

planning
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Document 3.1 – ES Volume 2

Appendix 10.1: WKN Flood Risk Assessment

Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North
(WKN) Waste to Energy Facility DCO

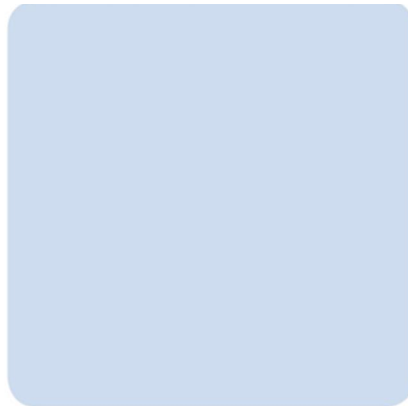
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WKN Proposed Development
Flood Risk Assessment
On Behalf of
Wheelabrator Technologies






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Quality Management


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- 1 This report contains only that available factual data for the WKN Site which was obtained from the sources described in the text. These data were related to the WKN Site on the basis of the location information made available to RPS and its sub-consultants by the client.
- 2 The assessment of the WKN Site is based on information supplied by the client and on-site inspections by RPS and its sub-consultants. Relevant information was also obtained from other sources.
- 3 The report reflects both the information provided to RPS and its sub-consultants in documents made available for review and the results of observations and consultations by RPS staff and its sub-consultants.
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Executive Summary

- S1 RPS has undertaken a Flood Risk Assessment (FRA) in accordance with the requirements of the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG ID7) for the construction of a new waste-to-energy plant (WKN) at Kemsley Paper Mill, Kemsley.
- S2 Environment Agency (EA) and Swale Borough Council SFRA mapping shows that the majority of the WKN Site is located in Flood Zone 2. Localised areas within the application boundary are located in Flood Zone 1 and 3.
- S3 Subsequent to the most recent EA mapping the site ground level profiled was raised to 6.30 mAOOD, locating the ground level c.0.3 m above the undefended worst-case 2115 modelled flood level, effectively taking the site out of Flood Zone 2 and into Flood Zone 1. As a consequence, the development has been steered to a sequentially appropriate area; therefore there is no requirement for either a Sequential or Exceptions Test.
- S4 The Swale SFRA (2010) indicates that a small section within the eastern extent of the site was flooded during the February 1953 tidal event.
- S5 The majority of the site is at a very low susceptibility to surface water flooding.
- S6 The susceptibility to groundwater flooding is low.
- S7 The risk of flooding from reservoir failure has been assessed as low.
- S8 The WKN Proposed Development is defined as less vulnerable in the NPPF and PPG and is deemed appropriate for the present flood zone and the zone including climate change.
- S9 The on-site surface water drainage network for the WKN Site will comprise of a single piped system collecting surface water runoff from building roof and hardstanding areas. All runoff will be drained via a Class 1 bypass oil interceptor, sized appropriately to accept the catchment area.
- S10 An external on site plant re-fuelling area and diesel fuel tank is to be provided on the western boundary of the WKN Site. This area will be isolated from the general hardstanding by way of a surface water channel drain surrounding the fuelling area, and then connected via a Class 1 full retention forecourt separator, prior to discharge into the surface water drainage system.
- S11 A storage attenuation volume of 1,740 m³ will be required on-site to accommodate the critical 1 in 100 year storm occurring during a tidal event plus climate change.
- S12 A new foul water drainage system will be incorporated into the drainage design to accommodate discharges from all sanitary appliances.
- S13 This FRA and supporting documentation shows that the proposed development at this location meets the requirements of the NPS, the NPPF and associated Planning Practice Guidance.

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1 Scope of Work

1.1 Background

1.1.1 RPS Planning and Development Ltd (RPS) has been instructed to prepare a site-specific Flood Risk Assessment (FRA) to support the development of an a new waste-to-energy facility (WKN) at the Kemsley Paper Mill, Kemsley in accordance with; the overarching National Policy Statement (NPS), the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) ID7.

1.1.2 The key objectives of the FRA are:

- To assess the flood risk to the WKN 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 WKN Proposed Development and associated 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
- To satisfy the requirements of the NPS, the NPPF and Planning Practice Guidance which require FRAs to be submitted in support of planning applications for development over 1 ha in area.

1.1.3 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.

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

1.2 Project Scope

1.2.1 This FRA has the following structure:

- Section 1 identifies the scopes of work;
- Section 2 identifies the sources of information that have been consulted in preparation of the report;
- Section 3 provides a hydrological review off the Site and undertakes a FRA of the proposed development scheme;
- Section 4 describes the Sites vulnerability status in line with the NPPF and PPG;
- Section 5 describes the flood risk management / Drainage measures that should be applied to the Site, where required; and
- Section 6 provides a summary and conclusion to the report.

2 Sources of Information

2.1 Introduction

2.1.1 Table 2.1 below lists the information sources consulted during preparation of this report.

Table 2.1: Information sources consulted during preparation of the report.

Data	Source	Notes
Site setting and hydrology.	OS Mapping 1: 50 000 Sheet 178: Thames Estuary. Environment Agency (EA).	Area information, rivers and other watercourses, general site environs, built environment, catchment Information.
Geology.	BGS (online) Geology of Britain Viewer.	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.
Department for Environment, Food & Rural Affairs (DEFRA)	Groundwater Flooding Scoping Study	Strategy for Flood & Coastal Erosion Risk Management: Groundwater Flooding Scoping Study May 2004.
Local Planning Authority (LPA).	Swale Borough Council.	Flood Zoning Local Development Framework.
Water Utility Company.	Thames Water.	Water and sewerage assets in the vicinity of the Site.
Flood Risk Assessment and Planning Guidance.	National Planning Policy Framework (NPPF). Planning Practice Guidance.	Flood zoning for the Site as used by the EA in England.
Reports.	Swale Borough Council Strategic Flood Risk Assessment Level 1 and 2	Swale Borough Council Strategic Flood Risk Assessment (SFRA), October 2009.
	Environment Agency, North Kent Rivers Catchment Flood Management Plan.	Environment Agency, North Kent Rivers Catchment Flood Management Plan, Summary Report December 2009.

2.2 Legislation and Guidance

Overarching National Policy Statement for Energy (EN-1)

- 2.2.1 The National Policy Statement (NPS) EN-1 sets out national policy for the energy infrastructure. It has effect, in combination with the relevant technology-specific NPS, on the decisions by the Infrastructure Planning Commission (IPC) on applications for energy developments that fall within the scope of the NPSs. For such applications NPS EN-1, when combined with the relevant technology-specific energy NPS, provides the primary basis for decisions by the IPC. Under the Planning Act 2008.
- 2.2.2 Applicants should ensure that applications, and any accompanying supporting documents, are consistent with the instructions and guidance in this NPS, the relevant technology-specific NPS and any other NPSs that are relevant to the application in question.

National Planning Policy Framework, March 2018.

- 2.2.3 The National Planning Policy Framework (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.
- 2.2.4 Paragraphs 148-169 set out the need for an appropriate assessment of flood risk. Guidance on the minimum requirements for such an assessment is contained in PPG ID7.
- 2.2.5 The NPPF requires the application of a sequential risk-based approach to determine 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.

- 2.2.6 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.
- 2.2.7 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 Mineral and Waste Local Plan 2013 – 2030 (2016)

- 2.2.1 The document sets out the overarching strategy and planning policies for mineral extraction importation and recycling, and the waste management of all waste streams that are generated or managed in Kent. The plan identifies and sets out the long term spatial vision and strategic objectives for Kent's mineral and waste. Delivers the strategy for minerals and waste planning that identifies how the objectives will be achieved in the plan period and the Development

Management (DM) policies that will be used when the County Council makes decisions on planning applications.

2.2.2 The policy relevant to hydrology and flood risk is outlined below;

Policy DM 10 – Water Environment

2.2.3 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 any 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.

2.2.4 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 these may be mitigated to an acceptable level.

Swale Borough Council Local Plan (December 2017)

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

2.2.6 The Local plan is required to ensure that all development of land takes place in the public interest. This involves accommodating the full range of economic, social and environmental development needs through the provision of a positive framework in which these often-competing requirements can be met. The plan seeks to meet the Borough's development needs for social and economic progress, whilst protecting and conserving acknowledged features of importance to the built and natural environment for future generations.

2.2.7 The policy relevant to hydrology and flood risk is outlined below;

Policy DM 21 – Water, flooding and drainage

2.2.8 When considering water related, flooding and drainage implication 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 greywater 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 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 safe guarding ground water source protection zones from pollution, to the satisfaction of the Environment Agency.

2.3 Climate Change

Flood risk assessments: climate change allowances (GOV.UK, online)

- 2.3.1 The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. The 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.
- 2.3.2 In February 2016 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 (

2.3.3 Table 2.2) to understand the range of impact.

Table 2.2: Peak Rainfall Intensity Allowance in Small and Urban Catchments (use 1961 to 1990 baseline)

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

2.3.4 The proposed development has an anticipated lifespan of approximately 25 years. In line with climate change guidance RPS has added 20% to all attenuation / runoff calculation for the development to account for climate change.

Sea level rise

2.3.5 Table 2.3 outlines the anticipated sea level rise associated with climate change per defined epoch. The EA expect sea level rise to increase the rate of coastal erosion.

Table 2.3: Sea Level Allowance for each Epoch (mm) per year (use 1990 baseline)

Area of England	1990 to 2025	2026 to 2055	2056 to 2085	2086 to 2115	Cumulative rise 1990 to 2115 / metres (m)
East, east midlands, London, south east	4 mm/yr. (140 mm)	8.5 mm/yr. (255 mm)	12 mm/yr. (360 mm)	15 mm/yr. (450 mm)	1.21 m
South West	3.5 mm/yr. (122.5 mm)	8 mm/yr. (240 mm)	11.5 mm/yr. (345 mm)	14.5 mm/yr. (435 mm)	1.14 m
North west, north east	2.5 mm/yr. (87.5 mm)	7 mm/yr. (210 mm)	10 mm/yr. (300 mm)	13 mm/yr. (390 mm)	0.99 m

2.3.6 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

3 Site Setting

3.1 Site Location

- 3.1.1 The WKN Site is located immediately to the east of the Kemsley Paper Mill at NGR 592053, 166697 on the eastern outskirts of Kemsley. It is bounded to the north by Kemsley Marshes, to the east by the Kemsley Paper Mill complex, to the south by K3 , and to the east by the Swale Estuary.
- 3.1.2 The WKN Site is accessed via an existing private access road from the adjoining Kemsley Paper Mill site.

3.2 Site Topography

- 3.2.1 The WKN Site topography is generally level at approximately 6.30m AOD.

3.3 Existing Development

- 3.3.1 The WKN Site (Drawing 1) was previously known as Kemsley Marsh, and has recently been developed for use as a laydown and constructional compound area to facilitate the construction of K3.

3.4 Proposed Development

- 3.4.1 It is understood that the application for Development Consent is for the construction of new waste-to-energy facility, WKN. The WKN Proposed Development includes the construction of:
- Turbine hall;
 - Boiler unit;
 - Tipping hall
 - Flue gas treatment;
 - Air cooling condensers
 - Substation,
 - Store and utilities
 - Access tracks and parking; and
 - Landscaping.
- 3.4.2 The order limits of the DCO also include for access via the existing haul road to the west of the WKN Site, a temporary access for construction vehicles via the existing track to the north and a constructional laydown area comprising a gravel surface underlain by a permeable geotextile membrane.

3.4.3 The proposed WKN Site layout plan can be found in Drawing 2.

4 Flood Risk Assessment

4.1 Hydrological Setting

- 4.1.1 The nearest watercourses to the WKN Site are a number of drain networks, which lie to the north. OS data and information obtained from a site visit by an RPS hydrologist notes a culverted drain beneath the construction access road on the western edge of the WKN 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 100 m to the east at closest orientation of the WKN Proposed Development and has been classified by the EA as the main risk of flooding with a maximum 5.28m AOD 2070 storm tide level. Therefore, fluvial flooding has not been assessed further within this report.
- 4.1.3 Responsibility for ordinary watercourses which discharge into the Swale fall under the jurisdiction of Kent County Council as the Lead Local Flood Authority (LLFA) and Lower Medway Internal Drainage Board (IDB) under the Water and Flood Management Act 2010 and Land Drainage Act 1991 [Ref 9.12]. The IDB and LLFA are required to exercise general supervision over all matter relating to water level management within their districts.
- 4.1.4 The North Kent Rivers Catchment Flood Management Plan (CFMP) [Ref 9.13] 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).

4.2 Fluvial and Tidal Flooding

- 4.2.1 EA online flood map for planning (figure 1) indicates that the majority of the Site lies within Flood Zone 2, land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% . 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% . 0.1%) in any year. A small localised area within the eastern extent of the Site is located within Flood Zone 3 (High Probability). The area around the western extent of the Site is within Flood Zone 1 defined as having a low probability (less than 1 in 1,000 years) annually of flooding.
- 4.2.2 However, subsequent to the publication of the EA flood maps a ground profiling exercise has been undertaken, raising the ground level to 6.30m AOD, 1.02m above the 1 in 200 year 2070 event and c.0.3 m above the worst case undefended 1 in 200 year 2115 flood event. This results in the land being a Flood Zone 1.
- 4.2.3 The existing access tracks and proposed temporary laydown area are shown to be at medium to high flood risk (Flood Zone 2 and 3), but are afforded flood protection via local defences.

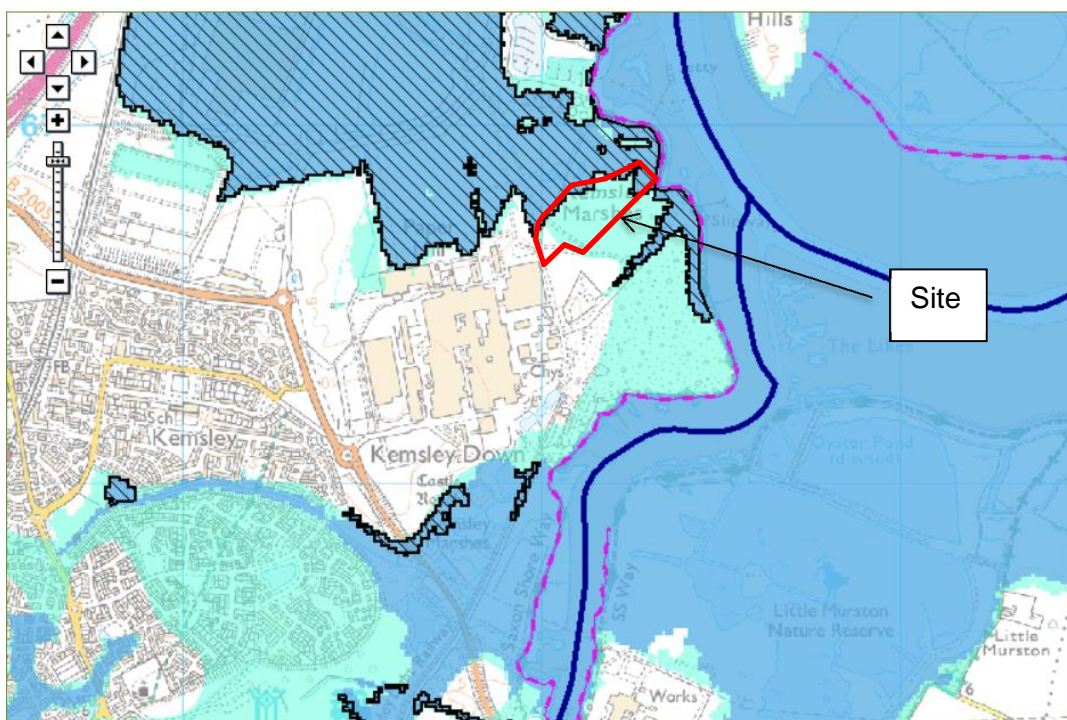


Figure 1: EA Flood Map for Planning (River and Sea)

- 4.2.4 EA Rivers and Sea flood mapping which takes into account the effect of any flood defences that may be in this area, indicates that the majority of the application area is at low risk of fluvial or tidal flooding, with a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) each year.
- 4.2.5 The Swale Borough Council SFRA (2009) flood zone map (Appendix 2) indicates that the majority of the Site is located within Flood Zone 1. A localised area within the eastern extent of the site is located within Flood Zone 3a.

Tidal Flood Risk

- 4.2.6 The EA has supplied modelled defended and undefended tidal flood levels (Table 4.1 and Table 4.2) extracted from the 2D TuFLOW North Kent Coast Modelling and Mapping Study (August 2013).
- 4.2.7 Modelled Node Locations and Defended and Undefended Tidal Flood Maps are located within Appendix 1.

Table 4.1: EA Undefended Modelled Tidal Flood Levels

Modelled Tidal Flood levels for Annual Exceedance probability shown in mAOD							
Node Location ID	National Grid Ref		Undefended (mAOD)				
	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

Table 4.2: Defended Modelled Tidal Flood Levels

Modelled Tidal Flood levels for Annual Exceedance probability shown in mAOD							
Node Location ID	National Grid Ref		Defended (mAOD)				
	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

4.2.8 A comparison between the WKN Proposed Development ground level (6.3 mAOD) and the modelled undefended tidal flood levels within the site (Table 4.1) indicate that the development

would be above the worst-case 1 in 200 year (0.5% AEP 2070) 6.02m AOD undefended flood level.

- 4.2.9 The WKN Proposed Development is therefore defined as being at low risk of fluvial and tidal flooding (confirmed by the EA Appendix 1).

4.3 Flood defences

- 4.3.1 The EA flood map for planning (Figure 1) indicates that areas surrounding the WKN Site and order limits benefit from flood defences.

- 4.3.2 The EA product four data (Appendix 1) indicates that the existing flood defences in the area surrounding the WKN Site are made up of raised walls and embankment. The flood defences provide a 1 in 1000 year standard of protection.

4.4 Flooding from rising / high groundwater

- 4.4.1 British Geological Survey (BGS) online map (Accessed October 2018) indicates that the WKN Site is underlain by superficial deposits Alluvium . Clay, Silty, Peaty, Sandy. The bedrock consists of the London Clay Formation (bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay).

- 4.4.2 The bedrock is classified by the EA under the Water Framework Directive as Unproductive Strata, defined as “...rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow”.

- 4.4.3 The BGS Hydrogeology 1:625,000 scale map defines the bedrock under the application area as Thames Group, being rock with essentially no groundwater.

- 4.4.4 The Swale Borough Council (2009) indicates that the risk of groundwater flooding may have increased since the closure of the Sittingbourne Paper Mill in 2007 as groundwater extraction has virtually ceased.

- 4.4.5 However the EA and Swale SFRA (2009) indicated that no groundwater flooding has occurred since the closure of the paper mill.

- 4.4.6 The DEFRA groundwater flooding scoping study (2004) map (Appendix 3) indicates that the WKN Site is not within a groundwater emergence zone.

- 4.4.7 No groundwater levels within the immediate WKN Site area have been made available.

- 4.4.8 Based on the information outlined above the potential for groundwater flooding is considered to be low.

4.5 Source Protection Zones

- 4.5.1 EA mapping shows the WKN Site is not located within a Source Protection Zone (SPZ).

4.6 Surface water flooding

- 4.6.1 EA surface water flood mapping (Figure 2 below) indicates that the majority of the WKN Site is at very low risk. However localised areas within the WKN Site are situated within low and high risk zones. (High risk means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%).)
- 4.6.2 The existing access road and track, as well as the laydown area are shown to be at very low to low risk of surface water flooding.

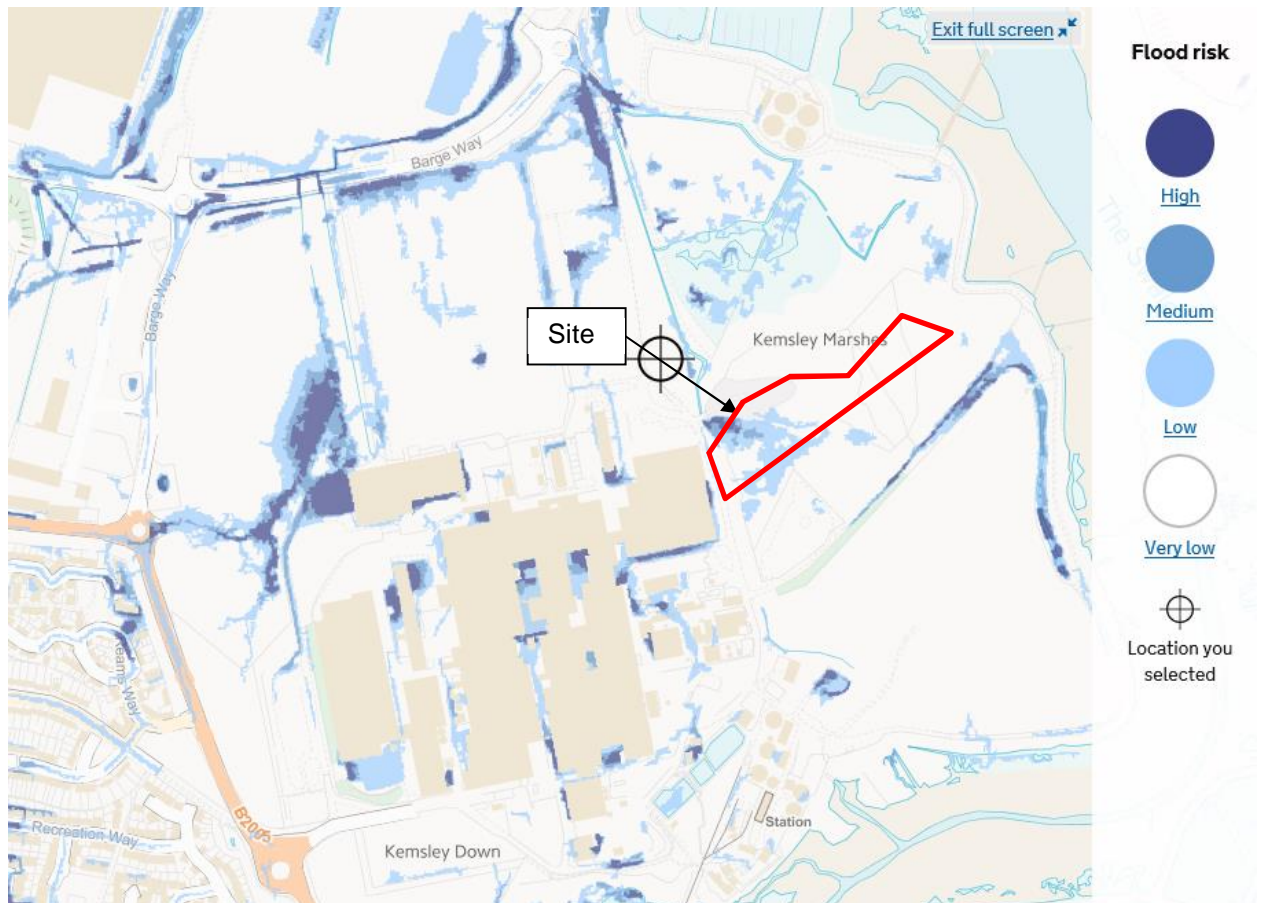


Figure 2: EA Surface Water Map

- 4.6.3 Overall, the WKN Site is assessed as having a low to medium susceptibility to surface water flooding.

4.7 Reservoir Failure Assessment

- 4.7.1 EA mapping indicates that the WKN Site is not at risk of reservoir flooding.

4.8 Sewer/Water Main Failure Assessment

Artificial drainage systems

Current drainage

- 4.8.1 The WKN Site does not have access to any existing public sewers, and is remote from the public sewer network. The existing Kemsley Paper Mill site does however benefit from its own private drainage system, which will provide a connection for the WKN Proposed Development.
- 4.8.2 K3 discharges surface water drainage directly to the Swale Estuary, via a tidal outfall, which operates only in periods of low tide. During high tides, the outfall is tide locked via a non-return flow valve, during which time all surface water runoff is retained on site. Foul drainage from K3 is drained via a pumped rising main back to the main private foul drainage system on the main Kemsley Paper Mill site.
- 4.8.3 It is assumed that private drainage systems will have been designed to industry standards (e.g. Sewers for Adoption). However, the most common causes of flooding from sewers are; inadequate flow capacity, blockages, pumping station failures, burst water mains, water inflow from rivers or the sea, tide locking, siltation, fats/greases, and sewer collapse. Should any of these events occur there is a risk of flooding by surcharge where the flows are in excess of the sewer capacity (usually 1 in 30 year events or greater).
- 4.8.4 Under the Director General 5 register requirements all water companies are obliged to keep a record of properties that have been affected by sewer flooding. Information provided within the EA product 4 data request and Swale SFRA indicates that the WKN Site area has not been affected by flooding from artificial drainage.
- 4.8.5 Taking into account the above and absence of any historical sewer flooding the overall risk of flooding via artificial drainage system to the WKN Site has been assessed as a low.

4.9 Historical flood events

- 4.9.1 The Swale SFRA (2009) indicates that the northern extent of the WKN Site was flooded during the February 1953 tidal event.

4.10 Flood Warnings

- 4.10.1 The WKN Site is located within the EA's Southeast region within the Isle of Sheppey and North Kent Coast from Kemsley to Seasalter Flood Warning Area extents, which provides local residents and businesses with several hours notice should a flood event be likely.

4.11 Present Flood Risk

- 4.11.1 The main flood risk to the WKN Site has been determined to be from Tidal flooding up to 6.02 mAOD.

4.11.2 However, following a ground profiling exercise the WKN Site has been elevated to 6.30 mAOD above the approximately 0.3 m above the worst-case undefended flood event and effectively into Flood Zone 1.

5 Flood Risk Vulnerability Classification

5.1 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, a Commercial application is classified as a **Less Vulnerable** development in flood risk terms.
- 5.1.2 The majority of the WKN Site is located within an area identified as Flood Zone 2. However, following a ground profiling exercise the site is located above the flood zones into Flood Zone 1. Table 3 of Planning Practice Guidance (Table 5.1 of this report) indicates that **Less Vulnerable** uses are appropriate for locations in Flood Zone 1.

Table 5.1: 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 Drainage

6.1 Surface Water and Drainage

- 6.1.1 The sustainable management of surface water is an essential element of reducing future flood risk to the WKN 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 a 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.

6.2 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 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 SuDS Manual C753 sets 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:

- Interim code of practice for sustainable drainage systems (2004)
- DEFRA Sustainable drainage systems - non-statutory technical standards for sustainable drainage systems (2015)
- C698 Site handbook for the construction of SUDS (2007)
- Building Regulations 2010: Approved Documents H Drainage and waste disposal (2002 edition incorporating 2010 amendments)
- BRE365 Soakaway design

6.3 Sustainable Drainage Options

6.3.1 The NPPF and associated Planning Practice Guidance ID7, Ciria C753 SUDS Manual (2015) and also the Local Plan 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); and
- 4) Regional Control . management of runoff from several sites, typically in a detention pond or wetland.

6.3.2 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.

6.3.3 The proposed development will need to capture any run-off produced within the Site boundary on-site. The drainage philosophy for the development is outlined below.

6.4 Existing Site Drainage

- 6.4.1 The WKN Site is currently utilised as a laydown and construction compound area to facilitate the construction of K3. Existing drainage is described on Section 4.8.
- 6.4.2 Foul drainage provision for the WKN Site is proposed to be drained via a newly constructed on-site gravity sewer system discharging to a new pumping station and rising main. Foul discharge from the WKN Site is then pumped back to the privately owned foul drainage system located on the main paper mill site.

6.5 Drainage Design Philosophy

- 6.5.1 RPS was commissioned (October 2018) to produce a drainage design philosophy for the WKN development. (See Drainage Design Philosophy (019593-RPS-SI-XX-RP-D-0030) in Appendix 5.2 for full philosophy).
- 6.5.2 The purpose of the Drainage Design Philosophy report is to outline the design principles for both surface and foul water drainage to be adopted in the development of the WKN Site.
- 6.5.3 Run-off from the access tracks is managed via an existing drainage system.
- 6.5.4 Run-off from the temporary laydown area will be managed in accordance with the CEMP.

Proposed Surface Water Drainage

- 6.5.5 The proposed new surface water drainage system will be designed using current MicroDrainage analysis software, ensuring planning consultee requirements, Lead Local Flood Authorities (LLFA) and EA guidelines are satisfied to prevent uncontrolled flooding of the WKN Site and surrounding areas.
- 6.5.6 The on-site surface water drainage network for the WKN Site will comprise of a single piped system collecting surface water runoff from building roof and hardstanding areas. All runoff will be drained via a Class 1 bypass oil interceptor, sized appropriately to accept the catchment area.
- 6.5.7 Surface water runoff from the external hardstanding areas will be collected as follows:
 - Car parking, HGV parking and site access roads . traditional trapped road gullies and channel / kerb drains, connected via a bypass petrol interceptor
 - General materials handling areas . open shallow concrete vee-channels, connected to trapped drainage sump pits to allow for regular maintenance and cleaning.
 - Storage areas . continuous perimeter concrete upstand bunds with vehicle access ramps, to allow for full containment of material washout during rainfall events.
- 6.5.8 The SuDS attenuation swale will collect discharge from all impermeable areas of the WKN Site, which will then be discharged un-attenuated with a single below ground gravity pipe, which will connect to a new combined tidal discharge outfall with non-return flap valve, located on the Swale Estuary, constructed in accordance with details to be agreed with the Environment

Agency. This outfall shall serve both the K3 and WKN Proposed Development but will have separate discharge points for both.

- 6.5.9 The surface water drainage system proposed for the WKN Site will be designed in accordance with the following basic criteria (See Drainage Design Philosophy (019593-RPS-SI-XX-RP-D-0030) in Appendix 5.2 for full details):
- All network pipework will be designed for no surcharging above pipe soffit level for the 1 in 2 year design storm event.
 - The system shall be designed not to flood for the 1 in 100 year design storms (plus climate change effects).
 - The site drainage serving building roofs and external paved areas will discharge un-attenuated to the attenuation swale for all rainfall events.
 - Impermeable hard surfaced areas of the site totalling 2.0 Hectares.
- 6.5.10 In order to achieve a free discharge for the site surface water runoff discharging from the attenuation swale, provide a workable lagoon and swale volume and storage depth, whilst providing a sufficient pond outfall pipe gradient to the Swale Estuary outfall, it is proposed to set the Swale Estuary outfall level at 2.65 m AOD.

Design Rainfall and Extreme Tidal Events

- 6.5.11 The EA has indicated that a storm surge event combined with envisaged climate change effects (considered up to 2070) will raise the static tide levels by an additional 2.48 m.
- 6.5.12 Should the storm surge event occur during a spring tide the resultant high water level of 5.28 mAOD will submerge the outfall for an approximate 5.8 hour period.
- 6.5.13 Micro Drainage software suite calculations indicate that a storage volume of between 1,740 m³ including 20% for climate change allowance is required to accommodate the critical 1 in 100 year storm occurring during this tidal event.
- 6.5.14 There will be an approximate 6.2 hour period during this tidal event for the storage pond to empty before the tide levels rise again and further discharge would not be possible.
- 6.5.15 In order to ensure the attenuation lagoon will have protection against sea water inundation during extreme tide events, the top of bank level of the new storage lagoon will be set to a level of 5.88m (600m free board above the predicted 5.28m AOD 2070 storm tide level).
- 6.5.16 The level of ground floor to all new buildings proposed for the site shall be set at a level of 6.30m AOD, which is approximately 0.3 m above the maximum predicted 2117 flood level, thus eliminating the risk of site flooding as a result of sea water inundation.

6.6 Proposed Foul Water Drainage

- 6.6.1 A new foul water drainage system is required to serve the new office and mess facilities of the WKN Proposed Development. This will be designed using current MicroDrainage analysis software, to prevent any flooding of the WKN Site and surrounding areas. The foul water

drainage system will be designed in accordance with BS EN 752: 2008, Drain and sewer systems outside buildings and Building Regulations Approved Document H.

6.6.2 The foul drainage system accommodates discharge from all sanitary appliances contained within staff welfare facilities, which will accommodate up to 6 staff members per shift. Foul drainage shall be discharged via gravity drain, which is then proposed to be connected either into:

- Below ground packaged foul bio-digester treatment plant with consented discharge to the surface water drainage system (subject to EA approval of discharge water quality to surface water drainage system) and with EA water quality sampling chamber; or
- Below ground cesspool tank located on the development site with up to 28 days storage, and fitted with high level warning alarm.

7 Summary and Conclusions

7.1 Summary

- 7.1.1 A site-specific FRA in accordance with the NPS, the NPPF and PPG ID7 has been undertaken for the construction of a new waste-to-energy facility (WKN) at Kemsley Paper Mill, Kemsley.

7.2 Flood Risk

- 7.2.1 EA and Swale Borough Council SFRA mapping shows that the majority of the WKN Site is located in Flood Zone 2. Localised areas within the eastern extent of the WKN Site are located in Flood Zone 1 and 3. The WKN Site is consequently at low to medium risk of flooding.
- 7.2.2 Subsequent to the most recent EA mapping the site ground level was profiled raised to 6.30 mAOD, locating the ground level c.0.3 m above the undefended worst-case 2115 modelled flood level, effectively located in Flood Zone 1. As a consequence, the development has been steered to a sequentially appropriate area; therefore there is no requirement for either a Sequential or Exceptions Test.
- 7.2.3 The Swale SFRA (2010) indicates that the majority of the WKN Site was flooded during the February 1953 tidal event.
- 7.2.4 The majority of the WKN Site is situated within low probability of surface water flooding. Localised areas within the Site are within medium and high risk areas.
- 7.2.5 The susceptibility to groundwater flooding is low.
- 7.2.6 The risk of flooding from reservoir failure has been assessed as low.
- 7.2.7 The on-site surface water drainage network for the WKN Site will comprise of a single piped system collecting surface water runoff from building roof and hardstanding areas. All runoff will be drained via a Class 1 bypass oil interceptor, sized appropriately to accept the catchment area.
- 7.2.8 A storage attenuation volume of 1,740 m³ (20% climate change) will be required on-site to accommodate the critical 1 in 100 year storm occurring during this tidal event.
- 7.2.9 A new foul water drainage system will be incorporated into the drainage design to accommodate discharges from all sanitary appliances.

7.3 Conclusion

- 7.3.1 This FRA and supporting documentation illustrates that following ground profiling the WKN Proposed Development is at low risk of flooding and appropriate to the location, meeting the requirements of the NPPF and PPG.

7.3.2 There are no reasons relating to flood risk why the WKN Proposed Development should not be granted permission.

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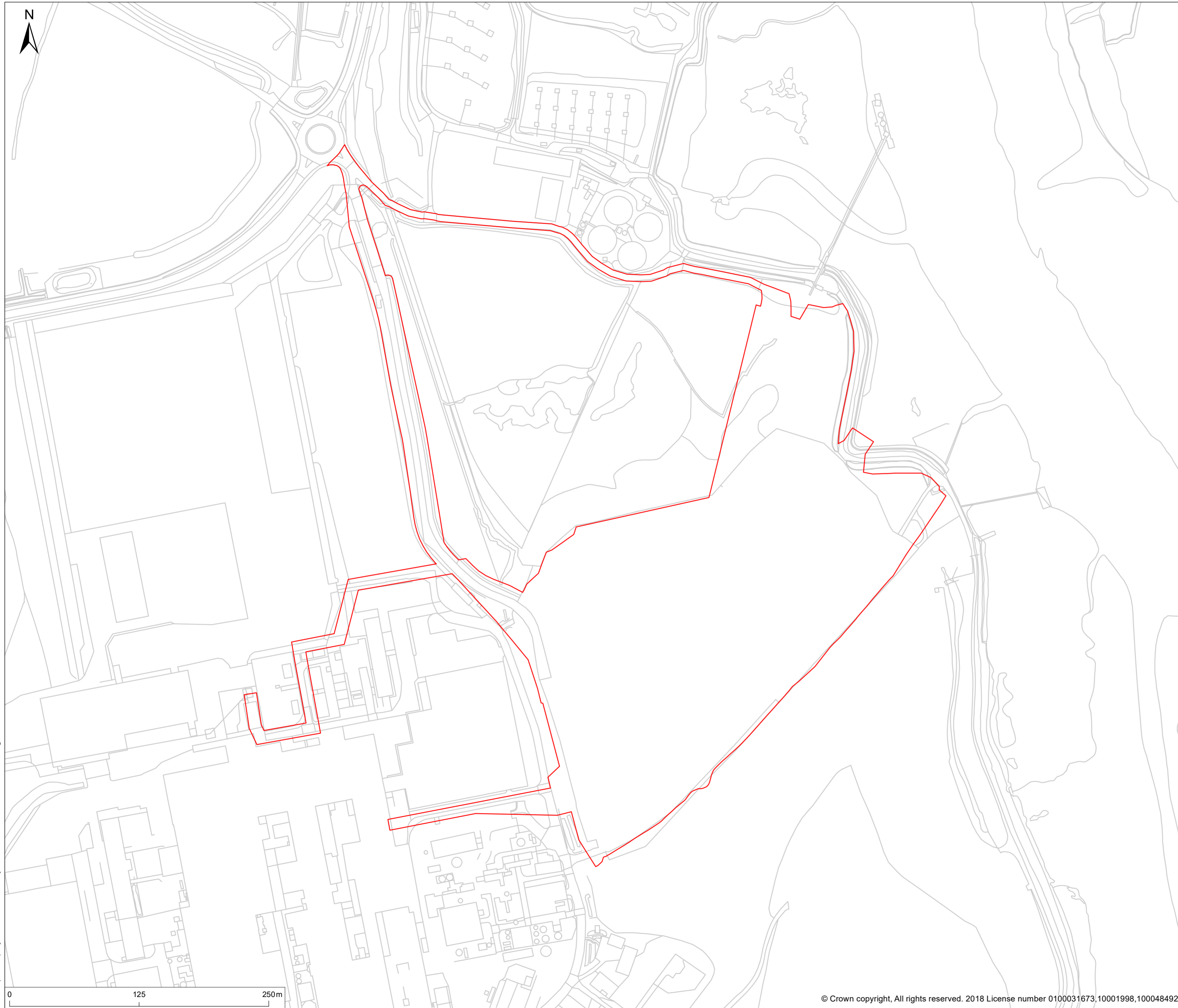
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Drawings



\\eur-mpfs-02\projects\9812 Kemsley Construction Phase\Tech\Drawings\9812-0048-03.mxd

EN010083
Planning Act 2008
The Infrastructure Planning (Applications: Prescribed forms and Procedure) Regulations 2009
Regulation: 5(2)(o)

Legend
 DCO Boundary

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Client **Wheelabrator Technologies Inc**

Project **K3 and WKN DCO**

Title **DCO Boundary Plan**

Status	Drawn By:	PM/Checked By
SUBMISSION	CR	TS

Job Ref	Scale @ A2	Date Created
OXF9812	1:2,500	SEPT 2019

Document Reference	Document Number
9812-0048-03	5.2

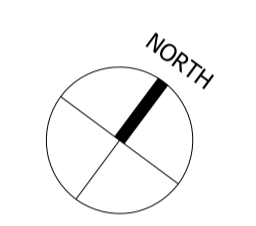
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- KEY
- Planning Application Boundary —
 - Building / Plant ■
 - Structure with height below 10m. Indicative size only. ■
 - K3 Boundary —



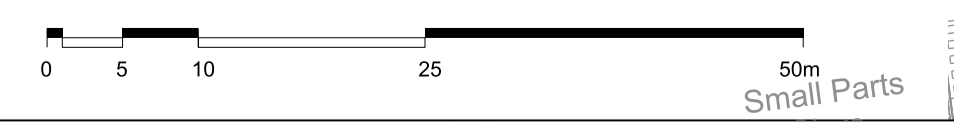
- NOTES
- *(a) Fire water tanks and Raw water tanks may be located below ground
 - *(d) Stack height between 80m - 110m. Subject to final design. Stack may be located within a 5m radius of these coordinates
- Landscaping is for information only

G	18/09/25	Issued for Information
F	18/09/05	Issued for Information
-	18/08/31	Issued for Information

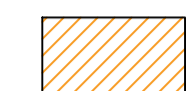

FOR INFORMATION

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WKN	PROJECT	
Site Layout		
DRAWING	DATE	
1:500@A1	18/09/25	
1:1000@A3	SCALE	DATE
1371 SK133	G	GS
DWG. NO.	REVISION	CHECKED



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	Impermeable Areas	= 2ha
	Permeable Areas	= 0.44ha



Rev	Description	By	Ckd	Date
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Client
Project WKN Waste to Energy Facility

Title Impermeable Areas

Status	Scale	Date Created
Preliminary	1:500 @A1	29.10.2018
Project Leader	Drawn By	Checked by
GB	LJS	DW

Document Number	Revision	Subsidiary
019593-RPS-SI-XX-DR-D-0301	-	S2
Project Number	Signature	Zone

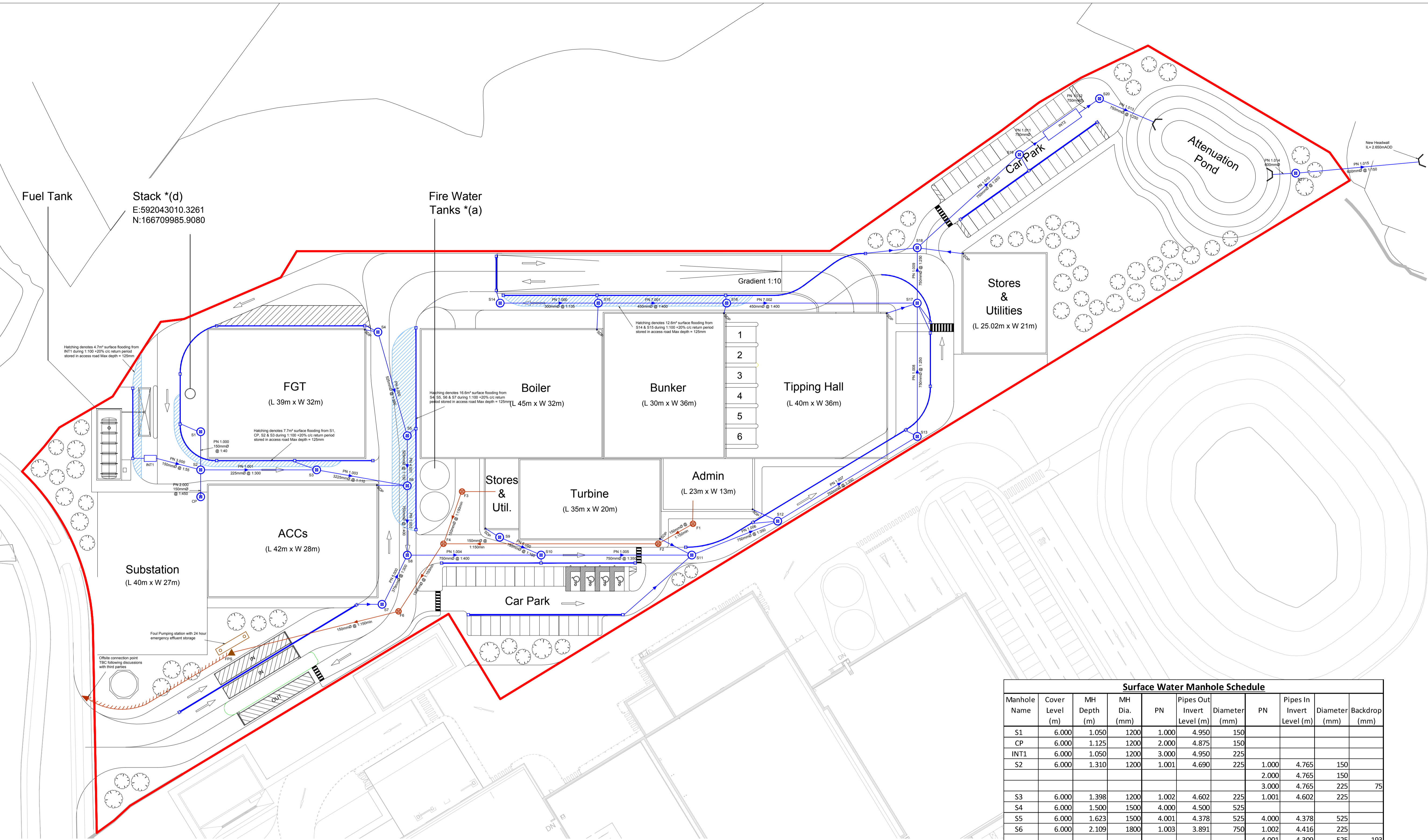


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Key:

- mm@ 1.*** FW Drain (I/D & Gradient)
- mm@ 1.*** SW Drain (I/D & Gradient)
- FW HDPE Rising Main
- F1 FW Manhole
- S2 SW Manhole
- FW Pumping Station
- o RWP Rainwater Pipe (c/w RE)
- o SDP Syphonic Primary Downpipe
- Linear Drainage e.g. Kerb/Slot Drain
- Headwall
- INT1 Proprietary Oil Interceptor Unit



Surface Water Manhole Schedule

Manhole Name	Cover Level (m)	MH Depth (m)	MH Dia. (mm)	PN	Pipes Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	6.000	1.050	1200	1.000	4.950	150				
CP	6.000	1.125	1200	2.000	4.875	150				
INT1	6.000	1.050	1200	3.000	4.950	225				
S2	6.000	1.310	1200	1.001	4.690	225	1.000	4.765	150	
							2.000	4.765	150	
							3.000	4.765	225	75
S3	6.000	1.398	1200	1.002	4.602	225	1.001	4.602	225	
S4	6.000	1.500	1500	4.000	4.500	525				
S5	6.000	1.623	1500	4.001	4.378	525	4.000	4.378	525	
S6	6.000	2.109	1800	1.003	3.891	750	1.002	4.416	225	
							4.001	4.309	525	193
S7	6.000	1.275	1350	5.000	4.725	375				
S8	6.000	2.147	1800	1.004	3.853	750	1.003	3.853	750	
							5.000	4.686	375	458
S9	6.000	1.050	1200	6.000	4.950	150				
S10	6.000	2.224	1800	1.005	3.776	750	1.004	3.776	750	
							6.000	4.859	150	483
S11	6.000	2.324	1800	1.006	3.676	750	1.005	3.676	750	
S12	6.000	2.383	1800	1.007	3.617	750	1.006	3.617	750	
S13	6.000	2.492	1800	1.008	3.508	750	1.007	3.508	750	
S14	6.000	1.200	1200	7.000	4.800	300				
S15	6.000	1.514	1350	7.001	4.486	450	7.000	4.636	300	
S16	6.000	1.588	1350	7.002	4.412	450	7.001	4.412	450	
S17	6.000	2.615	1800	1.009	3.385	750	1.008	3.385	750	
							7.002	4.300	450	616
S18	6.000	2.662	1800	1.010	3.338	750	1.009	3.338	750	
S19	6.000	2.790	1800	1.011	3.210	750	1.010	3.210	750	
INT2	6.000	2.917	1800	1.012	3.083	750	1.011	3.183	750	
S20	6.000	2.938	1800	1.013	3.062	750	1.012	3.062	750	
POND	5.880	2.880	-	1.014	3.000	600	1.013	3.014	750	164
S21	5.880	2.900	1500	1.015	2.980	600	1.014	2.980	600	
	5.000	2.213			OUTFALL		1.015	2.787	600	



Rev	Description	By	Ckd	Date

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Client
Wheelabrator TECHNOLOGIES

Project WKN Waste to Energy Facility

Title Proposed Drainage Layout

Status Preliminary Scale 1:500 @A1 Date Created 29.10.2018

Project Leader GB Drawn By LJS Checked by DW

Document Number	Revision	Subsidiary
019593-RPS-SI-XX-DR-D-0300	-	S2
Project Number	Originator - Zone - Level - Type - Risk - Drawing Number	RPS Project Number
		019593

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Appendices

Appendix 1

Correspondence

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

Contents

- Flood Map Confirmation
- Flood Map Extract
- Model Output Data
- Data Point Location Map
- Modelled Flood Outlines Map
- Defence Details
- Historic Flood Data
- Historic Flood Event Map
- Additional Data
- Environment Agency Standard Notice

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.

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.

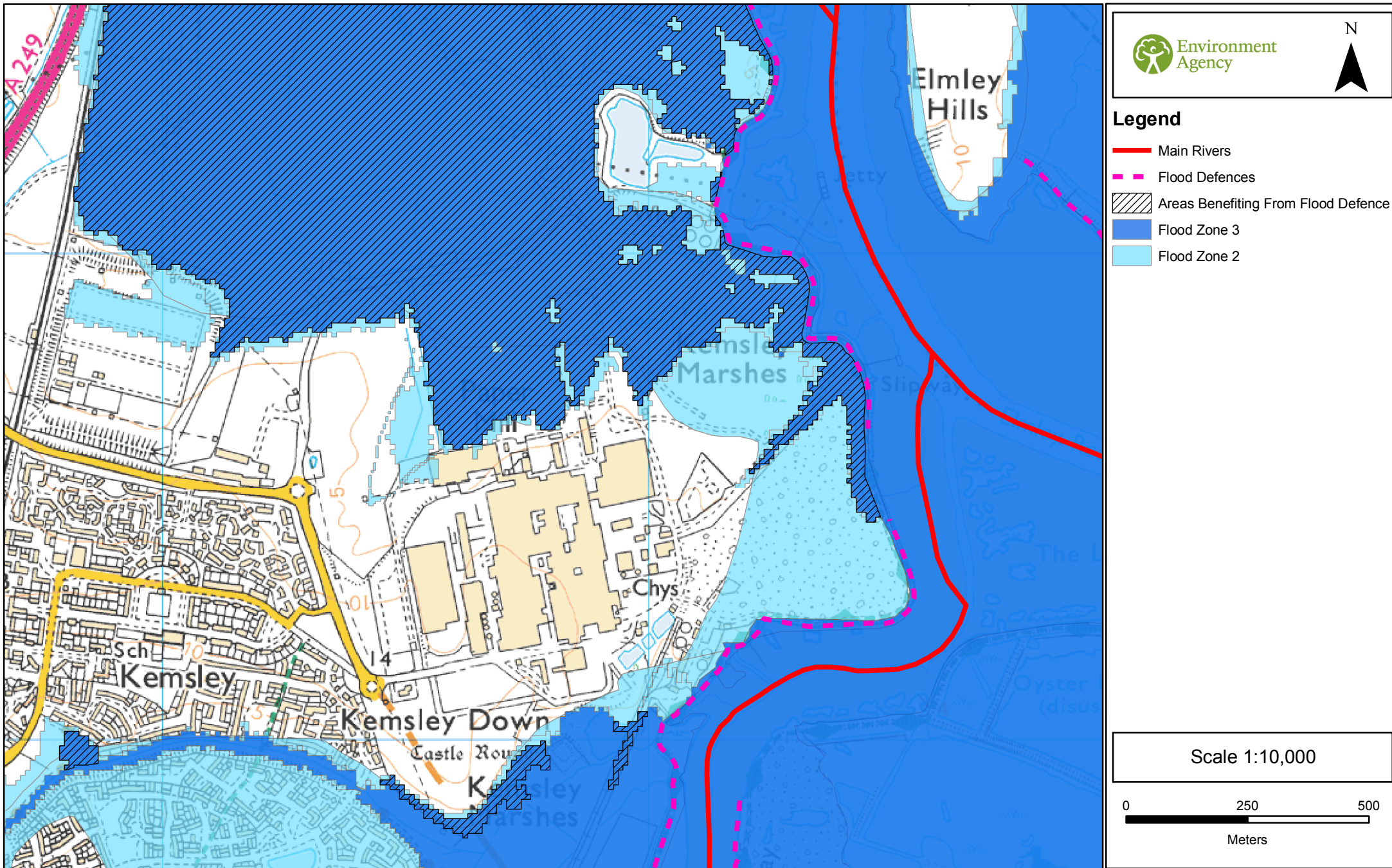
Enclosed is an extract of our Flood Map which shows this information for your area.

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.

Flood Map Centred on Kemsley, Kent

Created 11 February 2016 (Ref KSL1494 TM)



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

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

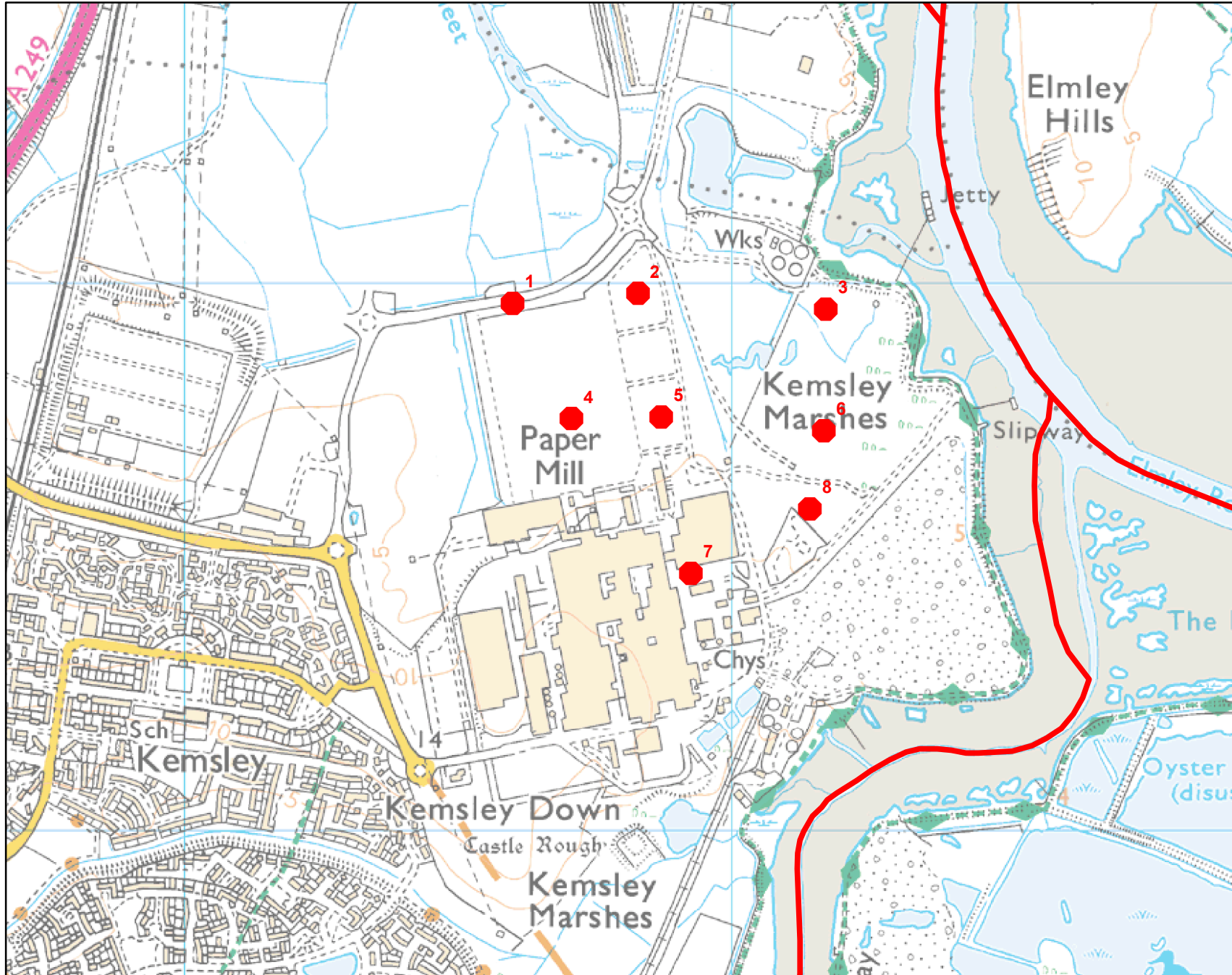
Node Location ID	Modelled Tidal Flood levels for Annual Exceedance Probability shown in mAOD						
	National Grid Ref		Undefended				
	Easting	Northing	5% AEP 2012	0.5% AEP 2012	0.5% AEP 2070	0.5% AEP 2115	0.1% AEP 2012
1	591602	166964	4.06	4.70	5.27	6.01	5.16
2	591831	166982	4.06	4.70	5.27	6.01	5.16
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.

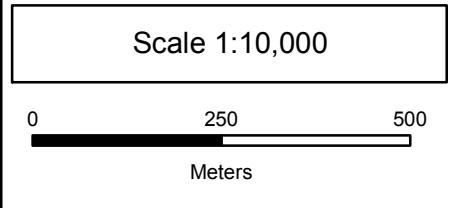
There are no health warnings or additional information for these levels or the model from which they were produced.

Modelled Node Locations Centred on Kemsley, Kent

Created 11 February 2016 (Ref KSL1494 TM)

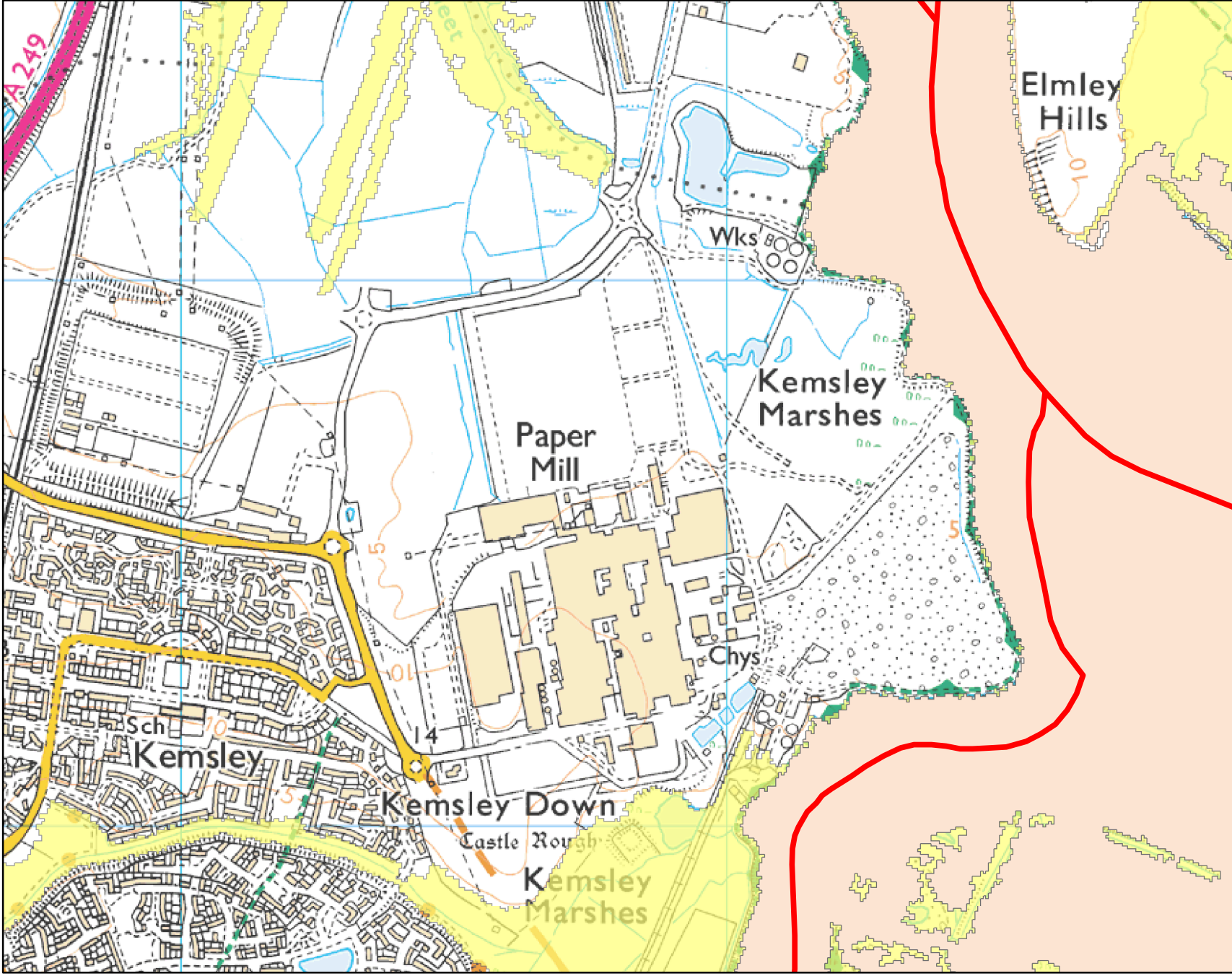


- Legend**
- NodeLocations
 - Main Rivers



Defended Modelled Tidal Flood Outlines Centred on Kemsley, Kent

Created 11 February 2016 (Ref KSL1494 TM)

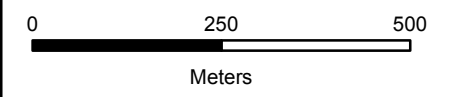


Legend

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

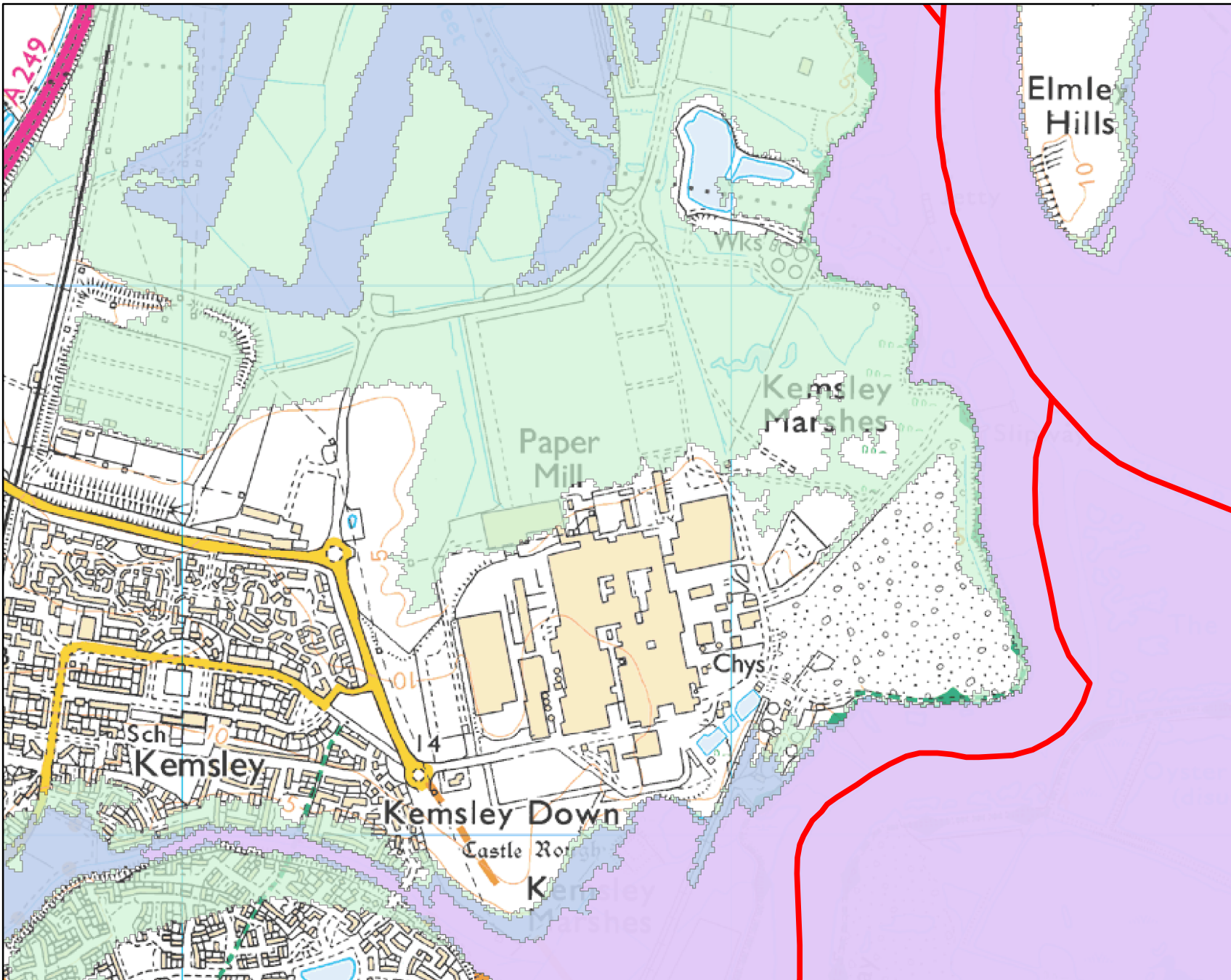
Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale 1:10,000



Defended Modelled Tidal Flood Outlines Centred on Kemsley, Kent

Created 11 February 2016 (Ref KSL1494 TM)



Environment Agency

N

Legend

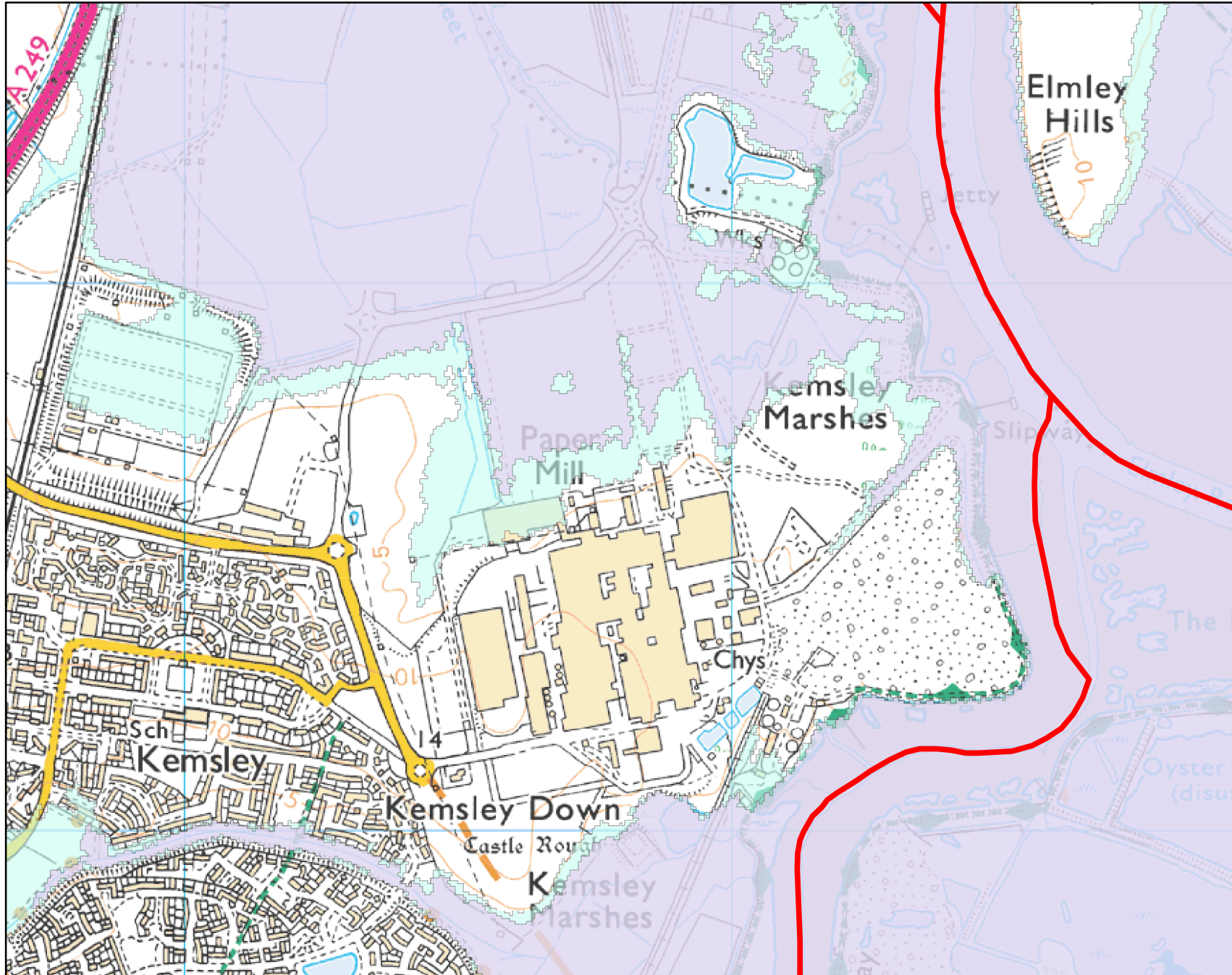
- Main Rivers
- 0.5% AEP (2012)
- 0.5% AEP (2070)
- 0.5% AEP (2115)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring 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
-  5% AEP (2012)
-  0.1% AEP (2012)

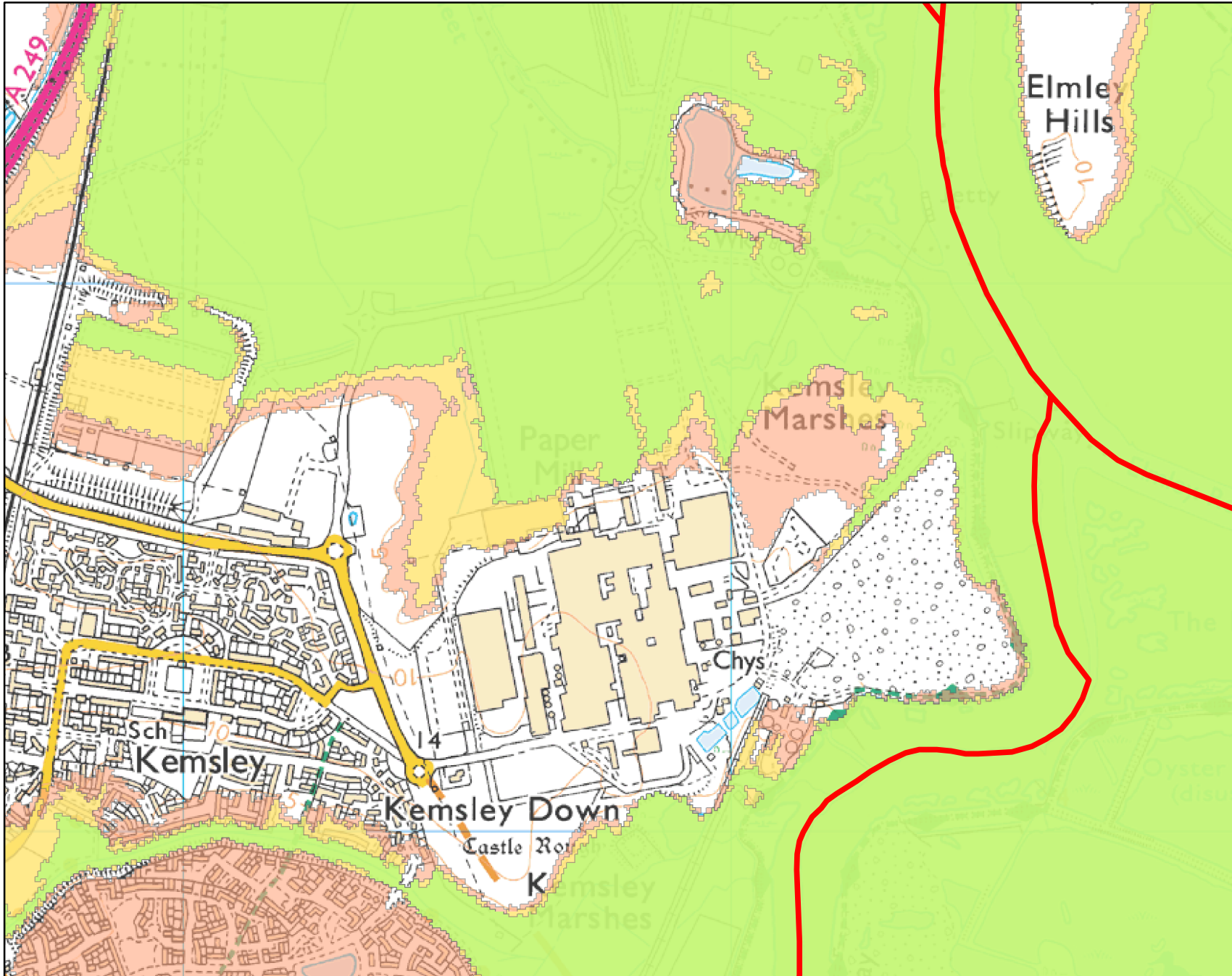
Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

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 occurring in any given year.

Scale 1:10,000

0 250 500
Meters

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.

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.

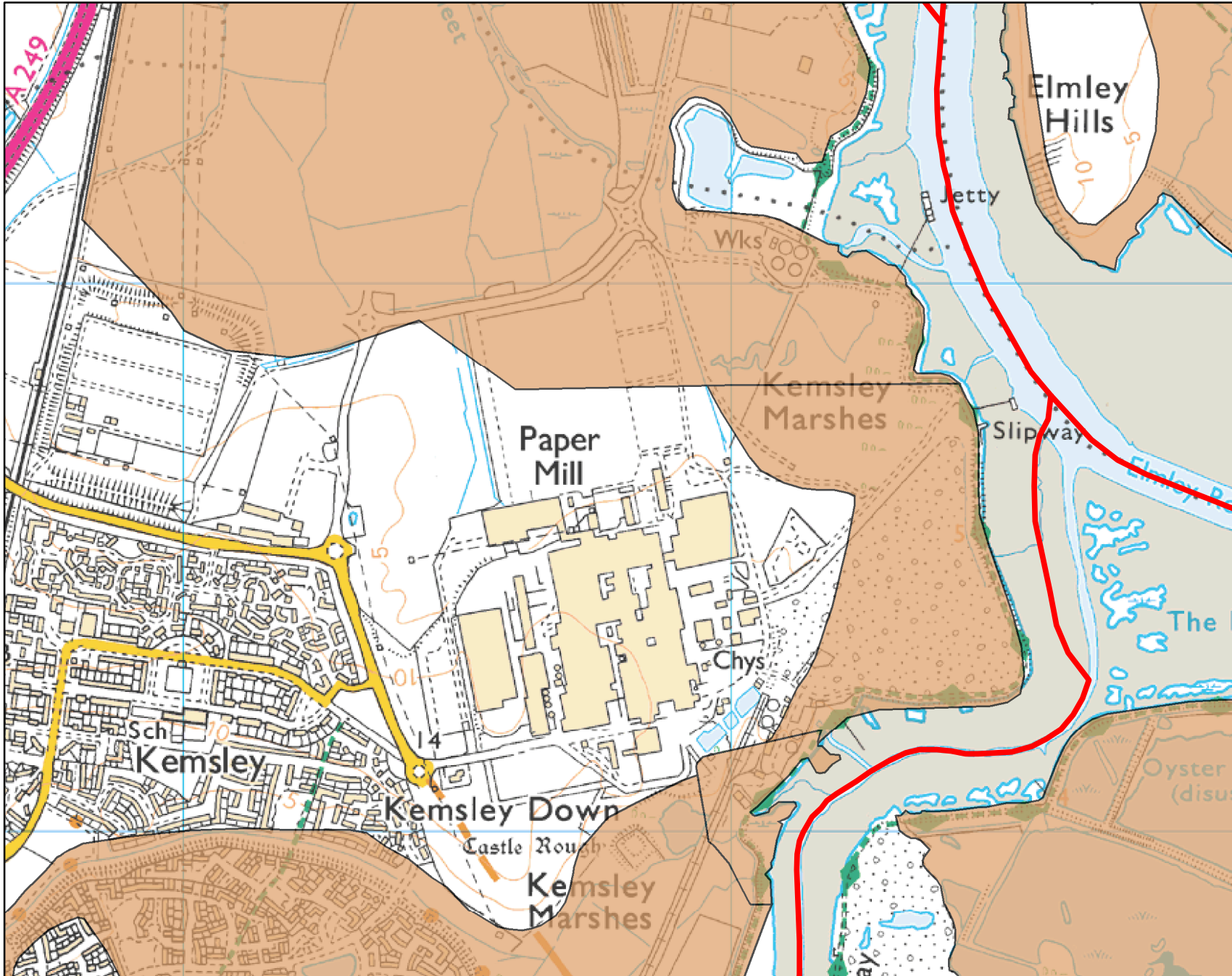
Please be aware that flooding can come from different sources. Examples of these are:

- 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.

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

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.

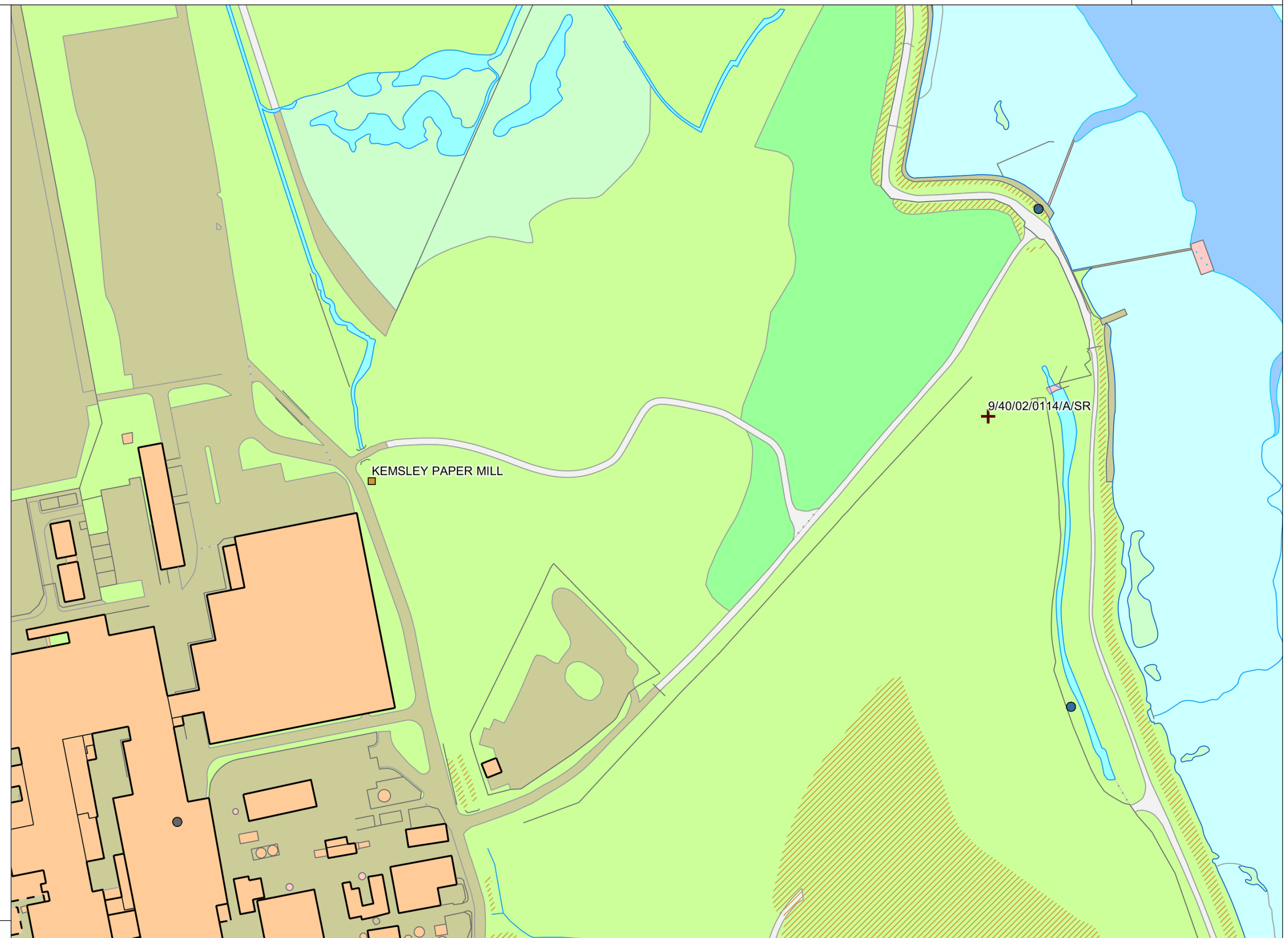
Surface Water

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.

- 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



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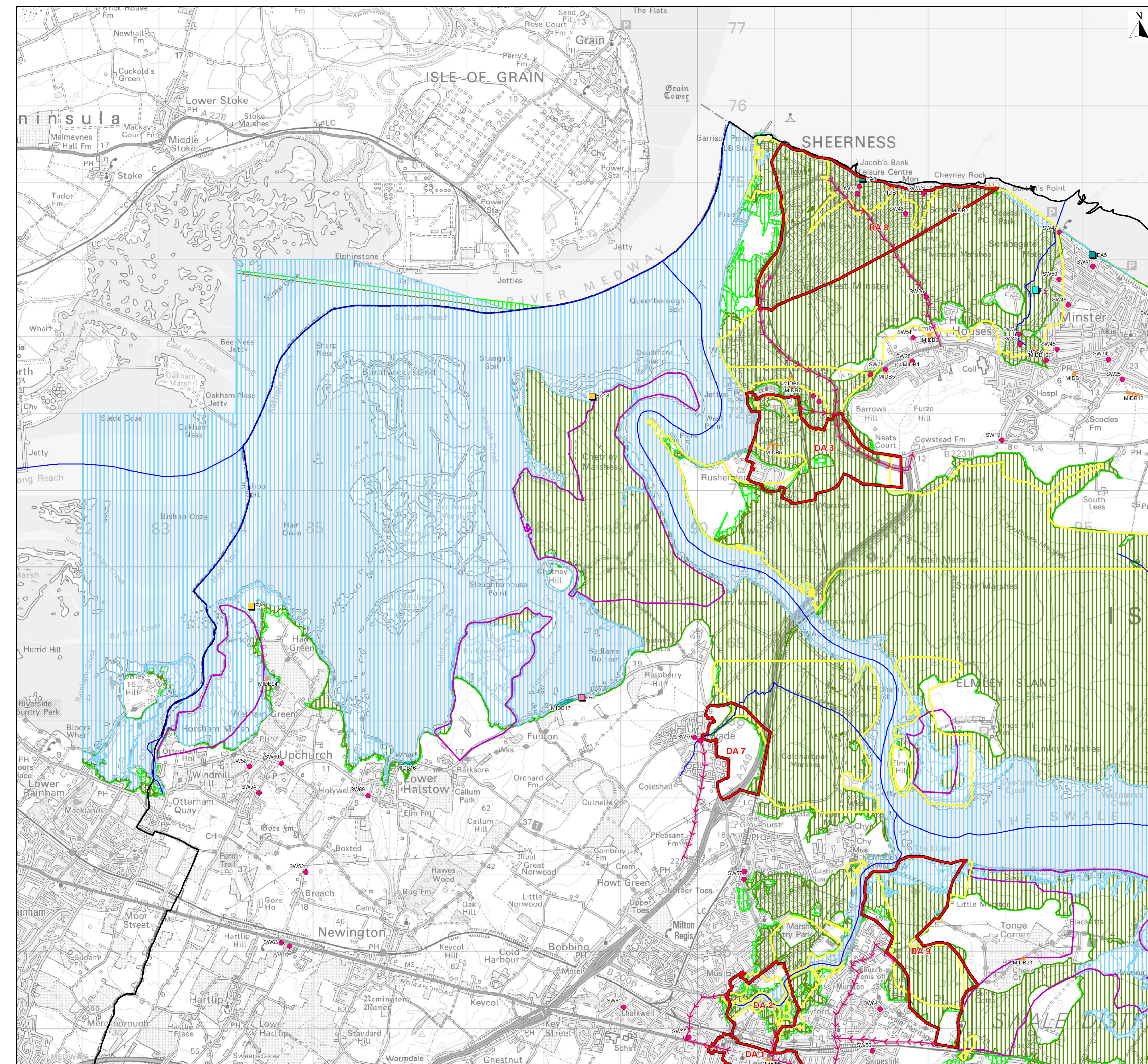
Definitions

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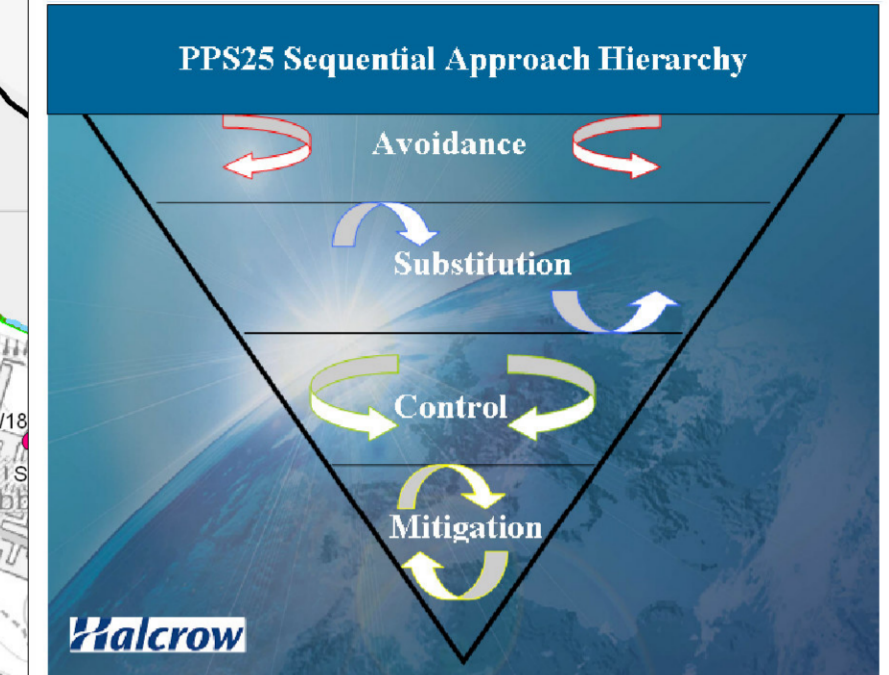
Swale Borough Council SFRA Flood Zone Map



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.

FRA requirements
 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.

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.

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.

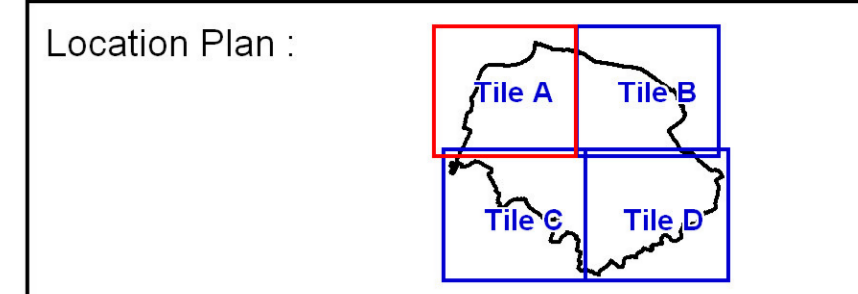
Zone 3b The Functional Floodplain
 Definition
 This zone comprises land where water has to flow or be stored in times of flood. SFRA should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, 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
 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.



PPS25 : Flood Risk Vulnerability Classification

Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water-compatible Development
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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). 	<ul style="list-style-type: none"> 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 users in this category, subject to a specific warning and evacuation plan.

PPS25 : Flood Risk Vulnerability and Flood Zone 'Compatibility'

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



LEGEND

- Main Rivers
- Evacuation routes
- Swale Borough Boundary
- Area Action Plan & Development Area
- Lower Medway Internal Drainage Board Data
- Flood Zones

Environment Agency Data

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

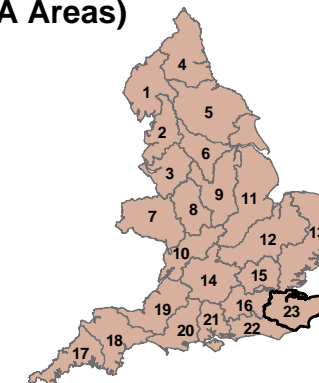
Scale
 0 0.5 1 kilometres

DEFRA groundwater Emergence Map for EA Southern Region

This map should not be used without reference to the accompanying report



Key Plan (EA Areas)



Legend

- CEH River (BFI unclassified)
- CEH River (BFI 0.901 - 1.000)
- CEH River (BFI 0.801 - 0.900)
- CEH River (BFI 0.701 - 0.800)
- CEH River (BFI <0.700)
- Groundwater Data Coverage
- GW Flooding Sites 2000/1
- GW Emergence Zone (20m rise)

User Note

This map is based on data analysed at a National Scale and should not be used to determine local vulnerability.

Please refer to the Groundwater Flooding Scoping Study Report (Jacobs, March 2004) for an explanation of methodology employed, results and confidence criteria.

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Drawn By:	DC	Date:	Mar 2004
Checked By:	SM	Date:	Mar 2004
Reviewed By:	NW	Date:	Mar 2004

REV	DATE	REMARKS
B	MAR 04	FINAL ISSUE
A	FEB 04	FIRST ISSUE

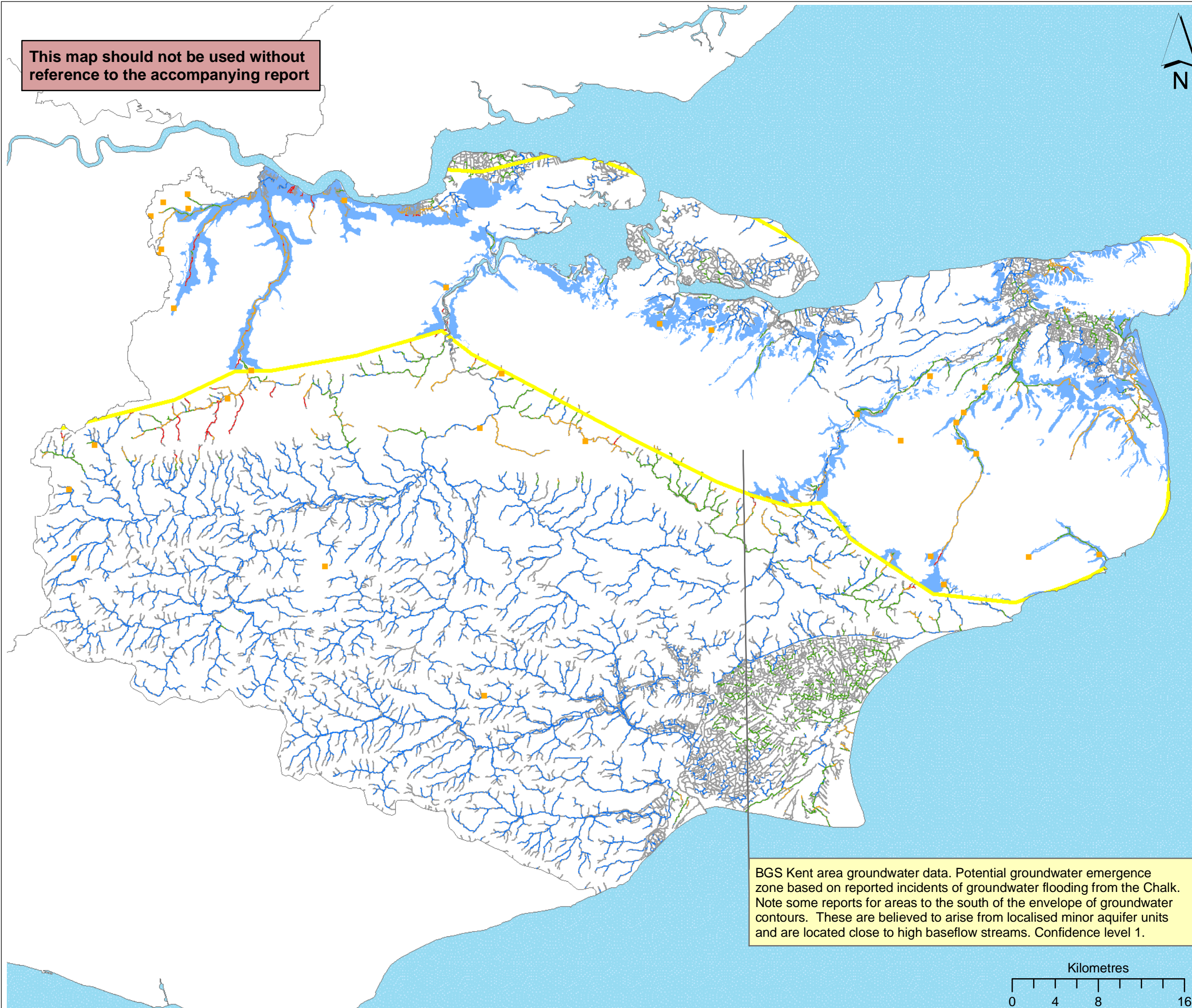


GROUNDWATER FLOODING SCOPING STUDY

GROUNDWATER EMERGENCE MAP FOR EA SOUTHERN REGION, KENT AREA

ISSUE DATE: FEB 2004 REV No: B REV DATE: MAR 2004

SCALE: AS SHOWN ON MAP DRAWING NUMBER: DEFRA/VULNERABILITY/23/FINAL



BGS Kent area groundwater data. Potential groundwater emergence zone based on reported incidents of groundwater flooding from the Chalk. Note some reports for areas to the south of the envelope of groundwater contours. These are believed to arise from localised minor aquifer units and are located close to high baseflow streams. Confidence level 1.

