

Swale Borough Council Level 2 Strategic Flood Risk Assessment

Draft Report

November 2020

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Swale Borough Council



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This report describes work commissioned by Anna Stonor of Swale Borough Council, by an email dated 22 September 2020. Ffion Wilson, Peter Rook, Kate Fairfield and Alastair Dale of JBA Consulting carried out this work.

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Purpose

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- Swale Borough Council
- Kent County Council
- The Environment Agency
- Medway Internal Drainage Board
- Southern Water

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Executive summary

Introduction

The study area for this Strategic Flood Risk Assessment (SFRA) is the Swale Borough Council's authoritative area. This 2020 SFRA document supersedes the previous Swale Borough Council 2009 Level 1 and 2 SFRA and the Faversham Creek SFRA 2010 Amendment.

The primary purpose of the Level 2 SFRA is to provide an appropriate understanding of the level of actual risk affecting development included in the Local Plan Review. The assessment takes into account all sources of flooding and considers other factors affecting flood risk such as residual risk along with the potential implications from asset failure. The information provided as part of the Level 2 SFRA enables Swale Borough Council to apply the exception test to sites in accordance with the National Planning Policy Framework.

This report should be used alongside the Level 1 SFRA published for the borough in 2020, which identifies flood risk across the Local Plan area and reviews both flood risk and planning policy throughout the borough.

Hydraulic modelling

Following the recommendations made in the Level 1 SFRA, existing hydraulic models were updated in the Local Plan area to better understand how flood risk to individual sites in the Local Plan area may change due to the impacts of climate change. Climate change uplifts were applied to the North Kent Coast tidal model and the Scrapsgate Lane fluvial model, based on new allowances published by the Environment Agency based on the UKCP18 projections.

JBA previously produced climate change mapping based on the national scale Risk of Flooding from Surface Water (RoFSW) mapping, these were used alongside the climate change mapping from the revised modelling to understand future flood risk to sites in the Local Plan area.

Site specific assessments

The high-level screening exercise undertaken as part of the Level 1 SFRA identified flood risk to 348 sites across the Local Plan area. Following this, nine priority sites were identified by Swale Borough Council as requiring a Level 2 site assessment. These were assessed using best practice and the best available data with the full set of recommendations and site-specific mapping available in Appendix A.

Many of these sites were highly constrained, with multiple types of flooding in addition to residual risk from defences to consider, particularly with sites located on the Isle of Sheppey which are also considered to be very sensitive to the impacts of climate change on tidal flood risk. A detailed breakdown of flood risk along with recommendations for the measures that must be considered to make these sites safe, has been provided within the site summary tables.

At the time of finalising the draft Level 2 SFRA, it is understood that the only site to **be taken forward as part of the Local Plan process will be 'Land at The Port of Sheerness, Rushenden Road'**. However, a list of key recommendations for development has been provided on a Plan wide basis for all of the sites considered, should they be taken forward at a later date.

Due to Covid-19 restrictions at the time of preparing this Level 2 SFRA, the Warden Bay fluvial model was unavailable from the Environment Agency. If the Seaview Park, Warden Bay Road site is to be taken forward at a later stage, then the Warden Bay

fluvial model should be re-run with the latest Environment Agency climate change allowances.

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Abbreviations

	Definition
AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
Defra	Department of the Environment, Food and Rural Affairs
FAA	Flood Alert Area
FRA	Flood Risk Assessment
FSA	Flood Storage Area
FWMA	Flood and Water Management Act
FWA	Flood Warning Area
FZ	Flood Zone
GI	Green Infrastructure
GIS	Geographic Information Service
GSPZ	Groundwater Source Protection Zone
JBA	Jeremy Benn Associates
KCC	Kent County Council
LLFA	Lead Local Flood Authority - Local Authority responsible for taking the lead on local flood risk management
LPA	Local Planning Authority
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
PFR	Property Flood Resilience
PPG	Planning Practice Guidance
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SBC	Swale Borough Council
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
SuDS	Sustainable Drainage Systems
TUFLOW	Two-dimensional Unsteady FLOW (a hydraulic model)
UKCP18	United Kingdom Climate Projections 2018
WFD	Water Framework Directive

1 Introduction

Swale Borough covers an area of approximately 370km² and has an estimated population of over 140,000. There are 40 Parish Councils in the Local Plan area. The largest settlement is the town of Sittingbourne, with a population of over 49,000. Other sizeable towns include Faversham, Sheerness and Queenborough.

The study area is bound by the River Medway, the Thames Estuary and the North Sea to the north with many of the river networks and inlets being tidally influenced.

This Level 2 Strategic Flood Risk Assessment (SFRA) 2020 document should be used alongside the 2020 Level 1 SFRA for the borough, which identifies flood risk across the Local Plan area and reviews both flood risk and planning policy throughout the borough.

1.1 Levels of SFRA

The [Planning Practice Guidance](#) ¹ advocates a tiered approach to risk assessment and identifies two levels of SFRA. Level 1 should be completed first to understand whether a Level 2 assessment is required.

- 1 Level 1: where flooding is not a major issue and where development pressures are low. The assessment should be sufficiently detailed to allow application of the Sequential Test.
- 2 Level 2: where land outside Flood Zones 2 and 3 cannot appropriately accommodate all the necessary development creating the need to apply the **NPPF's Exception Test. In these circumstances the assessment should consider** the detailed nature of the flood characteristics within a Flood Zone and assessment of other sources of flooding.

This report fulfils the Level 2 SFRA requirements.

1.2 National Planning Policy and Guidance

The [Revised National Planning Policy Framework](#) ² was published in July 2018, and last updated in June 2019, replacing the previous version published in March 2012. The NPPF sets out Government's planning policies for England and how these are expected to be applied. The Framework is based on core principles of sustainability and forms the national policy framework in England, also accompanied by a number of Planning Practice Guidance (PPG) notes. It must be taken into account in the preparation of local plans and is a material consideration in planning decisions.

1.2.1 The Exception Test

It will not always be possible for all new development to be allocated on land that is not at risk from flooding. To further inform whether land should be allocated, or Planning Permission granted, a greater understanding of the scale and nature of the flood risks is required. In these instances, the Exception Test will be required.

The Exception Test should only be applied following the application of the Sequential Test. It applies in the following instances:

- More vulnerable in Flood Zone 3a
- Essential infrastructure in Flood Zone 3a or 3b
- Highly vulnerable in Flood Zone 2 (this is NOT permitted in Flood Zone 3a or 3b)

¹ Planning Practice Guidance (PPG) <https://www.gov.uk/guidance/flood-risk-and-coastal-change>. Accessed November 17 2020.

² National Planning Policy Framework: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>. Accessed November 17 2020

Exception Test

"The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:

a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b) 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.

Both elements of the exception test should be satisfied for development to be allocated or permitted."

(Revised National Planning Policy Framework, Section 14 paragraph 160 and 161)

1.3 Use of SFRA data

SFRAs are high level strategic documents and, as such, do not go into detail on an individual site-specific basis. This SFRA has been developed using the best available information, supplied at the time of preparation. This relates both to the current risk of flooding from rivers, the sea and surface water and where available the potential effects of future climate change.

Climate change modelling has utilised the most recent climate change allowances published by the Environment Agency.

Other datasets used to inform this SFRA may also be periodically updated and following the publication of this SFRA, new information on flood risk may be provided by Risk Management Authorities.

2 Hydraulic Modelling

2.1 Climate Change allowances

Following the publication of the UKCP18³ climate change allowances and following the recommendations made in the Level 1 SFRA, existing hydraulic models were updated in the Local Plan area to incorporate these new allowances and to provide an assessment of site specific flood risk using the best available data.

Climate change allowances⁴ for peak river flow, sea level rise and rainfall intensity have been applied to fluvial, tidal and surface water models respectively to better understand the impacts of climate change on flood risk throughout the Local Plan area.

2.2 North Kent Coast model

The Environment Agency's tidal flood risk mapping model for the River Medway and Swale Estuary finalised in 2018, referred to as the "North Kent Coast Domain 2 model", was used to prepare updated flood risk mapping outputs presented in the SFRA. Both with-defence (defended) and without-defence (undefended) scenarios were completed.

The model geometry, which includes elevations of the land and flood risk management defences, was retained from the 2018 modelling. However, the model was simulated with updated tidal (water level vs time) and wave-overtopping (flow vs time) boundary inputs. Tidal boundaries represent the rise and fall of water levels, which include both astronomical and surge components. Wave overtopping boundaries represent the additional inputs of water expected from waves interacting the frontage of defences and/or land.

For the present-day predictions of flood risk, events simulated were those with a 5%, 0.5% and 0.1% Annual Exceedance Probability (AEP), which are aligned with Flood Zones 3b, 3a and 2 respectively. The tidal boundaries were updated to the year 2020 (present day) using the Coastal Flood Boundary Extreme Sea Levels (2018) dataset, which is an update from the 2011 data used to inform the 2018 modelling.

Additionally, the 0.5% AEP event (Flood Zone 3a) was simulated for the future years 2080 and 2120, for both the Higher central and Upper end sea level rise estimates for the South east of England. This guidance is derived from UK Climate Projections 2018 (UKCP18) data and presented in the guidance for climate change allowance in flood risk assessments (link: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>).

Wave-overtopping boundaries were prepared for the same events using the existing model setup and methodology, but are only applied to defended case modelling. For undefended modelling scenarios, wave overtopping inputs are not applicable as the tidal water level inputs flood over the location of the land that is raised in the defended scenario.

2.3 Scrapsgate Drain model

The Environment Agency's Scrapsgate Drain (fluvial) 2016 Flood Modeller TUFLOW model covers an area west of Minster and to the south east of Sheerness. To better understand the impacts of climate change on the Local Plan area, this has been updated with the latest climate change allowances for peak river flow in the Thames river basin district.

Allowances for the '2080s' epoch (2070-2115) for the upper end (70%), higher central (35%) and central (25%) applied to the baseline modelling.

³ UK climate projections: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index> (accessed November 2020)

⁴ Flood risk assessments: climate change allowances: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> (accessed November 2020)

Table 2-1: Peak river flow allowances used to update the Scrapsgate Drain model for climate change

	Peak river flow allowances in the Thames river basin district		
	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
H++	25%	40%	80%
Upper End	25%	35%	70%
Higher Central	15%	25%	35%
Central	10%	15%	25%

2.4 Warden Bay model

At the time of finalising the Level 2 SFRA, it is understood that the only site to be taken **forward as part of the Local Plan process will be 'Land at The Port of Sheerness, Rushenden Road'**.

Due to Covid-19 restrictions at the time of preparing this Level 2 SFRA, the Warden Bay fluvial model was unavailable from the Environment Agency. If the Seaview Park, Warden Bay Road site is to be taken forward at a later stage, then the Warden Bay fluvial model should be re-run with the latest Environment Agency climate change allowances. For the purposes of this Level 2 SFRA, the 1% AEP plus 35% and 60% climate change allowances have been assessed.

2.5 Surface water

Climate change uplifts for rainfall intensity have been applied on a regional basis to the national scale Risk of Flooding from Surface Water (RoFSW) mapping to consider the future impacts of climate change on surface water flood risk in the Local Plan area. Climate change uplifts for the 2080s (2070-2115) of 20% (central) and 40% (upper end) have been applied to the present day 1% AEP event. This has been used to inform the sensitivity of sites in the Level 2 SFRA to the impacts of climate change on surface water flood risk.

3 Level 2 sites assessment

3.1 Introduction

The primary purpose of the Level 2 SFRA is to provide an appropriate understanding of the level of actual risk affecting development included in the Local Plan Review. It should be noted that the actual risk is the predicted flooding including for the presence of the effect of flood defences and other flood risk management measures, whereas Flood Zones describe the risk without taking account of the effect of flood defences and flood risk management measures (where there are no flood defences or flood risk management measures the actual risk is the same as shown on the Flood Zones). Having understood the risk, the assessment identifies, as appropriate outline requirements for measures that can be adopted so development can be implemented safely and remain safe over the intended life without adversely affecting third parties or existing communities.

The Level 2 assessment provides an understanding of actual risk, and so in circumstances where there are existing flood risk management measures, it is important to understand the level of protection these afford and how the standard of protection changes over time as a consequence of climate change effects.

There are a number of formal flood and coastal defences present within the study area (see the Level 1 SFRA for further information). The flood risk at several potential sites identified within the Local Plan area could be influenced by the presence of these defences, particularly with sites located on the Isle of Sheppey. At these locations it will be important to understand the benefit that defences can have on reducing flooding, and consequences if their design standard is exceeded or they fail. Residual risk of these defences should be understood and managed. Maintenance arrangements, including funding mechanisms, for the defences will need to be evidenced for the lifetime of development.

If defences are identified as being required to protect a development site, it will need to be demonstrated that they will not have a resulting negative impact on flood risk elsewhere, that there is no net loss in floodplain storage and that they can be appropriately managed and maintained for the lifetime of development. In some circumstances it will be a requirement to demonstrate that there is an appropriate level of commitment to the maintenance of the standard of protection afforded by existing defences, where reliance is placed on the standard they provide.

There are also locations where the risk of flooding from surface water and groundwater must be evaluated, together with the commitment to measures that maintain the safety of development over the intended life. The Level 2 assessment also provides further information on flood depths, extent of flooding, flood velocities and flood hazard for the present-day situation as well as flood extents for climate change conditions, allowing the change over the lifetime of proposed development to be understood.

At some sites that are partially affected by flood risk it is possible that development can be safely implemented in accordance with policy and guidance by adopting a sequential approach so that open space and low risk areas of a site are the same locations as affected by flood risk.

The focus of the Level 2 assessment is to provide evidence to support planning decisions about the design and location of any development. The principles and approach adopted for the assessment should also be applied to windfall sites (proposed development not included in the plan), particularly with respect to providing evidence within Flood Risk Assessments (FRAs) that flood risk will be appropriately managed over the life of proposed new development.

In Swale Borough, not all development can be allocated outside of flood risk areas. Therefore, a Level 2 SFRA was required in addition to the Level 1 assessment.

3.2 Site assessment criteria

Sites were provided by Swale Borough Council for assessment in the Level 1 SFRA. In the Level 1 assessment, a site screening of 348 sites provided by Swale Borough Council was conducted. Details of this can be found in Table 14-1 and Appendix K of the Level 1 SFRA.

Following the Level 1 assessment analysis, Swale Borough Council identified nine priority sites that were put forward for a site assessment as part of the Level 2 SFRA. These sites were originally identified in the 2020 [Strategic Housing and Land Availability Assessment](#)⁵ (SHLAA) undertaken by Swale as the Local Planning Authority.

These sites were typically in highly constrained areas identified through the Level 1 SFRA and site screening as being at risk of flooding. Swale Borough Council confirmed that a detailed Flood Risk Assessment and a sequential approach to development should be undertaken at a site level for these sites. The justification for their inclusion in the Level 2 assessment are provided in Table 3-1.

⁵ Swale Borough Council Strategic Housing and Land Availability Assessment (2020): <https://services.swale.gov.uk/meetings/mgAi.aspx?ID=8571>

Table 3-1 Level 2 sites and reason for inclusion in the Level 2 assessment

Site Name	Reason for Level 2 Assessment
Land Rear of 66 Scrapsgate Road	Flood risk only significant constraint within SHLAA. 98% of the site within Flood Zone 3a and 2% of the site in Flood Zone 3b.
Neats Court, Queenborough Road	Flood risk only significant constraint in SHLAA. Outside the Queenborough Regeneration Area. 50% of the site in Flood Zone 3a and 41% of the site in Flood Zone 2.
Land at Queenborough Road	Flood risk only significant constraint within SHLAA. 100% of the site in Flood Zone 3a.
Land East of Abbey Farm	SHLAA assessed site as suitable. 8% of the site in Flood Zone 3a and 7% of the site in Flood Zone 2.
Seaview Park, Warden Bay Road	SHLAA assessed site as suitable. 14% of the site in Flood Zone 3a and 13% of the site in Flood Zone 2.
Land East of Queenborough	SHLAA assessed site as suitable. 4% of the site in Flood Zone 3a and 2% of the site in Flood Zone 2.
Land South and South-West of Iwade	SHLAA assessed site as suitable. 5% of the site in Flood Zone 3b, 1% of the site in Flood Zone 3a and 1% of the site in Flood Zone 2.
Land at Brett House, Bysing Wood Road	SHLAA assessed site as suitable. 26% of the site in Flood Zone 3b and 38% of the site in Flood Zone 3a.
Land at The Port of Sheerness, Rushenden Road	Due to exceptional regeneration opportunity on a large site. 3% of the site in Flood Zone 3b, 16% of the site in Flood Zone 3a and 81% of the site in Flood Zone 2.

At the time of finalising the Level 2 SFRA, it is understood that the only site to be taken forward as part of the Local Plan process will be 'Land at The Port of Sheerness, Rushenden Road'.

3.3 Site summary tables

As part of the Level 2 SFRA, detailed site summary tables have been prepared for each of the sites brought forward for the Level 2 analysis (Appendix A). Table 3-2 details the information set out in the summary tables. Additionally, each site summary table provides more detailed information on:

- the resolution and detail of the analysis used to assess the flood risk (more detailed data and higher resolution flood modelling has been prepared so appropriate evidence is available to consider the implications of satisfying the Exception Test);

- the severity and extent of actual flood risk across proposed sites;
- the site-specific flood risk assessment requirements; and
- the implications for the preparation of local policies to provide for sustainable developments as well as reducing flood risk to existing communities.

Table 3-2: Information content of the Level 2 site summary tables

Section	Information
Site details	OS Grid reference Area Current land use (greenfield or brownfield) Proposed site use Flood risk vulnerability Topography
Sources of flood risk	Existing watercourses Flood history Fluvial risk Surface water risk Groundwater risk Reservoir risk
Flood risk management infrastructure	Defences Residual risk
Emergency planning	Flood warning Access and egress
Climate Change	Modelled increases in flood extent compared to the 0.5% AEP tidal or 1% AEP fluvial, and the implications for the site. Modelled impact of climate change on surface water risk and the implications for the site.
Requirements for drainage control and impact mitigation	Bedrock geology Superficial Geology Soils Groundwater Source Protection Zone Historic Landfill Site Broadscale assessment of possible SuDS Cumulative impacts of development
Recommendations for Local Plan policy:	Sequential Test and Exception Test requirements Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers

3.4 Accompanying mapping

To accompany each site summary table, higher resolution flood mapping has been prepared. The mapping is intended to be read alongside the appropriate site summary table. Flood risk information on the higher resolution mapping includes:

- Site boundary

- Environment Agency Flood Zones 2, 3a and 3b (functional floodplain) - these are used to identify the requirements for a Flood Risk Assessment and to support the Sequential Test and Exception Test. Further details on these are provided in the Sequential Test and Exception Test requirements section of each site sheet.
- Modelled Fluvial 1% AEP plus 35% and 70% flood extents showing the predicted actual risk (if available) – these are used to consider the potential effects of climate change on development. The allowances selected are based on the type of development being assessed. The Environment Agency provide guidance on this through the [Flood risk assessments: climate change allowances⁶](#) webpage.
- Modelled Tidal 0.5% AEP 2095 and 2120 EPOCH Higher Central and Upper End flood extents (if available) - these are used to consider the potential effects of climate change on development. The allowances selected are based on the type of development. The Environment Agency provide guidance on this through the *Flood risk assessments: climate change allowances1* webpage.
- Modelled breach extents for the 0.5% AEP tidal flood event (if available) – a number of locations throughout the plan area have been modelled for tidal breach, where available this data has been used to consider residual risk to sites in the Level 2 SFRA.
- Modelled 1% AEP fluvial/0.5% tidal depth, velocity and hazard outputs (if available) – these are used to describe the site-specific risk of flooding including depth, velocity and hazard.
- Risk of Flooding from Surface Water 3.33%, 1% and 0.1% AEP flood extents – these are required to support the exception test. It is important that surface water management is considered and therefore the Risk of Flooding from Surface Water (RoFSW) dataset has been used to identify those sites which are potentially at risk of flood from surface water.
- Risk of Flooding from Surface Water 1% AEP depths and velocities – these are used to describe the site-specific risk of flooding from surface water including the depth and velocity.
- Risk of Flooding from Surface Water 1% AEP plus 20% and 40% climate change uplifts – these are used to show the potential risk of flooding from surface water, taking into account the potential future flood risk as a result of climate change.
- JBA Groundwater flood risk mapping displaying predicted groundwater levels from the surface during 1% AEP groundwater event – this dataset is used to identify areas at potential groundwater flood risk to support the assessment of flood risk from other sources.

4 Summary

4.1 Overview

This Level 2 SFRA delivers site specific guidance and recommendations for a number of sites considered as part of the Local Plan process throughout the borough. It should be used in conjunction with the Level 1 SFRA which delivers a strategic assessment of all

⁶ Environment Agency (2016) Flood risk assessments: climate change allowances, available at <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> [Accessed 10/06/2020]

sources of flooding in the Local Plan area. The study area comprises the administration area of Swale Borough Council.

4.2 Recommendations

It is our understanding that at the time of finalising the draft Level 2 SFRA, the only site **being taken forward as part of the Local Plan process is 'Land at The Port of Sheerness, Rushenden Road'**. However, a full list of site-specific recommendations can be found in Appendix A should they be taken forward at a later date.

In undertaking the site assessments, a number of key recommendations for development in the Local Plan area have been identified for further consideration:

- Residual risk to sites posed by failure of flood defences, including overtopping and breach should be considered in site-specific Flood Risk Assessments. Residual risk of these defences should be understood and managed. Maintenance arrangements, including funding mechanisms, for the defences will need to be evidenced for the lifetime of development.
- A number of sites not considered to be at risk of tidal flooding during the present day, may be at risk in the future due to the impacts of climate change. Development must consider the impacts of climate change throughout the projected lifetime of the development, considering the vulnerability of the proposed development. In addition to the effects of sea level rise on existing defences it is important that consideration be given to the performance and effectiveness of drainage systems with tidal outfalls.
- Climate change modelling may need to be undertaken at several sites using the appropriate allowances for the type of development and level of risk.
- Safe access and egress should be demonstrated in the tidal 0.5% and fluvial 1% AEP plus climate change events. Safe access and egress should also be demonstrated for breach, if appropriate relevant to the site.
- Where surface water flooding is identified as a significant constraint, consideration should be given to providing safe access and egress during surface water flood events.
- Proposals should consider the opportunity to include measures that provide for a reduction in predicted flood risk at existing development.
- Development should not increase flood risk off site to existing communities throughout the Local Plan area.
- Where appropriate consideration should be given to the adoption of a sequential approach to the placement of development on a site so that only low vulnerability proposals are located on land at risk from flooding.

Appendices

A Site summary sheets and mapping

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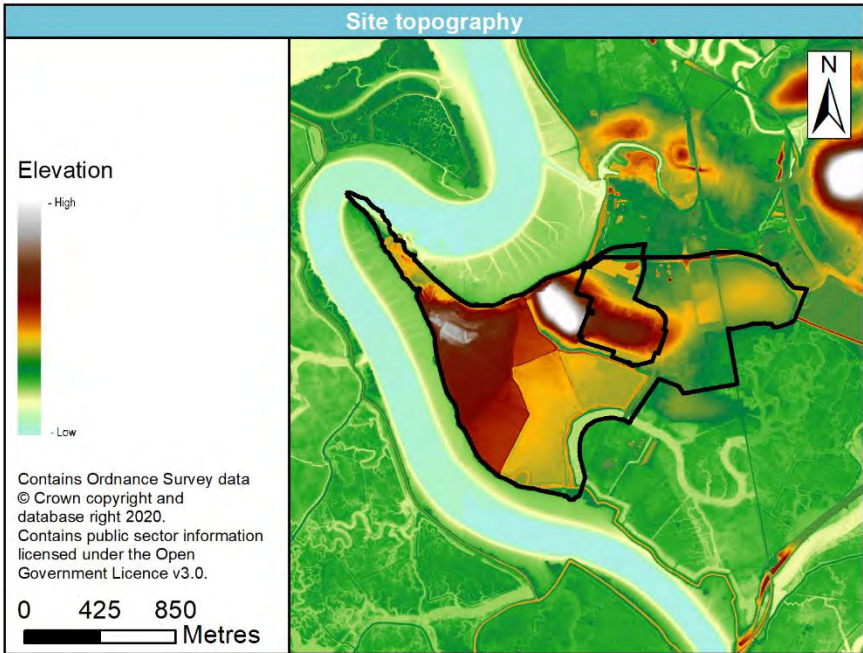
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Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

Site details	OS Grid reference	TQ 90760 71030
	Area (ha)	149.65
	Current land use	Dredging and industrial uses
	Proposed site use	Mixed
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #00a0c0; color: white; margin: 0;">Site topography</p>  <p style="font-size: small; margin: 5px 0;">Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</p> <p style="font-size: small; margin: 0;">0 425 850 Metres</p> </div> <ul style="list-style-type: none"> A significant part of the site forms a peninsula that is surrounded on most sides by the River Swale, this part of the site is used for mooring dredging vessels. The site surrounds the existing community of Rushenden, which is located on an area of high ground and is surrounded by the site boundary. There is an area of high ground north west of Rushenden that is currently undeveloped, this is approximately 10-12m AOD above surrounding ground levels and is within Flood Zone 1. The ground slope across the site generally has a gradient of less than 5%, however the site area is quite large and there are variations in topography within the site. The site is surrounded by the River Swale and a number of other watercourses, these are identified in the Environment Agency' 1m LIDAR DTM.

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

Sources of flood risk	Existing watercourses	<p>The site boundary is formed by the tidal reaches of the River Swale to the north, west and south of the site. Part of the eastern site boundary is formed from a large ordinary watercourse that is a Lower Medway Internal Drainage Board (LMIDB) asset.</p> <p>LIDAR and aerial photography indicates that there are a number of other watercourses, including drainage ditches within the site boundary towards the centre, south west and north east of the site. In some locations these appear to be culverted, as a result, residual risk due to blockages should be considered.</p> <p>Existing maintenance arrangements for these watercourses should be considered, the watercourse at the south east corner and to the north of the site are indicated to be adopted by the Lower Medway Internal Drainage Board and development should consider the Board's requirements as set out in their byelaws and whether any consents will be required.</p>		
	Flood history	<p>The site is entirely within the extent of the Environment Agency's recorded flood outlines dataset, this indicates that the majority of the site flooded in February 1953 as a result of the overtopping of defences. Areas of higher ground near the existing community of Rushenden were not within these historic flood extents.</p> <p>This dataset has been used to define Flood Zone 2 at this site, however it should be noted that changes in both sea level and ground levels since 1953 are likely to have resulted in a change to flood risk at this site, and the extent of Flood Zone 2 is not considered to be appropriate.</p>		
	Tidal	Proportion of the site at risk in the defended scenario		
		(proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	0.5% AEP	0.1% AEP
		2.70%	3.78%	4.82%
<p>Available modelled data:</p> <p>The site is covered by the Environment Agency North Kent Coast (Tidal) 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>Flood extents during the present day are relatively small and are primarily limited to the northern peninsula of the site and to a limited extent around the northern and southern boundaries of the site. The majority of this flooding is limited to a small fringe around the site with depths mostly limited to less than 1m with the exception of the northern peninsula and at the south east corner of the site where more significant flooding occurs</p>				
Surface Water	Proportion of site at risk (RoFSW)			
(proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)				
3.3% AEP	1% AEP	0.1% AEP		
0.64%	1.81%	8.32%		

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

		<p>Description of surface water flow paths:</p> <p>The topography of the site is very flat with minimal internal variations, as a result, surface water flood extents are relatively minimal, particularly for the western part of the site. However there are more indications of overland flow routes to the north of the site due to the steeper topography and existing development to the eastern side of the site. Overall, flood extents are very small during the 3.3% AEP and 1% AEP events. Extents are greater during the 0.1% AEP, however it should be noted that some of these areas correspond to existing water features such as ponds or existing ditches, as such these are unlikely to be representative of surface water flood risk to the site.</p> <p>The industrial site towards the east of the site is shown to be at the most significant risk of surface water flooding with surface water indicated to pool along Argent Road and the surrounding areas during the 3.33% AEP event with a significant increase in extent for the 1% and 0.1% AEP events.</p> <p>Overland flow routes along Sheet Glass Road and Thomsett Way are present during the 3.33% AEP event an</p> <p>RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.</p>		
	Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories		
		Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories
		0.00%	0.00%	0.00%
		<p>The site is not considered to be at risk of groundwater flooding, however as groundwater datasets are generally produced nationally it is recommended that ground investigations are carried out and reported on within a site-specific FRA where this is required (known to be a problem locally).</p>		
Reservoir	<p>The site is not considered to be at risk of flooding from reservoirs.</p>			

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

		Defence Type	Standard of Protection	Condition
		Flood risk management infrastructure	Defences	Tidal - Earth Embankment, Rushenden Hill
Tidal – high ground	1000			4
Raised tidal sea wall	1000			3
Steel sheet piling	150			3
Queenborough Creek Barrier	1000			2
Residual risk	Culvert / structure blockage?			There are a number of locations close to the site where watercourses appear to be culverted, as a result the residual risks from blockages should be considered as part of a site-specific FRA.
	Impounded water body failure?	There are no impounded waterbodies within the vicinity of the site.		
	Defence breach/overtopping?	Breach modelling was previously undertaken for the North Kent Coast model, One of the modelled breach locations includes the Queenborough Creek Barrier approximately 380m north of the site boundary. In the event of this asset failing during a 0.5% AEP event, substantial flood extents are indicated over the northern part of the site including Sheet Glass Road and Thomsett Way.		
Emergency planning	Flood warning	The site is covered by the 064WAC1ShepSwale Flood Alert Area and is within the 064FWC1Sheerness Flood Warning Area, which are in place to provide alerts and warnings for coastal flooding.		
	Access and egress	<p>It is uncertain that safe access and egress to and from the site is currently available. The entire site is located within Flood Zones 2 and 3 and is surrounded by watercourses, the extents of these indicate that there is a risk that the centre of the site could potentially become a 'dry island' cut off from emergency services in the event of flooding.</p> <p>The undefended model outputs for the 0.5% AEP (2115 epoch) climate change have been assessed as a 'worst case' scenario in the event of a breach. These indicate that safe refuge is available towards the centre of the site, however the flood extents are greater than in the defended scenario.</p> <p>Hazard ratings decrease closer to the centre of the site, with typical ratings considered of less than 1.5 which is 'danger to some'. Hazard rating increases towards the edges of the site, with values associated with a classification of 'danger for most' or 'danger for all'.</p> <p>The site is located adjacent to higher ground at Rushenden. Access to Rushenden is by the B2007 that then joins the A249.</p>		
		Proportion of site at 0.5% AEP tidal flood risk in the defended scenario		

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

	Climate Change allowances	Area	Present day	2080 Higher Central	2080 Upper End	2120 Higher Central	2120 Upper End	
		South East England	3.78%	16.79%	24.56%	60.25%	65.19%	
Climate Change	Implications for the site	<p>The site is shown to be very sensitive to the impacts of climate change in comparison to the present day, with significant increases in flood extents across the site for both the 2080 and 2120 epochs for both higher central and upper end allowances for climate change. Flooded areas of site also include the existing industrial estate along Argent Road with depths indicated to be in excess of 1m.</p> <p>The 2120 epoch shows the most significant increase in flood extent, with the majority of the eastern side of the site and a large proportion of the centre of the site indicated to be within these flood extents in addition to areas where there are existing dwelling in Rushenden. The centre of the site is not within these extents, however it is unclear whether safe access and egress would remain in the event of flooding and there is a risk that development could be cut off from surrounding infrastructure. A commitment would be required to the improvement in the standard of existing defences so that proposed development would be safe for its intended life.</p>						
	Impact of climate change on risk from surface water	Proportion of site at 1% AEP surface water flood risk						
		Present day	+20% rainfall uplift		+40% rainfall uplift			
		1.81%	2.86%		4.22%			
	Implications for the site	<p>Surface water flood extents are indicated to increase with uplifts of 20% and 40% for rainfall intensity applied to the present day 1% AEP event. These indicate that flood extents will increase due to the impacts of climate change with the most significant increase from the 40% uplift. However, these extents are less than the present day 0.1% AEP event and the site is not considered to be sensitive to surface water flooding.</p>						

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

Requirement for drainage control and impact mitigation	Bedrock Geology	The site is underlain by the London Clay Formation which is indicated to be comprised of clay and silt at the site.
	Superficial Geology	The entire site is underlain by superficial alluvium deposits, these are comprised of clay, silt, sand and peat.
	Soils	Loamy and clayey soils of coastal flats with naturally high groundwater
	Groundwater Source Protection Zone	The site is not within a groundwater Source Protection Zone.
	Historic Landfill Site	A large proportion of the western side of the site is within the Rushenden Marshes historic landfill site. The Rushenden historic landfill site is also present towards the north east corner of the site and is wholly contained within the site boundary.

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

	Broad scale assessment of possible SuDS	<p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development, including the effect on the performance of existing drainage outfalls under circumstances where climate change effects resulted in an increase to the mean sea levels.</p> <p>Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p> <p>BGS data indicates that the underlying geology is the London Clay Formation and the site is underlain by superficial alluvial deposits, as a result permeability is likely to be highly variable. Proposals to use infiltration should confirm that this is feasible through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.</p> <p>Surface water outfalls that discharge into the River Swale may be affected by tide locking due to water levels tidal influence on the River Swale. The impacts of tide locking will need to be considered in terms of the storage requirements of the site.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p>			
		Recommendations for Local Plan policy	Cumulative impacts of development	Sensitivity to cumulative impacts	
<p>The catchment is indicated to have a high sensitivity to cumulative impacts. However, the isolated location of this site makes it unlikely that it would be associated with flood risk issues that could give rise to cumulative effects.</p>					
Proportion of the site within each Flood Zone					
		Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
		10.07%	46.50%	40.78%	2.65%
Sequential Test and Exception Test requirements					

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

	<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p> <p>The Exception test will be required in the following scenario:</p> <ul style="list-style-type: none"> • highly vulnerable and in flood zone 2 • essential infrastructure in flood zone 3a or 3b • more vulnerable in flood zone 3a <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. <p>The available mapping shows that part of the site is within Flood Zone 3b where more vulnerable development is not permitted. However, the site area is quite large and it may be possible to adopt a sequential approach to the site layout with more vulnerable development located outside of Flood Zone 3a or 3b.</p>
	<p>Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers</p>
	<p>Flood risk assessment:</p> <ul style="list-style-type: none"> • At the planning application stage, a site-specific flood risk assessment will be required for this site as it is greater than 1 hectare in size, is located in Flood Zones 2 and 3, and the development is likely to introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in future. It will also be required where development: <ul style="list-style-type: none"> ○ Is on land which has been identified by the Environment Agency as having critical drainage problems. • Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. • The residual risk to the site posed by failure of flood defences, including overtopping and breach should be considered in a site-specific Flood Risk Assessment. Maintenance arrangements (including funding mechanisms) for the defences will need to be demonstrated for the lifetime of development. • Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of tidal flooding. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development. • Consideration should be given to the potential off-site impacts development may have on flood risk to the existing community of Rushenden. • Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. • Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. • Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. • Proposals will need to demonstrate that users will be safe and more vulnerable uses are located outside Flood Zone 3b. <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • New development must seek opportunities to reduce the overall level of flood risk to the site. For example by: <ul style="list-style-type: none"> ○ Reducing rates and volumes of runoff; ○ Relocating development to lower risk flood zones;

Site reference	SLA18/113
Site name	Land at The Port of Sheerness, Rushenden Road, Rushenden

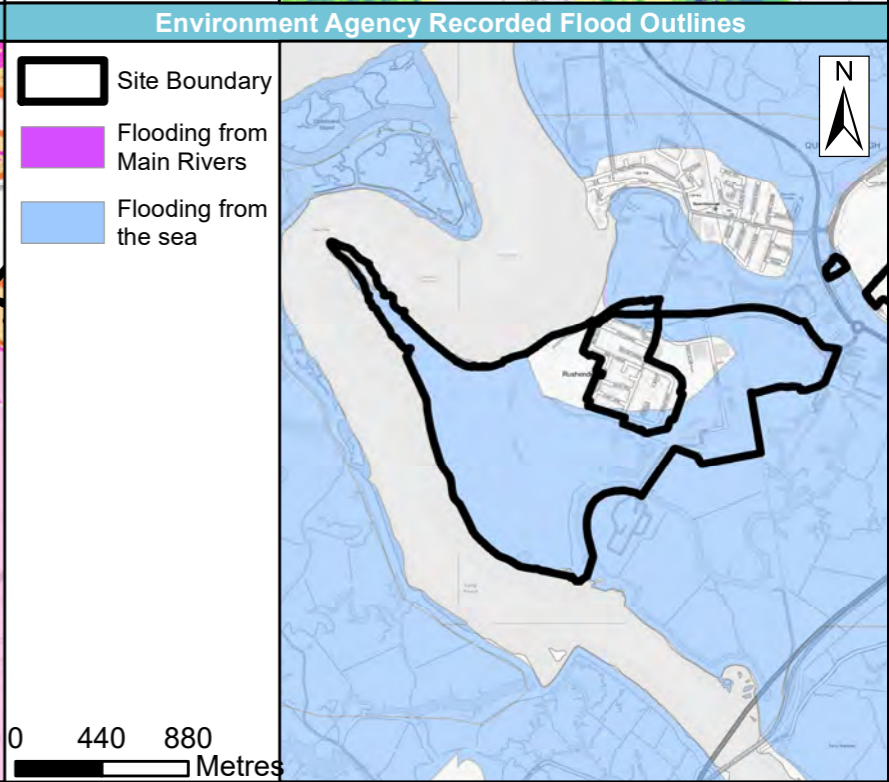
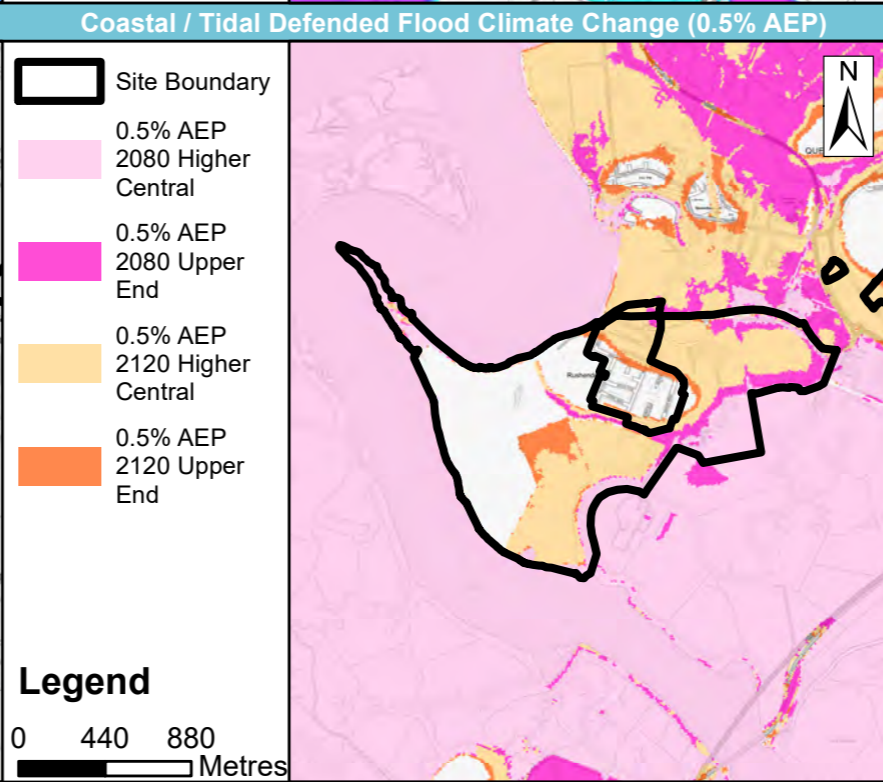
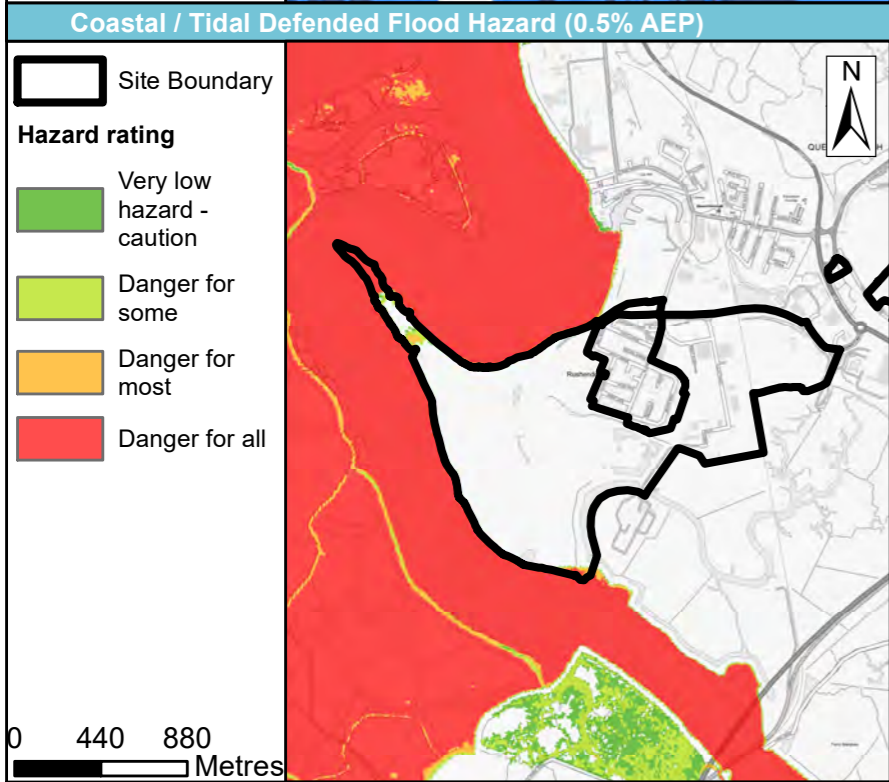
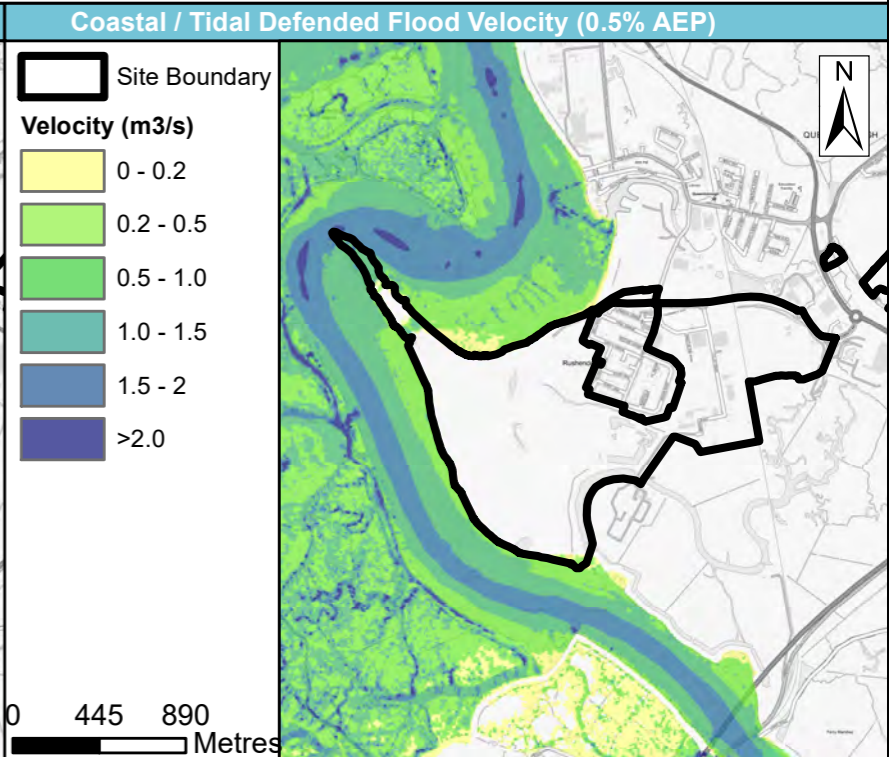
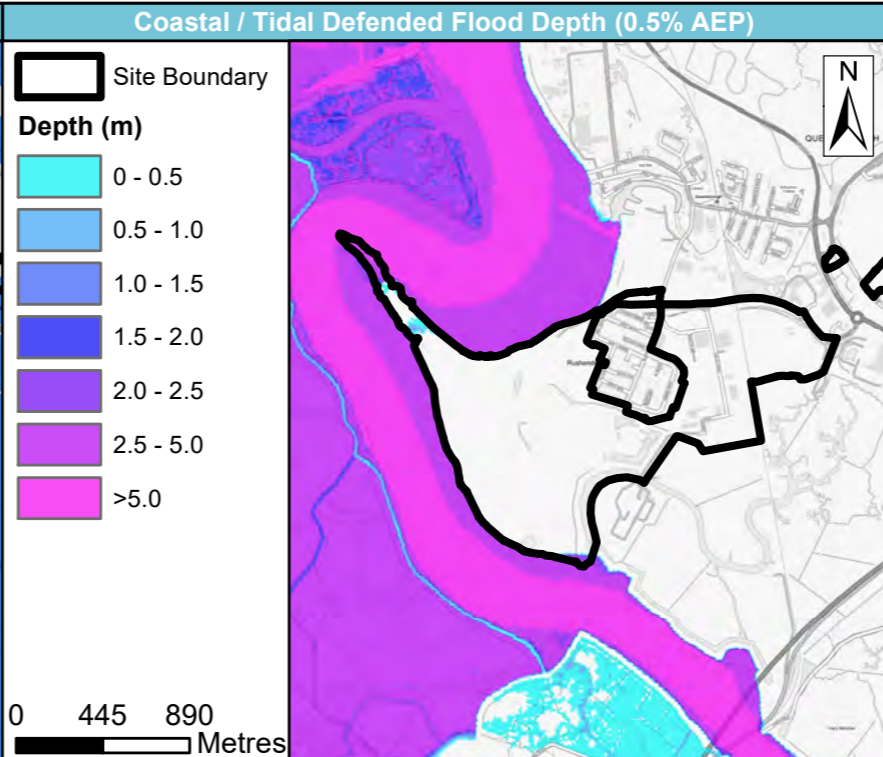
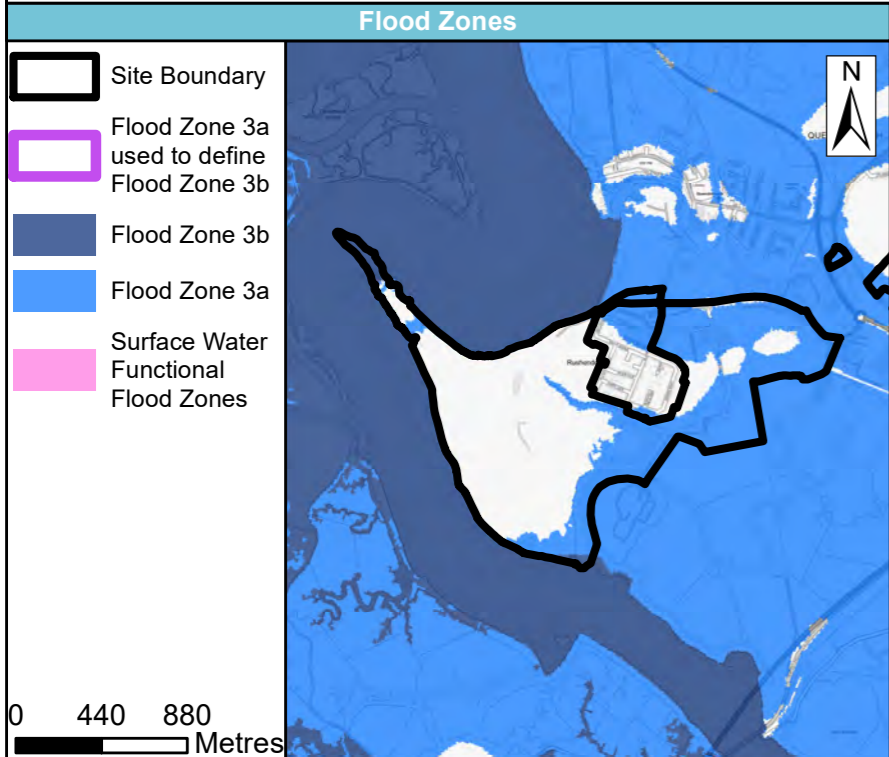
	<ul style="list-style-type: none"> ○ Creating space for flooding. • Safe access and egress should be demonstrated in the tidal 0.5% AEP plus climate change event and as there is a risk of surface water flooding on the site, consideration should also be given to providing safe access and egress during surface water flood events. The provisions should seek to improve the safety of the existing community in Rushenden. • The commitment required to strategic improvement of the standard of protection afforded by the existing defences should be addressed and appropriate arrangements established. • All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff. Consideration should be given to the predicted increase in mean sea levels on the performance of existing drainage systems and outfalls. • SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • A greenfield site such as this should be able to implement an exemplar surface water drainage scheme to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • Assessment of runoff should include allowances for climate change effects. Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk. • The site is within the Lower Medway Internal Drainage Board (IDB), if surface water discharge to an IDB watercourse (directly or indirectly) is proposed, this will be subject to additional consents or requirements as outlined in the Board's byelaws. • A number of IDB adopted watercourses are present within the site boundary, development must consider the Board's requirements during the design of the site and site layout. This includes surface water discharge consent in accordance with byelaw 3, and byelaw 10 which does not allow obstructions within 8m of the edge of the watercourse without prior consent from the Board. • SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best design practice (CIRIA C753 Manual 2015). • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name	Land at The Port of Sheerness, Rushenden Road
Site area (ha)	149.56

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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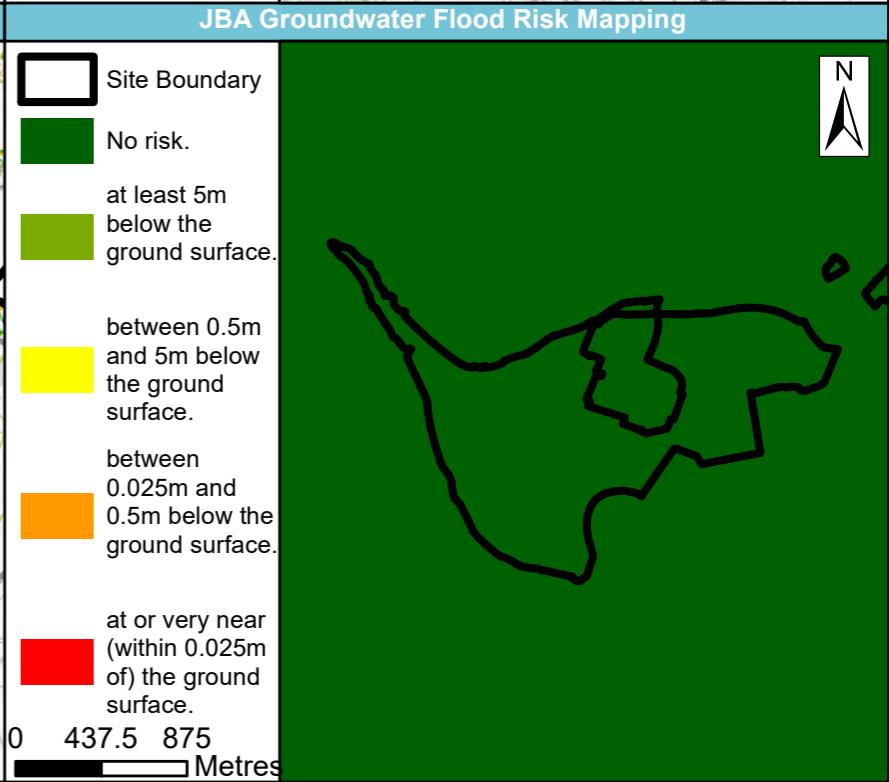
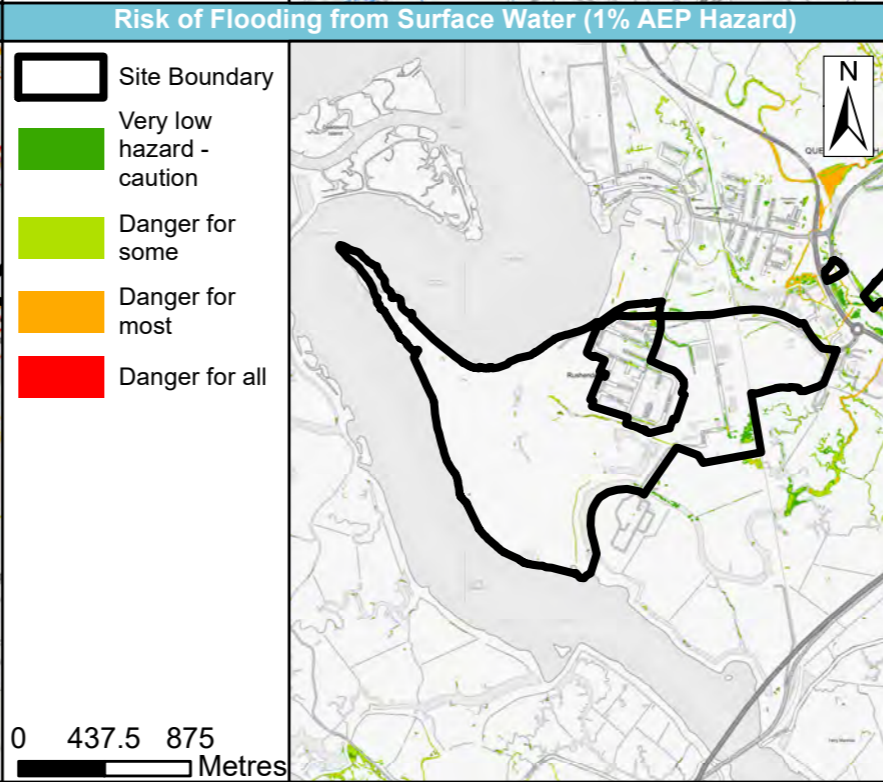
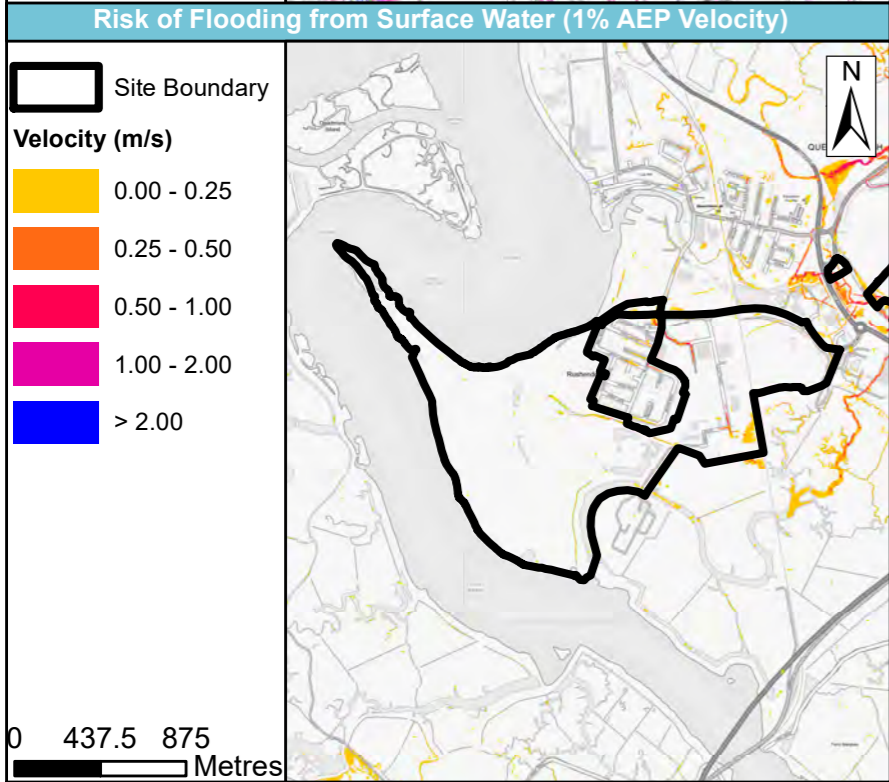
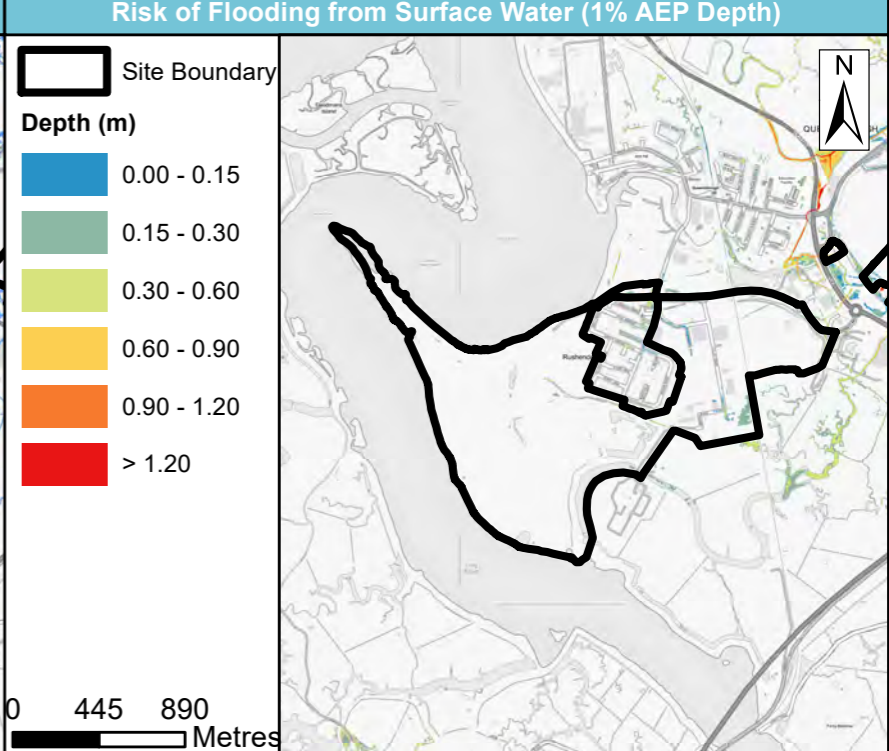
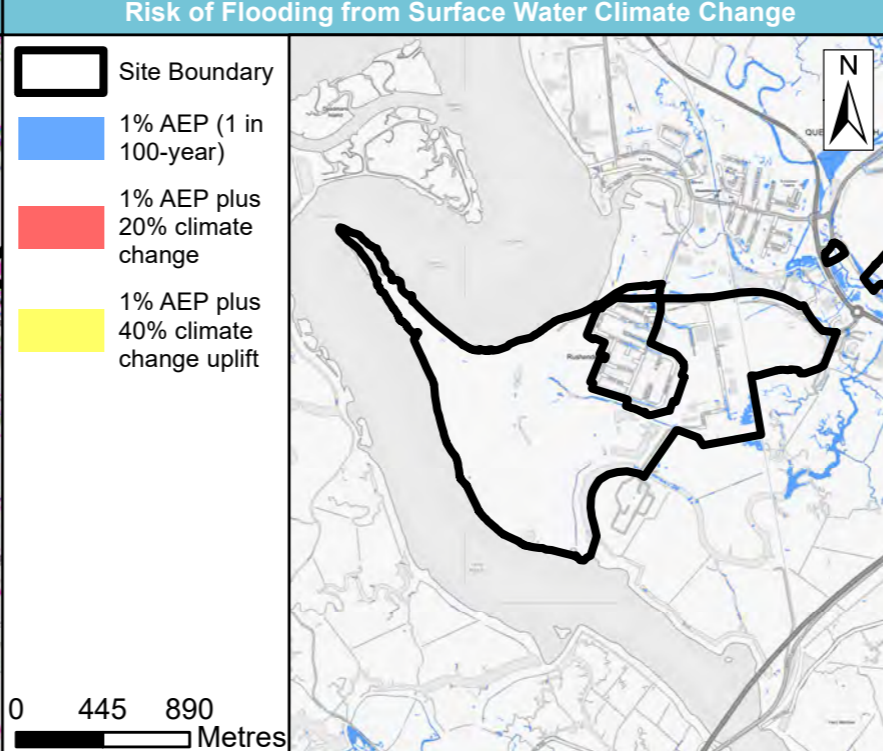
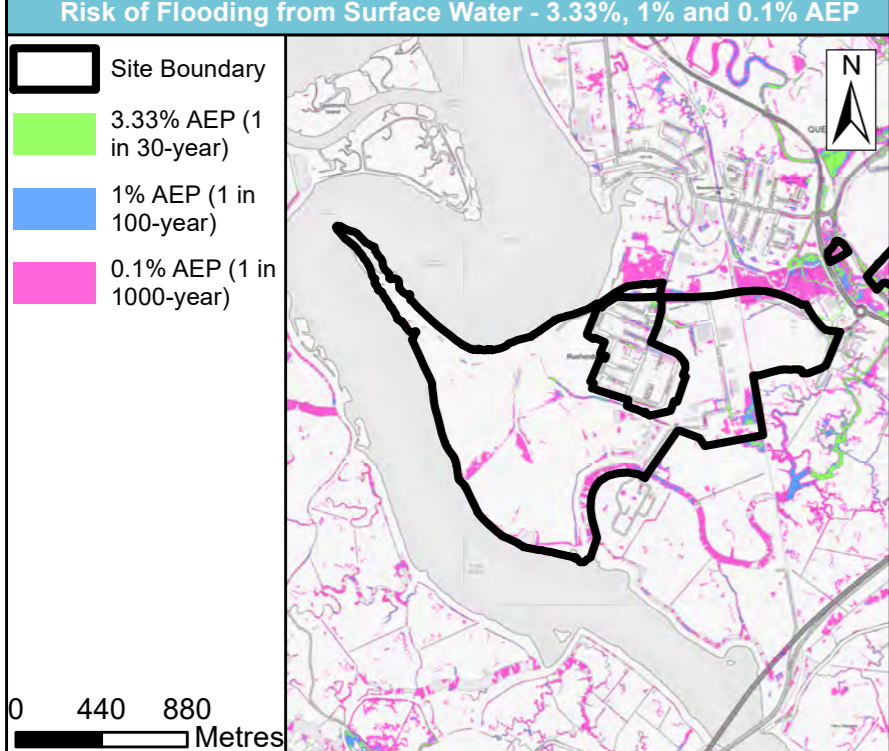


Site name	Land at The Port of Sheerness, Rushenden Road
Site area (ha)	149.56

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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Site name Land at The Port of Sheerness, Rushenden Road

Site area (ha) 149.56

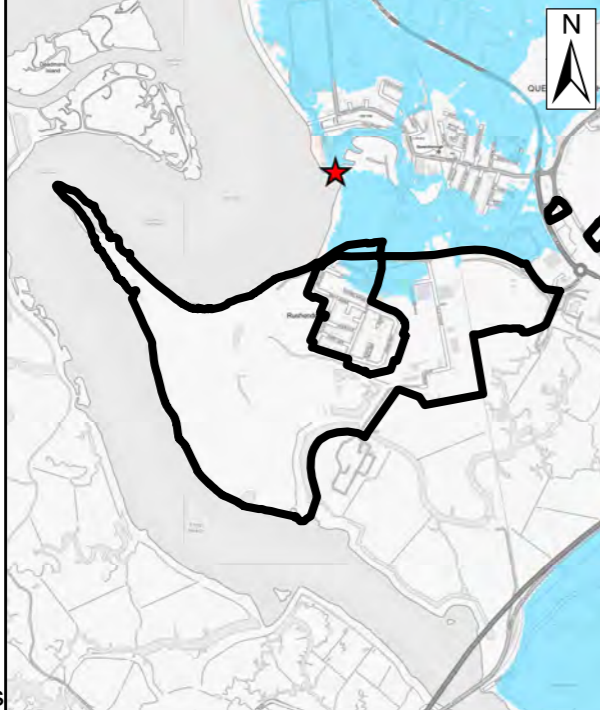
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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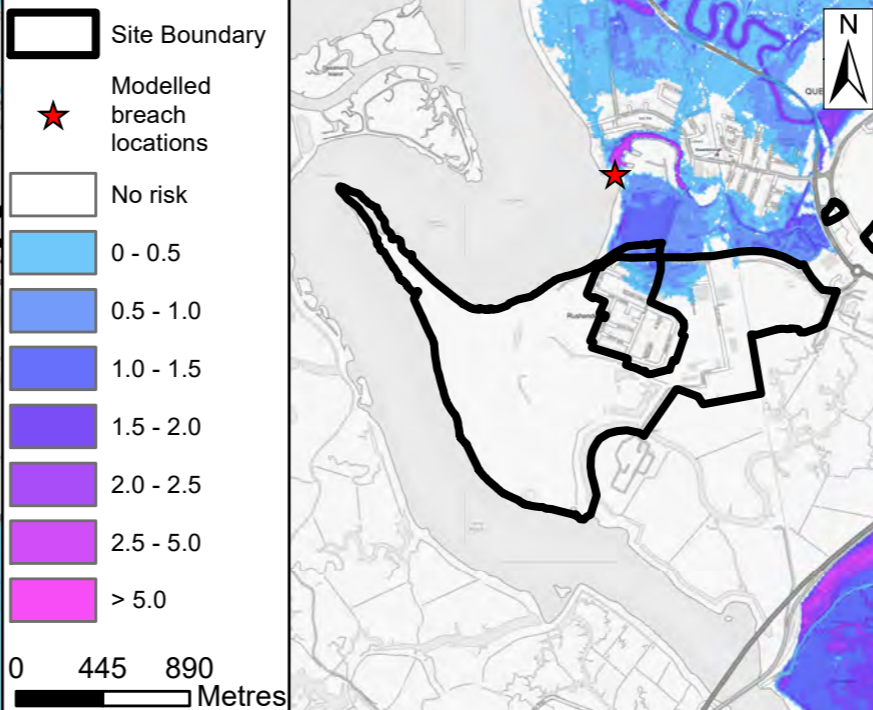
Modelled breach extents (Present Day)

- Site Boundary
- Modelled breach locations
- Modelled breach extents (0.5% AEP-Present Day)



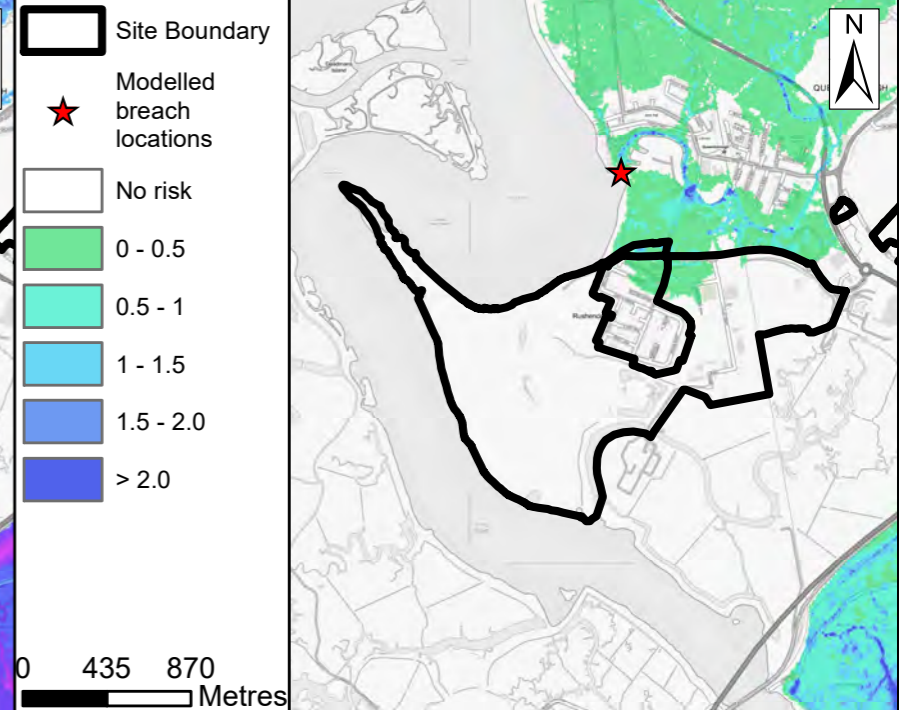
Modelled breach extents (0.5% AEP Present Day) Depth

- Site Boundary
- Modelled breach locations
- No risk
- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 5.0
- > 5.0



Modelled breach extents (0.5% AEP Present Day) Velocity

- Site Boundary
- Modelled breach locations
- No risk
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2.0
- > 2.0



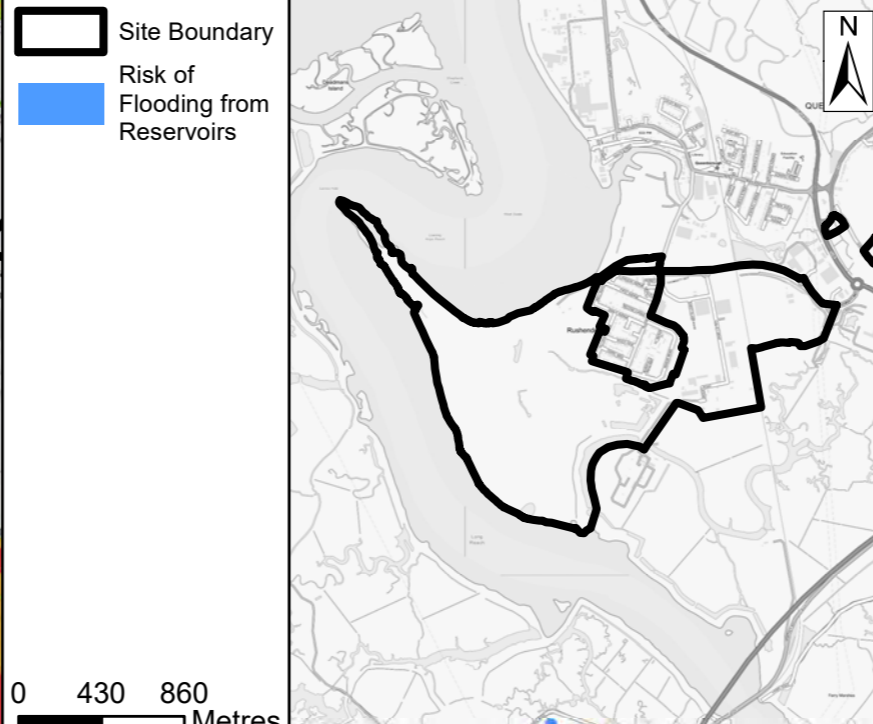
Modelled breach extents (0.5% AEP Present Day) Hazard

- Site Boundary
- Modelled breach locations
- Very low hazard - caution
- Danger for some
- Danger for most
- Danger for all

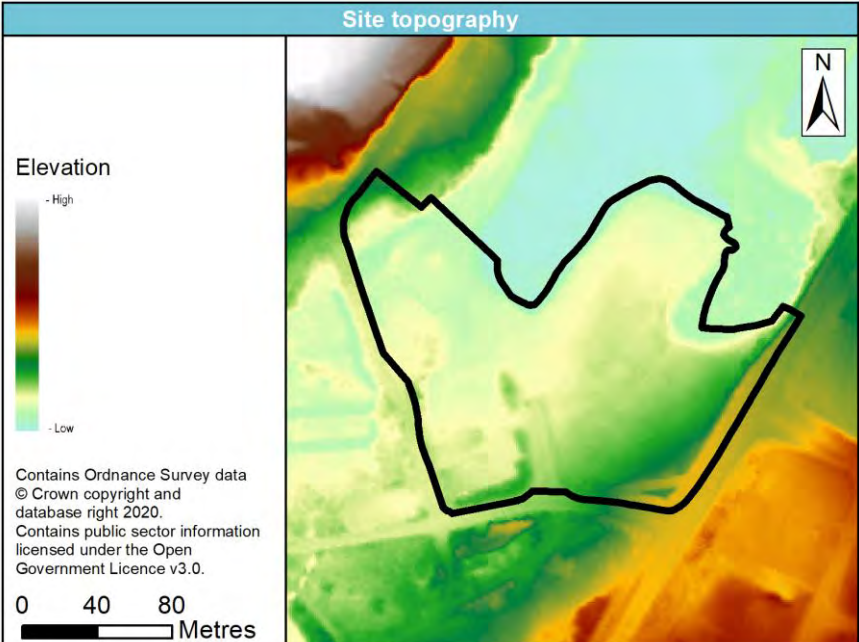


Risk of Flooding from Reservoirs extent

- Site Boundary
- Risk of Flooding from Reservoirs



Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

Site details	OS Grid reference	TR 00230 62180
	Area (ha)	2.75
	Current land use	Offices/ open scrubland
	Proposed site use	35 residential dwellings
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #00a0c0; color: white; margin: 0;">Site topography</p>  <p style="font-size: small; margin: 5px 0;">Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</p> </div> <ul style="list-style-type: none"> The site is generally flat, with a large body of water to the north of the site accounting for lower elevations. The south of the site is occupied by office buildings and an access road (Bunting Close). There is a slight slope of the site from the south east to north west. The ground slope across the site generally has a gradient of less than 5%.

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

Sources of flood risk	Existing watercourses	There are no watercourses within the site, however there are a series of ponds and ordinary watercourses to the north of the site that could pose a potential flood risk.		
	Flood history	The Environment Agency's recorded flood outlines do not show any historic flood extents within the vicinity of the site. Kent County Council's historic events recorded a single surface water flood event in 2018, 750m east of the site.		
	Fluvial	Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	1% AEP	0.1% AEP
		N/A	N/A	N/A
		Available modelled data: The closest watercourse is located 130m north of the site boundary and no detailed fluvial model data is available for this site. Whilst the site is within the extent of Flood Zones 2 and 3 the available mapping is not considered reliable for this location as it is based on generalised national scale modelling techniques. The nearest watercourse is located 135m to the north of the site.		
		The site is immediately downstream of a Surface Water Functional Flood Zone and based on the topography and distance from any nearby watercourses, it is more likely that the predicted presence of Flood Zones 2 and 3 at this site are most likely associated with surface and overland flow generated from the upstream catchment. There is no watercourse upstream of the site to collect and convey this runoff although the ponds and general topography in the area will be expected to be influential with respect to the risk of flooding from surface runoff.		
	Tidal	Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	0.5% AEP	0.1% AEP
		0.00%	0.00%	0.00%
		The site is covered by the Environment Agency North Kent Coast (Tidal) 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk. The site is not indicated to be at risk of tidal flooding at the present day.		
	Surface Water	Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		3.3% AEP	1% AEP	0.1% AEP
0.80%		1.56%	6.55%	

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

		<p>Description of surface water flow paths:</p> <p>There is a small area to the west of the site where surface water is indicated to pool during the 1 in 30 year (3.33% AEP) event, this is associated with a topographic low spot. There are a number of small surface water flow paths present during the 1 in 1000 year (0.1% AEP) event, these are present on Bunting Close at the south of the site and at the north west of the site. These flow paths discharge off site to Bysing Wood Road and to the pond.</p> <p>Mapping showing the RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.</p>		
	Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories		
		Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories
		0.07%	2.50%	2.57%
	<p>Parts of the north and east of the site boundary are considered to be at risk of groundwater flooding, however it should be noted that the area to the north is the location of the existing pond and this may not be appropriate. Therefore, the site is considered at low risk of groundwater flooding. However, as groundwater datasets are generally produced nationally it is recommended that more detailed local ground investigations are carried out and reported on within a site-specific FRA where this is required (groundwater known to be a potential problem locally).</p>			
Reservoir	<p>The site is not considered to be at risk of reservoir flooding. However, careful consideration should be given to the performance, operation and long term maintenance of the ponds when preparing an FRA.</p>			

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

Flood risk management infrastructure	Defences	Flood defences				
		There are no known flood defences within the vicinity of the site.				
	Residual risk	Culvert / structure blockage?	There are no known culverts or structures within the vicinity of the site.			
		Impounded water body failure?	The site is not considered to be at risk from failure of impounded water bodies.			
Defence breach/overtopping?		The site is not considered to be at residual risk of from breach or overtopping.				
Emergency planning	Flood warning	The site is not covered by any flood warnings or flood alerts.				
	Access and egress	<p>The site is not considered to be at high risk of fluvial flooding, however the ponds in the area are potential sources of flood risk and there are a number of surface water flow paths that could pose a potential flood risk to the site. The west of the site is mostly located within Flood Zone 1 and safe access and egress should be to the west, this includes access to the site via a small unnamed track that serves Faversham Angling Club.</p> <p>The east of the site is mostly within Flood Zone 2 and this may impede safe access and egress, however as previously noted the extents of Flood Zones 2 and 3 at this site are not considered to be appropriate based on the distance (~130m) from the nearest watercourse.</p>				
Climate Change	Climate Change allowances for fluvial flood risk	Proportion of site at 1% AEP fluvial flood risk in the defended scenario				
		River Basin District	Present day	Flood Zone 2 as a proxy for climate change		
		Thames	n/a	n/a		
		0.00%	63.93%			
	Implications for the site	As there is no available modelled data for fluvial flood risk at the site, Flood Zone 2 has been used as a proxy for climate change. As previously noted, this may not be representative of fluvial flood risk to the site, as Flood Zone 2 is based on nationally produced generalised modelling and the existing watercourse is a significant distance from the site.				
Climate Change allowances for tidal flood risk	Proportion of site at 0.5% AEP tidal flood risk in the defended scenario					
	Area	Present day	2080 Higher Central	2080 Upper End	2120 Higher Central	2120 Upper End
	South East England	0.00%	0.00%	0.00%	0.00%	1.22%

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

	Implications for the site	The northern boundary of the site is indicated to be at risk of tidal flood risk during the upper end allowances for a 2120 epoch 0.5% AEP event, which is indicated to affect the ponds along this boundary. However tidal flooding is not present during any other events and flood extents are limited to the site boundary, as a result the site can be considered to have a low sensitivity to the impacts of climate change on tidal flood risk.		
	Impact of climate change on risk from surface water	Proportion of site at 1% AEP surface water flood risk		
		Present day	+20% rainfall uplift	+40% rainfall uplift
		1.56%	1.69%	1.81%
Implications for the site	There is a slight increase in surface water flood extents when an uplift of 20% and 40% is applied to the 1% AEP event, however the increase is very minimal for both the 20% and 40% increase and no additional areas of the site are considered to be at risk of flooding in comparison to the present day 1% AEP event. The flood extents are significantly smaller than the present day 0.1% AEP event, therefore the site is not considered to be sensitive to the impacts of climate change on surface water flooding.			

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

Requirement for drainage control and impact mitigation	Bedrock Geology	British Geological Survey data indicates that the entire site is underlain by the Thanet Formation, which at this site is comprised of sand, silt and clay.
	Superficial Geology	The entire site is underlain by superficial deposits, these are mostly Head deposits comprised of silt and clay, however gravel and sand deposits are also present over the western part of the site.
	Soils	Freely draining slightly acid loamy soils.
	Groundwater Source Protection Zone	The site is not located within a groundwater Source Protection Zone.
	Groundwater vulnerability	Groundwater is considered to have a high vulnerability within the site.
	Historic Landfill Site	The site is located within the extent of the Bysing Wood historic landfill site.

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

	Broad scale assessment of possible SuDS	<p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.</p> <p>BGS data indicates that the underlying geology is the Thanet Formation and the site is underlain by superficial head deposits, as a result permeability is likely to be highly variable. Proposals to use infiltration should confirm that this is feasible through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. Mapping suggests that the site slopes make it possible to consider most forms of detention.</p> <p>Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p> <p>Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical.</p>			
		Cumulative impacts of development	<p>Sensitivity to cumulative impacts</p> <p>The catchment is indicated to be in a wider catchment that has a high sensitivity to cumulative impacts. However, the potential key issue is the potential for surface runoff to be generated during local high intensity storms and this should be the key consideration when considering flood risk at the site.</p>		
Recommendations for Local Plan policy	Proportion of the site within each Flood Zone				
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	
	36.07%	37.84%	0.00%	26.09%	
	Sequential Test and Exception Test requirements				
The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied. It should be noted that the zones as described by the available mapping are					

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

	<p>probably not appropriate, as there is no watercourse near to the site that could generate conventional fluvial flooding.</p> <p>The Exception test will be required in the following scenario:</p> <ul style="list-style-type: none"> • highly vulnerable and in flood zone 2 • essential infrastructure in flood zone 3a or 3b • more vulnerable in flood zone 3a <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. <p>The available mapping shows the site is within Flood Zone 3b where more vulnerable development is not permitted, however it may be possible to adopt a sequential approach to the site layout with more vulnerable development located outside of Flood Zone 3a or 3b. Furthermore, the flood zones at this site have been derived from nationally produced generalised modelling and are located approximately 135m away from any watercourses, as a result these may not be indicative of fluvial flood risk at this site.</p>
	<p>Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers</p> <p>Flood risk assessment:</p> <ul style="list-style-type: none"> • At the planning application stage, a site-specific flood risk assessment will be required for this site as it is greater than 1 hectare in size, is located in Flood Zones 2 and 3, and the development will introduce a more vulnerable use. It will also be required where development: <ul style="list-style-type: none"> ○ Is on land which has been identified by the Environment Agency as having critical drainage problems; • Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. Particular consideration should be given to the potential runoff generated by the "dry valley" upstream and the interaction of surface flow paths with the existing ponds in the area. • Detailed, site specific modelling should be undertaken to ascertain whether the current flood zones are indicative of fluvial or surface water flood risk to the site. • Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of fluvial and surface water flooding. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development. • Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. • Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. • Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. • Proposals will need to demonstrate that users will be safe and more vulnerable uses are located outside Flood Zone 3b. <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • New development must seek opportunities to reduce the overall level of flood risk to the site. For example by: <ul style="list-style-type: none"> ○ Reducing rates and volumes of runoff; ○ Relocating development to lower risk flood zones; ○ Creating space for flooding.

Site reference	SLA18/108
Site name	Land at Brett House, Bysing Wood Road, Faversham

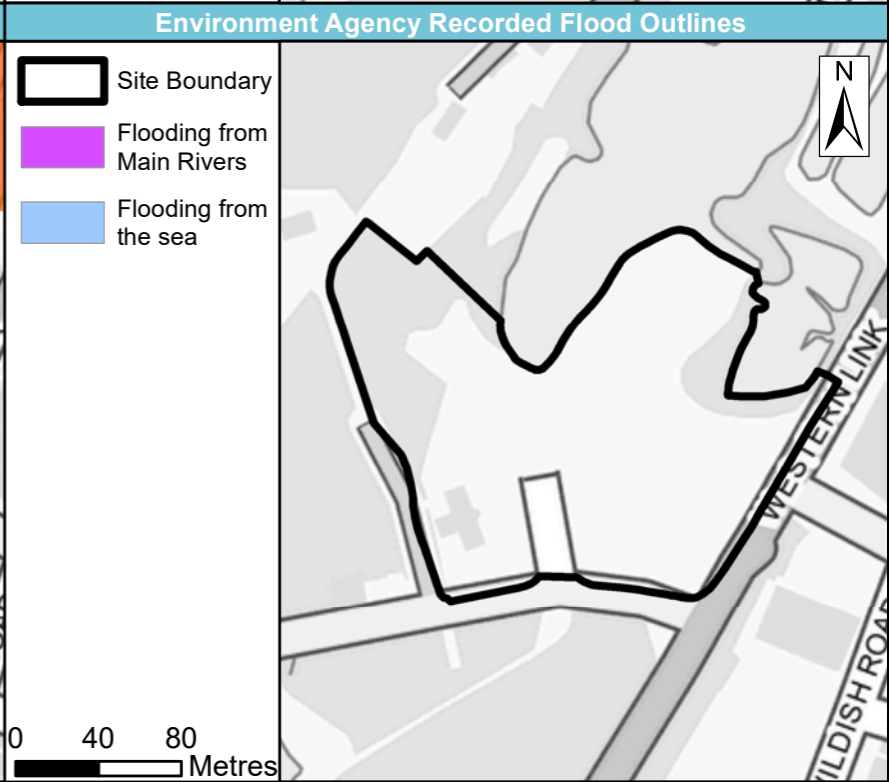
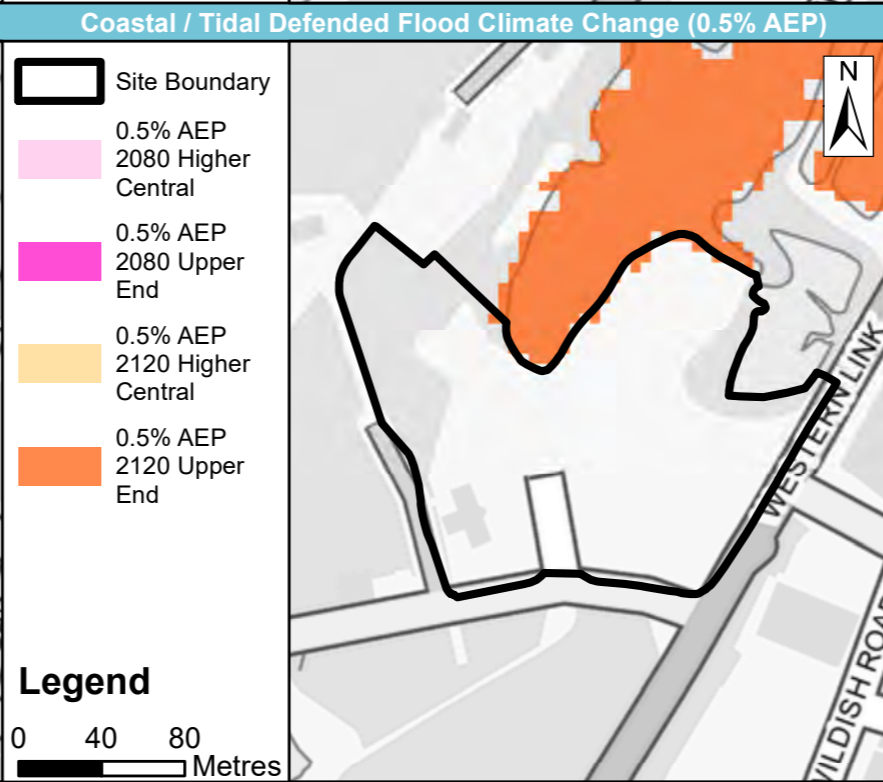
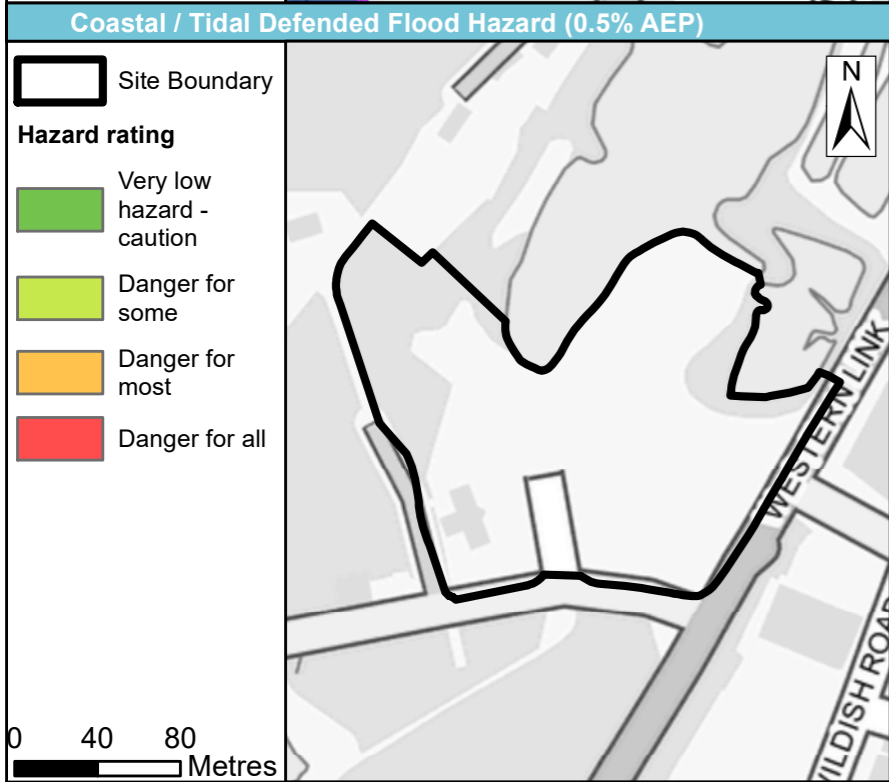
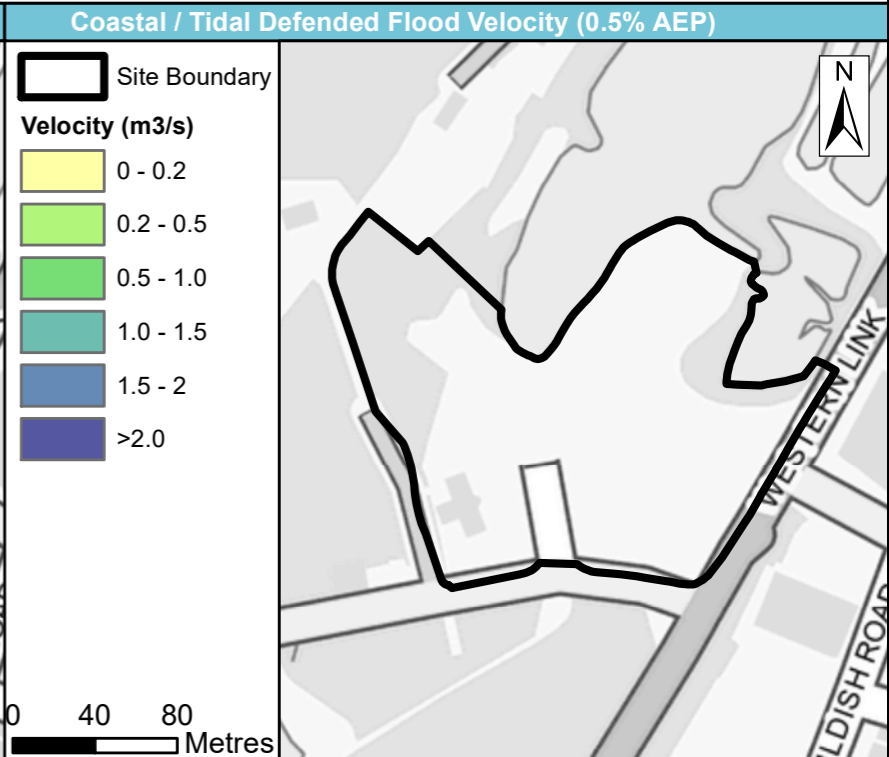
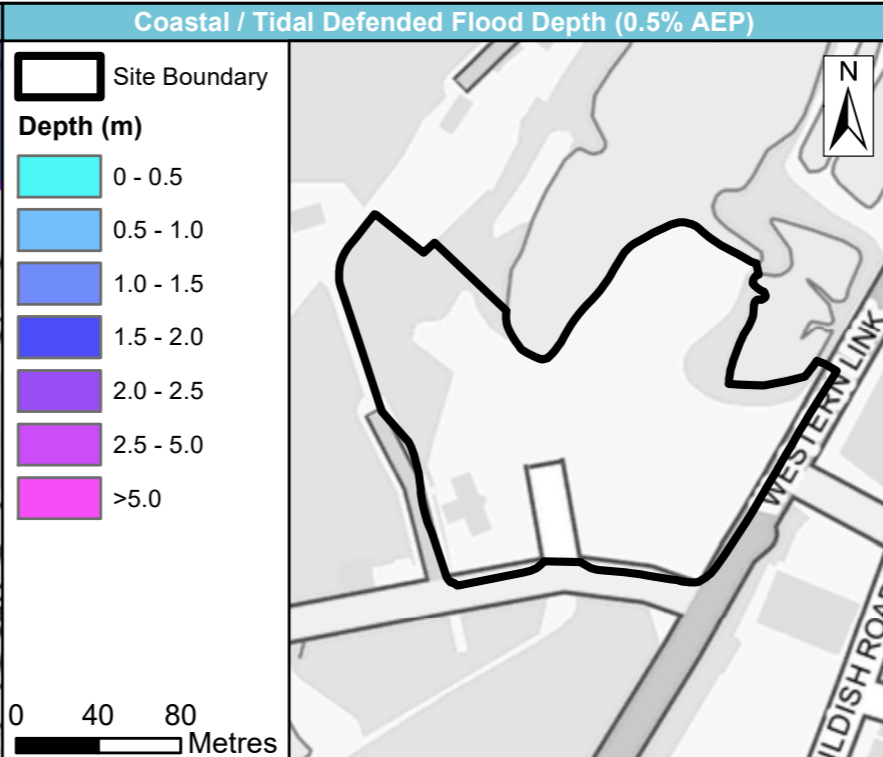
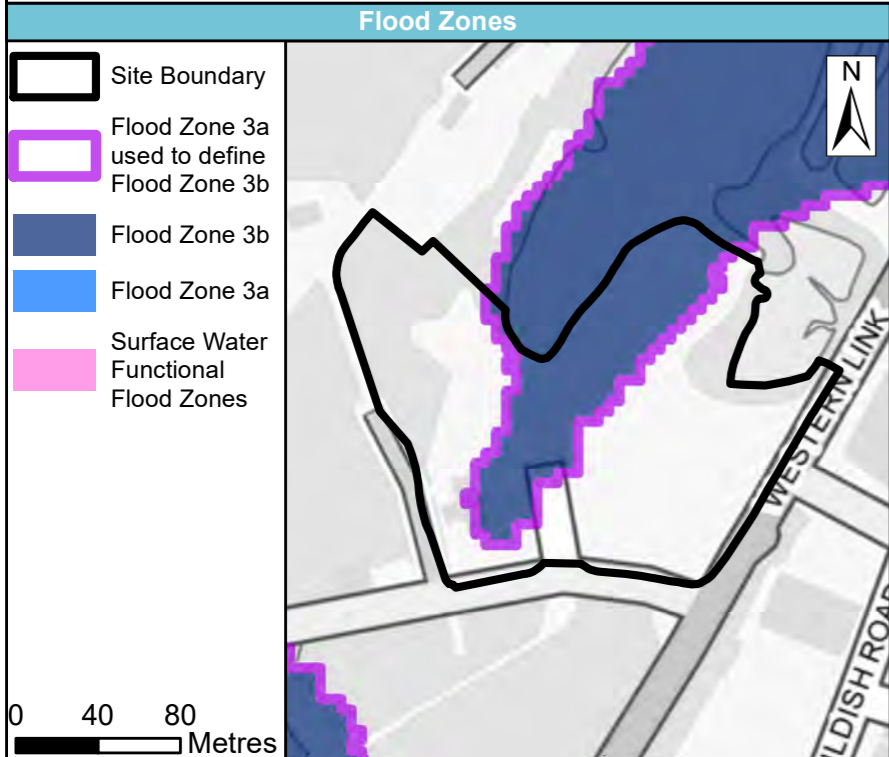
	<ul style="list-style-type: none"> • Safe access and egress should be demonstrated in the fluvial 1% AEP plus climate change event and as there is a risk of surface water flooding on the site, consideration should also be given to providing safe access and egress during surface water flood events. • All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff. • Example features include swales, attenuation features, green roofs, rainwater capture and reuse and permeable paving. • The site is within the Lower Medway Internal Drainage Board (IDB), if surface water discharge to an IDB watercourse (directly or indirectly) is proposed, this will be subject to additional consents or requirements as outlined in the Board's byelaws. • Assessment of runoff should include allowances for climate change effects. Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk. • SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best design practice (CIRIA C753 Manual 2015). • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name	Land at Brett House, Bysing Wood Road
Site area (ha)	2.7516

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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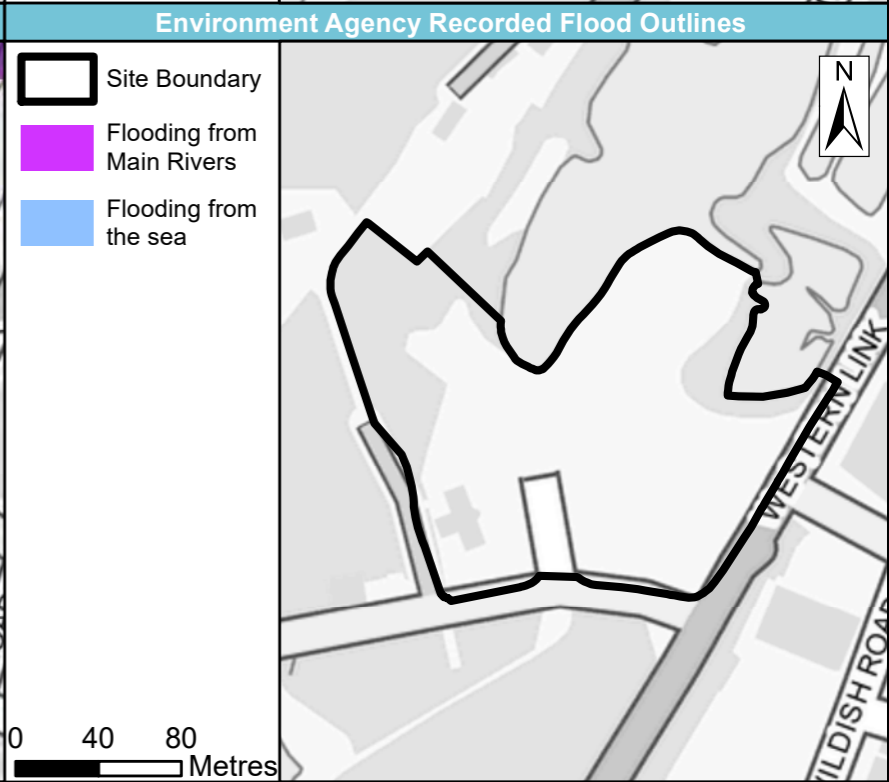
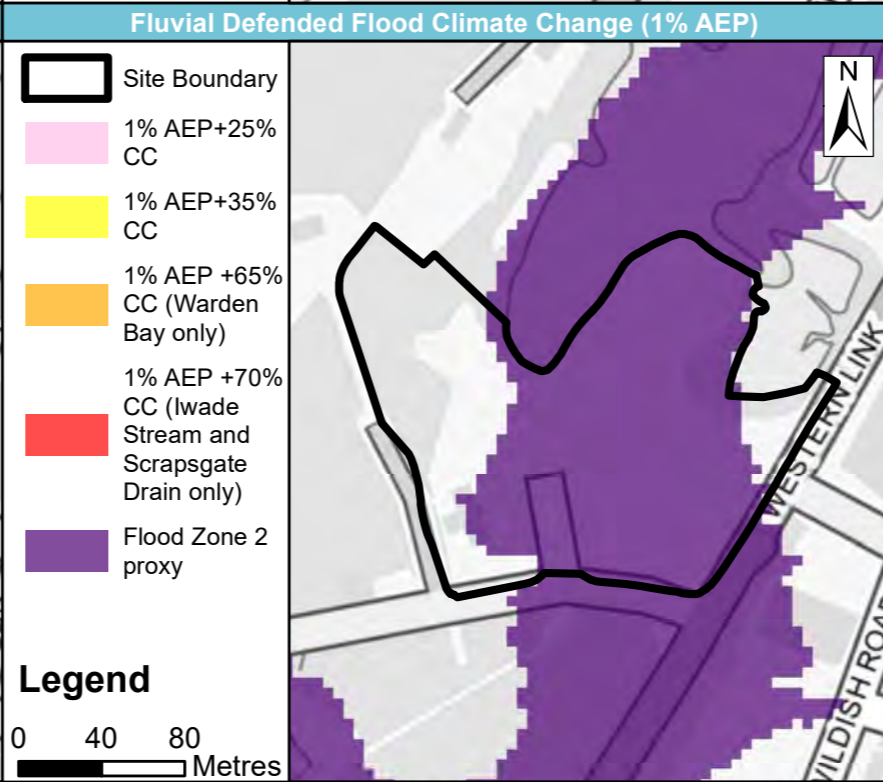
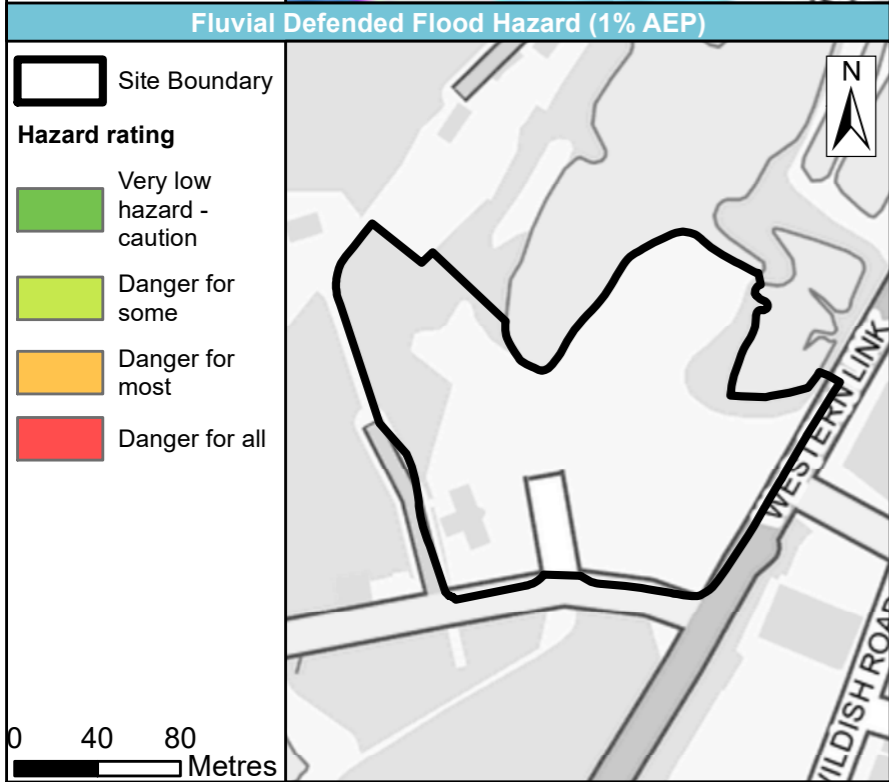
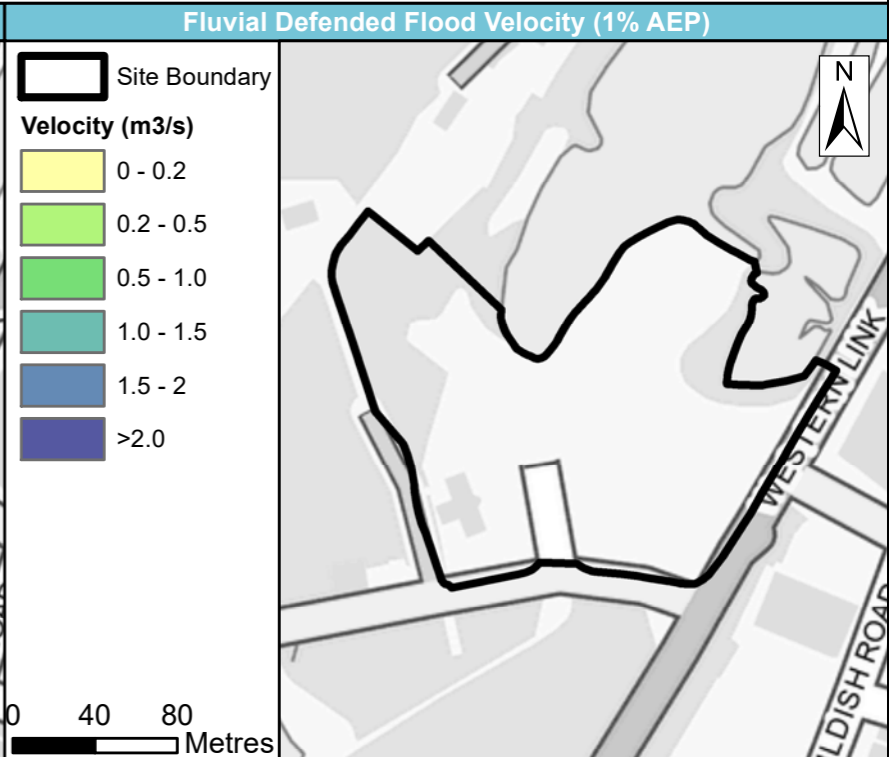
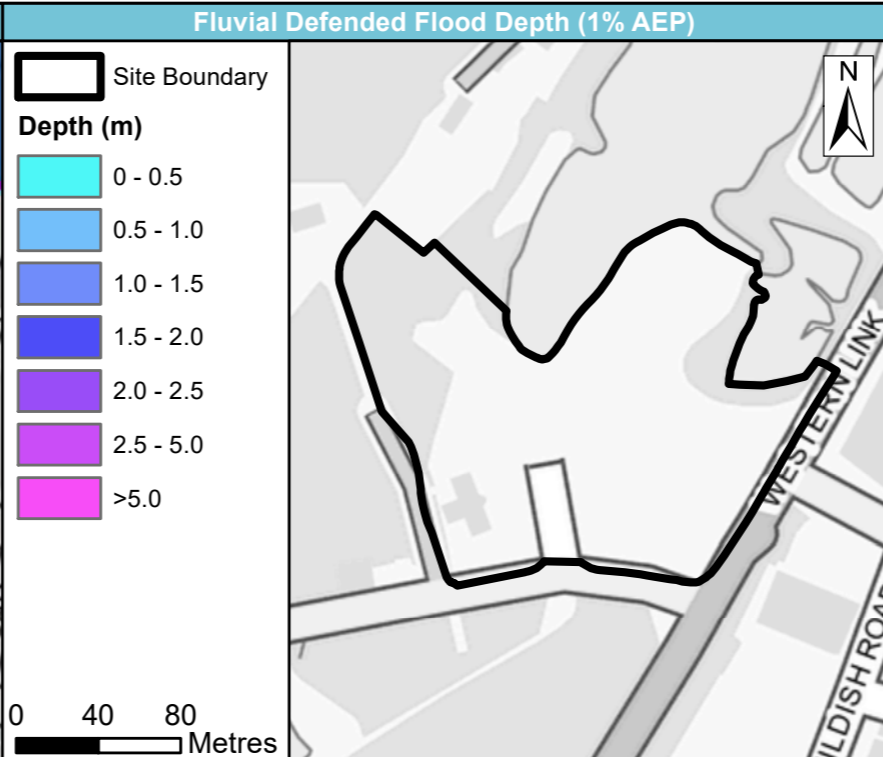
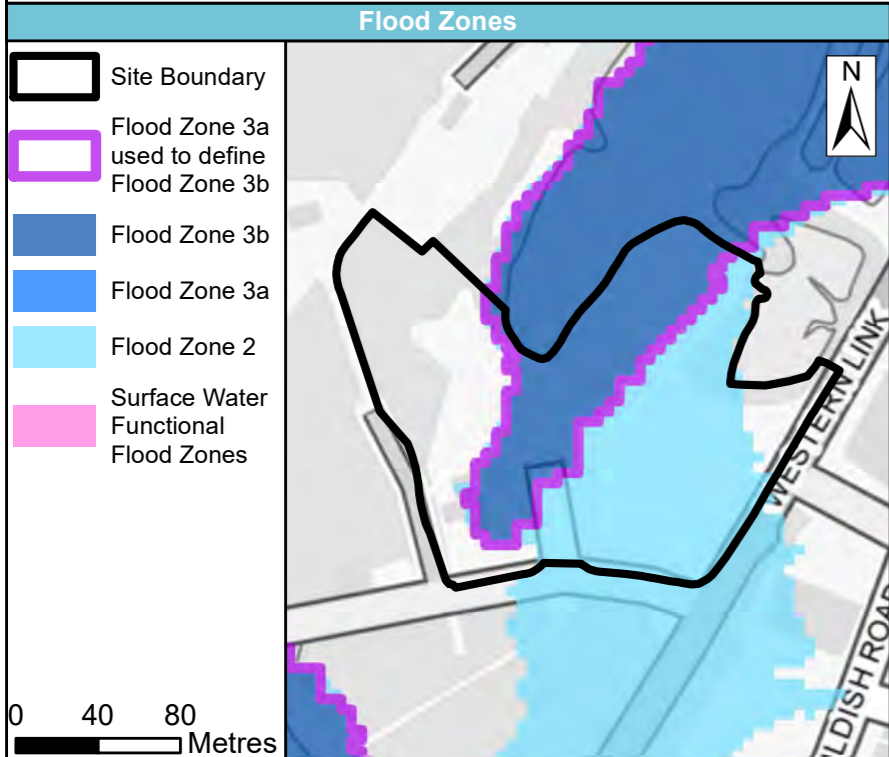


Site name	Land at Brett House, Bysing Wood Road
Site area (ha)	2.7516

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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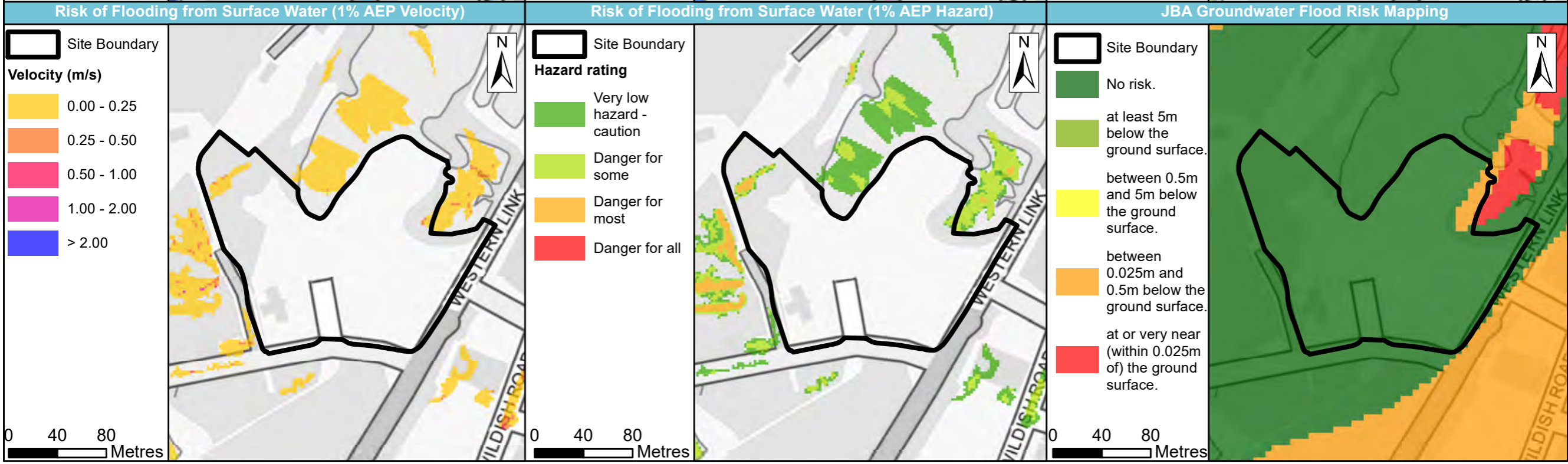
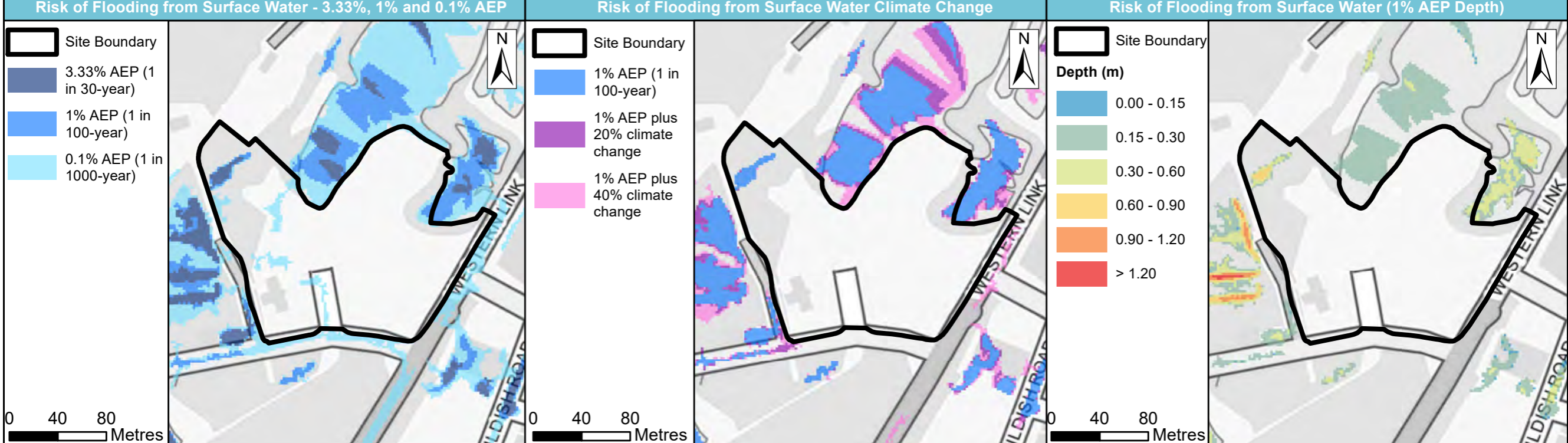


Site name	Land at Brett House, Bysing Wood Road
Site area (ha)	2.7516

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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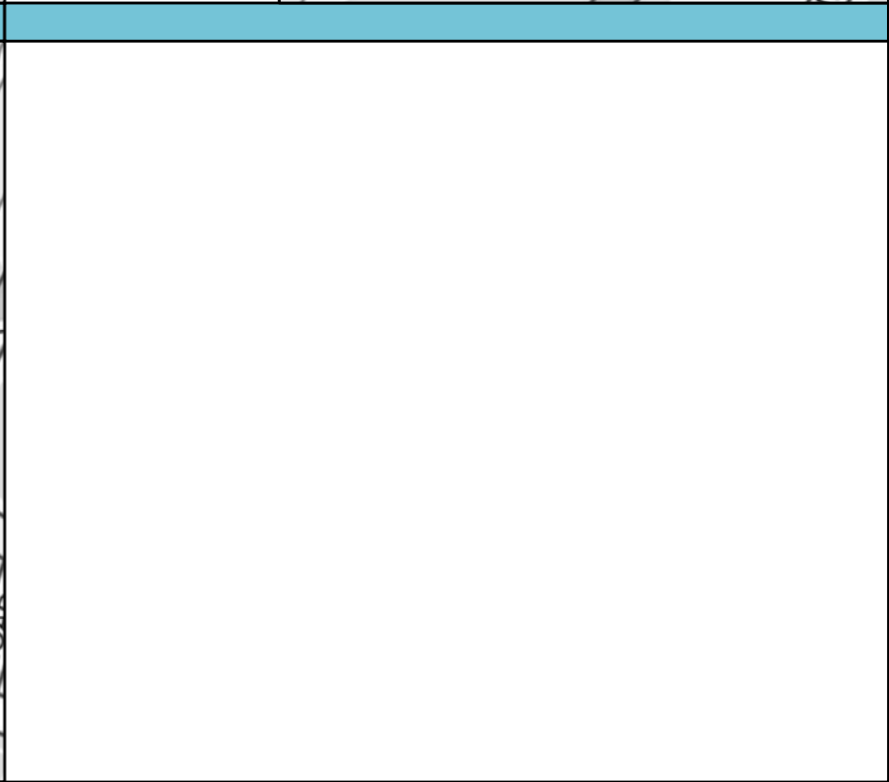
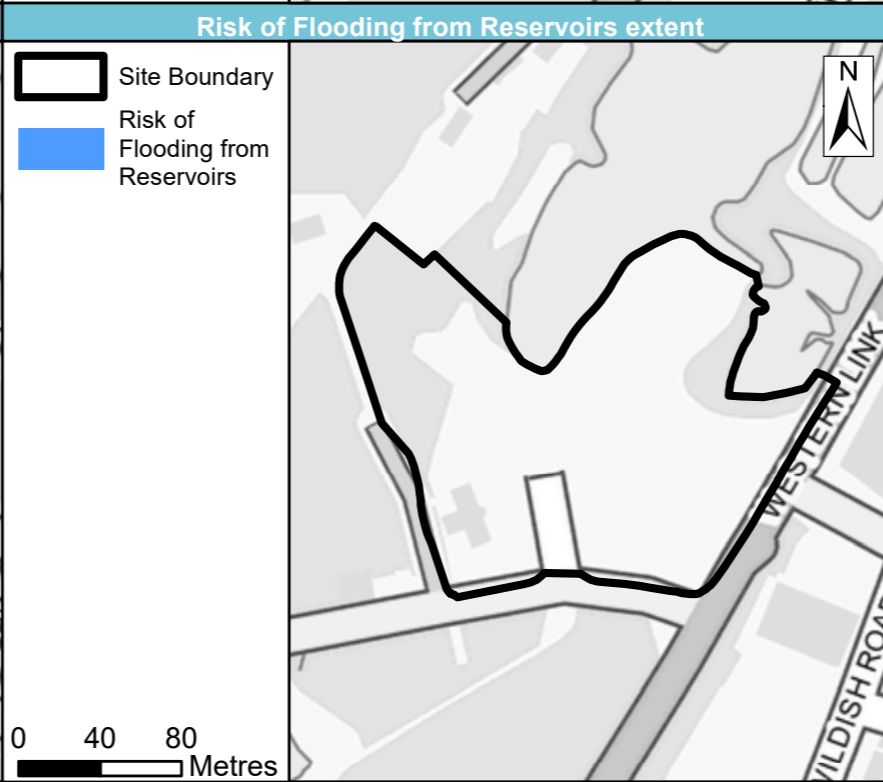
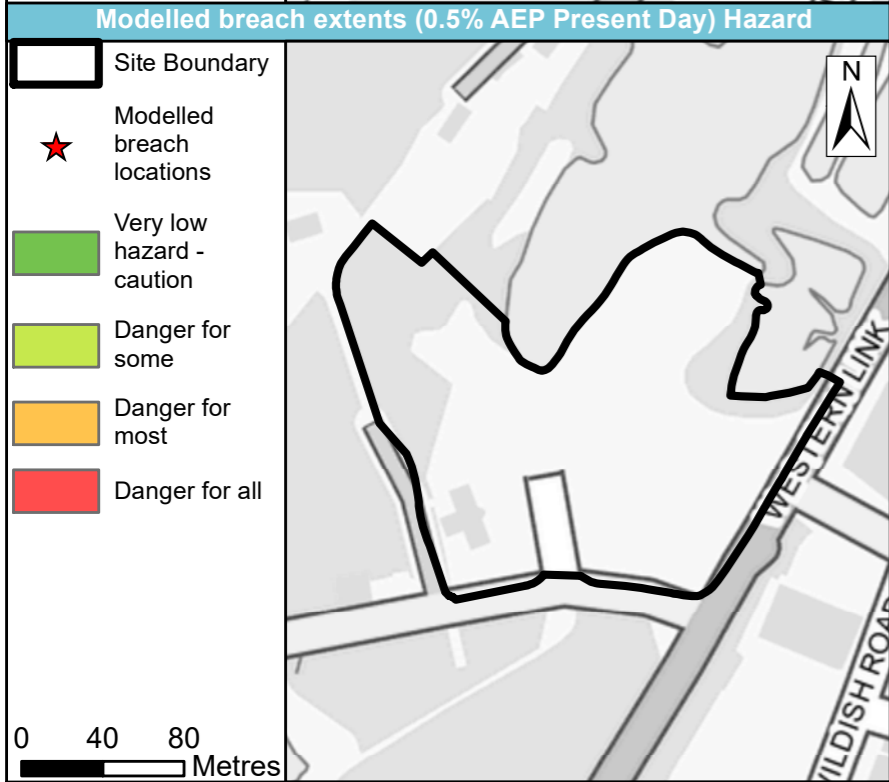
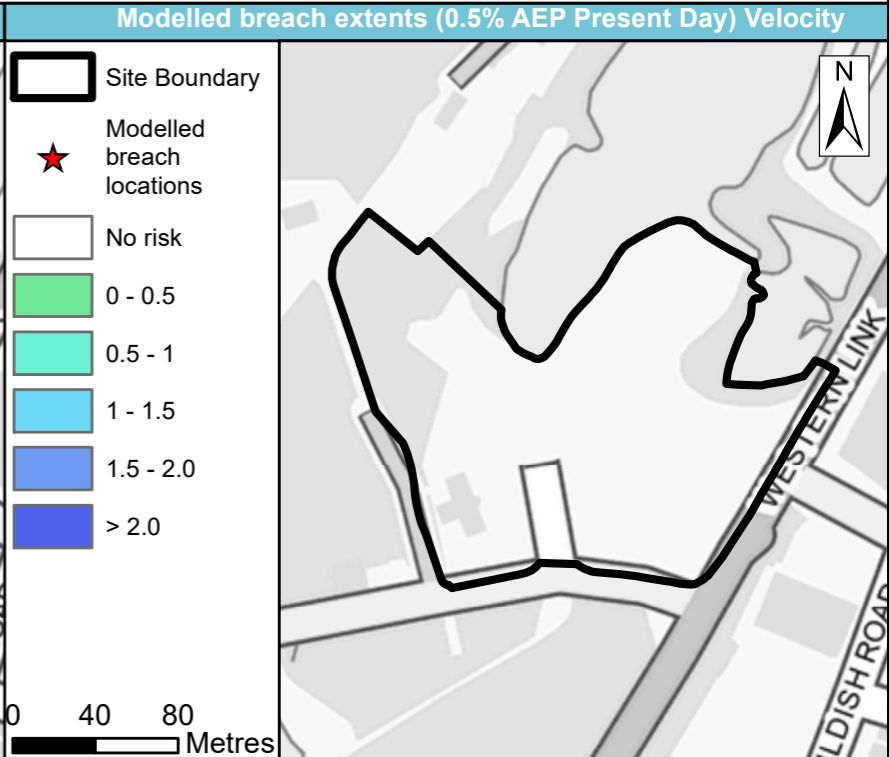
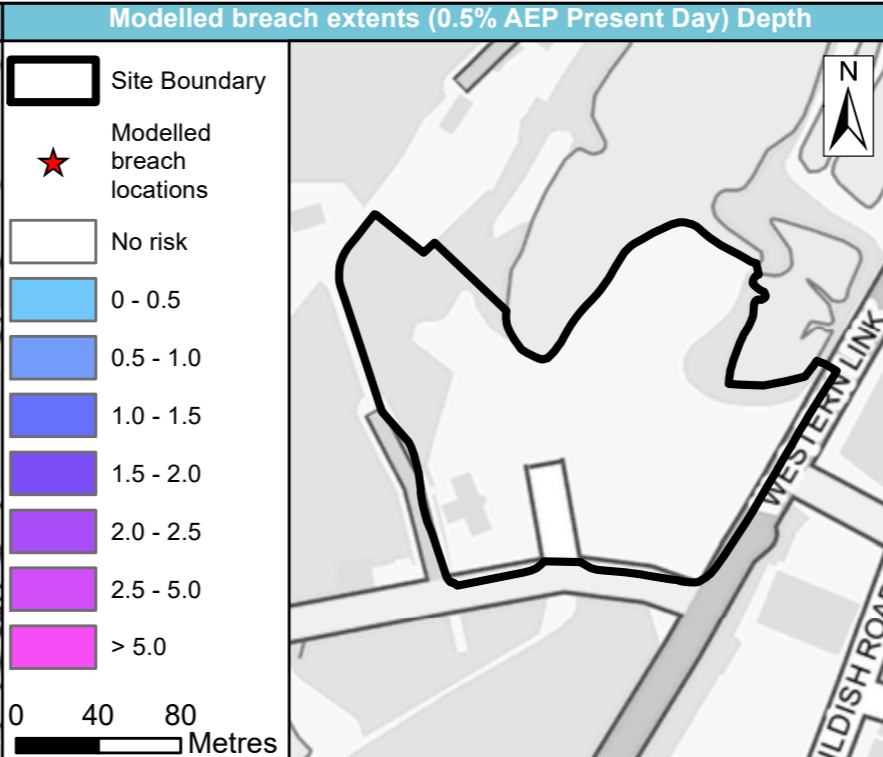
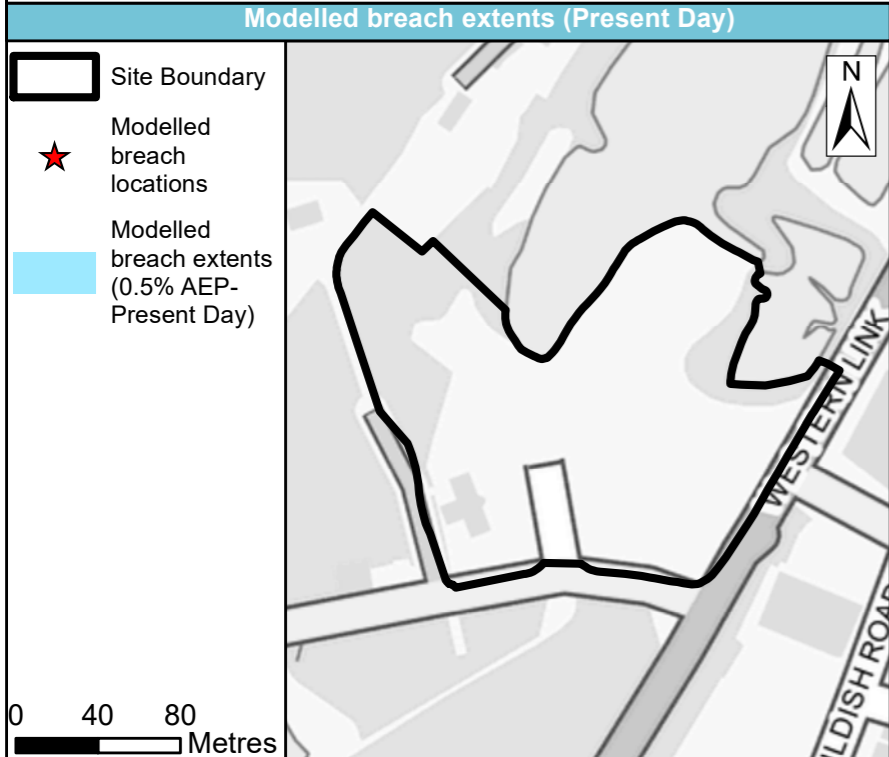


Site name	Land at Brett House, Bysing Wood Road
Site area (ha)	2.7516

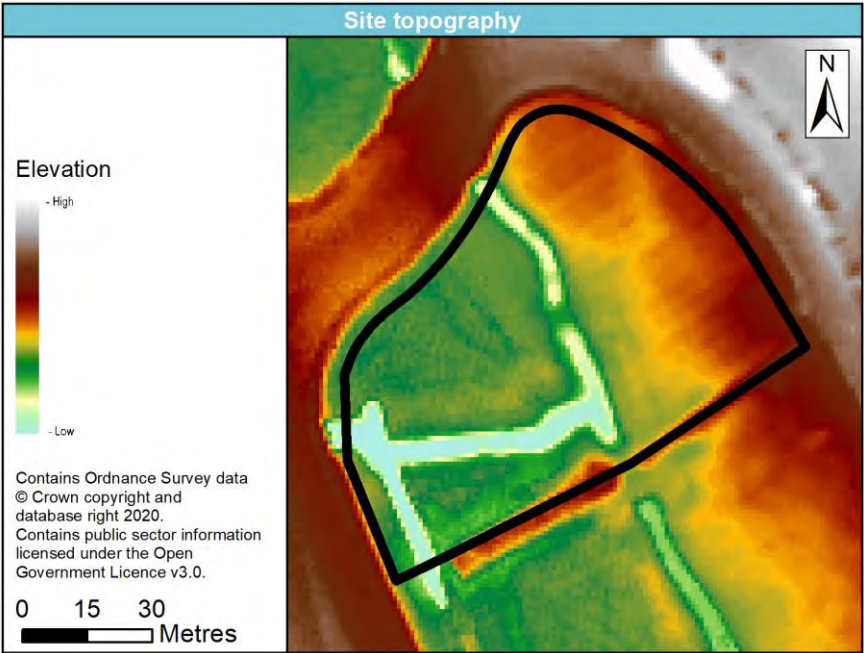
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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Site reference	SLA18/061
Site name	Land at Queenborough Road, Queenborough

Site details	OS Grid reference	TQ 91923 71826
	Area (ha)	0.65
	Current land use	Grazing (greenfield)
	Proposed site use	Residential
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #00a0c0; color: white; margin: 0;">Site topography</p>  <p style="font-size: small; margin: 5px 0;"> Elevation - High - Low </p> <p style="font-size: x-small; margin: 5px 0;"> Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0. </p> <p style="font-size: small; margin: 5px 0;"> 0 15 30 Metres </p> </div> <ul style="list-style-type: none"> The site is flat and low lying and is situated lower than the A249, the A250 and Queenborough Road which form the western, northern and eastern boundaries of the site respectively. The site area is relatively flat with although there is a slight slope from the north east to the south west of the site. The ground slope across the site generally has a gradient of less than 5%, however the site area is quite large and there are variations in topography within the site.

Site reference	SLA18/061
Site name	Land at Queenborough Road, Queenborough

Sources of flood risk	Existing watercourses	<p>There is an ordinary watercourse that flows from the north of the site via a 600mm culvert under the A250, this flows through the site before flowing into a culvert under the A249 to the west of the site. The watercourse also flows along the boundary of the A249 to the south of the site.</p> <p>The site is in the Lower Medway Internal Drainage Board (LMIDB) area, although this watercourse is not listed as an IDB asset. It is not considered to be an EA main river.</p>		
	Flood history	<p>The site is entirely within the extent of the Environment Agency's recorded flood outlines dataset, this indicates that the site flooded in February 1953 as a result of the overtopping of defences.</p>		
	Tidal	<p>Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)</p>		
		5% AEP	0.5% AEP	0.1% AEP
		0.00%	0.00%	0.00%
		<p>Available modelled data: The site is covered by the Environment Agency North Kent Coast (Tidal) 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>No detailed fluvial modelling is available for the site.</p> <p>Flood characteristics: The site is not considered to be at risk of tidal flooding during the defended present-day scenarios, however the site is considered to be at risk during the present day undefended scenarios and the defended climate change scenarios.</p>		
	Surface Water	<p>Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)</p>		
3.3% AEP		1% AEP	0.1% AEP	
12.34%		14.90%	61.37%	
<p>Description of surface water flow paths: Surface water flow paths are indicated to pass through the centre of the site, however the extents for the 3.33% and 1% AEP events mostly correspond with the watercourses that are present at the site and may not represent surface water flooding. The site is indicated to flood during the 0.1% AEP event, although it is more likely that this represents flooding from the ordinary watercourse at the site rather than flooding from surface water runoff.</p> <p>RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.</p>				
Groundwater	<p>Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories</p>			

Site reference	SLA18/061
Site name	Land at Queenborough Road, Queenborough

		Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories		
			0.00%	0.00%	0.00%	
		The site is not considered to be at risk of groundwater flooding, however as groundwater datasets are generally produced nationally it is recommended that ground investigations are carried out and reported on within a site-specific FRA where this is required (known to be a problem locally).				
	Reservoir	The site is not considered to be at risk of flooding from reservoirs.				
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition		
		Embankment	0.75%	3		
	Residual risk	Culvert / structure blockage?	The culvert under the A249 could pose a residual flood risk in the event of blockage, as water would back up and potentially flood the site.			
		Impounded water body failure?	There are no impounded waterbodies within the vicinity of the site.			
	Defence breach/overtopping?	<p>The watercourse on the site ultimately discharges into the River Swale 1km downstream of the site, defences at this point have been previously modelled for breach in 2016.</p> <p>Although the site itself is not within the breach extents, the extents are close to the western boundary, flooding the western side of the A249. This could potentially lead to the culvert along the western site boundary becoming surcharged and cause flooding to the site.</p>				
Emergency planning	Flood warning	The site is within the 064WAC1ShepSwale Flood Alert Area and the 064FWC1Sheerness Flood Warning Area which are in place to provide alerts and warnings for coastal flooding.				
	Access and egress	<p>It is uncertain that safe access and egress to and from the site will be possible. The entire site is located within Flood Zone 3a with watercourses passing through the centre of the site.</p> <p>The undefended model outputs for the 0.5% AEP (2115 epoch) climate change have been assessed as a 'worst case' scenario in the event of a breach. These indicate that typical flood depths within the site are commonly in excess of 3m and are indicated to be in excess of 2m during the defended scenario.</p> <p>The surrounding area is indicated to be at risk of flooding with significant depths of flooding on areas of higher ground such as the A249 and A250. As such it is not clear whether safe access and egress or safe refuge is available at the site or in the immediate vicinity of the site.</p>				
Climate Change	Climate Change allowances	Proportion of site at 0.5% AEP tidal flood risk in the defended scenario				
		Area	Present day	2080 Higher Central	2080 Upper End	2120 Higher Central

Site reference	SLA18/061
Site name	Land at Queenborough Road, Queenborough

		South England	East	0.00%	0.00%	0.00%	100%	100%	
	Implications for the site	<p>The site is considered to be sensitive to the impacts of climate change on tidal flood risk. The site is not considered to be at risk of tidal flooding during the present day or 2080 epoch defended scenarios from a 0.5% AEP event for either the higher central or upper end allowances. There is a very large increase in flood extent during the 2120 epoch which results in the entire site being within the extent of a 0.5% AEP event during this epoch.</p> <p>The proposals will need to include provisions that address the need to increase the standard of protection of the existing defences so that appropriate arrangements are in place to address the potential risk over the lifetime of the development.</p>							
	Impact of climate change on risk from surface water	Proportion of site at 1% AEP surface water flood risk							
		Present day	+20% rainfall uplift		+40% rainfall uplift				
		14.90%	19.07%		25.78%				
Implications for the site	<p>The surface water flood extents at this site correlate with the existing ordinary watercourses as opposed to representing flooding from surface water runoff. The 1% AEP extents show an increase with a 20% and 40% uplift applied. This is most significant during the 40% uplift, with flooding from the watercourse at the south west corner of the site. However, the flood extents are significantly less than the 0.1% extent and the site is not considered to be sensitive to the impacts of climate change on surface water flood risk. The low lying nature of the site and the presence of arterial drainage systems make it essential to understand the performance of the existing system and how this could be affected under climate change conditions, when the rise in mean sea level will potentially affect the discharge capacity of the watercourse system.</p>								

Site reference	SLA18/061
Site name	Land at Queenborough Road, Queenborough

	Bedrock Geology	The site is underlain by the London Clay Formation which at this site is comprised of clay and silt.
	Superficial Geology	Approximately half of the site is underlain by superficial deposits of alluvium to the west. These deposits are formed of clay, silt, sand and peat.
	Soils	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
	Groundwater Source Protection Zone	The site is not within a groundwater Source Protection Zone
	Historic Landfill Site	The site is not within a historic landfill site
	Requirement for drainage control and impact mitigation	<p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p>
Broad scale assessment of possible SuDS	<p>BGS data indicates that the underlying geology is the London Clay Formation and the site is underlain by superficial alluvial deposits, as a result permeability is likely to be highly variable. Proposals to use infiltration should confirm that this is feasible through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.</p> <p>Surface water outfalls that discharge into the watercourse may be affected by tide locking due to water levels tidal influence on the watercourse. The impacts of tide locking will need to be considered in terms of the storage requirements of the site.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p>	

Site reference	SLA18/061
Site name	Land at Queenborough Road, Queenborough

	Cumulative impacts of development	The catchment is indicated to have a high sensitivity to the cumulative impacts of development. However, the intrinsic flood risk issues and low lying nature of the site make it an implicit requirement to consider the performance of the wider drainage network when preparing appropriate drainage and flood risk proposals. This exercise should capture the potential cumulative effects that could affect other parties or land downstream.		
Recommendations for Local Plan policy	Proportion of the site within each Flood Zone			
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
	0%	0%	100%	0%
	Sequential Test and Exception Test requirements			
	The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.			
	<p>The Exception test will be required in the following circumstances:</p> <ul style="list-style-type: none"> • highly vulnerable and in flood zone 2 • essential infrastructure in flood zone 3a or 3b • more vulnerable in flood zone 3a <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. <p>The development proposals for this site are for a residential development which is classed as 'more vulnerable' development. The entire site is within Flood Zone 3a and as a result the exception test will be required.</p>			
Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers				
<p>Flood risk assessment:</p> <ul style="list-style-type: none"> • At the planning application stage, a site-specific flood risk assessment will be required for this site as it is located in Flood Zones 2 and 3, and the development is likely to introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in future. It will also be required where development: <ul style="list-style-type: none"> ○ Land greater than 1 ha in size; ○ Is on land which has been identified by the Environment Agency as having critical drainage problems; • Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. • Much of the site is covered by ordinary watercourses and it would be necessary to identify proposals that demonstrated it was possible to develop the site without increasing flood risk off-site. • The residual risk to the site posed by failure of flood defences, including overtopping and breach should be considered in a site-specific Flood Risk Assessment. Maintenance arrangements (including funding mechanisms) for the defences will need to be demonstrated for the lifetime of development. • Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of tidal flooding. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development. • Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. 				

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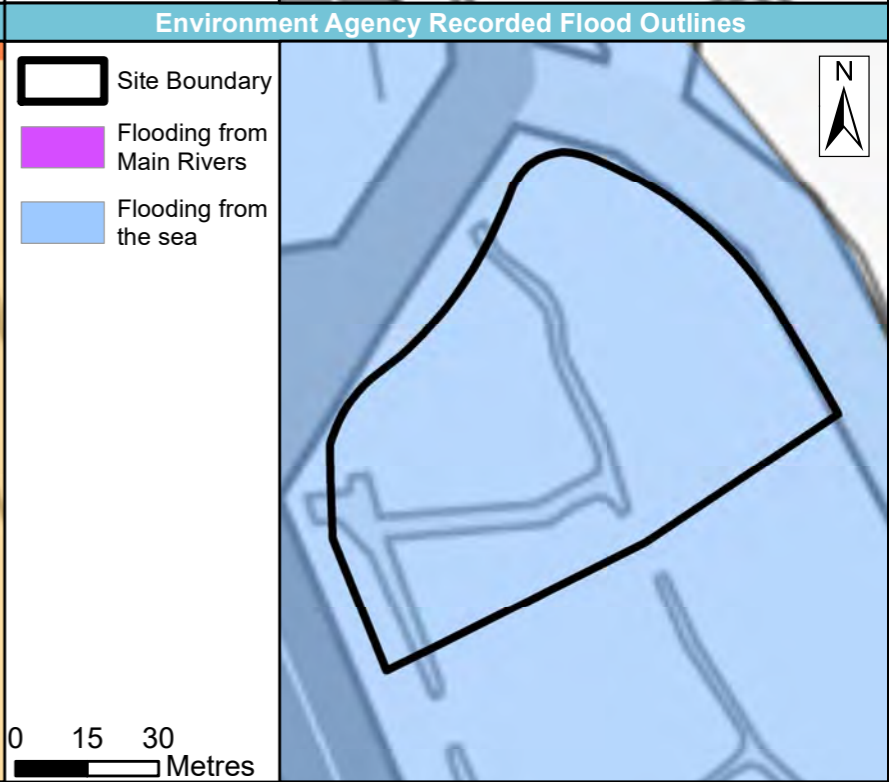
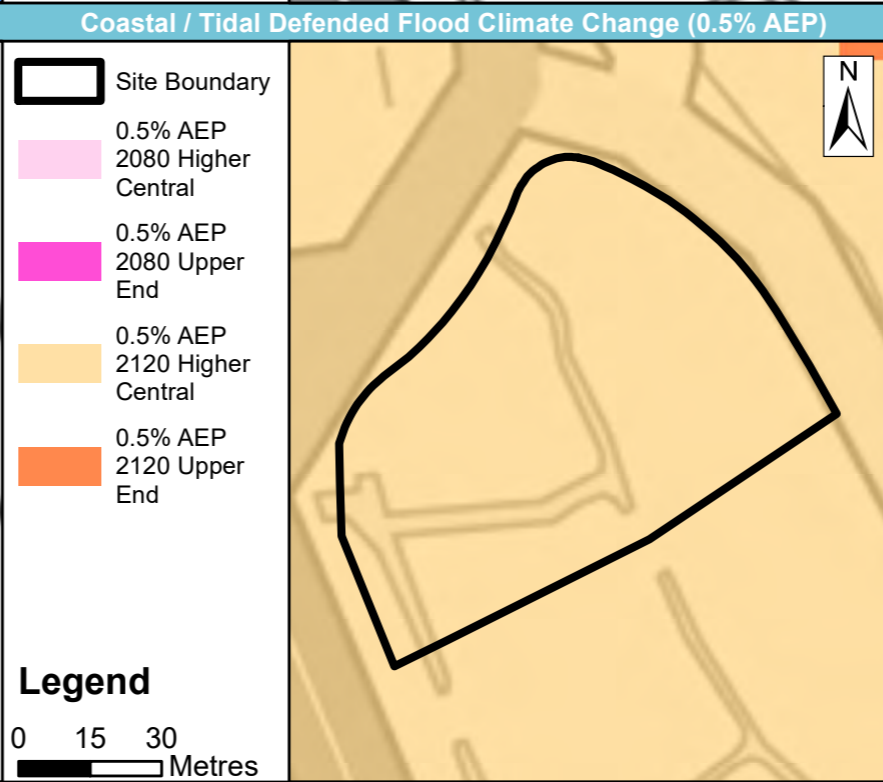
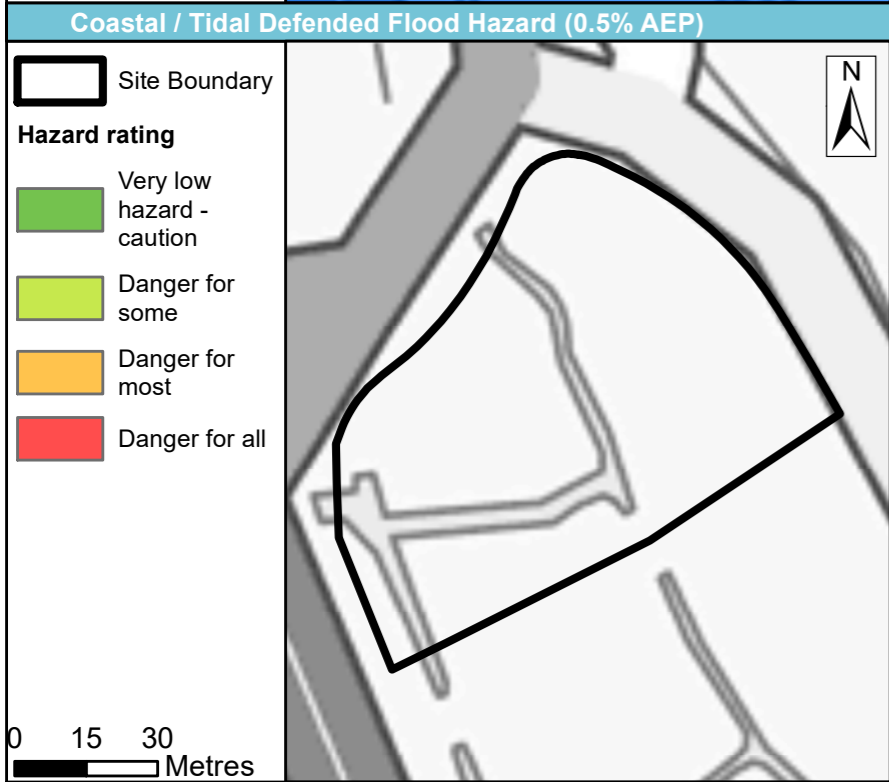
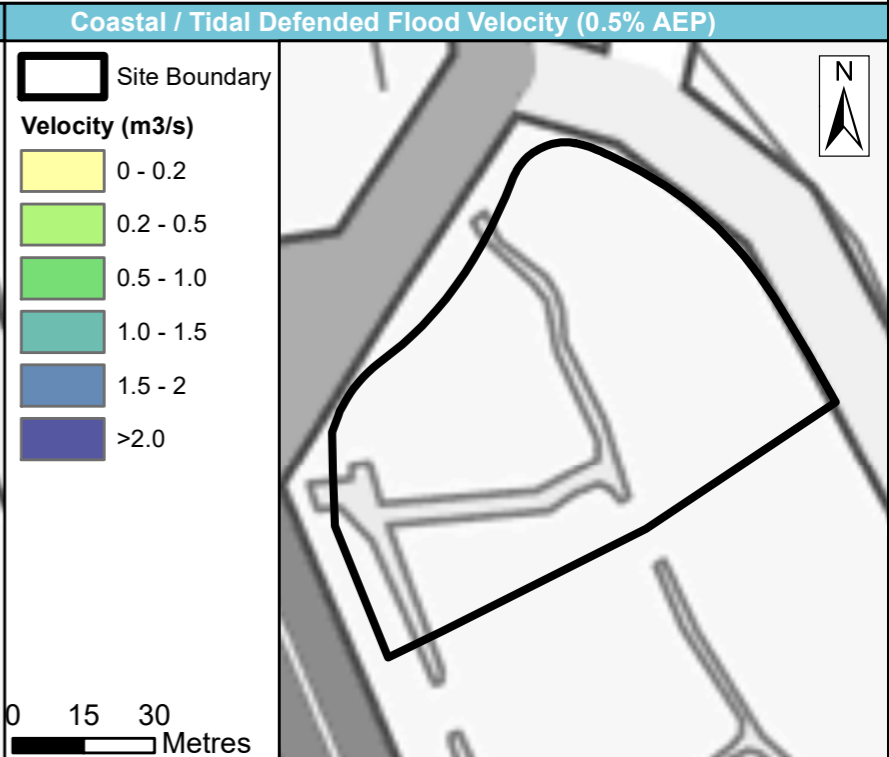
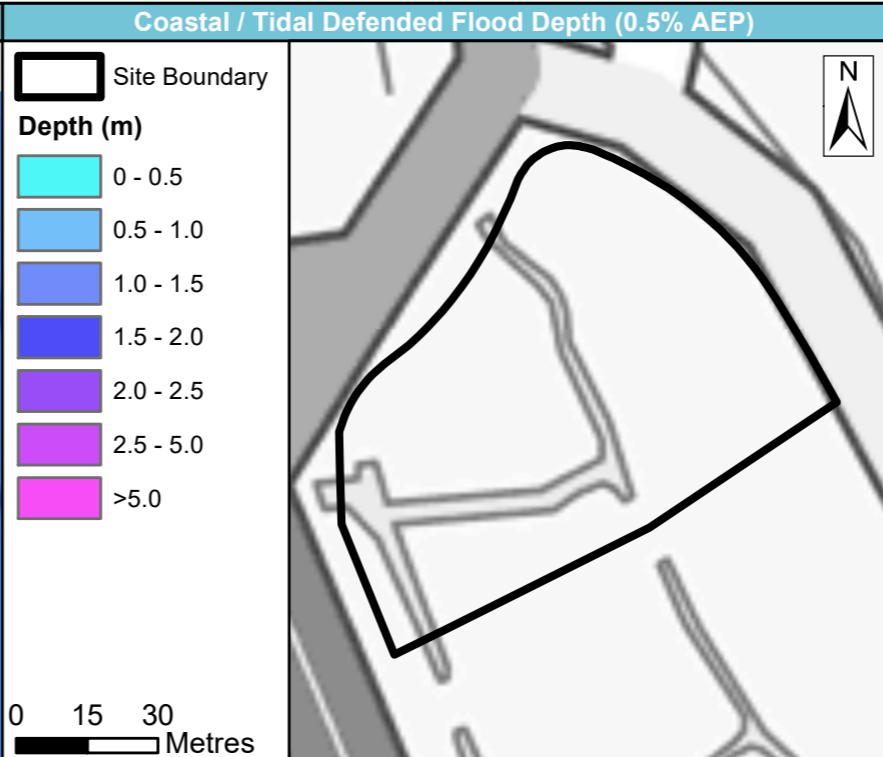
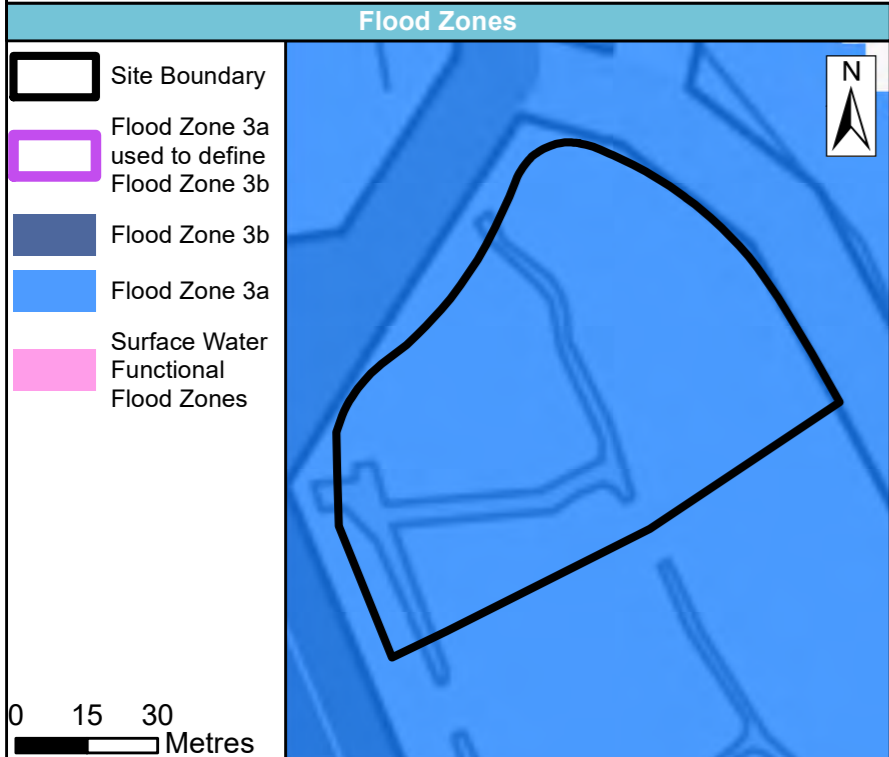
	<ul style="list-style-type: none"> • Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. • Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. • Proposals will need to demonstrate that users will be safe and more vulnerable uses are located outside Flood Zone 3a. <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • New development must seek opportunities to reduce the overall level of flood risk to the site. For example by: <ul style="list-style-type: none"> ○ Reducing rates and volumes of runoff; ○ Relocating development to lower risk flood zones; ○ Creating space for flooding. • Safe access and egress should be demonstrated in the tidal 0.5% AEP plus climate change event and as there is a risk of surface water flooding on the site, consideration should also be given to providing safe access and egress during surface water flood events. • All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff. • SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • A greenfield site such as this should be able to implement an exemplar surface water drainage scheme to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • Assessment of runoff should include allowances for climate change effects. Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk. Consideration should be given to the potential effect on the performance of the existing watercourse system of the predicted rise in mean sea level. This should address potential effects on third party land and property. The site is within the Lower Medway Internal Drainage Board (IDB), if surface water discharge to an IDB watercourse (directly or indirectly) is proposed, this will be subject to additional consents or requirements as outlined in the Board's byelaws. • SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best design practice (CIRIA C753 Manual 2015). • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name	Land at Queenborough Road
Site area (ha)	0.65464

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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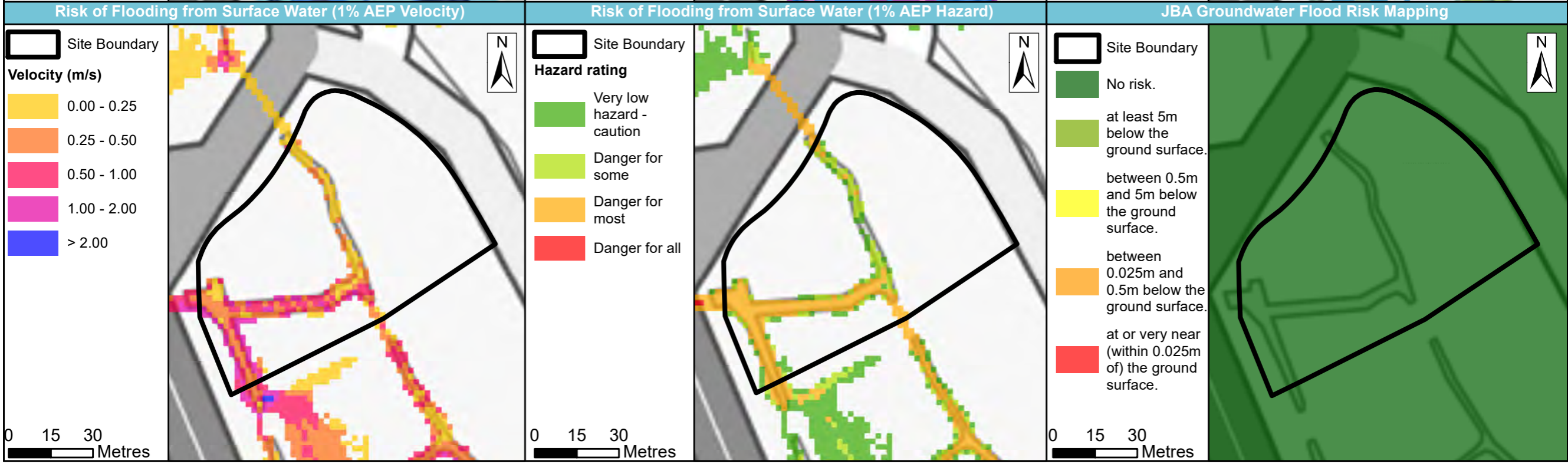
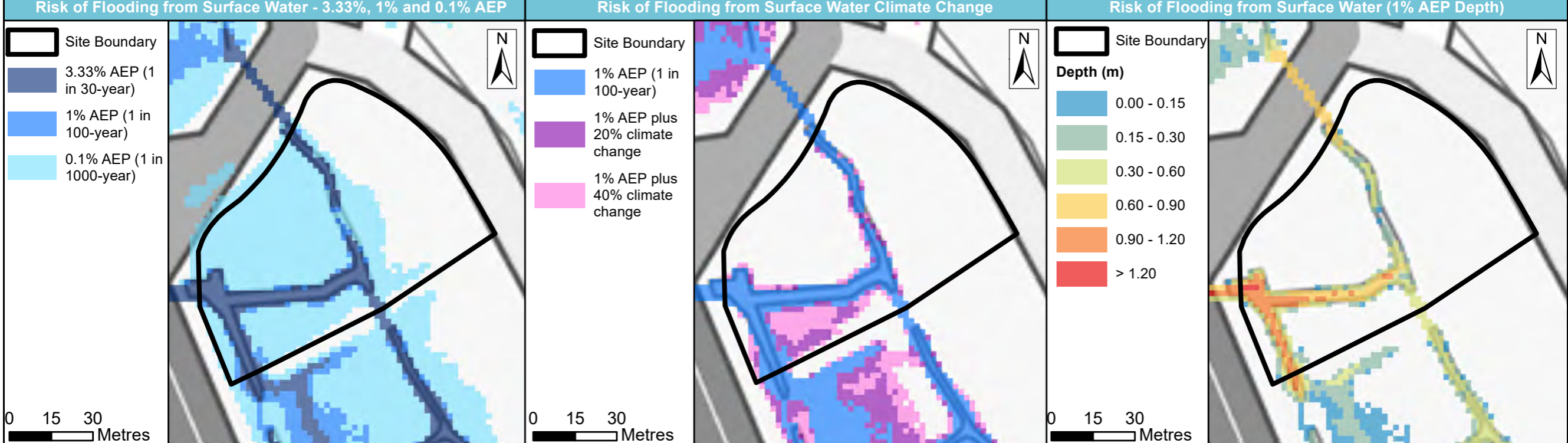


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Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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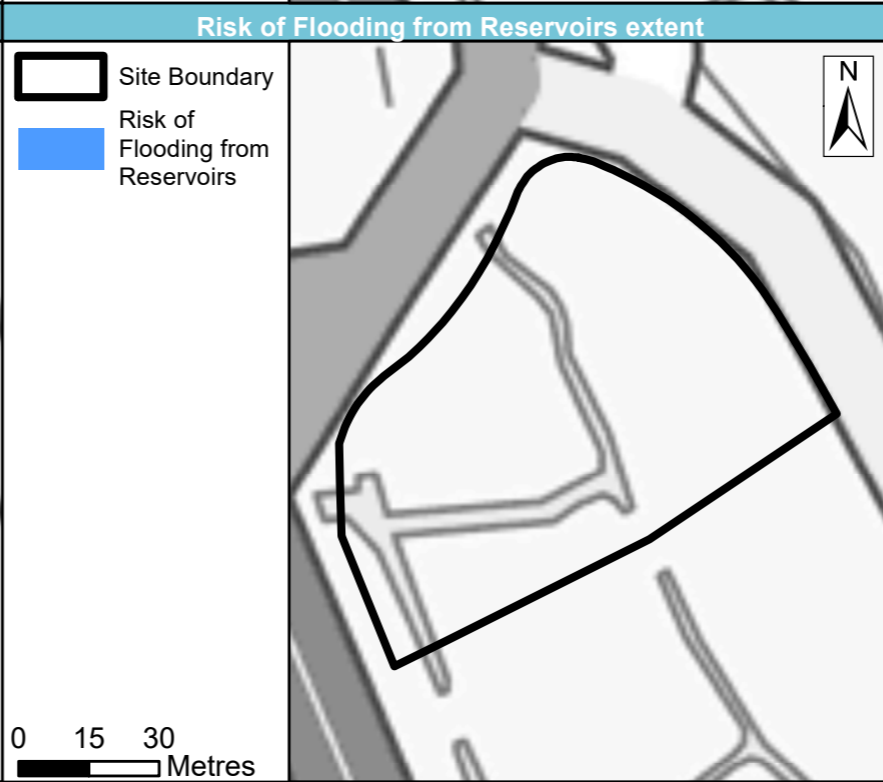
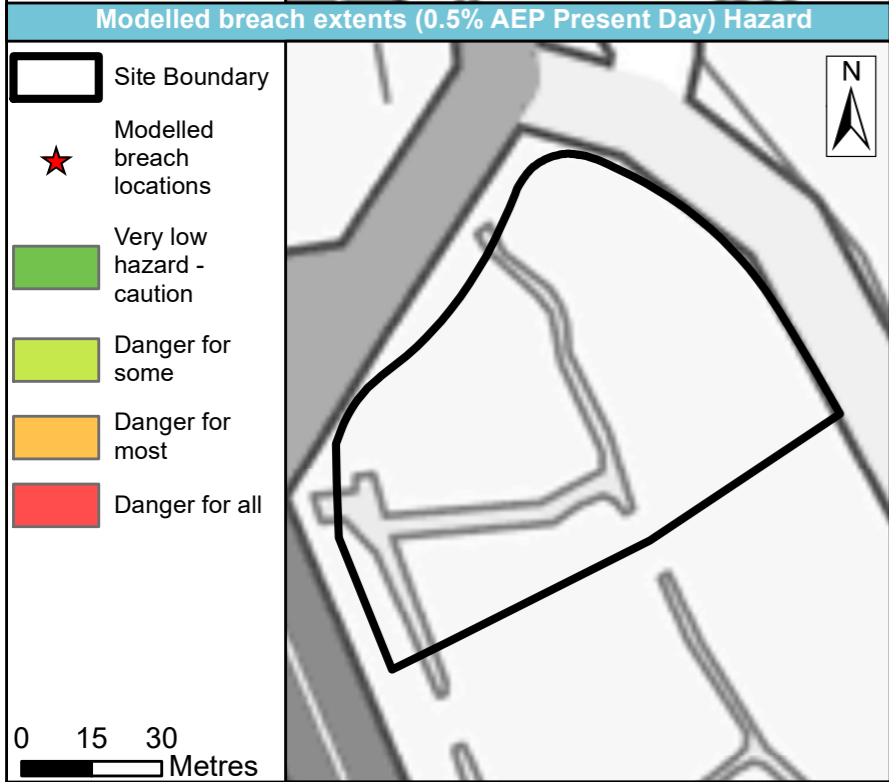
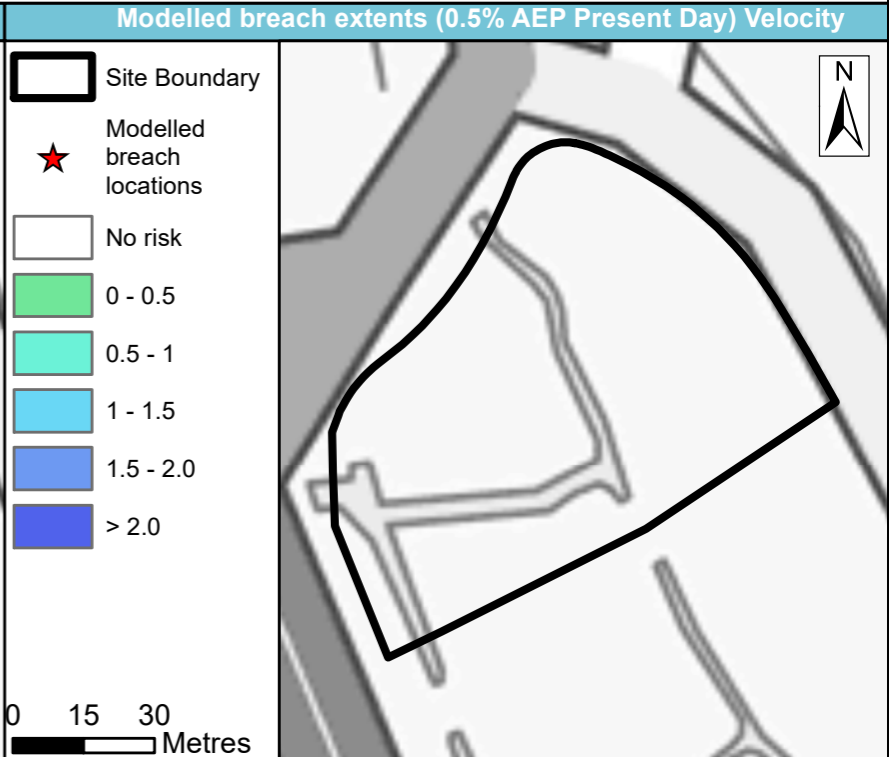
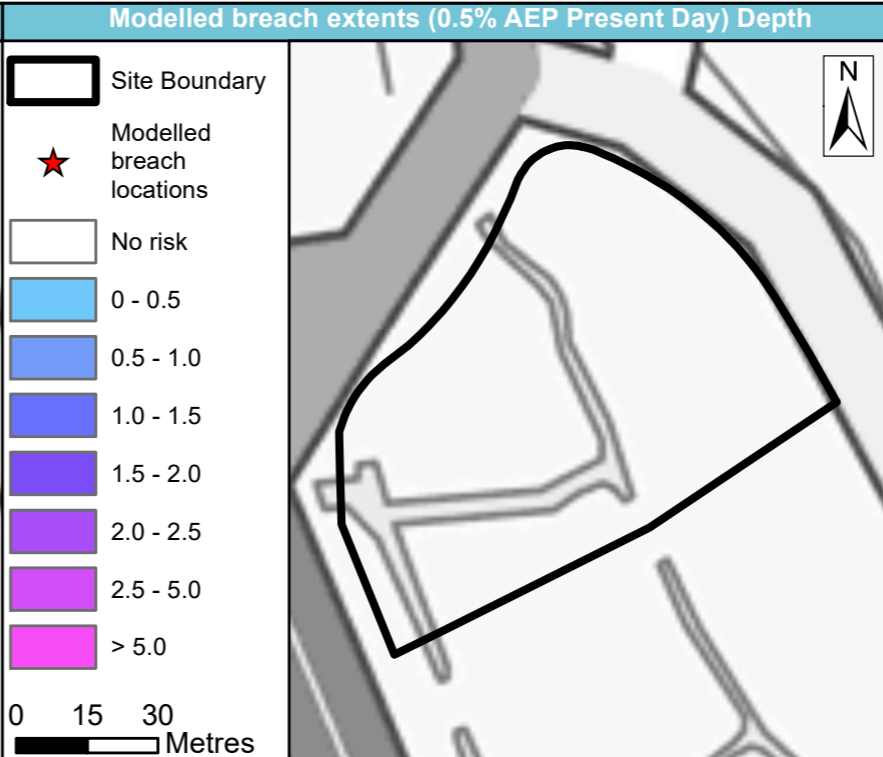
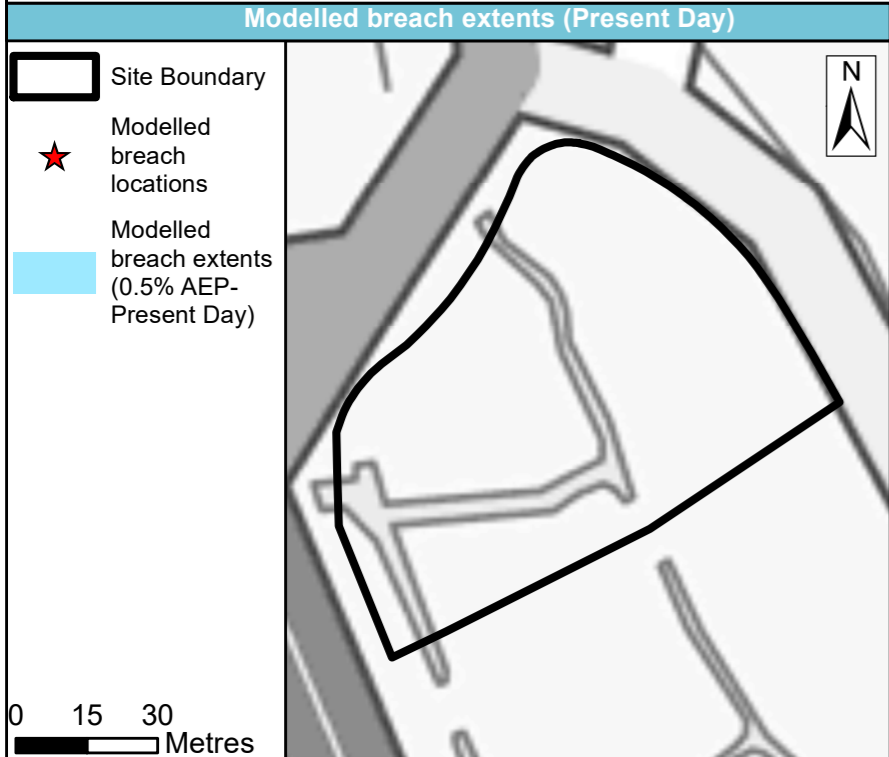


Site name	Land at Queenborough Road
Site area (ha)	0.65464

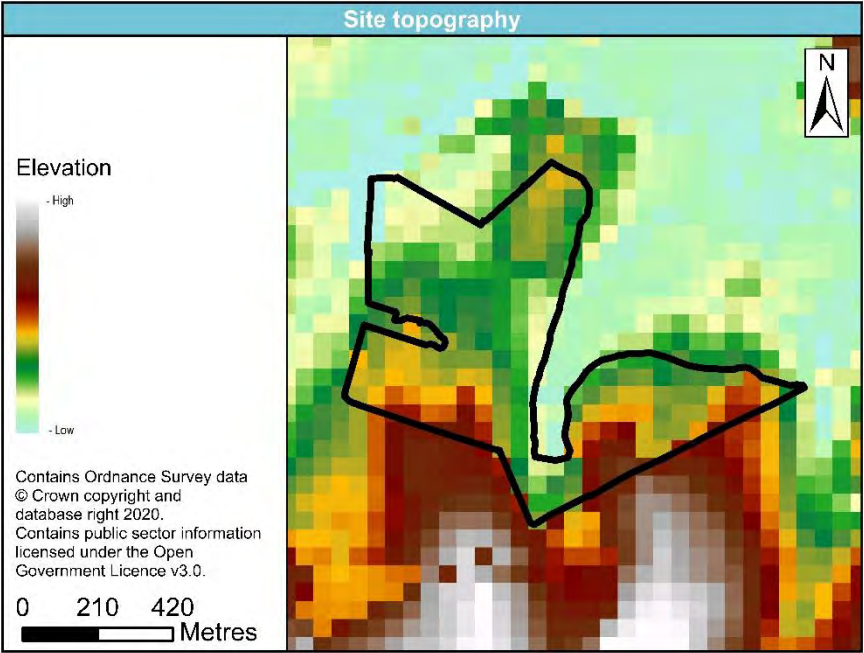
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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Site reference	SLA18/065
Site name	Land East of Abbey Farm

Site details	OS Grid reference	TR 02677 61713
	Area (ha)	52.8
	Current land use	Greenfield
	Proposed site use	Residential- 1,300 unit
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 10px;">  <p style="text-align: center;">Site topography</p> <p>Elevation - High - Low</p> <p>Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</p> <p>0 210 420 Metres</p> <ul style="list-style-type: none"> Ground levels at the site slope from north to south. There are no existing buildings at the site. An access road (Abbey Fields) is located in the north west of the site. The ground slope across the site generally has a gradient of less than 5% </div>

Site reference	SLA18/065
Site name	Land East of Abbey Farm

Sources of flood risk	Existing watercourses	<p>Faversham Creek (Main River) flows along the north west boundary of the site.</p> <p>OS mapping and aerial photography indicates that there are a number of ordinary watercourses to the north of the site, belonging to the Lower Medway Internal Drainage Board. One ordinary watercourse is identified in the parcel of land between the east and west site reaches, which appears to receive flows from a culvert under the railway line at the site boundary. Discharges from watercourses are probably through tidally dependent outfalls, as a result, residual risk due to blockages should be considered at the outfall – also the risk of failure of flap valves should be considered.</p>		
	Flood history	<p>An area 50m north west of the site is reported to have flooded in January 1979, due to the overtopping of coastal defences. Flooding was only reported on the northern bank of Faversham Creek and so is not thought to have affected the site.</p>		
	Tidal	<p>Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)</p>		
		5% AEP	0.5% AEP	0.1% AEP
		5%	7%	11%
		<p>Available modelled data: The site is covered by the Environment Agency North Kent Coast (NKC) [Tidal] 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk. JBA have recently updated the NKC model to take account of the predicted effects of UKCP18.</p> <p>Flood characteristics: A small north westerly section of the site is located within Flood Zone 3b (5% AEP defended fluvial event). This extent increases by 2% for the 0.5% AEP tidal event and a further 4% for the 0.1% AEP tidal event. Risk remains contained to the north west of the site.</p>		
Surface Water	<p>Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)</p>			
	3.3% AEP	1% AEP	0.1% AEP	
	0%	1%	4%	
	<p>Description of surface water flow paths: The site is at a negligible risk of surface water flooding for the 3.3% AEP flood event. A small amount of surface water accumulation occurs in the 1% AEP event in isolated topographic low points across the east, south and west of the site. There is a 3% increase in this flood extent for the 0.1% AEP event. A small surface water flow path is present during the 0.1% AEP event from the ordinary watercourse into the south of the site.</p> <p>Mapping showing the RoFSW only considers flood risk where the hazard rating is greater than 0.575.</p>			

Site reference	SLA18/065
Site name	Land East of Abbey Farm

	Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories		
		Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories
		5%	14%	19%
		<p>The east of the site is located within in an area with a medium risk of groundwater flooding. During a 1% AEP groundwater event, the available mapping suggests that this area is predicted to have groundwater levels between 0.5m and 5m below the ground surface. There is a small area in the south of the site with a high risk of groundwater flooding, predicted to have groundwater levels less than 0.25m below the ground surface during such event.</p> <p>However, as groundwater datasets are generally produced nationally it is recommended that more detailed local ground investigations are carried out and reported on within a site-specific FRA where this is required (groundwater known to be a potential problem locally).</p>		
	Reservoir	The site is not considered to be at risk of flooding from reservoirs.		

Site reference	SLA18/065
Site name	Land East of Abbey Farm

	Defences	Defence Type	Standard of Protection	Condition	
		Embankments	0.1%	Fair	
		Wall	0.1%	Fair	
Flood risk management infrastructure	Residual risk	Culvert / structure blockage?	The performance of outfalls to the Faversham Creek is critical to the effectiveness of the drainage as a result the residual risks from a blockage and failure of flap valves should be considered as part of a site-specific FRA.		
		Impounded water body failure?	The site is not considered to be at risk from failure of impounded water bodies.		
		Defence breach/overtopping?	Breach modelling was previously undertaken for the North Kent Coast model, whilst the site itself was not modelled for breach this is still a residual risk as it is situated behind raised defences. Breach modelling should be considered as part of a site-specific FRA.		
Emergency planning	Flood warning	The site is situated within the Environment Agency's 'Coast from Kemsley to Seasalter' (064FWCKemsley) Flood Warning Area and the Environment Agency's 'Isle of Sheppey and coast from Kemsley to Seasalter' (064WAC1ShepSwale) Flood Alert Area, which are in place to provide alerts and warnings for coastal flooding.			
	Access and egress	The defended model outputs for the 0.5% AEP (2120 epoch) climate change have been assessed as a 'worst case' scenario in the event of a breach. These confirm that safe access and egress would be available to the south of the site via Abbey Fields.			
Climate Change	Climate Change allowances to the year 2120	Proportion of site at 0.5% AEP tidal flood risk in the defended scenario			
		Area	Present day	Higher Central	Upper End
	South East England	7%	17%	24%	
Implications for the site	<p>There is a significant increase in flood extent for both climate change allowances in comparison to the present 1% AEP flood event. The central and north west sections of the site are predicted to be most susceptible to tidal flood risk in the future. The flood extent for both allowances reach and exceed that of the undefended 0.1% AEP flood extent.</p> <p>The proposals at the allocation site will need to include provisions that address the need to increase the standard of protection of the existing defences so that appropriate arrangements are in place to address the potential risk over the lifetime of the development.</p>				
Proportion of site at 1% AEP surface water flood risk					

Site reference	SLA18/065
Site name	Land East of Abbey Farm

	Impact of climate change on risk from surface water	Present day	+20% rainfall uplift	+40% rainfall uplift
			1%	2%
	Implications for the site	<p>A small increase in flood extent during the 1% AEP surface water event is predicted for the plus 20% and 40% climate change events. However, the extents do not reach that of the 0.1% AEP surface water flood event. These increases are seen as expansions in surface water pooling at localised topographic low points across the site. Therefore, the site will be at a slightly higher risk from surface water flooding in the future.</p> <p>Of greater concern is the potential effect of increases in mean sea level on the discharge capacity of the drainage system. This could affect surface water flood risk in the future, if the drainage became less effective</p>		

Site reference	SLA18/065
Site name	Land East of Abbey Farm

Requirement for drainage control and impact mitigation	Bedrock Geology	The majority of the site's bedrock geology consists of Thanet Sand Formation (sand, silt and clay). The eastern section of the site has a bedrock geology of White Chalk.
	Superficial Geology	The majority of the site is overlain by alluvium (clay, silt and sand). The central section of the site is overlain by Brickearth (silt).
	Soils	The site has freely draining slightly acid loamy soils.
	Groundwater Source Protection Zone	The site is not located within a Groundwater Source Protection Zone.
	Historic Landfill Site	There are two historic landfill sites located 20m to the west and north-west of the site, respectively.
	Broad scale assessment of possible SuDS	<p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development, particularly with respect to the discharge capacity of the tidal outfalls. Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p> <p>British Geological Society (BGS) data indicates that the underlying geology is the Thanet Sand Formation and White Chalk subgroup and the site is underlain by Alluvium and brickearth deposits. As a result, permeability is likely to be variable. Proposals to use infiltration should confirm that this is feasible through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. Mapping suggests that the site slopes make it possible to consider most forms of detention.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p>

Site reference	SLA18/065
Site name	Land East of Abbey Farm

	Cumulative impacts of development	The site is located within a catchment with a high sensitivity to development. The Implications of increased volumes both generated by the development and potentially affecting it should be addressed at an appropriate catchment level to demonstrate that additional volumes from upstream or at the site do not exacerbate flood risk at vulnerable locations remote from the site. This exercise should also consider whether the site is potentially affected by proposed development upstream.		
Recommendations for Local Plan policy	Proportion of the site within each Flood Zone			
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
	80%	7%	13%	0%
	Sequential Test and Exception Test requirements			
	The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.			
	The Exception test will be required in the following circumstances: <ul style="list-style-type: none"> • highly vulnerable and in flood zone 2 • essential infrastructure in flood zone 3a or 3b • more vulnerable in flood zone 3a 			
	Development will not normally be permitted for the following scenario: <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. 			
	The available mapping shows the site is partially within Flood Zone 3a where more vulnerable development will require the Exception Test. However, it may be possible to adopt a sequential approach to the site layout with more vulnerable development located outside of Flood Zone 3a.			
	Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers			
	Flood risk assessment: <ul style="list-style-type: none"> • At the planning application stage, a site-specific flood risk assessment will be required for this site as it is greater than 1 hectare, located within Flood Zone 2 and 3 and may be subject to other sources of flooding where the development would introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in the future. It is also required where development: <ul style="list-style-type: none"> • Is on land which has been identified by the Environment Agency as having critical drainage problems; or • Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. • The residual risk to the site posed by failure of flood defences, including overtopping and breach should be considered in a site-specific Flood Risk Assessment. Maintenance arrangements (including funding mechanisms) for the defences will need to be demonstrated for the lifetime of development. • Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of tidal, surface water flooding and drainage. Proposals should consider the opportunity to include measures that provide for a reduction in predicted surface water flood risk at existing development. • Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. • Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. 			

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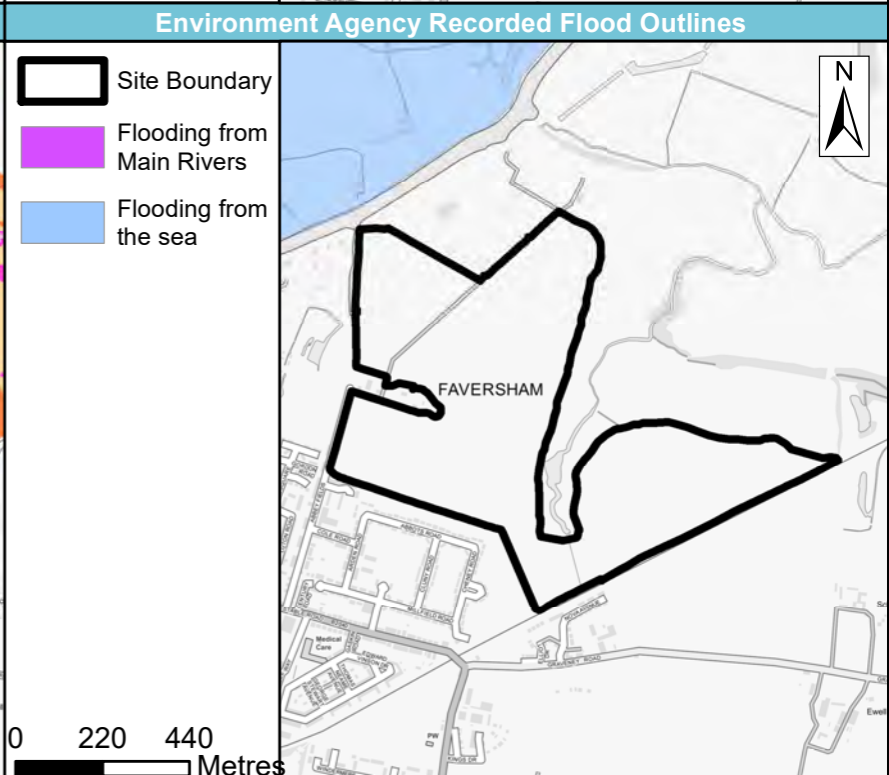
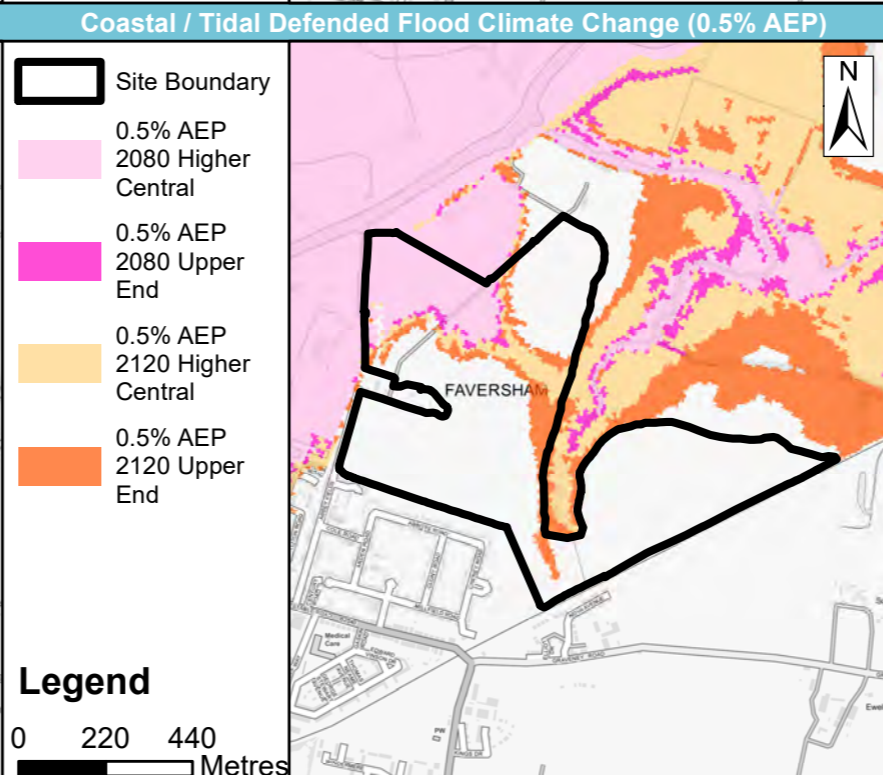
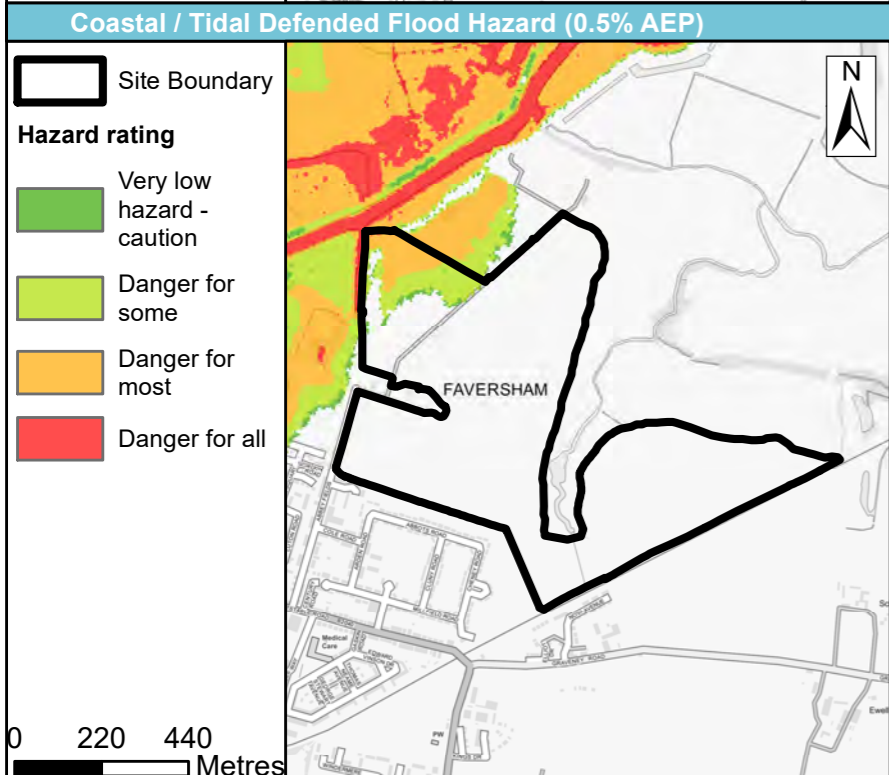
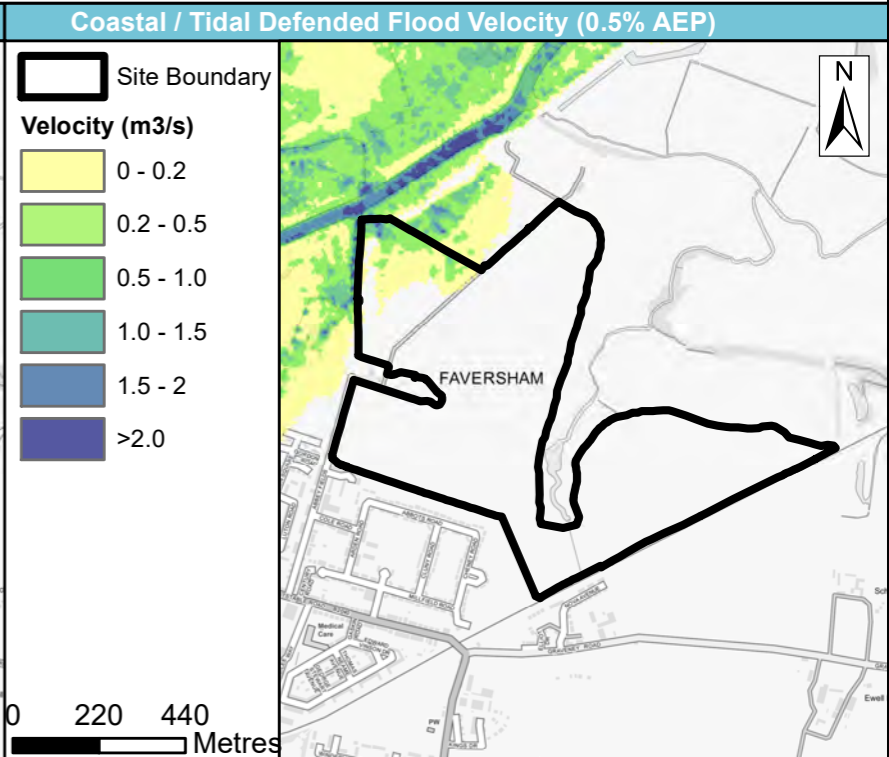
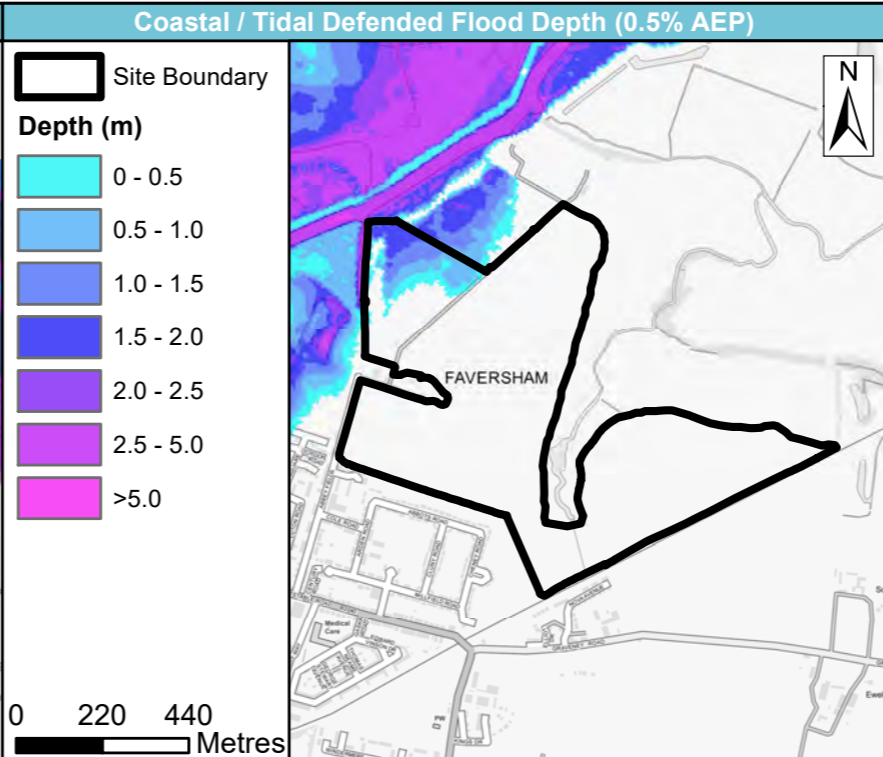
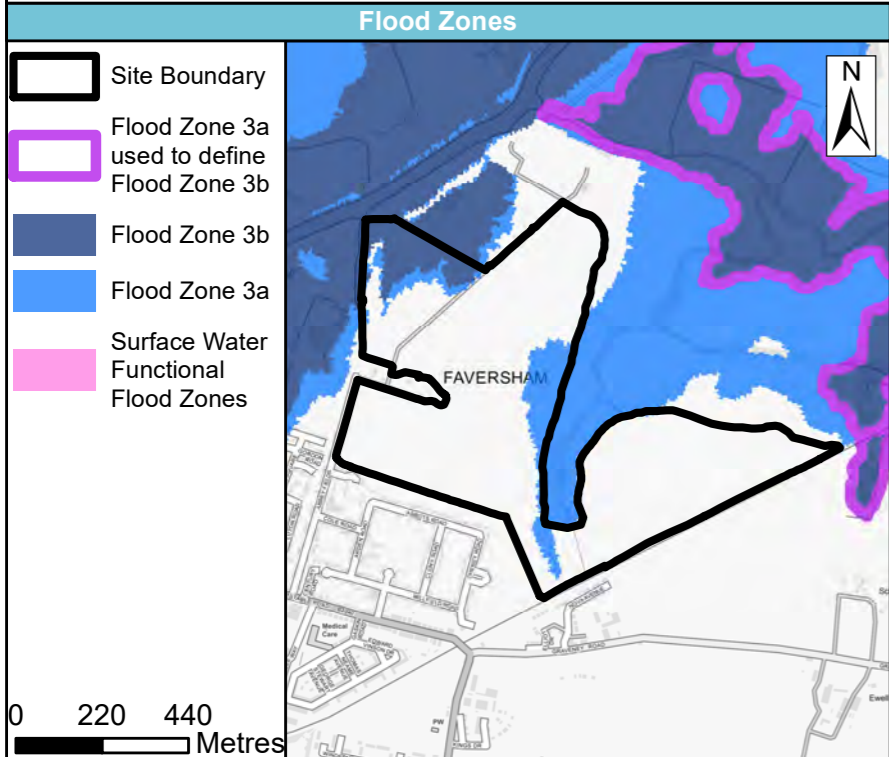
	<ul style="list-style-type: none"> • Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. • Proposals will need to demonstrate that the site can adopt a sequential approach more vulnerable uses located in lower risk parts of the site where possible. • Cumulative effects should be considered (see above). <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • New development must seek opportunities to reduce the overall level of flood risk at the site. For example, by: <ul style="list-style-type: none"> • Reducing volume and rate of runoff • Relocating development to zones with lower flood risk • Creating space for flooding. • Safe access and egress should be demonstrated in the tidal 0.5% AEP plus climate change events. Consideration should also be given to providing safe access and egress during surface water events. • The commitment required to strategic improvement of the standard of protection afforded by the existing defences should be addressed and appropriate arrangements established. • All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff. • SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • A greenfield site such as this should be able to implement an exemplar surface water drainage scheme to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • Assessment of runoff should include allowances for climate change effects. . Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk. The capacity of discharges to the Faversham Creek might be affected by changes in mean sea level and the potential implications should be addressed. • The site is partly within the Lower Medway Internal Drainage Board (IDB), if surface water discharge to an IDB watercourse (directly or indirectly) is proposed, this will be subject to additional consents or requirements as outlined in the Board's byelaws. • SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best practice (CIRIA C752 Manual 2015). • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name	Land East of Abbey Farm
Site area (ha)	52.7968

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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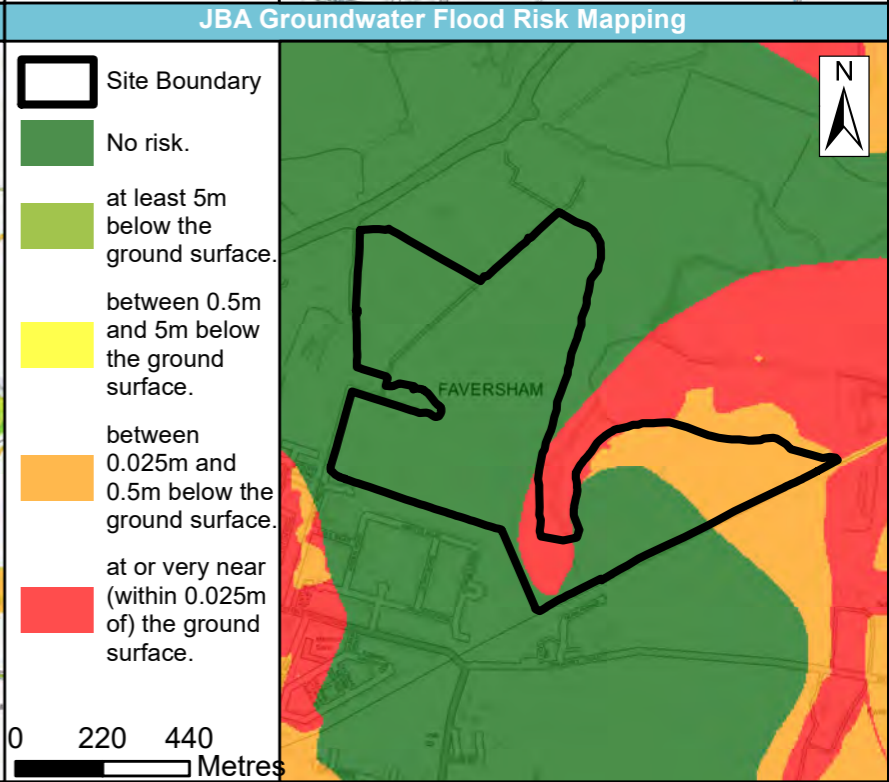
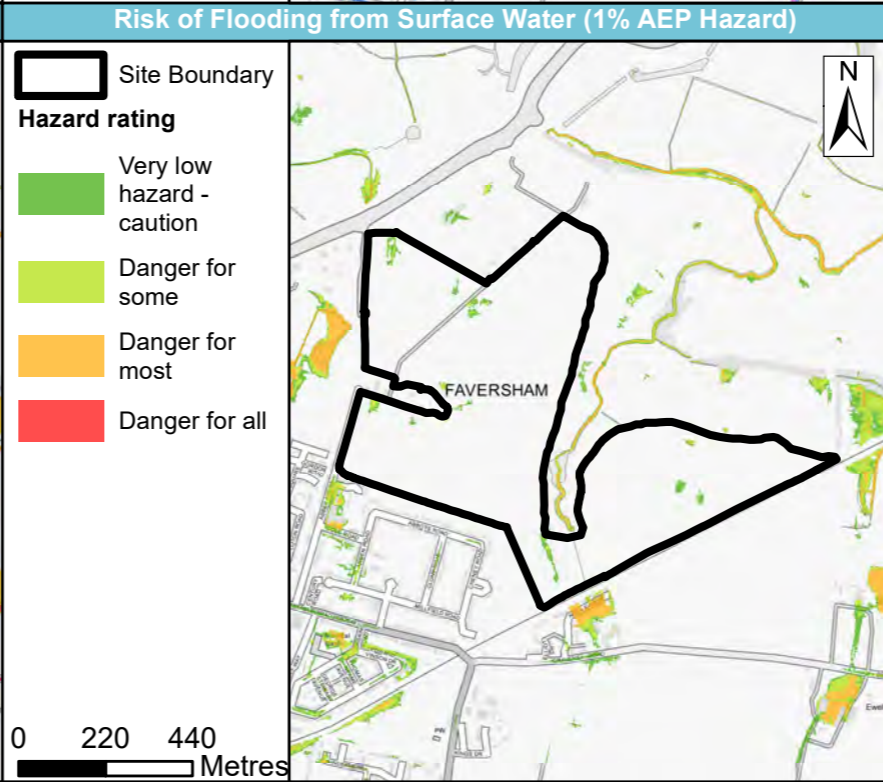
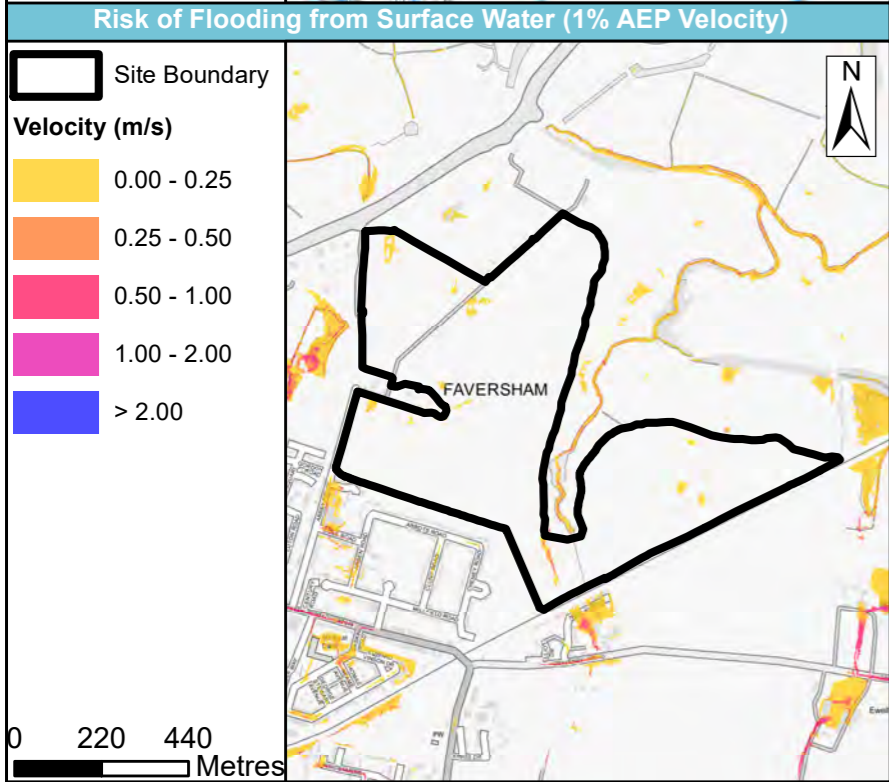
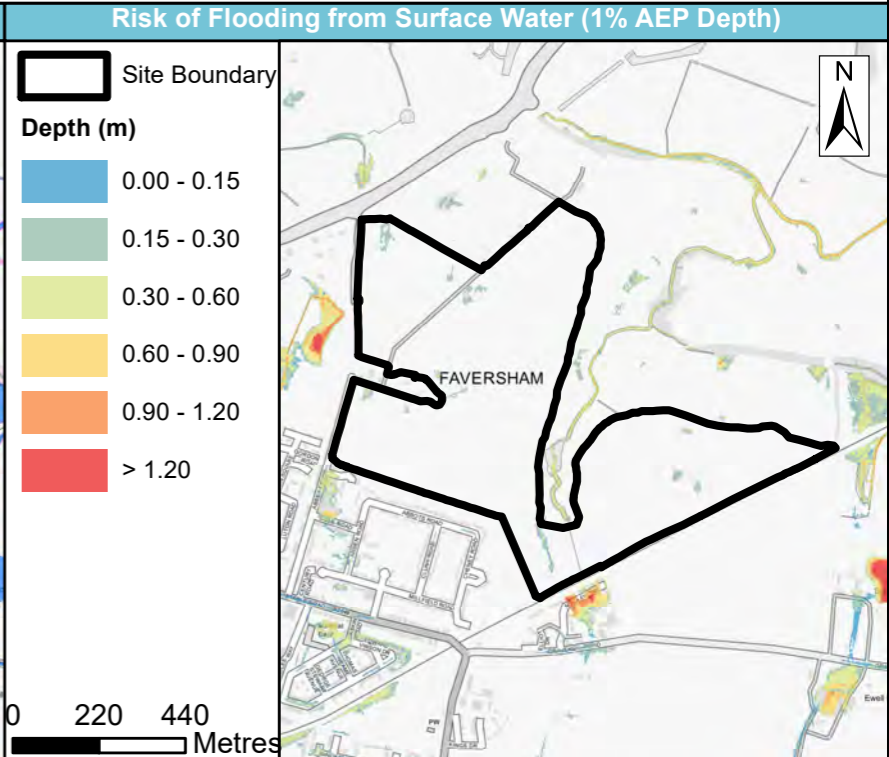
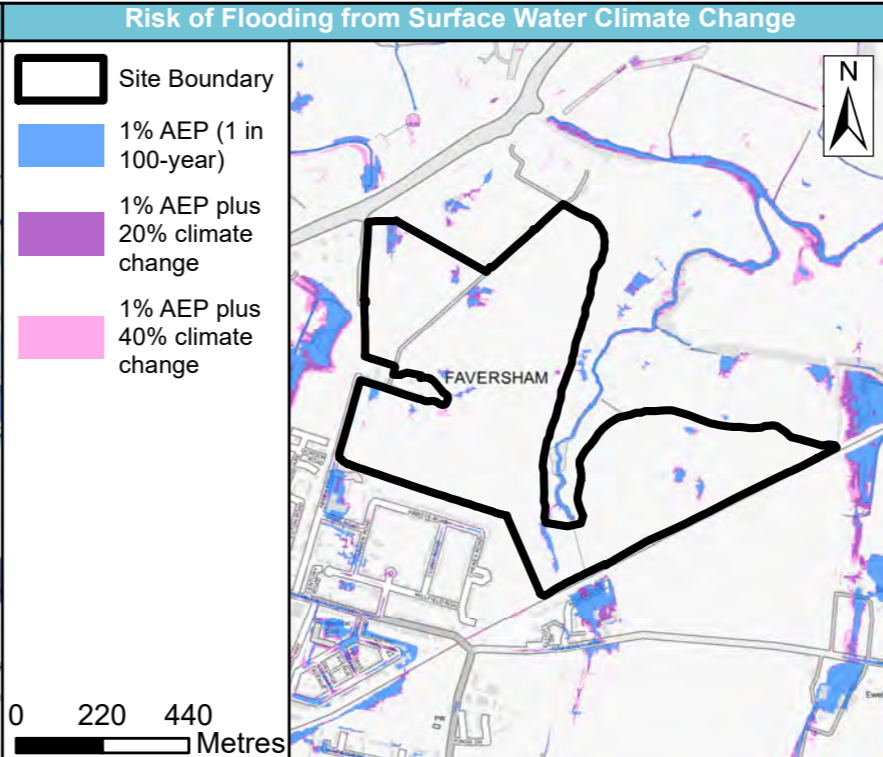
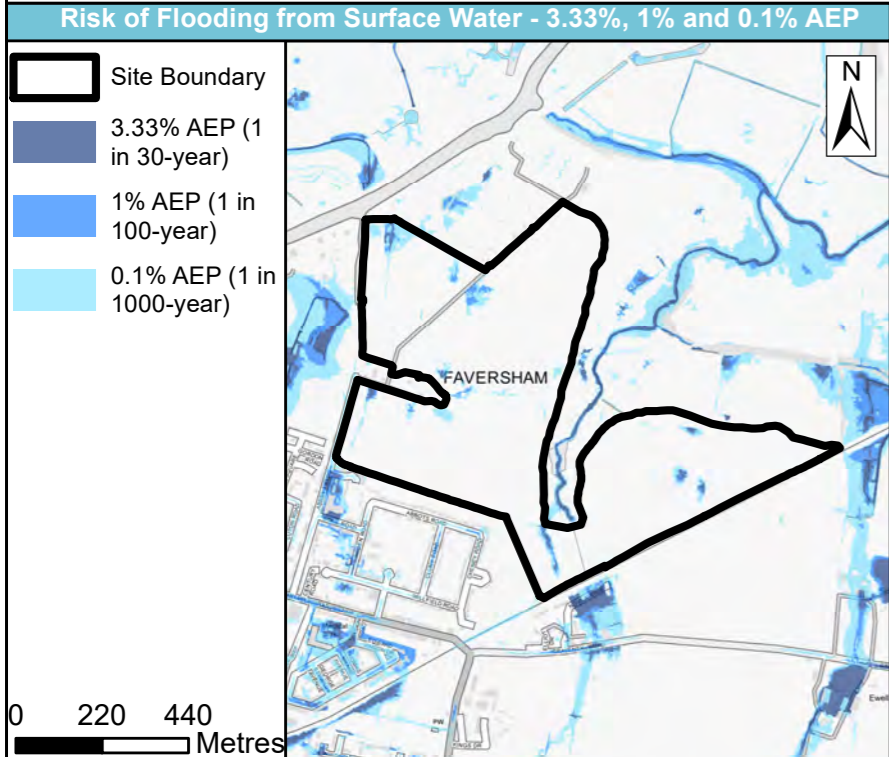


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Site area (ha)	52.7968

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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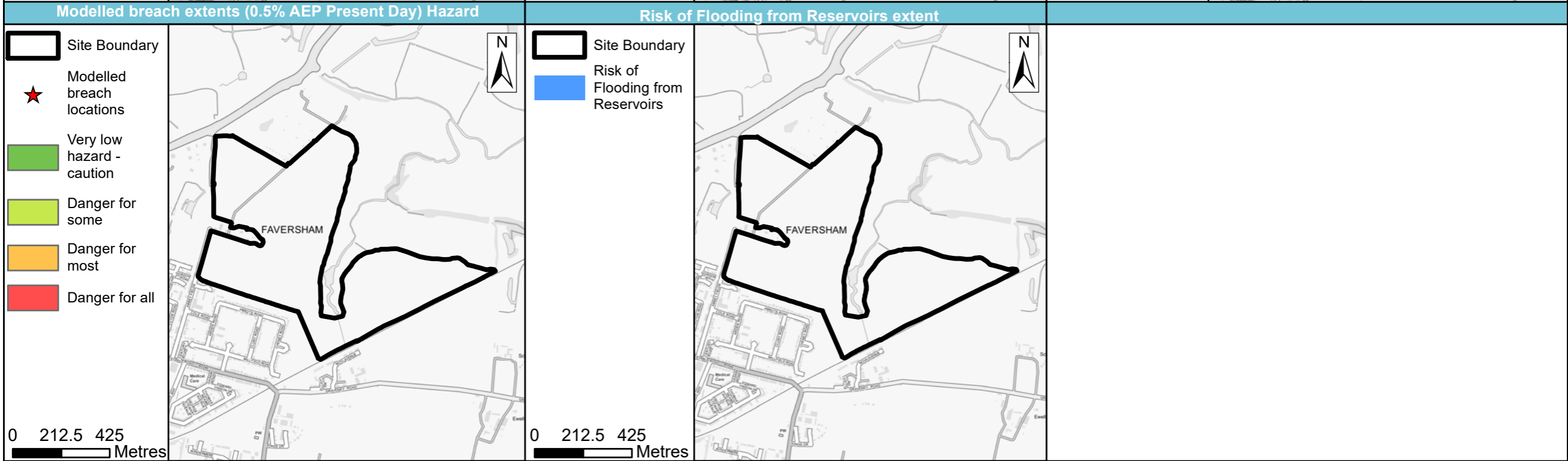
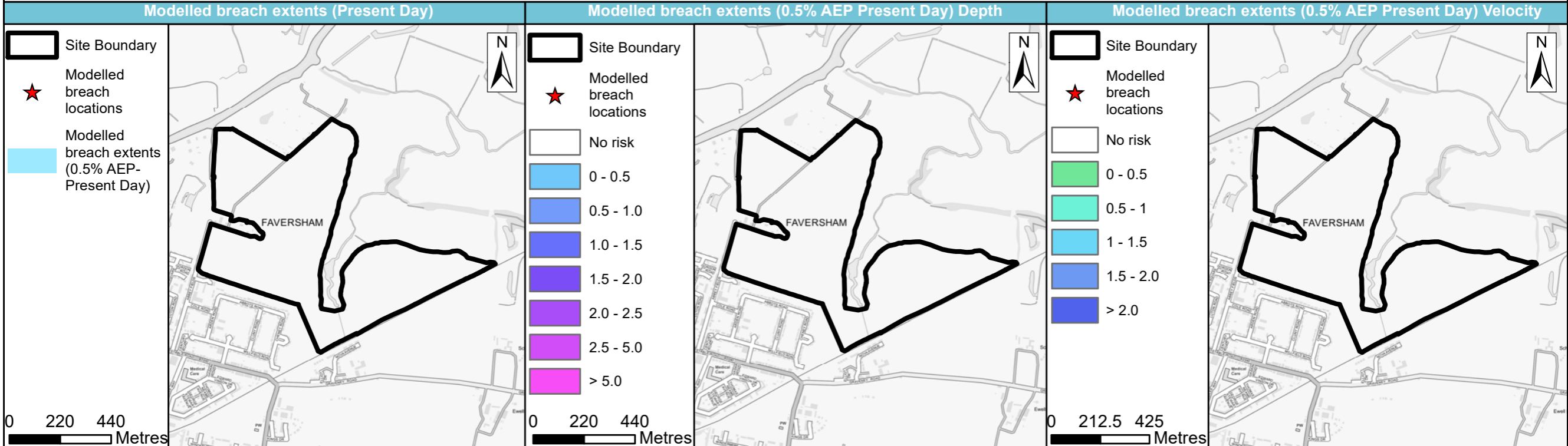


Site name	Land East of Abbey Farm
Site area (ha)	52.7968

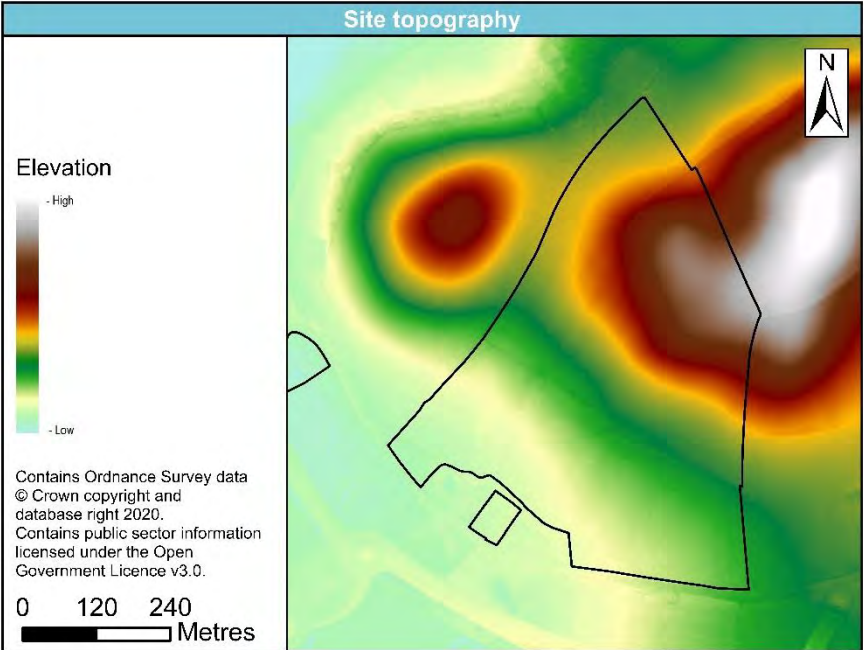
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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Site reference	SLA18/165
Site name	Land East of Queenborough

Site details	OS Grid reference	TQ 92402 71801
	Area (ha)	26.8
	Current land use	Agriculture
	Proposed site use	Residential- 540 units
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #00a0c0; color: white; margin: 0;">Site topography</p>  <p style="font-size: small; margin: 5px 0;"> Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0. </p> <p style="margin: 0;">0 120 240 Metres</p> </div> <ul style="list-style-type: none"> Ground levels at the site slope from north-east to south-west There are a few existing agricultural buildings at the site along an access road in the south from Neats Court Farm. The ground slope across the site generally has a gradient of greater than 5%

Site reference	SLA18/165
Site name	Land East of Queenborough

Sources of flood risk	Existing watercourses	An ordinary watercourse is located approximately 400m west of the site. The site is in the Lower Medway Internal Drainage Board (LMIDB) area, although this watercourse is not listed as an IDB asset, nor is it considered to be an EA main river.		
	Flood history	A significant area to the north, west and south of the site is reported to have flooded in February 1953 as a result of the overtopping of coastal defences. No flooding was recorded within the site boundary.		
	Tidal	Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	0.5% AEP	0.1% AEP
		0%	0%	0%
		Available modelled data: The site is covered by the Environment Agency North Kent Coast (Tidal) 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk. JBA have recently updated the NKC model to take account of UKCP18. Flood characteristics: The site is not at risk of flooding from the tidal scenarios.		
	Surface Water	Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		3.3% AEP	1% AEP	0.1% AEP
		1%	2%	10%
		Description of surface water flow paths: A small surface water flow path is present during the 3.3% AEP event along Queensborough Road, resulting in surface water accumulation along the south west boundary of the site. A 1% increase in this flood extent to the south is predicted for the 1% AEP event. During the 0.1% AEP event an additional surface water flow path is present along the western site boundary, resulting in a further 8% increase in flood extent. Mapping showing the RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.		
Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories			
	Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories	
	0%	0%	0%	
	The entire site is considered to be at a negligible risk of groundwater flooding during a 1% AEP groundwater flood event. However, as groundwater datasets			

Site reference	SLA18/165
Site name	Land East of Queenborough

		are generally produced nationally it is recommended that ground investigations are carried out and reported on within a site-specific FRA where this is required (known to be a problem locally).			
	Reservoir	The site is not considered to be at risk of flooding from reservoirs.			
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition	
		Embankment	0.1%	Fair	
		High Ground	0.1-4%	Poor-Good	
		Wall	0.1%	Fair	
	The section of the North Kent Coastline in proximity to the site is lined with sections of embankments, walls and high ground with varying standards of protection and conditions.				
Residual risk	Culvert / structure blockage?	There are no known culverts or structures in the vicinity of the site.			
	Impounded water body failure?	The site is not considered to be at risk from failure of impounded water bodies.			
	Defence breach/overtopping?	<p>The watercourse to the west of the site ultimately discharges into the River Swale 1km downstream of the site. Defences at this point have been previously modelled for a breach in 2016.</p> <p>Breach extents remain to the western side of the A249 and therefore the site is not thought to be at risk of flooding due to defence breach or overtopping.</p>			
Emergency planning	Flood warning	The site is situated within the Environment Agency's 'Sheerness, Minster and Queenborough' (064WAC1ShepSwale) Flood Warning Area and the Environment Agency's 'Isle of Sheppey and coast from Kemsley to Seasalter' (064WAC1ShepSwale) Flood Alert Area, which are in place to provide alerts and warnings for coastal flooding.			
	Access and egress	The defended model outputs for the 0.5% AEP (2120 epoch) climate change have been assessed as a 'worst case' scenario event. These confirm that safe access and egress would be available to the south east of the site along Queensborough Road.			
Climate Change	Climate Change allowances to the year 2120	Proportion of site at 0.5% AEP tidal flood risk in the defended scenario			
		Area	Present day	Higher Central	Upper End
		South East England	0%	5%	9%

Site reference	SLA18/165
Site name	Land East of Queenborough

	Implications for the site	<p>The site which is not considered to be at risk during the present day 1% AEP scenario, is sensitive to the impacts of climate change on tidal flood risk for the 2120 epoch. A relatively small portion of the south west corner of the site is predicted to be susceptible to tidal flood risk in the future.</p> <p>The proposals at the allocation site will need to include provisions that address the need to increase the standard of protection of the existing defences so that appropriate arrangements are in place to address the potential risk over the lifetime of the development, or adopt a sequential approach to development that avoids placing vulnerable receptors in locations that might flood in future.</p>		
	Impact of climate change on risk from surface water	Proportion of site at 1% AEP surface water flood risk		
		Present day	+20% rainfall uplift	+40% rainfall uplift
		2%	3%	4%
Implications for the site	<p>A small increase in flood extent during the 1% AEP surface water event is predicted for the plus 20% and 40% climate change events. However, the extents do not reach that of the 0.1% AEP surface water flood event. These increases are located along the southern site boundary and in the west of the site. Therefore, the site will be at a slightly higher risk from surface water flooding in the future.</p>			

Site reference	SLA18/165
Site name	Land East of Queenborough

Requirement for drainage control and impact mitigation	Bedrock Geology	The site's bedrock geology consists of the Thames Group (clay, silt, sand and gravel).
	Superficial Geology	The site is not overlain by any superficial deposits.
	Soils	The site has slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils
	Groundwater Source Protection Zone	The site is not located within a Groundwater Source Protection Zone.
	Historic Landfill Site	The site is not located within a historic landfill site
	Broad scale assessment of possible SuDS	<p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p> <p>British Geological Society (BGS) data indicates that the underlying geology is the Thames Group and underlying soils are slowly permeable loamy and clayey. Groundwater levels and the permeability of soils at the site should be assessed via an infiltration test, with the use of infiltration maximised as much as possible. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. Mapping suggests that the site slopes make it possible to consider most forms of detention.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p>

Site reference	SLA18/165
Site name	Land East of Queenborough

	Cumulative impacts of development	The site is located across a catchment boundary, with the north west of the site in a catchment with a high sensitivity to cumulative impacts of development and the south east of the site in a catchment with medium sensitivity. However, the isolated location of this site makes it unlikely that it would be associated with flood risk issues that could give rise to substantive cumulative effects.			
Recommendations for Local Plan policy	Proportion of the site within each Flood Zone				
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	
	94%	2%	4%	0%	
	Sequential Test and Exception Test requirements				
	The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.				
	The Exception test will be required in the following circumstances: <ul style="list-style-type: none"> highly vulnerable and in flood zone 2 essential infrastructure in flood zone 3a or 3b more vulnerable in flood zone 3a 				
	Development will not be permitted for the following scenario: <ul style="list-style-type: none"> Highly vulnerable development within FZ3a. Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. 				
	The available mapping shows the site is partially within Flood Zone 3a where more vulnerable development requires the exception test. However, it should be possible to adopt a sequential approach to the site layout with more vulnerable development located outside of Flood Zone 3a.				
	Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers				
	Flood risk assessment: <ul style="list-style-type: none"> At the planning application stage, a site-specific flood risk assessment will be required for this site as it is greater than 1 hectare, located within Flood Zone 2 and 3 and may be subject to other sources of flooding where the development would introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in the future. It is also required where development: <ul style="list-style-type: none"> Is on land which has been identified by the Environment Agency as having critical drainage problems; or Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of tidal and surface water flooding. Proposals should consider the opportunity to include measures that provide for a reduction in predicted surface water flood risk at existing development. Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. Proposals will need to demonstrate that the site can adopt a sequential approach more vulnerable uses located in lower risk parts of the site where possible. Cumulative effects should be considered (see above). 				

Site reference	SLA18/165
Site name	Land East of Queenborough

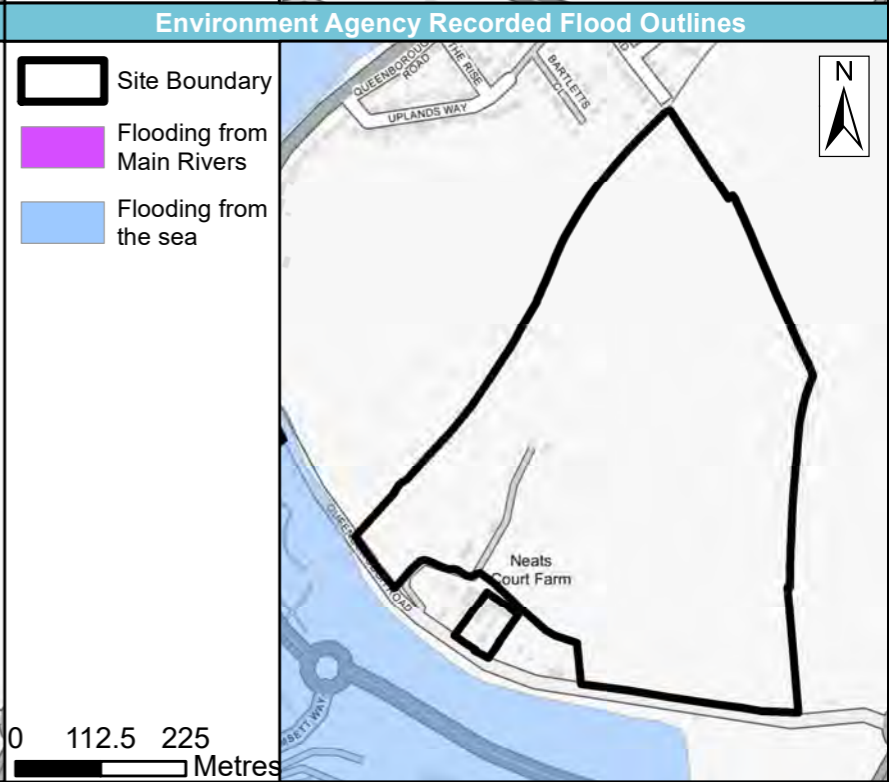
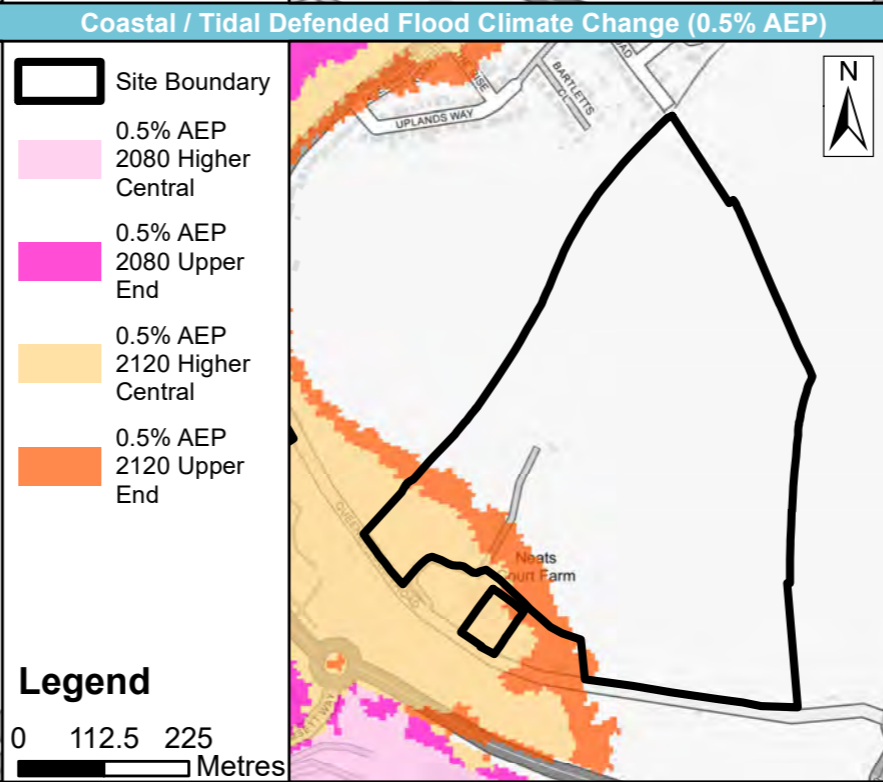
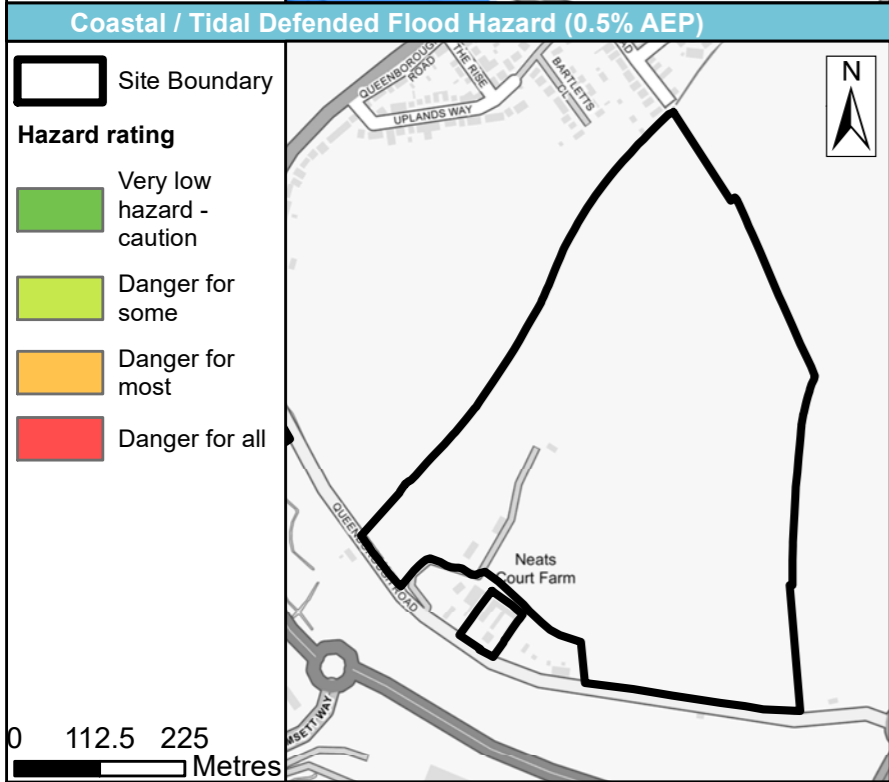
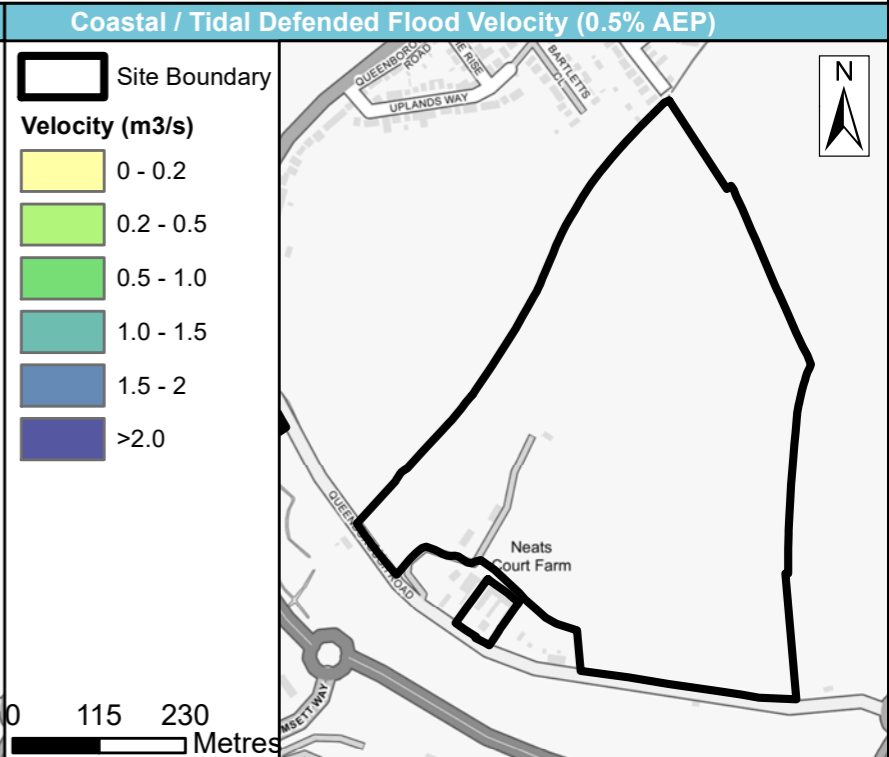
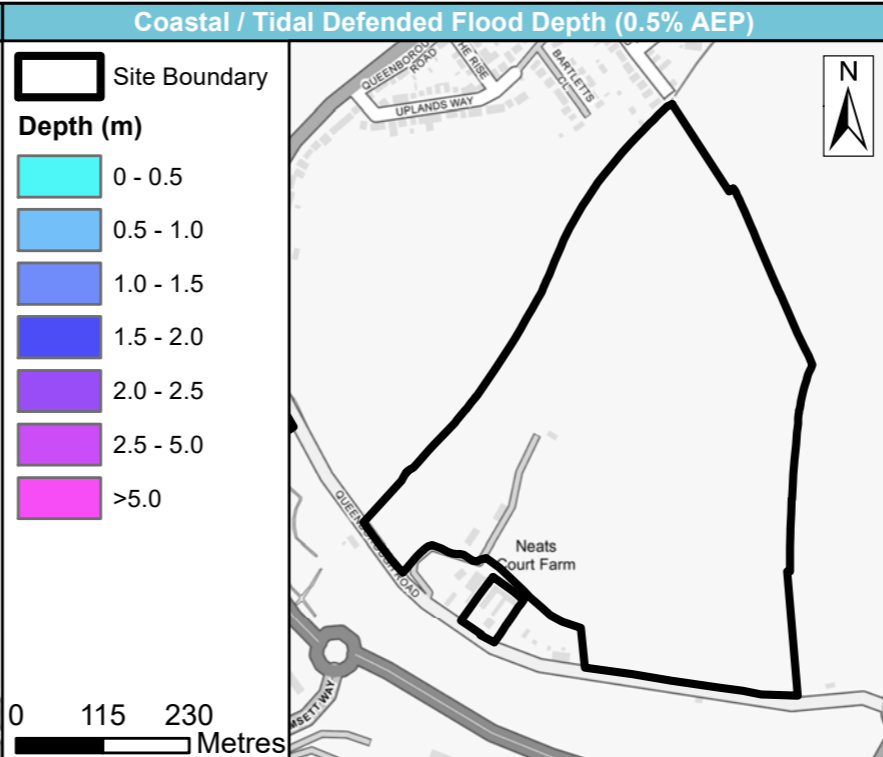
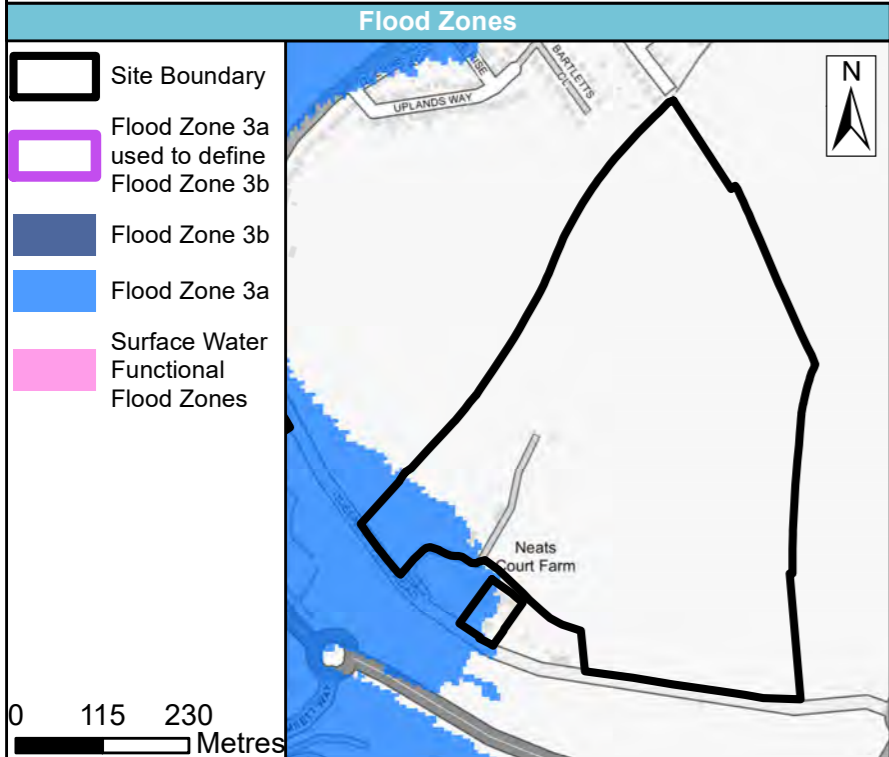
	<p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • New development must seek opportunities to reduce the overall level of flood risk at the site. For example, by: <ul style="list-style-type: none"> ○ Reducing volume and rate of runoff ○ Relocating development to zones with lower flood risk ○ Creating space for flooding. • Safe access and egress should be demonstrated in the tidal 0.5% AEP plus climate change events. Consideration should also be given to providing safe access and egress during surface water events. • If development is proposed in locations at future risk from flood risk the commitment required to strategic improvement of the standard of protection afforded by the existing defences should be addressed and appropriate arrangements established. An appropriate sequential approach to proposed development would address this requirement. • All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff. • SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • A greenfield site such as this should be able to implement an exemplar surface water drainage scheme to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • Assessment of runoff should include allowances for climate change effects. Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk. • The site is partly within the Lower Medway Internal Drainage Board (IDB), if surface water discharge to an IDB watercourse (directly or indirectly) is proposed, this will be subject to additional consents or requirements as outlined in the Board's byelaws. • SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best practice (CIRIA C752 Manual 2015). • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name	Land East of Queenborough
Site area (ha)	26.8098

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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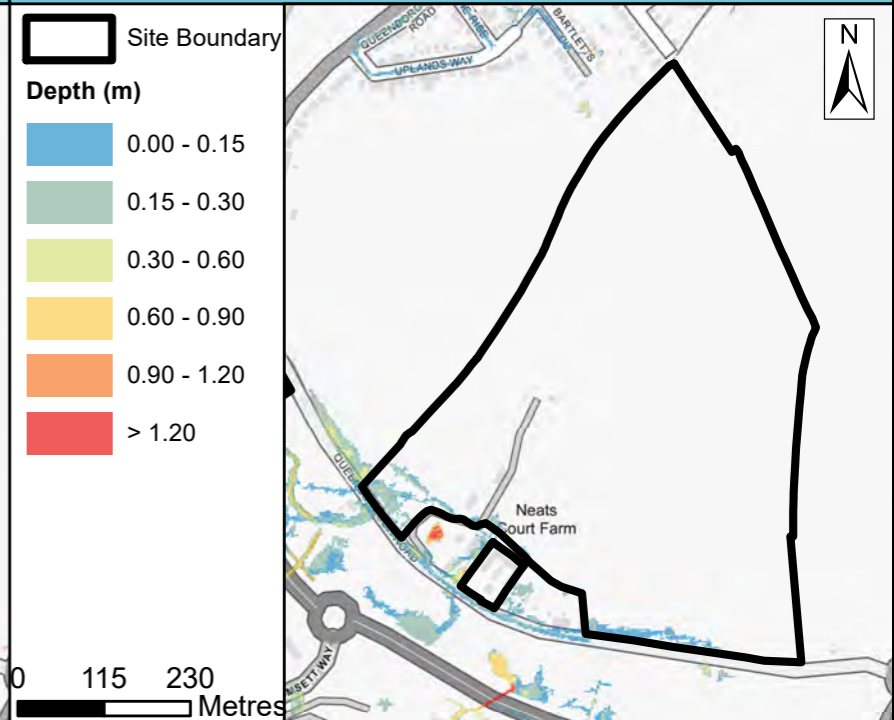
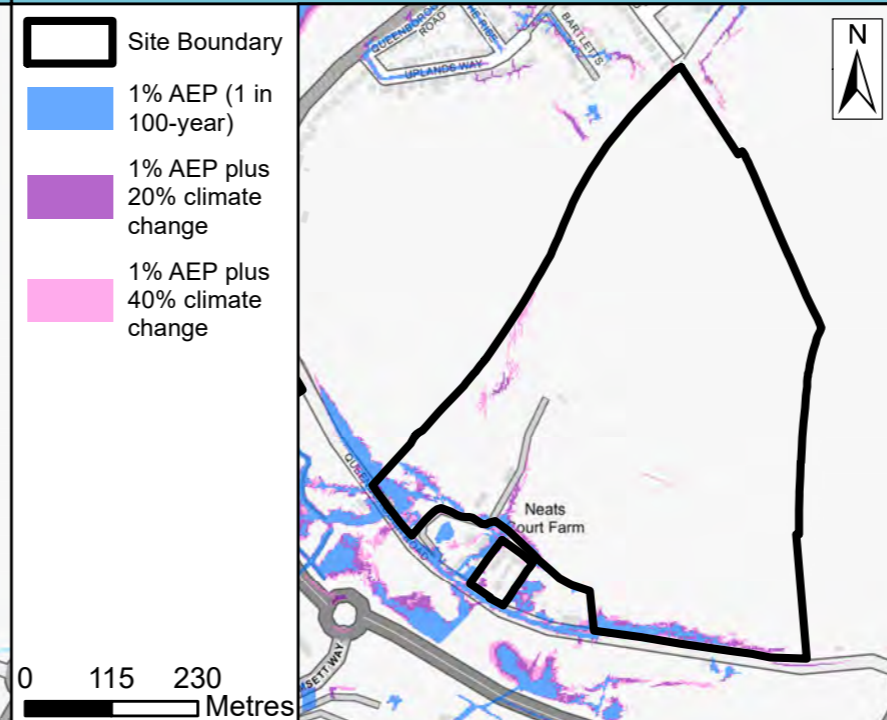
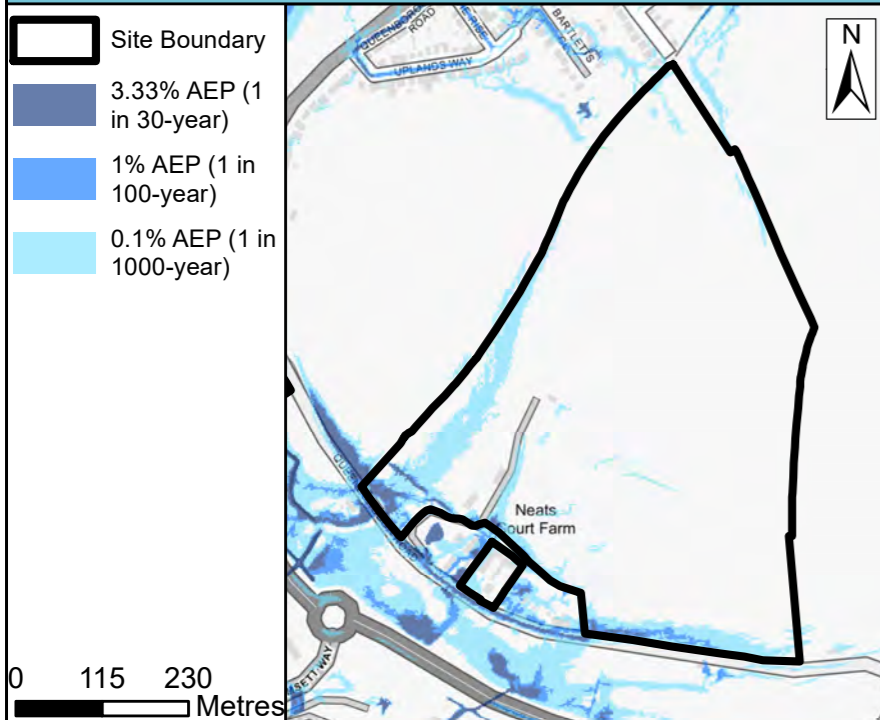
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Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping

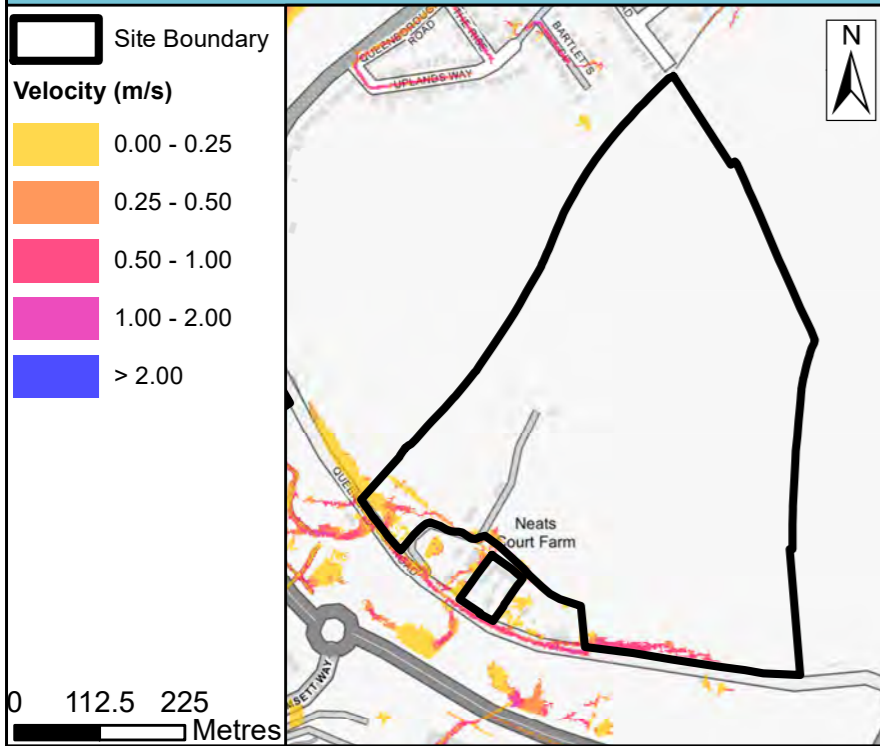


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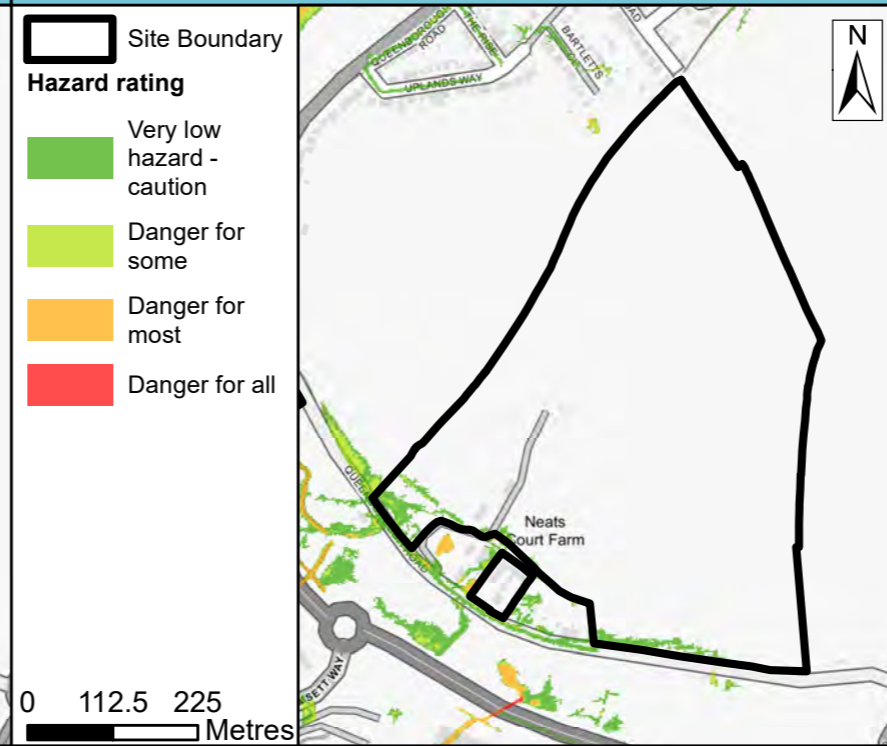
Risk of Flooding from Surface Water - 3.33%, 1% and 0.1% AEP	Risk of Flooding from Surface Water Climate Change	Risk of Flooding from Surface Water (1% AEP Depth)
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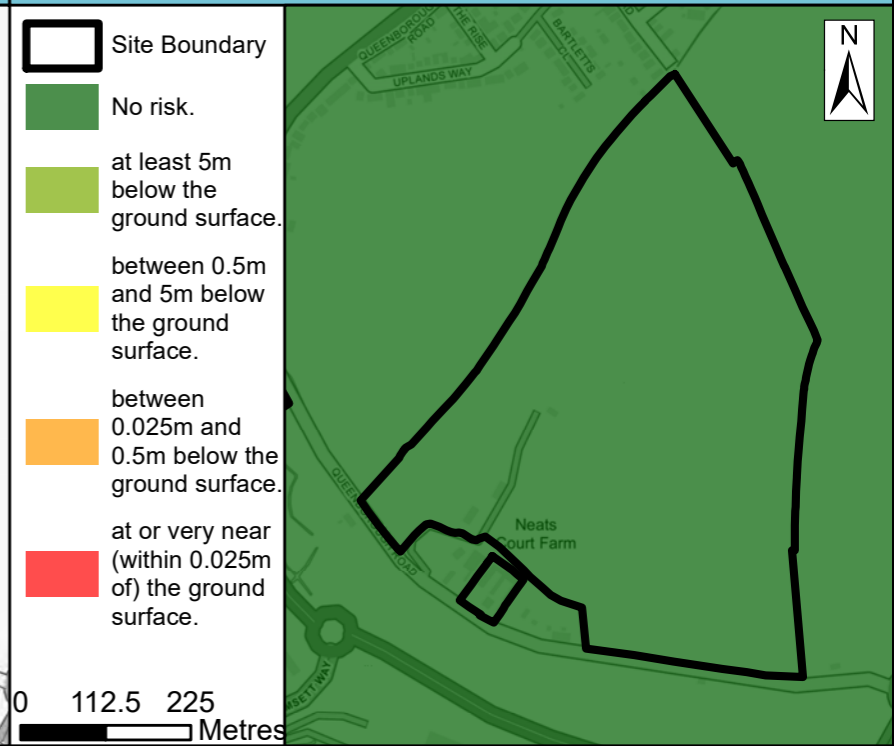
Risk of Flooding from Surface Water (1% AEP Velocity)



Risk of Flooding from Surface Water (1% AEP Hazard)



JBA Groundwater Flood Risk Mapping

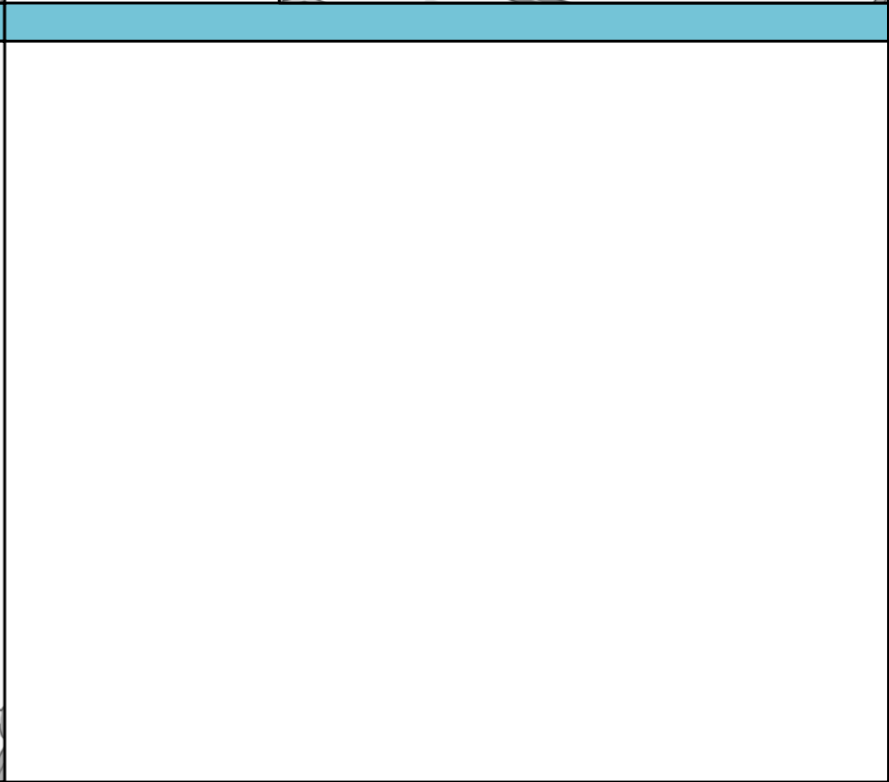
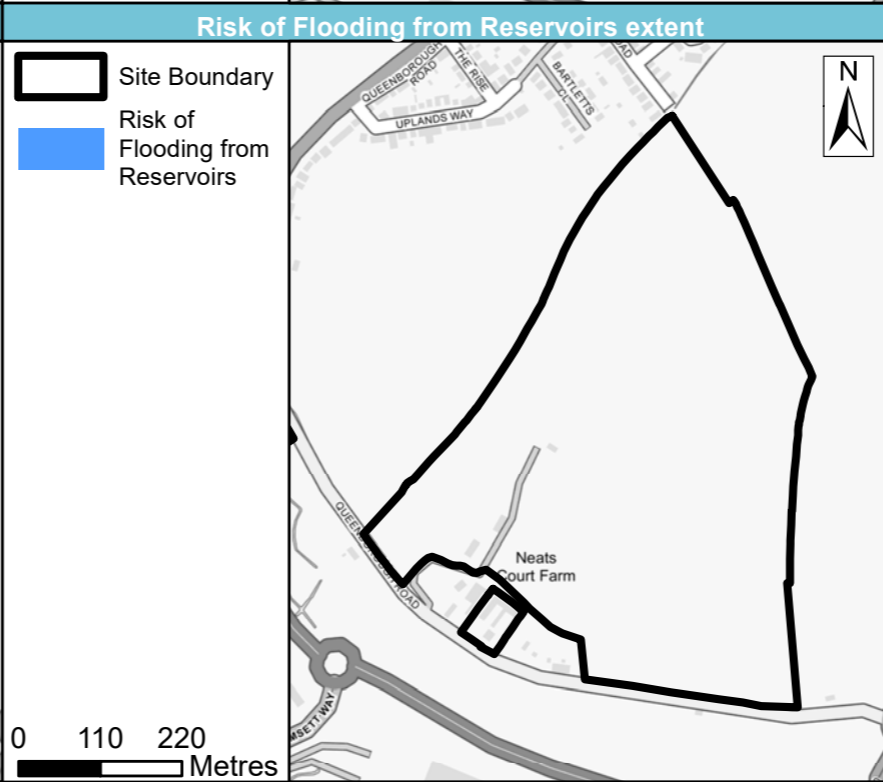
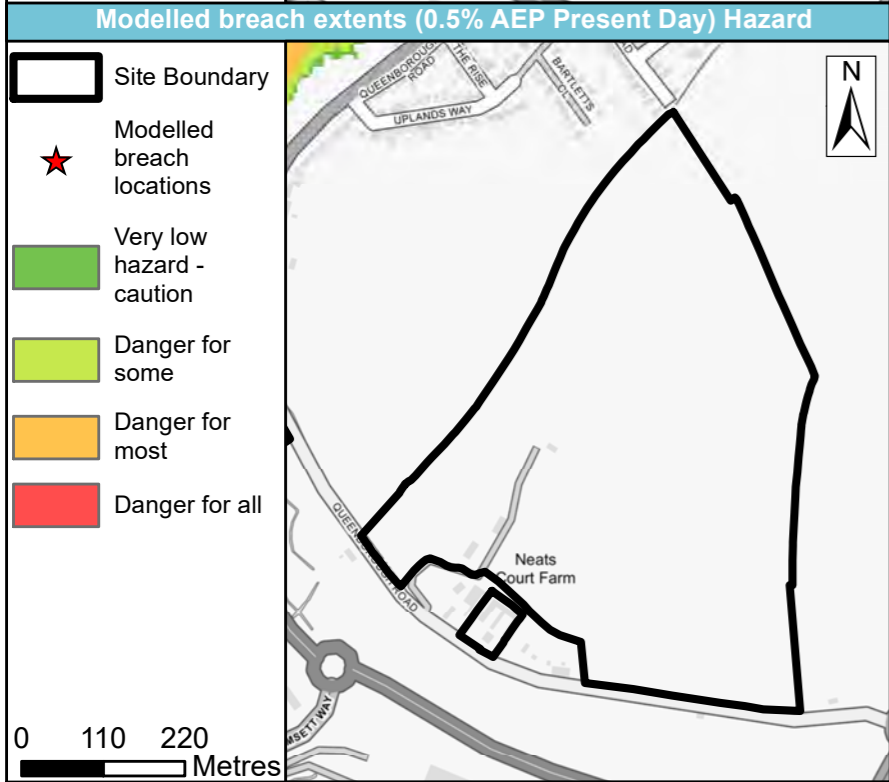
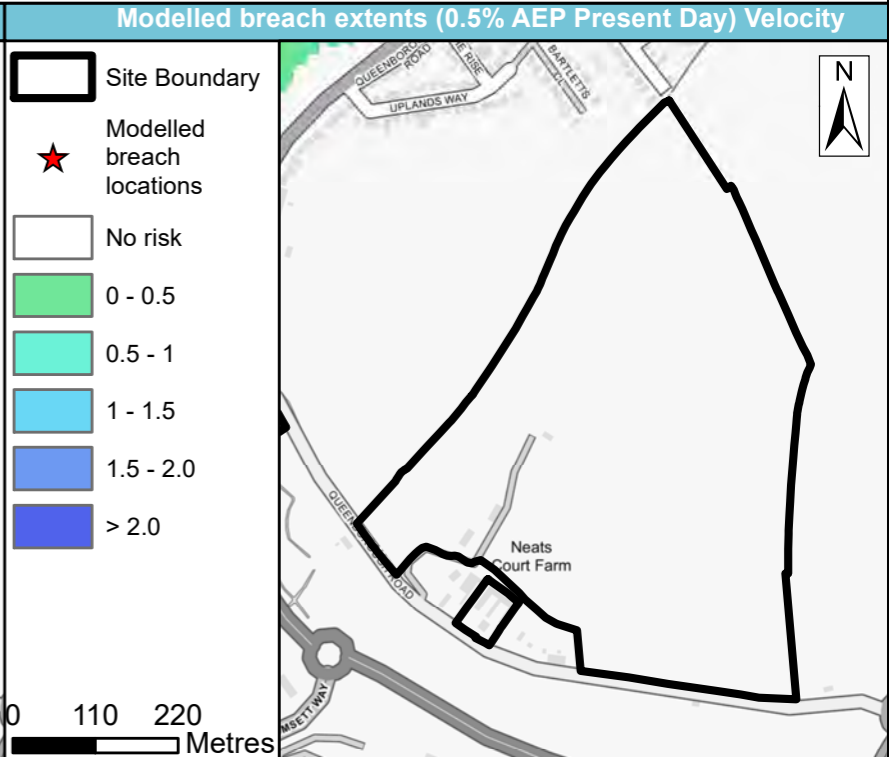
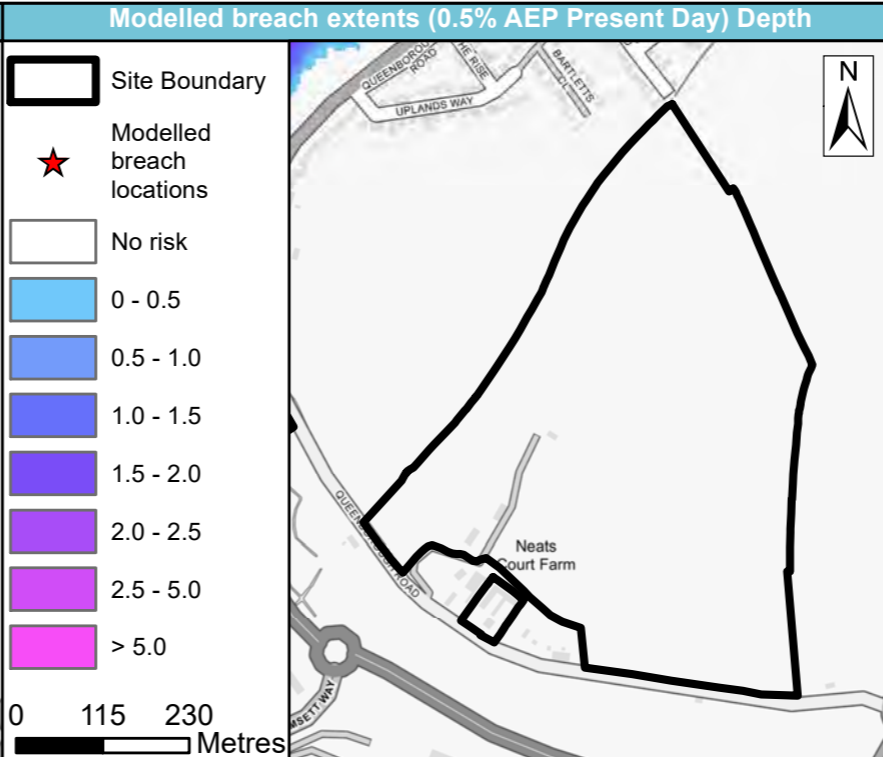
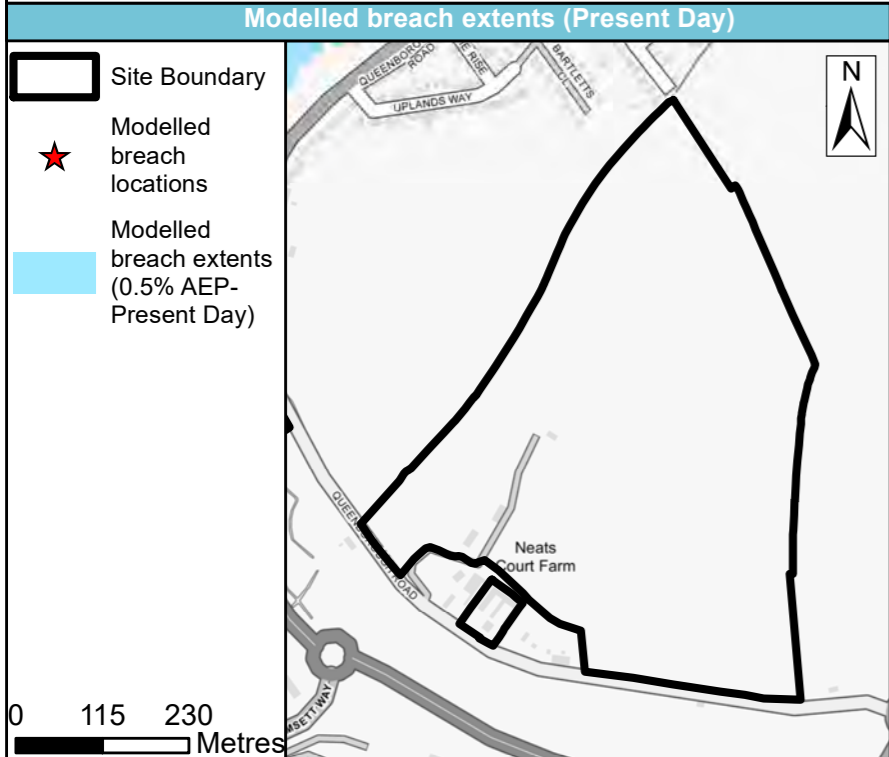


Site name	Land East of Queenborough
Site area (ha)	26.8098

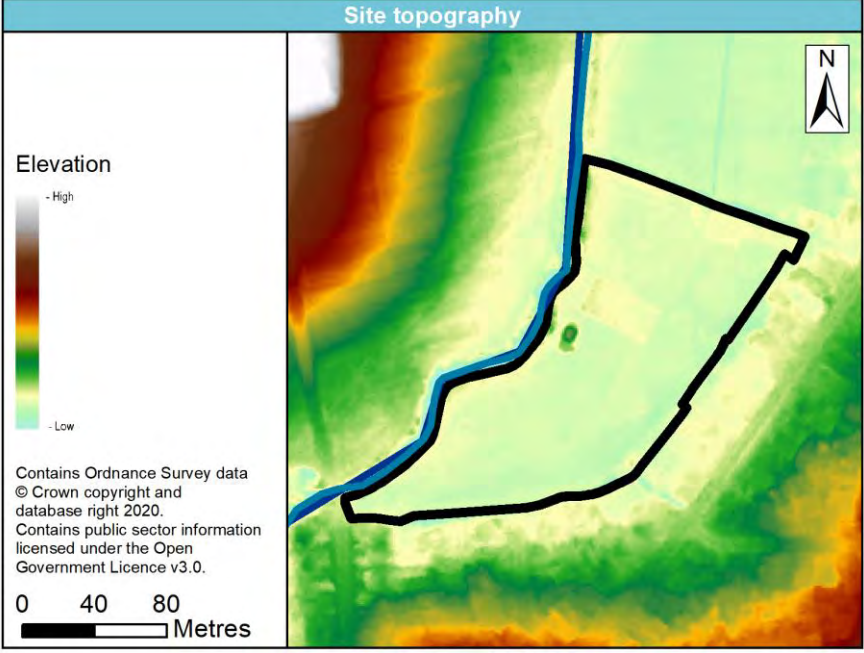
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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Site reference	SLA18/011
Site name	Land at rear of 66 Scrapsgate Road

Site details	OS Grid reference	TQ 94337 73247
	Area (ha)	2.13
	Current land use	Equestrian
	Proposed site use	Residential
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 5px;">  <p style="text-align: center;">Site topography</p> <p>Elevation - High - Low</p> <p><small>Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</small></p> <p>0 40 80 Metres</p> </div> <ul style="list-style-type: none"> The site is currently used for equestrian purposes and consists of a number of fields and a few small buildings. The ground slope across the site generally has a gradient of less than 5%, however the site area is quite large and there are variations in topography within the site. The western boundary of the site is formed by the Scrapsgate Drain which ultimately discharges into the English Channel approximately 1.5km north of the site.

Site reference	SLA18/011
Site name	Land at rear of 66 Scrapsgate Road

Sources of flood risk	Existing watercourses	<p>The western boundary of the site is formed by the Scrapsgate Drain, this is indicated to be a main river as defined by the Environment Agency.</p> <p>There is an ordinary watercourse that runs along the southern boundary of the site from Marina Drive, this discharges into the Scrapsgate Drain at Marian Drive along the western boundary of the site.</p> <p>The entire site is within the Lower Medway Internal Drainage Board area, although the watercourses at this site have not been adopted by the IDB.</p>		
	Flood history	<p>The site is entirely within the extent of the Environment Agency's recorded flood outlines dataset, this indicates that the site flooded in February 1953 as a result of the overtopping of defences.</p>		
	Fluvial	<p>Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)</p>		
		5% AEP	1% AEP	0.1% AEP
		1.85%	45.99%	86.93%
		<p>Available modelled data: The site is covered by the Environment Agency Scrapsgate Drain (fluvial) 2016 Flood Modeller TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>Flood characteristics: The majority of the site is considered to be at risk of fluvial flooding during the 1% AEP event, with the greatest flood extents towards the north and east of the site.</p>		
Tidal	<p>Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)</p>			
	5% AEP	0.5% AEP	0.1% AEP	
	0.00%	0.00%	0.00%	
	<p>Available modelled data: The site is covered by the Environment Agency North Kent Coast (Tidal) 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>Flood characteristics: Defences are in place along the coastline approximately 1km downstream of the site, as a result the site is not considered to be at risk of flooding from tidal sources during the defended scenarios for the 5%, 0.5% and 0.1% AEP events. However the site is probably at risk of tidal flooding in the future due to the impacts of climate change.</p> <p>The impacts of flooding to the site should be considered with regard to making development safe and with consideration to not increasing flood risk elsewhere.</p>			

Site reference	SLA18/011
Site name	Land at rear of 66 Scrapsgate Road

		The site is indicated to provide storage during flood events and the impacts of development on flood risk off site should be considered.		
	Surface Water	Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		3.3% AEP	1% AEP	0.1% AEP
		22.57%	73.65%	98.71%
		Description of surface water flow paths:		
		<p>A large proportion of the site is considered to be at risk of surface water flooding, although this is more likely to be associated with fluvial flood risk at this site. The extents of flooding affect mostly the eastern boundary of the site and properties along Scrapsgate Road during the 3.33% AEP event. Flood extents significantly increase during the 1% and 0.1% AEP events with most of the site considered to be at risk of surface water/ fluvial flooding during these events.</p> <p>The impacts of flooding to the site should be considered with regard to making development safe and with consideration to not increasing flood risk elsewhere.</p> <p>RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.</p>		
	Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories		
		Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories
		0.00%	0.00%	0.00%
		The site is considered to be at negligible risk of groundwater flooding. However, as groundwater datasets are generally produced nationally it is recommended that ground investigations are carried out and reported on within a site-specific FRA where this is required (known to be a problem locally).		
	Reservoir	The site is not considered to be at risk of flooding from reservoirs.		

Site reference	SLA18/011
Site name	Land at rear of 66 Scrapsgate Road

	Defences	Defence Type	Standard of Protection	Condition
		Maintained channel	20%	3
Flood risk management infrastructure	Residual risk	Culvert / structure blockage?	There are a number of locations close to the site where watercourses appear to be culverted, as a result the residual risks from blockages should be considered as part of a site-specific FRA.	
		Impounded water body failure?	There are no impounded waterbodies within the vicinity of the site.	
		Defence breach/overtopping?	Breach modelling was previously undertaken for the North Kent Coast model, whilst the site itself was not modelled for breach this is still a residual risk as the site is considered to be at risk of flooding during the defended scenarios.	
	Flood warning	The site is covered by the 064WAC1ShepSwale Flood Alert Area and is within the 064FWC1Sheerness Flood Warning Area, which are in place to provide alerts and warnings for coastal flooding.		
Emergency planning	Access and egress	<p>The site and the surrounding area are completely within the extent of the undefended North Kent Coast 0.5% AEP extents for the 2070 and 2115 epoch. The closest dry land is approximately 100m to the south of the site and it is uncertain whether it will be possible to demonstrate safe access and egress as flood depths during are commonly in excess of 3m.</p> <p>In the event of fluvial flooding, safe access and egress is likely to be available towards Scrapsgate Road to the west and Mariana Avenue to the west of the site. Flood depths are generally less than 200mm during the 1% AEP event.</p>		
	Climate Change allowances for '2080s'/ Climate Change allowances for the '2115 EPOCH'	Proportion of site at 1% AEP fluvial flood risk in the defended scenario		
River Basin District		Present day	Higher Central	Upper End
Thames		n/a	35% increase in peak river flows	70% increase in peak river flows
Climate Change	Implications for the site	<p>Flood extents are estimated to increase during the 35% and 70% climate change scenarios for the 1% AEP event, although a large proportion of the site was considered to be at risk from the present day 1% AEP. Flood depths also increase during the 35% and 70% although these are generally less than 300mm over the majority of the site.</p> <p>The flood extents show a significant increase in comparison to the present day 1% AEP, with a particularly large increase for the 35% scenario. However these extents are slightly less than the present day 0.1% AEP event. This indicates that site is moderately sensitive to the impacts of climate change on fluvial flood risk. The site would require the implementation of substantive measures so development</p>		

Site reference	SLA18/011
Site name	Land at rear of 66 Scrapsgate Road

		was safe. Further evidence is required to ascertain whether appropriate measures that do not adversely affect third parties are feasible.				
Climate Change allowances for '2080s'/ Climate Change allowances for the '2115 EPOCH'	Proportion of site at 0.5% AEP tidal flood risk in the defended scenario					
	Region	Present day	2080 Higher Central	2080 Upper End	2120 Higher Central	2120 Upper End
	South East England	0.00%	0.00%	0.00%	100%	100%
Implications for the site	<p>The site is not considered to be at risk of tidal flooding during the present day or during the 2080 epoch for the 0.5% AEP event. However, the entire site is considered to be at risk of flooding during the defended 0.5% AEP 2120 epoch scenario, with flood depths of typically 1m or greater. This indicates that the site is sensitive to the impacts of climate change, as the site is not indicated to be affected by the present day 0.1% AEP event.</p> <p>The proposals will need to include provisions that address the need to increase the standard of protection of the existing defences so that appropriate arrangements are in place to address the potential risk over the lifetime of the development.</p>					
Impact of climate change on risk from surface water	Proportion of site at 1% AEP surface water flood risk					
	Present day	+20% rainfall uplift		+40% rainfall uplift		
	73.65%	85.26%		91.66%		
Implications for the site	There is an increase in flood extents and depths with a 20% and 40% uplift for climate change. However the RoFSW mapping is likely to be more indicative of fluvial flood risk at this site. The 1% AEP +40% uplift is slightly less than the extent for the present day 0.1% AEP event, this indicates that the site may have a moderate sensitivity to the impacts of climate change on surface water flood risk.					

Site reference	SLA18/011
Site name	Land at rear of 66 Scrapsgate Road

Requirement for drainage control and impact mitigation	Bedrock Geology	The site is underlain by the London Clay Formation which is comprised of clay and silt at the site.
	Superficial Geology	The entire site is underlain by superficial deposits of alluvium. These are comprised of clay, silt, sand and peat at the site.
	Soils	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils
	Groundwater Source Protection Zone	The site is not within a groundwater Source Protection Zone
	Historic Landfill Site	The site is not within a historic landfill site
	Broad scale assessment of possible SuDS	<p>The site is located within an area of Minster that is flat, uses a ditch system for drainage and is therefore a sensitive area for drainage delivery. Within this area, attenuation of runoff should be considered with SuDS design. KCC should be consulted on the drainage design for the development site at an early stage in this area.</p> <p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p> <p>BGS data indicates that the underlying geology is the London Clay Formation and the site is underlain by superficial alluvial deposits, as a result permeability is likely to be highly variable. Proposals to use infiltration should confirm that this is feasible through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p>

Site reference	SLA18/011
Site name	Land at rear of 66 Scrapsgate Road

	Cumulative impacts of development	The catchment is considered to be highly sensitive to the cumulative impacts of development. Consideration should be given to the potential effect on third party land of measures required to make development safe (surface water and flood risk).			
Recommendations for Local Plan policy	Proportion of the site within each Flood Zone				
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	
	0.00%	0.00%	98.15%	1.85%	
	Sequential Test and Exception Test requirements				
	<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p> <p>The Exception test will be required in the following scenario:</p> <ul style="list-style-type: none"> • highly vulnerable and in flood zone 2 • essential infrastructure in flood zone 3a or 3b • more vulnerable in flood zone 3a <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. <p>The development proposals for this site are for a residential development which is classed as 'more vulnerable' development. The entire site is within Flood Zone 3a and as a result the exception test will be required.</p>				
Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers					
<p>Flood risk assessment:</p> <ul style="list-style-type: none"> • At the planning application stage, a site-specific flood risk assessment will be required for this site as it is greater than 1 hectare in size, is located in Flood Zones 2 and 3, and the development is likely to introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in future. It will also be required where development: <ul style="list-style-type: none"> ○ Is on land which has been identified by the Environment Agency as having critical drainage problems; • Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. • The residual risk to the site posed by failure of flood defences, including overtopping and breach should be considered in a site-specific Flood Risk Assessment. Maintenance arrangements (including funding mechanisms) for the defences will need to be demonstrated for the lifetime of development. • Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of tidal flooding. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted fluvial flood risk at the existing site. • Consideration should be given to the potential off-site impacts development may have on surface water and fluvial flood risk. • Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. • Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. 					

Site reference	SLA18/011
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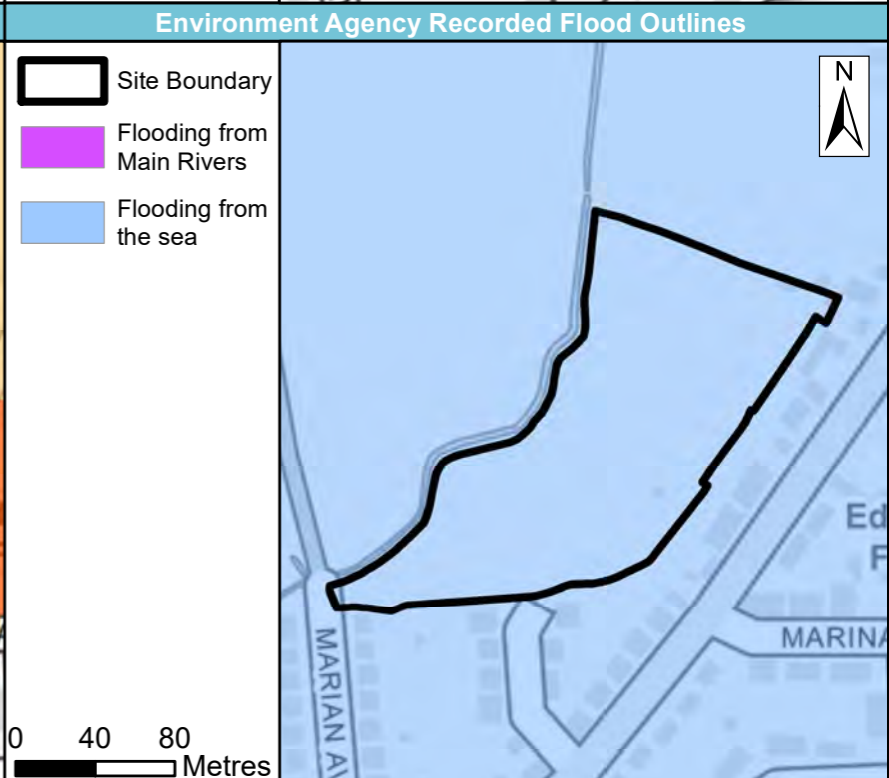
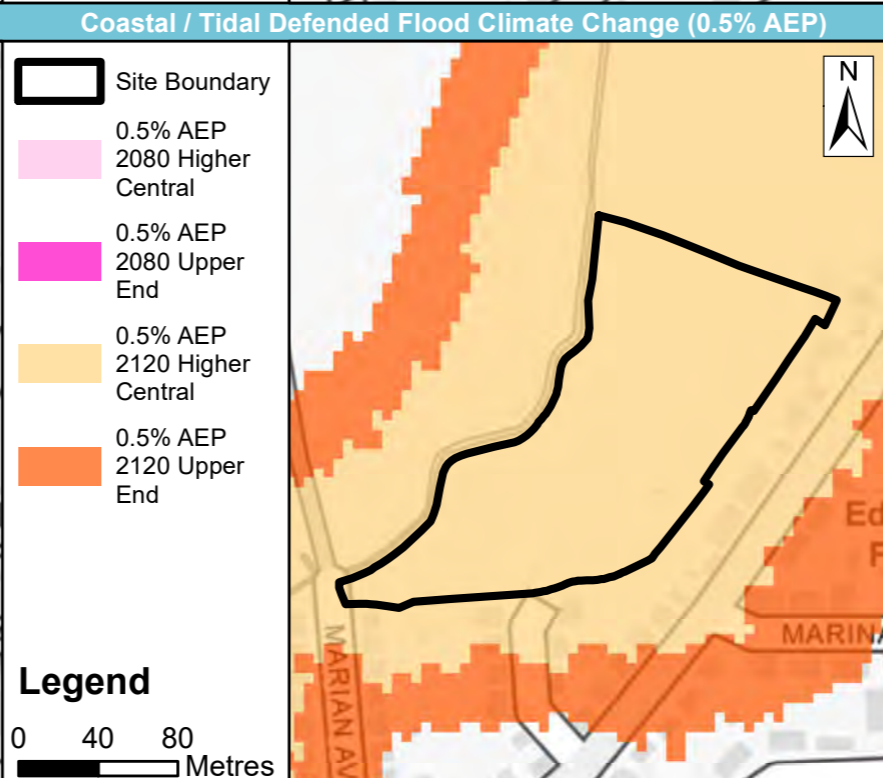
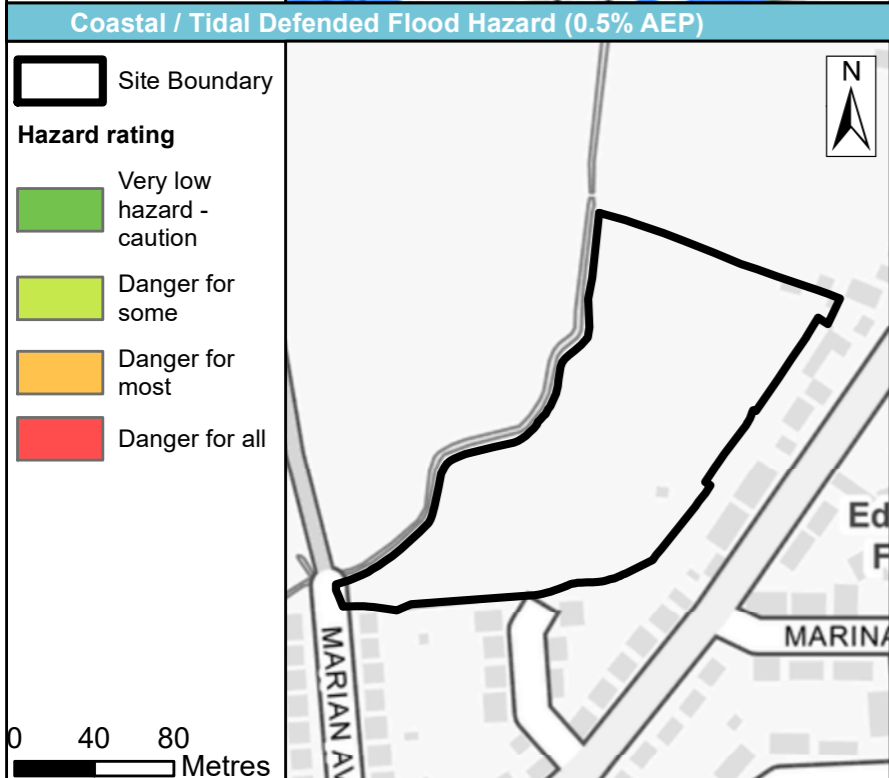
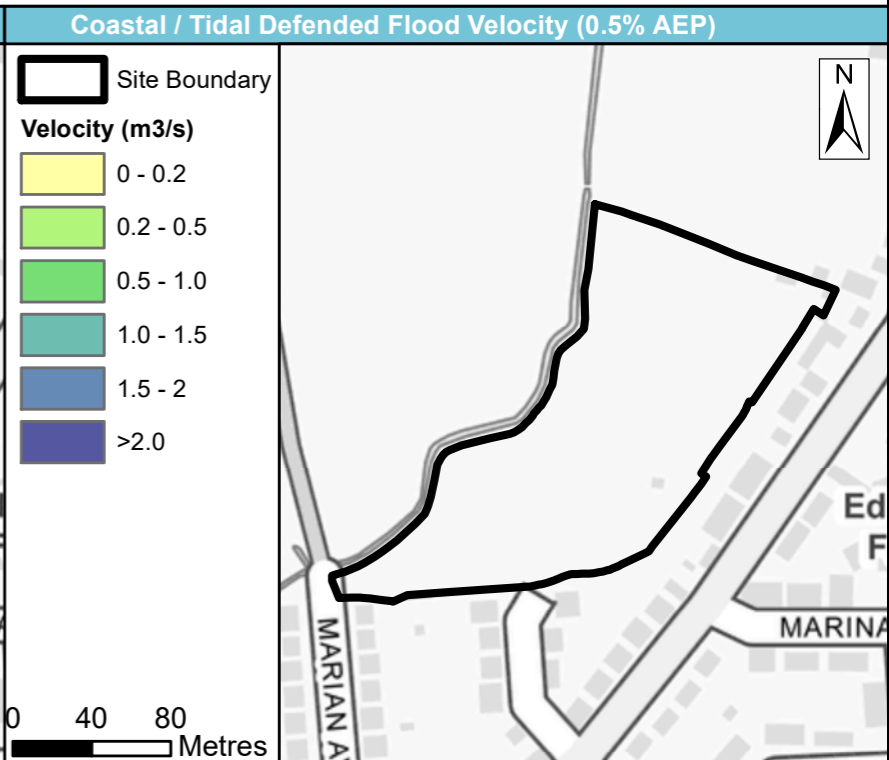
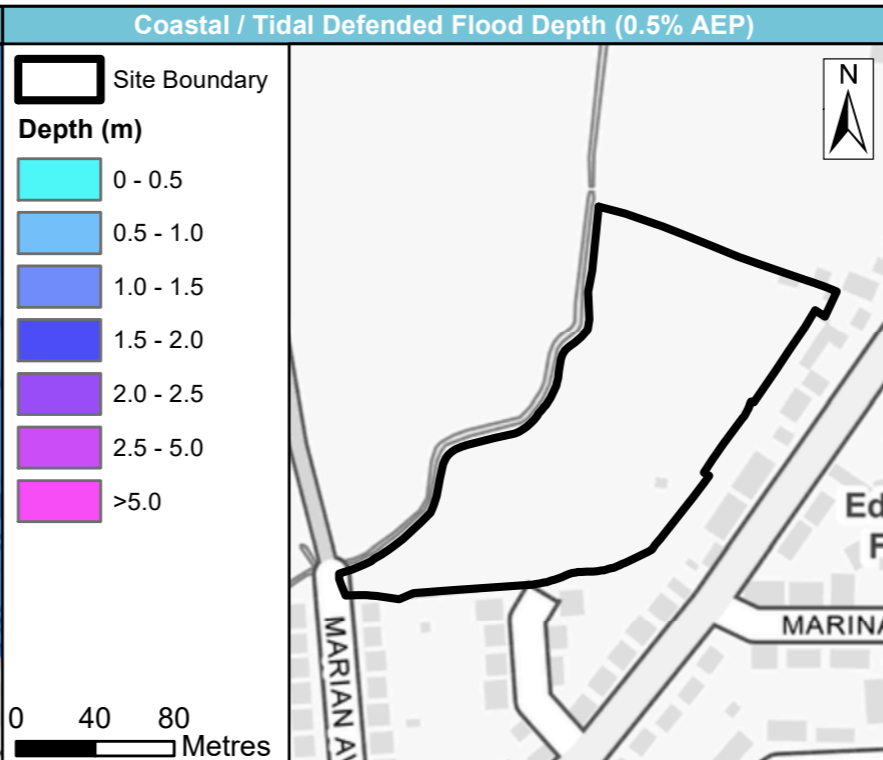
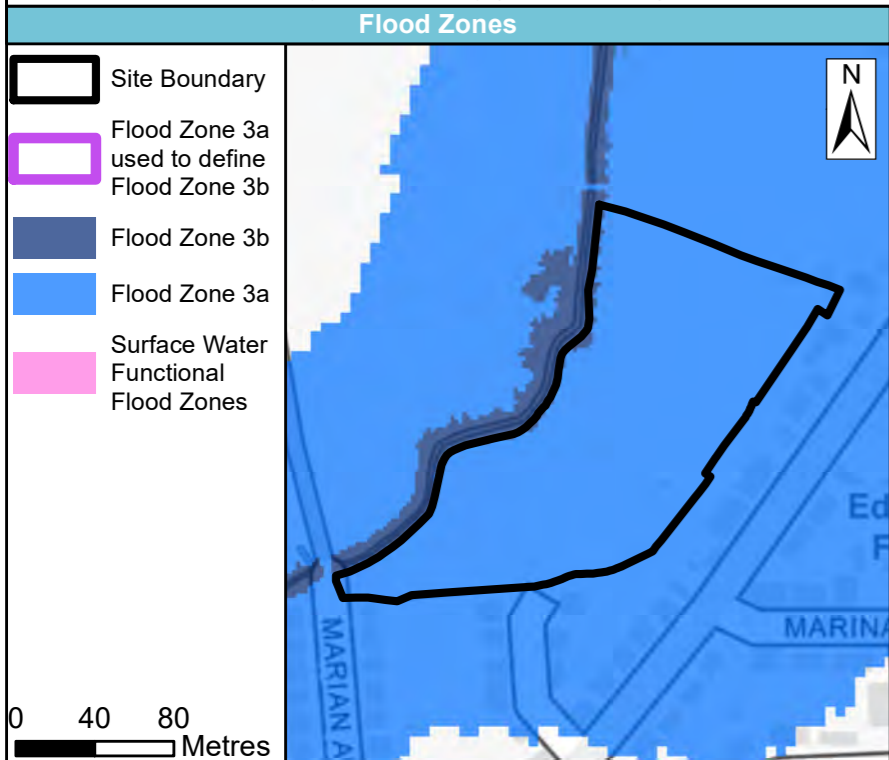
	<ul style="list-style-type: none"> • Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. • Proposals will need to demonstrate that users will be safe and more vulnerable uses are located outside Flood Zone 3b. <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • New development must seek opportunities to reduce the overall level of flood risk to the site. For example by: <ul style="list-style-type: none"> ○ Reducing rates and volumes of runoff; ○ Relocating development to lower risk flood zones; ○ Creating space for flooding. • Safe access and egress should be demonstrated in the fluvial 1% AEP and tidal 0.5% AEP plus climate change events. As there is a significant risk of surface water flooding on the site, consideration should also be given to providing safe access and egress during surface water flood events. • Measures will be required so development is safe from fluvial flooding. Evidence is required to understand whether such measures can be implanted without having an adverse effect on third party land . • A commitment is required to the secure the standard of protection from tidal flooding. This will involve a contribution to the enhancement of existing defences. • All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff. • SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • A greenfield site such as this should be able to implement an exemplar surface water drainage scheme to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. • Assessment of runoff should include allowances for climate change effects. Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk. • The site is within the Lower Medway Internal Drainage Board (IDB), if surface water discharge to an IDB watercourse (directly or indirectly) is proposed, this will be subject to additional consents or requirements as outlined in the Board’s byelaws. • SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best design practice (CIRIA C753 Manual 2015). • Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name	Land Rear of 66 Scrapsgate Road
Site area (ha)	2.13911

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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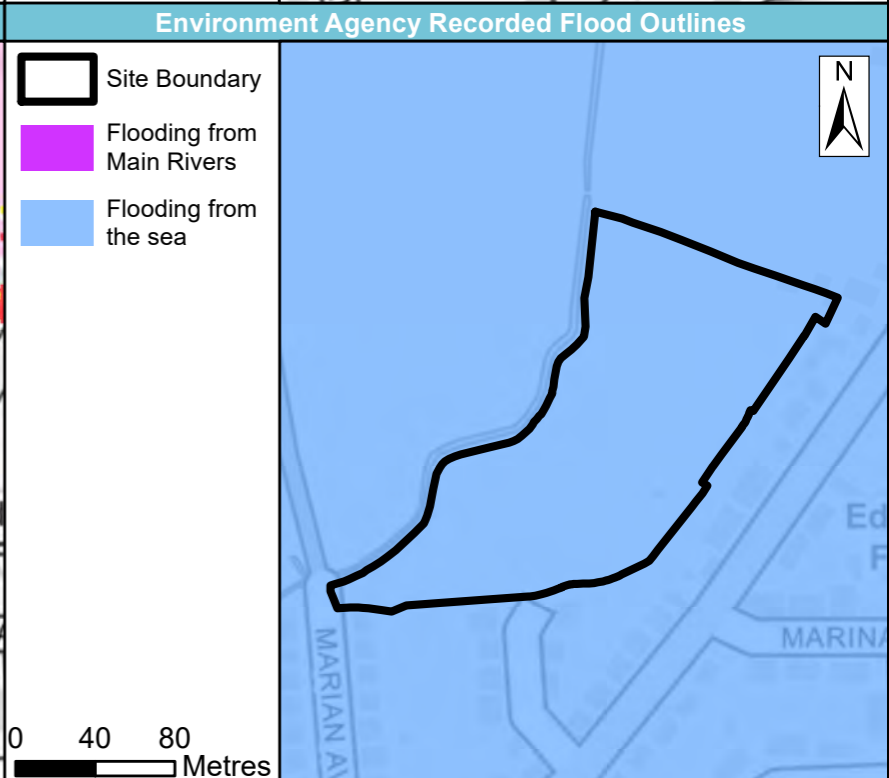
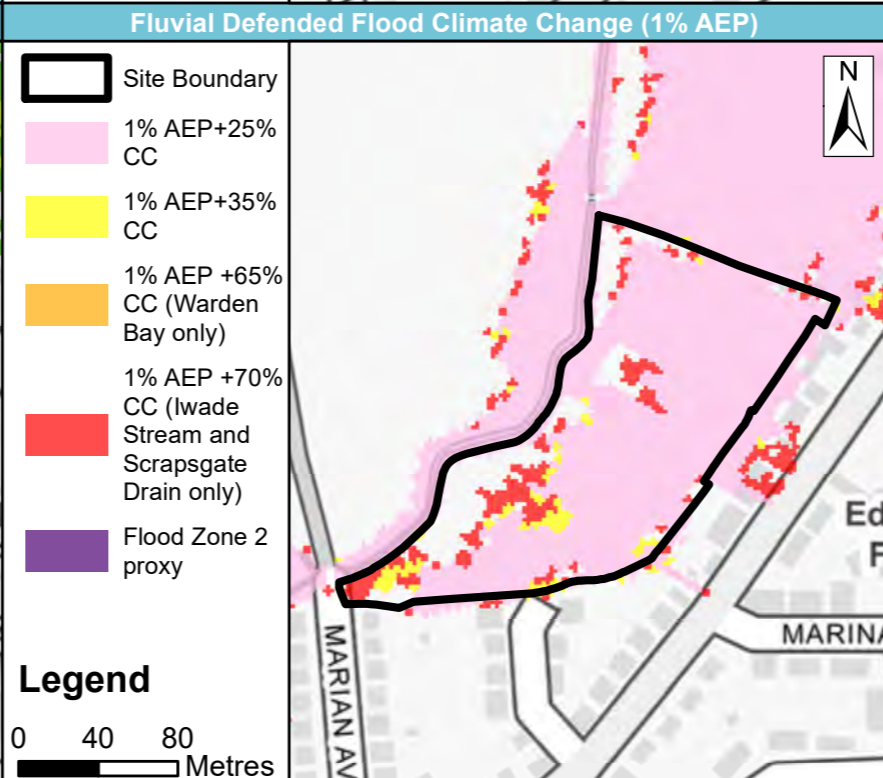
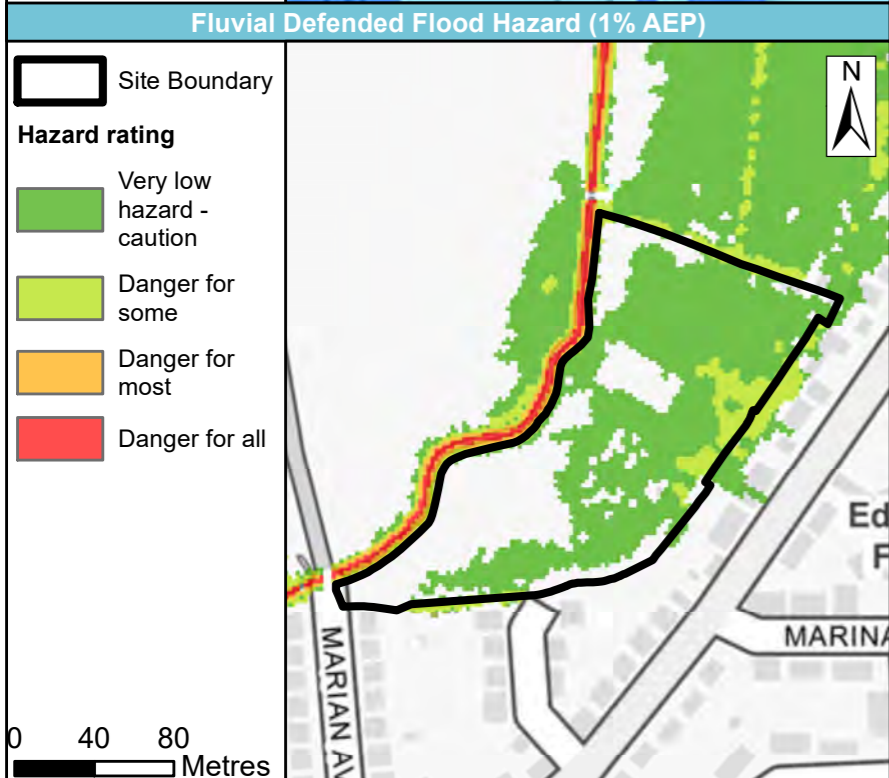
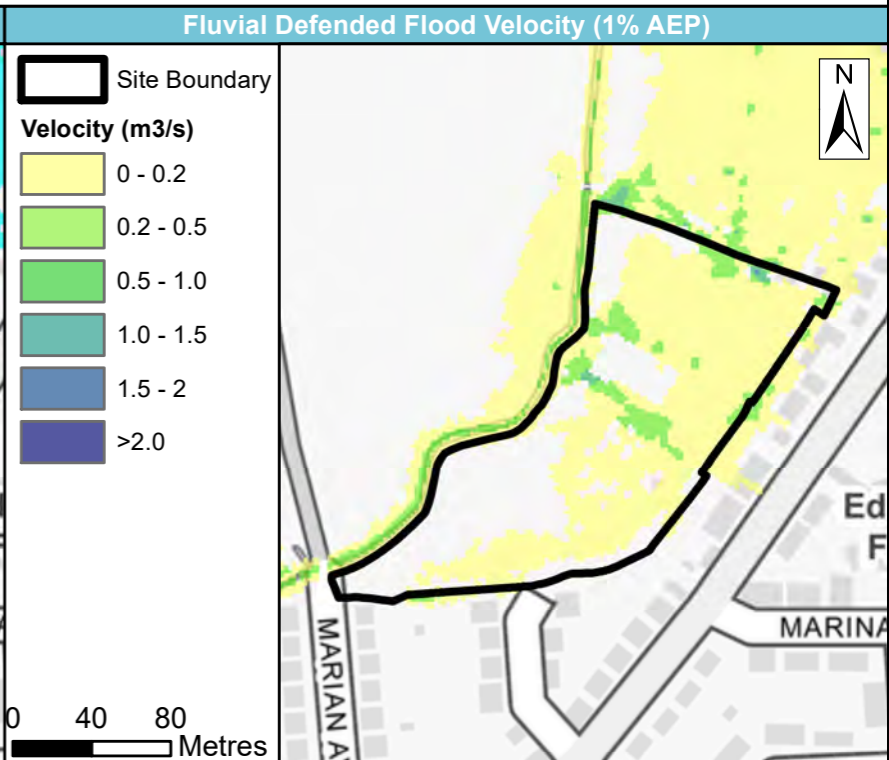
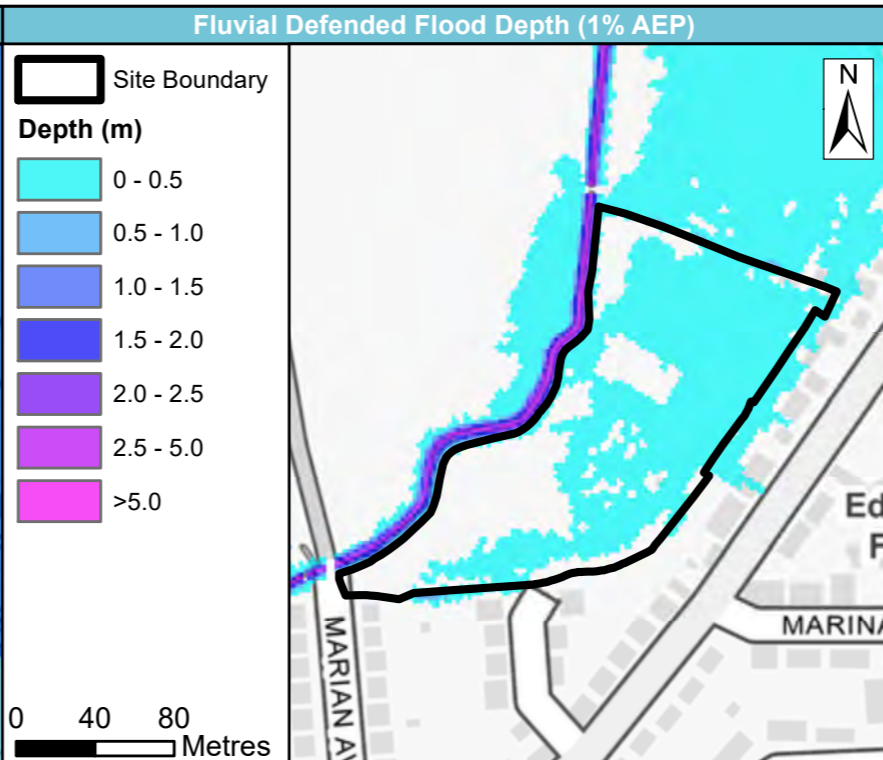
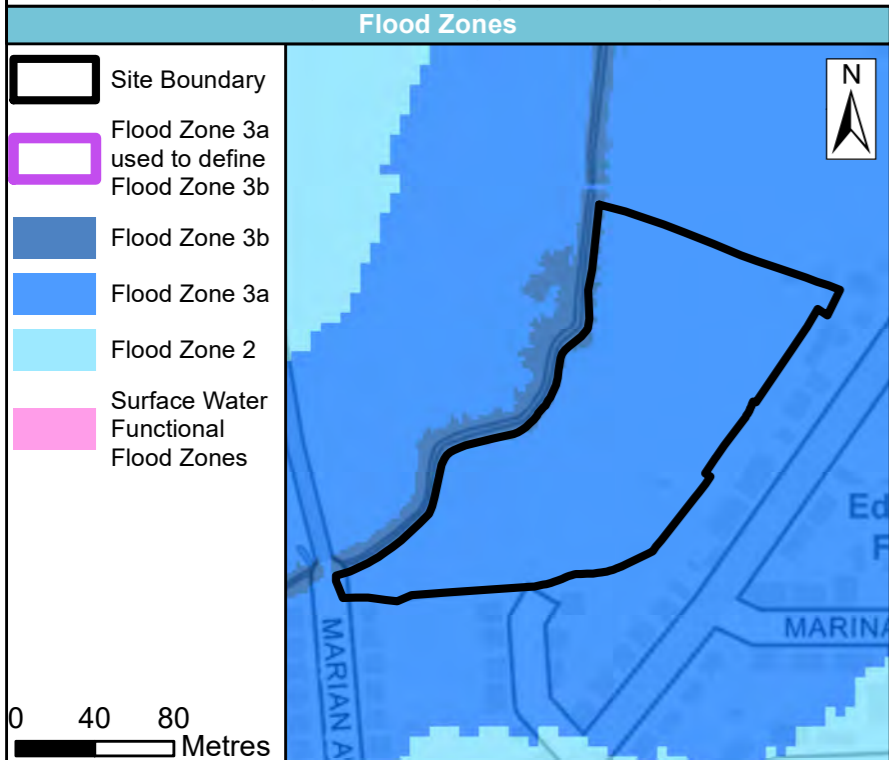


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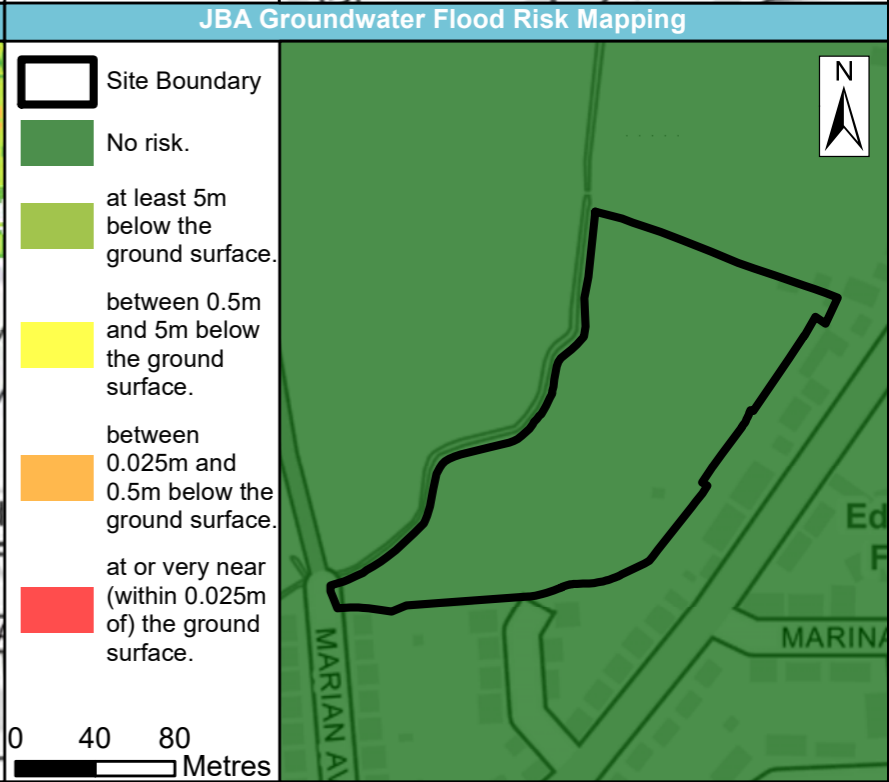
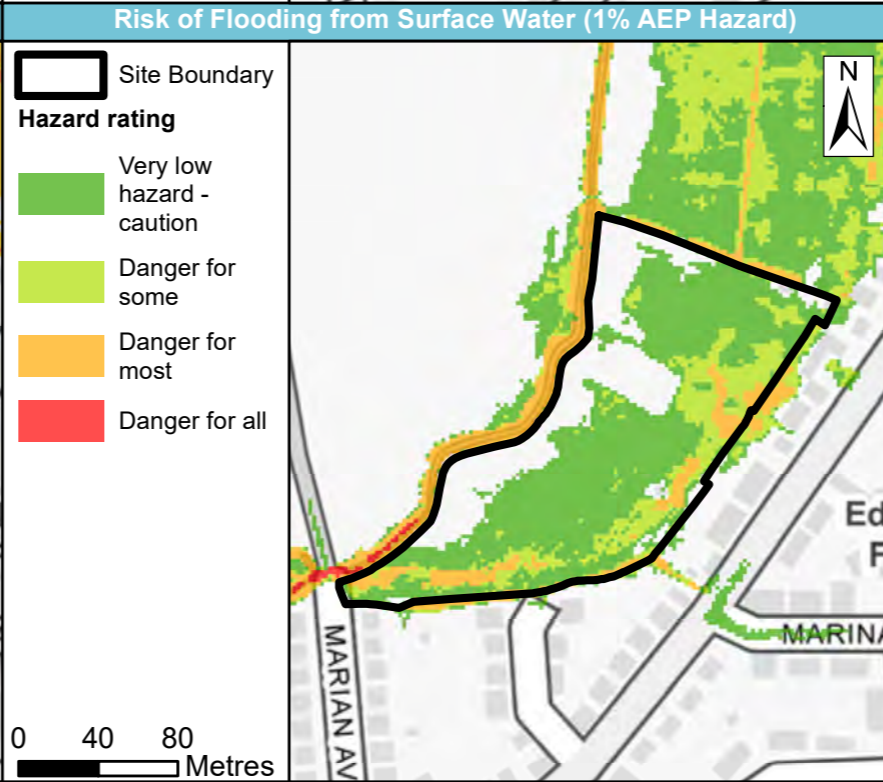
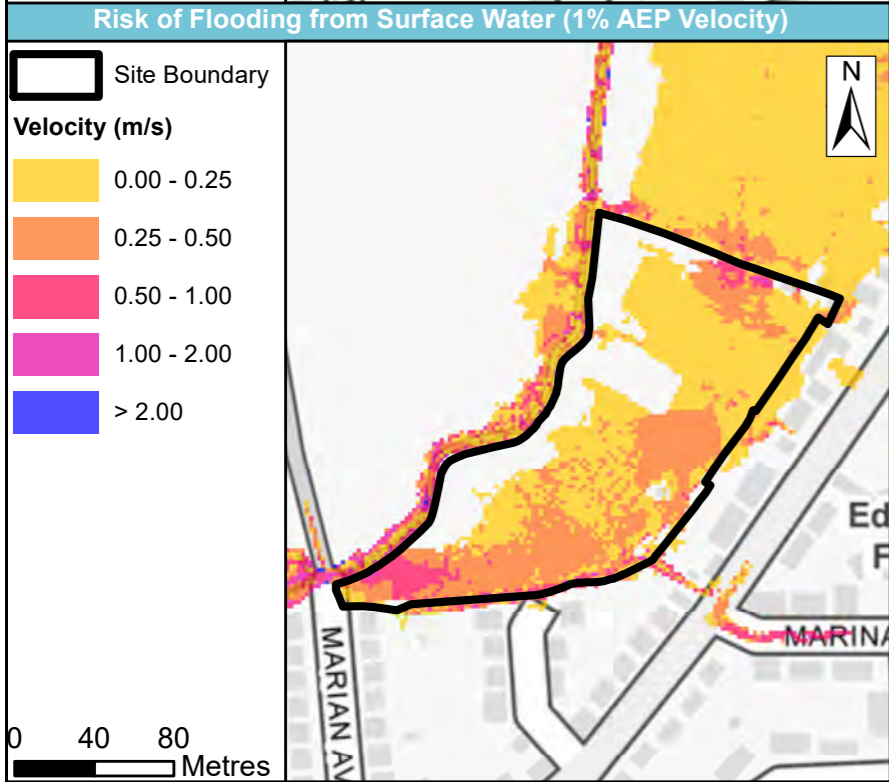
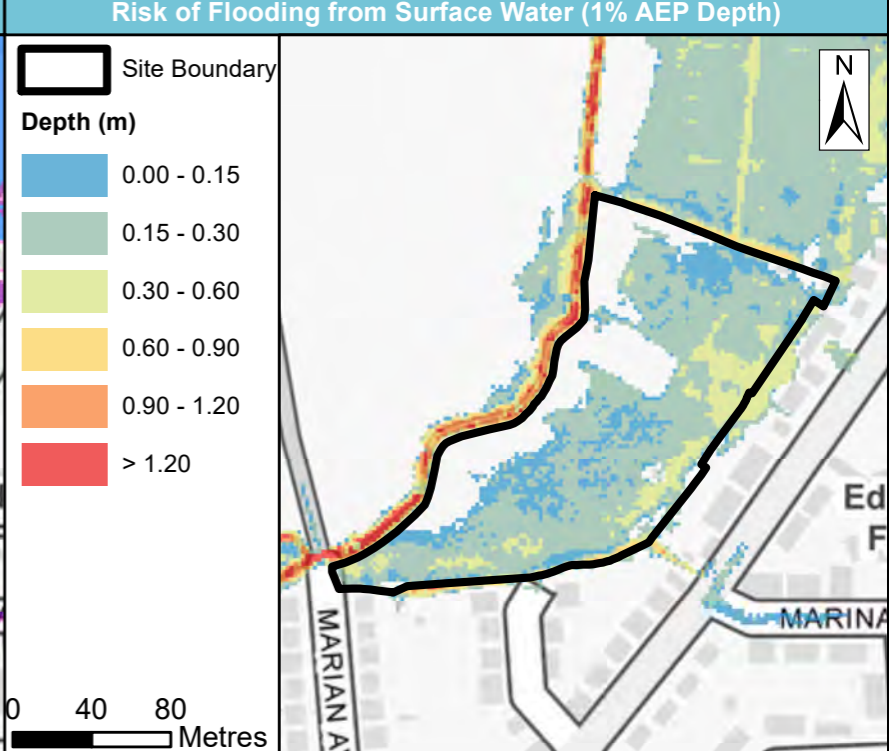
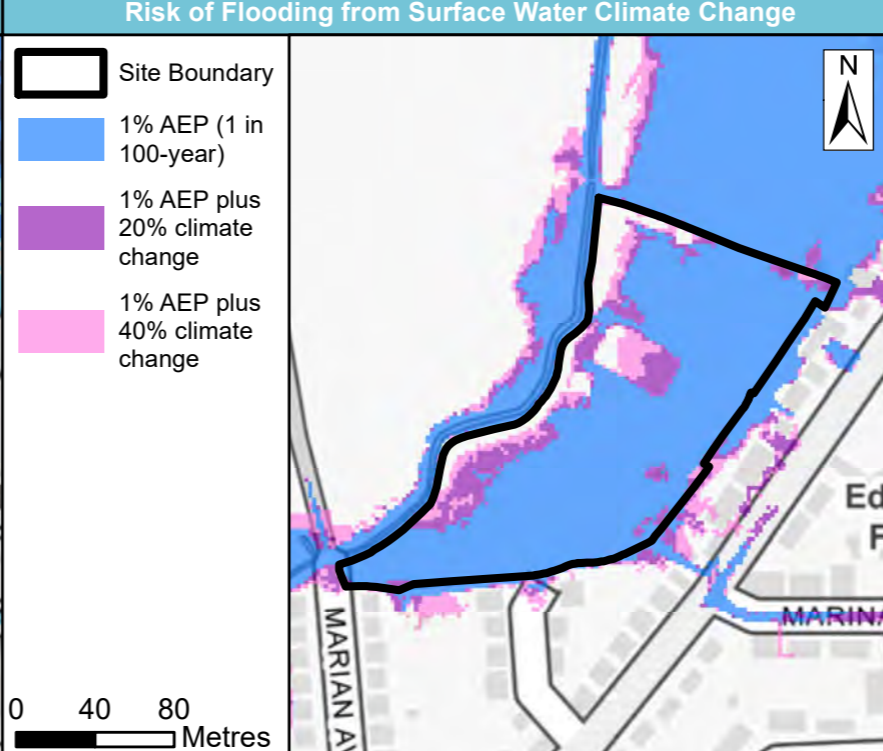
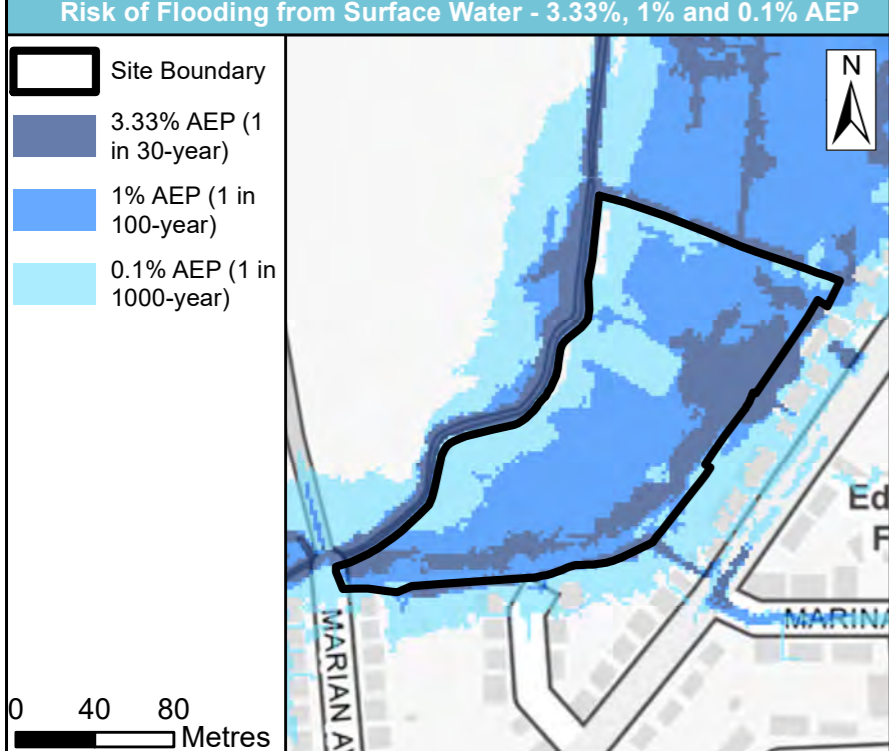


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Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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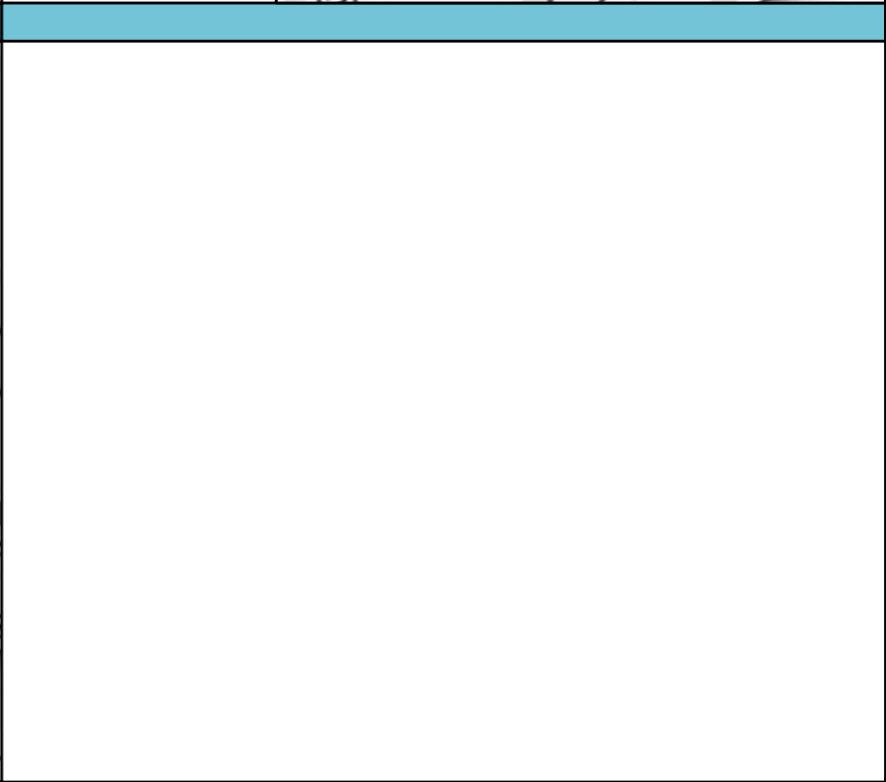
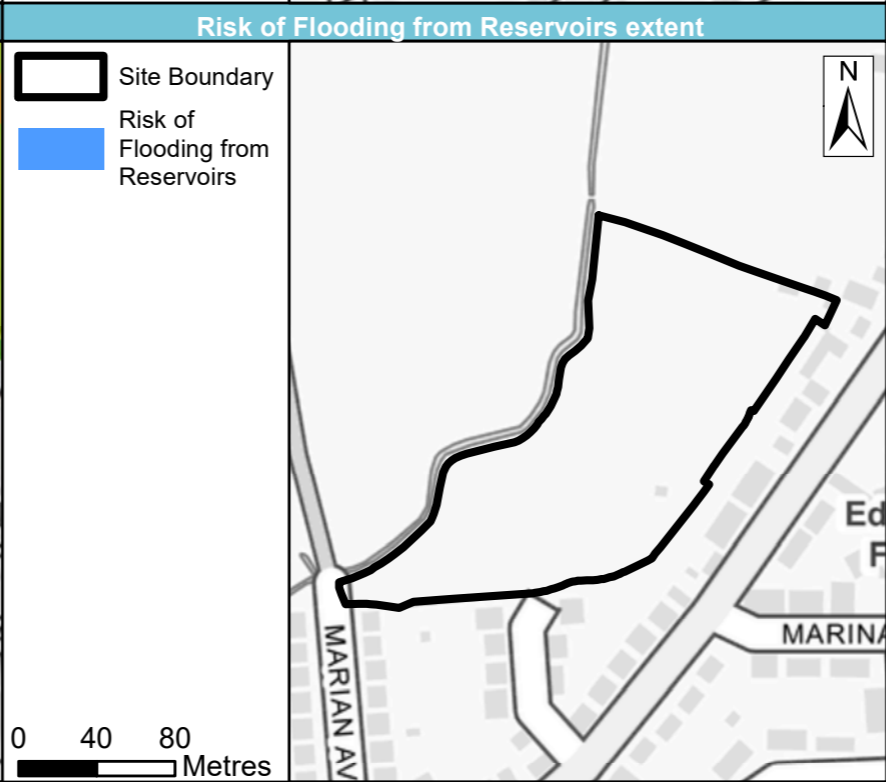
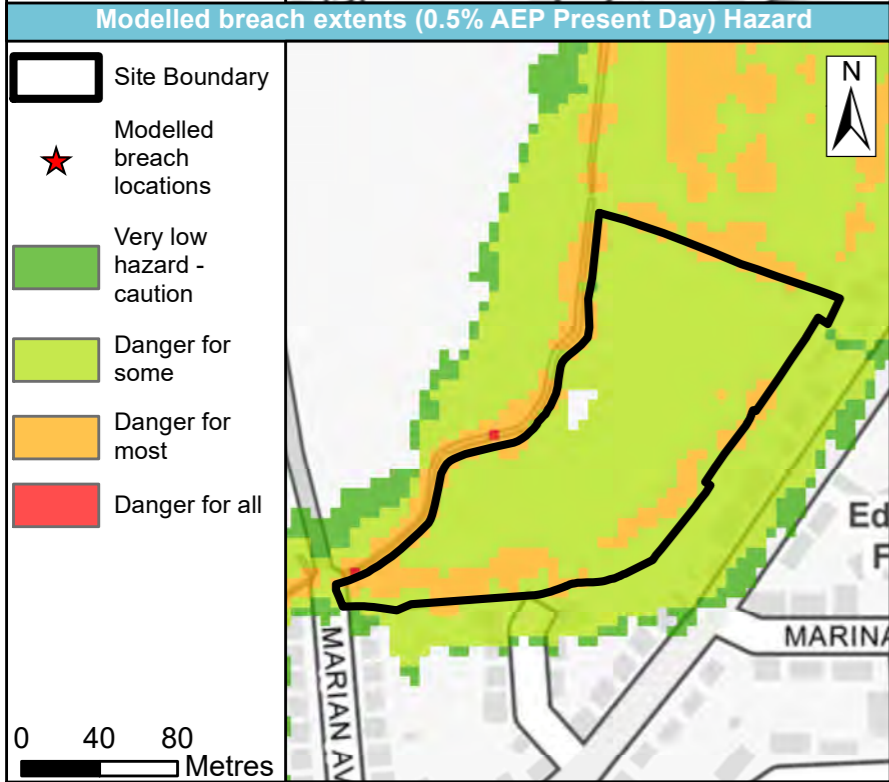
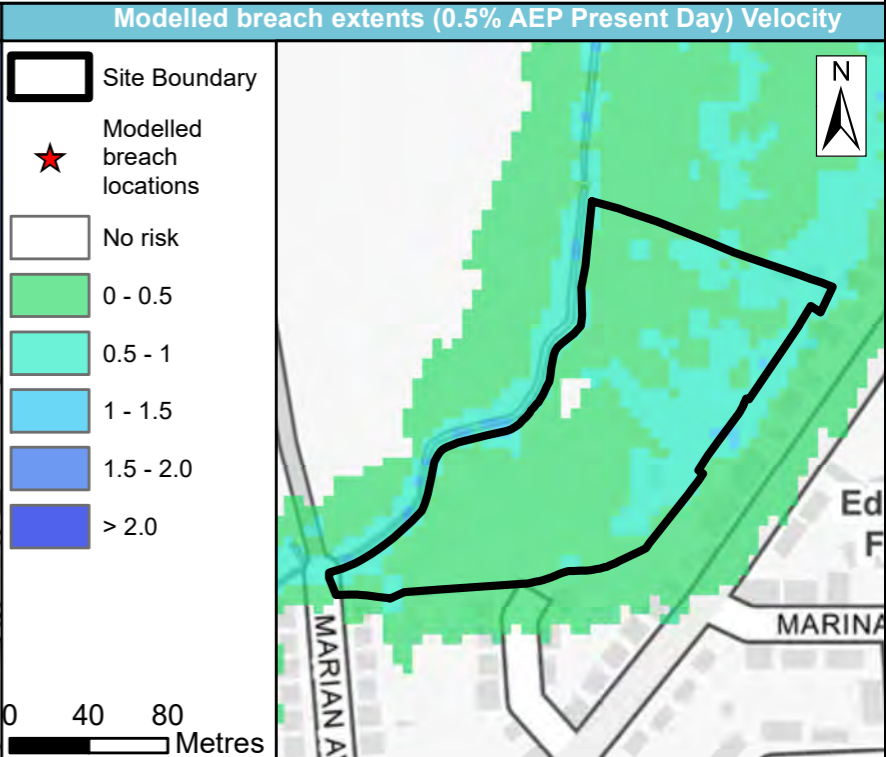
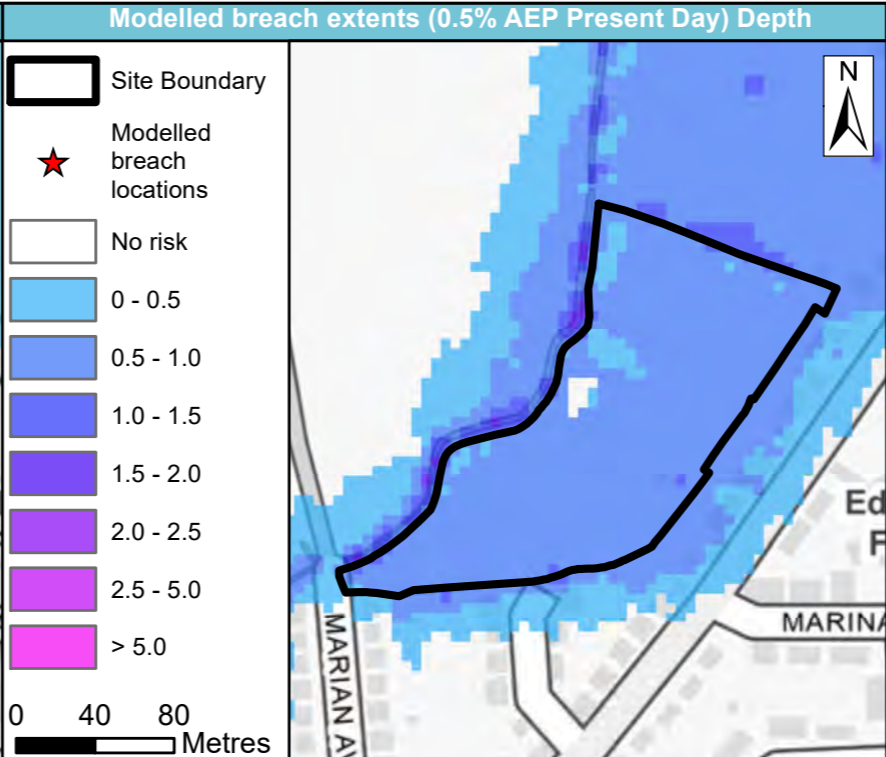
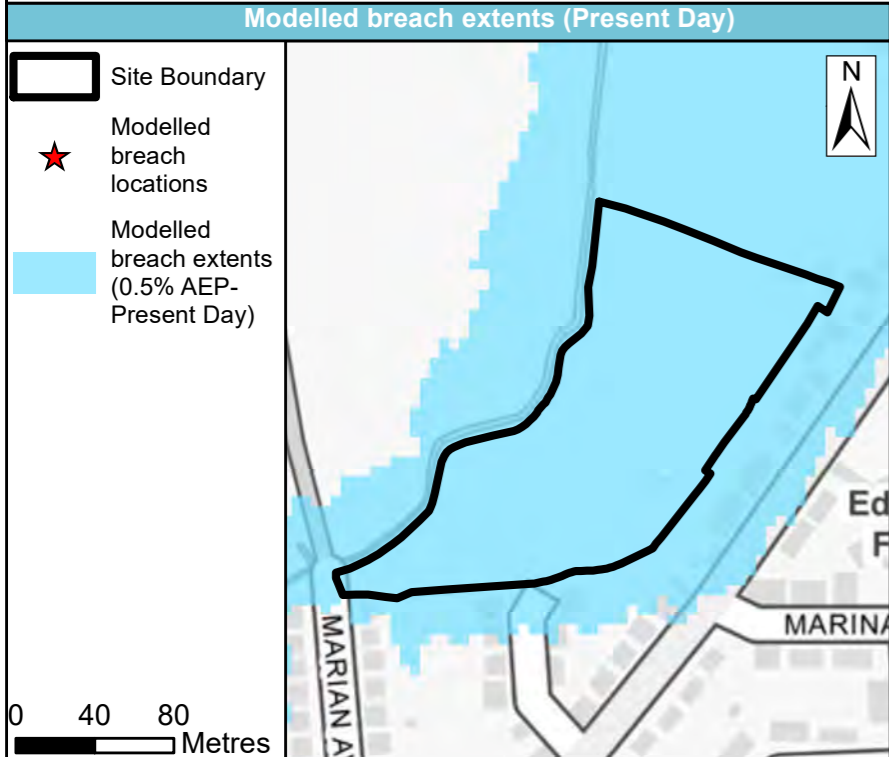


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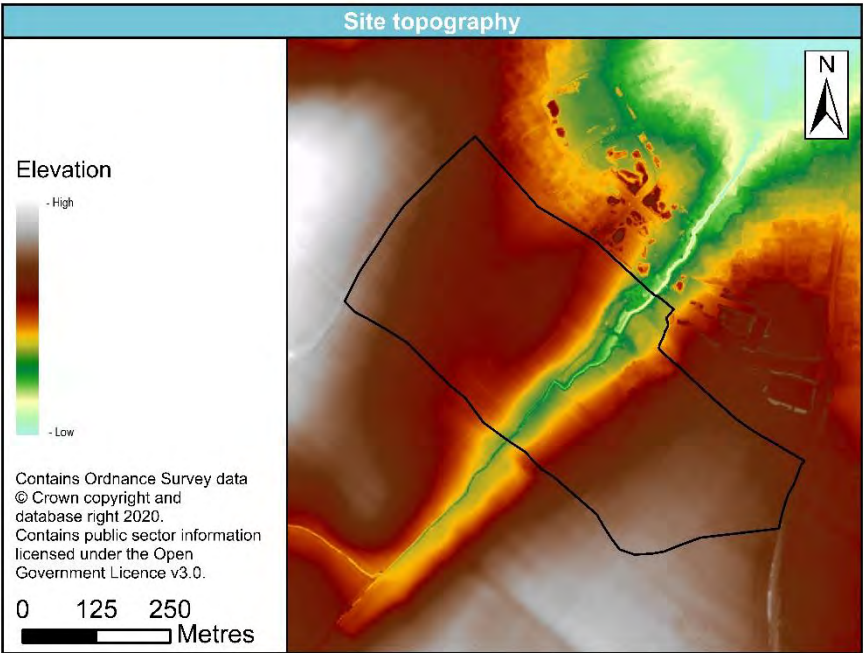
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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Site reference	SLA18/054
Site name	Land South and South-West of Iwade

Site details	OS Grid reference	TQ 89621 67191
	Area (ha)	24.61
	Current land use	Agriculture
	Proposed site use	Residential - 475 units
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center; background-color: #00a0c0; color: white; margin: 0;">Site topography</p>  <p style="font-size: small; margin-top: 5px;">Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</p> </div> <ul style="list-style-type: none"> The topography of the site slopes inwards from the south east and north west creating a low elevation valley in the centre of the site, along which a watercourse flows. There are several existing buildings located in the north east of the site. The ground slope across the site generally has a gradient of less than 5%

Site reference	SLA18/054
Site name	Land South and South-West of Iwade

Sources of flood risk	Existing watercourses	Iwade Stream flows through the centre of the site. The stream is considered to be an Ordinary Watercourse until it reaches the north east of the site where it is designated as an EA main river.		
	Flood history	An area of Iwade village, 150m to the north east of the site, is reported to have flooded in October 2000 from channel capacity exceedance (no raised defences). No flooding was recorded within the site boundary.		
	Fluvial	Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	1% AEP	0.1% AEP
		0%	0%	0%
		Available modelled data: The section of Iwade Stream designated as an EA main river is covered by the Iwade Stream (Fluvial) 2017 Flood Modeller-TUFLOW model. For the rest of the watercourse no detailed fluvial model data is available. Flood characteristics: Less than 0.4% of the site is predicted to be at risk of flooding from the 5% and 1% AEP scenarios and less than 0.5% is at risk in the 0.1% AEP scenario. Risk remains contained to the Iwade Stream channel.		
	Surface Water	Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		3.3% AEP	1% AEP	0.1% AEP
		2%	4%	14%
		Description of surface water flow paths: Flow paths largely remain within the Iwade Stream channel during the 3.3% AEP rainfall event. For the 1% AEP event small isolated areas of ponding occur to the north of the channel. A further 10% of the site is impacted during the 0.1% AEP event, with accumulation occurring either side of the entire channel reach as well as along two flow paths into the north west of the site. Mapping showing the RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.		
Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories			
	Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories	
	0%	0%	0%	
	The entire site is considered to be at a negligible risk of groundwater flooding during a 1% AEP groundwater flood event. However, as groundwater datasets are generally produced nationally it is recommended that ground investigations			

Site reference	SLA18/054
Site name	Land South and South-West of Iwade

		are carried out and reported on within a site-specific FRA where this is required (known to be a problem locally).				
	Reservoir	The site is not considered to be at risk of flooding from reservoirs.				
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition		
		There are no known flood defences within the vicinity of the site.				
	Residual risk	Culvert / structure blockage?	There are no substantive known culverts or structures in the vicinity of the site.			
		Impounded water body failure?	The site does contain a breach flow path from an upstream reservoir, but the extent is limited to the corridor of the existing watercourse.			
Defence breach/overtopping?		The site is not at risk of flooding due to defence breach or overtopping.				
Emergency planning	Flood warning	The site is not situated within an Environment Agency Flood Alert or Flood Warning Area.				
	Access and egress	The site is not considered to be at a high risk of fluvial flooding in the present or climate change scenarios. The south west and north east of the site are located within Flood Zone 1, allowing for safe access and egress to be made via School Lane or Sheppey Way.				
Climate Change	Climate Change allowances for '2080s'	Proportion of site at 1% AEP fluvial flood risk in the defended scenario				
		River Basin District	Present day	Higher Central	Upper End	Flood Zone 2 as a proxy for climate change
		Thames	n/a	35% increase in peak river flows	70% increase in peak river flows	Present 0.1% AEP event
		0%	0%	0%	5%	
	Implications for the site	<p>The section of the watercourse covered by the Iwade Stream model was assessed for a 35% and 70% uplift in peak river flows. The outputs were shown to have a negligible impact on the site (<1%).</p> <p>As there is no available modelled data for the remaining section of the watercourse within the site, Flood Zone 2 has been used as a proxy. The proxy indicates that 5% of the site could be considered sensitive to the impacts of climate change on fluvial flood risk. Increases in flood risk may occur on the low-lying land immediately surrounding the channel.</p>				

Site reference	SLA18/054
Site name	Land South and South-West of Iwade

		Detailed modelling should be completed through the FRA at the site to determine the potential fluvial risk over the lifetime of the development. A sequential approach should be adopted to the layout and design at the site.		
	Impact of climate change on risk from surface water	Proportion of site at 1% AEP surface water flood risk		
		Present day	+20% rainfall uplift	+40% rainfall uplift
		4%	5%	7%
Implications for the site	A small increase in flood extent during the 1% AEP surface water event is predicted for the plus 20% and 40% climate change events. However, the extents do not reach that of the 0.1% AEP surface water flood event. These increases are located on land surrounding the Iwade Stream channel and in the north west of the site. Therefore, the site will be at a slightly higher risk from surface water flooding in the future.			

Site reference	SLA18/054
Site name	Land South and South-West of Iwade

Requirement for drainage control and impact mitigation	Bedrock Geology	The site's bedrock geology consists of the Thames Group (clay, silt, sand and gravel).
	Superficial Geology	The majority of the site is overlain by Brickearth (silt). The north west section of the site is overlain by alluvium (clay, silt and sand).
	Soils	The majority of the site has slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. A small section of the site in the south east is overlain by loamy soils with naturally high groundwater.
	Groundwater Source Protection Zone	The site is not located within a Groundwater Source Protection Zone.
	Historic Landfill Site	The site is not located within a historic landfill site

Site reference	SLA18/054
Site name	Land South and South-West of Iwade

	Broad scale assessment of possible SuDS	<p>The site is located within the Iwade catchment, an area identified by Kent County Council where the effective implementation of SuDS features is likely to be key to enabling future development. There is a history of flooding in Iwade that is exacerbated by large areas of flow paths being culverted and so future development is likely to have a reasonably significant impact on flood risk. As such, it is important that SuDS features and landscaping in potential developments are designed to attenuate surface water before it enters the Iwade Stream. Potential development in the Iwade catchment will only be permitted if it is demonstrable that betterment of runoff rates will be achieved.</p> <p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p> <p>British Geological Society (BGS) data indicates that the underlying geology is the Thames subgroup and the site is underlain by alluvium and brickearth. As a result, permeability is likely to be highly variable. Proposals to use infiltration should confirm that this is feasible through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>Opportunities to reduce site runoff may be possible by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. Mapping suggests that the site slopes make it possible to consider most forms of detention.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p>			
		Cumulative impacts of development	<p>The site is located within a catchment with a high sensitivity to development. However, as potential development in Iwade is only permitted if a betterment of runoff rates will be achieved, this development is unlikely to give rise to cumulative effects elsewhere.</p>		
Recommendations for Local Plan policy	Proportion of the site within each Flood Zone				
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	
	93%	1%	1%	5%	
	Sequential Test and Exception Test requirements				
<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p>					

Site reference	SLA18/054
Site name	Land South and South-West of Iwade

	<p>The Exception test will be required in the following circumstances:</p> <ul style="list-style-type: none"> • highly vulnerable and in flood zone 2 • essential infrastructure in flood zone 3a or 3b • more vulnerable in flood zone 3a <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. <p>The available mapping shows the site is partially within Flood Zone 3a where more vulnerable development requires the exception test, however it should be possible to adopt a sequential approach to the site layout with more vulnerable development located outside of Flood Zone 3a. Furthermore, the flood zones for the majority of the site have been derived from nationally produced generalised modelling and as a result these may not be indicative of fluvial flood risk at this site. Detailed modelling should be carried out through an FRA.</p>
	<p>Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers</p>
	<p>Flood risk assessment:</p> <ul style="list-style-type: none"> • At the planning application stage, a site-specific flood risk assessment will be required for this site as it is greater than 1 hectare, located within Flood Zone 2 and 3 and may be subject to other sources of flooding where the development would introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in the future. It is also required where development: <ul style="list-style-type: none"> ○ Is on land which has been identified by the Environment Agency as having critical drainage problems; or • Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. • Detailed, site specific modelling should be undertaken to ascertain whether the current flood zones are indicative of fluvial or surface water flood risk to the site. • Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of fluvial and surface water flooding. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development. • Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. • Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. • Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. • Proposals will need to demonstrate that the site can adopt a sequential approach more vulnerable uses located in lower risk parts of the site where possible. • Cumulative effects should be considered (see above). <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • New development must seek opportunities to reduce the overall level of flood risk at the site. For example, by: <ul style="list-style-type: none"> ○ Reducing volume and rate of runoff ○ Relocating development to zones with lower flood risk ○ Creating space for flooding. • Safe access and egress should be demonstrated in the tidal 0.5% AEP plus climate change events. Consideration should also be given to providing safe access and egress during surface water events.

Site reference	SLA18/054
Site name	Land South and South-West of Iwade

	<ul style="list-style-type: none">• All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff.• SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc.• Example features include swales, attenuation features, green roofs, rainwater capture and reuse and permeable paving.• Assessment of runoff should include allowances for climate change effects. Potential development in the Iwade catchment will only be permitted if it is demonstrable that betterment of runoff rates will be achieved.• SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best design practice (CIRIA C753 Manual 2015).• Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name

Land South and South-West of Iwade

Site area (ha)

24.6097

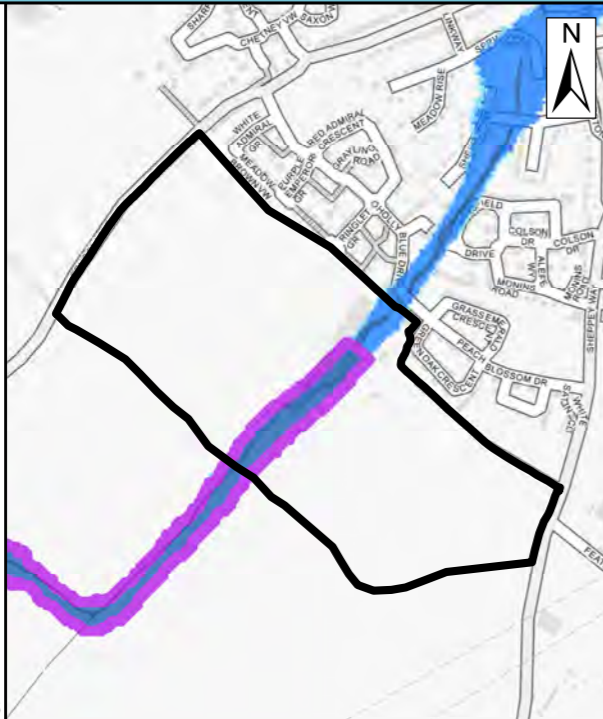
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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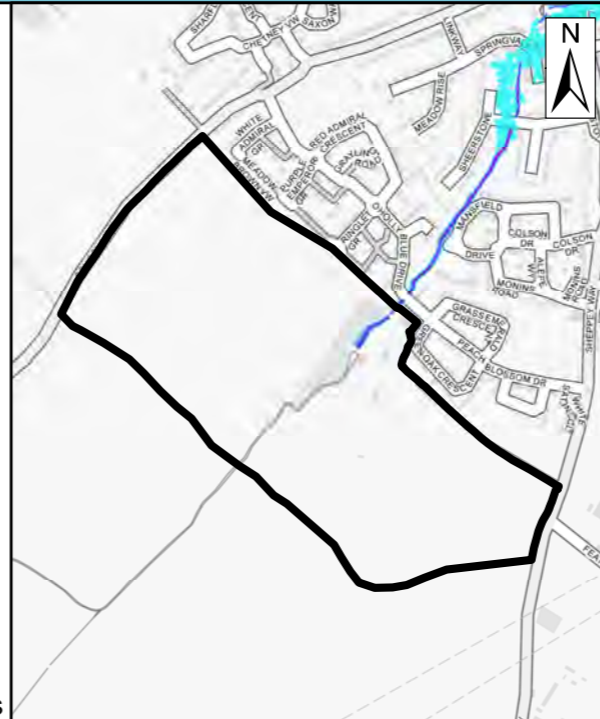
Flood Zones

- Site Boundary
- Flood Zone 3a used to define Flood Zone 3b
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2
- Surface Water Functional Flood Zones



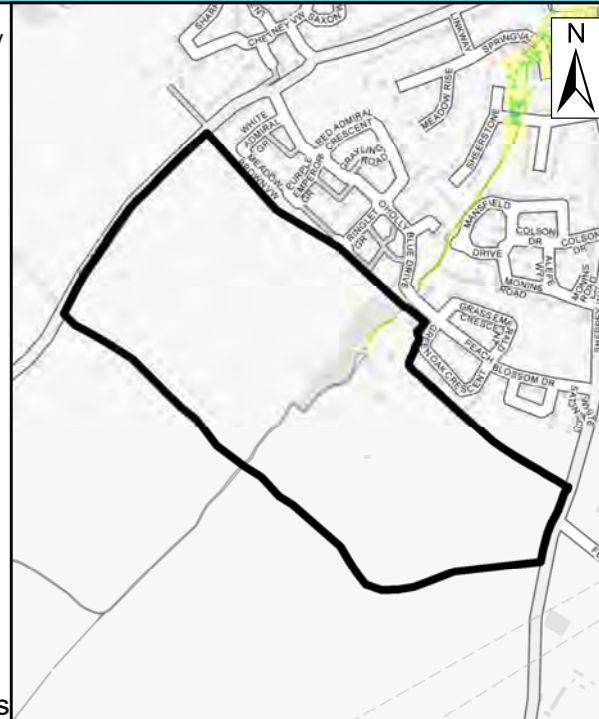
Fluvial Defended Flood Depth (1% AEP)

- Site Boundary
- Depth (m)
- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 5.0
- >5.0



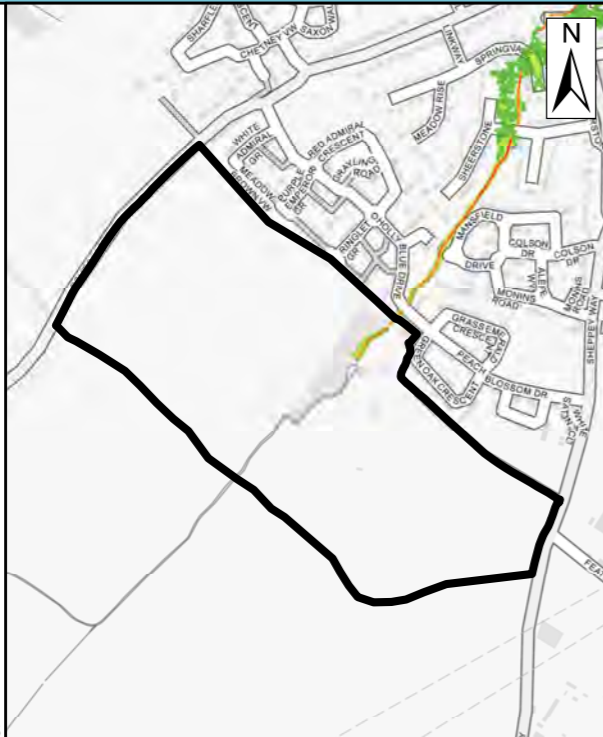
Fluvial Defended Flood Velocity (1% AEP)

- Site Boundary
- Velocity (m3/s)
- 0 - 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2
- >2.0



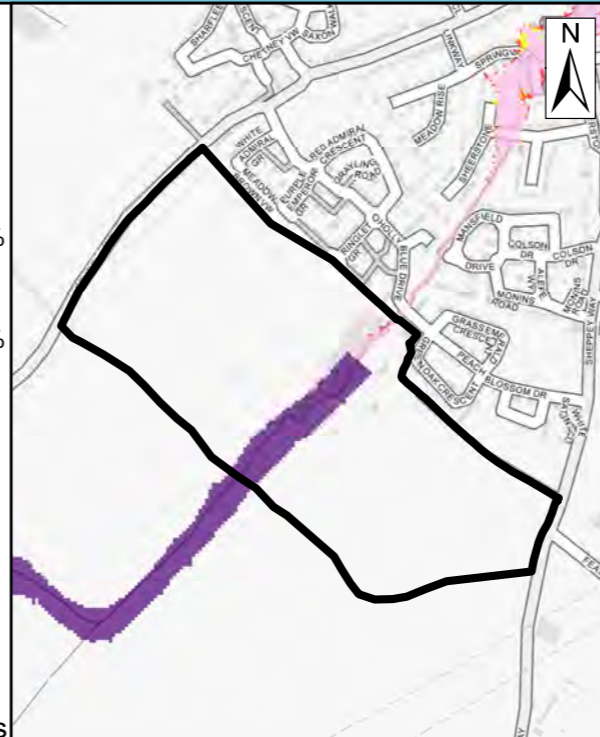
Fluvial Defended Flood Hazard (1% AEP)

- Site Boundary
- Hazard rating
- Very low hazard - caution
- Danger for some
- Danger for most
- Danger for all



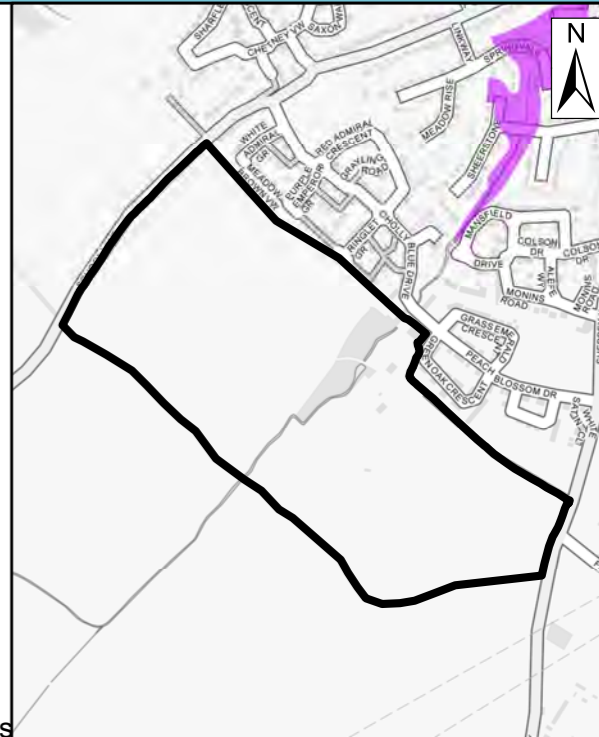
Fluvial Defended Flood Climate Change (1% AEP)

- Site Boundary
- 1% AEP+25% CC
- 1% AEP+35% CC
- 1% AEP +65% CC (Warden Bay only)
- 1% AEP +70% CC (Iwade Stream and Scrapsgate Drain only)
- Flood Zone 2 proxy



Environment Agency Recorded Flood Outlines

- Site Boundary
- Flooding from Main Rivers
- Flooding from the sea



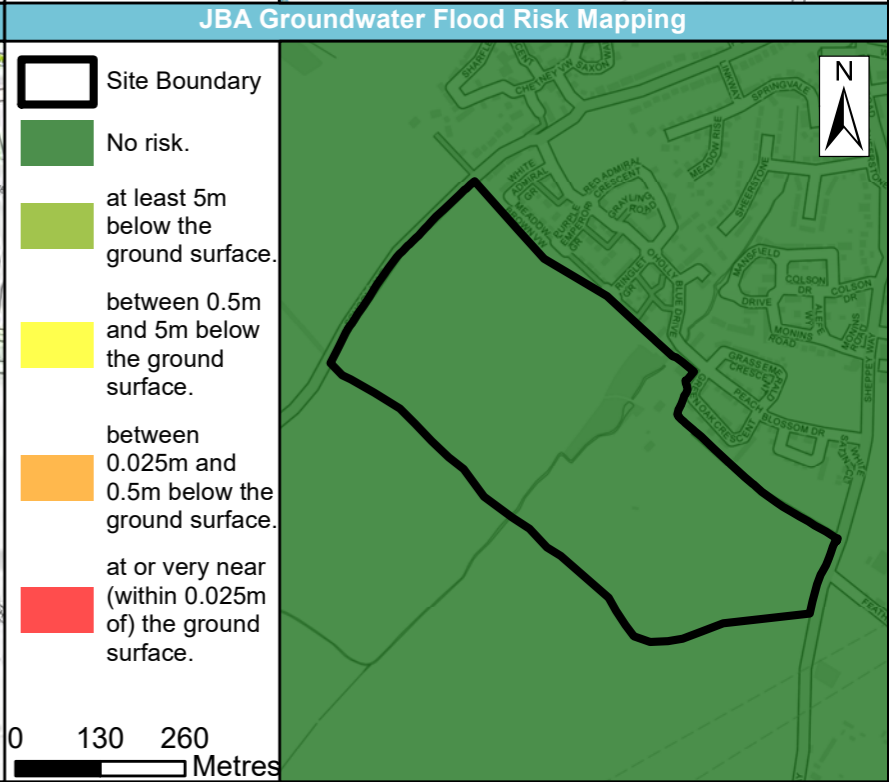
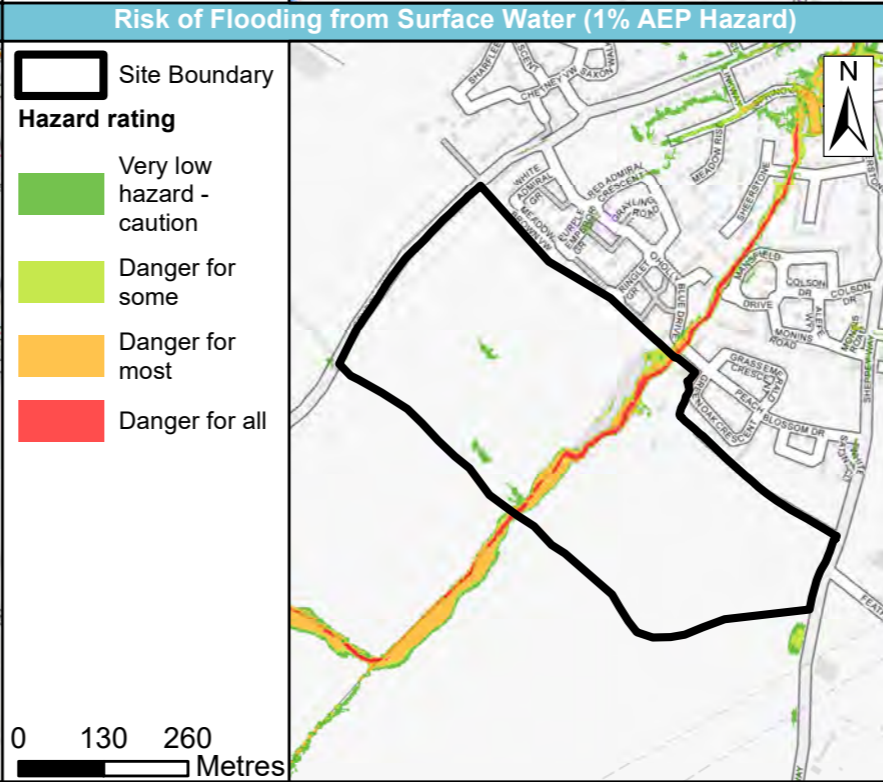
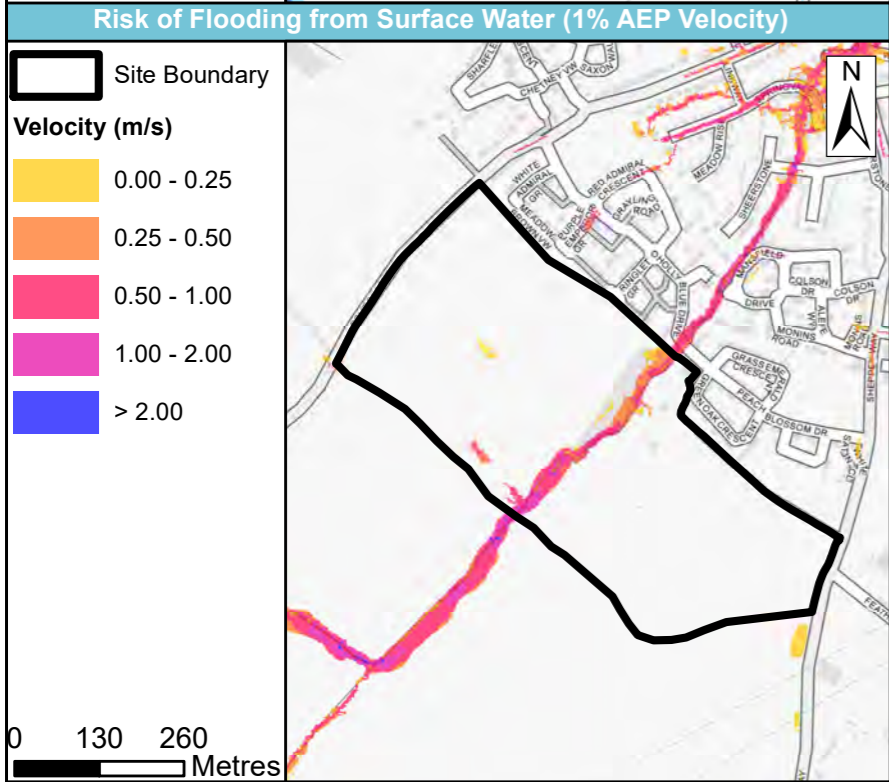
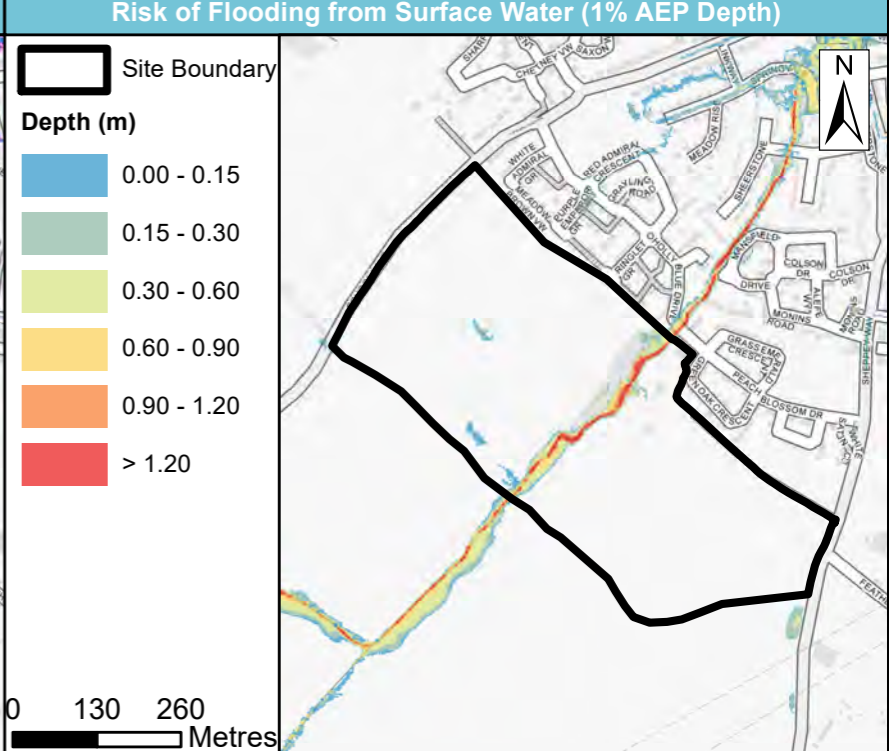
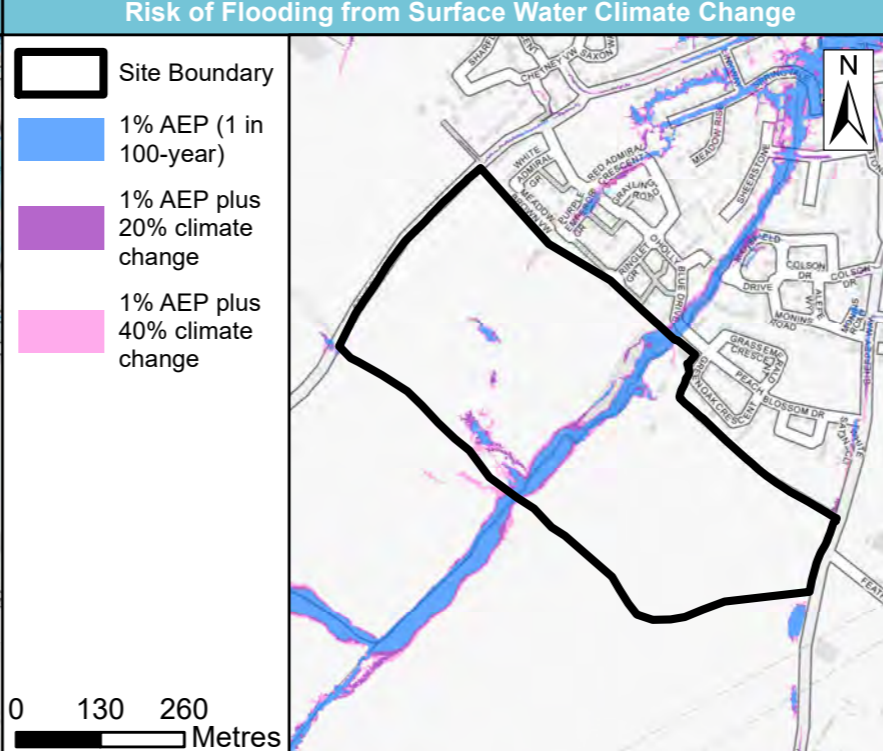
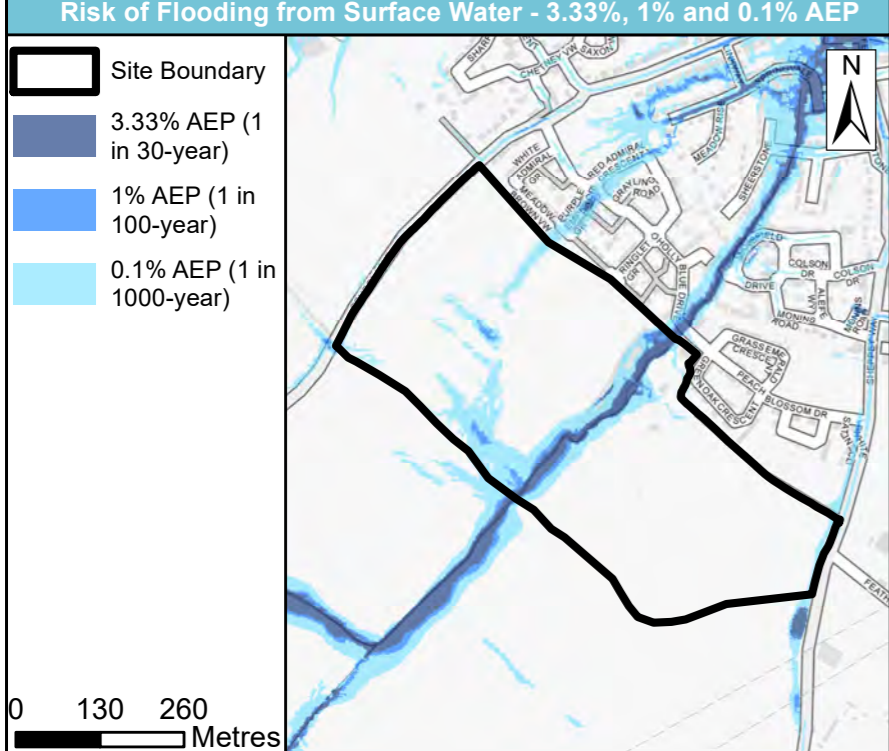
Legend

Site name	Land South and South-West of Iwade
Site area (ha)	24.6097

**Swale Borough Council Level 2
Strategic Flood Risk Assessment
Site Summary Sheet mapping**



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Site name

Land South and South-West of Iwade

Site area (ha)

24.6097

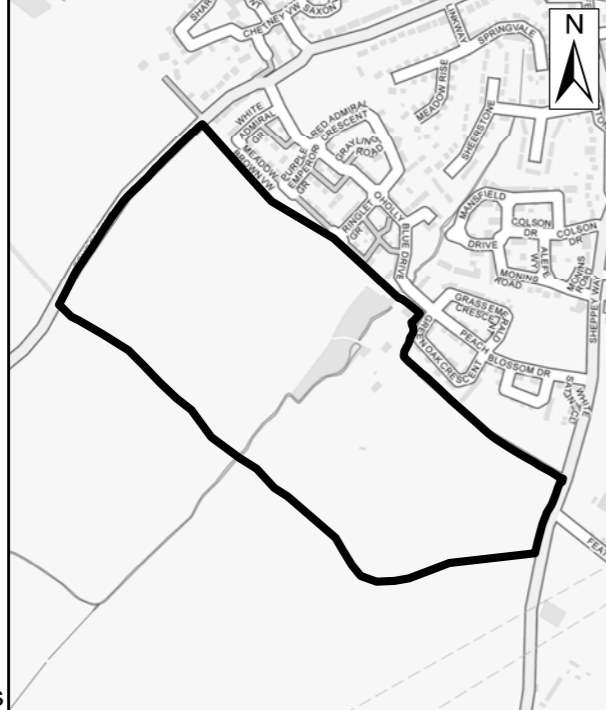
Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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Modelled breach extents (Present Day)

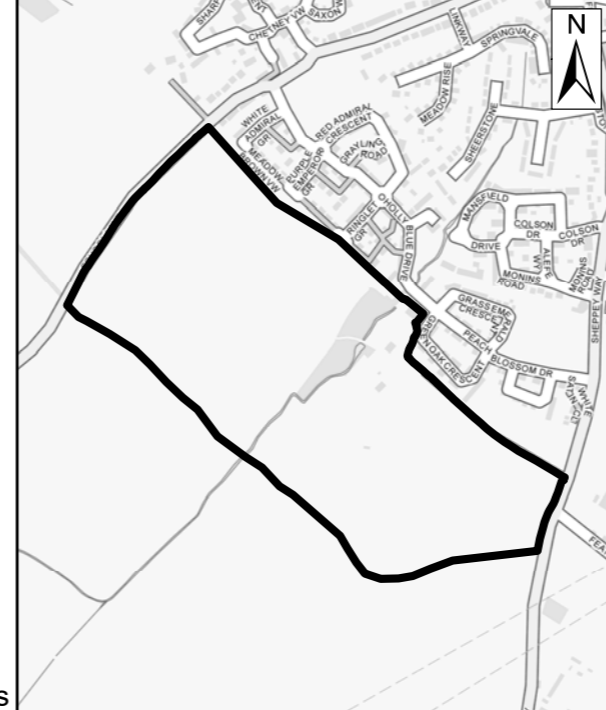
- Site Boundary
- Modelled breach locations
- Modelled breach extents (0.5% AEP-Present Day)



0 130 260 Metres

Modelled breach extents (0.5% AEP Present Day) Depth

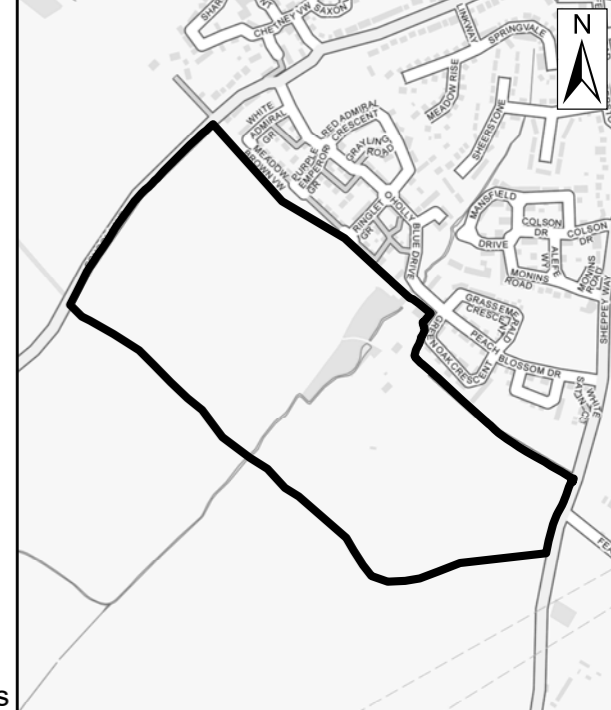
- Site Boundary
- Modelled breach locations
- No risk
- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 5.0
- > 5.0



0 130 260 Metres

Modelled breach extents (0.5% AEP Present Day) Velocity

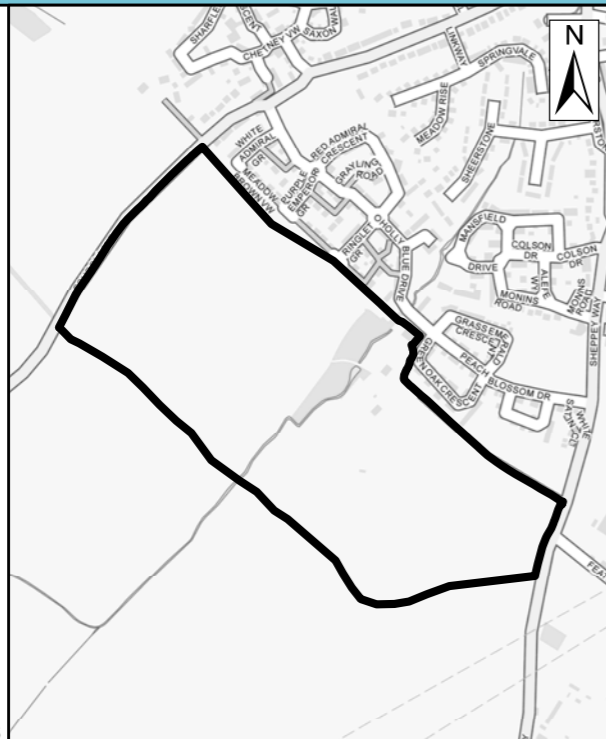
- Site Boundary
- Modelled breach locations
- No risk
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2.0
- > 2.0



0 125 250 Metres

Modelled breach extents (0.5% AEP Present Day) Hazard

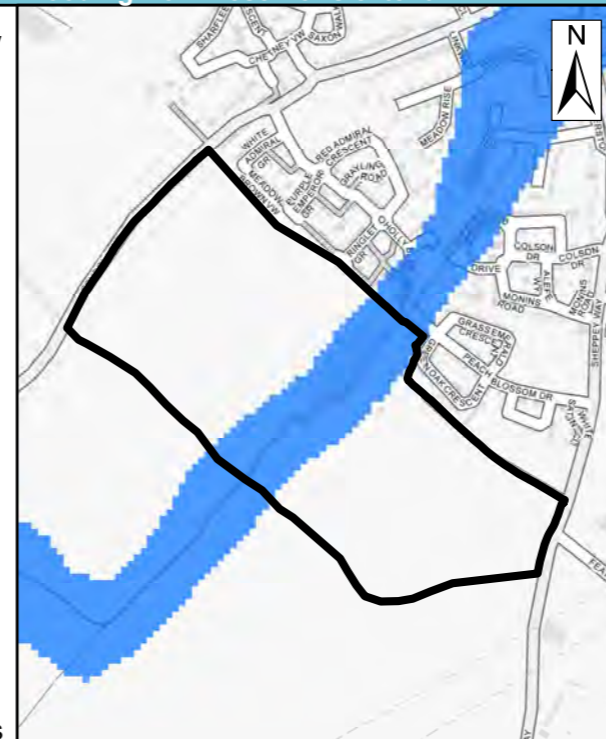
- Site Boundary
- Modelled breach locations
- Very low hazard - caution
- Danger for some
- Danger for most
- Danger for all



0 125 250 Metres

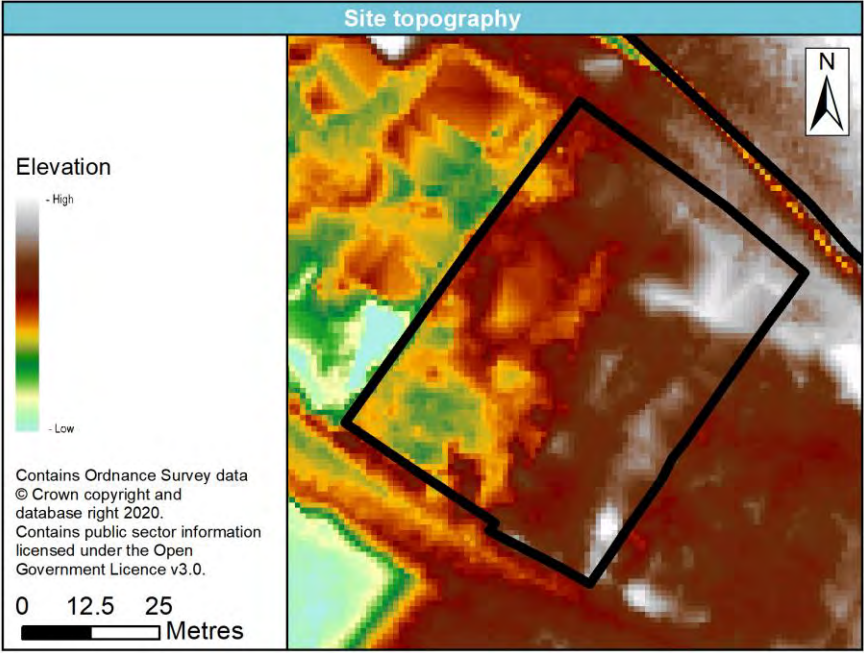
Risk of Flooding from Reservoirs extent

- Site Boundary
- Risk of Flooding from Reservoirs



0 125 250 Metres

Site reference	SLA18/032
Site name	Neats Court, Queenborough Road, Queenborough

Site details	OS Grid reference	TQ 92249 71571
	Area (ha)	0.38
	Current land use	Stables/cart/barn/granary/garage
	Proposed site use	Residential
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #00a0c0; color: white; margin: 0;">Site topography</p>  </div> <ul style="list-style-type: none"> This is a brownfield site, with a number of existing buildings including stables and a garage. The site area is relatively flat with although there is a slight slope from the north east to the south west of the site although it is likely that this is representative of the existing development as opposed to the actual site levels. The ground slope across the site generally has a gradient of less than 5%, however the site area is quite large and there are variations in topography within the site.

Site reference	SLA18/032
Site name	Neats Court, Queenborough Road, Queenborough

Sources of flood risk	Existing watercourses	There are no indications of existing watercourses within the vicinity of the site.		
	Flood history	There are no indications that the site has flooded historically. The Environment Agency's recorded flood outlines indicate that the Isle of Sheppey flooded in February 1953 as a result of the overtopping of defences and that flood extents during this event were approximately 20m from the site boundary at the southern side of Queenborough Road.		
	Tidal	Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	0.5% AEP	0.1% AEP
		0.00%	0.00%	0.00%
		Available modelled data: The site is covered by the Environment Agency North Kent Coast (Tidal) 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk. Flood characteristics: The site is not considered to be at risk of tidal flooding during the defended present day scenarios, however the site is considered to be at risk during the present day undefended scenarios and the defended climate change scenarios.		
	Surface Water	Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		3.3% AEP	1% AEP	0.1% AEP
		0.28%	1.35%	29.59%
		Description of surface water flow paths: There are a number of surface water flowpaths and ponding that occurs within the vicinity of the site as a result of the topography. However the site itself is not considered to be at significant risk, with most surface water flooding indicated to occur during the 0.1% AEP event. Flooding during this event is mostly limited to surface water pooling in the south west corner of the site, as a result of overland flows from Queenborough Road. RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.		
Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories			
	Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories	
	0.00%	0.00%	0.00%	

Site reference	SLA18/032
Site name	Neats Court, Queenborough Road, Queenborough

		The site is not considered to be at risk of groundwater flooding, however as groundwater datasets are generally produced nationally it is recommended that ground investigations are carried out and reported on within a site-specific FRA where this is required (known to be a problem locally).					
	Reservoir	The site is not considered to be at risk of flooding from reservoirs.					
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition			
		Embankment	0.75%	3			
	Residual risk	Culvert / structure blockage?	There are no known watercourses or culverts within the vicinity of the site.				
		Impounded water body failure?	There are no impounded waterbodies within the vicinity of the site.				
Defence breach/overtopping?		The site is not within the breach extents for the 0.5% AEP event that have been modelled to the west of the site.					
Emergency planning	Flood warning	The site is within the 064WAC1ShepSwale Flood Alert Area and the 064FWC1Sheerness Flood Warning Area which are in place to provide alerts and warnings for coastal flooding.					
	Access and egress	It is uncertain that safe access and egress to and from the site will be possible. The entire site is predominantly located within Flood Zones 2 and 3a with a small part of the site in the north east corner that is within Flood Zone 1, this could be used for safe refuge in the event of flooding. However, this is not the case during the climate change scenarios, with the entire site and surrounding areas considered to be at risk of flooding. The undefended model outputs for the 0.5% AEP (2120 epoch) climate change have been assessed as a 'worst case' scenario in the event of a breach. These indicate that typical flood depths within the site are commonly in excess of 3m and are indicated to be in excess of 2m during the defended scenario.					
Climate Change	Climate Change allowances	Proportion of site at 0.5% AEP tidal flood risk in the defended scenario					
		Area	Present day	2080 Higher Central	2080 Upper End	2120 Higher Central	2120 Upper End
		South East England	0.00%	0.00%	0.00%	88.84%	100%
	Implications for the site	The site is considered to be very sensitive to the impacts of climate change on tidal flood risk as it is not considered to be at risk of tidal flooding during the present day defended scenarios from a 0.5% or 0.1% AEP event. There is a very large increase in flood extent during the 2120 epoch which results in the entire site being within the extent of a 0.5% AEP event during the upper end allowance for this epoch. The proposals will need to include provisions that address the need to increase the standard of protection of the existing defences so that appropriate arrangements are in place to address the potential risk over the lifetime of the development.					
Impact of climate change on risk	Proportion of site at 1% AEP surface water flood risk						
	Present day	+20% rainfall uplift		+40% rainfall uplift			

Site reference	SLA18/032
Site name	Neats Court, Queenborough Road, Queenborough

	from surface water	1.35%	7.51%	13.58%
	Implications for the site	Surface water flood extents increase slightly with a 20% and 40% uplift for climate change applied to the 1% AEP event. The extents are particularly notable at the south west corner of the site, which is not considered at risk of flooding during the present day 1% AEP event. The extents are less than the present day 0.1% AEP event and as a result the site is not considered to be sensitive to the impacts of climate change on surface water flood risk.		

Site reference	SLA18/032
Site name	Neats Court, Queenborough Road, Queenborough

Requirement for drainage control and impact mitigation	Bedrock Geology	The site is underlain by the London Clay Formation which at this site is comprised of clay and silt.
	Superficial Geology	There are no underlying superficial deposits
	Soils	The site has slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils
	Groundwater Source Protection Zone	The site is not within a groundwater Source Protection Zone.
	Historic Landfill Site	The site is not within a historic landfill site
	Broad scale assessment of possible SuDS	<p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting should be considered in the design of the site.</p> <p>British Geological Society (BGS) data indicates that the underlying geology is the Thames Group and underlying soils are slowly permeable loamy and clayey. Groundwater levels and the permeability of soils at the site should be assessed via an infiltration test, with the use of infiltration maximised as much as possible. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.</p> <p>Surface water discharge rates should not exceed the existing discharge rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. Mapping suggests that the site slopes make it possible to consider most forms of detention.</p> <p>The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.</p> <p>If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.</p>

Site reference	SLA18/032
Site name	Neats Court, Queenborough Road, Queenborough

	Cumulative impacts of development	The catchment is indicated to have a high sensitivity to the cumulative impacts of development. Consideration should be given to the performance of existing drainage systems that convey runoff from the site to demonstrate that there are no adverse effects on third party land or property.			
Recommendations for Local Plan policy	Proportion of the site within each Flood Zone				
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	
	8.51%	41.07%	50.42%	0.00%	
	Sequential Test and Exception Test requirements				
	The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.				
	The Exception test will be required in the following scenario: <ul style="list-style-type: none"> highly vulnerable and in flood zone 2 essential infrastructure in flood zone 3a or 3b more vulnerable in flood zone 3a 				
	Development will not be permitted for the following scenario: <ul style="list-style-type: none"> Highly vulnerable development within FZ3a. Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. 				
	The development proposals for this site are for a residential development which is classed as 'more vulnerable' development. The site is within Flood Zone 3a and as a result the exception test will be required.				
	Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers				
	Flood risk assessment: <ul style="list-style-type: none"> At the planning application stage, a site-specific flood risk assessment will be required for this site as it is located in Flood Zones 2 and 3, and the development is likely to introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in future. It will also be required where development: <ul style="list-style-type: none"> Land greater than 1 ha in size; Is on land which has been identified by the Environment Agency as having critical drainage problems; Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. The residual risk to the site posed by failure of flood defences, including overtopping and breach should be considered in a site-specific Flood Risk Assessment. Maintenance arrangements (including funding mechanisms) for the defences will need to be demonstrated for the lifetime of development. Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of tidal flooding. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development. Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk. Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. 				

Site reference	SLA18/032
Site name	Neats Court, Queenborough Road, Queenborough

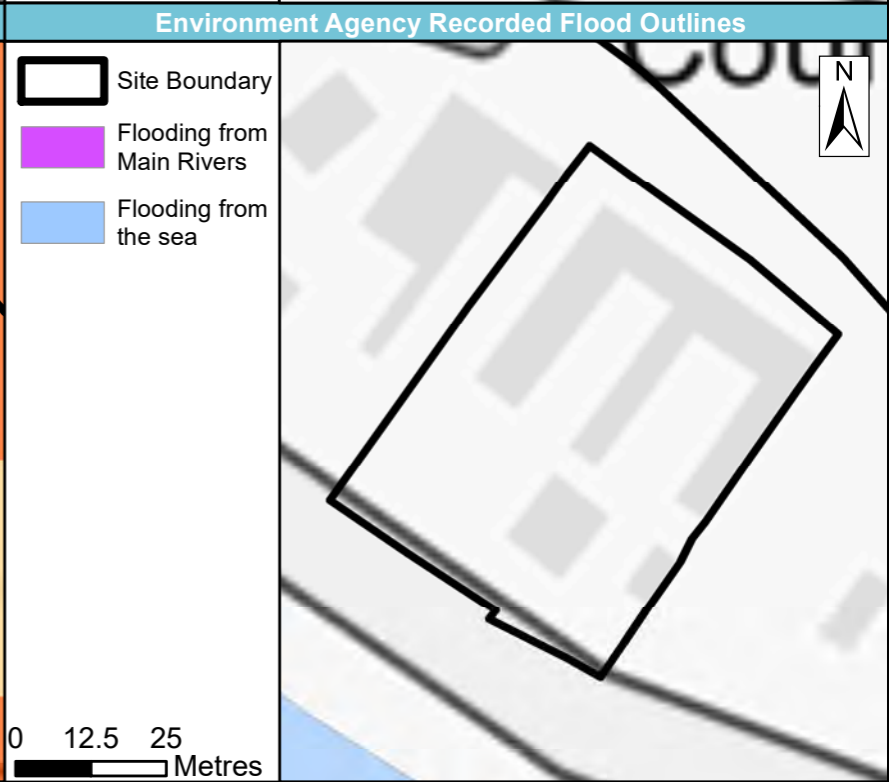
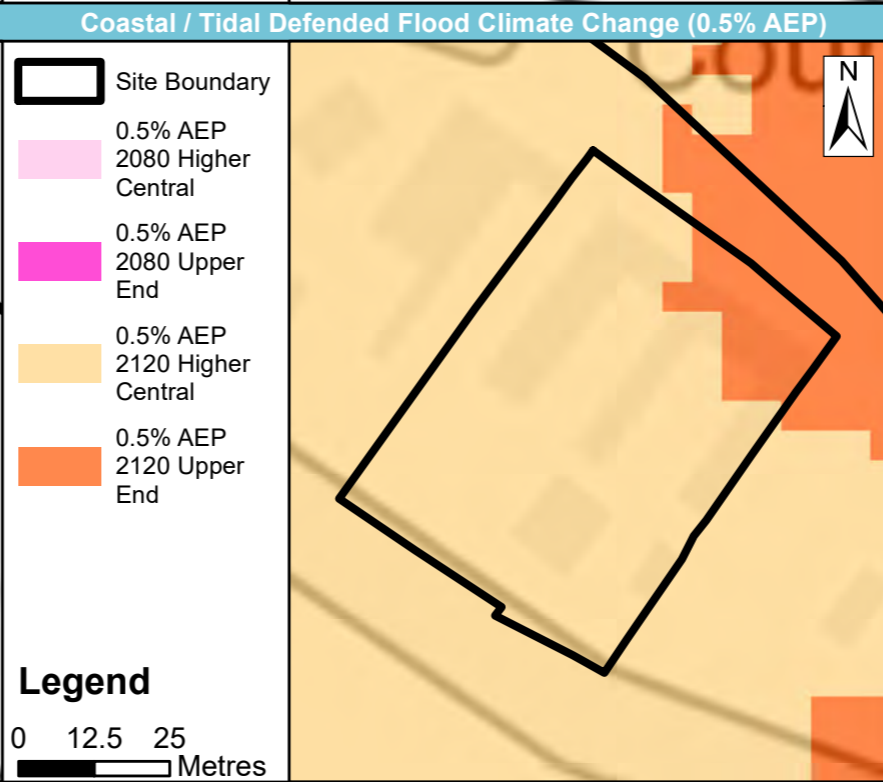
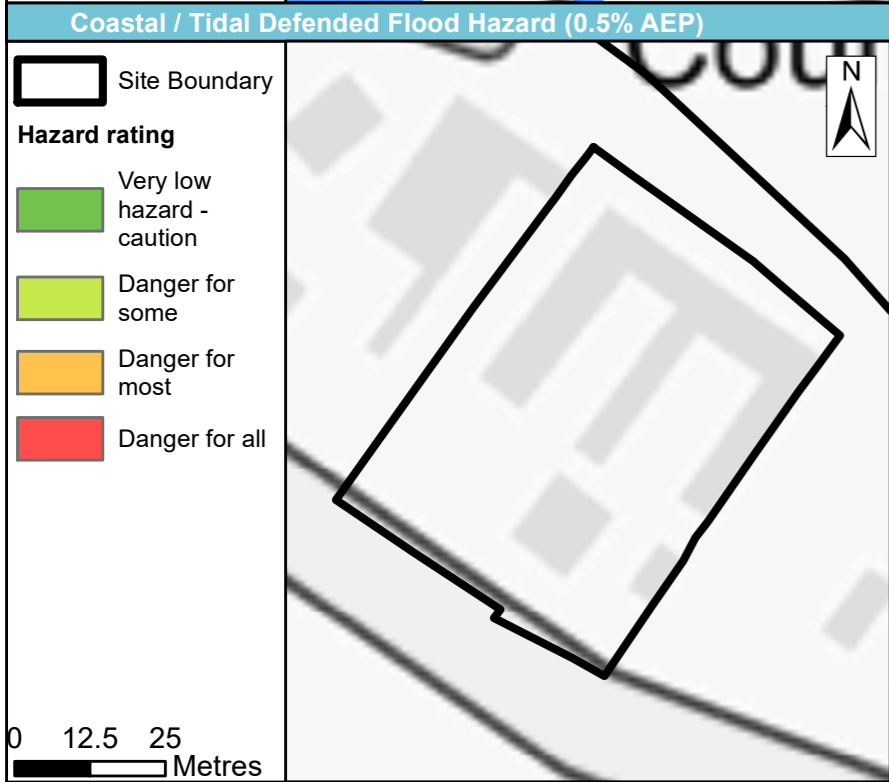
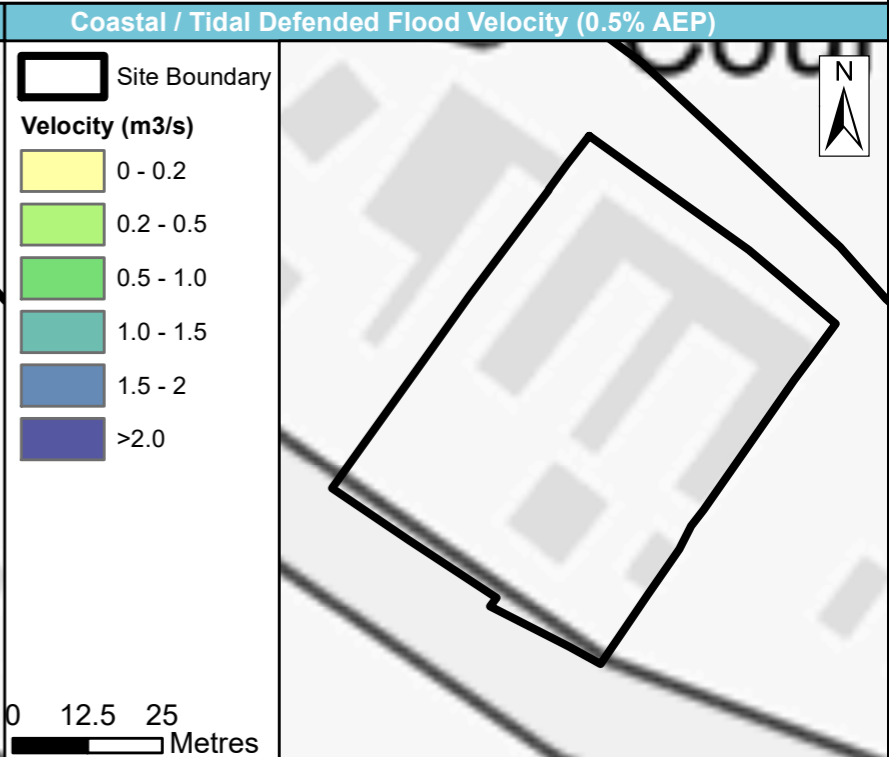
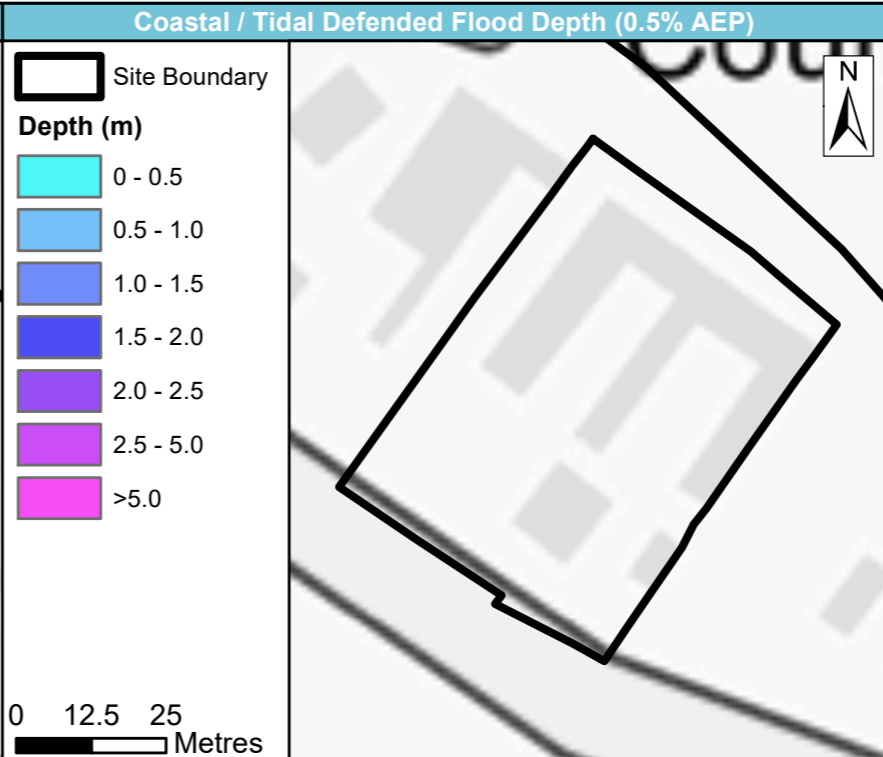
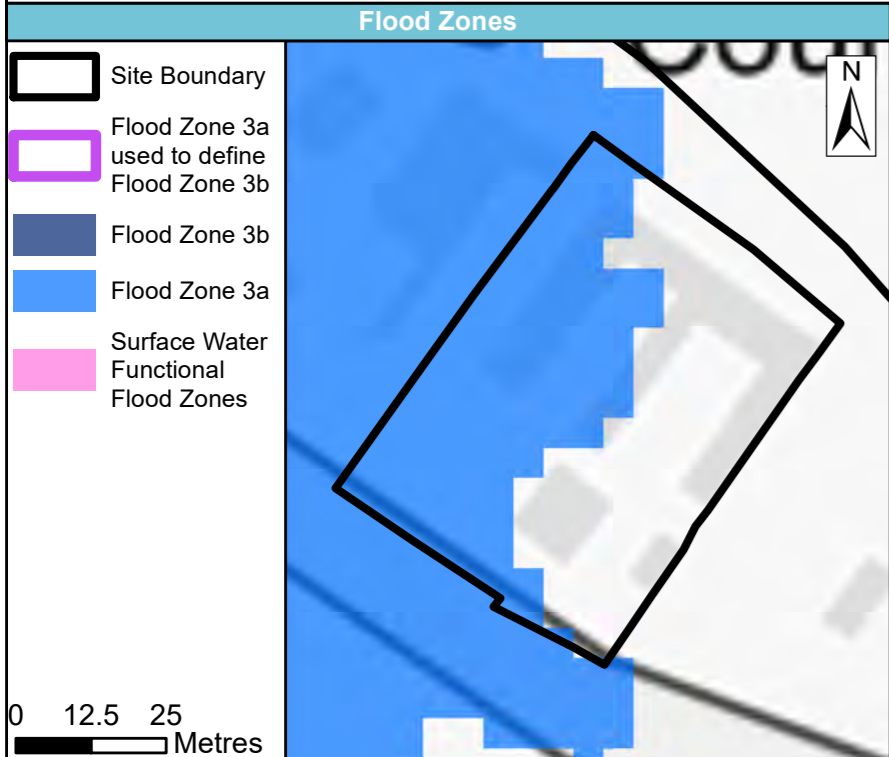
	<ul style="list-style-type: none"> Proposals will need to demonstrate that users will be safe and more vulnerable uses are located outside Flood Zone 3a. <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> New development must seek opportunities to reduce the overall level of flood risk to the site. For example by: <ul style="list-style-type: none"> Reducing rates and volumes of runoff; Relocating development to lower risk flood zones; Creating space for flooding. Safe access and egress should be demonstrated in the tidal 0.5% AEP plus climate change event All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff. SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. The proposals will need to include the commitment to provisions that address the need to increase the standard of protection of the existing defences so that appropriate arrangements are in place to address the potential risk over the lifetime of the development. A greenfield site such as this should be able to implement an exemplar surface water drainage scheme to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. Assessment of runoff should include allowances for climate change effects. Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk. The site is within the Lower Medway Internal Drainage Board (IDB), if surface water discharge to an IDB watercourse (directly or indirectly) is proposed, this will be subject to additional consents or requirements as outlined in the Board's byelaws. SuDS design must follow Kent County Council policy, meet the Defra National Non-Statutory Technical Standards, and follow current best design practice (CIRIA C753 Manual 2015). Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas as public open space. Further details regarding Swale Borough Council requirements are available on the following webpage: http://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf
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Site name	Neats Court, Queenborough Road
Site area (ha)	0.378786

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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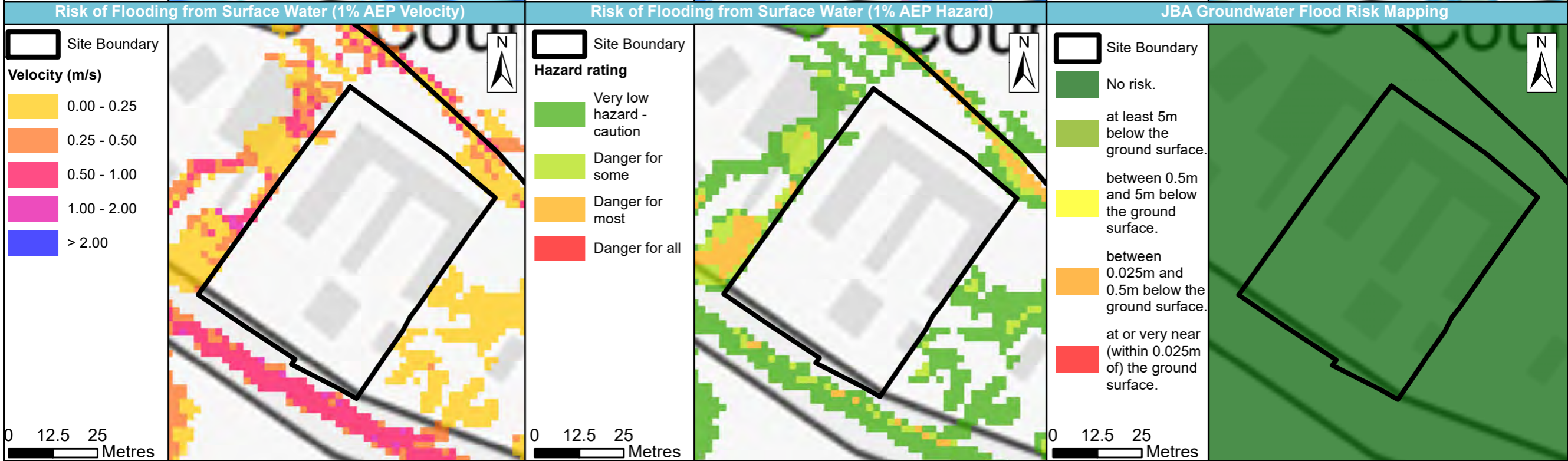
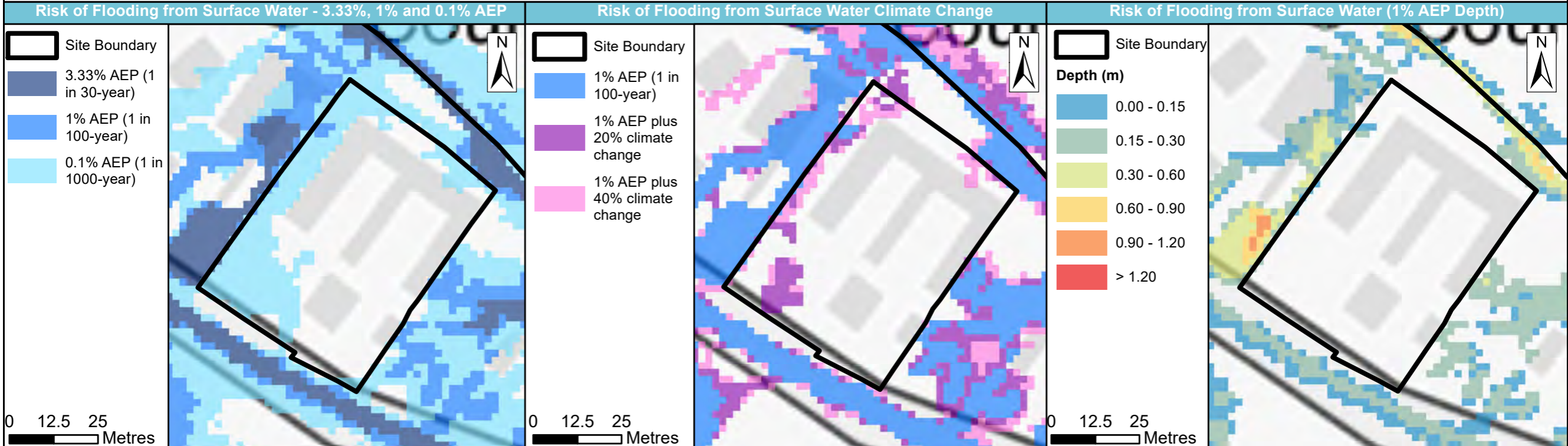


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**Swale Borough Council Level 2
Strategic Flood Risk Assessment
Site Summary Sheet mapping**



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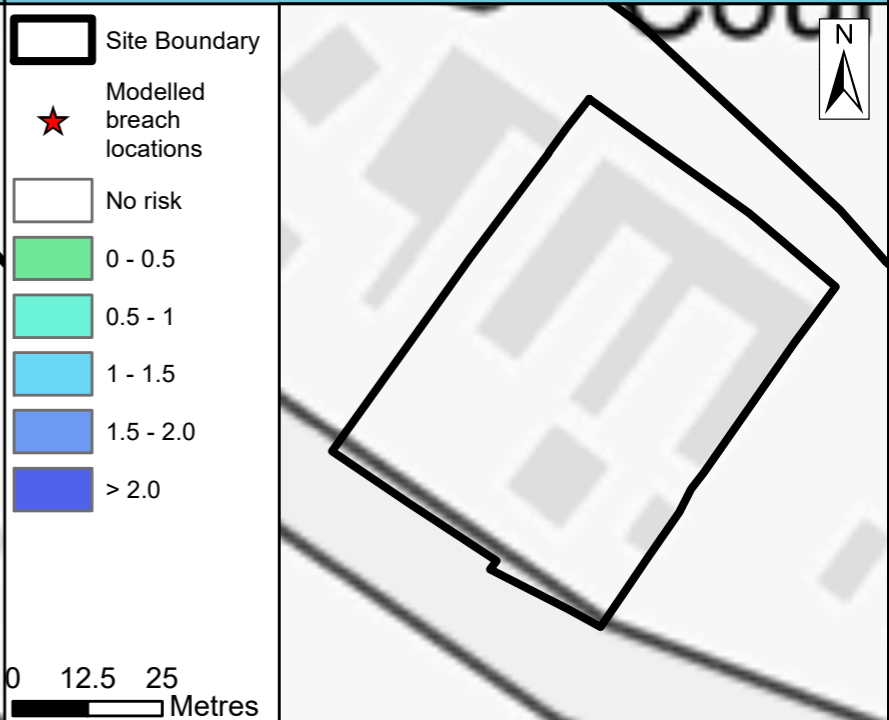
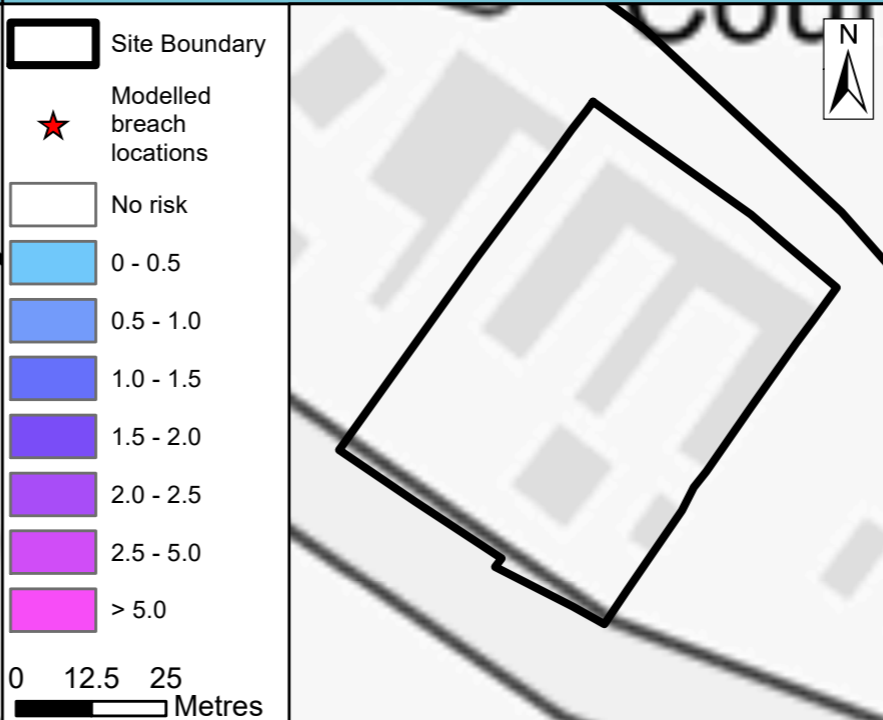
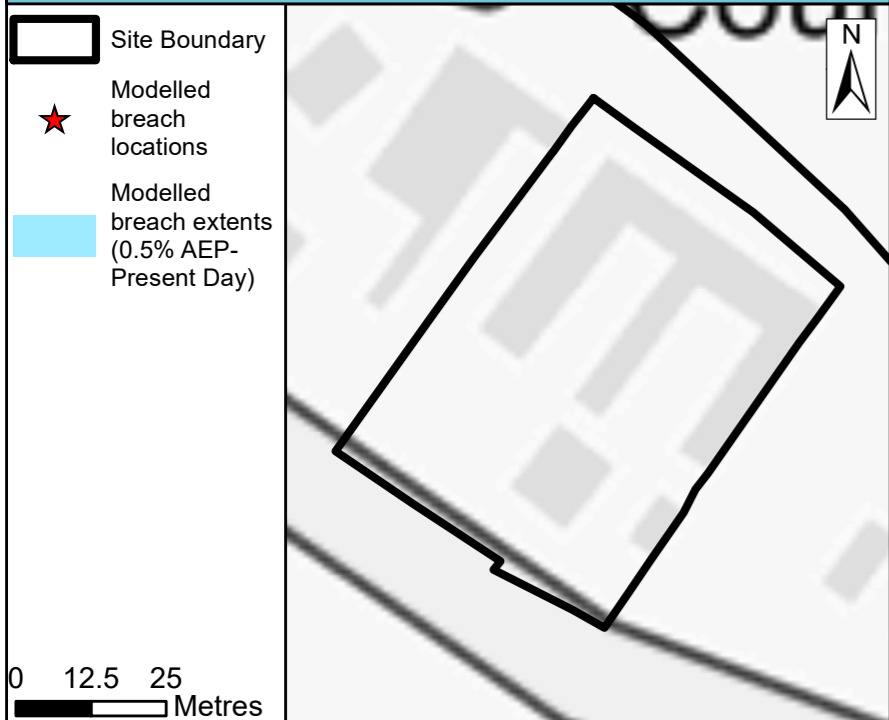
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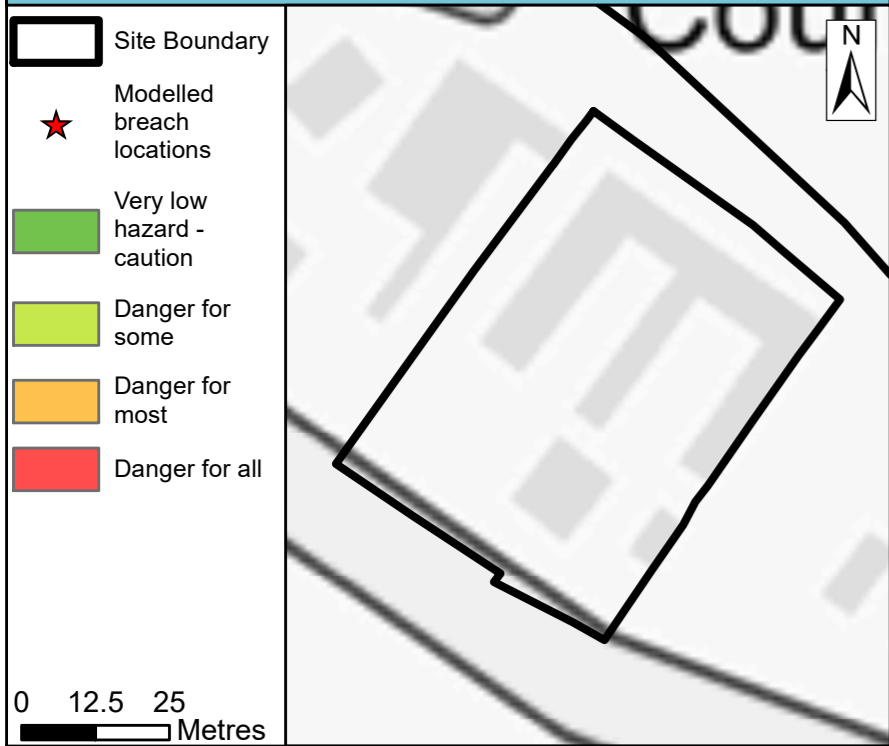


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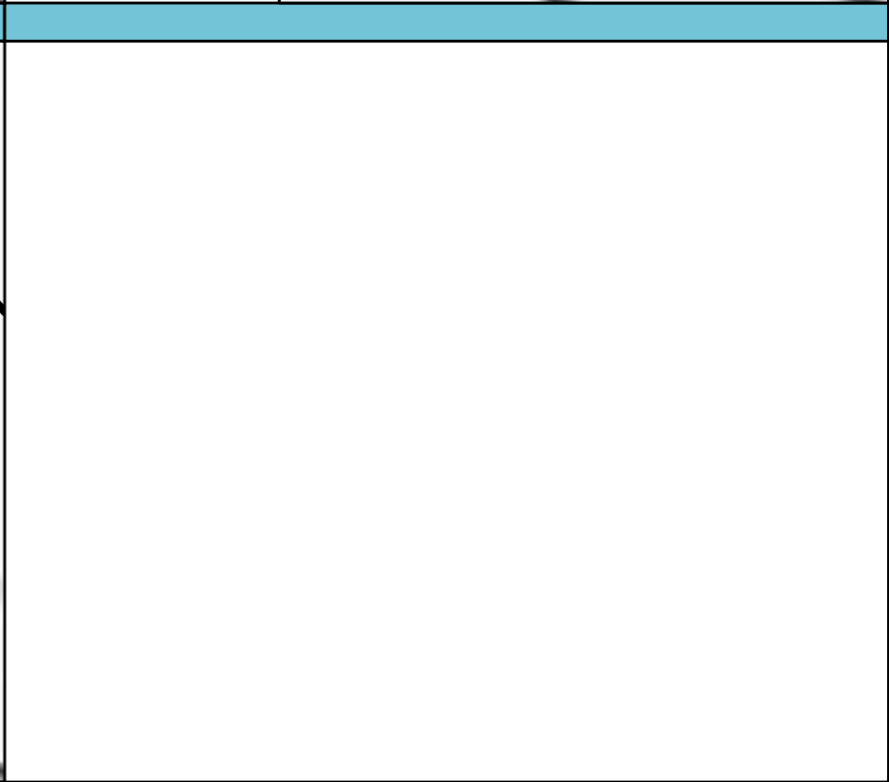
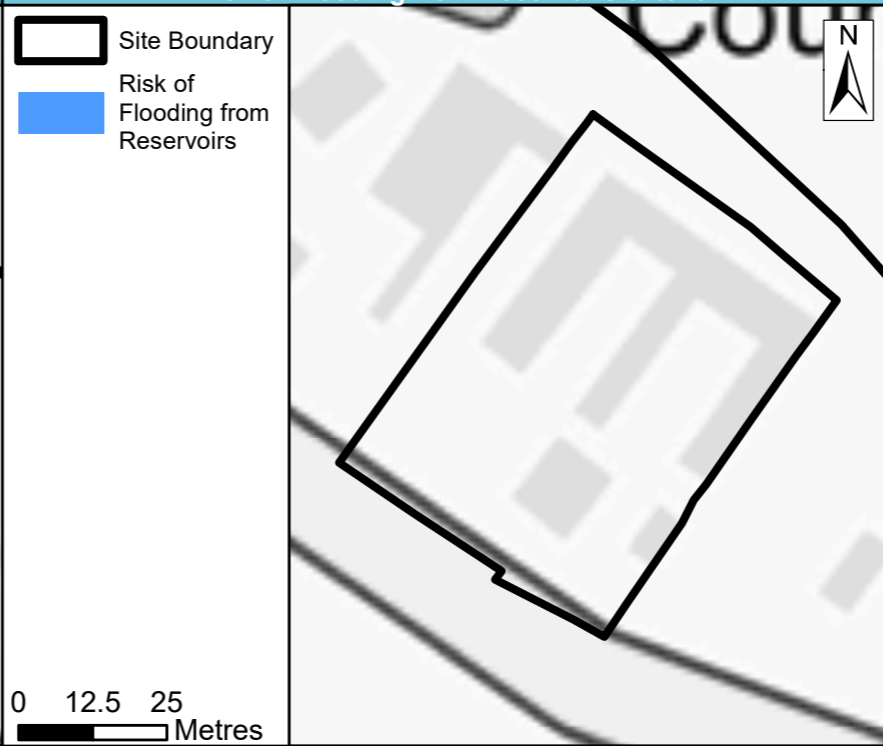
Modelled breach extents (Present Day) Modelled breach extents (0.5% AEP Present Day) Depth Modelled breach extents (0.5% AEP Present Day) Velocity



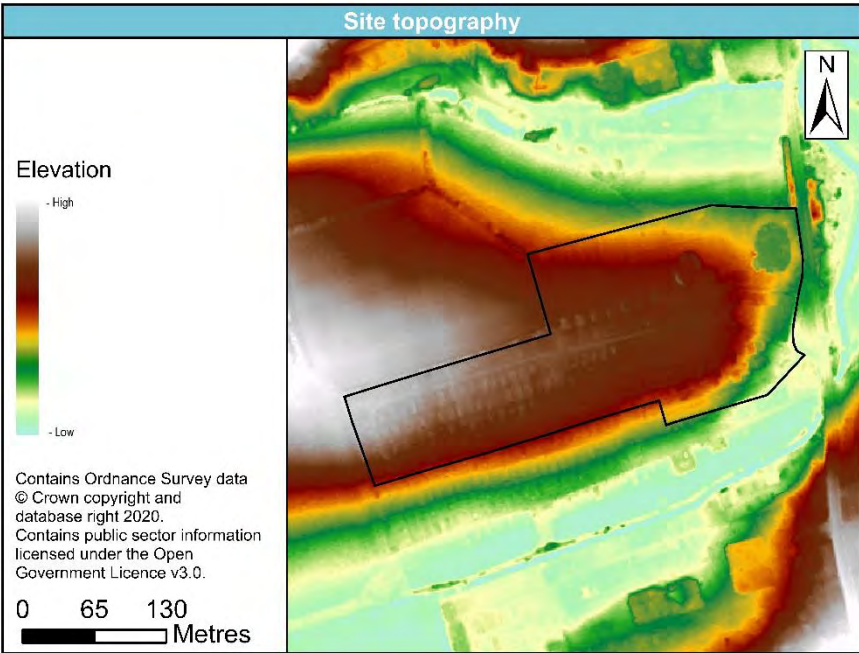
Modelled breach extents (0.5% AEP Present Day) Hazard



Risk of Flooding from Reservoirs extent



Site reference	SLA18/121
Site name	Seaview Park, Warden Bay Road

Site details	OS Grid reference	TR 02283 71062
	Area (ha)	5.5
	Current land use	Caravan Park
	Proposed site use	Residential – 135 units
	Flood risk vulnerability	More vulnerable
	Topography	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #00a0c0; color: white; margin: 0;">Site topography</p>  <p style="font-size: small; margin: 5px 0;"> Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0. </p> </div> <ul style="list-style-type: none"> Ground levels at the site slope from a high point along the western site boundary to an area of lower elevations in the east. There are several existing buildings and an access road located within the site. The ground slope across the site generally has a gradient of less than 5%

Site reference	SLA18/121
Site name	Seaview Park, Warden Bay Road

Sources of flood risk	Existing watercourses	Warden Bay Stream (Main River) is located approximately 50m from the site, parallel to the southern boundary. The watercourse flows through a culvert under Warden Bay Road before then flowing to the east of the site. The residual risk due to a blockage of the culvert should be considered.		
	Flood history	The Environment Agency's recorded flood outlines indicate that a small section of the site in the east flooded in February 1953 due to the overtopping of coastal defences. Kent County Council's historic records also show reported flooding of the holiday park in 2012, the cause of which is not stated.		
	Fluvial	Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	1% AEP	0.1% AEP
		1%	2%	4%
		Available modelled data: The site is covered by the Environment Agency Warden Bay (Fluvial) 2016 Flood Modeller-TUFLOW model. Flood characteristics: A small south easterly section of the site is located within Flood Zone 3b (5% AEP defended fluvial event). This extent increases by 0.5% for the 1% AEP fluvial event and a further 1.8% for the 0.1% AEP fluvial event. Risk remains contained to the south east corner of the site.		
	Tidal	Proportion of the site at risk in the defended scenario (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)		
		5% AEP	0.5% AEP	0.1% AEP
		0%	0%	0%
		Available modelled data: The site is covered by the Environment Agency North Kent Coast (Tidal) 2019 Flood Modeller-TUFLOW model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk. JBA have recently updated the NKC model to take account of UKCP18. Flood characteristics: The site is not at risk of flooding from the tidal scenarios.		
Surface Water	Proportion of site at risk (RoFSW) (proportion reported are for the area of land occupied by each flood extent between larger or smaller return period events, and therefore not cumulative. Percentages rounded to the nearest 1%. Areas <0.5% not recorded)			
	3.3% AEP	1% AEP	0.1% AEP	
	1%	2%	6%	

Site reference	SLA18/121
Site name	Seaview Park, Warden Bay Road

		<p>Description of surface water flow paths:</p> <p>There is a small area in the south east corner of the site where surface water is indicated to accumulate during the 3.33% AEP event. This is associated with low-lying land surrounding the Warden Bay Stream. There is a 1% and 5% increase in this extent for the 1% AEP and 0.1% AEP events respectively. An additional area of ponding in an isolated spot in the north east of the site develops during the 0.1% AEP event.</p> <p>Mapping showing the RoFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.</p>		
	Groundwater	Proportion of site at risk in JBA Groundwater Map 1% AEP risk categories		
		Depth below surface 0-0.025m	Depth below surface 0.025-0.5m	Total in highest risk categories
		0%	0%	0%
	<p>The entire site is considered to be at a negligible risk of groundwater flooding during a 1% AEP groundwater flood event. However, as groundwater datasets are generally produced nationally it is recommended that ground investigations are carried out and reported on within a site-specific FRA where this is required (known to be a problem locally).</p>			
Reservoir	The site is not considered to be at risk of flooding from reservoirs.			

Site reference	SLA18/121
Site name	Seaview Park, Warden Bay Road

	Defences	Defence Type	Standard of Protection	Condition	
			Embankment	0.1%	Poor
Flood risk management infrastructure	Residual risk	Culvert / structure blockage?	Warden Bay Stream appears to be culverted under Warden Bay Road in proximity to the south east of the site. As a result, the residual risks from a blockage should be considered as part of a site-specific FRA.		
		Impounded water body failure?	The site is not considered to be at risk from failure of impounded water bodies.		
		Defence breach/overtopping?	Breach modelling was previously undertaken for the North Kent Coast model, whilst the site itself was not modelled for breach this is still a residual risk as it is situated behind raised defences		
Emergency planning	Flood warning	The site is situated within the Environment Agency's 'Scrapsgate Drain to Warden Bay Drain' (064WAF331) Flood Warning Area and the 'Coast from Warden Bay to Hamlet of Shellness' (064WAC1ShepSwale) Flood Warning Area The site is also situated within the Environment Agency's 'Rivers on the Isle of Sheppey' (064WAF331) Flood Alert Area and the 'Isle of Sheppey and coast from Kemsley to Seasalter (064WAC1ShepSwale) Flood Alert Area			
	Access and egress	The site is considered to be at a small risk of fluvial flooding in the south east of the site. Safe access and egress should therefore be available to the west. The defended model outputs for the 0.5% AEP (2120 epcoh) climate change have been assessed as a 'worst case' scenario in the event of a breach. These confirm that safe access and egress would still be available to the west of the site.			
Climate Change	Climate Change allowances for '2080s'	Proportion of site at 1% AEP fluvial flood risk in the defended scenario			
		River Basin District	Present day	Higher Central	n/a
		Thames	n/a	35% increase in peak river flows	60% increase in peak river flows
		2%	3%	3%	
	Implications for the site	Small areas of the site are considered to be sensitive to the impact of climate change on fluvial flood risk, however the implications for the site are predicted to be minimal. The site is predicted to have <1% increase in area at risk for a 35% increase in peak river flows and <1.5% increase for a 60% increase in peak river flows. These increases are located in the south east of the site. The flood extent for both scenarios do not reach that of the undefended 0.1% AEP flood extent. If the site is to be taken forward in the Local Plan at a later date, the Warden Bay model should be run with a 70% increase in peak river flows to account for the Thames Upper End climate change allowance or the latest Environment Agency guidance at the time. A sequential approach should be implemented so development at the site is on land that provides the appropriate standard of protection for the intended lifetime.			

Site reference	SLA18/121
Site name	Seaview Park, Warden Bay Road

	Climate Change allowances to the year 2120	Proportion of site at 0.5% AEP tidal flood risk in the defended scenario			
		Region	Present day	Higher Central	Upper End
		South East England	0%	0%	2%
	Implications for the site	<p>The site which is not considered to be at risk during the present day 1% AEP scenario, is considerably minorly sensitive to the impacts of climate change on tidal flood risk. Less than 2% of the site in the south east corner is predicted to be susceptible to tidal flood risk in the 2120 Upper End scenario. The site is not predicted to be at risk in the 2120 Higher Central scenario.</p> <p>The proposals at the allocation site might need to include provisions that address the need to increase the standard of protection of the existing defences so that appropriate arrangements are in place to address the potential tidal flood risk over the lifetime of the development, even if this is considered very minor. Alternatively, if a sequential approach is implemented then it would be possible for development to be safe over the intended life</p>			
	Impact of climate change on risk from surface water	Proportion of site at 1% AEP surface water flood risk			
		Present day	+20% rainfall uplift	+40% rainfall uplift	
		2%	2%	3%	
	Implications for the site	<p>A very small increase in flood extent during the 1% AEP surface water event is predicted for the plus 20% and 40% climate change events. However, the extents do not reach that of the 0.1% AEP surface water flood event. These increases are located in the south east and north east of the site. Therefore, the site will be at a slightly higher risk from surface water flooding in the future.</p>			

Site reference	SLA18/121
Site name	Seaview Park, Warden Bay Road

	Bedrock Geology	The entire site's bedrock geology consists of the Thames Group (clay, silt, sand and gravel).
	Superficial Geology	The site is not overlain by any superficial deposits.
	Soils	The site has slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils
	Groundwater Source Protection Zone	The site is not located within a Groundwater Source Protection Zone.
	Historic Landfill Site	There are no historic landfill sites within the vicinity of the site.
	Requirement for drainage control and impact mitigation	Broad scale assessment of possible SuDS

Site reference	SLA18/121
Site name	Seaview Park, Warden Bay Road

	Cumulative impacts of development	The site is located entirely within a catchment that has a medium sensitivity to development. It is unlikely that the site is in a location where cumulative effects will be influential.		
	Proportion of the site within each Flood Zone			
	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
	71%	13%	15%	1%
	Sequential Test and Exception Test requirements			
	<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p> <p>The Exception test will be required in the following circumstances:</p> <ul style="list-style-type: none"> • highly vulnerable and in flood zone 2 • essential infrastructure in flood zone 3a or 3b • more vulnerable in flood zone 3a <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b. • <p>The available mapping shows the site is within Flood Zone 3b where more vulnerable development is not permitted and 3a where the exception test is required. However, it may be possible to adopt a sequential approach to the site layout with more vulnerable development located outside of Flood Zone 3a or 3b.</p>			
Recommendations for Local Plan policy	Recommendations for requirements of site-specific Flood Risk Assessment, including guidance for developers			
	<p>Flood risk assessment:</p> <ul style="list-style-type: none"> • At the planning application stage, a site-specific flood risk assessment will be required for this site as it is greater than 1 hectare, located within Flood Zone 2 and 3 and may be subject to other sources of flooding where the development would introduce a more vulnerable use and contains land identified in the strategic flood risk assessment as being at increased flood risk in the future. It is also required where development: <ul style="list-style-type: none"> ○ Is on land which has been identified by the Environment Agency as having critical drainage problems; or • Other sources of flooding must be considered as part of any site-specific flood risk assessment, including surface water and groundwater. • Climate change modelling of Warden Bay will need to be undertaken using the Upped End allowance. • The residual risk to the site posed by failure of flood defences, including overtopping and breach should be considered in a site-specific Flood Risk Assessment. Maintenance arrangements (including funding mechanisms) for the defences will need to be demonstrated for the lifetime of development. • Consideration should be given to the potential effects of climate change, particularly with respect to the impacts of tidal and surface water flooding. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development. • Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these. • Consultation with the Local Authority, Lead Local Flood Authority and Environment Agency should be undertaken at an early stage. 			

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Site name	Seaview Park, Warden Bay Road

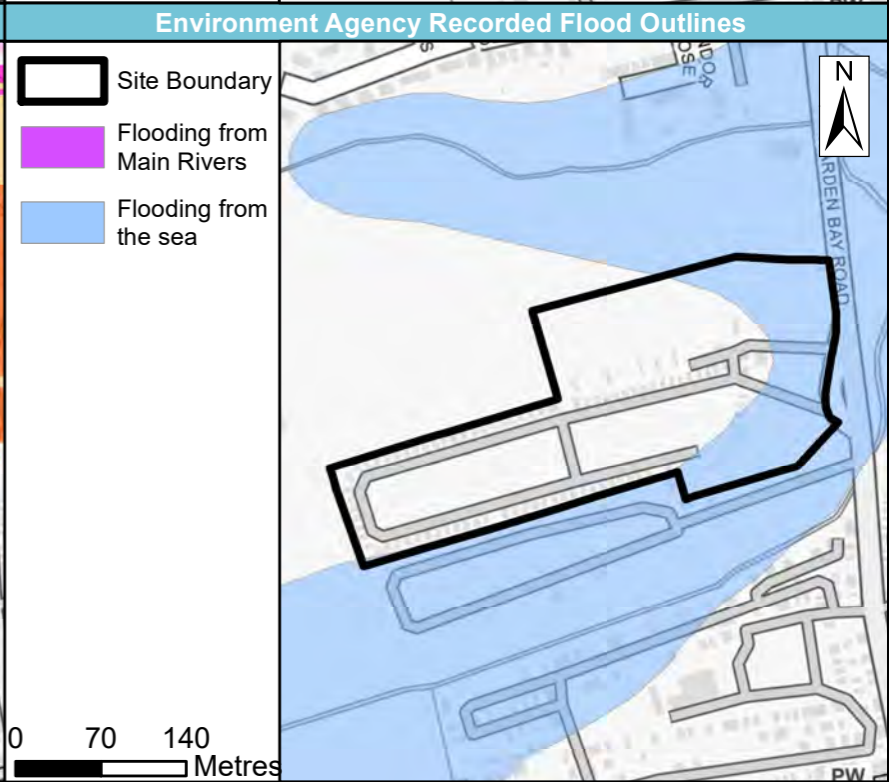
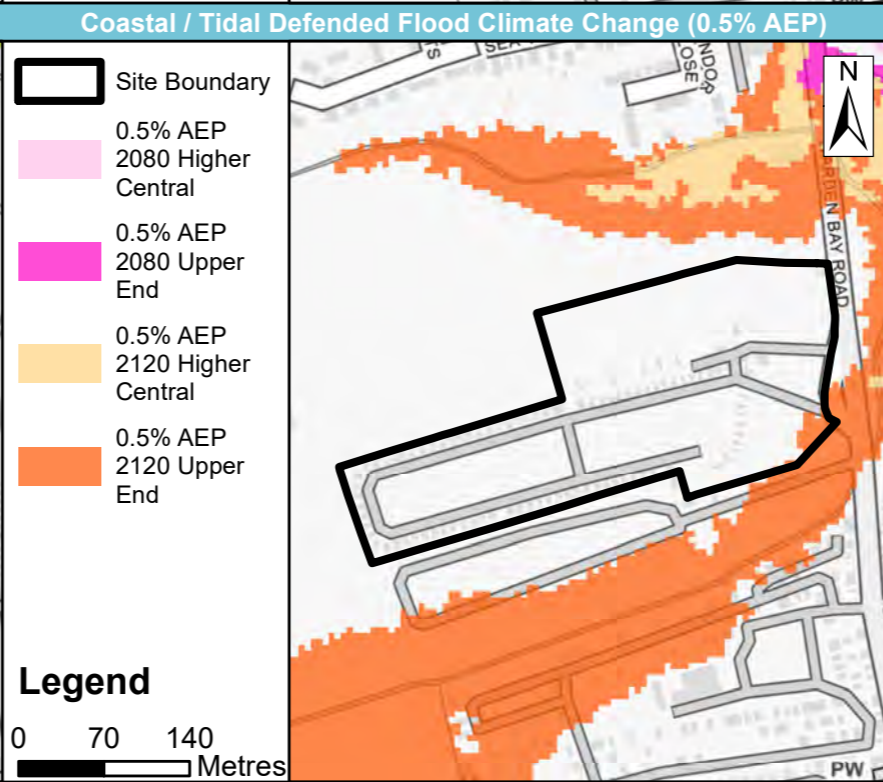
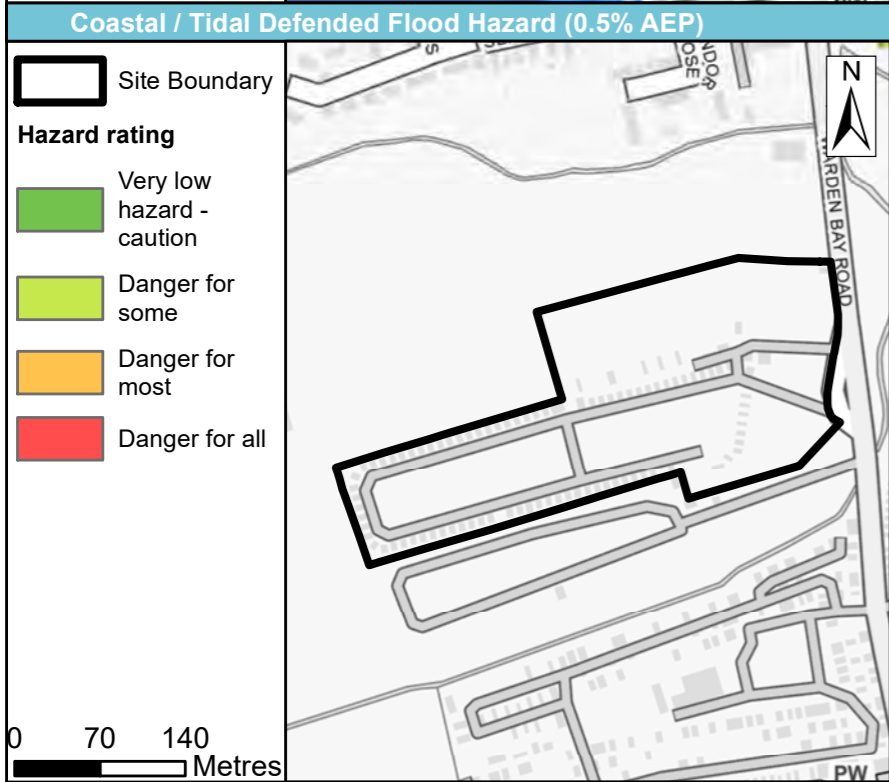
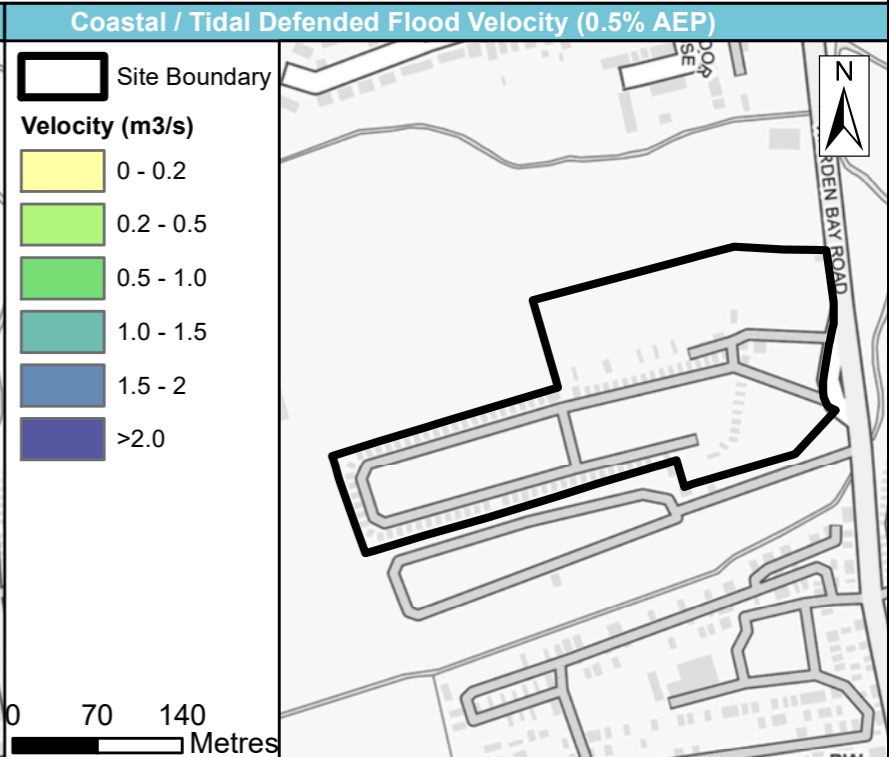
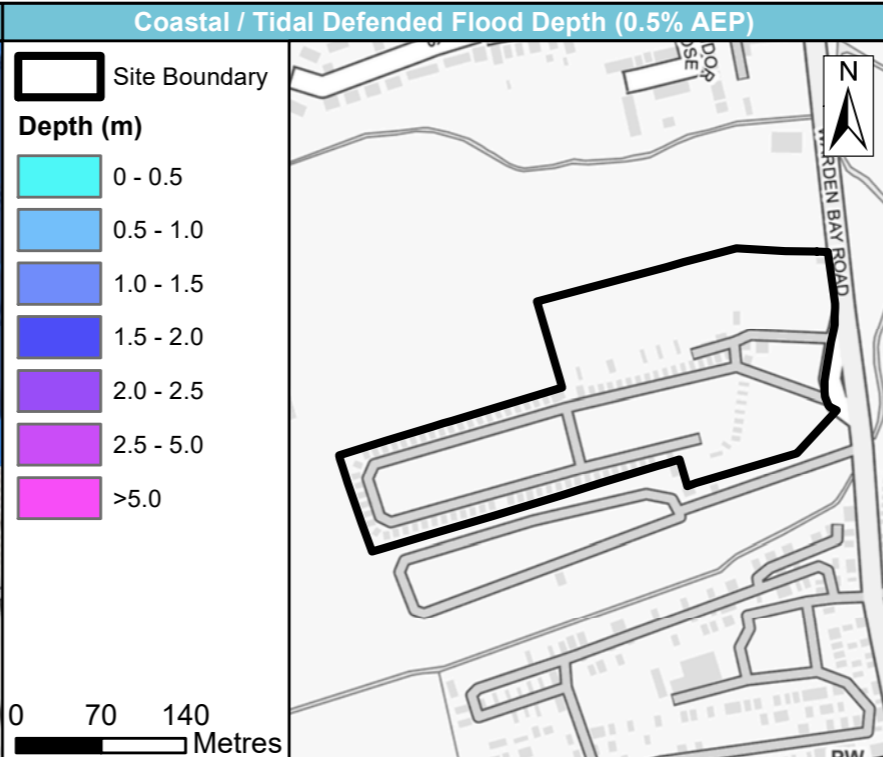
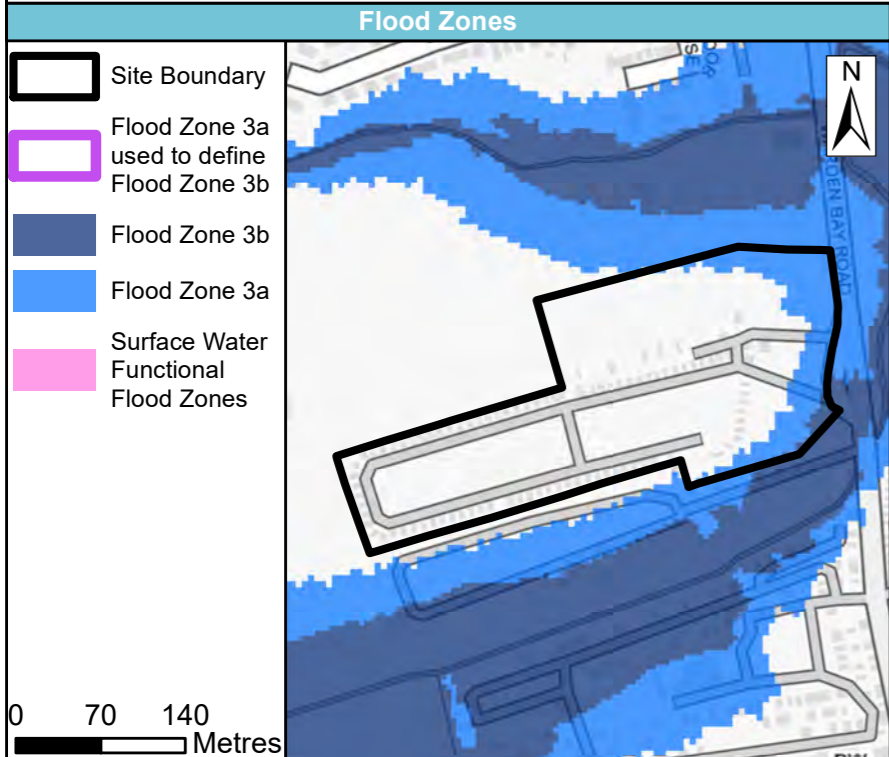
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Site name	Seaview Park, Warden Bay Road
Site area (ha)	5.4636

Swale Borough Council Level 2 Strategic Flood Risk Assessment Site Summary Sheet mapping



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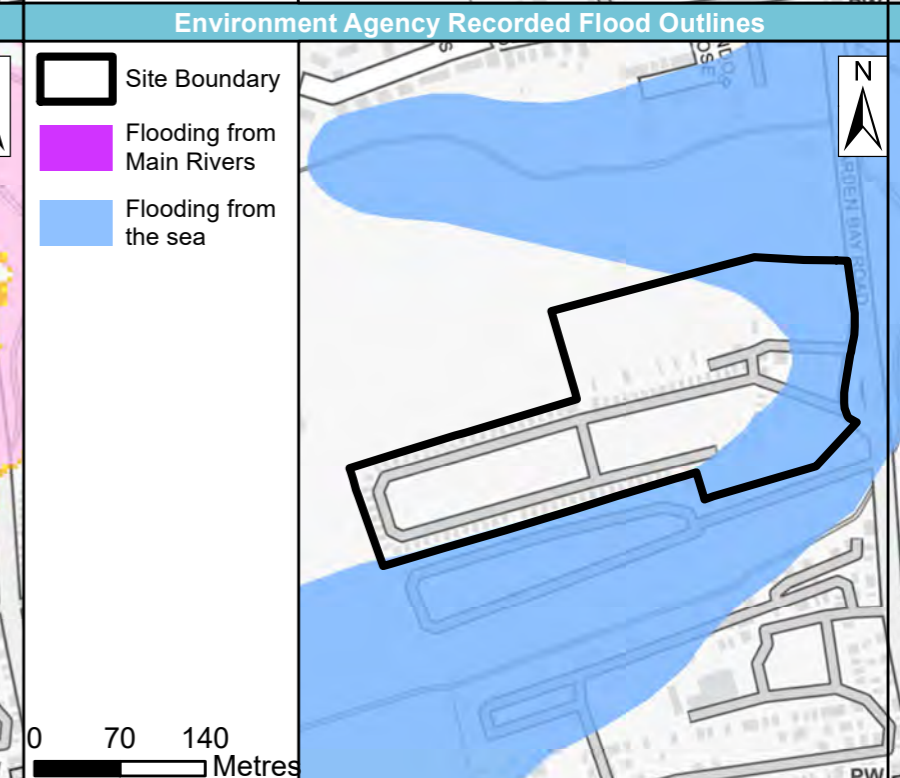
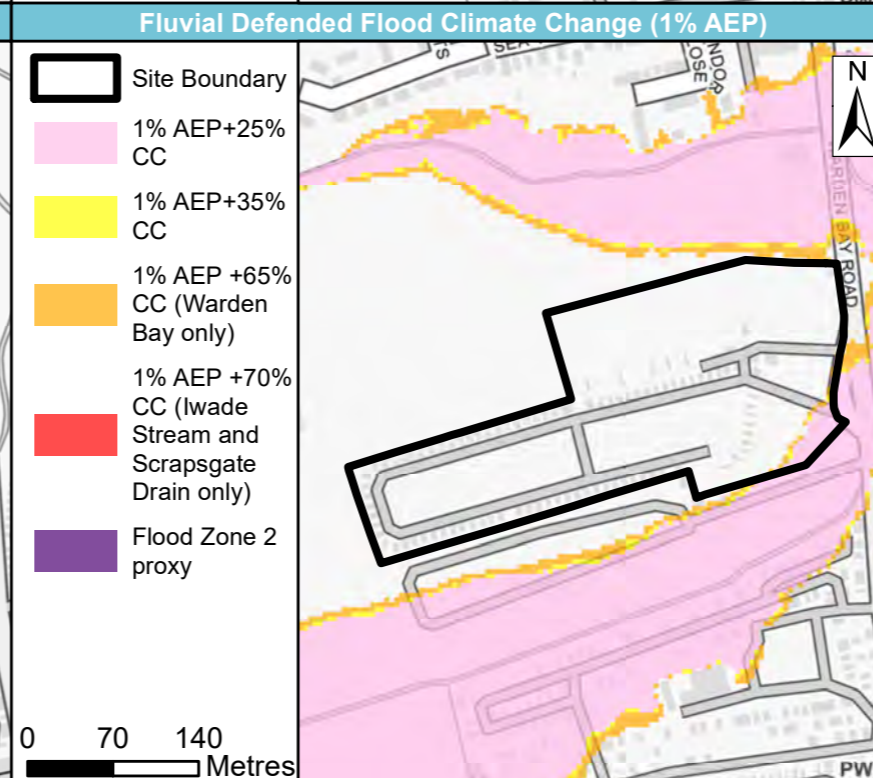
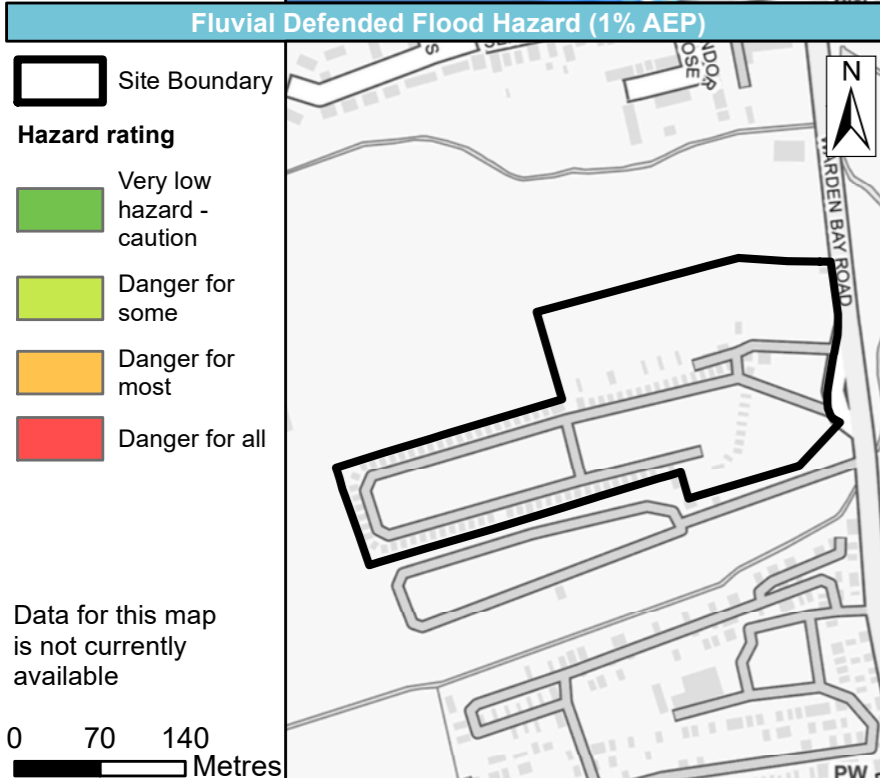
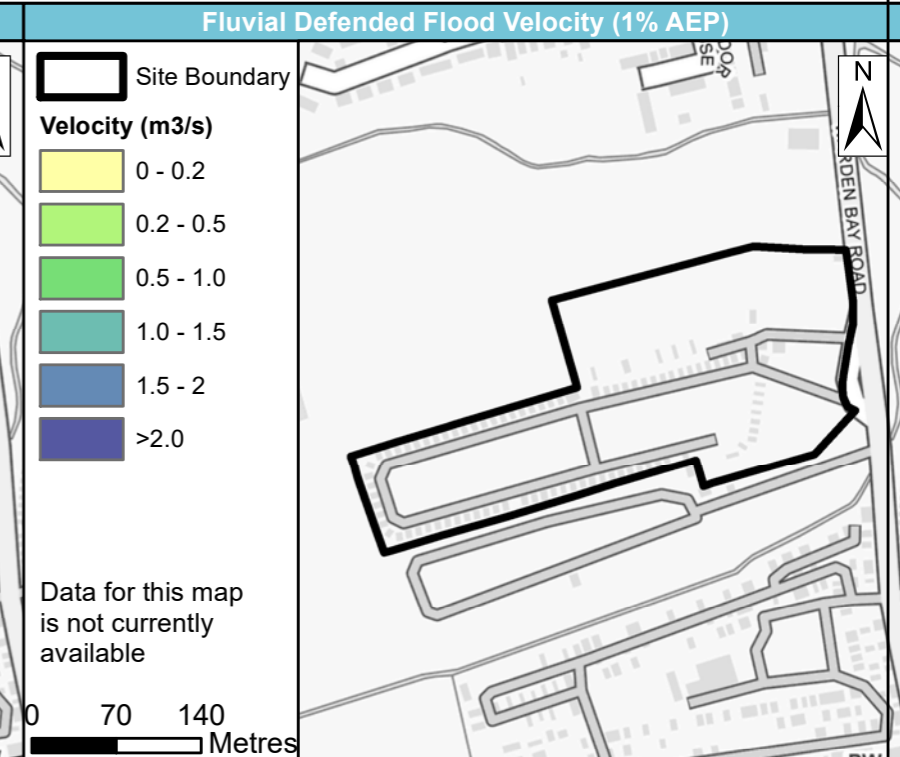
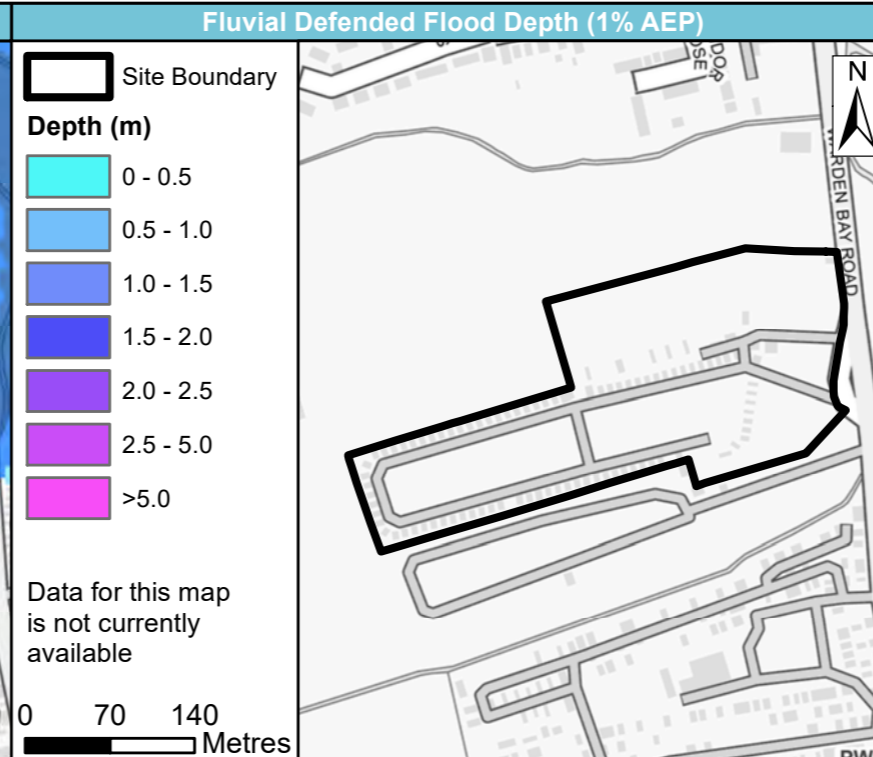
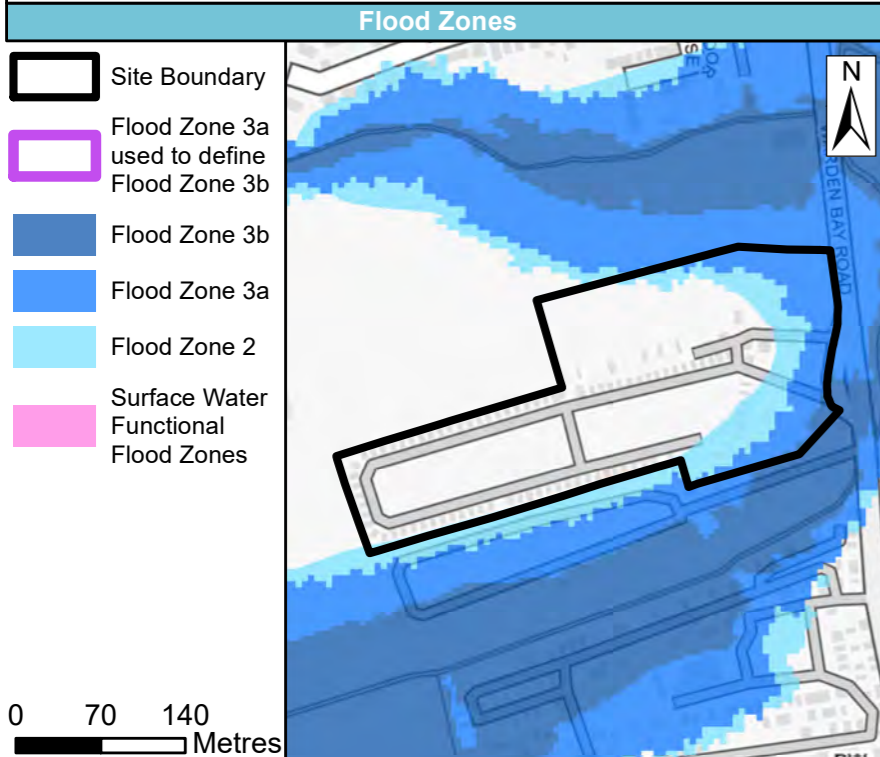
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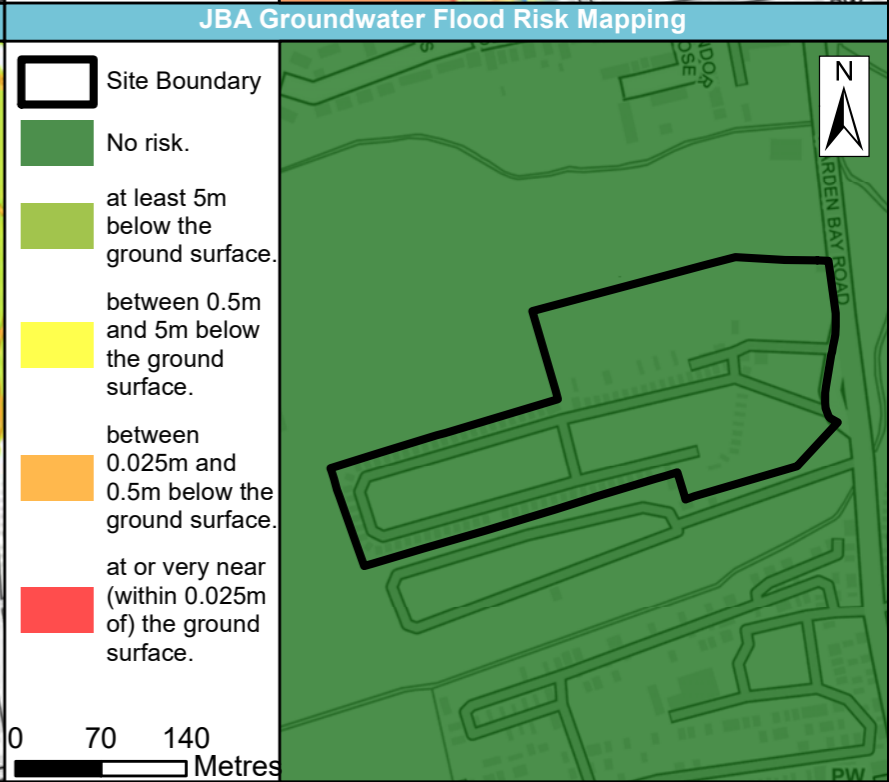
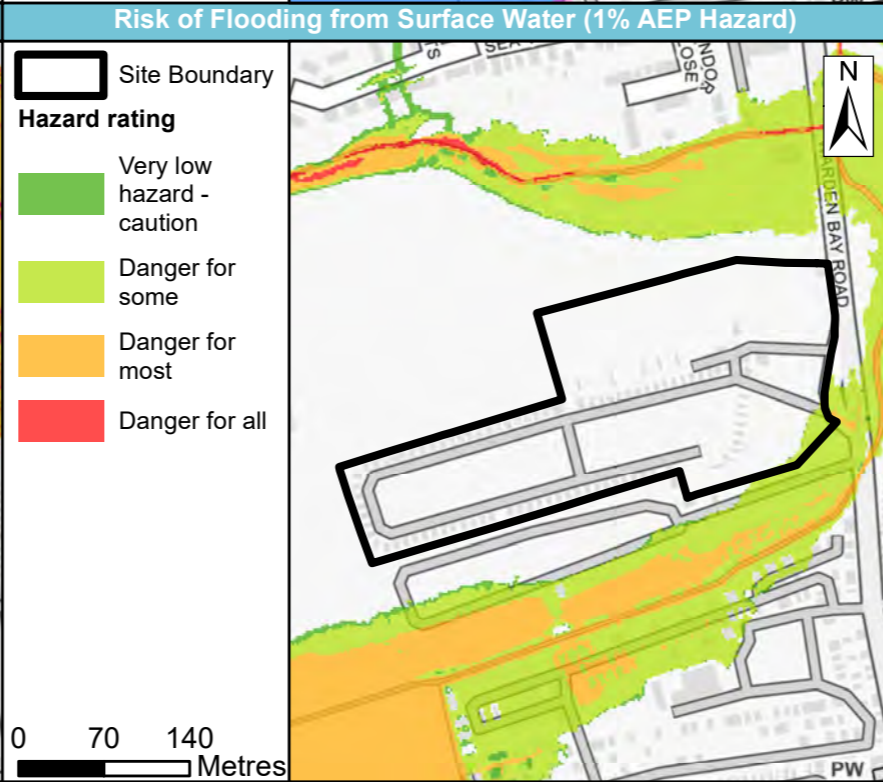
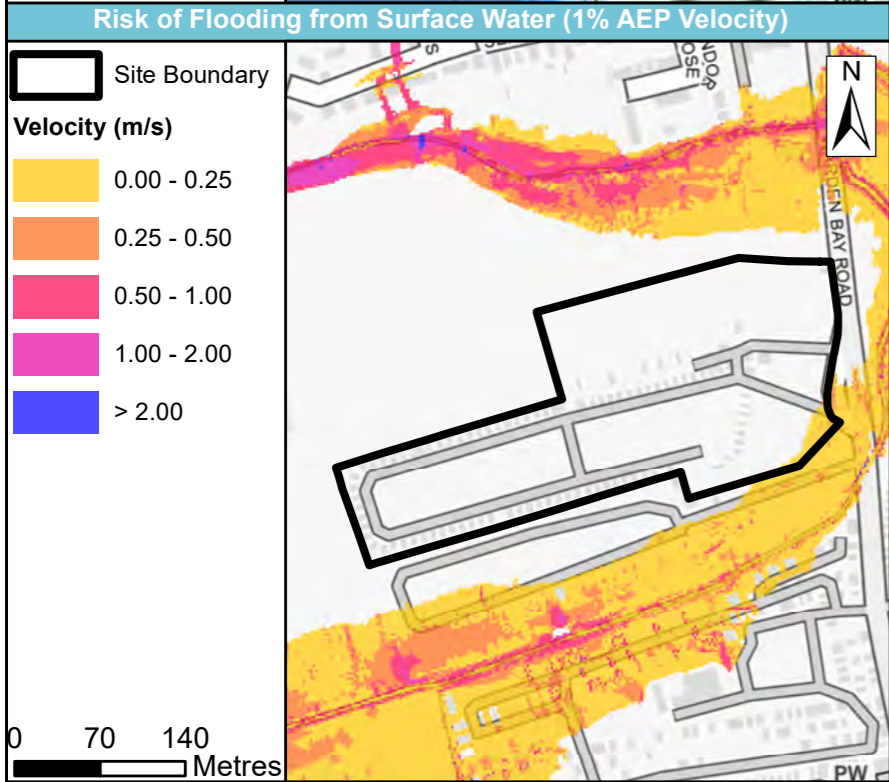
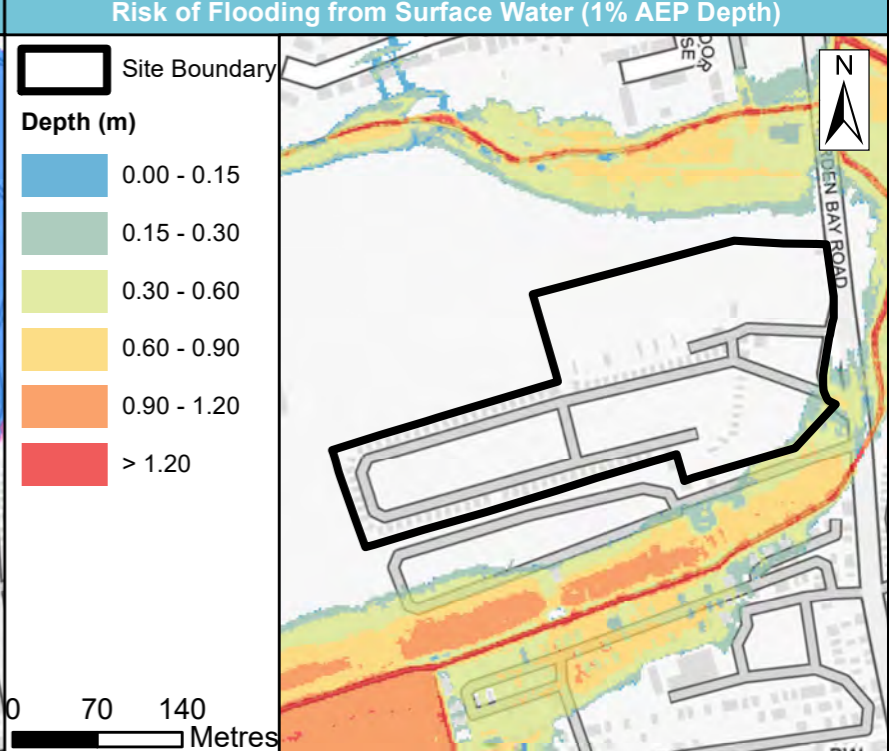
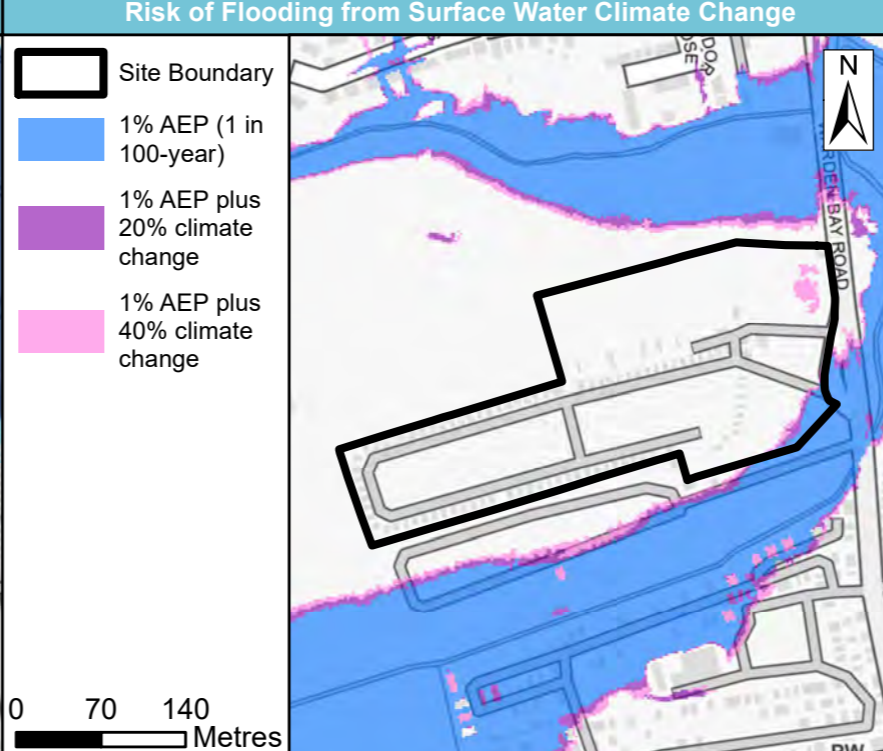
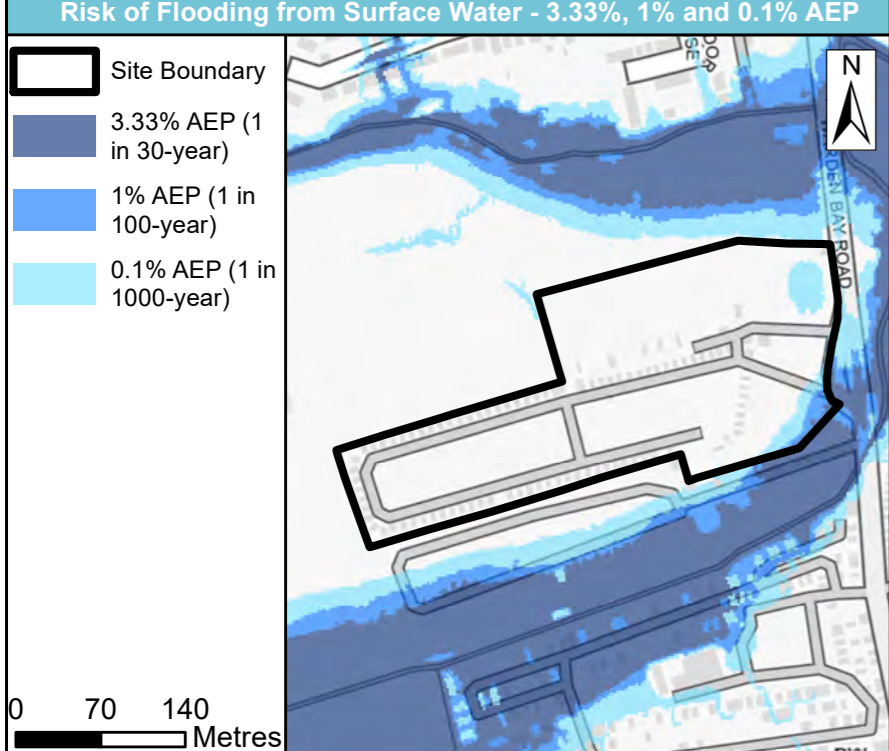


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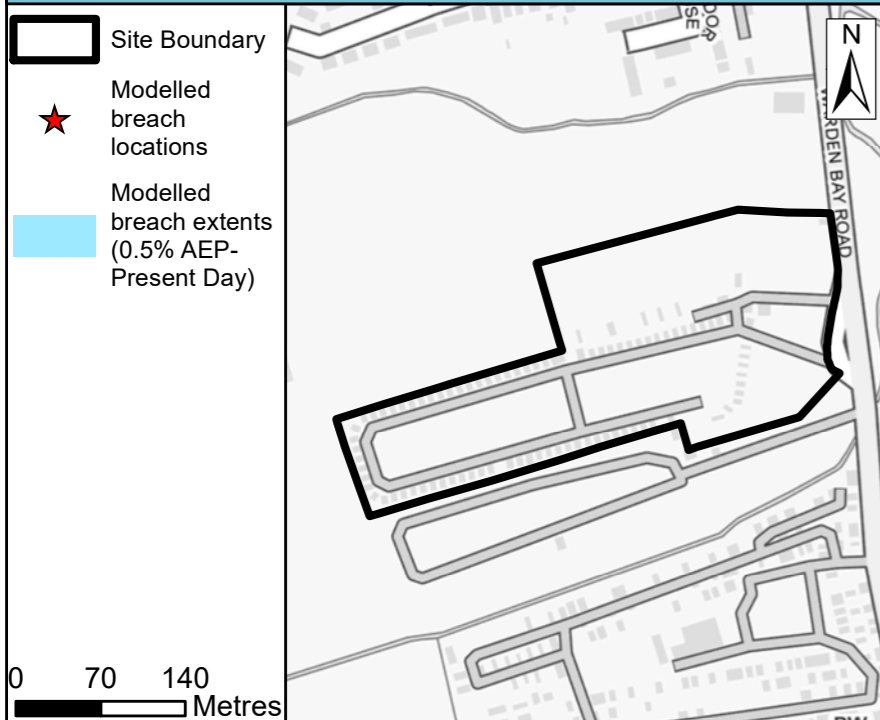
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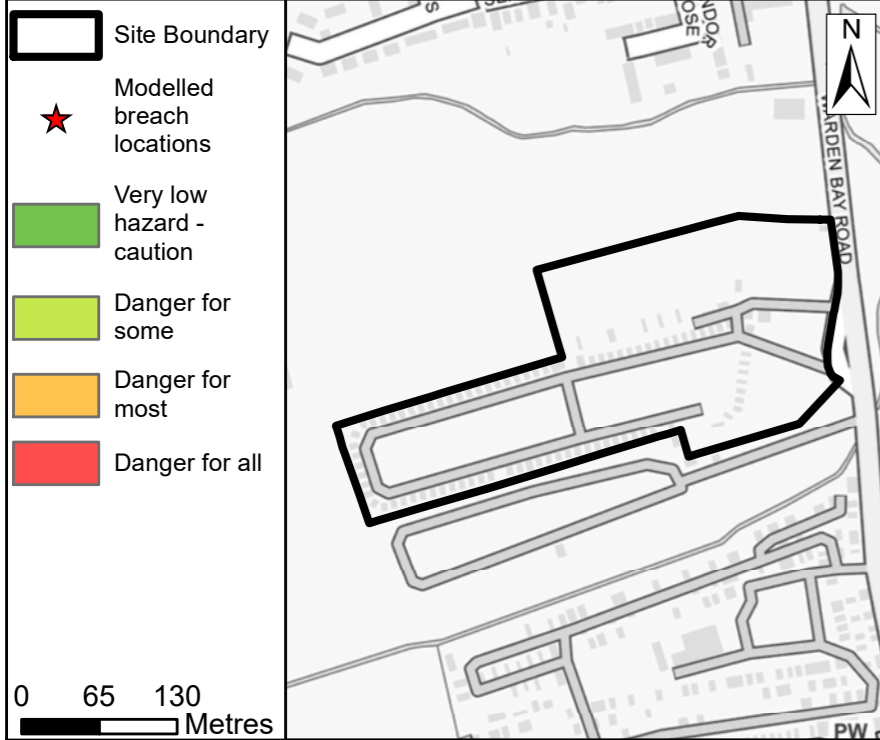


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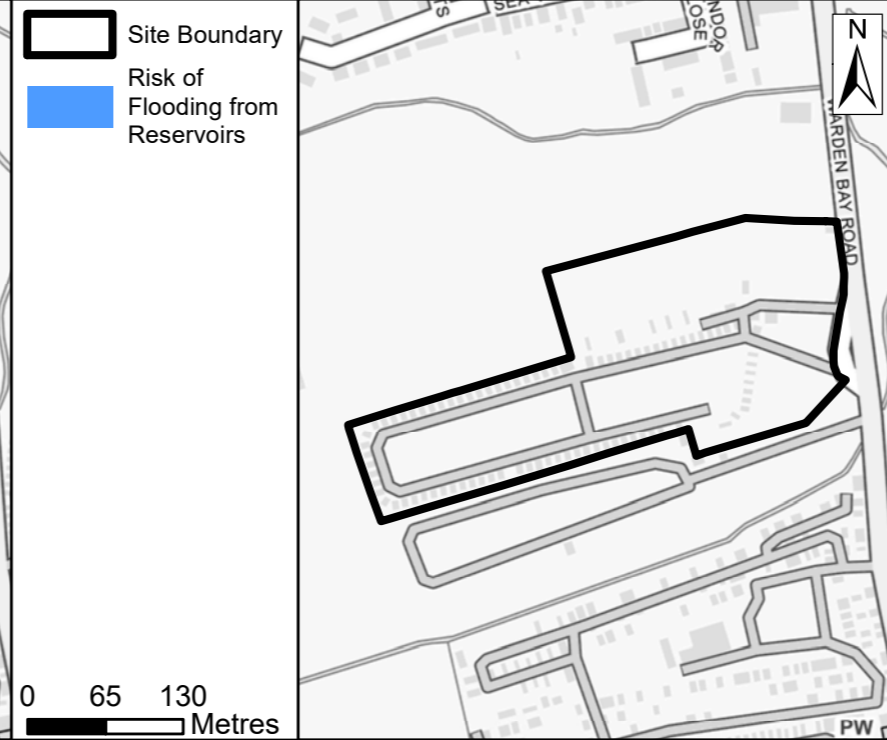
Modelled breach extents (Present Day) | Modelled breach extents (0.5% AEP Present Day) Depth | Modelled breach extents (0.5% AEP Present Day) Velocity



Modelled breach extents (0.5% AEP Present Day) Hazard



Risk of Flooding from Reservoirs extent



Modelled breach extents (0.5% AEP Present Day) Hazard

