.3 The ground within the SEP site will be levelled to a minimum of 5.80 mAOD. Consequently, the site would not be flooded during the undefended 0.5% AEP (2070) tidal flood event, hence RPS consider the site to be located within Flood Zone 1. The majority of the site is at very low risk of surface water flooding.

8.2.4 The risk of groundwater flooding is considered to be low.

8.2.5 The risk of flooding from infrastructure failure is considered to be low.

8.2.6 The risk of flooding from reservoir failure has been assessed as low.

8.2.7 The proposed development is appropriate for the present flood zone and the zone including climate change.

8.2.8 For Kemsley the total rainfall for a 360 minute 1 in 100 year rainfall event is 73.7mm (based on FEH version 3). Including the 20% climate change the rainfall event becomes 88.5mm. The total equivalent impermeable area for Kemsley SEP is 3.4 ha. The total area of the pond is assumed to be 5000 m^2 taking the total equivalent impermeable area to 3.9 ha. This gives a total runoff volume during the 360 minute 1 in 100 year + 20% climate change rainfall event of 3500 m^3. Storage attenuation will be provided via an appropriately sized pond situated to the east of the SEP building.

8.3 Conclusion

8.3.1 This FRA assesses the flood risk of the Sustainable Energy Plant in support of the application to discharge condition 16 associated with planning application Ref SW/18/503317 approved 11th

October 2018 and subsequent NMA approved 21st December 2018 (application Ref SW/18/503317/R).

8.3.2 The FRA has demonstrated the following:

- The profiled site is elevated to Flood Zone 1.
- All aspects of the proposed development are appropriate for their respective flood zoning classification without the need for Sequential and Exception Tests to be undertaken.

8.3.3 The FRA has also considered the potential impact of the proposed development on surface water runoff rates. Appropriate mitigation measures to attenuate surface runoff have been presented, in accordance with EA requirements and the SuDS manual.

8.3.4 This FRA demonstrates that the proposed development is not at risk of tidal flooding and incorporates appropriate SuDS measures to manage run-off with increasing flood risk elsewhere. Therefore, the proposed development meets the requirements of National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) ID7.

REFERENCES

BGS (Online), Geology of Britain Viewer. Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home

CIRIA Report C532. Control of Water Pollution from Construction Sites.

CIRIA Report C741 Environmental Good Practice on Site.

CIRIA Report C753 (2015) The SuDS manual.

Communities and Local Government, March 2012. National Planning Policy Framework.

DEFRA, October 2006. Flood and Coastal Defence Appraisal Guidance FCDPAG4 Economic Appraisal Supplementary, Note to Operating Authorities – Climate Change Impacts.

DEFRA, December 2011. National Standards for sustainable drainage systems. Designing, constructing, operating and maintaining drainage for surface runoff.

Environment Agency, July 2009. Fluvial Design Guide.

Environment Agency, October 2013. Rainfall runoff management for developments. Report – SC030219.

Flood estimation for small catchments. Institute of Hydrology (1994). Report no 124.

Halcrow Group Limited (October 2009). Swale Borough Council: Strategic Flood Risk Assessment for Local Development Framework, Level 1 and 2.

Ordnance Survey Explorer (2012) 1:50,000 Map 178: Thames Estuary and Rugby.

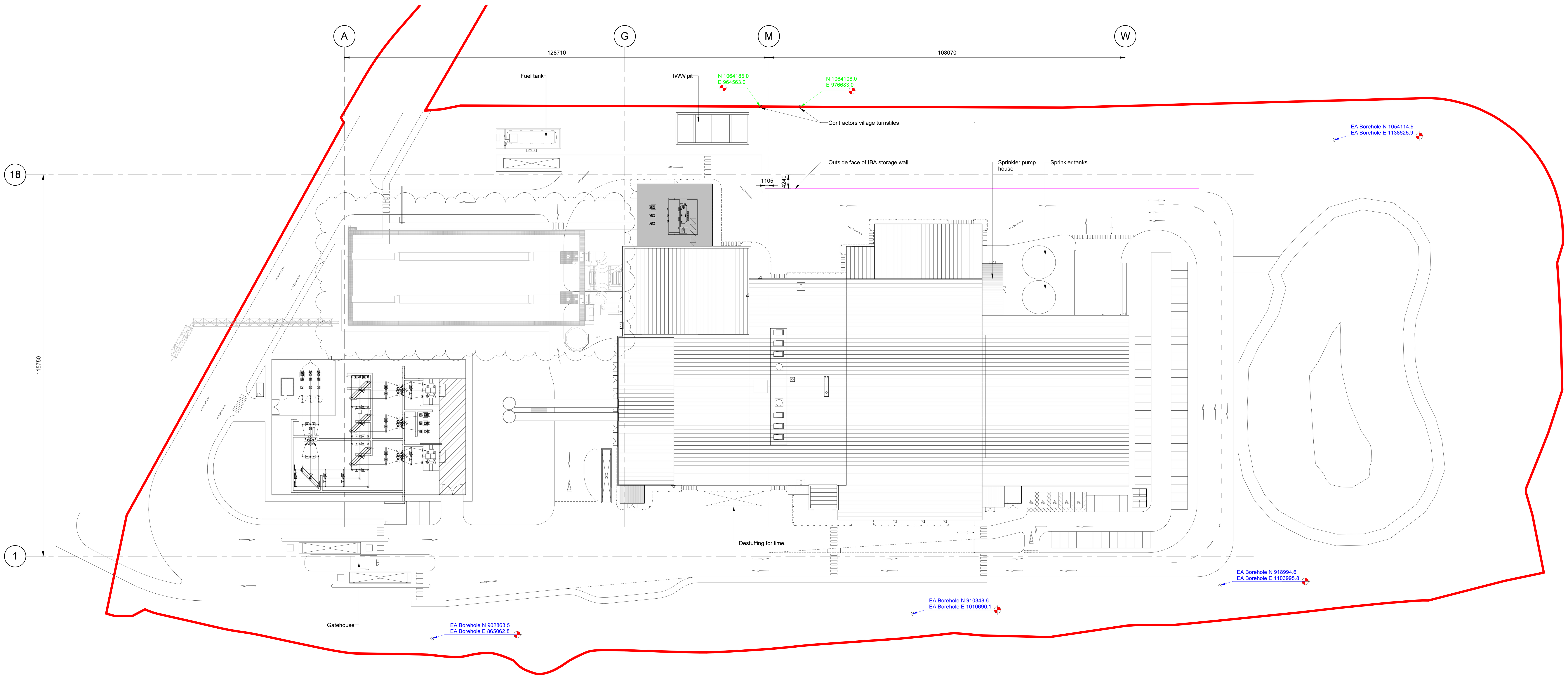
Ordnance Survey 1:10,000 Scale Electronic Data Mapping for assessment area.

UK Climate Projections science report: Climate change projections, Version 3, updated December 2010.

DRAWINGS

Drawing 1	Location Plan / Layout plan
Drawing 2	Proposed impermeable areas
Drawing 3	Current Site layout
Drawing 4	Proposed Site Levels

- Dimensions are all in millimeters, unless stated otherwise.
- Scaling of this drawing is not recommended.
- It is the recipients responsibility to print this document to the correct scale.
- All the relevant drawings and specifications should be read in conjunction with this drawing.



Rev	Date	Drawn	Checked	Approved	Modifications
F	21/12/2016	SG	GH	GMc	ACC's layout updated.
E	16/12/2016	SG	GH	GMc	Attenuation pond geometry updated. Sprinkler tank geometry has reverted back as per Rev C.
D	13/12/2016	ZF	GH	GH	Building perimeter kerbs replaced with bollards. UKPN relay room setting out updated. Sprinkler tank size and setting out updated.
C	30/11/2016	SG	GH	GMc	Car parking arrangement rationalised. Kerb arrangements updated to suit Arup drawing. EA borehole monitoring points indicated.
B	09/11/2016	ZF	SG	GH	Site plan updated to suit revised CNIM site layout, current building footprint and diesel tank.
A	30/09/2016	ZF	GH	GH	First Issue.

K3 CHP Facility

Kemsley Mill, Sittingbourne, Kent

K3 CHP Powering the future

CUSTOMER:

Wheelabrator TECHNOLOGIES

EPC CONTRACTOR:

CNIM CONSTRUCTIONS INDUSTRIELLES DE LA MÉDITERRANÉE

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Doc Number

SUBCONTRACTOR DRAWING TITLE:

DRAWING TITLE:

ZONE 0
SITE PLAN

Dpt : | Format : A0 | Scale : 1 : 500

DRAWING N° 5025 20 02 00 02 / UM G 0910 F

Project N°	Type	Doc N°	Rev
AAK	04	20 02 00 02_UM G 0910	F

Key

- Concrete pavement (S1)
- Asphalt pavement (S2)
- Asphalt footpath (S3)
- Aggregate surface (S4)
- Soft landscaping (refer to Landscape Architect's drawings for details and specification)
- Facade drain
- Attenuation Basin

Notes

1. Coordinates and levels relate to CCL site grid, refer to Architect's drawings for details.
2. Site and building layout derived from CNIM drawing number 0H8013-0202, received 12/05/2016.
3. Refer to highway construction detail drawings for details of pavement build-ups.
4. Refer to Landscape Architect's drawings for details of landscaping.
5. Locations of footpaths to be agreed and provided by UMC.

Uncontrolled sketch issued
23/12/16
RT

PROJECT:

K3 CHP Facility
Kemsley Mill, Sittingbourne, Kent

K3 CHP Powering the future

CUSTOMER:

Wheelabrator TECHNOLOGIES

EPC CONTRACTOR:

CNIM CONSTRUCTIONS INDUSTRIELLES DE LA MÉDITERRANÉE

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www.arup.com

SUBCONTRACTOR DRAWING TITLE:

STATUS For Review

DRAWING TITLE:

K3 Site
Roads and Hardstandings
Surfaces Finishes Plan

Dpt : Civil | Format : A0 | Scale : 1:500

DRAWING N° 5025 20 02 00 21 / AP G 0011

Project N°	Type	Doc N°	Rev
AAK	04	20 02 00 21 / AP G 0011	B

Do not scale

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Site Location

Rev	Description	Date	Initial	Checked

RPS

Suite D10, Josephs Well, Hanover Walk, Leeds
West Yorkshire, LS3 1AB.

T: +44 (0) 113 220 6190 E: rpsld@rpsgroup.com

Client KTI

Project Kemsley SEP

Title Current Site Layout

Status	Drawn By	PM/Checked By
PRELIMINARY	AK	-
Job Ref	**Scale @ A3**	**Date Created**
JER6846		FEB 17

Drawing Number **JER6846 - Drawing 3**

Rev **-**

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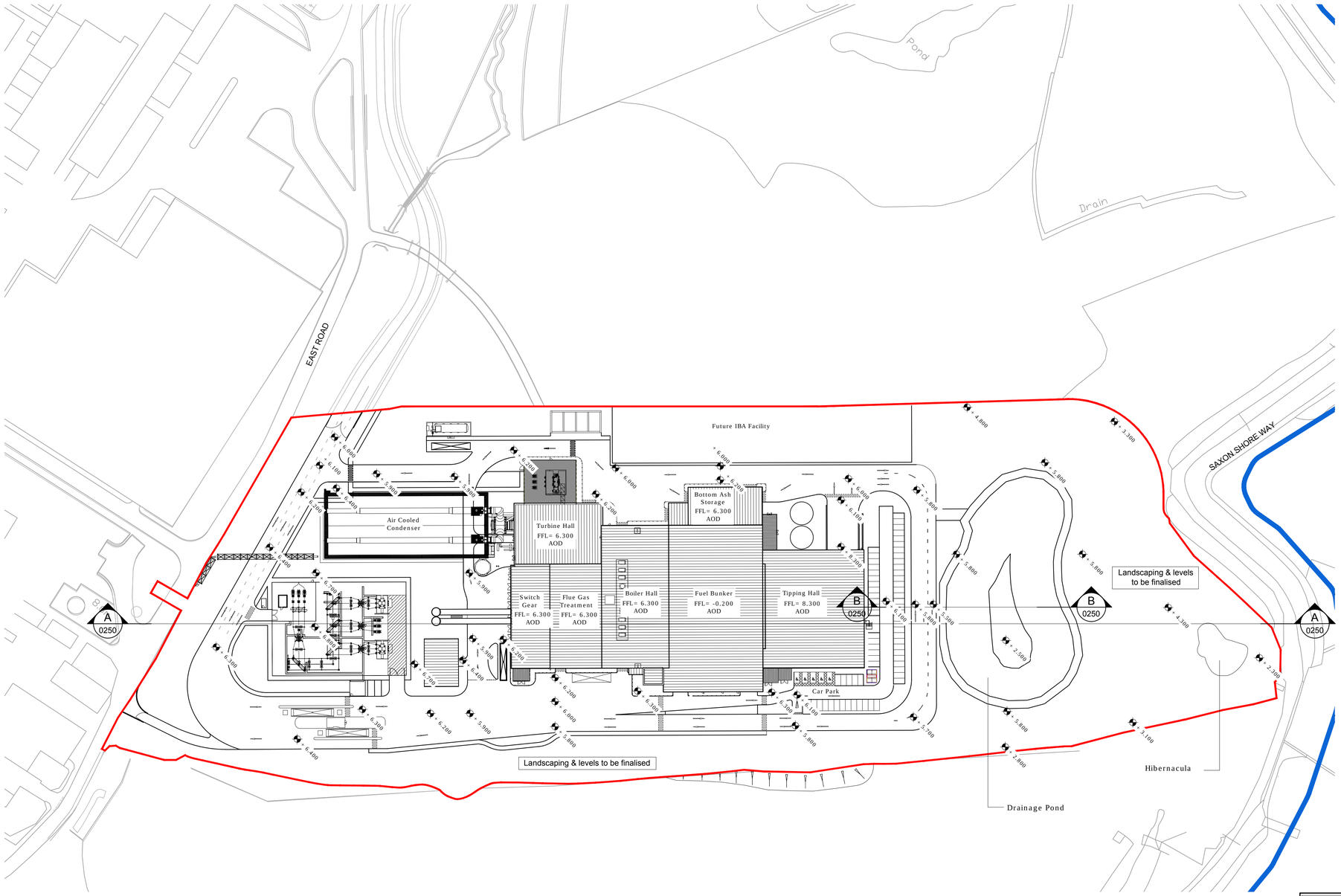
10m SCALE 1:1000



Proposed Levels
Scale 1:1000

Refer to Figure 4.24 for site sections A-A and B-B

Key
× 4.300 Proposed Level (m A.O.D.)

All levels obtained from ARUP CAD information issued 23/01/17

All levels relative to ordinance datum

Received - 3 March 2017
Planning Applications Group

Drawing for PLANNING purposes only

Content of drawing based on UMC drawing number AAK-04-2002002_UMG0910. Reproduced with permission

rev	amendments	by	ckd	date
E	Admin HVAC area roof added. Escape stairs amended to be un-enclosed stair. Landscaping and levels note added.	JT	CMGD	28.02.17
D	Updated to reflect current scheme.	JT	CMGD	14.02.17
C	Drawing updated to suit UI layout.	AJL	ST	25.07.12
B	Levels updated to suit revised site layout. Logos confirmed.	AKC	RM	18/01/10
A	BH 1-3 indicated. Ecological ditch position indicated. Drawing figure added. Levels updated to suit revised site layout.	JDW	RM	16/12/09

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E rpsnewark@rpsgroup.com

Client: Wheelabrator Technologies

Project: Kemsley Sustainable Energy Plant

Title: Proposed Levels/ Site Plan

Drawing Status	Date Created	Drawing Scale
Preliminary	September 2009	1:1000
Project Leader	Drawn By	Initial Review
AWY	AKC	ST

Drawing Number: 16315 / A1 / 0600
Rev: E

FIGURE 4.26C

APPENDICES

Appendix 1 Correspondence

Appendix 2 Swale Borough Council Flood Map

Appendix 3 RPS Surface Water Management and Foul Drainage Philosophy Statement (REF NK016315)

APPENDIX 1

Correspondence

Angus Kerry

From: Jonathan Morley
Sent: 08 June 2016 11:04
To: Angus Kerry
Subject: FW: KSL 1494 TM Environmental Information Request
Attachments: KSL1494 TM Info request.pdf; Standard_Notice 2012.pdf; KSL 1494 TM Environmental Information Request

Jonathan Morley BSc (Hons)
Senior Geoenvironmental Engineer - RPS Planning & Development
Suite D10, Josephs Well, Hanover Walk,
Leeds, West Yorkshire, LS3 1AB.
United Kingdom
Tel: +44 (0) 113 220 6190
Direct: +44 (0) 113 2204427
Mobile: +44 (0) 7920 566017
Email: jonathan.morley@rpsgroup.com
www: www.rpsgroup.com

From: KSL Enquiries [mailto:KSLE@environment-agency.gov.uk]
Sent: 15 February 2016 16:35
To: Jonathan Morley
Subject: KSL 1494 TM Environmental Information Request

Dear Jonathan,

Our reference: **KSL 1494 TM Environmental Information Request**

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR). Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Thank you for your request for modelled flood levels.

Please find attached the requested Product 4. I will send you what information we have on the rest of your enquiry as soon as I can.

Please be aware that the Environment Agency supply data, but we do not interpret it for use in a Flood Risk Assessment. Flood Risk Assessments should be completed by a suitably competent and qualified person.

You may be interested in the following guidance / information publically available:

- **'Planning Practice Guidance'** - provides information about planning considerations in areas at risk of flooding. http://planningguidance.planningportal.gov.uk/
- **'Planning applications: assessing flood risk'** - information about completing Flood Risk Assessments. https://www.gov.uk/planning-applications-assessing-flood-risk
- **'Site specific flood risk assessment: Checklist'** – a checklist to help ensure you have considered all the relevant factors in your flood risk assessment. http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/

We recommend that you discuss your proposals with the Local Planning Council at the earliest opportunity. They will be able to advise you on a wide range of planning matters in addition to flood risk.

This information is subject to the attached standard notice.

I trust this information is of use. If you have any further questions, please contact us and we will be happy to help.

If you have any further queries or if you'd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months and we will happily do this for you.

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive:http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL

Kind regards,

Toby

Toby Mortby | Customers and Engagement Officer | Kent and South London
Environment Agency | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH
Internal: 723-3115 External: 01732 223115
Email: KSLenquiries@environment-agency.gov.uk

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive:
http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL

www.gov.uk/floodsdestroy

From: Jonathan Morley [mailto:jonathan.morley@rpsgroup.com]
Sent: 12 February 2016 12:10
To: KSL Enquiries
Subject: RE: KSL 1494 TM Environmental Information Request

Good afternoon Toby,

I understand that fees were paid on the 02/02/16. Would you be able to supply the Product 4 data at your earliest convenience as we a have very tight project timeframe?

Thank you in advance.

Best regards

Jonathan

Jonathan Morley BSc (Hons)
Senior Geoenvironmental Engineer - RPS Planning & Development
Suite D10, Josephs Well, Hanover Walk,
Leeds, West Yorkshire, LS3 1AB.

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Direct: +44 (0) 113 2204427
Mobile: +44 (0) 7920 566017
Email: jonathan.morley@rpsgroup.com
www: www.rpsgroup.com

From: KSL Enquiries [mailto:KSLE@environment-agency.gov.uk]
Sent: 26 January 2016 11:56
To: Jonathan Morley
Subject: RE: KSL 1494 TM Environmental Information Request

Dear Jonathan,

Once payment has been made I can then send your request to the relevant teams. Depending on when the payment is made we would aim to supply a response within 20 working days of your original enquiry, this would be the 11 February 2016. Of course if there is a delay in payment then this could be later.

We do however try to answer all enquiries as quick as we can so will of course aim to supply your data before then.

If you have any other questions please contact us and we'll be happy to help.

Kind regards,

Toby

Toby Mortby | Customers and Engagement Officer | Kent and South London
Environment Agency | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH
Internal: 723-3115 External: 01732 223115
Email: KSLenquiries@environment-agency.gov.uk

From: Jonathan Morley [mailto:jonathan.morley@rpsgroup.com]
Sent: 26 January 2016 09:27
To: KSL Enquiries
Subject: RE: KSL 1494 TM Environmental Information Request

Good morning Toby,

Thank you for the email.

Please can you confirm when the data will be available?

Kind regards

Jonathan

Jonathan Morley BSc (Hons)
RPS Planning & Development
Suite D10, Josephs Well, Hanover Walk,
Leeds, West Yorkshire, LS3 1AB.
United Kingdom
Tel: +44 (0) 113 220 6190
Direct: +44 (0) 113 2204427
Mobile: +44 (0) 7920 566017
Email: jonathan.morley@rpsgroup.com
www: www.rpsgroup.com

From: KSL Enquiries [mailto:KSLE@environment-agency.gov.uk]
Sent: 25 January 2016 16:00
To: Jonathan Morley
Subject: KSL 1494 TM Environmental Information Request

Dear Jonathan,

RE: KSL 1494 TM Environmental Information Request

Thank you for your request for information that was received on 14 January 2016.

Before proceeding with this request, we will require a payment of £50 + VAT (£60). This is not a charge for supplying the data, but a charge for the copyright licence which is set out in our Standard Notice. The Standard Notice explains how you may use the information you have asked for and will be sent to you at the same time that we send you your information.

Charging Summary
Copyright Licence Charge = £50 + VAT @ 20%
Total Charge = £60

If you wish to pay by credit or debit card please contact me on 01732 223 115 and I will be pleased to take these details over the phone. **Please note that we can only accept card payments from the cardholder.**

If you wish to make payment by cheque, please make your cheque payable to 'The Environment Agency' and send it to the address below.

Once we have received your payment, we will aim to respond to your enquiry within 10 working days in accordance with our Customer Charter.

If I have not received your payment within 60 days of the date of this letter/email, I will assume that you no longer require the information.

If you have any further queries please contact us and we will be happy to help.

Kind Regards,

Toby

Toby Mortby | Customers and Engagement Officer | Kent and South London
Environment Agency | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH
Internal: 723-3115 External: 01732 223115
Email: KSLenquiries@environment-agency.gov.uk

www.gov.uk/floodsdestroy

DO YOU KNOW WHAT TO DO? FLOODS DESTROY BE PREPARED

From: Jonathan Morley [mailto:jonathan.morley@rpsgroup.com]
Sent: 14 January 2016 12:49
To: Enquiries, Unit
Cc: Andrew Stevenson
Subject: Environmental Information Request

Dear Sirs,

Environmental Information Request: Kemsley, Kent.

We are currently conducting a flood risk assessment for a development at Kemsley Marshes, Kent (site outlined in red on the attached plan).

To undertake the assessment RPS wish to obtain the following information

- Confirmation of Flood Zone (electronic MapInfo Version if possible);
- Confirmation of the most recent Strategic Flood Risk Assessment (SFRA);
- SFRA Flood zone extents for the area (electronic MapInfo Version if possible);
- EA and SFRA Flood Hazard, surface water and reservoir flood risk mapping including water depths for the area;
- A online link to or copy of the most recent SFRA, including associated drawings, maps and appendices;
- Mapping and records for any surface water assets owned or maintained;
- Any existing river and/or tidal levels, for the 100 year, 100 year with climate change, 200 year, 200 year with climate change, 1000 year, and 1000 year with climate change flood events;
- Any gauged flow records for river networks in close proximity to the site, with associated estimated return periods;
- Details of any historical flood events;
- Details of existing or planned flood alleviation and defences in this area;
- Details of future defence upgrades and/or shoreline management plans/policies;
- Details of any flooding due to drainage problems associated with the site, including flood levels, flood extents and any available anecdotal information;
- Records of any surface and groundwater discharges, abstractions including private licences and pollution incidents;
- Details of any recorded groundwater levels in the area, and groundwater vulnerability of the area;
- Details of any groundwater flooding issues in the area, including flood levels, flood extents and any available anecdotal information;
- Details of aquifer designation, soil classification, and Source Protection Zones in this area; and
- Any other flooding related data and/or reports held in relation to the site and immediate area.

Please would you inform me of any data costs that may be incurred as soon as possible.

Should you have any queries please do not hesitate to contact me.

Yours sincerely
for RPS

Jonathan Morley BSc (Hons)
Senior Engineer - RPS Planning & Development
Suite D10, Josephs Well, Hanover Walk,
Leeds, West Yorkshire, LS3 1AB.
United Kingdom
Tel: +44 (0) 113 220 6190
Direct: +44 (0) 113 2204427
Mobile: +44 (0) 7920 566017
Email: jonathan.morley@rpsgroup.com
www: www.rpsgroup.com

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RPS Group Plc web link: http://www.rpsgroup.com

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Product 4 (Detailed Flood Risk) for: Kemsley, Kent
Requested by: Jonathan Morley - RPS
Reference: KSL1494 TM
Date: 11 February 2016

Contents

The information provided is based on the best data available as of the date of this letter.

You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made to the data for this location. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Flood Map Confirmation

The Flood Map:

Our Flood Map shows the natural floodplain for areas at risk from river and tidal flooding. The floodplain is specifically mapped ignoring the presence and effect of defences. Although flood defences reduce the risk of flooding they cannot completely remove that risk as they may be over topped or breached during a flood event.

The Flood Map indicates areas with a 1% (0.5% in tidal areas), Annual Exceedance Probability (AEP) - the probability of a flood of a particular magnitude, or greater, occurring in any given year, and a 0.1% AEP of flooding from rivers and/or the sea in any given year. The map also shows the location of some flood defences and the areas that benefit from them.

The Flood Map is intended to act as a guide to indicate the potential risk of flooding. When producing it we use the best data available to us at the time, taking into account historic flooding and local knowledge. The Flood Map is updated on a quarterly basis to account for any amendments required. These amendments are then displayed on the internet at www.gov.uk/prepare-for-a-flood.

At this Site:

The Flood Map shows that this site lies within the outline of the 0.5% chance of flooding in any given year from the sea.

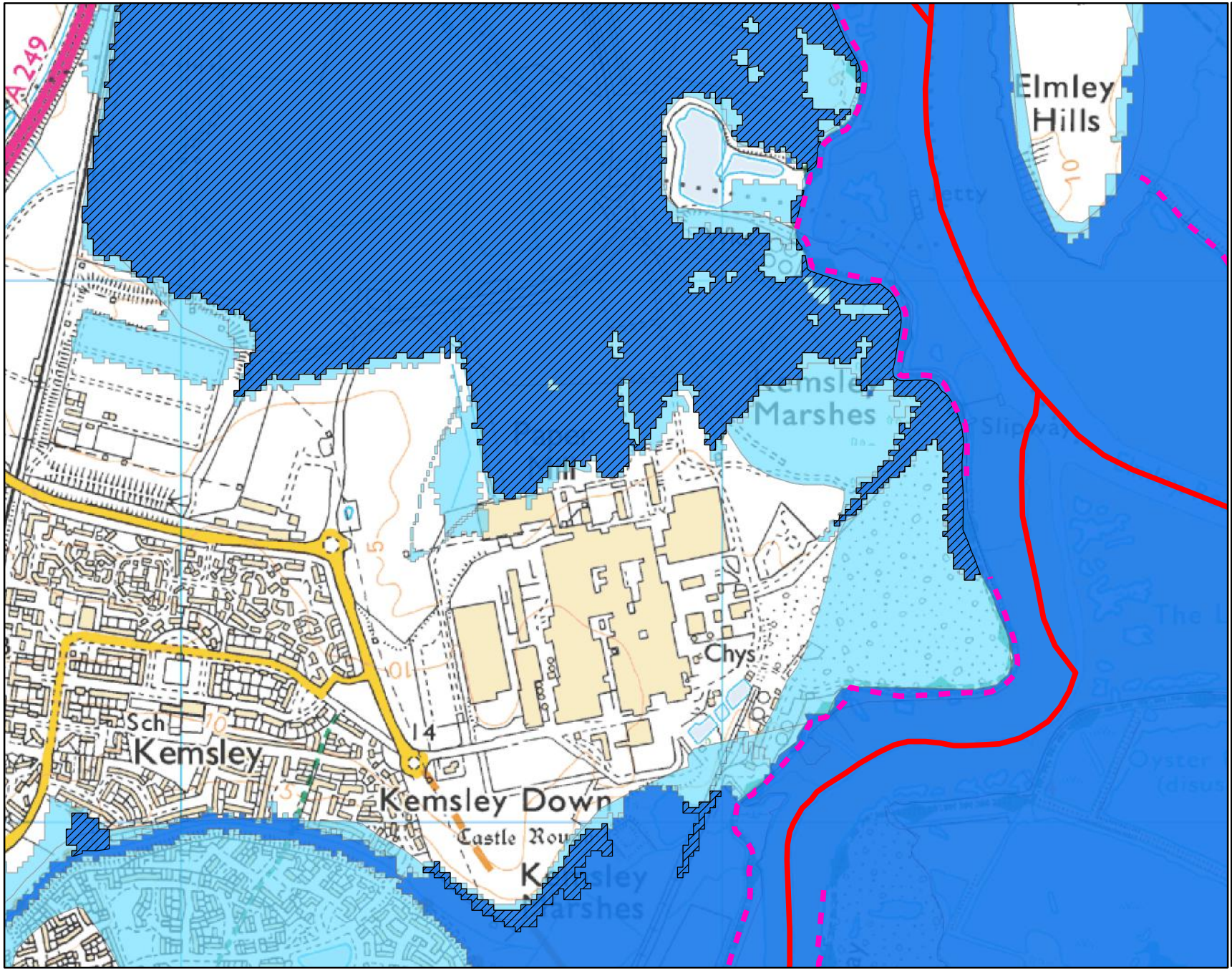
Enclosed is an extract of our Flood Map which shows this information for your area.

Method of production

The Flood Map at this location has been derived using detailed tidal modelling of the North Kent Coast, completed in August 2013.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Flood Map Centred on Kemsley, Kent
Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

- Main Rivers
- Flood Defences
- Areas Benefiting From Flood Defence
- Flood Zone 3
- Flood Zone 2

Scale 1:10,000

0 250 500

Meters

Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Model Output Data

You have requested flood levels for various return periods at this location.

The modelled flood levels for the closest most appropriate model grid cells, any additional information you may need to know about the modelling from which they are derived and/or any specific use or health warning for their use are set out below.

Using a 2D TuFLOW model the floodplain has been represented as a grid. The flood water levels have been calculated for each grid cell.

A map showing the location of the points from which the data is taken is enclosed. Please note you should read the notice enclosed for your specific use rights.

Table 1: Defended Modelled Tidal Flood levels for Annual Exceedance Probability shown in mAOD

Node Location ID	Modelled Tidal Flood levels for Annual Exceedance Probability shown in mAOD						
	National Grid Ref		Defended				
	Easting	Northing	5% AEP 2012	0.5% AEP 2012	0.5% AEP 2070	0.5% AEP 2115	0.1% AEP (2012)
1	591602	166964	0.00	0.00	0.00	5.43	0.00
2	591831	166982	0.00	0.00	0.00	5.42	0.00
3	592174	166953	0.00	0.00	0.00	5.42	0.00
4	591709	166753	0.00	0.00	0.00	5.43	0.00
5	591874	166756	0.00	0.00	0.00	5.43	0.00
6	592170	166731	0.00	0.00	0.00	5.52	0.00
7	591927	166470	0.00	0.00	0.00	0.00	0.00
8	592145	166588	0.00	0.00	0.00	0.00	0.00

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Table 2: Undefended Modelled Tidal Flood levels for Annual Exceedance Probability shown in mAOD

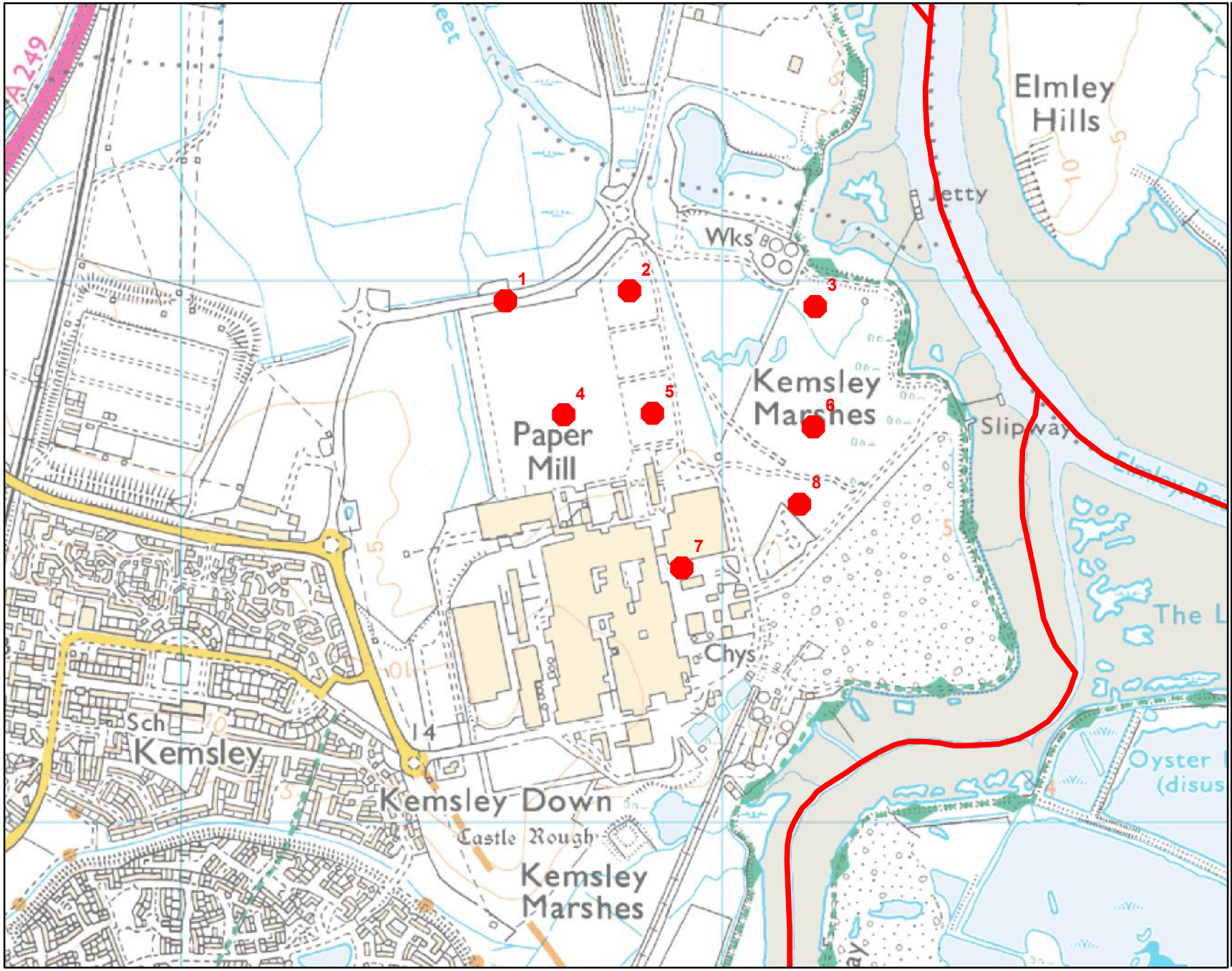
Node Location ID	Modelled Tidal Flood levels for Annual Exceedance Probability shown in mAOD						
	National Grid Ref		Undefended				
	Easting	Northing	5% AEP 2012	0.5% AEP 2012	0.5% AEP 2070	0.5% AEP 2115	0.1% AEP 2012
1	591602	166964	4.06	4.70	5.27	6.01	5.16
2	591831	166982	4.06	4.70	5.27	6.01	5.16
3	592174	166953	4.07	4.71	5.28	6.01	5.17
4	591709	166753	4.06	4.70	5.27	6.01	5.16
5	591874	166756	0.00	4.71	5.28	6.01	5.16
6	592170	166731	0.00	0.00	0.00	6.02	0.00
7	591927	166470	0.00	0.00	0.00	0.00	0.00
8	592145	166588	0.00	0.00	0.00	0.00	0.00

Data taken from North Kent Coast Modelling and Mapping Study, completed by JBA Consulting, in August 2013.

There are no health warnings or additional information for these levels or the model from which they were produced.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Modelled Node Locations Centred on Kemsley, Kent
Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

- NodeLocations
- Main Rivers

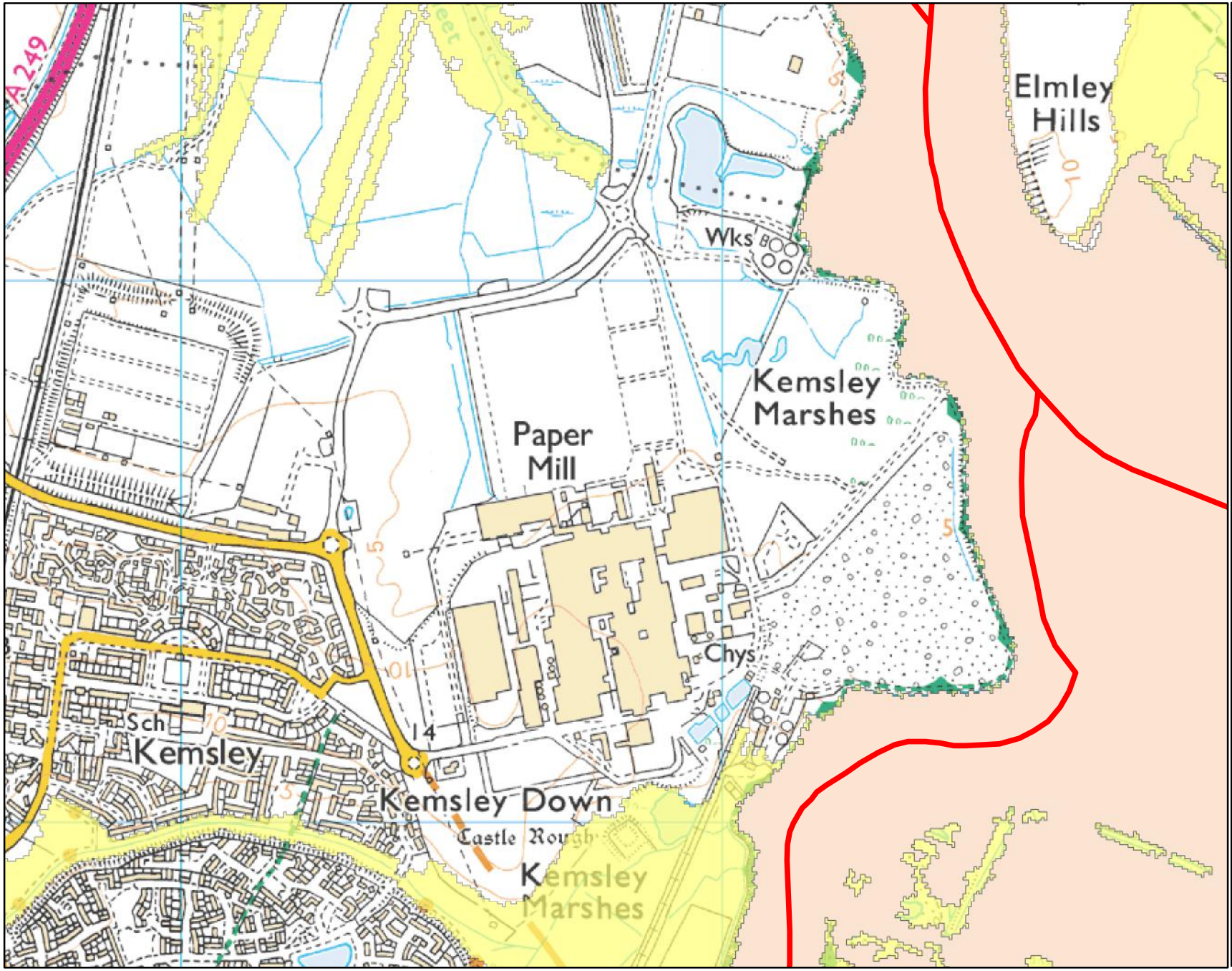
Scale 1:10,000

0 250 500

Meters

Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Defended Modelled Tidal Flood Outlines Centred on Kemsley, Kent
Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

- Main Rivers
- 5% AEP (2012)
- 0.1% AEP (2012)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occuring in any given year.

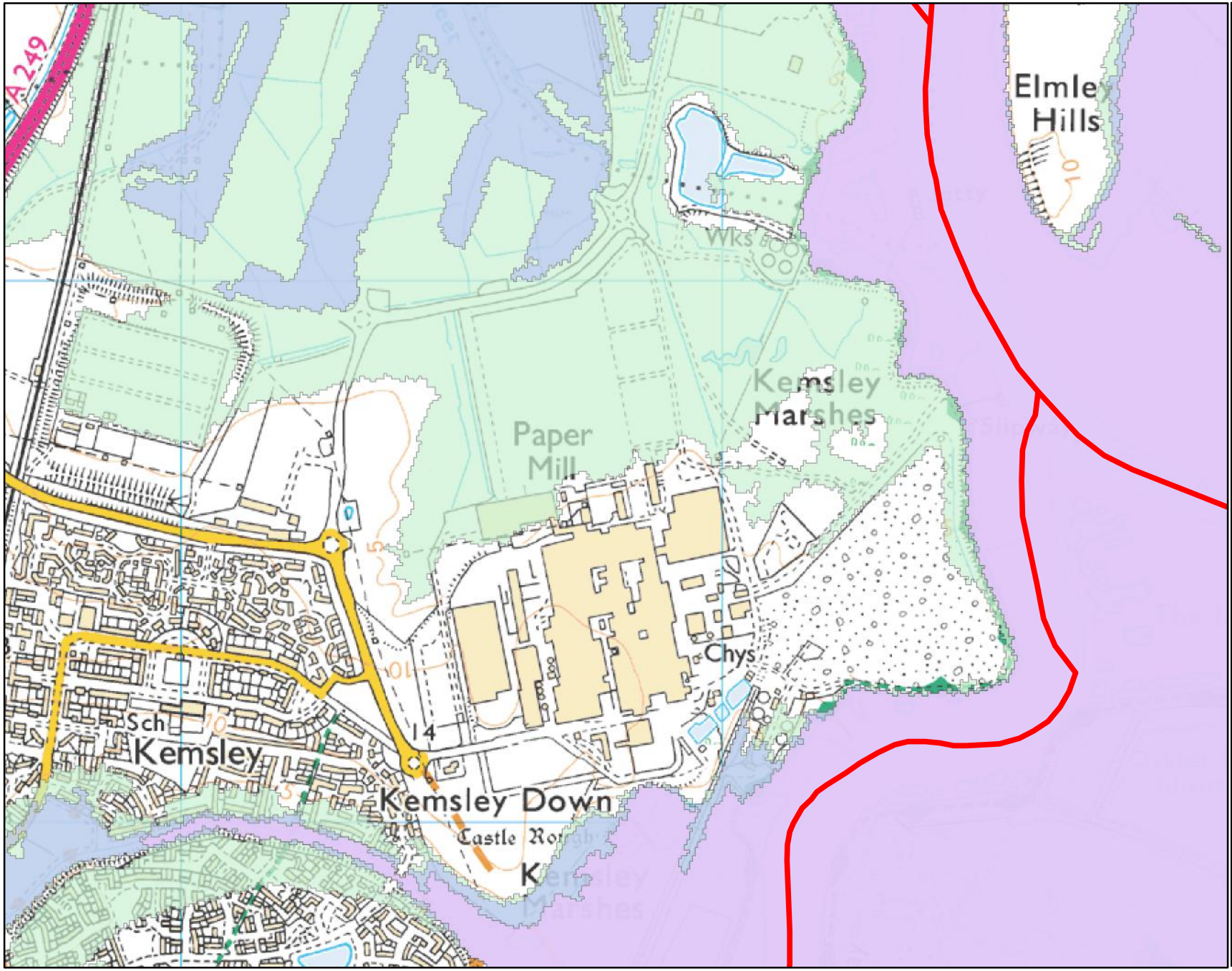
Scale 1:10,000

0 250 500

Meters

Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Defended Modelled Tidal Flood Outlines Centred on Kemsley, Kent
Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

- Main Rivers
- 0.5% AEP (2012)
- 0.5% AEP (2070)
- 0.5% AEP (2115)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occuring in any given year.

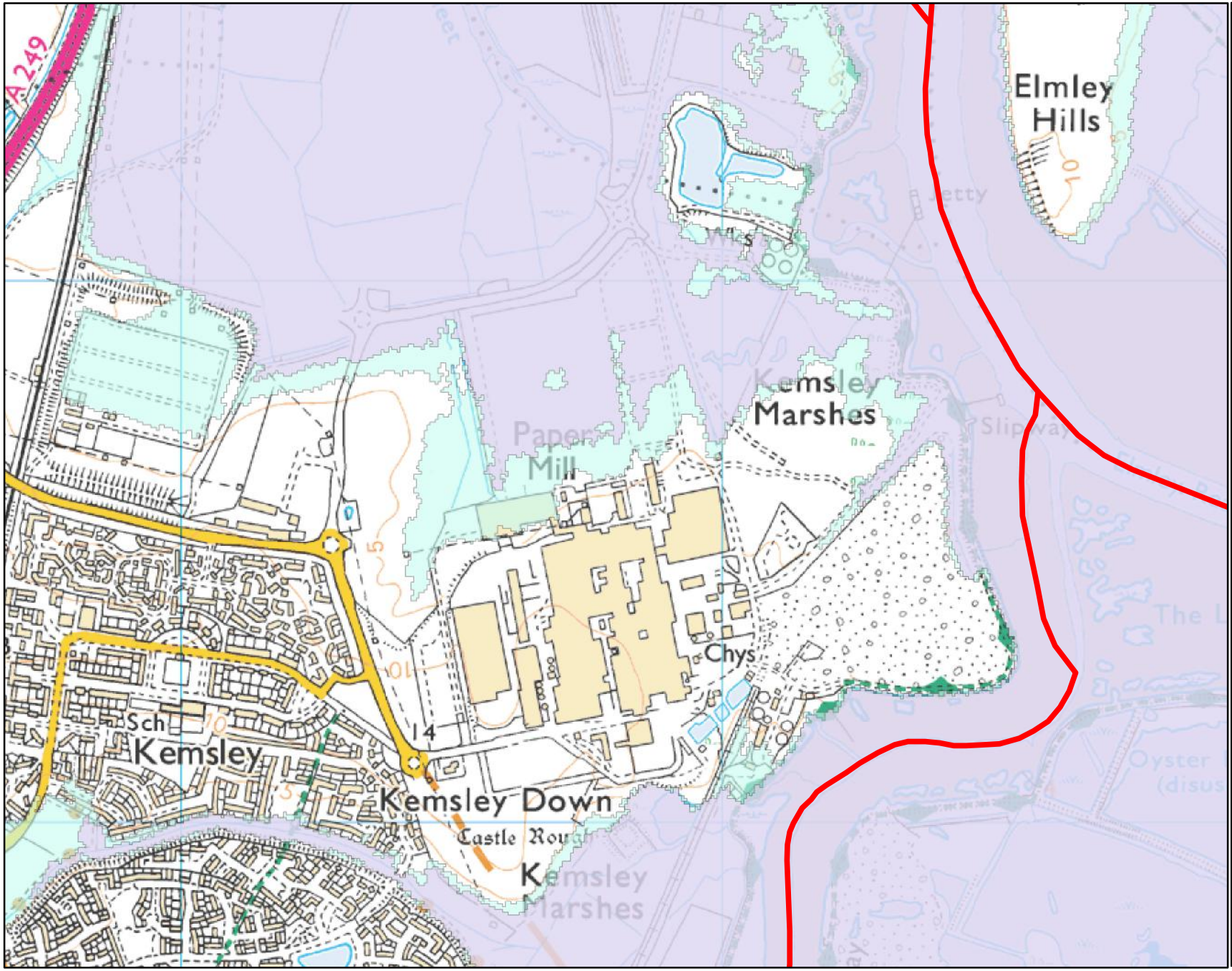
Scale 1:10,000

0 250 500

Meters

Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Undefended Modelled Tidal Flood Outlines Centred on Kemsley, Kent
Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

- Main Rivers
- 5% AEP (2012)
- 0.1% AEP (2012)

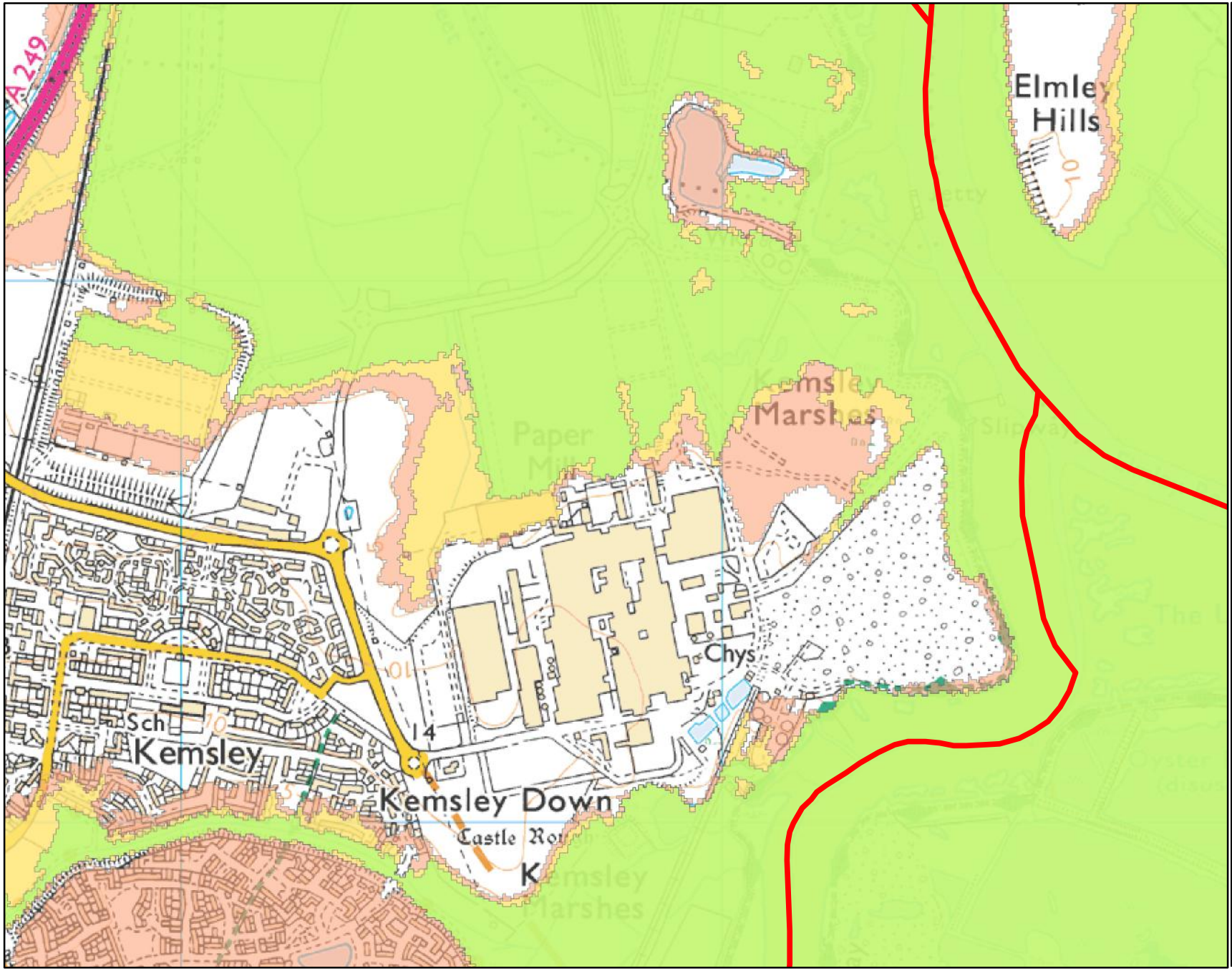
Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occuring in any given year.

Scale 1:10,000

0 250 500

Meters

Undefended Modelled Tidal Flood Outlines Centred on Kemsley, Kent
Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

- Main Rivers
- 0.5% AEP (2012)
- 0.5% AEP (2070)
- 0.5% AEP (2115)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occuring in any given year.

Scale 1:10,000

0 250 500

Meters

Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Defence Details

Existing flood defences in this area are made up of raised walls and embankments. These provide a 1 in 1000 year standard of protections.

The Environment Agency currently has no planned improvement works to these defences.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Historic Flood Data

We hold records of historic flood events from rivers and the sea. Information on the floods that may have affected the area local to your site are provided on the enclosed map (if relevant).

Flood Event Data

Please note that our records are not comprehensive. We would therefore advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

We map flooding to land, not individual properties. Our historic flood event record outlines are an indication of the geographical extent of an observed flood event. Our historic flood event outlines do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.

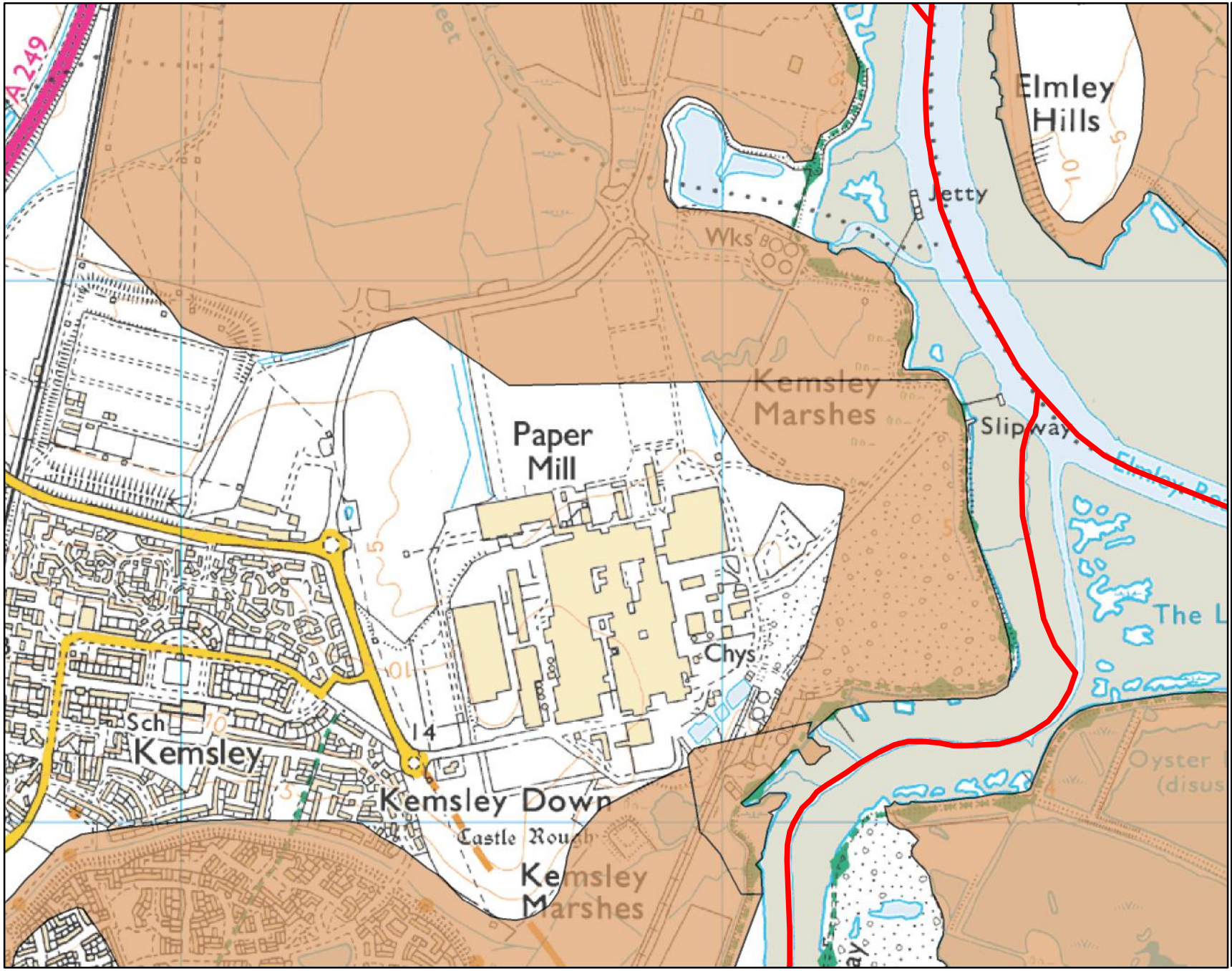
Please be aware that flooding can come from different sources. Examples of these are:

- from rivers or the sea;
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system);
- overflowing or backing up of sewer or drainage systems which have been overwhelmed,
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. However you should be aware that in recent years, there has been an increase in flood damage caused by surface water flooding or drainage systems that have been overwhelmed.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Historic Flood Outlines Centred on Kemsley, Kent
Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

- Main Rivers
- Feb 1953

Scale 1:10,000

0 250 500

Meters

Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Additional Information

Use of Environment Agency Information for Flood Risk / Flood Consequence Assessments

Depending on the enquiry, we may also provide advice on other issues related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In **England**, you should refer to the Environment Agency's Flood Risk Standing Advice, the technical guidance to the National Planning Policy Framework and the existing PPS25 Practice Guide for information about what flood risk assessment is needed for new development in the different Flood Zones. These documents can be accessed via:

https://www.gov.uk/government/publications/flood-risk-standing-advice-for-local-planning-authorities-frsa
http://planningguidance.planningportal.gov.uk/

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk / Consequence Assessment (FRA / FCA) where one is required, but does not constitute such an assessment on its own.

2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. The information produced by the local planning authority referred to above may assist here.

3. Where a planning application requires a FRA / FCA and this is not submitted or deficient, the Environment Agency may well raise an objection.

4. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your local planning authority.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Surface Water

We have provided two national Surface Water maps, under our Strategic Overview for flooding, to your Lead Local Flood Authority –Kent County Council, who are responsible for local flood risk (i.e. surface runoff, ground water and ordinary watercourse), which alongside their existing local information will help them in determining what best represents surface water flood risk in your area.

Kent County Council have reviewed these and determined what it believes best represents surface water flood risk. You should therefore contact this authority so they can provide you with the most up to date information about surface water flood risk in your area.

You may also wish to consider contacting the appropriate relevant Local Planning Authority and/or water/sewerage undertaker for the area. They may be able to provide some knowledge on the risk of flooding from other sources. We are working with these organisations to improve knowledge and understanding of surface water flooding.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

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Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Angus Kerry

From: KSL Enquiries <KSLE@environment-agency.gov.uk>
Sent: 16 February 2016 14:39
To: Jonathan Morley
Subject: KSL 1494 TM Environmental Information Request
Attachments: spotflowgaugings.csv; KSL 1494 TM Env Info Request Kemsley Marshes.xlsx; KSL 1494.pdf; Standard_Notice 2012.pdf

Dear Jonathan,

Thank you for your enquiry which was received on 14 January 2016.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

In addition to the Product 4 supplied yesterday please find our following response.

- *Any gauged flow records for river networks in close proximity to the site, with associated estimated return periods*

A single spot flow gauging is available near this location, please find the data attached.

- *Records of any surface and groundwater discharges, abstractions including private licences and pollution incidents"*

Within the site boundary, there are **no records.** You will however see on the map attached that there are three pollution incidents (blue dots) one abstraction (red cross) and one surface water discharge (orange square) in close proximity of the site boundary in question.

- *Details of any recorded groundwater levels in the area, and groundwater vulnerability of the area*
  Details of any groundwater flooding issues in the area, including flood levels, flood extents and any available anecdotal information

Please find attached an Excel workbook response. There are two spreadsheets within this workbook ï the first shows abstractions within approximately 2 km of the site.
In the second spreadsheet, there is a table of observation boreholes for which we have level data ï these are within approximately 4.5 km of the site.
There are no records of any groundwater flooding reports within 3 km of the subject area.

- *Details of aquifer designation, soil classification, and Source Protection Zones in this area*

Aquifer Designation & Soil Classification ï This site is underlain by Alluvium which at this location is described as ñclay, silty, peaty and sandyòand is classified as a secondary (undifferentiated) aquifer. The alluvium is likely to be underlain by other superficial deposits; Beach and Tidal Flat Deposits (clay, silt and sand), and/ or Head deposits (clay and silt), which are classified as a secondary (undifferentiated) aquifer, and unproductive strata respectively. The bedrock underlying the site comprises the London Clay Formation, which is classified as unproductive strata.
Source Protection Zone ï The nearest Source Protection Zone 3 is located 1.4km to the southwest of the southernmost point of the subject site

For future enquiries, please refer to our online ñWhatôs In Your Back Yardòservice, where this information is already publicly available.

This information is subject to the attached standard notice.

I trust this information is of use. If you have any further questions, please contact us and we will be happy to help.

If you have any further queries or if youôd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months and we will happily do this for you.

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey ï we use every piece of feedback we receive:
http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL

Kind Regards,

Toby

Toby Mortby | Customers and Engagement Officer | Kent and South London
Environment Agency | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH
Internal: 723-3115 External: 01732 223115
Email: KSLenquiries@environment-agency.gov.uk

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey ï we use every piece of feedback we receive:
http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL

www.gov.uk/floodsdestroy

DO YOU KNOW WHAT TO DO? FLOODS DESTROY BE PREPARED

From: Jonathan Morley [mailto:jonathan.morley@rpsgroup.com]
Sent: 14 January 2016 12:49
To: Enquiries, Unit
Cc: Andrew Stevenson
Subject: Environmental Information Request

Dear Sirs,

Environmental Information Request: Kemsley, Kent.

We are currently conducting a flood risk assessment for a development at Kemsley Marshes, Kent (site outlined in red on the attached plan).

To undertake the assessment RPS wish to obtain the following information

- Confirmation of Flood Zone (electronic MapInfo Version if possible);
- Confirmation of the most recent Strategic Flood Risk Assessment (SFRA);
- SFRA Flood zone extents for the area (electronic MapInfo Version if possible);
- EA and SFRA Flood Hazard, surface water and reservoir flood risk mapping including water depths for the area;
- A online link to or copy of the most recent SFRA, including associated drawings, maps and appendices;
- Mapping and records for any surface water assets owned or maintained;
- Any existing river and/or tidal levels, for the 100 year, 100 year with climate change, 200 year, 200 year with climate change, 1000 year, and 1000 year with climate change flood events;

- Any gauged flow records for river networks in close proximity to the site, with associated estimated return periods;
- Details of any historical flood events;
- Details of existing or planned flood alleviation and defences in this area;
- Details of future defence upgrades and/or shoreline management plans/policies;
- Details of any flooding due to drainage problems associated with the site, including flood levels, flood extents and any available anecdotal information;
- Records of any surface and groundwater discharges, abstractions including private licences and pollution incidents;
- Details of any recorded groundwater levels in the area, and groundwater vulnerability of the area;
- Details of any groundwater flooding issues in the area, including flood levels, flood extents and any available anecdotal information;
- Details of aquifer designation, soil classification, and Source Protection Zones in this area; and
- Any other flooding related data and/or reports held in relation to the site and immediate area.

Please would you inform me of any data costs that may be incurred as soon as possible.

Should you have any queries please do not hesitate to contact me.

Yours sincerely
for RPS

Jonathan Morley

Jonathan Morley BSc (Hons)
Senior Engineer - RPS Planning & Development
Suite D10, Josephs Well, Hanover Walk,
Leeds, West Yorkshire, LS3 1AB.
United Kingdom

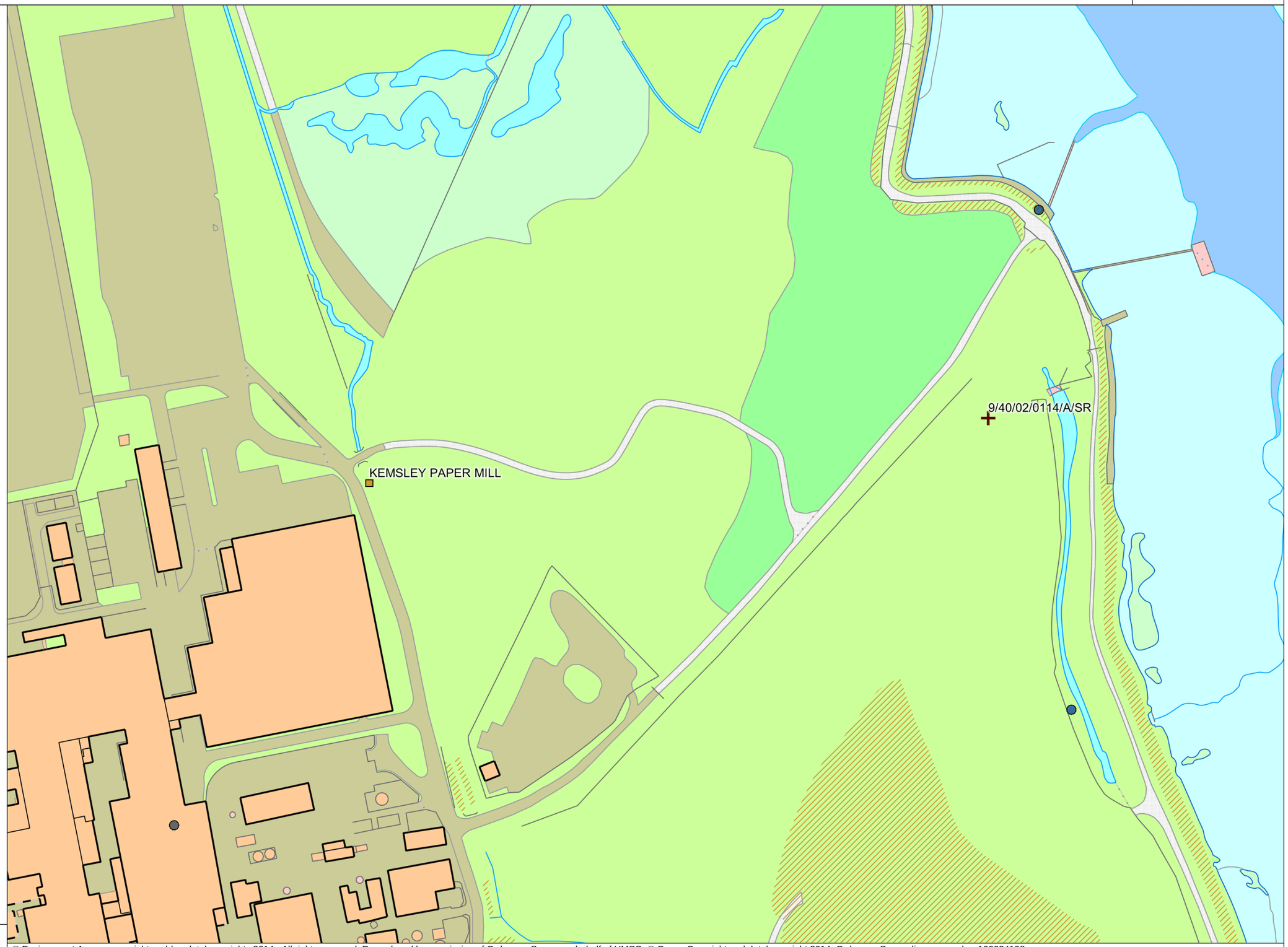
Tel: +44 (0) 113 220 6190
Direct: +44 (0) 113 2204427
Mobile: +44 (0) 7920 566017
Email: jonathan.morley@rpsgroup.com
www: www.rpsgroup.com

KSL 1494

Environment Agency

Legend

- NIRS2 Pollution Incidents
- WIMS Active Discharge Consents Outlets
  - Agriculture
  - Miscellaneous
  - Sewage Outlet - not from Water Companies
  - Sewage Outlet - from Water Companies
  - Sewage and Trade combined
  - Trade
  - Waste Site
- Water Discharge Activity Exemptions
- NALD Abstraction Points
- NALD Abstraction Reaches
- NALD Abstraction Areas



0 22 44 66 m.

N W E S

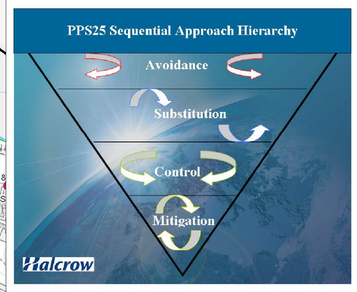
APPENDIX 2

Swale Borough Council Flood Map

This map, in conjunction with the SFRA report and tables, is intended to assist with the Sequential Test in allocating development sites. The test is the most important flood risk management tool for spatial planning, as it implements the high level measures of avoidance / prevention and substitution.

A planning authority applies the Sequential Test to demonstrate that there are no reasonably available sites in areas with less risk of flooding that would be appropriate to the type of development or land use proposed. Preference should be given to locating new development in Flood Zone 1. If there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3a and finally Flood Zone 3b. Within each Flood Zone new development should be directed to sites with lower flood risk from all sources as indicated by the SFRA.

In applying the Sequential Test, climate change should be taken into account in accordance with the expected lifetime of the development. The Environment Agency recommendation is to assume a lifetime of approximately 60 years for commercial development and 100 years for residential. For flood modelling purposes, the 'present day' is taken as 2010, hence flood zones for commercial are calculated based on the PPS25 estimated conditions for 2070. PPS25 provides climate change predictions up to 2115, just over 100 years in the future. As a precaution, flood zones for residential use conditions for 2115.



PPS25 : Flood Zones Definition

Zone 1 Low Probability

Definition
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

Appropriate uses
All uses of land are appropriate in this zone.

FRA requirements
For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention. See Annex E for minimum requirements.

Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

Zone 2 Medium Probability

Definition
This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Appropriate uses
The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D.2 are appropriate in this zone.
Subject to the Sequential Test being applied, the highly vulnerable uses in Table D.2 are only appropriate in this zone if the Exception Test (see para. D.9.) is passed.

FRA requirements
All development proposals in this zone should be accompanied by a FRA. See Annex E for minimum requirements.

Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

Zone 3a High Probability

Definition
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.

Appropriate uses
The water-compatible and less vulnerable uses of land in Table D.2 are appropriate in this zone.
The highly vulnerable uses in Table D.2 should not be permitted in this zone.
The more vulnerable and essential infrastructure uses in Table D.2 should only be permitted in this zone if the Exception Test (see para. D.9) is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

FRA requirements
All development proposals in this zone should be accompanied by a FRA. See Annex E for minimum requirements.

Policy aims
In this zone, developers and local authorities should seek opportunities to:
i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;
ii. relocate existing development to land in zones with a lower probability of flooding; and
iii. create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b The Functional Floodplain

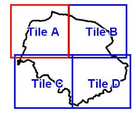
Definition
This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

Appropriate uses
Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted in this zone. It should be designed and constructed to:
– remain operational and safe for users in times of flood;
– result in no net loss of floodplain storage;
– not impede water flows; and
– not increase flood risk elsewhere.
Essential infrastructure in this zone should pass the Exception Test.

FRA requirements
All development proposals in this zone should be accompanied by a FRA. See Annex E for minimum requirements.

Policy aims
In this zone, developers and local authorities should seek opportunities to:
i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and
ii. relocate existing development to land with a lower probability of flooding.

Location Plan :



PPS25 : Flood Risk Vulnerability Classification

Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	• Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.
More Vulnerable	• Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment plants. • Sewage treatment plants (if adequate pollution control measures are in place).
Water-compatible Development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

PPS25 : Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Zone	Flood Risk Vulnerability classification	Essential Infra structure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
	Zone 1	V	V	V	V	V
	Zone 2	V	V	Exception Test required	V	V
	Zone 3a	Exception Test required	V	X	Exception Test required	V
	Zone 3b "functional floodplain"	Exception Test required	V	X	X	X

V : Development is appropriate
X : Development should not be permitted

Swale Borough Council
Swale House, East Street
Sittingbourne
Kent, ME10 3HT

Halcrow Group Ltd
Griffin House, 135 High Street
Crawley
West Sussex, RH10 1DQ

LEGEND

- Main Rivers
- Evacuation routes
- SW 0 Southern Water Flood Incidents Data
- Swale Borough Boundary
- Area Action Plan & Development Area

Lower Medway Internal Drainage Board Data

- MIDB 0 Flooding from other sources
- MIDB 0 Tidal flooding

Environment Agency Data

- EA 0 Flooding from other sources
- EA 0 Tidal flooding
- EA 0 Fluvial flooding
- EA 0 Groundwater flooding
- Flood extents of 1953 event (tidal)
- Flood extents of 1978 event (mainly tidal, some fluvial)

Flood Zones

- Flood Zone 2
- Flood Zone 3a
- Flood Zone 3b

Due the volume of data displayed on this map not all features are labelled. All the information is available in a GIS format supplied as part of this SFRA.

0 0.5 1 kilometres

Project : Swale SFRA for Local Development Framework

Drawing: Flood Map : Flood Zones 2, 3a, 3b & Historical Flooding Tile A in 2010

Drawing no. : WBSWLE-FZ-001 Date : 07 Oct 2009 Scale : 1 in 25,000 at A1

APPENDIX 3

Surface Water Management and Foul Drainage Philosophy Statement

Title: **Surface Water Management and Foul Drainage Design Philosophy Statement**

Project: **NK016315**

Prepared for: **Kemsley Sustainable Energy Plant**

Date: 13th December 2016

Our Ref: NK016315

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QUALITY MANAGEMENT

Prepared by:	Dean Watson
Authorised by:	Gordon Barnard
Date:	13th Dec 2016
Project Number/ Document Reference:	NK016315

Revision History

Rev.	Description
Rev A	Amended in accordance with landowners comments in clause 7.2.10
Rev B	Project description fuel stock capacity corrected.
Rev C	Design Addendum added. Appendix D, Appendix C contents replaced accordingly. 7.3.11; 7.3.2; 7.3.3 updated in accordance with Design Addendum.
Rev D	Section 7 – clauses 7.1, 7.2.1, 7.2.3, 7.2.4, 7.3.1.1, 7.3.1.2, 7.3.2, 7.3.3 and 7.3.4 amended. Section 8 – clause 8.1 amended. Section 9 – clause 9.1 amended. Appendix B – figures updated. Appendix C – WINDES microdrainage calculations updated. Appendix D – omitted.
Rev E	Appendix B – figures updated

CONTENTS

1 INTRODUCTION

1.1 The following report outlines the scheme design philosophy with respect to surface water, foul and process drainage for a proposed Sustainable Energy project to be constructed on the Swale Estuary at Sittingbourne in Kent.

2 PROJECT DESCRIPTION

2.1 The proposed project will comprise:

- A sustainable energy plant with a fuel stock capacity of 550,000 tpa.

The facility will use combustible non hazardous waste as the fuel source.

In addition to the main fuel store, treatment, boiler and turbine buildings, ancillary development will comprise access roads, parking, weighbridge, maintenance and office areas.

The current site layout is indicated on drawing figure 4.3D.

3 GROUND CONDITIONS/ADJACENT LAND

3.1 A phase II site investigation undertaken by RPS in July 2009 indicates that the geological strata beneath the site comprise:

(i)

(ii) Cohesive made ground to maximum thickness of 4.5m.

(iii) Cohesive alluvium to maximum thickness of 3.5m

(iv) London clays to maximum thickness of 5m.

These deposits overlay the solid geology associated with the Woolwich and Thanet sands and Cretaceous bedrock Chalk.

Historical site investigation information made available by the landowner indicates the following:

(i) The area of land to the north of the site was previously used to store coal. This area is indicated as hatched on the drawings. The made ground in this area retains a residual coal element.

(ii) The area to the south of the site forms the Kemsley Waste Disposal Site (KWDS). This landfill area has recently been capped with clay. An access track forms the northern boundary of the KWDS. It is understood that methane monitoring stations are located along the path. Furthermore it is believed that leachate from the KWDS is discharged to an existing ditch located on the development site.

It is proposed that the path is retained on its present line such that access is maintained post development.

4 GROUND WATER

4.1 The site investigation groundwater monitoring indicates wide spread seepage within the made ground and alluvium layers. It is likely that this represents a perched system. A deeper groundwater system (most likely in continuity with the Swale estuary) was encountered at a depth of 14m below existing ground level.

The London clay is classified as a non-aquifer. The Woolwich and Thanet sands are minor aquifers and the chalk bedrock is classified as a major aquifer.

5 EXISTING TOPOGRAPHY AND PROPOSED FINISHED LEVELS

5.1 The existing site slopes gently from west to east towards the Swale estuary.

The elevation at the western end is approximately 7.0m AOD and at the eastern boundary approximately 4.0m AOD. Finished floor levels for the proposed scheme are anticipated to be set to a level of 6.30m. Thus part of the site will be in cut and part will require upfilling.

6 ECOLOGICAL CONTEXT

6.1 A phase I Habitat and Scoping Survey and assessment was carried out by RPS in June 2009.

Much of the surrounding area to the north-east, east and south of the site is designated as SSSI, SPA and Ramsar notable for coastal grazing and salt marshes and intertidal habitat.

7 SURFACE WATER MANAGEMENT

7.1 Overall Philosophy

The current site generally comprises undeveloped marsh land (together with a stock pile area used by the adjacent paper mill). The construction and operation of the new development will therefore significantly increase the impermeable area of the site and hence the volume of the surface water run-off from the site and potentially the nature of the run-off in terms of its capacity to pollute receiving watercourses/bodies.

The overall philosophy for the design of the surface water drainage system for the site development is therefore to manage surface water discharge sustainably and at source and to ensure that discharged waters do not constitute a pollution risk.

This overall approach is in accordance with the requirements of Appendix F of PPS 25 (Development and Flood Risk). PPS 25 has now been superseded by Planning Policy Framework (NPPF) with particular reference to paragraph 9 of the Technical Guidance to the NPPF published in March 2012. It is anticipated that the pollution risks identified and mitigations proposed in this document will satisfy the requirements of the relevant planning consultees such as the Environment Agency and Natural England.

The Surface Water Drainage design is shown on drawing figure 4.25D. As shown on the drawing, it is proposed that all clean surface water from the site is discharged to receiving storage pond constructed on the site as shown on drawing figure 4.24D. The storage pond discharges this water under gravity to the tidal Swale estuary to the north east. The provision of the constructed pond will provide an effective and economic way of conveying water to the receiving swale during normal conditions with the added benefit of protecting the adjacent marsh land habitat from surface water run-off. The pond will also provide protection against flooding of the site during design rainfall and tidal events. This design proposal is assessed in detail below against the following criteria:

- Pollution/Aquifer contamination
- Flooding
- SUD's
- Climate change
- Water reclamation

7.2 Pollution/Aquifer Contamination

The operation of the facility exposes the surface water management system to pollution risk. The operations and activities which contribute to this risk together with the proposed mitigation measures to be implemented are outlined below.

7.2.1 Potential Polluting Activities/Sources

The following activities/operations require consideration.

(i) Waste water associated with the process.

(ii) Movement of lorries, loading shovels and cars.

(iii) Storage of fuel and operation of on site re-fuelling facility.

(iv) Fire suppression.

(v) Landscape top soil run-off

(vi) Discharge of leachate from adjacent KWDS land.

(vii) Exposure of contaminated land/creation of pathways in areas adjacent to the site.

7.2.2 Waste Water associated with the process

Refer to Section 8 for further details.

7.2.3 Movement of lorries, loading shovels and cars

Normal activity

Minor day to day fuel/oil spillages from car/lorry/loading shovel engines will be flushed into the yard and car park surface water drainage systems and treated through by-pass interceptors.

The by-pass interceptors will be alarmed for fuel and silt build up and to indicate when routine maintenance is required.

Lorry yard accident / exceptional fuel spillage/unloading spillages

Lorry or loading shovel impact or damage to fuel pumps could result in volumes of fuel/oil released sufficient to exceed the capacity of the interceptors. In these scenarios untreated contaminated water would be discharged directly to the storage pond. In order to deal with this an electrically operated closure valve will be provided so that contaminated water is retained in the storage pond such that it can be pumped to tanker for removal off site.

7.2.4 Production of Domestic Foul Waste Water

The energy plant will comprise areas of office space with associated welfare facilities. The domestic waste water produced shall be discharged to the foul system.

7.2.5 Fire Suppression

In the event of fire, the water required to suppress it will be stored in pits and sumps constructed within each building. Perimeter upstands and ramped access doors will prevent this water escaping to the external areas. Contaminated water contained within the fire water pits and sumps will be tested and disposed of off site.

7.2.6 Landscape Topsoil run-off

Surface water run-off from the landscape slopes will be collected by a series of land drains located at the base of the slopes and these will discharge the water into the storage pond.

7.2.7 Aquifer Contamination

As indicated in section 3.1, the ground conditions effectively preclude the use of infiltration drainage techniques. Thus the project presents no risk of contamination to the underlying aquifers.

7.2.8 Existing Ditch

(i) The location of an existing ditch on the western boundary of the site is shown on the drawings. The land owner has indicated that this ditch does not receive any leachate discharge from the adjacent KWDS. In order to accommodate the proposed scheme the ditch will be infilled and a new mitigation ditch constructed – see section 10.

7.2.9 Adjacent Area Pollution Pathways

The construction of the storage pond will require works (including excavations) in the potentially contaminated areas on the boundaries of the site.

Excavations for the pond are likely to encounter the made ground. It is intended however that the storage pond will be lined with clean site won clay placed to a depth of at least 300mm. Thus potential for the pond to act as a pathway for coal residue pollution is removed.

7.3 Flooding

The site will be exposed to the risk of flooding due to the following:

(i) Exceedance of the capacity of the below ground pipework, channel drains storage elements, etc., constructed as part of the works during design rainfall events.
(ii) Failure of the above ground superstructure drainage elements such as siphonic pipework and gutters as a consequence of (i) above.
(iii) Exceedance of available storage capacity as a result of design rainfall events coinciding with tidal events. This situation will result in the site becoming tide locked. Thus discharge to the adjacent Swale estuary or Milton Creek would not be possible during these periods.
(iv) Inundation of the site of seawater during extreme tidal events.

For the purposes of this report, flooding as a result of (i), (ii) and (iii) described above is defined as:

- Rainwater falling on the development site, entering the drainage system and subsequently crossing the site boundary at any location.
- Rainwater falling on the development site, entering the drainage system and subsequently entering buildings on the development site.

7.3.1 Capacity Exceedance

7.3.1.1 Basic Criteria for Design

The surface water drainage system shown on drawing figure 4.25D will be designed in accordance with the following basic criteria:

(i) All network pipework will be designed for no surcharging above pipe soffit for 1 in 2 year design storms.

(ii) The system shall be designed not to flood (as defined above) for 1 in 100 year +20% climate change design storms.

(iii) The site drainage serving the roofs and external areas will discharge freely to the storage pond for all rainfall events.

(iv) The drainage networks will be designed and flooding simulated using WINDES micro-drainage software. All drainage will generally be designed in accordance with BS EN 752-2008: Drain and Sewer Systems outside buildings and the recommendations outlined in the 7th Edition of Sewers for Adoption.

(v) The roof drainage for the various buildings comprising the facility shall be siphonic drainage systems designed to provide category 3 protection (as described in BS EN 12056:3) and a 25-year design life. The siphonic drainage systems and gutters will therefore be designed for 1 in 100 year return period storms.

For the main buildings, a single primary siphonic system is proposed. This will be designed to take rainfall intensities of up to 231mm/hr and discharge directly to the underground drainage system. Overflows will also be implemented such that in the event of an exceptional rainfall event or blockage the water can still be discharged from the gutter.

7.3.1.2 Additional Comments with respect to Capacity Exceedance

In addition to the basic criteria defined above, it should be noted:

- As indicated on the drawing slot, channel and kerb drains constructed close to the surface will be utilized to a considerable extent. This will ensure that the drainage is generally kept shallow thus avoiding expensive and potentially dangerous deep excavations and the perched water table at high level.

- Storage of run-off water in external areas through design of external levels/provision of raised kerbs, etc., has not been utilized given the nature of the facility (extensive buildings, limited yard areas, potential ash contamination).

The two points above will require that, in effect, the below ground pipework and high level slot and kerb drains are designed to convey 1:100 year rainfall volumes directly to the storage pond.

It is proposed that the pond is designed such that a 600mm freeboard is maintained in the 1:100 year +20% climate change rainfall event combined with the 1 in 100 year storm surge.

7.3.2 Coinidence of Design Rainfall and Tidal Events

The RPS Flood Risk Assessment states that the EA has confirmed that there are no runoff requirements entering the Tidal Swale Estuary. Due to the tidal nature of the outfall, the outfall from the proposed site will not have any impact on flood risk in the Tidal Swale Estuary.

7.3.3 Tidal Range

The normal tidal range at the outfall is provided in the UK Hydrographic Office Admiralty Tide Table Volume 1 2016. The nearest tabulated port is Grovehurst Jetty (within 200m of the proposed outfall). The normal tidal range (in m AOD) for this is give in Table 1.

LAT (m)	MLWS (m)	MLWN (m)	MHWN (m)	MHWS (m)	HAT (m)
-2.9	-2.3	-1.4	+1.8	+2.9	+3.4

Table 1: Tidal Range at Grovehurst Jetty (2000)

Where:

- MLWS: Mean Low Water Springs
- MLWN: Mean Low Water Neaps
- MHWN: Mean High Water Neaps
- MHWS: Mean High Water Springs
- LAT: Lowest Astronomical Tide
- HAT: Highest Astronomical Tide

Figure 1 shows the Tidal Cycle for Sheerness adjusted for Grovehurst Jetty (from UK Hydrographical Office Admiralty Tide Table) for the 1 in 200 year + 20% climate change event.

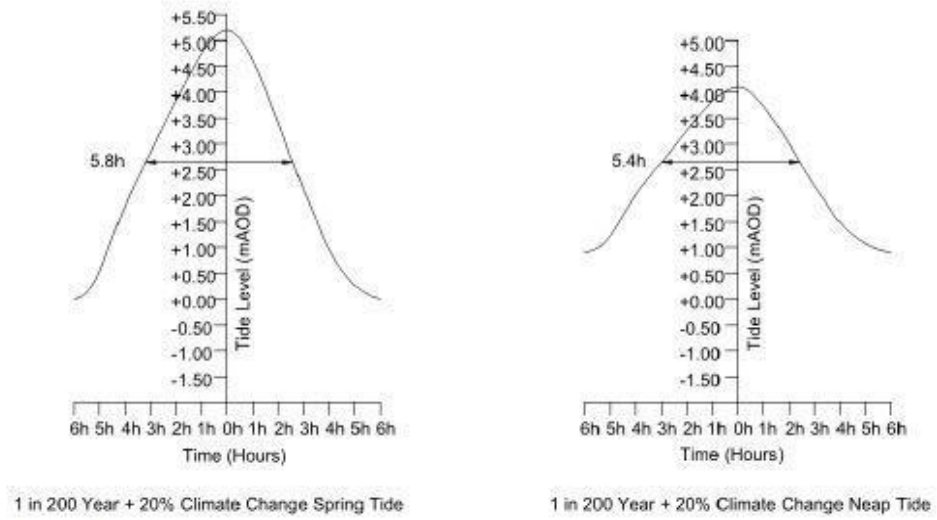


Figure 1: Tidal Cycles at Grovehurst Jetty

These show that if the outfall is set at a level of 2.65m AOD then the pond is tide locked for a maximum period of 5.8 hours (350 minutes). For Kemsley the total rainfall for a 360 minute 1 in 100 year rainfall event is 73.7mm (based on data from the Flood Estimation Handbook Version 3). Including 20% climate change this becomes 88.5mm.

The total equivalent impermeable area (taking 1.0 as a runoff coefficient for hardstanding and 0.3 as a runoff coefficient for softscape) of this is 3.4 hectares. The total area of the pond is assumed to be 5000m² taking the total equivalent impermeable area to 3.9 hectares.

This gives a total runoff volume during the 360 minute 1 in 100 year + 20% climate change rainfall event of 3500m³. The attenuation basin is therefore to be sized to meet this criteria.

7.3.4 Discharge

The design principles assume that the pond must fully empty before the outfall becomes tide locked again. Making the conservative assumption that no discharge occurs until the tide level falls below the invert of the outfall this means that the pond must discharge fully within a period of 6.2 hours. Over 6.2 hours this flow rate would be sufficient to drain 7700 litres indicating that this criteria will be met.

7.4 SUD's

With reference to NPPF and CIRIA SuDS Manual C753 a sustainable approach to the management of surface water drainage is to be adopted:

(i) The perimeter storage pond will be vegetated and will hold, slow down and contribute to treatment of the run-off water. The pond will prevent uncontrolled discharge water entering areas of land adjacent the site.

(ii) The water reclamation systems indicated, represent additional source control in addition to providing a useable resource.

The ground conditions comprising essentially cohesive impermeable strata to considerable depth and the presence of perched water table preclude the use of infiltration devices.

7.5 Climate Change

As indicated in preliminary discussions with the EA and as recommended in NPPF design peak rainfall intensities will be increased by 20% as a precaution against the effects of climate change.

8 PROCESS DRAINAGE

8.1 The following measures will be implemented to deal with waste process water generally. In the tipping hall and bunker it is not intended that any dedicated internal drainage is provided with all water draining into the bunker and soaking into the waste. The bottom ash hall will drain to the dedicated process drainage network in which effluent is collected, treated and recirculated inside the plant.

(i) Buildings or equipment areas where waste water is generated or the risk of spillage of fuel, oil, condensate etc. is present will be provided with internal building drainage as necessary.

(ii) It is envisaged that waste water associated with the boiler process will be recycled for slag cooling purposes.

(iii) Level entry doors will be provided with threshold channel drains discharging to the foul system. Perimeter upstands and ramped access to ensure all spillages, leaks, etc. remain with the building footprint.

9 FOUL DRAINGE

9.1 The foul drainage elements described in 7.2.1 (production of domestic foul waste, process driven waste water and refuelling.) will discharge (to rates agreed with the receiving sewer owners and/or the Water Authority) to the existing foul sewer located within Ridham Avenue. The remoteness of some of the areas requiring connection to the foul system (e.g. slag laydown area) will require that a pumping station and rising main are provided to discharge foul water to the receiving sewer at self cleansing velocities.

9.1.1 The new site foul drainage will be designed in accordance with BS EN 752, 7th Edition of Sewers for Adoption and the requirements of the Building Regulations.

10 ECOLOGICAL ENHANCEMENT

10.1 In order to compensate for infilling of the existing ditch located on the western boundary (see 7.2.10) it is intended to provide a new ditch slightly to the west of the existing ditch. The ditch is indicated on drawing figure 4.41D .

11 CONSTRUCTION PHASE POLLUTION CONTROL

11.1 Safeguards shall be implemented during the construction phase to minimise the risk of pollution and detrimental effects to the water interests around the site. The following general mitigation measures shall be implemented.

(i) Works on site shall generally follow the best practice guidelines outlined in Section 5 and 6 of CIRIA C532 – Control of Water Pollution from Construction Sites.

(ii) Temporary foul drainage to serve the contractors welfare facilities will be provided at the start of works on site.

(iii) Refuelling and maintenance of machines shall be strictly controlled and oil storage tanks confined to locations remote from the perimeter of the site. All leaking or empty oil drums shall be immediately removed from site.

(iv) Well constructed and designated storage areas shall be provided located more than 20m away from the site perimeter. Chemical or fuel storage shall comprise of impermeable boxes and appropriate bunding.

(v) On site concrete batching plants (if utilised) are to be located more than 20m away from the site perimeter. The washing out of any concrete mixing plant or cleaning of ready mix concrete tankers shall be strictly controlled. The effluent from such cleaning shall be tankered off site or suitably treated using sedimentation tanks before the run-off is discharged.

(vi) A strict waste management system will be incorporated to prevent the disposal of construction or domestic rubbish entering the adjacent marshland areas. Waste materials will be properly stored on site.

(vii) Fill material imported to upfill to site will be sourced with due regard to leachate characteristics to the approval of the EA and Natural England. It is anticipated that the storage pond required for the permanent works will be constructed in advance of the earthworks operations such that construction phase storage and settling pond capabilities are available from the start of the works, and to provide tidal innundation protection to the construction site.

APPENDIX A

Ground Investigation Report Extracts/Ground Water Level Extract

BOREHOLE LOG

RPS

Borehole No. **BH1** Sheet 1 of 2

Project Name:	Kemsley Mill	Coordinates	Drilling Plant:	Casing Details	Hole Type
Project No.	JER4418	Northings: -	Start Date: 09/07/2009	Hole Diameter (mm) / Casing Depth (m)	BH
Location:	Sittingbourne, Kent	Eastings: -	End Date: 10/07/2009		Scale 1:50
Client:	E.ON	Ground Level: - m OD	Logged By:		

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Level (m AOD)	Depth (m)	Legend	Description Of Strata
								Grey brown slightly gravelly silty SAND with occasional fill including metal, stone and bricks. Occasional bands of light brown clay with concrete. (MADE GROUND)
		1.00	SPT	68/225mm (3,3,9,9,50)				
		2.00	U001			2.00		Firm to stiff grey slightly gravelly slightly sandy CLAY. Gravels are subangular to angular stone. (MADE GROUND)
		3.00	SPT	N=10 (1,1,2,2,3,3)				
		4.00	U002			3.85		Firm to stiff grey brown occasionally orange mottled CLAY.
	▼	5.00	SPT	N=12 (1,2,3,3,3,3)				
		6.50	U003			7.40		Stiff light grey CLAY. Occasional bands of sand present with depth.
		8.00	SPT	N=14 (1,2,2,4,4,4)				
		9.50	U004					
			Type	Results				

Continued next sheet

0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 6.00 6.50 7.00 7.50 8.00 8.50 9.00 9.50

Remarks:

Chiselling Details

Time Taken	Depth From (m)	Depth To (m)	Tool Used

Groundwater Notes

Strike (m)	Casing Depth (m)	Level After 20 Mins (m)
13.00	12.50	5.25

AGS

RPS

BOREHOLE LOG

Borehole No. **BH2**
Sheet 1 of 2

Project Name: Kemsley Mill	Coordinates	Drilling Plant:	Casing Details		Hole Type
Project No. JER4418	Northings: -	Start Date: 06/07/2009	Hole Diameter (mm)	Casing Depth (m)	BH
Location: Sittingbourne, Kent	Eastings: -	End Date: 06/07/2009			Scale
Client: E.ON	Ground Level: - m OD	Logged By:			1:50

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Level (m AOD)	Depth (m)	Legend	Description Of Strata
								Grey slightly gravelly silty sand. Gravel is subangular flient, stone and stone ash. Occasional metal, bricks and bands of firm light brown clay. (MADE GROUND)
		1.00	SPT	N=4 (1,1,1,1,1,1)				
		2.00	SPT	N=10 (2,2,2,2,3,3)		2.00		Stiff light brown light brown slightly sandy CLAY. Occasional fragments of brick and concrete. (MADE GROUND)
		3.00	U001					
		4.00	SPT	N=9 (2,3,2,2,3,2)				
						4.60		Firm light grey orange mottled CLAY.
	▼					5.00		Stiff light grey orange mottled slightly sandy CLAY.
		6.50	SPT	N=25 (3,5,6,6,6,7)				
						7.80		Stiff grey CLAY.
		8.00	U002					
		9.50	SPT	N=24 (2,4,4,6,7,7)		9.50		Stiff grey CLAY with occasional sand. Sand bands present below 12.1m.
			Type	Results				

Continued next sheet

Remarks:

Chiselling Details				Groundwater Notes		
Time Taken	Depth From (m)	Depth To (m)	Tool Used	Strike (m)	Casing Depth (m)	Level After 20 Mins (m)
				14.50	14.50	5.10

AGS

RPS

BOREHOLE LOG

Borehole No. **BH3** Sheet 1 of 2

Project Name: Kemsley Mill	Coordinates	Drilling Plant:	Casing Details		Hole Type
Project No. JER4418	Northings: - Eastings: -	Start Date: 13/07/2009	Hole Diameter (mm)	Casing Depth (m)	BH
Location: Sittingbourne, Kent	Ground Level: - m OD	End Date: 14/07/2009			Scale 1:50
Client: E.ON		Logged By:			

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Level (m AOD)	Depth (m)	Legend	Description Of Strata
								Stiff brown slightly gravelly slightly sandy CLAY. Gravels are subangular to angular limestone and stone fill. Includes fill material such as glass and pottery. (MADE GROUND)
		1.00	SPT	N=6 (1,1,1,1,2,2)				
		2.00	SPT	65/225mm (2,2,5,10,50)		2.00		Dense dark grey slightly sandy SILT. Becomes clayey with depth. (MADE GROUND)
	▼	3.00	SPT	N=11 (2,2,2,3,3,3)		3.00		Stiff light brown orange grey mottled slightly sandy CLAY. Becomes grey with depth.
		4.00	U001					
		5.00	SPT	50/150mm (9,21,30,20)				
		6.50	U002					
						7.00		Dense grey slightly silty SAND.
		8.00	SPT	52/150mm (11,23,22,30)				
		9.50	U003					
			Type	Results				

Continued next sheet

Remarks:

Chiselling Details				Groundwater Notes		
Time Taken	Depth From (m)	Depth To (m)	Tool Used	Strike (m)	Casing Depth (m)	Level After 20 Mins (m)
				3.00	3.00	2.87
				14.00	-	-

AGS

The Solid Geology is recorded as typically consisting of a veneer of the London Clay formation underlain by the Woolwich Beds.

The London Clay was proven as a grey clay with localised sand bands to 12.3m depth at BH1 and 14m depth at BH2. The London Clay was not encountered at BH3 with the Superficial Deposits underlain directly by the Woolwich Beds below 7m depth. This is supported by the high SPT 'N' values recorded within BH3, consistent with expectation for the Woolwich Beds. However, the associated high SPT 'N' values correlate very much with the latter one. The soils at BH3 between 7m and 14m may simply be a transition zone between the two formations.

A single plasticity test indicates a high plasticity index of 49 with a natural moisture content of 30%. A high shrinkage material is indicated.

4 no. standard penetration tests recorded uncorrected N values of between 14 and 29. The results are provided in *Appendix F* and indicate a trend of increasing value with depth from a firm consistency within the upper formation, gradually hardening to stiff with depth. These results correlate with the single triaxial test result of 97kPa (stiff).

6.1.4 Solid Geology – Woolwich Beds

The Woolwich Beds was proven as a grey silty sand to at least 20m depth.

3 no. particle size distribution tests indicate a variable material ranging from gap graded (consisting of silty fine sand) to poorly graded (consisting of slightly sandy very silty clay).

9 no. standard penetration tests all recorded uncorrected N values in excess of 50 indicating a very dense relative density. The results are provided in *Appendix F*.

The 2 no. shear box test within cohesive material gave an angle of shearing resistance of 14.5° and 15.5 ° associated with an apparent cohesion of 20kPa and 22kPa.

6.2 Groundwater

Groundwater seepages within the Made Ground or the upper Alluvium were recorded in most trial pits and boreholes. These are believed to be perched and characteristic of the variability of the material and the associated infiltrations. A deeper ground water body was encountered at 13 to 14.5 mBGL confined below the London Clay within the Woolwich Beds. All deeper strikes rose to about 5 m depth after 20mins (recorded as fast inflow).

Standing levels of the confined groundwater body were recorded between 3 and 4.7 mBGL. Standing levels of the perched groundwater body were recorded between 1.7 and 4.4 mBGL within the Made Ground or Alluvium.

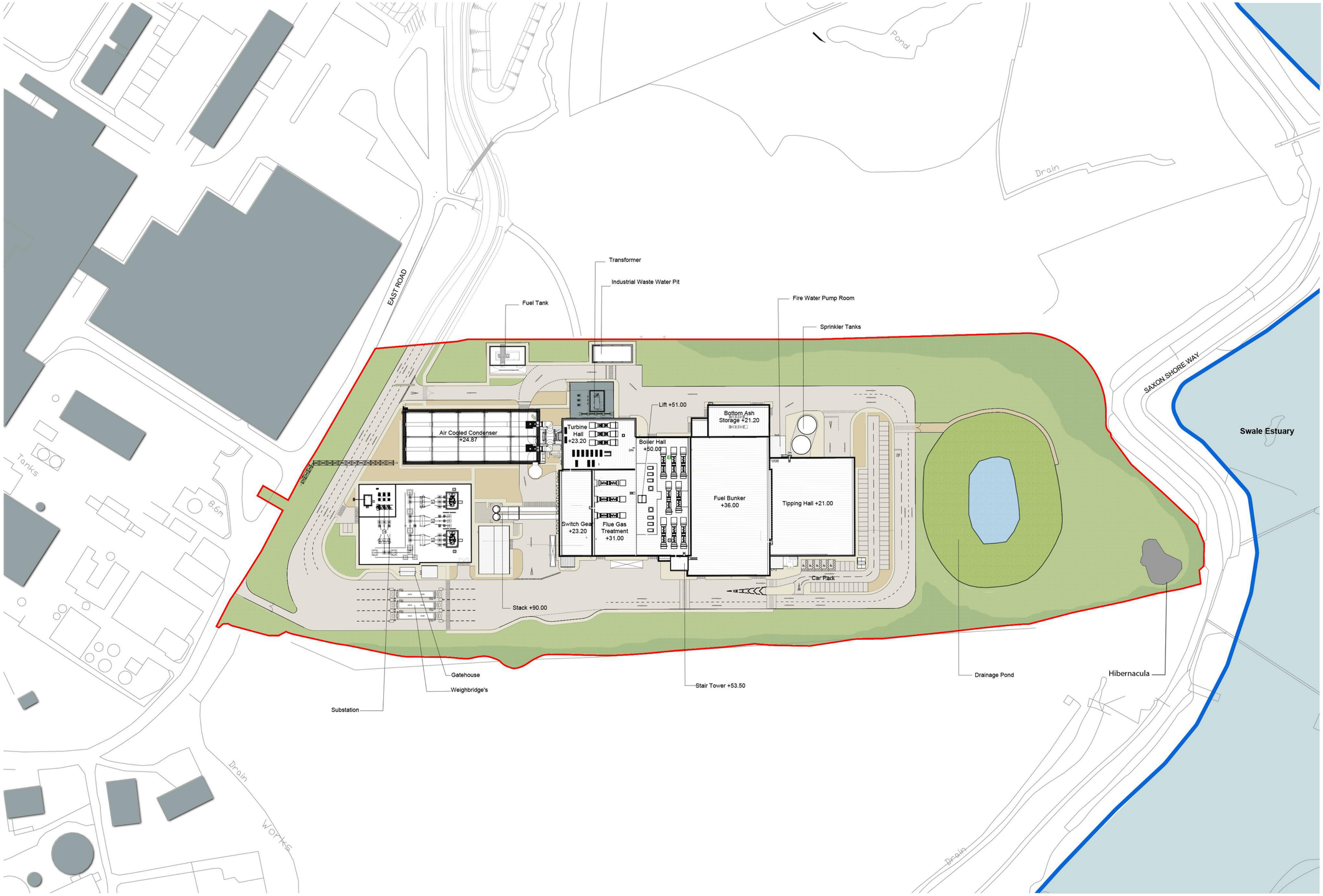
APPENDIX B

Drawings

notes :

1. If this drawing has been received electronically it is the recipients responsibility to print the document to the correct scale.
2. All dimensions are in millimetres unless stated otherwise. It is recommended that information is not scaled off this drawing.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.
4. Information based on drawing reference: OH8013-0202/62G105.

Note: Reference to OS of existing paper mill provided by St Regis Paper Mill in DWG format and topographical survey provided by Eon.



Land Ownership Boundary

Proposed Development Boundary

Drawing for PLANNING purposes only

Content of drawing based on UMC drawing number AAK-04-20020002_UMG 0990. Reproduced with permission

rev	amendments	by	ckd	date
U	Site plan updated.	BC	TFH	5.09.18
T	Drawing updated to UMG current Site plan	PBR	TFH	26.06.18
S	Admin HVAC area roof added. Escape stairs amended to be un-enclosed stair.	JT	CMGD	28.02.17
R	Client logos updated. Steam export rack updated as per CNIM drawing. Gates and fences added. Escape stairs added at Tipping Hall, Car Park layout updated to suit. Footpath added at Fuel Tank. Entrance barrier removed. Admin HVAC area roof added. Escape stairs amended to be un-enclosed stair.	JT	CMGD	13.02.17
P	Labels added. Hatches updated.	MT	CD	20.01.17
N	Site Plan updated	JH	CD	09.01.17
M	Updated to suit current site layout received from EPC contractor	AE	JAT	16.11.15
L	Updated as per client comments 26.10.15.	MK	JAT	27.10.15
K	Updated to suit current building layout received from EPC contractor.	MK	JAT	19.10.15
J	Vehicle wash down area removed.	JAT	TP	24.02.15
H	Updated as per current comments.	CB	JAT	18.02.15
G	Logos confirmed.Site layout/access clarified	AJL	RS	28.06.13
F	Title block and roof layout updated	JAT	SG	24.10.12
E	E.ON logo added.	KRy	PRP	15.02.10
D	Roof plan updated. Transformer confirmed as external.	AJL	PRP	21.01.10
C	Surrounding site context and site gates added. Existing OS and colours altered.	SMG	PRP	08.12.09
B	Entrance Clarified. Red line boundary confirmed. Critical dimensions added.	AJL	PRP	02.12.09
A	Boundary confirmed, swale extent reduced	PRP	RS	19.11.09

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Client: Wheelabrator Technologies

Project: Kemsley Sustainable Energy Plant

Title: Proposed Site Layout

Drawing Status	Date Created	Drawing Scale
Preliminary	November 2009	1:1000
Project Leader	Drawn By	Initial Review
RS	AJL	PRP

Drawing Number: 16315 / A1 / P / 0100 U

Rev: U

FIGURE 4.3D

notes :

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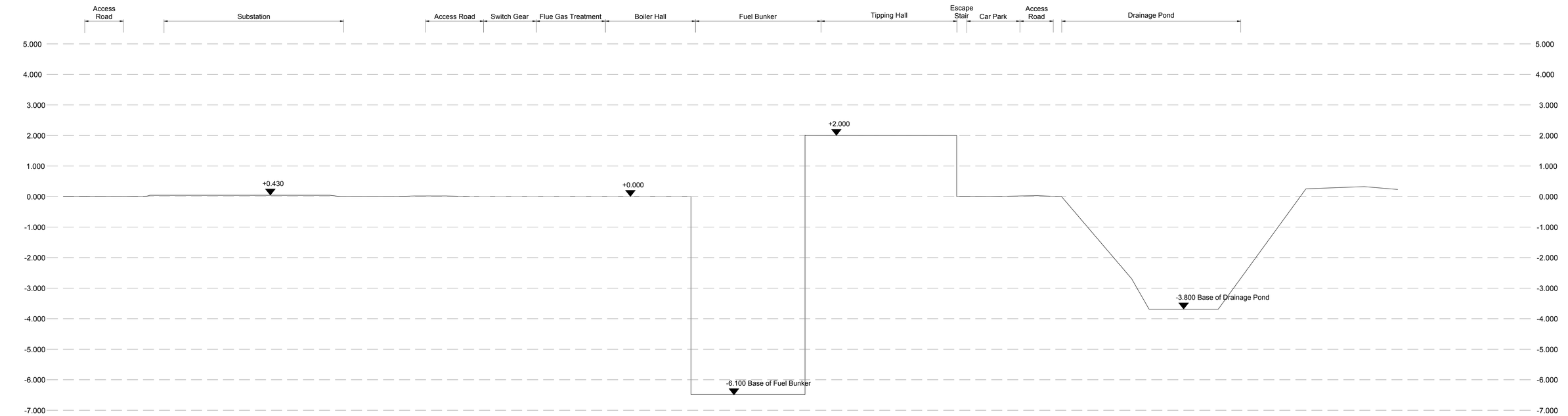
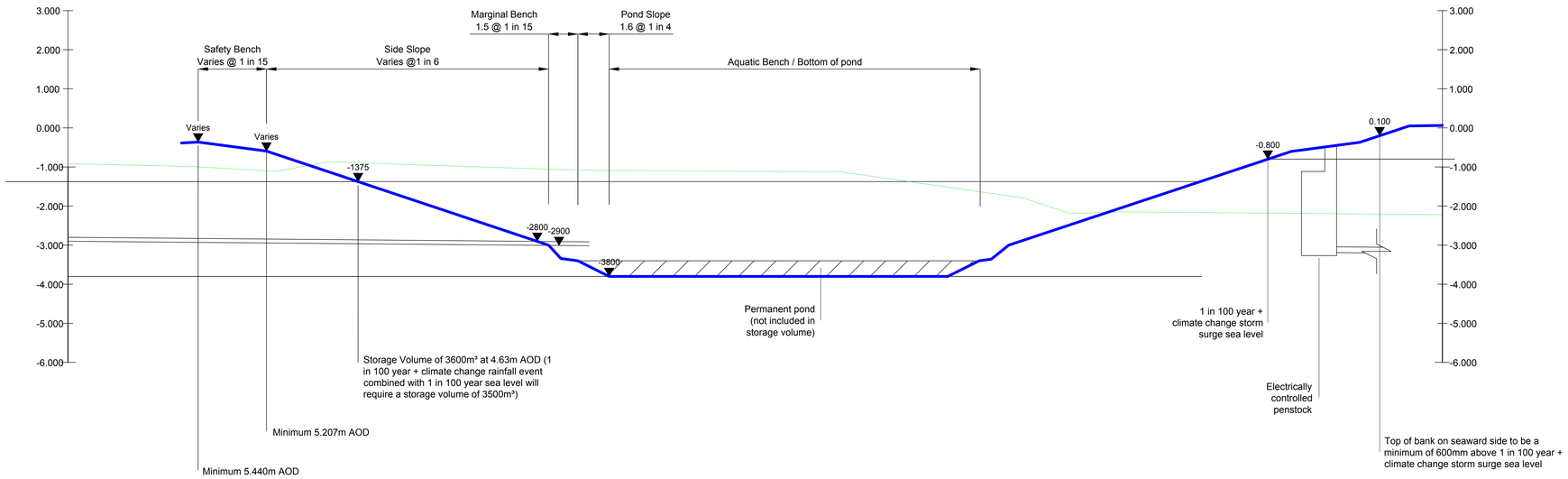
2. All dimensions are in millimetres unless stated otherwise. It is recommended that information is not scaled off this drawing.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.



Section A-A
Scale 1:50 Vertical/1:500 Horizontal

Refer to RPS drawing 0600 for section line locations



Key:
- Existing Levels
- Proposed Levels

Section B-B
Scale 1:50

Drawing for PLANNING purposes only

Content of drawing based on UMC drawing number AAK-04-2002002_UMG0910 and ARUP drawing number SK-005. Reproduced with permission

rev	amendments	by	ckd	date
J	Level lines darkened	BC	TFH	31.08.1
H	Levels revised to suit new levels	PBR	ET	17.07.18
G	Client logos updated. Section A-A title changed to Section B-B. New Section A-A added. Drawing title updated to Site Sections.	JT	CMGD	15.02.17
F	Updated to suit NMA 2016	JH	CMGD	11.01.17
E	Sections updated to suit latest UI design.	AJL	ST	26.07.13
D	**Logos confirmed.**	**AJL**	**PRP**	**03.03.10**
C	**Drawing figure added. Drawing updated to suit revised site layout.**	**AKC**	**ST**	**24/11/09**
B	**1. Existing ditch noted as infilled/culverted 2. Pond outfall pipe added. 3. Minor amendents**	**JDW**	**RM**	**04/11/09**
A	**Compensatory ditch indicated.**	**AKC**	**ST**	**29/10/09**

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Client: Wheelabrator Technologies

Project: Kemsley Sustainable Energy Plant

Title: Site Sections

Drawing Status	Date Created	Drawing Scale
Preliminary	October 2009	1:500
Project Leader	Drawn By	Initial Review
AWY	AKC	ST

Drawing Number: 16315 / A0 / 0250

Rev: J

Figure 4.24D

1m SCALE 1:50

10m SCALE 1:500

notes :

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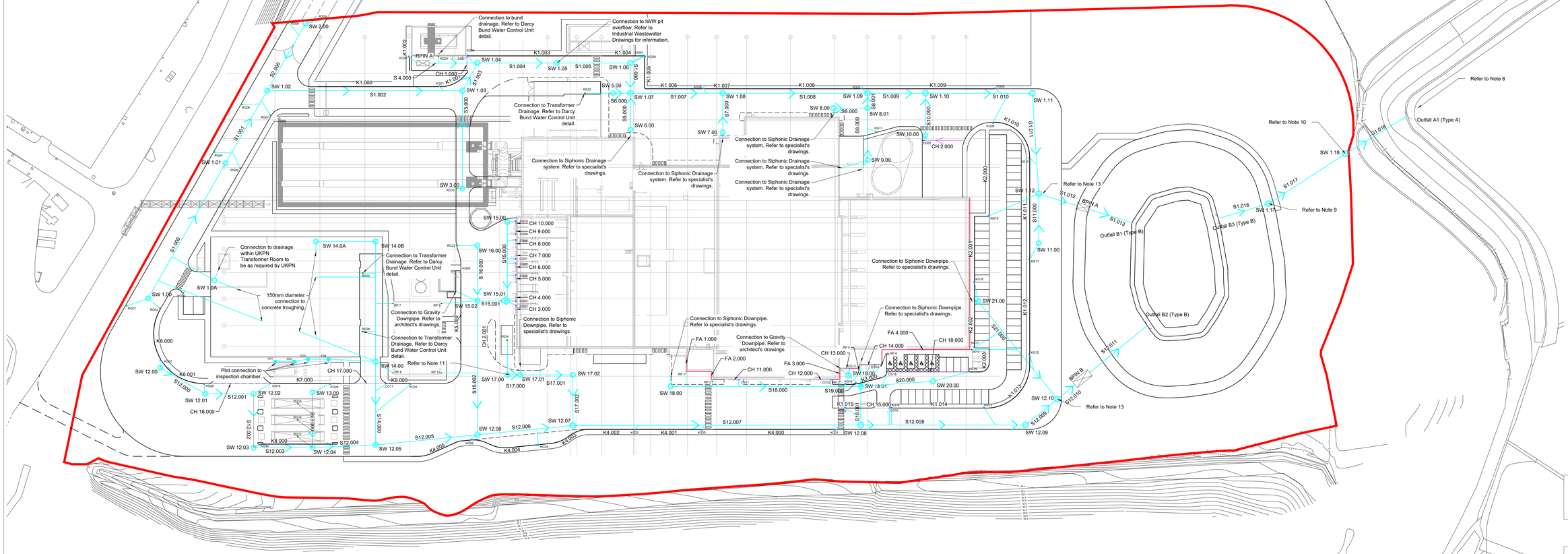
2. All dimensions are in millimetres unless stated otherwise. It is recommended that information is not scaled off this drawing.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Legend:

- Channel Drain
- Surface water sewer
- Surface water filter drain (perforated pipe)
- Kerb inlet drain
- Manhole
- RG01 Road Gully
- KG02 Kerb Gully
- CG03 Channel Gully
- BPIN Bypass Petrol interceptor
- RPIN Full Retention Petrol interceptor
- Headwall
- DP 1 Downpipe



Drainage Layout

Scale 1:500

1. This drawing to be read in conjunction with Surface Water Drainage Schedule (5025 20 02 00 22/AP G 0011), Surface Water Setting Out drawing (5025 20 02 00 22/AP G 0015), Drainage Construction Details (5025 20 02 00 22/AP G0091, 0092, 0093, 0096 and 0097), CNIM, MEP and structural drawings.
2. External pipes with cover less than 1.2m to have Class A3 pipe bedding, external pipes with cover greater than 1.2m to have Class S pipe bedding.
3. Upstream gully / channel connection pipe invert level to suit gully / channel connection detail.
4. All gully and channel connections to main drainage runs to be 100mm Ø unless stated otherwise.
5. Connection Points to building drainage pending confirmation from UMC.
6. Pipes, fittings and gully materials to be as per surface water drainage schedule (5025 20 02 00 22/AP G 0011). Those upstream of the 3 way valve or leading to the CNIM spill tank in the HCl/NaOH delivery area to be PVC-U with EPDM seals.
7. Discharge location and outfall design for outfall A1 to be confirmed with EA.
8. Manhole SW 1.17 to contain electrically controlled penstock or gate valve, rated to close when water levels in manhole SW 1.18 reach -3.3mASD (Hydoc UK ElectroSlide or similar approved). To be supplied with power as required by actuator and telemetry from level sensor in manhole SW 1.18. Comms to be routed back to Admin Block.
9. Manhole SW 1.18 to contain level sensor to monitor water level in manhole. To be supplied with power as required by sensor. Comms to be routed back to manhole SW 1.17.
10. Manhole SW 17.00 to contain three way valve to divert flows to containment tank during delivery process.To be supplied with power as required by actuator and comms from control panel mounted on external building wall (refer to MEP designer's drawings).
11. Landscape drainage to be determined upon completion of levels design.

Drawing for PLANNING purposes only

Content of drawing based on ARUP drawing number 20-02-00-22 APG 0001. Reproduced with permission

rev	amendments	by	ckd	date
J	Drawing updated to current site plan, drainage amended accordingly.	CW	DW	07.09.18
H	Client logos updated. Steam export rack updated as per CNIM drawing. Drainage philosophy updated. Outfall detail note removed. Electrical layouts removed. Site plan updated.	JT	CMG	15.02.17
G	Drawing updated to suit new drainage layout.	JH	CMG	18.01.17
F	Foul outfall drainage updated	LMA	ST	02.08.13
E	**Drawing updated to suit UI layout.**	**AJL**	**ST**	**11.07.13**
D	**Updated to suit revised site layout. Logos clarified.**	**AKC**	**RM**	**18/01/10**
C	**Drawing figure added. Updated to suit revised site layout.**	**AKC**	**ST**	**16/12/09**
B	**Minor amendments**	**JDW**	**RM**	**04/11/09**
A	**Compensatory ditch indicated.**	**AKC**	**ST**	**29/10/09**

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Project: Kemsley Sustainable Energy Plant

Title: Proposed Drainage Layout

Drawing Status	Date Created	Drawing Scale
Preliminary	September 2009	1:500
Project Leader	Drawn By	Initial Review
AWY	AKC	ST

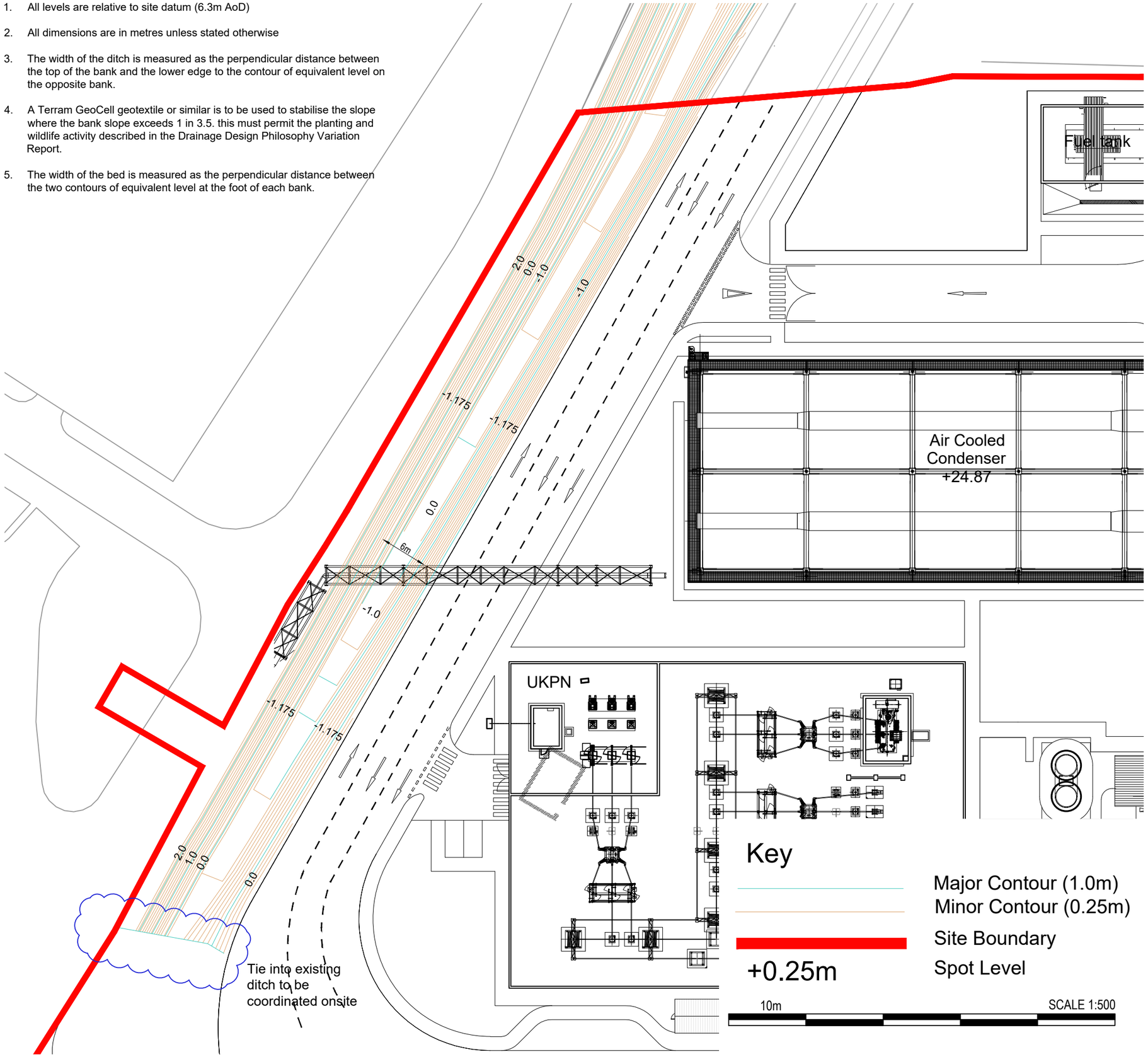
Drawing Number: 16315 / A0 / 0301

Rev: J

Figure 4.25D

10m SCALE 1:500

1. All levels are relative to site datum (6.3m AoD)
2. All dimensions are in metres unless stated otherwise
3. The width of the ditch is measured as the perpendicular distance between the top of the bank and the lower edge to the contour of equivalent level on the opposite bank.
4. A Terram GeoCell geotextile or similar is to be used to stabilise the slope where the bank slope exceeds 1 in 3.5. this must permit the planting and wildlife activity described in the Drainage Design Philosophy Variation Report.
5. The width of the bed is measured as the perpendicular distance between the two contours of equivalent level at the foot of each bank.



notes :

1. If this drawing has been received electronically it is the recipients responsibility to print the document to the correct scale.
2. All dimensions are in metres unless stated otherwise. It is recommended that information is not scaled off this drawing.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Drawing for PLANNING purposes only

Content of drawing based on ARUP drawing number SK-001. Reproduced with permission

rev	amendments	by	ckd	date
B	Site Plan revised and updated!	PBR	ET	17.07.18
A	Client logos updated. Steam export rack updated as per CNIM drawing. Site layout updated. Key updated.	JT	CMGD	15.02.17

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Project: Kemsley Sustainable Energy Plant

Title: Proposed West Ecological Ditch

Drawing Status	Date Created	Drawing Scale
Preliminary	January 2017	1:500
Project Leader	Drawn By	Initial Review
TP	JH	CMGD

Drawing Number: 16315 / A3 / 0260

Rev: B

Figure 4.41D

APPENDIX C

WINDES microdrainage results.

	B	C	E	N	O	P	Q	R	S	AD	AE
1	Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
3	1.000	1.00	30 minute 1 year Summer	0.077	-1.267	-0.133	0.000	0.33		12.7	OK
4	1.001	1.01	30 minute 1 year Summer	0.020	-1.557	-0.108	0.000	0.53		22.3	OK
5	2.000	2.00	30 minute 1 year Summer	-0.354	-1.775	-0.218	0.000	0.10		6.5	OK
6	1.002	1.02	30 minute 1 year Summer	-0.154	-1.795	-0.128	0.000	0.59		39.7	OK
7	3.000	3.00	30 minute 1 year Summer	-0.550	-1.885	-0.135	0.000	0.34		12.5	OK
8	1.003	1.03	30 minute 1 year Summer	-0.475	-2.102	-0.162	0.000	0.61		48.6	OK
9	4.000	RPIN A	30 minute 1 year Summer	-0.596	-1.645	-0.071	0.000	0.18		1.6	OK
10	1.004	1.04	30 minute 1 year Summer	-0.455	-2.147	-0.173	0.000	0.56		53.9	OK
11	1.005	1.05	30 minute 1 year Summer	-0.216	-2.231	-0.174	0.000	0.56		53.4	OK
12	1.006	1.06	30 minute 1 year Winter I+	-0.369	-2.330	-0.195	0.000	0.56		55.3	OK
13	5.000	5.00	30 minute 1 year Summer	-0.026	-1.421	-0.195	0.000	0.11		17.5	OK
14	6.000	6.00	30 minute 1 year Summer	-0.050	-1.342	-0.082	0.000	0.42		7.3	OK
15	1.007	1.07	30 minute 1 year Winter I+	-0.121	-2.359	-0.198	0.000	0.56		77.5	OK
16	7.000	7.00	30 minute 1 year Summer	-0.037	-1.316	-0.072	0.000	0.18		1.5	OK
17	1.008	1.08	30 minute 1 year Winter I+	-0.317	-2.444	-0.206	0.000	0.57		77.4	OK
18	8.000	8.00	30 minute 1 year Summer	-0.099	-1.789	-0.182	0.000	0.08		8.7	OK
19	9.000	9.00	30 minute 1 year Summer	-0.027	-1.824	-0.274	0.000	0.16		50.2	OK
20	8.001	8.01	30 minute 1 year Summer	-0.316	-2.378	-0.222	0.000	0.35		59.1	OK
21	1.009	1.09	30 minute 1 year Winter I+	-0.303	-2.573	-0.230	0.000	0.60		115.9	OK
22	10.000	10.00	30 minute 1 year Summer	0.010	-1.255	-0.065	0.000	0.27		4.5	OK
23	1.010	1.10	30 minute 1 year Winter I+	-0.354	-2.700	-0.301	0.000	0.40		117.5	OK
24	1.011	1.11	30 minute 1 year Winter I+	-0.506	-2.779	-0.281	0.000	0.49		127.4	OK
25	11.000	11.00	30 minute 1 year Summer	-0.469	-1.883	-0.214	0.000	0.18		20.6	OK
26	1.012	1.12	30 minute 1 year Winter I+	-0.700	-2.878	-0.306	0.000	0.48		136.3	OK
27	1.013	BPIN A	30 minute 1 year Winter I+	-0.752	-2.991	-0.227	0.000	0.70		135.8	OK
28	1.014	Outfall B1	480 minute 1 year Winter I	1.000	-3.206	-0.406	0.000	0.04		28.4	OK
29	12.000	12.00	30 minute 1 year Summer	-0.055	-1.518	-0.249	0.000	0.07		5.8	OK
30	12.001	12.01	30 minute 1 year Summer	-0.039	-1.608	-0.200	0.000	0.24		25.8	OK
31	12.002	12.02	30 minute 1 year Summer	0.272	-1.862	-0.162	0.000	0.43		27.8	OK
32	13.000	13.00	30 minute 1 year Summer	-0.097	-1.468	-0.170	0.000	0.14		7.4	OK
33	13.001	13.01	30 minute 1 year Summer	0.336	-1.734	-0.175	0.000	0.11		7.9	OK
34	12.003	12.03	30 minute 1 year Summer	0.272	-1.948	-0.126	0.000	0.63		34.6	OK
35	14.000	14.00	30 minute 1 year Summer	0.353	-1.213	-0.109	0.000	0.53		41.5	OK
36	12.004	12.04	30 minute 1 year Summer	0.226	-2.106	-0.246	0.000	0.36		71.1	OK
37	15.000	15.00	30 minute 1 year Summer	-0.060	-1.338	-0.068	0.000	0.21		1.1	OK
38	15.001	15.01	30 minute 1 year Summer	-0.063	-1.580	-0.076	0.000	0.13		1.1	OK
39	16.000	16.00	30 minute 1 year Summer	-0.441	-1.802	-0.158	0.000	0.19		7.0	OK
40	15.002	15.02	30 minute 1 year Summer	-0.405	-1.889	-0.113	0.000	0.48		18.4	OK
41	12.005	12.05	30 minute 1 year Summer	-0.565	-2.173	-0.146	0.000	0.78		107.4	OK
42	17.000	17.00	30 minute 1 year Summer	-0.229	-1.498	-0.068	0.000	0.22		1.7	OK
43	17.001	17.01	30 minute 1 year Summer	-0.183	-1.733	-0.209	0.000	0.20		25.1	OK
44	17.002	17.02	30 minute 1 year Summer	-0.187	-2.032	-0.208	0.000	0.21		25.1	OK
45	12.006	12.06	30 minute 1 year Summer	-0.549	-2.303	-0.196	0.000	0.65		131.6	OK
46	18.000	18.00	30 minute 1 year Summer	-0.247	-1.570	-0.123	0.000	0.08		1.4	OK
47	19.000	19.00	30 minute 1 year Summer	-0.034	-1.370	-0.136	0.000	0.02		1.2	OK
48	18.001	18.01	30 minute 1 year Summer	-0.248	-2.415	-0.240	0.000	0.28		39.2	OK
49	12.007	12.07	30 minute 1 year Winter I+	-0.615	-2.476	-0.174	0.000	0.60		167.8	OK
50	12.008	12.08	30 minute 1 year Winter I+	-0.794	-2.536	-0.113	0.000	1.00		163.0	OK
51	20.000	20.00	30 minute 1 year Summer	-0.206	-1.594	-0.188	0.000	0.30		48.9	OK
52	12.009	12.09	30 minute 1 year Winter I+	-0.857	-2.622	-0.171	0.000	1.00		188.8	OK
53	12.010	BPIN B	30 minute 1 year Winter I+	-0.664	-2.948	-0.276	0.000	0.60		188.5	OK
54	12.011	Outfall B2	30 minute 1 year Winter I+	-1.000	-3.025	-0.300	0.000	0.59		187.6	OK
55	1.015	X	480 minute 1 year Winter I	-1.000	-3.206	-0.406	0.000	0.01		1.7	OK
56	1.016	Outfall B3	480 minute 1 year Winter I	-1.000	-3.201	-0.401	0.000	0.01		1.6	OK
57	1.017	1.17	480 minute 1 year Winter I	-0.703	-3.196	-0.341	0.000	0.00		1.3	OK
58	1.018	1.18	480 minute 1 year Winter I	-1.381	-3.195	-0.225	0.000	0.00		0.0	OK