Battery Energy Storage System (BESS) Adjacent to Kent Biomass Plant

Flood Risk Assessment

Kent Renewable Energy Limited

Project Number: 60714594

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Delivering a better world

Quality information

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Revision History

Revision	Revision date	Details	Verified	Name	Position
1	December 2023	1st Issue	EC	Emily Craven	Associate Director
2	January 2024	Updated drawing	EC	Emily Craven	Associate Director
3	January 2024	Updated site boundary	RS	Rob Sweet	Associate

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1 Introduction

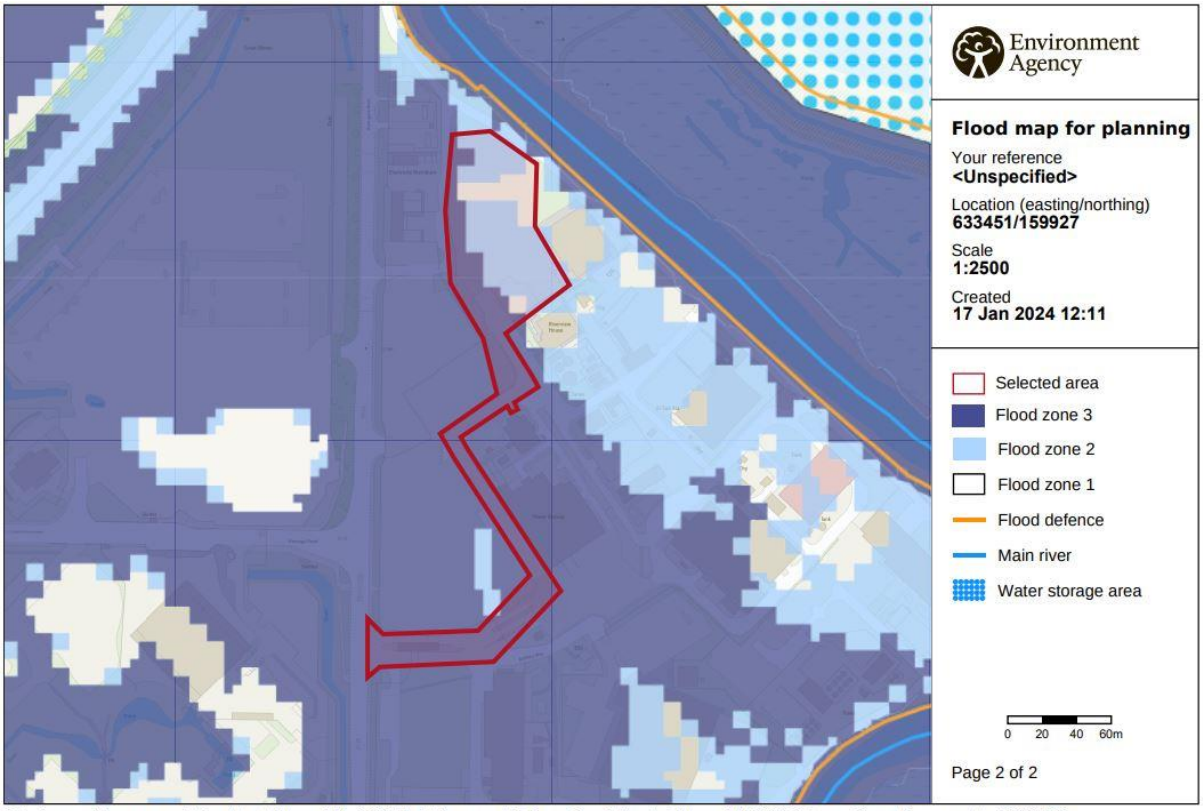
1.1 Commission

AECOM Limited (AECOM) has been commissioned by Kent Renewable Energy Limited (KRE (hereafter referred to as the 'Applicant')) to undertake a Flood Risk Assessment (FRA) for the installation of a Battery Energy Storage System (BESS (hereafter referred to as the 'Site')) on land adjacent to biomass combined heat and power plant at Wharf Road, Discovery Park, Sandwich, Kent.

This FRA considers the flood risk to the Site from all sources (based on freely available data), potential requirements for development and associated constraints. AECOM's approach to this FRA has involved a desk-based review of publicly available information to establish the likely flooding sources and mechanisms for the site and has been prepared in accordance with the National Planning Policy Framework (NPPF)[1] and supporting Planning Practice Guidance (PPG): Flood Risk and Coastal Change[2].

1.2 Policy Context

According to the Environment Agency's Flood Map for Planning[3] (Figure 1-1), the footprint of Kent BESS is largely located within Flood Zone 2, however there are Flood Zone 3 areas present on the western edges of the BESS Site and the existing access road to the south. Flood Zone 2 is defined as 'land having between a 1% and 0.1% annual probability of fluvial flooding; or land having between a 0.5% and 0.1% annual probability of tidal flooding'. Flood Zone 3 is defined as 'land having a 1% or greater annual probability of fluvial flooding; or land having a 0.5% or greater annual probability of tidal flooding'. The Site is shown to benefit from flood defences which are not accounted for in this classification.



[1] National Planning Policy Framework: https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf(accessed January 2024)
[2] Planning Practice Guidance: https://www.gov.uk/government/collections/planning-practice-guidance (accessed January 2024)
[3] Environment Agency's Flood Map for Planning: https://flood-map-for-planning.service.gov.uk/ (accessed January 2024)

Figure 1-1: Environment Agency Flood Map for Planning (December 2023)

According to the NPPF, an FRA should accompany all development proposals located within Flood Zone 2 and 3. When a site is located within Flood Zone 1, a FRA should be produced for: sites of 1 hectare (ha) or more; land identified by the Environment Agency as having critical drainage problems; land identified in a Strategic Flood Risk Assessment (SFRA) as being at increased flood risk in the future; and/or land that could be subject to other sources of flooding, where its development would introduce a more vulnerable use.

As the site is located within Flood Zones 2 and 3, an FRA is required to support the planning application to meet the requirements of the NPPF[1].

1.3 Flood Risk Assessment Methodology

The aim of an FRA is to assess the risks of all forms of flooding to and arising from a development. A risk-based approach is adopted by planning authorities through the application of the Source-Pathway-Receptor model. Our approach to this FRA is based on this model.

The Source-Pathway-Receptor model firstly identifies the causes or 'sources' of flooding to and arising from a development. The identification is based on a review of local conditions and consideration of the effects of climate change. The nature and likely extent of flooding arising from any one source is considered, e.g. whether such flooding is likely to be localised or widespread.

The presence of a flood source does not always imply a risk. It is the exposure pathway or the 'flooding mechanism' that determines the risk to the receptor and the effective consequence of exposure. For example, sewer flooding does not necessarily increase the risk of flooding unless the sewer is local to the Site and ground levels encourage surcharged water to accumulate.

The varying effect of flooding on the 'receptors' depends largely on the sensitivity of the target. Receptors include any people or buildings within the range of the flood source, which are connected to the sources of flooding by a pathway.

In order for there to be a flood risk, all elements of the model (a flood source, a pathway and a receptor) must be present. Furthermore, effective mitigation can be provided by removing one element of the model, for example by removing the pathway or receptor.

The approach to this FRA involves a desk-based review of available information to establish the likely flooding sources and mechanisms for the Site. Once the flood risk has been established, mitigation measures are proposed (where necessary) and residual risk explained.

1.4 Aims and Objectives

In producing this FRA, the following objectives have been met:

- Collect and review Environment Agency flood risk data, topographic data, development proposals and available planning policy documents;
- Assess the risk of flooding from all sources (tidal, fluvial, groundwater, surface water, sewers, and reservoirs) to and from the Site allowing for the effects of climate change over the lifetime of the Proposed Development;
- Assess the residual risk from a breach of the River Stour defences;
- Propose recommendations for appropriate flood risk mitigation measures (where applicable)
- Summarise how surface water will be managed from the Proposed Development;
- Produce a FRA report which identifies the key sources of flood risk and makes recommendations for appropriate flood risk mitigation measures (where applicable).

2 Site Description

2.1 Location

The Site, comprised of 0.7 ha, is located on the north-eastern side of the Discovery Park complex at Great Stonar, approximately 2km north of Sandwich, Kent. The Site is situated within a business park on hardstanding, brownfield land adjacent to Wharf Road. Areas to the south and west of the Site are largely comprised of industrial development and internal roads associated with Discovery Park, including Wharf Road to the east and north, Artillary Way to the west and Ramsgate Road to the west which leads to the A256. To the east of the Site is the River Stour with associated wetlands. The surrounding areas are a mix of agricultural fields, scattered farmsteads and solar farms. Existing access to the site is via Wharf Road.

Since 2014, the Site has been used for storage of logs relating to the adjacent biomass plant (alongside several other nearby plots within the estate), the Site boundary also includes an existing access road to the south of the current log storage area. The Applicant intends to relocate the storage of logs (currently at the Site) to a vacant piece of adjacent land to the west of the Site. The Site is located adjacent to the KRE Biomass Plant which is operated by the Applicant and currently provides Discovery Park with heat and electricity.

The immediate roads surrounding the Site and KRE Biomass Plant are secured via a gatehouse access off Ramsgate Road and are not accessible to non-site personnel. According to Kent County Council's website, the closest Public Right of Way is located approximately 50m west of the site, comprising a section of the English Coastal Path which also forms as part of Ramsgate Road.

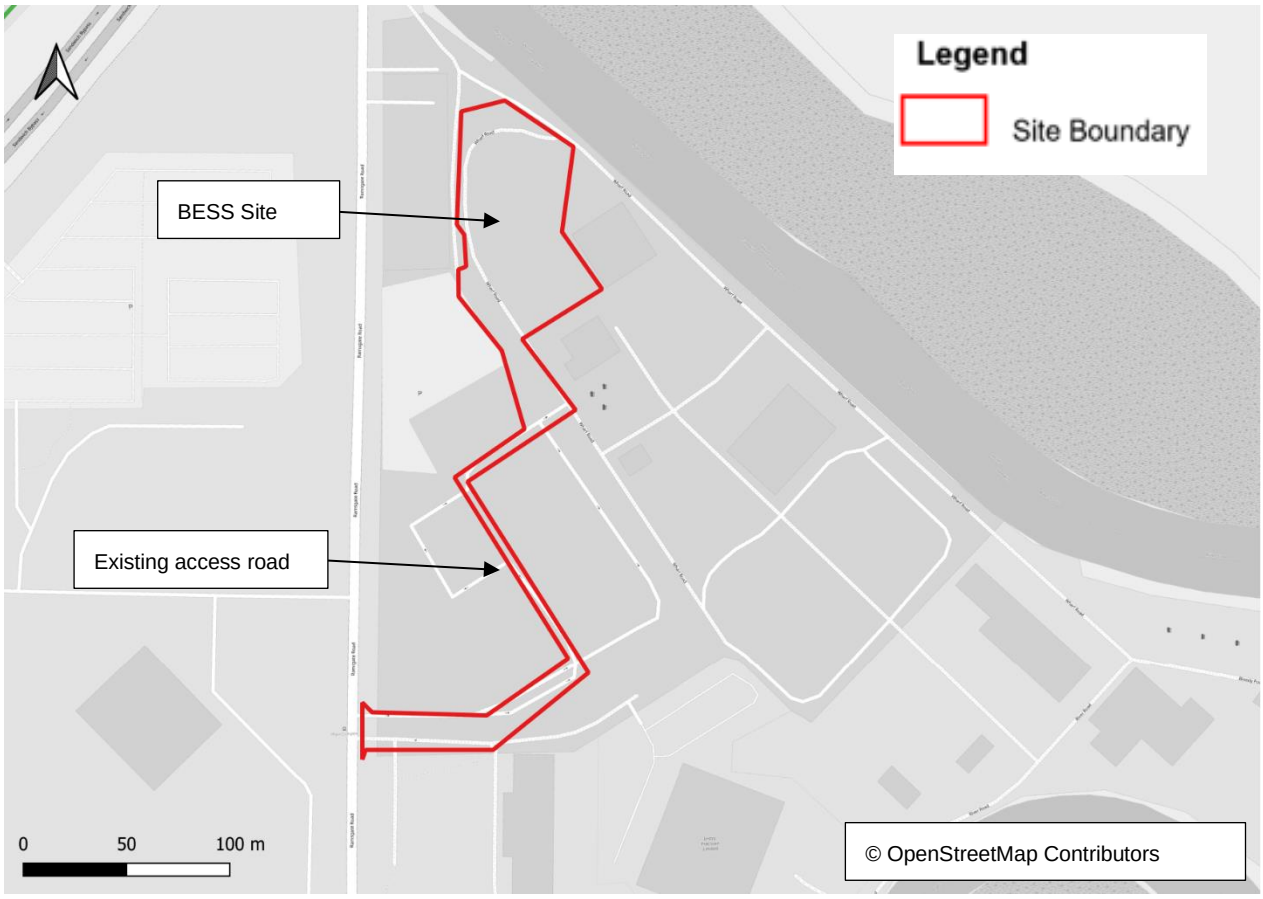


Figure 2-1: Site Location

2.2 Local Water Features

The closest water feature to the site is the River Stour, designated as an Environment Agency Main River. The eastern edge of the site is located approximately 12m from the edge of the River Stour. The River Stour is tidally influenced in this location and presents the greatest risk to the site. The Richborough Stream and Goshall Main

Stream join the Stour to the North of Sandwich, whilst the Sandwich Bay and Hackline March Sewer drain from the North of Deal to the River Stour at sandwich.

The Site is located approximately 600m north of Stonar Lake which is below ground level and has no embankments or control structures.

2.3 Flood Defences

The Sandwich Tidal Defence Scheme completed in 2016 is the largest-scale flood defence scheme in Kent and is made up of 16 sections of defences along the banks of the River Stour. This includes 14km of flood walls protecting the section of the River Stour closest to the Site (located approximately 50m to the eastern edge of the Site), a 1 metre high flood wall at Sandwich Quay (1.65km south of the Site), and flood storage areas at Broadsalts (located extensively to the east edge of the Site at the east edge of the River Stour) and Monks Wall located to the south west of the Site. The remaining 22% of the Dover District Coastline not currently protected by flood walls are protected naturally by high chalk cliffs.

The Stonar Cut, located approximately 1km north of the Site, creates a shortcut across the neck of the Sandwich Loop on the River Stout within which the Site is located, in order to bypass Sandwich town and further alleviate the risk of flooding by dropping the water level in the river at this location.

2.4 Geology and Hydrogeology

The British Geological Survey (BGS) Geology Viewer[4] shows that the bedrock geology underlying the Site is the Thanet Formation- comprised of sand, clay and silt with superficial tidal flat deposits of clay and silt.

The Cranfield University Soil and Agrifood Institute's online Soilscapes map[5] describes the site as being comprised of 'loamy and clayey soils of coastal flats with naturally high groundwater'.

The Defra Magic Map Application[6] shows that the bedrock beneath the Site is a Secondary A Aquifer, which are comprised of permeable layers that can support local water supplies. The superficial drift across the majority of the Site is classified as a Secondary (undifferentiated) Aquifer, meaning it has a slightly lower capacity for water storage than the underlying bedrock.

Source Protection Zones (SPZs) are defined around large and public potable groundwater abstraction sites with the aim of reducing potentially polluting activities around these areas. According to Defra's Magic Map[6], the site is not located within close proximity of an SPZ.

2.5 Topography

From a review of freely available LiDAR[7] data, it is evident that the Site is generally flat with ground levels varying between approximately 2.90m Above Ordnance Data (mAOD) and 4.10mAOD. The higher elevations are to the eastern boundary of the Site with the lower elevations to the western boundary (See Table 4-2).

2.6 Proposed Development

The Proposed Development comprises the construction and operation of a BESS with a total export capacity of 10MW. The Proposed Development would comprise 8 containerised battery units, 4 inventers/transformer units and 1 switch room set out in uniform rows (See Appendix A). Specific configuration of the units has not yet been decided and this FRA will help to inform development planning.

The battery units, inverter/transformer units and switch room would be housed in shipping container size units measuring approximately 12.20m (length) x 2.40m (width) x 2.9m (height). The proposed development would also contain ancillary equipment (fencing, access tracks and CCTV cameras).

No changes are proposed to the existing access road to the south of the proposed BESS.

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[4] British Geological Survey Geology Viewer: https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/ (Accessed September 2023)
[5] Cranfield Soil and Agrifood Institute Soilscapes Map: http://www.landis.org.uk/soilscapes/ [Accessed September 2023]
[6] Defra Magic Map Application: https://magic.defra.gov.uk/MagicMap.aspx (Accessed September 2023)
[7] Defra Survey Data Download: https://environment.data.gov.uk/DefraDataDownload/?Mode=survey (Accessed September 2023)

3 Planning Policy and Guidance

National planning policy sets out the overarching policy framework and local planning policy sets out the flood risk planning requirements for the local area, both of which must be adhered to. For this FRA, national guidance includes the NPPF and the accompanying PPG while local policy relates to the Dover District Local Plan.

3.1 NPPF

Section 14 of the NPPF and the associated PPG details current policy with respect to flood risk in England. Paragraph 173 (footnote 59) of the NPPF outlines that a site-specific FRA should be provided for all development located in Flood Zones 2 and 3, and for all sites that are greater than 1ha in Flood Zone 1.

The NPPF considers the vulnerability of different types of development to flooding. According to Annex 3 of the NPPF, as the Site is proposed for 'utility infrastructure for energy supply including storage', it would be classified as 'Essential Infrastructure'. According to Table 2 of the PPG, which provides a matrix identifying the development vulnerability classifications that are compatible within each flood zone, 'Essential Infrastructure' development is acceptable in Flood Zone 2, however the Exception Test is required for development located within Flood Zone 3.

3.1.1 Sequential Test

Paragraph 172 of the NPPF states that the aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the Proposed Development in areas with a lower risk of flooding. The Sequential Test should be applied in areas known to be at risk now or in the future from any form of flooding. As the proposed development is not an allocated site within the Local Plan and lies partially within Flood Zone 3 a Sequential Test will be required. Discussion on how the Site passes the Sequential Test is in the Planning and Design Access Statement, submitted as part of the Planning Application by the Applicant.

If it is not possible for development to be in areas with a lower risk of flooding, the Exception Test may have to be applied.

3.1.2 Exception Test

The Exception Test requires two elements to be satisfied (as set out in paragraph 172 of the NPPF) before allowing development to be allocated or permitted in situations where suitable sites at lower risk of flooding are not available following application of the Sequential Test. It should be demonstrated that:

1. Development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and
2. The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. This is usually demonstrated through a site-specific FRA.

This FRA effectively demonstrates within Section 4 and 5 that Part 2 of the Exception Test has been satisfied and that the Proposed Development will be safe for its lifetime.

3.2 Dover District Local Development Framework

The Dover District Local Development Framework is a suite of Development Plan Documents that set out the local planning policy for the area, covering up to the period of 2026. The documents relevant to flood risk which have been considered as part of this FRA include:

- Dover District Local Development Framework Core Strategy –2011[8]
- Dover District Land Allocations Local Plan– July 2015[9]

[8] Dover District Core Strategy: https://www.dover.gov.uk/Planning/Planning-Policy/PDF/Adopted-Core-Strategy.pdf [Accessed September 2023]
[9] Dover District Site Allocations Local Plan: https://www.dover.gov.uk/Planning/Planning-Policy/Adopted-Development-Plans/Land-Allocations-Local-Plan.aspx [Accessed September 2023]

DDC is preparing a new single Local Plan[10] and once agreed (formally adopted), will replace the current Dover District Local Development Framework. Consultation of the Regulation 18 Local Plan Review was completed in 2021, and publication of the Regulation 19 of the Town and Country Planning (Local Planning) Regulations 2012 took place in October 2022. Adaptation of the Local Plan is due to take place in 2024 and cover the period up to 2040.

It is important to note that the policies in the current Adopted Local Development Framework predate and in some cases are not compliant with the NPPF/PPG as they were prepared when the Regional Spatial Society (RSS) was in place at the time. Any significant changes in relation to Flooding will be addressed.

3.3 Core Strategy (2010)

The Dover District Local Development Framework (2010) is the primary document which forms part of the Local Plan. It sets out the overall development strategy for Dover up to 2026 and contains strategic planning policies to deliver that strategy. However, the Dover District Local Development Framework (2010) does not contain any local Core Strategies or Development Management Policies specific to flood risk. Instead, it states that 'flood risk is dealt with by national and regional policy'. The two national and regional policies outlined within the Core Strategy are as follows:

National Risk Management 4

Sustainable flood risk management requires local authorities to undertake a Strategic Flood Risk Assessment to provide a comprehensive understanding of flood risk and to put in place a framework for applying the PPS25 sequential approach.

Planning Policy Statement 25: Development and Flood Risk Practice Guide

The PPS25 is a holistic approach to managing risk set out in the Government's strategy for flood and coastal erosion management. It includes planning at all levels to deliver appropriate and sustainable development, taking full account of flood risk.

3.4 Core Strategy (2022)

The new Dover District Local Plan Regulation 19 (2022) does, however, include Core Strategies and Development Management Policies relevant to flood risk specific to the local region. These are outlined as follows:

CC5: Flood Risk

- Development on sites at risk of flooding must comply with the NPPF and associated guidance and will only be permitted as an exception and where it is demonstrated by a site-specific FRA, carried out in accordance with the requirements set out in the Council's Strategic Flood Risk Assessment, that it would not result in an unacceptable risk of flooding on the site itself or elsewhere.
- The FRA should be prepared in accordance with the guidance set out in the Council's 'Site-specific Guidance for Managing Flood Risk'. For development identified by the FRA to be at risk of flooding from any source, flood mitigation should be implemented in accordance with the Flood Risk Management hierarchy outlined in the document 'Site-specific Guidance for Managing Flood Risk'.

CC6: Surface Water Management

All new development should replicate natural ground and surface water flows and decrease surface water run-off using Sustainable Drainage Systems, in accordance with the following criteria and the NPPG:

- Proposals must follow the hierarchy of methods for discharge set out in the Council's Site-specific Guidance for Managing Flood Risk (2019):
    I. Into the ground, infiltration: the preferred method for discharging surface water run-off
    II. To a surface water body, subject to appropriate pollution control measures
    III. To a surface water sewer, highway drain or another drainage system
    IV. To a combined sewer
- SuDS design and robust long-term maintenance plan must be considered as an integral part of the master-planning and design process and should where possible provide multi-functional benefits.
- No surface water connection to a foul only sewer will be permitted.

[10] Dover District Local Plan: https://www.doverdistrictlocalplan.co.uk/uploads/pdfs/dover-district-local-plan-regulation-19-submission-document-oct-20221.pdf [Accessed September 2023]

- The discharge of surface water runoff into a public surface or combined sewer will only be acceptable if infiltration or discharge into a surface water body are shown not to be possible, an assessment Climate Change 235 of the capacity of the sewer has been undertaken, and the evidence demonstrates that there is no increased flood risk.

Where SuDs are required, a Sustainable Drainage Strategy containing proportionate information on the proposed sustainable drainage systems must be submitted as part of any planning application.

3.5 Kent Local Flood Risk Management Strategy

As Lead Local Flood Authority (LLFA), the Kent County Council (KCC) has the responsibility to produce and maintain a Local Flood Risk Management Strategy (LFRMS). The Kent LFRMS[11] was produced in 2017 and sets out the vision for managing the risk of flooding from local sources which includes surface water, ordinary watercourses and groundwater. The key objectives presented within this document are:

- To support and improve the safety and wellbeing of Kent's residents and the economy of Kent through appropriate flood risk management
- To work together effectively to understand and deliver appropriate flood risk management in Kent
- To contribute to sustainable development, regeneration and land management in Kent through the promotion of sustainable flood risk management practices that utilise natural processes where appropriate.

Information, where applicable has been extracted from the LFRMS to inform the risk of flooding within this FRA, as documented in Section 4.

3.6 Strategic Flood Risk Assessment

Strategic Flood Risk Assessments (SFRAs) are used by Local Planning Authorities (LPAs) to support their Local Plan and assist in making planning decisions. There are two SFRA levels:

- Level 1 provides enough information to apply the Sequential Test; and
- Level 2 builds on Level 1 and includes the information required to apply the Exception Test.

The DDC Level 1 SFRA was published in 2019[12]. and provides a district-wide assessment of flood risk from all sources, assessing the risk now and in the future and taking into account the predicted effects of climate change. Information, where applicable has been extracted from the SFRA to inform the risk of flooding within this FRA, as documented in Section 4.

3.7 SuDS Guidance

Kent County Council as the LLFA have provided technical advice and guidance on proposed surface water drainage strategies, designs and maintenance arrangements for all new major development within the 2019 Drainage and Planning Policy Statement[13]. The statement contains guidance on how to integrate sustainable drainage systems into the master-planning of both large and small developments, reinforcing requirements set out in the NPPF and policies set out by DDC.

Additionally, KCC have worked with other LLFAs in the South East of England to develop guidance to promote the use of SuDS within 'Water, People, Places'[14], which includes several different developments typologies as examples.

Applicants should consult and refer to these guidances and any future updates, when preparing applications incorporating SuDS schemes. All applications incorporating a SuDS scheme will also need to include details of a robust maintenance scheme to be agreed with the appropriate authority. These documents should be considered for any future development of the Site.

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[11] Kent County Council LFRMS: https://www.kent.gov.uk/__data/assets/pdf_file/0010/79453/Local-Flood-Risk-Management-Strategy-2017-2023.pdf [Accessed September 2023]
[12] DDC Level 1 Strategic Flood Risk Assessment (2019): https://www.doverdistrictlocalplan.co.uk/uploads/pdfs/strategic-flood-risk-assessment-2019-sfra.pdf [Accessed September 2023]
[13] KCC Drainage and Planning Policy: https://democracy.kent.gov.uk/documents/s112936/F1%20Appendix%20A%20-%20KCC%20Drainage%20and%20Planning%20Policy%20Statement.pdf (Accessed September 2023)
[14] Water, People, Places: https://www.kent.gov.uk/__data/assets/pdf_file/0007/23578/Masterplanning-for-SuDS.pdf [Accessed September 2023]

4 Flood Risk – To Development

4.1 Overview

The NPPF requires that all potential sources of flooding that could affect the Proposed Development are considered. This section of the FRA assesses the flood risk posed to the Site from: rivers and the sea, rising groundwater, directly from rainfall on the ground surface, overwhelmed sewers and drainage systems, as well as from reservoirs, canals, lakes and other artificial flood sources.

4.2 Tidal

Tidal flood sources include the sea and estuaries and are caused by the combination of storm surges and astronomical tides. According to the Environment Agency's Flood Map for Planning (Figure 1-1), the BESS Site is located predominantly within Flood Zone 2 meaning there is a 0.1% or greater annual probability of tidal flooding, and parts of the BESS Site and the entirety of the existing access road are located within Flood Zone 3 meaning there is a 0.5% or greater annual probability of tidal flooding. The River Stour, located 12m from the eastern edge of the Site, presents the greatest risk of flooding to the Site and is considered tidally influenced at this location.

The Site is located near to several flood defences (see Figure 4-1).

According to data provided by the Environment Agency, the Site is protected by the Sandwich Town Tidal Defence Scheme, which provides standard protection for a 0.5% Annual Exceedance Probability (AEP) flood event, and includes 14kms of flood walls and embankments varying between 0.5m and 1.2m on both banks of the River Stour, and a 1m high flood wall at Sandwich Quay. Additionally, the coastline between the Sandwich Bay Estate and Shell Ness is characterised by a sandy beach backed by an extensive dune system which provides protection from flooding for the land behind the dunes, including the Site. Furthermore, there are tidal flood storage areas located outside of Sandwich Town, extensively to the east of the site at the east edge of the Stour.

Hydraulic model results were supplied by the Environment Agency and produced by the '2018 East Kent coast Tidal Mapping Study' completed by JBA Consulting. According to the Environment Agency, the 0.5%AEP climate change scenarios projected to 2070 and 2115 were modelled using NPPF 2016 guidance, however Sea Level Rise (SLR) estimates have been updated since the model was produced. Our calculations based on updated climate change allowance data provided by the Environment Agency[15] depict that SLR is larger (ca. +8 cm) to the previously predicted (See Table 4.1) for the 2070 projection. However, when taking into account the proposed development of 40 years (2025 to 2065) and using the 'Upper End' allowance, this equates to a rise of 0.525 m (i.e. +4 mm) when compared with the 2018 East Kent coast Tidal Mapping Study' projections. It is therefore considered that the model outputs for the 2070 are appropriate for assessing future tidal conditions.

Table 4-1: Change in SLR estimates (metres per year)

NPPF Guidance	SLR projected to 2070
2016	0.521
2022	0.604

[15] Flood risk assessments: Climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances [Accessed September 2023]

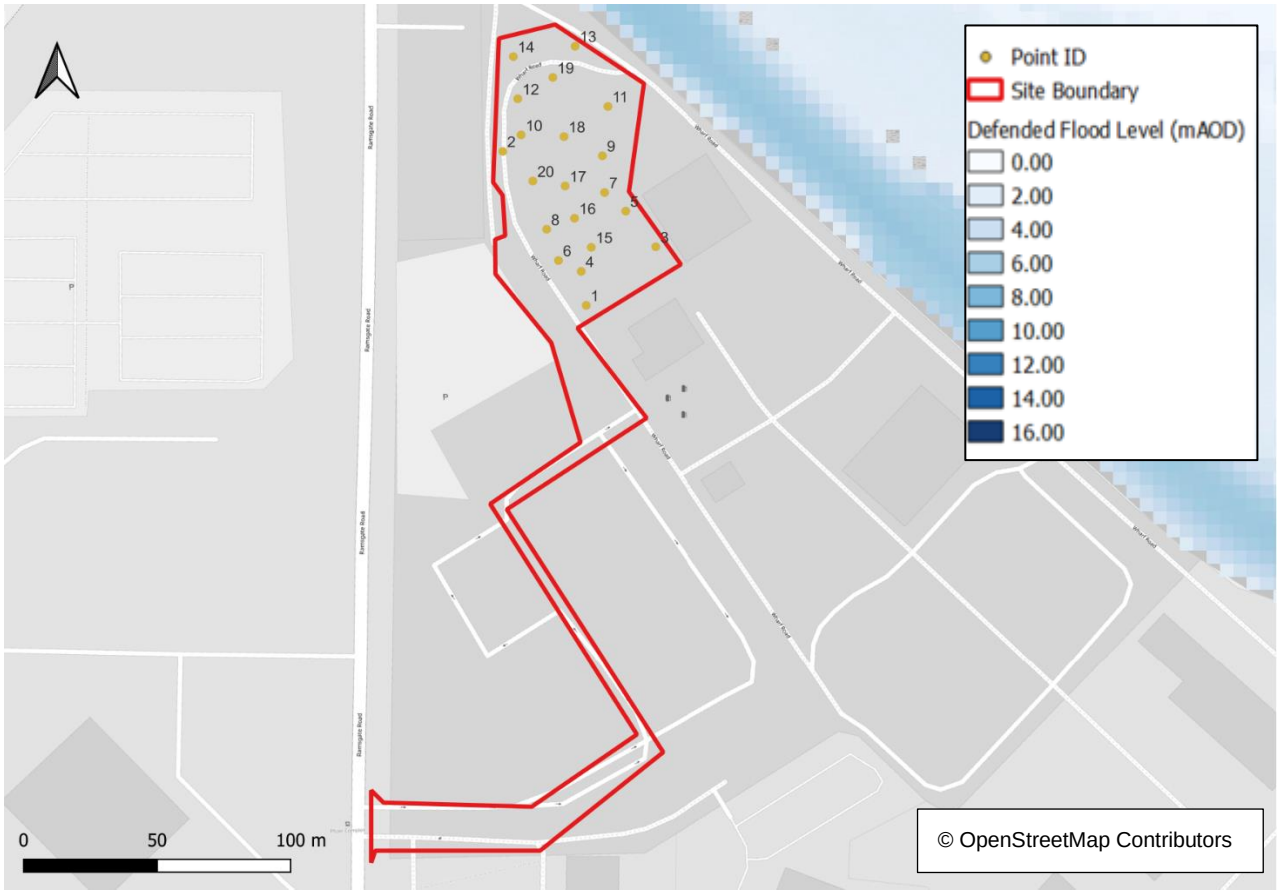

Figure 4-1: Maximum Flood Level for a Defended 2070 0.5% AEP Tidal Event

The River Stour has been identified as a potential source of tidal flood risk. However, as stated above, the presence of flood defences prevents a clear pathway between the source and the receptor (the Site) during the lifetime of development. The model estimates that in this defended scenario, the Site will not be flooded (Figure 4-1) The risk of tidal flooding is therefore considered to be **Very Low**, however there is a potential risk of residual flood risk if the defences fail (see section 4.3).

4.3 Tidal- Residual Risk

Examining the impact of structural failures of tidal defences allows the residual risk of tidal flooding to be accounted for. The reliance of Sandwich on tidal defence infrastructure will increase over the next century as sea levels rise.

A review of historic flood records shows that the Discovery Park, within which the Site is located, has not been affected by historical flood events and there is no data to suggest historical tidal flooding at the Site. A review of data for the wider district has identified that there have been several minor flood events including tidal defence breaches, according to the 2019 Dover District SFRA[16]. A more recent example includes the 2013 flood event where defences were overtopped in Gazen Salts Recreation, Sandwich Quay and Dover as a result of a tidal surge which caused damage to several flood defences.

Figure 4-2 shows the combined undefended tidal flood extents and shows that during an undefended 2070 climate change 0.5%AEP tidal event, the Site will become flooded. Table 4-2 shows the maximum flood depths at 20 different points at the Site, during the same scenario, extracted from hydraulic modelling results, as shown in figure 4-2. This shows that generally, where the BESS is proposed (see Appendix A), flood depths reach up to 1m.

[16] Dover District Council SFRA: https://www.doverdistrictlocalplan.co.uk/uploads/pdfs/strategic-flood-risk-assessment-2019-sfra.pdf [Accessed September 2023]

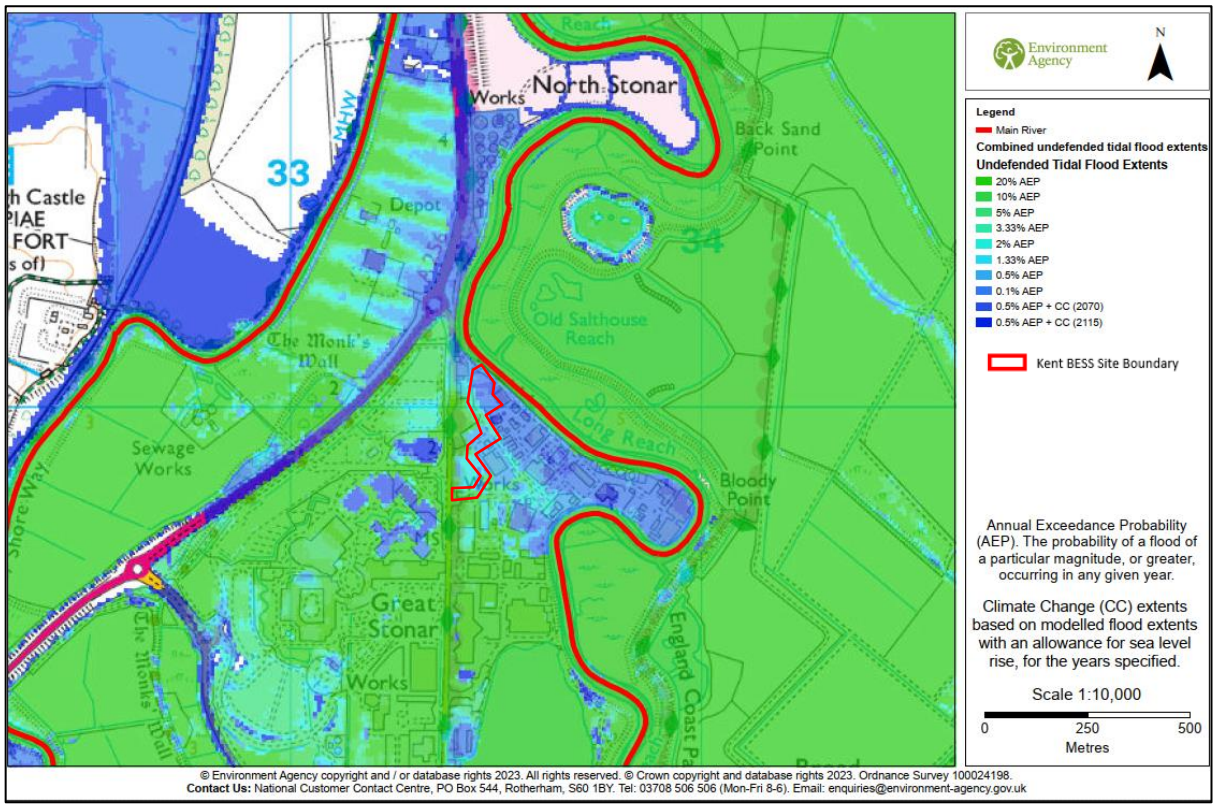

Figure 4-2: Undefended Tidal Flood Extents Map (0.5% AEP +CC 2070)

The River Stour has been identified as a potential source of tidal flood risk and if a total failure in the flood defences were to occur resulting in a wholly undefended scenario, there is a pathway to the site, and flood depths within the Site are depicted within Table 4-2. However, this scenario is highly unlikely to occur over the development lifetime and based on information from the asset management dataset[17] this asset is regularly inspected.

[17] DEFRA asset management dataset Asset Information and Maintenance Programme (data.gov.uk) (accessed January 2024).

Table 4-2: Maximum Flood Depths at the Site During the 0.5% AEP Climate Change 2070 Undefended Tidal Event

Point ID	National Grid Reference		Lidar DTM (m)	Flood Level (mAOD)	Flood Depth (m)
	Easting	Northing			
1	633472	15990	2.96	4.22	1.26
2	633436	160033	3.07	4.22	1.15
3	633498	160000	4.01	4.23	0.22
4	633473	159999	3.77	4.22	0.45
5	633489	160014	3.93	4.23	0.30
6	633455	159999	3.04	4.22	1.18
7	633481	160027	3.95	4.23	0.28
8	633450	160013	3.19	4.22	1.03
9	633481	160044	4.21	4.30	0.09
10	633447	160042	4.03	4.22	0.19
11	633474	160060	4.13	4.35	0.22
12	633449	160062	3.50	4.21	0.71
13	633449	160076	3.89	4.33	0.44
14	633480	160076	3.71	4.20	0.49
15	633480	159999	4.02	4.22	0.20
16	633470	160014	3.93	4.22	0.29
17	633466	160033	3.98	4.22	0.24
18	633465	160051	4.09	4.23	0.14
19	633465	160069	3.73	4.24	0.51
20	633448	160028	3.12	4.22	1.10

Although the likelihood of a defence breach is Low, the consequences associated with a breach are High, as outlined above. Based on this information, the overall risk from a tidal breach is considered to be **Medium**. Flood mitigation measures which aid in reducing risk have been recommended in Section 6.

4.4 Fluvial

Fluvial flooding generally occurs when high levels of rainfall within a catchment causes the flow within a river to exceed its bankfull capacity.

As noted in Section 1.2, the Environment Agency's Flood Map for Planning (Figure 1-1) shows that the site is located in Flood Zones 2 and 3, which is associated with tidal flooding from the River Stour. According to the SFRA, the tidal reach of the River Stour presents a combined risk of tidal and fluvial flooding to the town. However, that risk has significantly reduced since the completion of the Sandwich Town Tidal Defence in 2016, which has been demonstrated to protect the town from both types of flooding into the future (circa 50 years, under the 0.5% AEP event). A review of flood maps within the SFRA, alongside historical fluvial flood records, indicate that fluvial flooding is unlikely to present a significant risk to the Site with tidal flooding being the dominant source.

Based on the nature of the Proposed Development (i.e. storage system) and the fact that people will not be permanently working from the development, detailed hydraulic fluvial modelling has not been undertaken as part of this study. Mitigation has, however, been proposed (see Section 6) to manage any uncertainty surrounding fluvial flood risk.

Based on the above justification, the risk of fluvial flooding is considered to be **Low** for the proposed development.

4.5 Surface Water

Surface water flooding happens when rainwater cannot drain away through the normal drainage systems. Instead, it lies on or flows over the ground. Sandwich is, in parts, low lying and the varied topography throughout the district can present a risk of surface water flooding to both rural and urban communities. However, according to the Environment Agency 'Check your long-term flood risk portal'[18] (Figure 4-4), the risk of surface water flooding for the Site is Very Low, meaning that this area has a chance of surface water flooding of less than 0.1% each year.

In close proximity to the Site along the south eastern boundary there are areas classified as having 'high' and 'medium' risk of surface water flooding. There is 'medium' risk flooding on one of the two access roads to the Site, and 'high' risk flooding on Ramsgate Road, approximately 133m west of the Site. 'High' risk refers to an area that has a chance of flooding greater than 3.3% each year, whilst 'medium' risk denotes an area that has a chance of flooding between 1% and 3.3% each year.

[18] Environment Agency Check your long term flood risk portal: https://check-long-term-flood-risk.service.gov.uk/risk# [Accessed September 2023]

With the Proposed Development located in a 'Very Low' risk area (i.e. outside of a surface water flowpath), the risk of surface water flooding is considered to be **Very Low.**

Figure 4-4: Environment Agency's Flood Map for Surface Water (December 2023)

4.6 Groundwater

Groundwater flooding occurs when water levels in the ground rise above surface elevations and is dependent on regional geology. The geology dictates where this type of flooding takes place; it is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).

The Cranfield University Soil and Agrifood Institute's online Soilscapes map describes the site as being comprised of 'loamy and clayey soils of coastal flats with naturally high groundwater'. The Defra Magic Map Application shows that the bedrock beneath the Site is a Secondary A Aquifer, which are comprised of permeable layers that can support local water supplies. The superficial drift across the majority of the Site is classified as a Secondary (undifferentiated) Aquifer, meaning it has a slightly lower capacity for water storage than the underlaying bedrock.

Groundwater flooding is possible across the low-lying flat land to the north of the district, in which the Site in located, where there is a high potential for elevated groundwater levels and flooding to occur in close proximity to the River Stour. However, the drainage system in this area consists of an extensive network of ditches designed to remove water, to allow this land to be used. These ditches control groundwater levels and helps to maintain them below the surface, discharging any excess water into the Stour.

The Kent LFRMS states that groundwater does pose a potential risk, but the government allows for local determination based on historic events, as groundwater is unlikely to pose a significant risk in areas which have not experienced groundwater flooding previously. The Environment Agency Historic Flood Map [19] was interrogated which revealed that the Site had not experienced any kinds of historical flooding and subsequently no groundwater flooding. To further validate this, the BGS's Borehole Records Viewer[20] was reviewed to examine groundwater levels at the Site in the absence of a detailed Ground Investigation report. There is a borehole record approximately

[19] Environment Agency's Historic Flood Map: https://environment.data.gov.uk/dataset/889885c0-d465-11e4-9507-f0def148f590 [Accessed September 2023]
[20] BGS Borehole records viewer: https://www.bgs.ac.uk/information-hub/borehole-records/ [Accessed September 2023]

250m north of from the Site recorded in Table 4-3 depicting that water level in that area is at least 5.02m below ground level (mbgl).

Table 4-3: BGS Borehole Records

Hole ID	Borehole Length (m)	Groundwater Entry (mbgl)
TR36SW10	13.41	5.02

Taking into account the information presented, yet acknowledging that the Site is located in close proximity to the River Stour and lays on a Secondary A Aquifer, the risk to flooding at the Site from groundwater is considered **Low.**

4.7 Sewer

Sewer flooding generally occurs when the available discharge capacity of the system is exceeded by the inflow, the system becomes blocked by debris or sediment, or it cannot be released at the outfall due to a high water level within the receiving waterbody. In all three cases, water could back up through the sewerage system and may surcharge through manholes, flooding highways and properties.

The 2019 SFRA states that sewer flooding in most likely to occur in the three main urban locations of Sandwich, Deal and Dover. The Site is approximately 2km from the urban centre of Sandwich, and as there are no records of historical flooding at the Site including sewer flooding, the risk is considered to be **Very Low.**

4.8 Artificial Sources

Artificial flood sources include raised channels such as canals, or storage features such as ponds and reservoirs.

The Environment Agency's Flood Risk from Reservoirs Map[21] shows that the Site is not positioned within the 'dry day' or 'wet day' inundation extent for any major reservoir. 'Dry day' refers to a scenario in which a major reservoir suffers a breach when river levels are normal, whilst the 'wet day' scenario refers to the same event occurring when local rivers have already overtopped their banks. The nearest inundation extent is located approximately 1.65km south east of the Site.

The 2019 SFRA states that there are no potable water reservoirs or artificial waterways such as canals within the district. Stonar Lake, located approximately 600m south of the Site, is below ground level and has no embankments or control structures and is therefore considered to be at a low risk of failure.

Based on the information above, the flood risk from artificial sources to the Site is considered **Very Low**.

[21] Environment Agency's Flood Risk from Reservoir Map: https://check-long-term-flood-risk.service.gov.uk/map [Accessed September 2023]

4.9 Flood Risk Summary

The flood risk to the Proposed Development is summarised in Table 4-4.

Table 4-4: Summary of flood risk to the Proposed Development

Flood Mechanism	Source	Flood risk to the development	Mitigation required?
Tidal (Still Water Level)	The Sea	Very Low	No
Tidal (Breach)	The Sea	Medium (residual risk)	Yes
Fluvial	Main river/ ordinary watercourse	Low	No
Surface Water	Runoff from surrounding land and hard surfaces.	Very Low	No
Groundwater	Rising groundwater levels in the underlying geology.	Low	No
Sewers	Surrounding public / private drainage systems	Very Low	No
Artificial Sources	Reservoirs / Canals	Very Low	No

5 Flood Risk from Development

5.1 Surface Water Management

The existing Site is currently located on existing hardstanding, brownfield land and therefore the Proposed Development will not lead to an increase in impermeable area across the site. Additionally, the Site has an existing surface water drainage system on-site comprising a 940m^3 attenuation tank to deal with any excess surface water run off. There is also likely to be a need for storage onsite for firewater discharge which, following government requirements, will need to be at least 228m^3. The lack of increase in impermeable areas and existing attenuation tank demonstrates that an appropriate surface water drainage strategy is achievable. A surface water drainage strategy will be developed at detailed design stage.

6 Mitigation

To reduce the consequences of flooding, the following flood risk mitigation measures have been recommended to be incorporated into the development:

- **Flood Resilient Design** – These techniques can be employed on buildings within areas which are potentially at risk of flooding. It is recommended that:
  - Durable materials be considered for use where possible. These are materials which are unaffected by floodwater should a flood event occur.
  - Apply a sequential approach to development layout, so as to prioritise the location of battery units and substation in areas of Flood Zone 2 ahead of Flood Zone 3.
  - Raise the level of the battery units and substation by 300mm above ground level to mitigate any uncertainty regarding fluvial flood risk and also during an unlikely breach event from the River Stour.
- **Safe Access** – In the unlikely event that the flood defences fail or breach in the vicinity of the Site, and that there are workers present, based on Figure 6-1, it is recommended that all users of the Site evacuate using Ramsgate Road access route and head north until users reach flood free areas to the east of the A256, approximately 650m northwest of the Site. This area is suggested as a potential evacuation location due to its proximity to the Site and that it has not been flooded historically and it is not predicted to flood. In the event of the existing access road within the site boundary being flooded there are numerous existing access routes that could be utilised in addition to the proposed flood evacuation route.
- **Good Practice** – Any doors or openings to the containers will remain closed except during maintenance or repair so that if an unexpected flood event were to occur, all items within the storage container remain within the designated area.

Figure 6-1: Flood Free Suggested Evacuation Location

7 Conclusions

7.1 Overview

This FRA has appraised the risk of flooding to and from the Site. The Proposed Development has been assigned to the flood risk vulnerability category of 'Essential Infrastructure' (energy storage) in line with Annex 3 of the NPPF. The Site is located within Flood Zones 2 and 3. However, it benefits from the Sandwich Tidal Town Defence Scheme which has been a large scale, award winning project which has been effective at protecting the town to date and therefore a breach is considered unlikely.

According to Table 2 of the PPG, 'Essential Infrastructure' developments are permitted within Flood Zone 3 providing the exception test is passed and the Site has been designed and constructed to remain operational in times of flood.

7.2 Flood Risk – To Development

The following potential sources of flooding which could affect the Site have been considered and assessed as follows:

- The current and future risk of tidal flooding (based on still water levels only) is considered **'Very Low'** based on the data provided by the Environment Agency and the presence of flood defences.
- The likelihood of a defence breach is Low, however the consequences associated with a breach are Very High. Overall risk is therefore considered to be '**Medium**'.
- The risk of fluvial flooding to the Site is '**Low'**. This has been concluded following a review of Environment Agency historical flooding data and SFRA data.
- The risk of surface water flooding to the Site is deemed **'Very Low'** on the basis that there are no historical surface water flooding records, and data provided by the Environment Agency suggests that the Site is located in a 'Very Low' risk area.

- The risk of ground water flooding to the Site is deemed **'Low'** based on information provided by BGS Borehole Records Viewer and the Environment Agency's historical flood data.
- The risk of flooding from sewers is considered to be **'Very Low'.**
- The risk of flooding from artificial sources is considered to be **'Very Low'**, due to the Site not being situated within an inundation extent for any major reservoirs.

7.3 Flood Risk- From Development

As the Proposed Development will be located on pre-existing hard standing land, there will be no increase in the impermeable area. Consequently, it is unlikely that there will be an increase in surface water runoff post development. Drainage strategies will be developed post-consent of the Proposed Development.

As the site is protected by flood defences throughout its lifetime, the Proposed Development will not cause a loss of floodplain storage, and therefore, no compensation is required. In the unlikely event of a breach, the features which make up the Proposed Development may have a local impact on flood flows, however this is unlikely to impact third party land.

7.4 Mitigation

To reduce the consequences of flooding in a breach scenario, the following flood risk mitigation measures will be:

- Flood Resilient Design; i.e. sequentially locating storage containers within the Site in areas of the lowest flood risk.
- Flood Evacuation Route; and
- Good Practice (i.e. ensuring any doors or openings remain closed when not in use).

Appendix A Proposed Development

N

SUBSTATION

SCALE AT 1:350

0m 5 10 15 20 25 30

INDICATIVE BATTERY STORAGE LAYOUT

SCALE 1:350

LEGAL: NATURAL POWER CONSULTANTS LTD TAKE NO RESPONSIBILITY FOR THE ACCURACY OF DATA PROVIDED BY THIRD PARTIES.

NOTES:

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS BASED ON MAP DATA PROVIDED BY THE CLIENT.
3. NATURAL POWER TAKES NO RESPONSIBILITY FOR THE ACCURACY OF THIS DATA.
4. THE PLAN SHOWN IS FOR PLANNING PURPOSES ONLY AND NOT FOR CONSTRUCTION.
5. ALL BUILDINGS SHOWN ARE SUBJECT TO DETAILED DESIGN FOR CONSTRUCTION PURPOSES.

KEY:

- BOUNDARY - PLANNING APPLICATION
- BESS CABLES FROM BATTERY SUBSTATION TO KRE 33KV SUBSTATION
- PROPOSED TRACK
- BATTERY UNITS
- INVERTER UNITS

ASSUMPTIONS:

1. 12.2m x 2.4m (40FT x 8FT) CONTAINER.
2. 2.5 MWh CAPACITY PER 12.2m x 2.4m (40FT x 8FT) CONTAINER.
3. 1 INVERTER + LV/HV TRANSFORMER SOLUTION PER 2 BESS CONTAINERS EQUALLING 2.5MW/5MWh OR A 2 HOUR SYSTEM.
4. AT LEAST 3m SEPARATION FROM SITE BOUNDARY TO ALLOW FOR MAINTENANCE VEHICLE ACCESS.
5. 3m SEPARATION BETWEEN CONTAINERS. ADDITIONAL SPACE FOR FUTURE EXPANSION, FIRE SAFETY AND EASE OF O&M.
6. POINT OF CONNECTION AT SUBSTATION LOCATED TO THE WEST OF THE PROPOSED SITE AREA, BEYOND THE GREEN SERVICE CORRIDOR.
7. SITE DESIGN IS BASED ON SPACE OPTIMISATION AND PRELIMINARY ELECTRICAL OPTIMISATION AND DOES NOT CONSIDER ANY STRUCTURAL, DETAILED ELECTRICAL OR MECHANICAL OPTIMISATIONS. THIS DRAWING IS ONLY INTENDED TO BE USED FOR INDICATIVE PURPOSES.

REV	DESCRIPTION	BY	CH	APP	DATE
E	BOUNDARY UPDATED	MH	PJ	JS	11/01/24
D	BOUNDARY UPDATED	MH	PJ	JS	12/12/23
C	BOUNDARY EXTENDED	MH	PJ	JS	11/12/23
B	CABLE ROUTE ADDED	MH	PJ	JS	18/10/23
A	INITIAL ISSUE	MH	PJ	JS	29/09/23

CLIENT: KENT RENEWABLES ENERGY LIMITED

NATURAL POWER CONSULTANTS LTD.
120 BATH STREET
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TEL: +44 (0) 1644 430 008
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IFS DOC NO.: 1332637	IFS ACTIVITY: 10.1010
SCALE: 1:350 @ A1	SHEET NO.: 1 OF 1

STATUS: **FOR INFORMATION**

PROJECT: KRE BESS

DRAWING TITLE: INDICATIVE BATTERY STORAGE LAYOUT

DRAWING NO.: 18189_LAY_1001 | REVISION: E

Appendix B Environment Agency Data

Product 4 (Detailed Flood Risk) for: Ramsgate Road, CT13 9FP
Requested by: Archie Low / Aecom
Reference: KSL 323615 LMB
Date: 25 August 2023

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 contact us again, after a period of time, please quote the above reference in order to help us deal with your query.

Please refer to the Open Government Licence which explains the permitted use of this information.

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

Flood Map Confirmation

The Flood Map:

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

The Flood Map shows the probability of a flood of a particular magnitude, or greater, occurring in any given year. This is known as the Annual Exceedance Probability (AEP). Flood Zone 3 indicates areas of land having a 1 in 100 or greater annual probability (1% AEP) of flooding from rivers, or a 1 in 200 or greater annual probability (0.5% AEP) of flooding from the sea. Flood Zone 2 indicates areas of land having up to a 1 in 1000 annual probability (0.1% AEP) of flooding from rivers or the sea. The Flood Map also shows the location of some flood defences.

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 of completion, 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 https://flood-map-for-planning.service.gov.uk/.

At this Site:

The Flood Map shows that parts of this site lie within the outline of the 0.5% (Flood Zone 3) chance of flooding from the sea in any given year.

The Flood Map also shows that part of this lie within the outline of the 0.1 % (Flood Zone 2) chance of flooding from the sea in any given year.

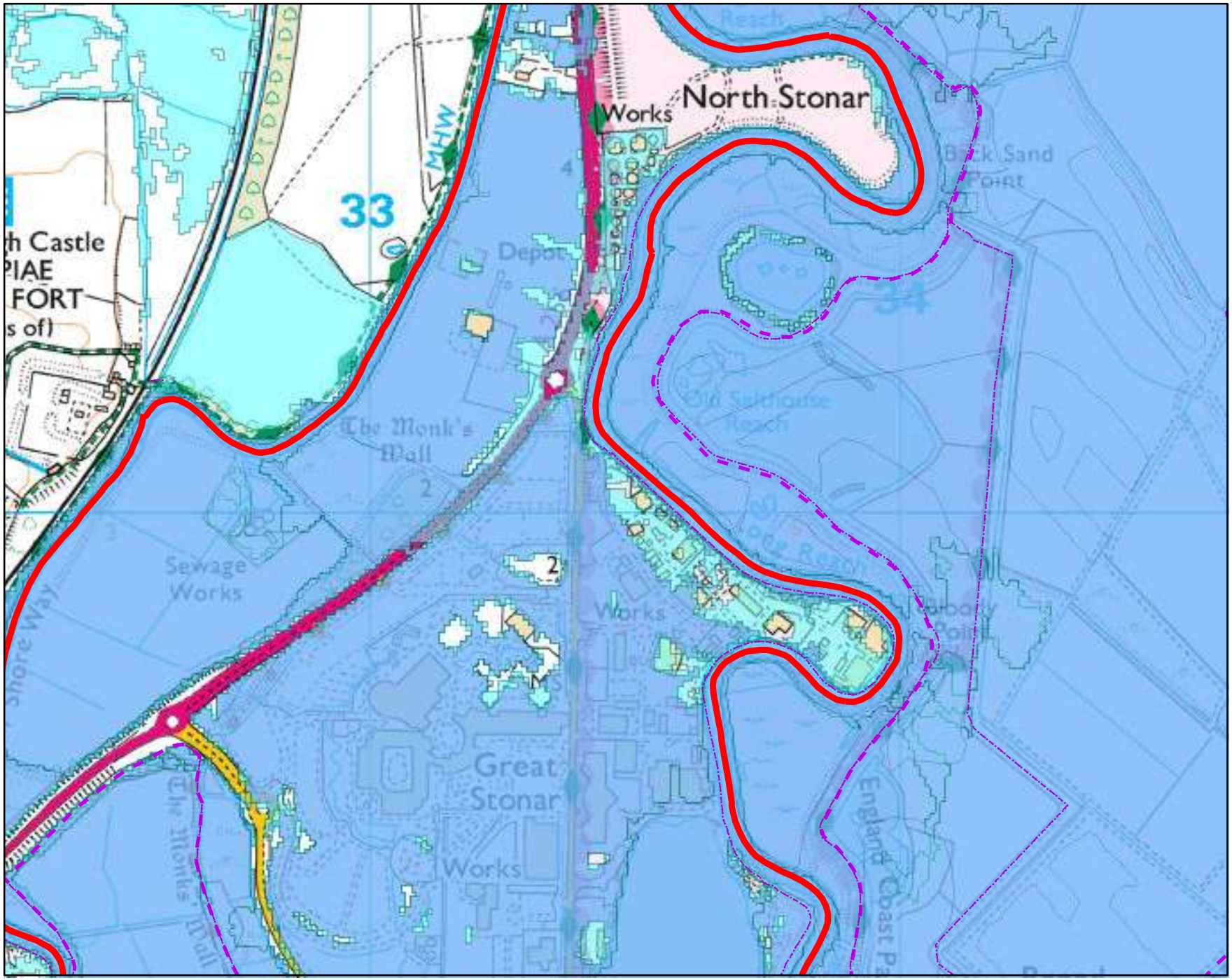
Enclosed is an extract of our Flood Map which shows this information for your area.

Method of production

The Flood Map at this location has been derived using detailed tidal modelling of the East Kent Coast, completed by JBA Consulting in 2018. The Flood Zones produced by this model are made up of the combined risk from the defended and undefended scenarios to capture the full risk from still water and wave overtopping.

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

Flood Map centred on Ramsgate Road, CT13 9FP.
Created 25 August 2023 [REF KSL 323615 LMB]



Environment Agency

N

Legend

- Main River
- Flood Defences
- Flood Storage Areas
- Flood Zone 3
- Flood Zone 2

Scale 1:10,000

0 250 500

Metres

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Model Output Data

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

A 2D TuFLOW model has been used to represent the floodplain as a grid. The flood water levels and/or depths have been calculated for each grid cell. The modelled flood levels / depths presented here are 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 any specific health warnings for their use are set out below.

A map showing the location of the points from which the data is taken is enclosed. Please refer to the Open Government Licence which explains the permitted use of this information.

East Kent Coast tidal mapping and data

Coastal flood boundary data set

The extreme sea levels used in the model were derived from the 'Coastal flood boundary conditions for UK mainland and islands' (*Defra; SEPA; The Scottish Government; Environment Agency,* 2011.)

Model limitations

The flood inundation model has not considered infiltration losses into the ground. Additionally, no surface water drainage systems or sewer networks are included in the model. All wave overtopping calculations assume a static beach profile.

Undefended outputs

The undefended model scenarios are still water only and did not include any inflow boundaries for wave overtopping.

Climate change

The 0.5% AEP climate change scenarios projected to 2070 and 2115 were modelled using National Planning Policy Framework (NPPF) 2016 guidance. The increases in sea level are shown in the table below.

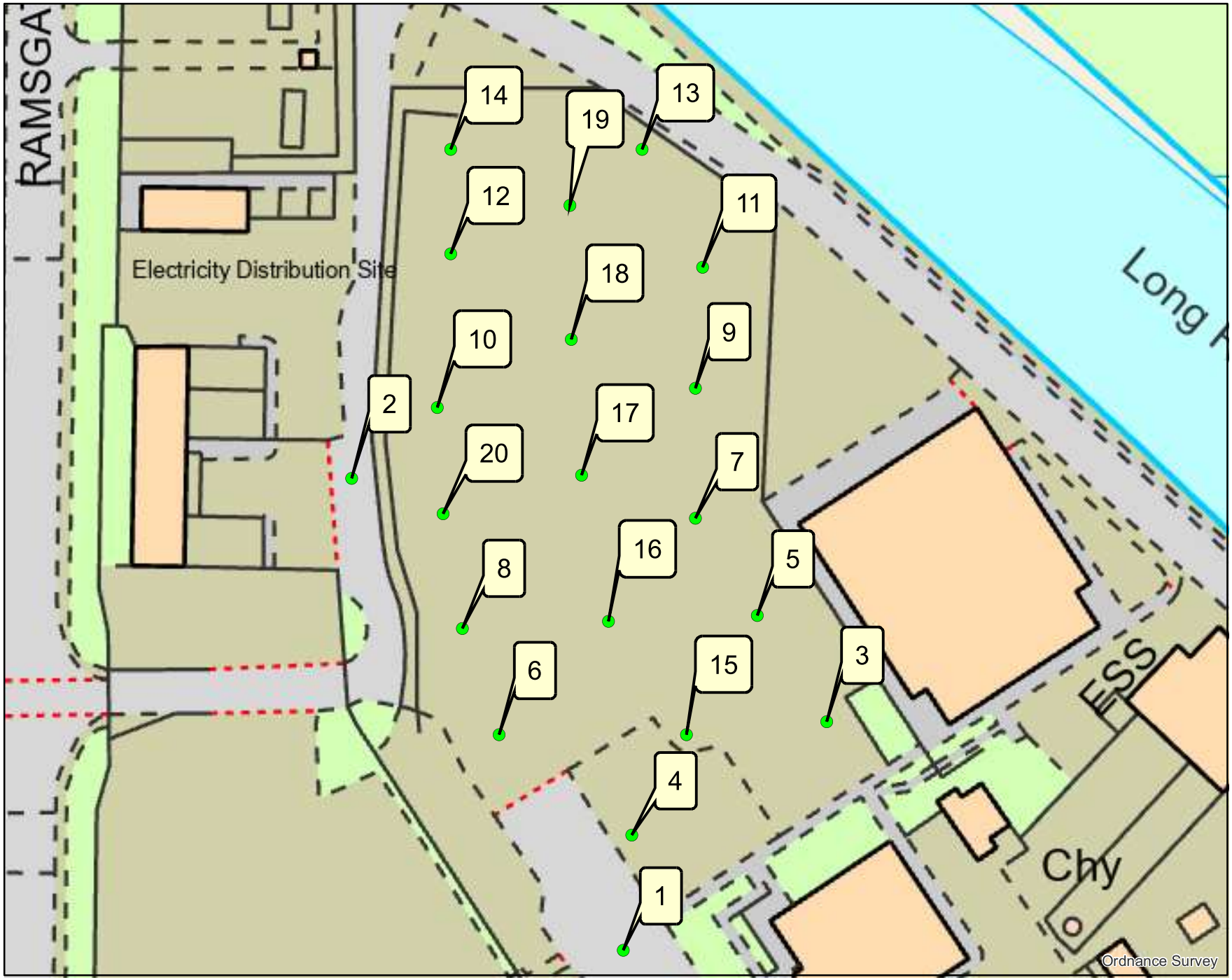
NPPF sea level rise (SLR) estimates, metres per year (2008 base year)

Guidance	SLR projected to 2070	SLR projected to 2115
NPPF	**0.521**	**1.166**

In addition to sea level rise, the model applied an increase of 10% to both offshore wind speed and wave height for the 2070 and 2115 epochs. This is in line with NPPF 2016 guidance. Please note climate change allowances have been updated since this model was produced. Please refer to the following website for the latest guidance: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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

Data Points Map centred on Ramsgate Road, CT13 9FP.
Created 25 August 2023 [REF KSL 323615 LMB]



Environment Agency

N

Legend

- Data Points

Scale 1:700

0 10 20

Metres

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Table 1: Modelled undefended tidal flood levels for Annual Exceedance Probability (AEP) events shown (mAOD)

Point ID	National Grid Reference		Modelled Tidal Flood Levels for Annual Exceedance Probability (AEP) events shown (metres AOD)									
			Undefended									
	Easting	Northing	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	0.5% AEP	0.1% AEP	0.5% AEP + CC (2070)	0.5% AEP + CC (2115)
1	633472	159970	0.00	0.00	3.02	3.09	3.26	3.40	3.67	4.05	4.22	5.30
2	633436	160033	0.00	0.00	0.00	0.00	3.26	3.40	3.67	4.05	4.22	5.30
3	633498	160000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.06	4.23	5.31
4	633473	159985	0.00	0.00	0.00	0.00	0.00	3.40	3.67	4.06	4.22	5.30
5	633489	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.06	4.23	5.30
6	633455	159999	0.00	0.00	0.00	3.09	3.26	3.40	3.67	4.05	4.22	5.30
7	633481	160027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.06	4.23	5.30
8	633450	160013	0.00	0.00	0.00	0.00	0.00	3.40	3.67	4.05	4.22	5.30
9	633481	160044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.30	5.30
10	633447	160042	0.00	0.00	0.00	0.00	0.00	3.40	3.67	4.05	4.22	5.30
11	633482	160060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.18	4.35	5.30
12	633449	160062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.05	4.21	5.30
13	633474	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.16	4.33	5.30
14	633449	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.04	4.20	5.30
15	633480	159999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.06	4.22	5.30
16	633470	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.06	4.22	5.30
17	633466	160033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.22	5.30
18	633465	160051	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.23	5.30
19	633465	160069	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.08	4.24	5.30
20	633448	160028	0.00	0.00	0.00	3.09	3.26	3.40	3.67	4.05	4.22	5.30

Data taken from the East Kent Coast Tidal Mapping Study, completed by JBA Consulting in 2018.

Climate change (CC) data represents modelled levels with an allowance for sea level rise for the years specified. In addition to sea level rise, the model applied an increase of 10% to both offshore wind speed and wave height for the 2070 and 2115 epochs. This is in line with 2016 NPPF guidance.

Values of 0.00 indicate locations at which the selected points lie outside of a particular modelled flood extent.

See Model Output Data section for health warnings and further information.

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

Table 2: Modelled defended tidal flood levels for Annual Exceedance Probability (AEP) events shown (mAOD)

Point ID	National Grid Reference		Modelled Tidal Flood Levels for Annual Exceedance Probability (AEP) events shown (metres AOD)									
			Defended									
	Easting	Northing	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	0.5% AEP	0.1% AEP	0.5% AEP + CC (2070)	0.5% AEP + CC (2115)
1	633472	159970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.85
2	633436	160033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
3	633498	160000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.87
4	633473	159985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
5	633489	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.86
6	633455	159999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
7	633481	160027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
8	633450	160013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83
9	633481	160044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.96
10	633447	160042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83
11	633482	160060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.97
12	633449	160062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
13	633474	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.85
14	633449	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.85
15	633480	159999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
16	633470	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
17	633466	160033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83
18	633465	160051	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84
19	633465	160069	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.85
20	633448	160028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83

Data taken from the East Kent Coast Tidal Mapping Study, completed by JBA Consulting in 2018.

Climate change (CC) data represents modelled levels with an allowance for sea level rise for the years specified. In addition to sea level rise, the model applied an increase of 10% to both offshore wind speed and wave height for the 2070 and 2115 epochs. This is in line with 2016 NPPF guidance.

Values of 0.00 indicate locations at which the selected points lie outside of a particular modelled flood extent.

See Model Output Data section for health warnings and further information.

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

Table 3: Modelled undefended tidal flood depths for Annual Exceedance Probability (AEP) events shown (m)

Point ID	National Grid Reference		Modelled Tidal Flood Depths for Annual Exceedance Probability (AEP) events shown (metres)									
			Undefended									
	Easting	Northing	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	0.5% AEP	0.1% AEP	0.5% AEP + CC (2070)	0.5% AEP + CC (2115)
1	633472	159970	0.00	0.00	0.06	0.13	0.31	0.44	0.71	1.10	1.26	2.34
2	633436	160033	0.00	0.00	0.00	0.00	0.19	0.33	0.60	0.98	1.15	2.23
3	633498	160000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.22	1.30
4	633473	159985	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.29	0.45	1.53
5	633489	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.30	1.38
6	633455	159999	0.00	0.00	0.00	0.05	0.22	0.35	0.62	1.01	1.18	2.25
7	633481	160027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.28	1.35
8	633450	160013	0.00	0.00	0.00	0.00	0.00	0.20	0.48	0.86	1.03	2.11
9	633481	160044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	1.09
10	633447	160042	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.08	0.19	1.27
11	633482	160060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.22	1.17
12	633449	160062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.71	1.80
13	633474	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.44	1.41
14	633449	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.49	1.59
15	633480	159999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	1.28
16	633470	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.29	1.37
17	633466	160033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	1.32
18	633465	160051	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	1.21
19	633465	160069	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.51	1.57
20	633448	160028	0.00	0.00	0.00	0.03	0.19	0.31	0.57	0.93	1.10	2.18

Data taken from the East Kent Coast Tidal Mapping Study, completed by JBA Consulting in 2018.

Climate change (CC) data represents modelled depths with an allowance for sea level rise for the years specified. In addition to sea level rise, the model applied an increase of 10% to both offshore wind speed and wave height for the 2070 and 2115 epochs. This is in line with 2016 NPPF guidance.

Values of 0.00 indicate locations at which the selected points lie outside of a particular modelled flood extent.

See Model Output Data section for health warnings and further information.

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Table 4: Modelled defended tidal flood depths for Annual Exceedance Probability (AEP) events shown (m)

Point ID	National Grid Reference		Modelled Tidal Flood Depths for Annual Exceedance Probability (AEP) events shown (metres)									
			Defended									
	Easting	Northing	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	0.5% AEP	0.1% AEP	0.5% AEP + CC (2070)	0.5% AEP + CC (2115)
1	633472	159970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.89
2	633436	160033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.77
3	633498	160000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86
4	633473	159985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06
5	633489	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93
6	633455	159999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80
7	633481	160027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89
8	633450	160013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64
9	633481	160044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74
10	633447	160042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81
11	633482	160060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84
12	633449	160062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34
13	633474	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96
14	633449	160076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.14
15	633480	159999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
16	633470	160014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
17	633466	160033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
18	633465	160051	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75
19	633465	160069	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.12
20	633448	160028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71

Data taken from the East Kent Coast Tidal Mapping Study, completed by JBA Consulting in 2018.

Climate change (CC) data represents modelled depths with an allowance for sea level rise for the years specified. In addition to sea level rise, the model applied an increase of 10% to both offshore wind speed and wave height for the 2070 and 2115 epochs. This is in line with 2016 NPPF guidance.

Values of 0.00 indicate locations at which the selected points lie outside of a particular modelled flood extent.

See Model Output Data section for health warnings and further information.

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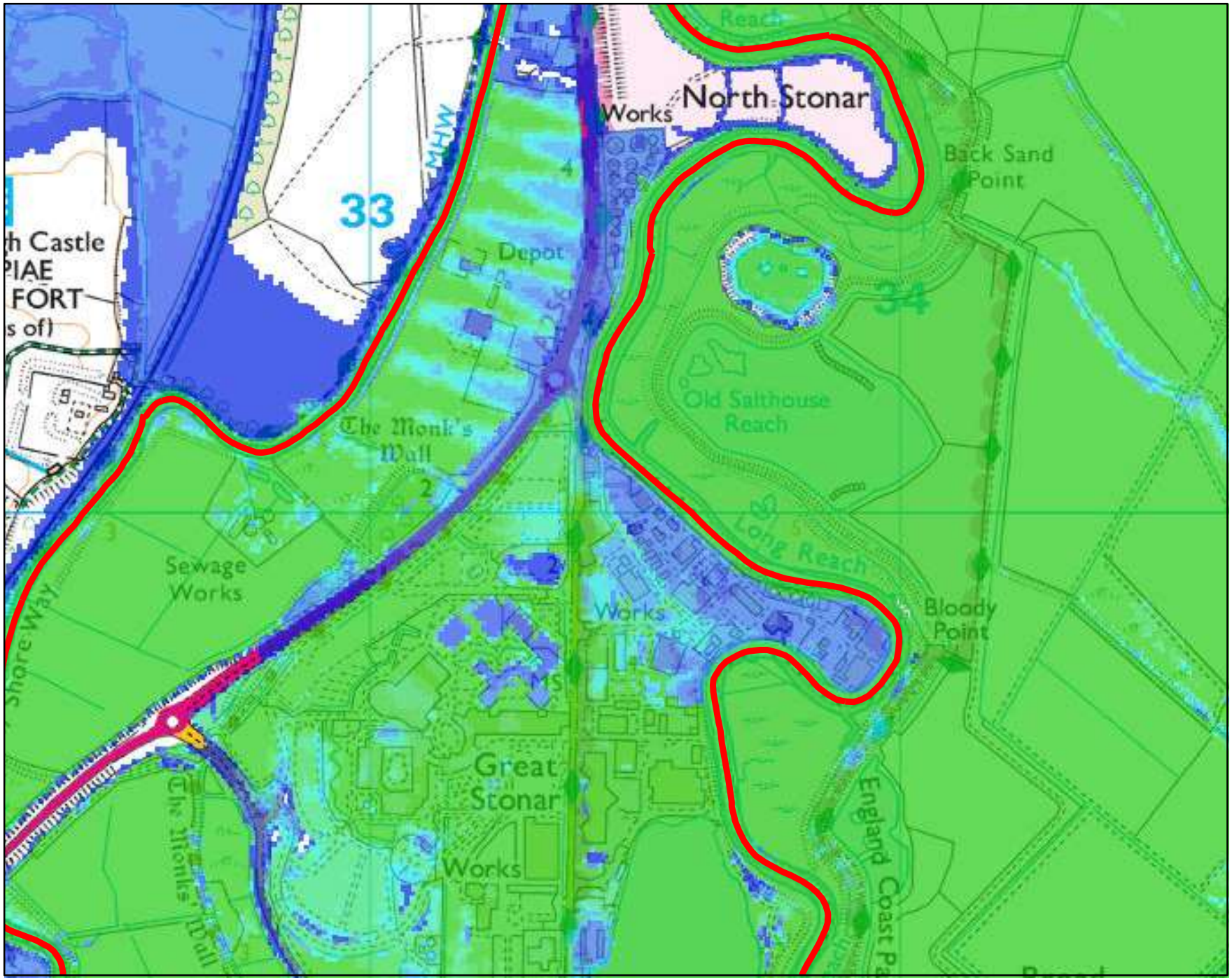
Undefended Tidal Flood Extents Map centred on Ramsgate Road, CT13 9FP.
Created 25 August 2023 [REF KSL 323615 LMB]



Environment Agency

N

Legend

Main River

Combined undefended tidal flood extents

Undefended Tidal Flood Extents

- 20% AEP
- 10% AEP
- 5% AEP
- 3.33% AEP
- 2% AEP
- 1.33% AEP
- 0.5% AEP
- 0.1% AEP
- 0.5% AEP + CC (2070)
- 0.5% AEP + CC (2115)

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

Climate Change (CC) extents based on modelled flood extents with an allowance for sea level rise, for the years specified.

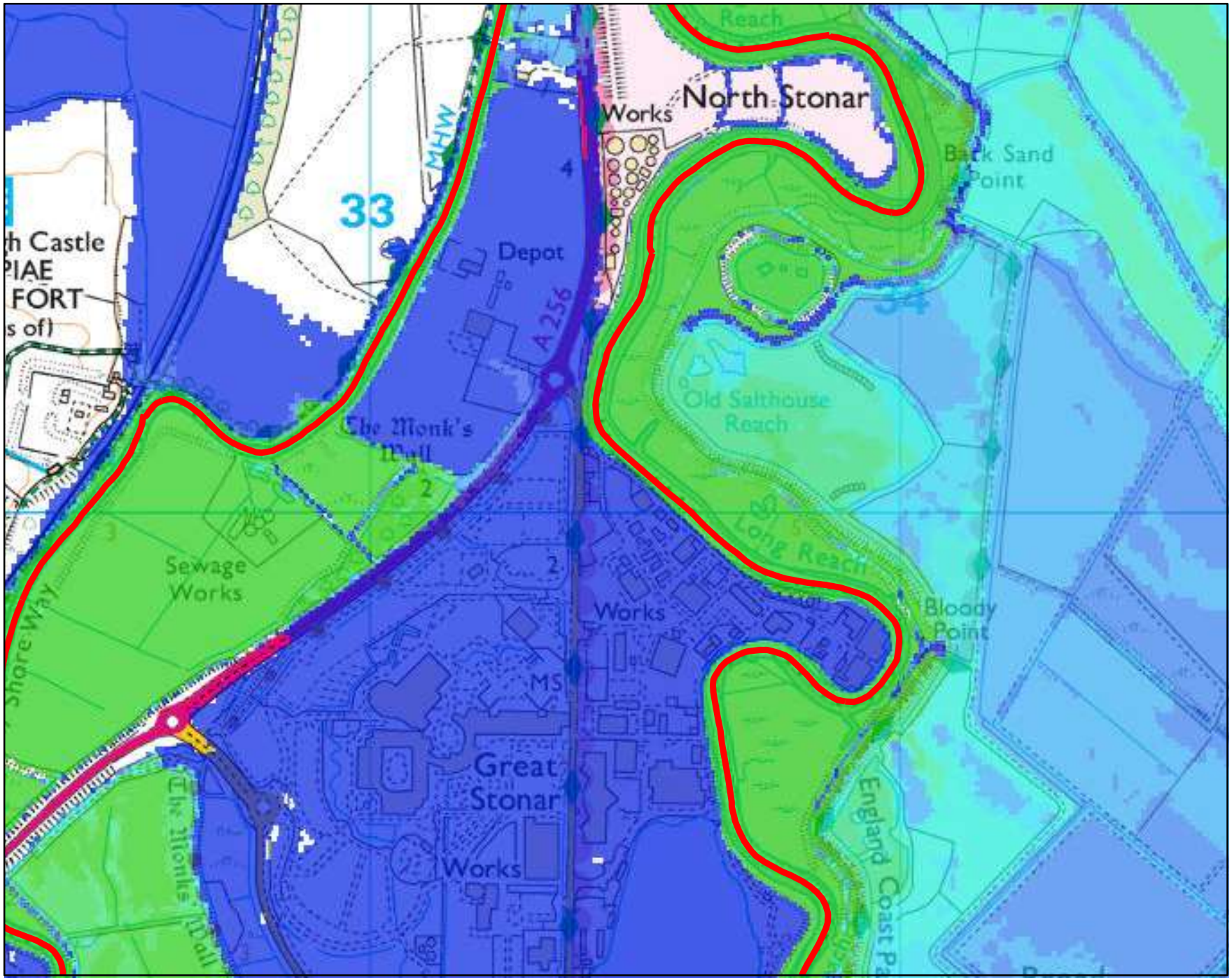
Scale 1:10,000

0 250 500

Metres

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defended Tidal Flood Extents Map centred on Ramsgate Road, CT13 9FP.
Created 25 August 2023 [REF KSL 323615 LMB]



Environment Agency

N

Legend

- Main River

Combined defended tidal flood extents

Defended Tidal Flood Extents

- 20% AEP
- 10% AEP
- 5% AEP
- 3.33% AEP
- 2% AEP
- 1.33% AEP
- 0.5% AEP
- 0.1% AEP
- 0.5% AEP + CC (2070)
- 0.5% AEP + CC (2115)

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

Climate Change (CC) extents based on modelled flood extents with an allowance for sea level rise, for the years specified.

Scale 1:10,000

0 250 500

Metres

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defence Details

Sandwich Bay Estate to Stonar Cut

The coastline between the Sandwich Bay Estate and Shell Ness is characterised by a sandy beach backed by an extensive dune system. The ground levels of the dune system provide protection from flooding for the land behind the dunes.

Stonar Cut and Back Sand Point

The right bank as far as Back Sand Point is included in Reaches 8-11 of the Sandwich scheme and forms part of the Broad Salts Spillway. There is an old embankment which is privately owned on the left bank.

Sandwich

Following the Pegwell Bay to Kingsdown Coastal Defence Strategy (2008), the Environment Agency developed a flood defence scheme to provide a 1 in 200 year standard of protection to 488 homes and 94 commercial properties in Sandwich. The scheme will also protect other key assets including Discovery Park, valuable infrastructure such as the main coastal access routes and key tourist and employment areas.
The Sandwich Town Tidal Defence Scheme consists of 16 sections of defence around the River Stour. The works included:

- a new tidal flood storage area outside of the town at Broadsalts;
- 14km of flood walls and embankments of varying heights (between 0.5m and 1.2m in town) on both banks of the River Stour;
- a 1m high flood wall at Sandwich Quay.

There are no formal flood defences owned or maintained by the Environment Agency in the area of this site/ property.

Areas Benefiting from Flood Defences

The Environment Agency has taken the decision to retire this dataset and remove it from the Flood Map for Planning portal. This is because we have determined that it no longer meets the customer needs and creates a false sense of security for users.

To understand the long-term risk of flooding to an area, you can use the Check Your Long Term Flood Risk portal: this will provide an understanding of flood risk from rivers and sea, taking into account the presence and condition of defences, and other sources of flood risk such as from surface water and reservoirs.

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Email: ksle@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 below and in the enclosed map

Dates of historic flood events in this area – February 1953, January 1978, February 2001 and November 2000.

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.

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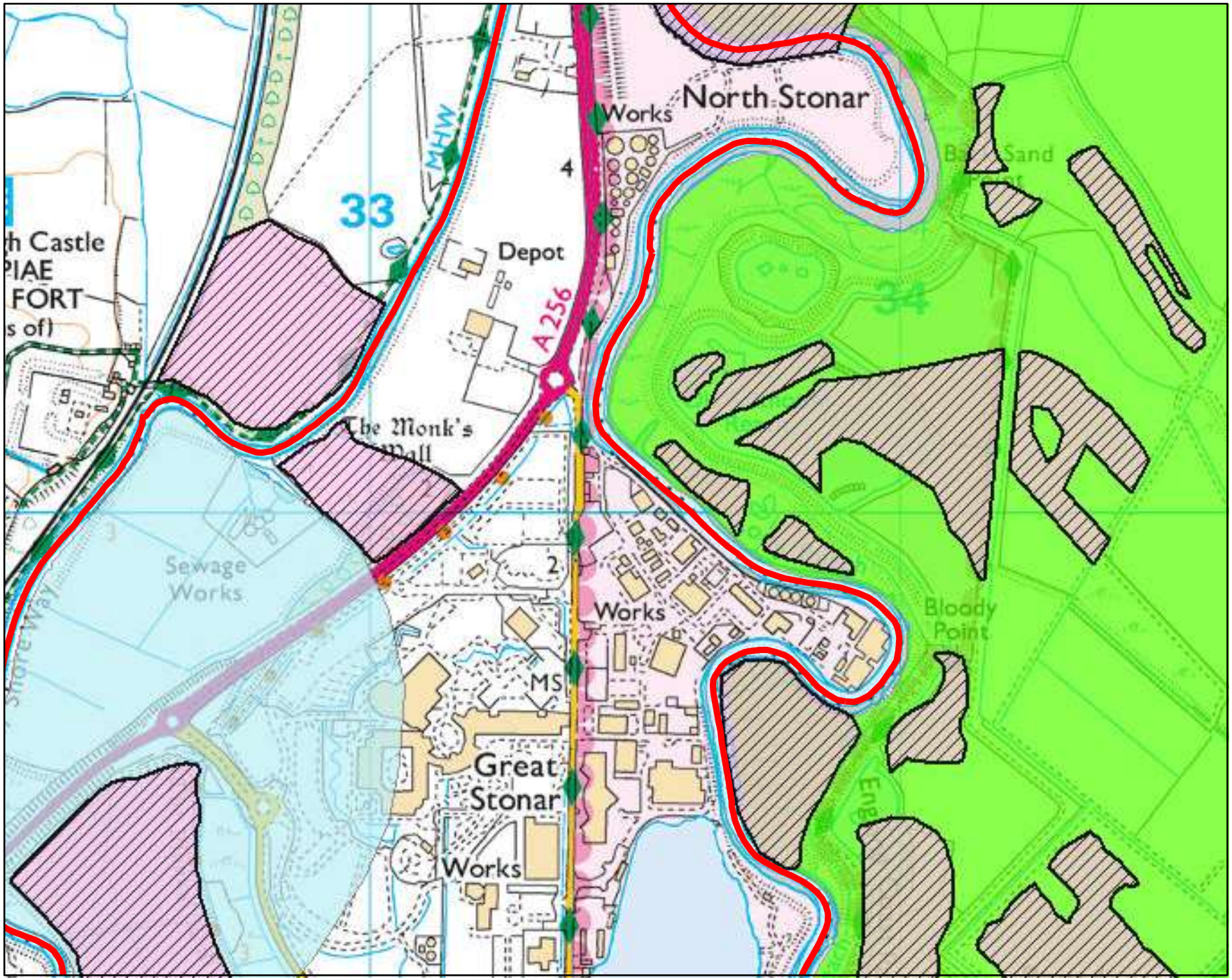
Historic Flood Extents Map centred on Ramsgate Road, CT13 9FP.
Created 25 August 2023 [REF KSL 323615 LMB]



Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Additional Information

Information Warning - OS background mapping

The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.

Planning advice and guidance

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Complete the form in the link and email back to kslplanning@environment-agency.gov.uk.

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

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Flood Risk Assessments Guidance

Flood risk standing advice for applicants

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

https://www.gov.uk/flood-risk-assessment-standing-advice

http://planningguidance.planningportal.gov.uk/

https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

https://www.gov.uk/guidance/flood-risk-and-coastal-change

You should also consult the Strategic Flood Risk Assessment and flood risk local plan policies 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 Assessment 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. You should discuss surface water management with your Lead Local Flood Authority.
3. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection due to insufficient information

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Email: ksle@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 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.

Your Lead Local Flood Authority 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.

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Email: ksle@environment-agency.gov.uk

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