# Swale Borough Council Level 1 Strategic Flood Risk Assessment

## Final Report

**Version 5**

**July 2026**

**Prepared for:**

**Swale Borough Council**

**www.jbaconsulting.com**

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# Contract

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This report describes work commissioned by Swale Borough Council, by an instruction dated 14 May 2024. The Client's representative for the contract was Anna Stonor of Swale Borough Council. Ed Hartwell, Ffion Wilson, Amber Humphries and Samuel Hotchkiss of JBA Consulting carried out this work.

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## Acknowledgements

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## Abbreviations

| | |
|---|---|
| AEP | Annual Exceedance Probability |
| AOD | Above Ordnance Datum |
| BSI | British Standards Institution |
| CCMA | Coastal Change Management Area |
| CCVA | Coastal Change Vulnerability Assessment |
| CFMP | Catchment Flood Management Plan |
| CIRIA | Construction Industry Research and Information Association |
| Defra | Department of the Environment, Food and Rural Affairs |
| FAA | Flood Alert Area |
| FRA | Flood Risk Assessment |
| FRMP | Flood Risk Management Plan |
| FWMA | Flood and Water Management Act |
| FWA | Flood Warning Area |
| FWS | Flood Warning Service |
| GI | Green Infrastructure |
| GIS | Geographic Information Service |
| GSPZ | Groundwater Source Protection Zone |
| ISIS | Hydrology and hydraulic modelling software |
| JBA | Jeremy Benn Associates |
| KCC | Kent County Council |
| LFRMS | Local Flood Risk Management Strategy |
| LLFA | Lead Local Flood Authority |
| LPA | Local Planning Authority |
| MEASS | Medway Estuary and Swale Strategy |
| NCERM | National Coastal Erosion Risk Map |
| NFM | Natural Flood Management |
| NPPF | National Planning Policy Framework |
| NVZ | Nitrate Vulnerable Zones |
| PFRA | Preliminary Flood Risk Assessment |
| PFR | Property Flood Resilience |
| PPG | Planning Practice Guidance |
| RBMP | River Basin Management Plan |
| RMA | Risk Management Authority |

| | |
|---|---|
| RoFSW | Risk of Flooding from Surface Water |
| SFRA | Strategic Flood Risk Assessment |
| SHLAA | Strategic Housing Land Availability Assessment |
| SIRF | Sewage Incident Reporting Form |
| SMP | Shoreline Management Plan |
| SuDS | Sustainable Drainage Systems |
| SWMP | Surface Water Management Plan |
| TUFLOW | Two-dimensional Unsteady FLOW (a hydraulic model) |
| UKCP18 | United Kingdom Climate Projections 2018 |
| WFD | Water Framework Directive |
| WLMB | Water Level Management Board |

## Definitions

**Annual Exceedance Probability**: The probability (expressed as a percentage) of a flood event occurring in any given year.

**Brownfield/Previously developed land**: Land which has been lawfully developed and is or was occupied by a permanent structure and any fixed surface infrastructure associated with it, including the curtilage of the developed land (although it should not be assumed that the whole of the curtilage should be developed). It also includes land comprising large areas of fixed surface infrastructure such as large areas of hardstanding which have been lawfully developed. Previously developed land excludes: land that is or was last occupied by agricultural or forestry buildings; land that has been developed for minerals extraction or waste disposal by landfill, where provision for restoration has been made through development management procedures; land in built-up areas such as residential gardens, parks, recreation grounds and allotments; and land that was previously developed but where the remains of the permanent structure or fixed surface structure have blended into the landscape.

**Catchment partnership approach:** A collaborative method of managing a river catchment in which risk management authorities, communities, businesses, and environmental organisations work together to improve water, land, and flood management across the whole catchment area.

**Climate change**: Long term variations in global temperature and weather patterns caused by natural and human actions.

**Coastal Change Management Area:** This is an area identified in plans as likely to be affected by physical changes to the coast. Such changes include erosion, coastal landslip, permanent inundation or accretion**.**

**Coastal flooding:** The inundation of normally dry land along the coast caused by high tides, storm surges or rising sea levels. The risk of flooding is linked to the stability of the coastline.

**Combined tidal and fluvial flooding**: Occurs when high sea tides and overflowing rivers happen simultaneously, increasing flood risk in coastal and estuarine areas.

**Design flood**: A flood event of a given annual flood probability, which is generally taken as: fluvial (river) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), flooding from the sea likely to occur with a 0.5% annual probability (a 1 in 200 chance each year, or surface water flooding likely to occur with a 1% annual probability (a 1 in 100 change each year), plus an appropriate allowance for climate change, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

**Finished Floor Level**: The final height or elevation of the top surface of a floor once all construction layers (such as screed, tiles, or other finishes) have been applied.

**Flood defence**: Infrastructure used to protect an area against floods such as floodwalls and embankments; they are designed to a specific Standard of Protection (SoP) (design standard).

**Fluvial flooding:** Fluvial flooding is the overflow of water from a watercourse onto surrounding land when capacity is exceeded.

**Green infrastructure**: A network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity.

**Greenfield**: An undeveloped parcel of land.

**Lead Local Flood Authority**: The unitary authority for the area or if there is no unitary authority, the County Council for the area. They lead in managing local flood risks (i.e. risks of flooding from surface water, ground water and ordinary (smaller) watercourses). In Swale the LLFA is Kent County Council.

**Main river**: A watercourse shown as such on the statutory main river map held by the Environment Agency. They are usually the larger rivers and streams. The Environment Agency has permissive powers (not duties) to carry out maintenance and improvement works on main rivers).

**Major development**: Defined in the National Planning Policy Framework (NPPF) as a housing development where 10 or more homes will be provided, or the site has an area of 0.5 hectares or more, or as a non-residential development with additional floorspace of 1,000m² or more, or a site of 1 hectare or more, or as otherwise provided in the Town and Country Planning (Development Management Procedure) (England) Order 2015.

**Natural Flood Management (NFM)**: Techniques that work with nature to reduce the risk of flooding for communities.

**Ordinary watercourse**: Any river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows but which does not form part of a main river. The local authority or Water Level Management Board (WLMB) has permissive powers (not duties) on ordinary watercourses.

**Permissive powers**: Authorities have the power to undertake flood risk management activities, but not a duty to do so. This will depend on priorities in flood risk management.

**Property Flood Resilience:** A range of measures that can be installed on a building, to reduce the risk of floodwater entering the property. It can also be used to make the inside of a property more resilient (also known as recoverability), minimising damage even if water does still enter the building.

**Residual risk**: the remaining level of risk that persists after measures have been taken to reduce or manage a hazard.

**Return period**: An estimate of the interval of time between events of a certain intensity or size, in this instance it refers to flood events. It is a statistical measurement denoting the average recurrence interval over an extended period of time.

**Riparian owner**: A riparian landowner, in a water context, owns land or property, with a Main River or ordinary watercourse (including culverts) running through, beneath or adjacent to the boundary of their land. Where the Main River or ordinary watercourse runs adjacent to the boundary, the riparian owner will usually own the watercourse up to its centre.

**Risk Management Authority (RMA)**: The EA; a Lead Local Flood Authority; a District Council in an area where there is no unitary authority; an Internal Drainage Board; a water company and a highway authority.

**Risk**: In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood.

**Stakeholder:** A person or organisation affected by the problem or solution or interested in the problem or solution. They can be individuals or organisations, includes the public and communities.

**Surface water flooding:** Flooding from surface water runoff (or 'pluvial' flooding) is caused by intense, usually short, periods of rainfall and mostly affects lower lying areas, often where the natural (or artificial) drainage system is unable to cope with the volume of water. Surface water flooding problems are inextricably linked to issues of poor drainage, or drainage blockage by debris, and sewer flooding.

**Sustainable Drainage Systems (SuDS)**: Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques, such as grates, gullies, and channels.

**Tidal flooding:** Caused by extreme tide levels exceeding ground and / or defence levels

**Windfall site**: A site which becomes available for development unexpectedly and therefore not included as allocated land in a the development plan.

# Executive Summary

## Introduction

The study area for this Strategic Flood Risk Assessment (SFRA) is the Swale Borough Council's authoritative area. This 2026 SFRA is an update to the 2020 SFRA document prepared by JBA Consulting. The assessment supersedes the previous Swale Borough Council 2009 Level 1 and 2 SFRA and the Faversham Creek SFRA 2010 Amendment.

The report has been prepared to provide comprehensive and supporting evidence for the emerging Local Plan 2027 -2042. The **Swale Borough Local Plan - Bearing Fruits 2031** was adopted in July 2017, and the emerging Local Plan will revisit the adopted Local Plan so that sufficient development is planned to meet the needs of the area.

The SFRA update was required to be compliant with the latest guidance described in the **National Planning Policy Framework (NPPF)** (last updated February 2025) and accompanying **Planning Practice Guidance (PPG)** (last updated September 2025).

The 2026 SFRA provides flood risk evidence and long-term strategy to support the management and planning of development, protect the environment, deliver infrastructure and promote sustainable communities within the Local Plan area. It also supports the selection of site allocations in the emerging Local Plan and provides information and guidance to be used in the preparation of Flood Risk Assessments in support of site-specific planning applications.

## SFRA objectives

The key objectives of the 2025 SFRA are:

- To take account of best practice, the latest guidance and the most up to date information;
- To assess the flood risk to and from the borough from all sources, now and in the future, as well as assess the impact that cumulative land use changes and development in the area will have on flood risk;
- To be a robust piece of evidence to inform the preparation of the Swale Local Plan and sustainability appraisal, so that flood risk is fully accounted for when considering allocation options and guide development to the safest areas;
- To inform the preparation of emerging local plan policies;
- To inform the application of the Sequential Test and, if necessary, the Exception Test;
- To identify the requirements for site-specific flood risk assessments;
- To assist in the determination of the acceptability of flood risk in relation to Swale's emergency planning capability;
- To help prioritise and target improvements to flood defences; and
- To consider opportunities to reduce flood risk to existing communities and developments and recommend how the Local Plan can best influence this issue.

## SFRA outputs

The Planning Practice Guidance advocates a tiered approach to risk assessment and identifies the following two levels of SFRA, of which Level 1 should be completed first:

1. Level 1: Required as part of the evidence base for the Local Plan under the NPPF. 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 1 SFRA requirements.

To meet the objectives of the SFRA, the following outputs have been prepared.

- A review and update of new and amended data sources.
- Assessment of all potential sources of flooding and the potential impact of climate change on flood risk.
- Mapping areas at risk from other sources including surface water, sewer, ground water, reservoir inundation.
- Mapping of location and extent of functional floodplain
- Recommendations of the criteria that should be used to assess future development proposals and the development of a Sequential Test and sequential approach to flood risk.
- High-level screening of proposed development sites against flood risk information.
- Guidance for developers including requirements for site-specific flood risk assessments.
- Mapping areas covered by an existing flood alert / warning.
- Mapping of flood defence infrastructure and highlighting areas that need improvements.
- Identify opportunities to reduce flood risk which can be included in the Local Plan policies.
- An assessment of surface water management issues and the application of Sustainable Drainage Systems (SuDS).

## Summary of assessment

### *Flood risk*

- There have been several recorded flood incidents across the study area, with tidal flooding resulting in the most severe consequences. The study area is bounded by the River Medway, the Thames Estuary and the North Sea to the north with flood levels in many of the relevant river networks and inlets being tidally influenced due to proximity to the sea, including the River Medway and The Swale. There are three recorded incidents of tidal floods in the study area (1953, 1978 and 2013), each resulting in widespread flooding.
- Notwithstanding the risk from high sea levels, analysis of flood risk indicates that surface water was noted to be the most frequent cause of flooding, with a smaller number of recorded flood incidents involving fluvial, groundwater, and sewer flooding. These sources of flooding have also occurred in combination, causing a cumulative effect. Further details of these historic events can be found in Section 5.1.
- Coastal flood risk will potentially increase in areas of the Local Plan area where coastal erosion threatens the stability of the coastline and tidal flood defences (this is the flood risk due to the failure or overwhelming of measures to protect against coastal erosion, rather than simple overtopping of defences due to high flood water levels).
- The Environment Agency's surface water dataset within the Flood Map for Planning, also known as the Risk of Flooding from Surface Water (RoFSW) dataset shows that surface water predominantly follows topographical flow paths of existing watercourses, dry valleys or roads, with some areas of ponding in low lying areas, often upslope of railway lines or roads.
- The JBA Groundwater Flood Map shows that a large proportion of Swale Borough is potentially at risk of groundwater flooding, with the most vulnerable settlements including Sittingbourne, Faversham, Teynham and Bapchild.
- There are 271 historic incidents of sewer flooding in the study area since 2015 that have been identified from Southern Water's records, with sewer flooding exacerbated in places by groundwater infiltrating into the sewer network and outfalls influenced by tidal levels.
- The Environment Agency's Reservoir Flood Extent mapping has been assessed, and two reservoirs have been identified in the study area. There are no records of historic flooding from reservoirs in the study area.
- There are currently three Flood Alert Areas and five Flood Warning Areas in the Local Plan area.

### *Flood defences*

There are tidal, coastal and tidal / fluvial flood defences located along the majority of the coastline and tidal watercourses in the study area. The standard of protection provided by these assets varies, as does their condition.

### *Climate change*

Climate change will not only cause changes in trends and mean values in temperature and rainfall but also increase the chance of occurrence and severity of more extreme wet and dry events.  It is important that development is planned with consideration of these extreme events as exemplified by the significant consequences of storm surge events in the sea leading to high tide levels and potentially severe flooding.

### *Development and flood risk*

Information used to support the Sequential and Exception Tests for both Local Plans and Flood Risk Assessments has been documented, along with guidance for planners and developers. Links have been provided for various guidance documents and policies published by other Risk Management Authorities such as the Lead Local Flood Authority and the Environment Agency.

### *Relevant studies*

There are many relevant regional and local key policies which have been considered within the SFRA, such as the Shoreline Management Plans for the **Isle of Grain to South Foreland** (2010) and the **Medway Estuary and Swale** (2010), the **North Kent Rivers Catchment Flood Management Plan** (2009), **Thames River Basin District Flood Risk Management Plan** (2023) and the **South East River Basin District Flood Risk Management Plan** (2023), the **Kent County Council Preliminary Flood Risk Assessment** (2011) and **Addendum** (2017) ,the **Medway Estuary and Swale flood and coastal risk management Strategy (MEAS)** (2019) and **Kent County Council Local Flood Risk Management Strategy** (2024). Other policy considerations have also been incorporated, such as sustainable development principles, climate change and flood risk management.

## Policy Recommendations

Swale Borough Council should take account of the following recommendations with respect to flood risk management when preparing appropriate policy.

### A. Development and planning considerations

***Sequential approach to development***

It is recommended that the sequential approach, is adopted for all future developments within the study area where there is flood risk. New development and re-development of land should seek opportunities to reduce the overall level of flood risk at the site where possible.

***Sequential and Exception tests***

The SFRA has identified the areas of Swale Borough at high risk of flooding from tidal, surface water and fluvial sources both now and in the future. Proposed development sites at locations at risk of flooding will be required to satisfy the Sequential and, where necessary, Exception Tests in accordance with the NPPF. Swale Borough Council will use the information in this SFRA and Appendix K when deciding which development sites to take forward in the emerging Local Plan.

***Site-specific Flood Risk Assessments***

Site specific Flood Risk Assessments (FRAs) are required by developers to provide a greater level of detail on flood risk and any protection provided by defences and, where necessary, demonstrate the development satisfies part b of the Exception Test.

Where required, developers should undertake more detailed hydrological and hydraulic assessments of the watercourses and tidal areas to verify flood extents (including latest climate change allowances). The modelling will inform floodplain and development zoning within the site and provide evidence that the Exception Test is satisfied if required. Where a site-specific Flood Risk Assessment (FRA) has produced modelling outlines which differ from the Environment Agency's Flood Map for Planning a full evidence-based review would be required. Where the watercourses are embanked, the effect of overtopping and breach must be considered and appropriately assessed.

All new development within the 1% AEP (1 in 100-year) fluvial or 0.5% AEP (1 in 200-year) tidal flood extent including an allowance for climate change (for the lifetime of the development) must not normally result in a net loss of flood storage capacity to avoid cumulative effects. Where possible, opportunities should be sought to achieve an increase in the provision of floodplain storage. Where proposed development results in a change in building footprint, the developer should normally ensure that it does not impact upon the ability of the floodplain to store or convey water and seek opportunities to provide floodplain betterment. Similarly, where ground levels are elevated to raise the development out of the floodplain, compensatory floodplain storage within areas that

currently lie outside the floodplain should normally be provided so the total volume of the floodplain storage is not reduced. Any flood risk management measures should be consistent with the wider catchment policies set out in the **North Kent Rivers Catchment Flood Management Plan** (2009), **Thames River Basin District Flood Risk Management Plan** (2023), the **South East River Basin District Flood Risk Management Plan** (2023), the **Kent County Council Local Flood Risk Management Strategy** (2024) and other relevant strategies.

The **NPPF** was last updated in February 2025 setting out the Government's planning policies for England and how these are expected to be applied.

There are also several guidance documents which provide information on the requirements for site-specific Flood Risk Assessments:

- **Standing Advice on Flood Risk (Environment Agency)**
- **Flood Risk Assessment for Planning Applications (Environment Agency)**
- **Site-specific Flood Risk Assessment: CHECKLIST (PPG, Defra)**

It should be noted that the UK Climate Change Projections 2018 (**UKCP18**) was published on 26 November 2018. When undertaking an FRA, reference should be made to the most up to date climate change allowances provided by the Environment Agency. Kent County Council require that for surface water flood risk, climate change allowances should be applied to both the 3.3% AEP (1 in 30-year) and 1% AEP (1 in 100-year) return periods.

Developers should consult with Swale Borough Council, Kent County Council, the Lower Medway Internal Drainage Board, the Environment Agency and Southern Water at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling, and drainage assessment and design.

### B. Surface water management and SuDS

Planners should be aware of the conditions and requirements set by Kent County Council as the Lead Local Flood Authority for surface water management and ensure development proposals and applications are compliant with the **Kent County Council's Drainage and Planning Policy Statement**. Proposals should also be compliant with **Defra's National standards for sustainable drainage systems (SuDS)**.

Special consideration should be given to development in Iwade and Minster, details of which can be found in Section 12.2 and Section 12.3 respectively.

### C. Review of planning applications

The Council should consult the Environment Agency's **National flood risk standing advice for local planning authorities**, (last updated October 2025) and any subsequent updates when reviewing planning applications for proposed developments at risk of flooding.

The Council will consult the relevant statutory consultees as part of the planning application process and they may, in some cases, also contact non-statutory consultees (e.g. Southern Water) that have an interest in the planning application. The Council will,

when appropriate consult with the North Kent Marshes Water Level Management Board (WLMB) with respect to flood related and water level management aspects. The WLMB can have more detailed local knowledge on the performance and characteristics of particular water features in the authority area.

### D. Finished Floor Levels and safe access

In line with the Environment Agency's **preparing a flood risk assessment: standing advice**, finished floor levels should be a minimum of whichever is higher of 600mm above the:

- average ground level of the site
- adjacent road level to the building
- estimated river or sea flood level

Where there is a high level of certainty about your estimated flood level, it may be appropriate to reduce this to 300mm. If there is a particularly high level of uncertainty it may need to be increased.

Lowering existing FFLs below the existing levels within the fluvial 1% AEP (1 in 100-year) and tidal 0.5% (1 in 200-year) plus climate change floodplain would not be acceptable and should be discouraged.

Building design and raised floor levels is the only way to fully reduce groundwater flood risk, through ensuring FFLs are raised above predicted groundwater levels considering known groundwater issues.

If it is not possible to raise floor levels to meet the minimum requirement developers should refer to the Environment Agency's **preparing a flood risk assessment: standing advice.**

FRAs also need to show how the development is not going to be flooded by surface water or groundwater. This could be by:

- diverting water away from buildings but safely managing it within the site
- raising floor levels above the estimated flood depths of surface and groundwater flooding

Safe access and escape will need to be demonstrated at all development sites. Emergency vehicular access should be possible during times of flood.

Where development is located behind, or in an area benefitting from defences, consideration should be given to the potential safety of the development, finished floor levels and for safe access and escape in the event of rapid inundation of water due to a defence breach with little warning.

### E. Residual risk

Residual risk is the risk that remains after the effect of mitigation measures is taken into account. The residual risk includes the consideration of flood events that exceed the design thresholds of the flood defences or circumstances where there is a failure of the defences, e.g. flood banks collapse. Residual risks should be considered as part of site-specific Flood Risk Assessments.

Further, any developments located within an area protected by flood risk management measures, where the condition of those defences is 'fair' or 'poor', where the standard of protection is not of the required standard or where the failure of the intended level of service gives rise to unsafe conditions should be identified by the developer as part of an FRA.

The risk to development from reservoirs is residual but developers should consider reservoir flooding during the planning stage. They should seek to contact the reservoir owner to obtain information and should apply the sequential approach to locating development within the site. Developers should also consult with relevant authorities regarding emergency plans in case of reservoir breach.

Resilience measures will be required if buildings are situated in -a flood risk area, and opportunities to enhance green infrastructure and reduce flood risk by making space for water should be sought.

### F. MEAS Contribution Zones

A **Medway Estuary & Swale Coastal Risk Management Strategy (MEAS) Contribution Advice Note** is being prepared by Swale Borough Council for developments within the MEAS Contribution Zone. The Advice Note outlines the need for payments to contribute to flood defence works through Planning Obligations/S106 Agreements and sets out the location of the contribution area and requirements for contributions.

The document will set out two zones:

- **MEAS Contribution Zone 1** - The Environment Agency Flood Map for Planning Flood Zones plus Climate Change dataset with the fluvial only flood risk removed (accessed April 2026).
  The Flood Map for Planning Flood Zones plus Climate Change dataset shows how the combined extent of Flood Zones 2 and 3 could increase with climate change over the next century, ignoring the benefits of any existing flood defences. The dataset uses the 'Upper End' allowance for risk of flooding from the sea, accounting for cumulative sea level rise to 2125.
  The Defra Data Services Platform provides further information on both the **Flood Map for Planning - Flood Zones plus Climate Change** dataset and the **Flood Map for Planning - Flood Zones dataset.**
- **MEAS Contribution Zone 2** - The Isle of Sheppey

Different contribution rates are required for developments within the different zones. The locations of the contribution zones are mapped in Appendix N.

### G. Future flood management

Developments should demonstrate opportunities to create, enhance and link green assets. This can provide multiple benefits across several disciplines including flood risk and biodiversity / ecology and may provide opportunities to use the land for an amenity and recreational purposes. Development that may adversely affect green infrastructure assets should not normally be permitted.

The information provided in the SFRA should be used as a basis for investigating potential strategic flood risk solutions within the study area. Opportunities could consist of the following:

- Catchment and floodplain restoration;
- Flood storage areas;
- Opening up culverts, weir removal, and river restoration;
- The Regional Habitat Creation Programme;
- Green infrastructure; and
- Preserving the function of surface water flood routes where appropriate.

For successful future flood risk management, it is recommended that the Council adopts a catchment partnership working approach in tackling flood risk and environmental management.

## Potential modelling improvements

The Environment Agency regularly reviews its flood risk mapping, and it is important to make contact to determine whether updated (more accurate) information is available prior to commencing a site-specific FRA. Developers should appropriately assess climate change through an FRA.

When using the SFRA to prepare FRAs it is important to check that the most up to date information is used, as is described in amendments to the flood mapping prepared and issued by the Environment Agency at regular intervals.

## Use of Strategic Flood Risk Assessment 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.

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.

# 1 Introduction

## 1.1 Swale Borough

Swale Borough covers an area of approximately 370km$^2$ and has an estimated population of over 151,700[1]. The location of Swale Borough is shown within Figure 1-1. There are 39 parishes and 2 non-parished areas within the Local Plan area. The largest settlement is the town of Sittingbourne, and 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.

## 1.2 Purpose of the Strategic Flood Risk Assessment

> "Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards."
>
> (National Planning Policy Framework (2025), Section 14 paragraph 171)

This Strategic Flood Risk Assessment (SFRA) 2025 document updates the previous 2020 SFRA and supersedes the previous Swale Borough Council 2009 Level 1 and 2 SFRA and the Faversham Creek SFRA 2010 Amendment. The SFRA study area is shown in Figure 1-1. The mapping in the appendices provides a borough wide view and **interactive maps** are available on Swale Borough Council's website.

The main purpose of the SFRA update was to prepare a document that provides comprehensive and supporting evidence for the emerging Local Plan 2022 - 2042. The **Swale Borough Local Plan - Bearing Fruits 2031** was adopted in 2017. The emerging Local Plan will revisit the adopted Local Plan to make sure that enough development will be planned to meet the needs of the area.

The SFRA update was also required to be compliant with the latest guidance described in the 2025 update to the National Planning Policy Framework (NPPF), support the selection of site allocations in the emerging Local Plan and to provide information and guidance to be used in the preparation of Flood Risk Assessments (FRAs) in support of site-specific planning applications.

1 Office of National Statistics (2021) **Swale population change, Census 2021 – ONS**

An updated NPPF was published on 7 February 2025 and sets out the Government's planning policies for England and how these are expected to be applied. This updated Framework replaces the previous versions of the NPPF published since March 2012.

The key objectives of the 2025 SFRA are:

- To take account of best practice, the latest guidance and the most up to date information;
- To assess the flood risk to and from the borough from all sources, now and in the future, as well as assess the impact that cumulative land use changes and development in the area will have on flood risk;
- To be a robust piece of evidence to inform the preparation of the Swale Local Plan and sustainability appraisal, so that flood risk is fully accounted for when considering allocation options and guide development to the safest areas;
- To inform the preparation of emerging local plan policies;
- To inform the application of the Sequential Test and, if necessary, the Exception Test.
- To identify the requirements for site-specific flood risk assessments;
- To assist in the determination of the acceptability of flood risk in relation to Swale's emergency planning capability;
- To help prioritise and target improvements to flood defences;
- To consider opportunities to reduce flood risk to existing communities and developments and recommend how the Local Plan can best influence this issue;

## 1.3 Levels of SFRA

The Planning Practice Guidance 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:** required as part of the evidence base for the Local Plan under the NPPF. 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 1 SFRA requirements.

## 1.4 SFRA outputs

To meet the objectives, the following outputs have been prepared:

- A review and update of new and amended data sources.
- Assessment of all potential sources of flooding and the potential impact of climate change on flood risk.
- Mapping of location and extent of functional floodplain.

- Recommendations of the criteria that should be used to assess future development proposals and the development of a Sequential Test and sequential approach to flood risk.
- High-level screening of proposed development sites against flood risk information.
- Guidance for developers including requirements for site-specific flood risk assessments.
- Mapping areas covered by an existing flood alert / warning.
- Mapping of flood defence infrastructure and highlighting areas that need improvements.
- Identification of opportunities to reduce flood risk which can be included in the Local Plan policies.
- An assessment of surface water management issues and the application of Sustainable Drainage Systems (SuDS).

## 1.5 Structure of this report

Table 1-1 outlines the layout and location of information that is included in the 2025 SFRA.

Table 1-1 SFRA report contents

| Section | Contents |
|---|---|
| 1: Introduction | Provides a background to the study, defines objectives, outlines the approach adopted and the consultation performed. |
| 2: Policy and strategy for flood risk management | Provides an overview of the planning framework, flood risk policy and flood risk responsibilities. |
| 3: Roles and responsibilities of Risk Management Authorities | The roles and responsibilities of Risk Management Authorities (RMAs) in Swale Borough. |
| 4: Sequential and Exception Tests | Describes the Sequential Approach and application of Sequential and Exception Tests.<br>Outlines cross boundary issues and considerations. |
| 5: Sources of information used in preparing the SFRA | Outlines what information has been used in the preparation of the SFRA. |
| 6: Climate change | Outlines climate change guidance and the implications for Swale Borough. |
| 7: Understanding flood risk in the Local Plan area | Introduces the assessment of flood risk and provides an overview of the characteristics of flooding affecting the borough. Provides a summary of responses that can be made to flood risk, together with policy and institutional issues that should be considered. |
| 8: Fluvial and coastal defences | Assessment of existing flood defences and flood risk management measures. |

| Section | Contents |
|---|---|
| 9: Flood risk management requirements for developers | Identifies the scope of the assessments that must be submitted in FRAs supporting applications for new development.<br><br>Provides guidance for developers and outlines conditions set by the Lead Local Flood Authority (LLFA) and the Environment Agency that should be followed. |
| 10: Principles for site design and master planning | Outlines considerations for the layout and design of a site to provide an opportunity to reduce flood risk within the development. |
| 11: Surface water management and SuDS | Advice on managing surface water run-off and flooding and the application of SuDS. |
| 12: Special Areas for consideration | Provides planning guidance for developments within Faversham Creek, Iwade and Minster. |
| 13: Flood warning and emergency planning | Outlines the flood warning service in the SFRA area and provides advice for emergency planning, evacuation plans and safe access and escape. |
| 14: Strategic flood risk solutions | Overview of possible strategies to reduce flood risk. |
| 15: Assessment of flood risk in potential development areas | A summary of the information presented in the site screening table, an overview of areas where flood defences may need improvements to reduce flood risk to the development sites, and an overview of the cumulative impacts of development in the study area. |
| 16: Cumulative impacts of development on flood risk | Assessment of the potential cumulative impact of development on flood risk within a catchment. |
| 17: Summary | Review of the Level 1 SFRA. |
| 18: Recommendations | Identifies recommendations for the council to consider as part of Flood Risk Management policy. |
| Appendix A-I:<br><br>Flood risk mapping | Maps showing flood risk information from all sources. |
| Appendix J: Coastal Change Management Area | Coastal Change Management Area methodology |
| Appendix K: Level 1 site screening table | Screening table showing the flood risk from all sources to the Level 1 development sites. |
| Appendix L: Sequential Test Dataset Guidance Document | Outlines the datasets required to undertake the Sequential Test. |

| Section | Contents |
|---|---|
| Appendix M: Data sources used within the SFRA | Provides an overview of the datasets used within the SFRA and where they can be found. |
| Appendix N: MEAS Contribution Zones | Map showing the MEAS contribution zone locations |

## 1.6 Consultation

The following parties have been consulted during the preparation of this Level 1 SFRA:

- Swale Borough Council
- Kent County Council
- Environment Agency
- Southern Water
- Lower Medway Internal Drainage Board
- Marine Management Organisation
- Neighbouring authorities (Ashford Borough Council, Canterbury City Council, Maidstone Borough Council, Medway Council)

## 1.7 Use of SFRA data

It is important to recognise that SFRAs are high level strategic documents and, as such, do not go into detail on an individual site-specific basis. The SFRA has been developed using the best available information at the time of preparation. This relates both to the current risk of flooding from rivers, and the potential impacts of future climate change.

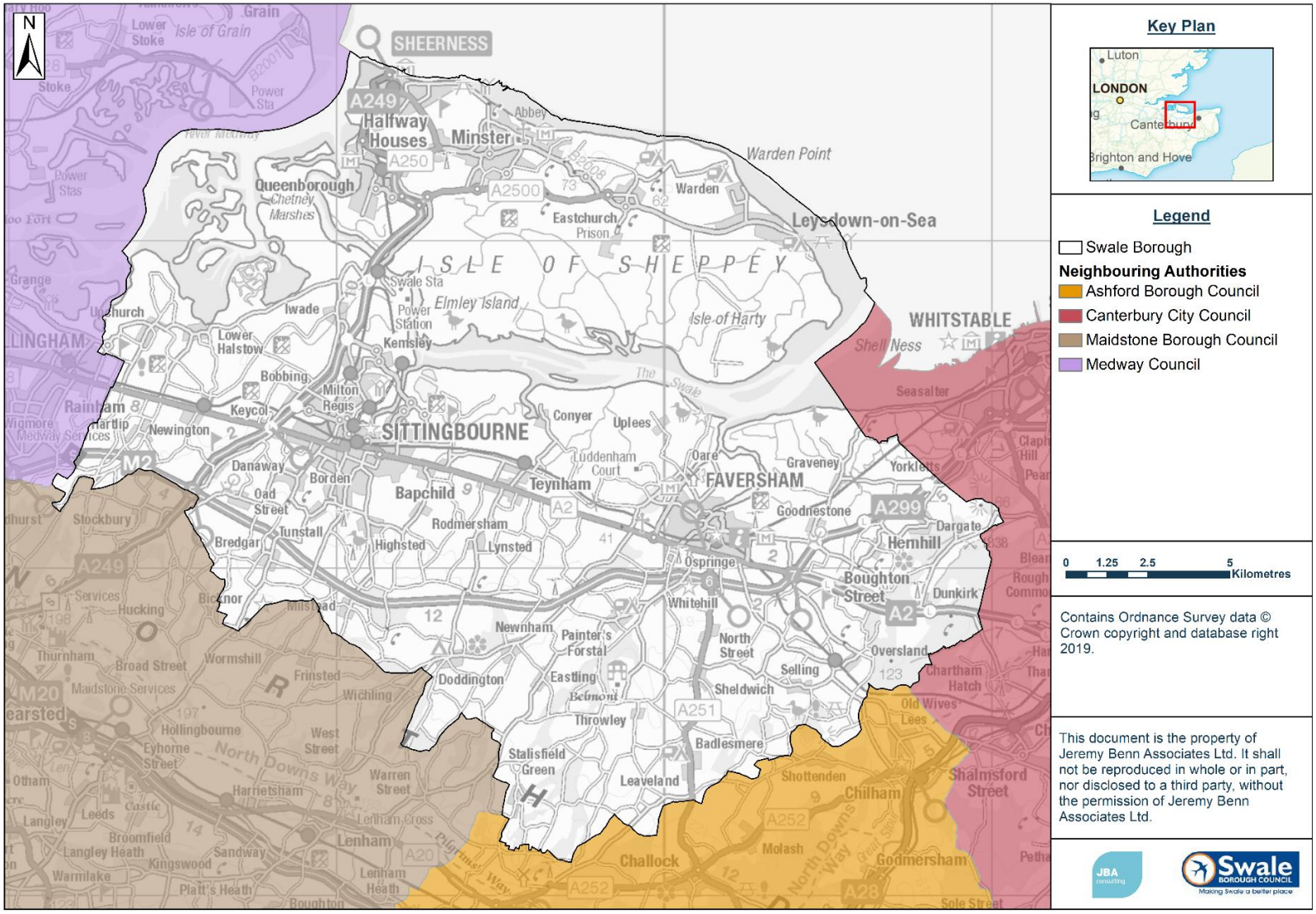
SFRAs should be **'living documents'**, and as a result should be updated when new information on flood risk, new planning guidance or legislation becomes available. New information on flood risk may be provided by Swale Borough Council, Kent County Council, the Environment Agency and Southern Water. Such information may be in the form of:

- New hydraulic modelling results
- Flood event information following a flood event
- Policy / legislation updates
- Environment Agency flood map updates
- New flood defence schemes etc.

The Environment Agency regularly reviews their flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a detailed Flood Risk Assessment.

It is recommended that the SFRA is reviewed internally, in line with the Environment Agency's Flood Zone map updates to ensure latest data is still represented in the SFRA, allowing a cycle of review and a review of any updated data by checking with the above bodies for any new information.

Figure 1-1: Local Plan area and neighbouring authorities



# 2 Policy and strategy for flood risk management

## 2.1 Key legislation for flood and water management in the borough

### 2.1.1 Floods Directive (2007) and Flood Risk Regulations (2009)

The **Flood Risk Regulations (2009)** previously translated the **EU Floods Directive (2007)** into UK law setting the requirement for Member States to complete an assessment of flood risk, known in England as a Preliminary Flood Risk Assessment (PFRA). This information was then used to identify areas where there is a significant risk of flooding (Flood Risk Areas), where States had to undertake Flood Risk and Hazard Mapping and produce Flood Risk Management Plans (FRMPs). This cycle was repeated on a six-yearly basis.

As of 1 January 2024, the Retained EU Law (Reform and Revocation) Bill automatically repealed any Retained EU Law (REUL) not otherwise preserved or replaced in UK law before the end of 2023, including the FRRs 2009 which transposed the EU Floods Directive into legislation. The FRRs were not retained because much of their content overlapped with existing UK legislation, particularly the Flood and Water Management Act 2010.

The Government expects to see continued implementation of the Flood Risk Management Plans 2021-2027, with funding for this still in place over the six-year period.

### 2.1.2 Flood and Water Management Act (2010)

The **Flood and Water Management Act (2010)** was passed in April 2010 following the recommendations made within the Pitt Review (2009) following the floods of 2007. It aims to create a simpler and more effective means of managing both flood risk and coastal erosion, establishing the lead role for Local Authorities, as LLFAs, designed to manage local flood risk (from surface water, ground water and ordinary watercourses) and to provide a strategic overview role of all flood risk for the EA.

### 2.1.3 Water Framework Directive (2000)

The **European Water Framework Directive (WFD)** (2000) was transposed into English Law by the **Water Environment Regulations (2017)** . The WFD aims to deliver improvements across Europe in the management of water quality and water resources. This is enforced through a series of plans called River Basin Management Plans (RBMPs). The borough falls within the **Thames RBMP (2022)** and a small area of the **South East RBMP (2022)**.

### 2.1.4 Environmental permitting

The **Environmental Permitting Regulations (2016)** set out where developers will need to apply for additional permission (as well as planning permission) to undertake works to a Main River. This includes flood risk activities; environmental permits, for example:

- Any activity within 8 metres of the bank of a main river, or 16 metres it is a tidal main river.
- Any activity within 8 metres of any flood defence structure or culvert on a main river, or 16 metres on a tidal river
- Any activity within 16 metres of a sea defence structure
- Involving quarrying or excavation within 16 metres of any main river, flood defence (including a remote defence) or culvert

Environmental permits may also be required from the Environment Agency to discharge runoff, trade effluent or sewage into a main river. They may also be required in relation to groundwater activities, where there may be a risk of groundwater contamination. Further guidance can be found on the Environment Agency's **Flood risk activities: environmental permits** webpage.

### 2.1.5 Byelaws

Land Drainage Byelaws outline legal obligations and responsibilities when undertaking works on or close to a watercourse, for the purpose of preventing flooding, or mitigating any damage caused by flooding.

The borough is covered by the **Southern region flood defence and land drainage byelaws** enforced by the EA. These byelaws apply to activities around main rivers, flood defences and floodplains.

Areas of Swale Borough are within the North Kent Marshes Water Level Management Board district which also has **byelaws**.

### 2.1.6 Additional legislation

Additional legislation relevant to development and flood risk in the borough include:

- **Town and Country Planning Act (1990)**, **Water Industry Act (1991)**, **Land Drainage Act (1991)**, **Environment Act (1995)**, which set out the regulations for development on land in England and Wales.
- The **Environment Act 2021** requires developers to provide Biodiversity Net Gain (BNG) and for LPAs to develop Local Nature Recovery Strategies (LNRS). Strategic site allocations in Local Plans which present opportunities for BNG or areas for habitat improvement/creation identified by the LNRS could have parallel opportunities to contribute to reduced flood risk from a range of sources.
- Other environmental legislation such as the **Habitats Directive (1992) (gov.uk)**, **Environmental Impact Assessment Directive (2014) (gov.uk)**, and **The Environmental Assessment of Plans and Programmes (Amendment) Regulations 2020** which apply as appropriate to strategic and site-specific developments to guard against environmental damage.
- The **Planning and Compulsory Purchase Act (2004) (gov.uk)** Section 19(1A) which requires LPAs to include in their Local Plans 'policies designed to secure that the

development and use of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change.'

- The **Planning and Infrastructure Bill** aims to accelerate housing delivery and critical infrastructure projects to support economic growth and meet clean energy targets.

## 2.2 Key national, regional, and local policy documents and strategies

Table 2-1 summarises relevant national, regional, and local flood risk policy and strategy documents and how these apply to development and flood risk. Hyperlinks are provided to external documents. These documents may:

- Provide useful and specific local information to inform FRAs within the local area.
- Set the strategic policy and direction for flood risk management and drainage – they may contain policies and action plans that set out what future flood mitigation and climate change adaptation plans may affect a development site. A developer should seek to contribute in all instances to the strategic vision for flood risk management and drainage in the borough.
- Provide guidance and/or standards that inform how a developer should assess flood risk and/or design flood mitigation and SuDS.

The following sections provide further details on some of these documents and strategies.

Please note that the links to these documents may change over time and any requests for these documents should be directed toward the documents' authors.

Table 2-1: National, regional, and local flood risk policy and strategy documents

| Policy level | Document, lead author and date | Contextual information | Policy and measures | Development design requirements | Next update due |
|---|---|---|---|---|---|
| National | **Flood and Coastal Erosional Risk Management Strategy for England** (EA, 2020) | Yes | Yes | No | 2026 |
| National | **National Planning Policy Framework** updated in February 2025 | Yes | Yes | Yes | 2026 |
| National | **Planning Practice Guidance (PPG): Flood risk** and **coastal change** updated in September 2025 | Yes | Yes | Yes | - |
| National | **Building Regulations Part H** (MHCLG, 2010) | Yes | No | Yes | - |
| National | **South East Marine Plan** (Marine Management Organisation, 2024) | Yes | Yes | No | - |
| National | **SuDS Manual (C753)** (Ciria, 2015) | Yes | Yes | Yes | - |
| National | **National standards for sustainable drainage systems (SuDS)** (Defra, 2025) | Yes | Yes | Yes | - |
| Regional | **North Kent Rivers Catchment Flood Management Plan** (EA, 2009) | Yes | Yes | No | - |
| Regional | **Thames River Basin District River Basin Management Plan** and the **South East River Basin District River Basin Management Plan** (EA, 2022) | Yes | Yes | No | 2028 |
| Regional | **Thames River Basin District Flood Risk Management Plan** and the **South East River Basin District Flood Risk Management Plan** (EA, 2023) | Yes | Yes | No | 2027 |
| Regional | **Southern Water – Water Resources Management Plan** (Southern Water, 2024) and **South East Water – Water Resources Management Plan** (South East Water, 2019) | Yes | No | No | - |

| Policy level | Document, lead author and date | Contextual information | Policy and measures | Development design requirements | Next update due |
|---|---|---|---|---|---|
| Regional | **Drainage and Wastewater Management Plan** (Southern Water, 2023) | Yes | No | No | - |
| Regional | **The Isle of Grain to South Foreland Shoreline Management Plan** (EA, 2010) and **Medway Estuary and Swale Shoreline Management Plan** (EA, 2010) | Yes | Yes | No | - |
| Regional | **Climate change guidance for development and flood risk** (EA, last updated May 2022) | Yes | No | Yes | - |
| Regional | **Water, People, Places: A guide for master planning sustainable drainage into developments** (Lead Local Flood Authorities of South East England) | Yes | No | Yes | - |
| Local | **Kent County Council Preliminary Flood Risk Assessment** (Kent County Council, 2011) | Yes | No | No | - |
| Local | **Kent County Council Preliminary Flood Risk Assessment Addendum** (Kent County Council, 2017) | Yes | No | No | - |
| Local | **Kent County Council Local Flood Risk Management Strategy 2024-2034** (Kent County Council, 2024) | Yes | Yes | No | 2034 |
| Local | **Kent County Council's Drainage and Planning Policy** (Kent County Council, 2019) | Yes | Yes | Yes | |
| Local | **Swale Surface Water Management Plan** (Kent County Council, 2012) | Yes | Yes | No | - |
| Local | **Medway Estuary and Swale flood and coastal risk management Strategy (MEAS)** (EA, 2019) | Yes | Yes | No | |

### 2.2.1 The National Flood and Coastal Erosion Risk Management Strategy for England (2020)

The **National Flood and Coastal Erosion Risk Management Strategy for England** provides the overarching framework for future action by all RMAs to tackle flooding and coastal erosion in England. The Strategy looks ahead to 2100 and the actions needed to address the challenge of climate change.

The Strategy has been split into three high level ambitions:

- Climate resilient places.
- Today's growth and infrastructure resilient in tomorrow's climate.
- A nation ready to respond and adapt to flooding and coastal change.

The Strategy was laid before parliament in July 2020 for formal adoption and published alongside a **Policy Statement for Flood and Coastal Erosion Risk Management**.

It can be expected that the implementation of the National Strategy will lead to the publication of new guidance and practice that is focused on resilience and adaptation over the coming years.

### 2.2.2 Catchment Flood Management Plans

Catchment Flood Management Plans (CFMPs) are a high-level strategic plan providing an overview of flood risk across each river catchment. The Environment Agency use CFMPs to work with other key-decision makers to identify and agree long-term policies for sustainable flood risk management.

There are six pre-defined national policies provided in the CFMP guidance and these are applied to specific locations through the identification of 'Policy Units'. These policies are intended to cover the full range of long-term flood risk management options that can be applied to different locations in the catchment.

The Local Plan area is covered by the **North Kent Rivers Catchment Flood Management Plan** (2009). The primary policy units for the area are:

- **North Kent Downs – Policy Option 1**. Areas of little or no flood risk that will continue to be monitored and advised.
- **North Kent Marshes – Policy Option 3**. Areas of low to moderate fluvial flood risk where existing flood risk is generally being managed effectively.

#### North Kent Downs

Flood risk is low in this area, with no people or properties currently affected by flooding. The low flood risk is predicted to continue into the future, with no properties predicted to be at risk of flooding from a 1% AEP (1 in 100-year) event in 2100. It is proposed that local authorities and water companies will need to continue to monitor and maintain drainage assets to prevent localised flood risk.

**North Kent Marshes**

Flood risk in this area is generally managed effectively and the biggest issue is likely the increased impacts of flooding with time due to climate change, though flood risk is not expected to increase notably. Proposed actions for the area include investigations into non-main river flooding in Sittingbourne, Conyer, and Faversham, and flood risk investigations at Iwade.

### 2.2.3 River Basin Management Plans

River Basin Management Plans (RBMPs) are prepared under the Water Framework Directive (WFD) and assess the pressure facing the water environment in the River Basin Districts. The Local Plan area falls within the **Thames River Basin District River Basin Management Plan** (2022) and **South East River Basin District River Basin Management Plan** (2022).

The plans provide a summary of programmes of measures that help prevent deterioration to protect and improve the beneficial use of the water environment in the river basin districts.

### 2.2.4 Flood Risk Management Plans

FRMPs set out how organisations, stakeholders and communities will work together to manage flood risk within a catchment.

The FRMP process adopts the same catchments as used in the preparation of River Basin Management Plans (as prepared to meet the requirements of the Water Framework Directive). The Local Plan Area lies largely within the North Kent Catchment area of the Thames River Basin District, though part of the southeast of the borough is located within the Stour Catchment area of the South East River Basin.

More detailed strategic information on proposed strategic measures and approaches can be found in the **Thames River Basin District Flood Risk Management Plan** (2023) – Parts A, B and C and the **South East River Basin District Flood Risk Management Plan** (2023) – Parts A, B and C. The FRMPs draw on previous policies and actions identified in the Catchment Flood Management Plans and also incorporate information from Local Flood Risk Management Strategies.

### 2.2.5 Preliminary Flood Risk Assessments

LLFAs and the Environment Agency have the task of preparing a Preliminary Flood Risk Assessment (PFRA) report every 6 years. As the LLFA, Kent County Council must review the flood risk from local flood sources which includes surface water, groundwater and ordinary watercourses. The Environment Agency must review the flood risk from fluvial and coastal flood risks.

The LLFA **PFRA document** that covers the study area was first published by Kent County Council (KCC) as the LLFA in 2011. In 2011, ten indicative Flood Risk Areas were identified nationally by Defra / the Environment Agency, and as a result of KCC's assessment, none encroached on Swale Borough Council's Local Plan area.

Under the Regulations, the Environment Agency exercised an 'Exception' in 2011 and did not prepare a PFRA for risk from rivers, reservoirs and the sea. This then made it a requirement for the Environment Agency to prepare and publish a Flood Risk Management Plan (FRMP).

In 2017, KCC prepared an **addendum** to the PFRA which updated the 2011 report. No Flood Risk Areas were identified within Swale Borough within this assessment. The report notes that Surface Water Management Plans have identified risks in Sittingbourne and the Isle of Sheppey from surface water runoff and tide locking of the Scrapsgate Drain.

The exercise was also carried out in 2018 by the Environment Agency and a further **national study** was prepared to identify potential areas of significant flood risk ("Flood Risk Areas"). Two Flood Risk Areas were identified in the borough, one to the north of Raspberry Hill Lane and the other to the north of Garrison Road.

### 2.2.6 Kent Local Flood Risk Management Strategy (LFRMS) 2017-2023

KCC is responsible for developing, maintaining, applying and monitoring a LFRMS for Kent, which includes the Local Plan area. The **Kent Local Flood Risk Management Strategy 2024-2034** (2024) sets out the strategic vision for local flood risk management in Kent. The strategy aims to manage local flood risk in Kent by improving understanding, reducing risk, resilient planning and building resilient communities.

The 2024 LFRMS builds upon the previous version, the **Kent County Council Local Flood Risk Management Strategy**, published in 2017.

### 2.2.7 Surface Water Management Plans

Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location. SWMPs are undertaken by LLFAs in consultation with key local partners who are responsible for surface water management and drainage in their area. SWMPs establish a long-term action plan to manage surface water in a particular area and are intended to influence future capital investment, drainage maintenance, public engagement and understanding, land-use planning, emergency planning and future developments.

The SWMP applicable to the Local Plan area is summarised below. The outcomes and actions from this SWMP should be considered in the context of proposed developments within the study area.

The **Swale Surface Water Management Plan** (2012) was undertaken by KCC to investigate the local flood risks in Swale as part of their role in understanding local flood risk management in Kent. The plan acts as an intermediate risk assessment, identifying 22 priority locations at risk of local flooding that require detailed assessment. These priority locations are generally clustered around Sittingbourne, Faversham, and the northwest of the Isle of Sheppey.

The plan then outlines potential actions and measures for managing the identified flood risks at these priority locations, detailing the partners or stakeholders responsible for the

actions, the indicative costs, and the associated timescales. Generic actions and ongoing monitoring measures are also discussed.

### 2.2.8 Water Resources Management Plans (WRMPs)

Under the duties set out in sections 37A to 37D of the Water Industry Act 1991, all water companies across England and Wales must prepare and maintain a WRMP. This must be prepared at least every five years and reviewed annually.

WRMPs should set out how a water company intends to achieve a secure supply of water for their customers and a protected and enhanced environment.

**Southern Water – Water Resources Management Plan** (2025) and **South East Water – Water Resources Management Plan** (2019) are available online.

### 2.2.9 Drainage and Wastewater Management Plans (DWMPs)

Water and sewage companies must produce a Drainage and Wastewater Management Plan (DWMP), covering a minimum of 25 years, which looks at current and future capacity, pressures, and risks to their networks such as climate change and population growth. They detail how a company plans to work with RMAs and drainage asset owners to manage future pressures. Southern Water has prepared a **Drainage and Wastewater Management Plan**.

As part of the plan, Southern Water undertook a Baseline Risk and Vulnerability Assessment to understand the probability and impact of the current and future performance of their wastewater systems. The results show there are areas of not significant, moderately significant and very significant risk of **internal flooding** in Swale, and areas of moderately significant and very significant risk of **hydraulic overload**.

### 2.2.10 Local policy and guidance for SuDS

The 2025 NPPF states that: ‘Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal.’ (Paragraph 182) and 'development should only be allowed in areas at risk of flooding where… it can be demonstrated that… c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate' (Paragraph 181).

At the time of writing this SFRA, the following documents and policies are relevant to SuDS and surface water in the borough. Hyperlinks are provided to external documents:

- **SuDS Manual (C753)**, published in 2007 and updated in 2015.
- **Defra National standards for sustainable drainage systems (SuDS)**, June 2025.
- **Building Regulations Part H** (MHCLG), 2010.

As LLFA, KCC has a strategic overview role for local flood risk, which involves flooding from surface water, groundwater and ordinary watercourses. The **Kent County Council**

**Drainage and Planning Policy** sets out the requirements that KCC has for drainage strategies and surface water management provisions relating to development applications.

### 2.2.11 Shoreline Management Plans

Shoreline Management Plans (SMP) form part of Defra's strategy for flood and coastal defence. They provide a large-scale assessment of risks associated with coastal evolution and present the policy framework to address these risks in a sustainable manner. The SMP policies defined by Defra are:

- **Hold the line** – maintain or upgrade the level of protection provided by defences.
- **Advance the line** – build new defences seaward of the existing defence line.
- **Managed realignment** – allowing retreat of the shoreline, with management to control or limit the movement.
- **No active intervention** – a decision not to invest in providing or maintaining defences.

The SMPs set short (0-20 years), medium (20-50 years), and long term (50-100 years) coastal management policies for the next 100 years for specific lengths of coastline. Not all policies are guaranteed funding and over time the Environment Agency along with other partners will identify the cost.

The SMPs are currently undergoing a refresh due to changes in evidence, guidance, and policy since they were initially approved in 2016. The refresh aims to:

- Provide guidance on how SMPs can incorporate new knowledge, legislation, and guidance.
- Improve overall quality, deliverability, and consistent application of key principles across SMPs but recognising local nuances.
- Ensure shoreline management plans remain technically robust but adaptable to future change.
- Promote the principle that SMPs should be 'living' and provide a clearly defined route-map with actions to be 'epoch-2 ready' (epoch 2 is roughly from 2030) and enable delivery of the policies over the coming decades.

There are two existing plans for Swale which are outlined below.

**The Isle of Grain to South Foreland Shoreline Management Plan** (2010) covers part of the study area from Faversham Creek to southwest of Seasalter, as well as the northern coastline of the Isle of Sheppey from Sheerness to Shellness. The majority of coastline in this area requires 'Hold the Line' or 'Managed Realignment', both in the short and long term, though with 'No Active Intervention' planned for the area between Minster Slopes to Warden Bay.

The **Medway Estuary and Swale Shoreline Management Plan** (2010) covers part of the Local Plan coastline from Otterham Quay to Faversham Creek, as well as the southern coastline of the Isle of Sheppey from Sheerness to Shellness. The long term policy in this area is largely either 'Hold the Line' or 'Managed Realignment', with some areas of 'No Active Intervention'.

### 2.2.12 Medway Estuary and Swale flood and coastal risk management Strategy

The Local Plan area falls within **Medway Estuary and Swale flood and coastal risk management Strategy (MEAS)** area. The strategy sets out the Environment Agency's plan to sustainably manage the coastline and tidal defences in the Medway estuary and Swale area. It aims to protect people, properties, designated habitat and agricultural land over the next 100 years.

### 2.2.13 Neighbourhood plans

A neighbourhood plan is a document produced by a local community that sets out planning policies for their area and can be used to:

- Protect local green spaces;
- Encourage better designed places;
- Bring forward housing that meets local needs.

Neighbourhood planning groups can use the information in this SFRA to assess the risk of flooding to sites within their community.

Swale Borough Council provides further details about neighbourhood plans on their **website**.

# 3 Roles and responsibilities of Risk Management Authorities

The roles and responsibilities of Risk Management Authorities (RMAs) in Swale Borough, as described in the **Flood and Water Management Act (2010)** are outlined below.

## 3.1 Swale Borough Council

As a Local Planning Authority, Swale Borough Council assess, consult on and determine whether development proposals are acceptable, ensuring that flooding and other similar risks are effectively managed.

The council will consult relevant statutory consultees as part of planning application assessments and may, in some cases, also contact non-statutory consultees, such as Southern Water, that have an interest in the planning application.

Swale Borough Council are also the Coast Protection Authority, primarily managing coastal erosion through defences. These defences are sometimes dual purpose and often serve to manage the coastal flood risk.

## 3.2 Environment Agency

The Environment Agency is responsible for protecting and enhancing the environment and contributing to the government's aim of achieving sustainable development in England and Wales. In terms of flood risk, the Environment Agency has a strategic overview of all sources of flooding and coastal erosion. Examples of this strategic overview role include:

- Setting the direction for managing the risks through strategic plans;
- Providing evidence and advice to inform Government policy and support others;
- Working collaboratively to support the development of risk management skills and capacity; and
- Providing a framework to support local delivery.

The Agency also has operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea, as well as being a coastal erosion risk management authority.

The Environment Agency has powers to carry out flood and coastal risk management work and to regulate the actions of other flood risk management authorities on the coast. These powers are permissive, which means they are not a duty.

The Environment Agency also has powers to regulate and consent works. You must follow the environmental permitting rules if you want to do work:

- on or near a main river
- on or near a flood defence structure
- in a flood plain

- on or near a sea defence

Further details on Environment Agency permits can be found on the **Environment Agency's Flood risk activities: environmental permits** website.

### 3.3 Kent County Council

As the Lead Local Flood Authority (LLFA) for the area, Kent County Council's duties and powers include:

- Local Flood Risk Management Strategy (LFRMS): LLFAs must develop, maintain, apply and monitor a LFRMS to outline how they will manage flood risk, identify areas vulnerable to flooding and target resources where they are needed most.
- Flood Investigations: When appropriate and necessary LLFAs must investigate and report on flooding incidents (Section 19 investigations).
- Register of Flood Risk Features: LLFAs must establish and maintain a register of structures or features which, in their opinion, are likely to have a significant effect on flood risk in the LLFA area.
- Designation of Features: LLFAs may exercise powers, as all RMAs can, to designate structures and features that affect flood risk, requiring the owner to seek consent from the authority to alter, remove or replace it.
- Consenting: When appropriate, LLFAs will perform consenting of works on ordinary watercourses. Further details can be found on the **KCC land drainage website**.
- Enforcement: The LLFA has enforcement powers under the Land Drainage Act 1991 and FWMA 2010.

KCC is also the Local Highway Authority and manages highway drainage, carrying out maintenance and improvement works on an on-going basis, as necessary, to maintain existing standards of flood protection for highways, making appropriate allowances for climate change. It also has the responsibility to ensure road projects cause no increased flood risk. KCC are statutory consultees with respect to surface water management in proposed new development. **KCC's sustainable drainage in planning website** provides further information and advice.

### 3.4 Water and wastewater providers

Southern Water is the sewerage undertaker for the Local Plan area. They have the responsibility to maintain surface, foul and combined public sewers to ensure the area is effectively drained. When flows (foul or surface water) are proposed to enter public sewers, Southern Water will assess whether the public system has the capacity to accept these flows as part of their pre-application service. If there is not available capacity, they will provide a solution that identifies the necessary mitigation. Southern Water can also comment on the available capacity of foul and surface water sewers as part of the planning application process although this is not a statutory role.

The **Southern Water planning your development** webpage recommends early discussions with Southern Water to ensure there is enough capacity in the sewer network

for any significant developments, particularly in the Faversham area. Additionally, as part of national mapping in the Water UK **Assessing the Available Capacity in UK Sewerage Systems** report the areas around Lower Halstow, Sittingbourne, Teynham and Boughton are located within 'Risk level 4', meaning they are identified as currently having widespread capacity constraints for pipes in the foul and combined sewer network.

Southern Water and South East Water provide potable water to the Local Plan area. Whilst not associated with flood risk, Southern Water and South East Water should also be consulted with regards to water resources and usage.

For further details about developer services and relevant application forms please see **Southern Waters Developer Services website** and **South East Water's Developer Services Website**.

### 3.5 North Kent Marshes Water Level Management Board (WLMB)

Under the Land Drainage Act 1991 WLMBs exercises general powers of supervision over all matters relating to water level management within their district. Key watercourses are adopted by the Board for maintenance purposes, and the Board also has responsibility for the operation and maintenance of assets used to manage water levels.

# 4 Sequential and Exception Tests

This section summaries national planning policy for development and flood risk and the application of the sequential and exceptions tests for both planners and developers.

## 4.1 National Planning Policy Framework and Guidance

The **NPPF** sets out the Government's planning policies for England. It must be considered in the preparation of Local Plans and is a material consideration in planning decisions. The NPPF advises on how flood risk should be considered to guide the location of future development and FRA requirements. The NPPF states that:

*"Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards"* (Paragraph 171).

The **Flood Risk and Coastal Change PPG**, last updated September 2025, sets out how the policy should be implemented. **Diagram 1** in the PPG (Paragraph: 007 Reference ID: 7-007-20220825) sets out how flood risk should be considered in the preparation of Local Plans.

## 4.2 The Sequential and Exception Tests and application to the Local Plan

### 4.2.1 The Sequential Test

Firstly, land at the lowest risk of flooding from all sources now and in the future should be considered for development. A test is applied called the 'Sequential Test' to do this. Figure 4-1 summarises the Sequential Test. The LPA will apply the Sequential Test to potential allocations. A Sequential Test Dataset Guidance document for Swale Borough can be found in Appendix L. The Sequential Test will be undertaken by Swale Borough Council through a free-standing document.

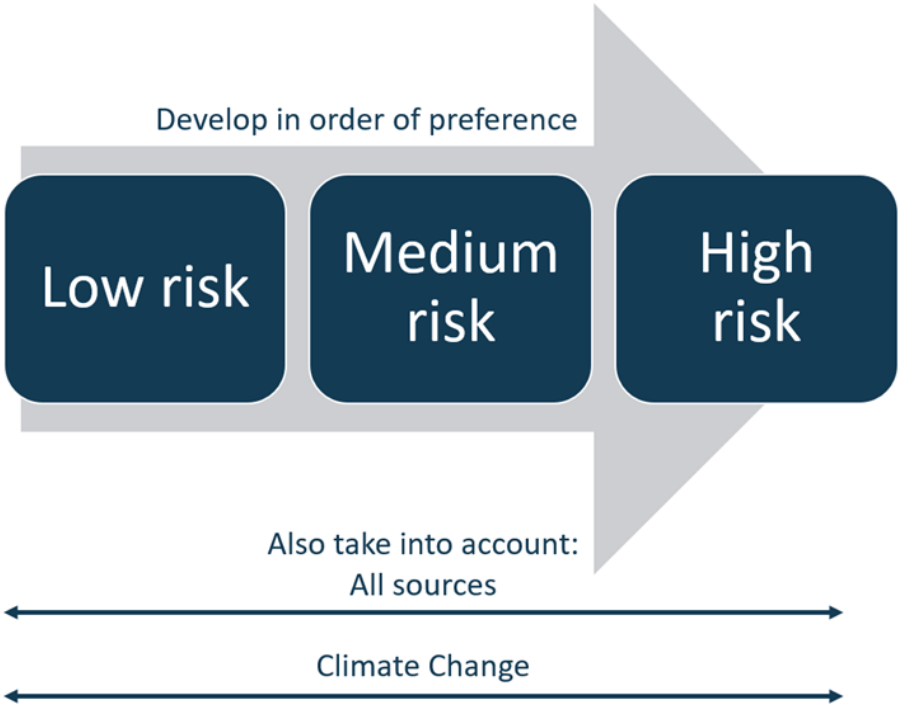



Figure 4-1: The Sequential Test.

Whether any further work is needed to decide if the land is suitable for development will depend on both the vulnerability of the development and the Flood Zone it is proposed for. **Table 2 of the PPG** shows whether, having applied the Sequential Test first, the vulnerability of development is not compatible with a particular Flood Zone and where the Exception Test is required to determine the suitability of that vulnerability of development to the Flood Zone.

Figure 4-2 illustrates the Sequential Test as a process flow diagram using the information contained in this SFRA to assess potential development sites against areas of flood risk and development vulnerability compatibilities. This is a stepwise process, but a complex one, as several of the criteria used are qualitative and based on experienced judgement. The process must be documented, and evidence used to support decisions recorded.

In addition, the risk of flooding from other sources and the impact of climate change must be considered when considering which sites are suitable to allocate.

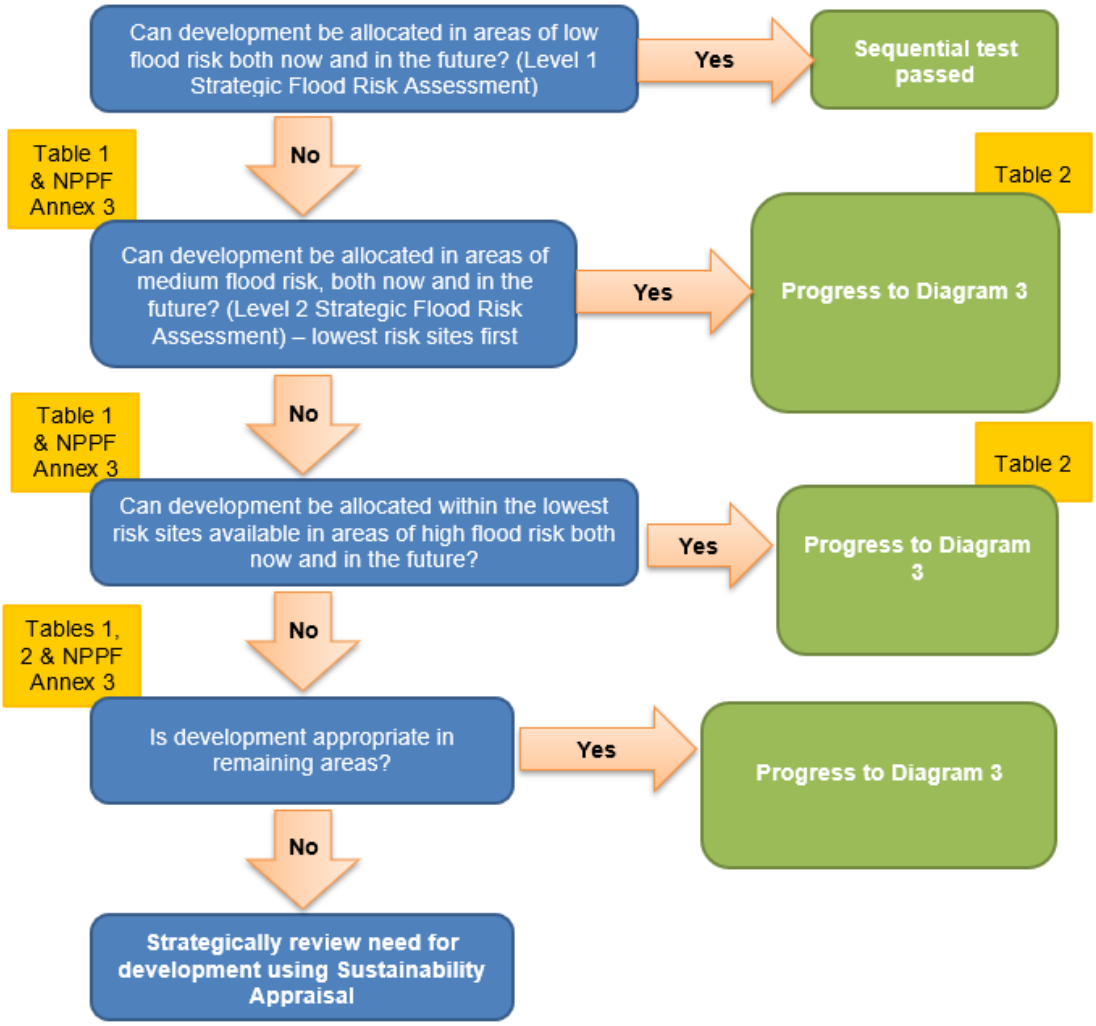



Diagram 2 of PPG: Flood Risk and Coastal Change (paragraph 026, Reference ID 7-026-20220825).

Figure 4-2: Application of the Sequential Test for plan preparation.

### 4.2.2 The risk-based approach

The NPPF takes a risk-based approach to development in flood risk areas. Since the update of the NPPF in July 2021, the Sequential Test has been required to consider all sources of flooding both 'now and in the future'.

The updated PPG further states in Paragraph 023 of the flood risk and coastal change guidance: "*Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk*".

The general implications of these are summarised as follows:

- The Sequential Test must be based on mapping that enables decision making according to a prioritisation based on a risk-based sequence (for river and sea flooding national mapping is available that describes low, medium and high-risk Flood Zones but comparable mapping of this specific type and quality is not available for other sources; for river and sea flooding the risk zones are based on the assumption that no flood risk management features are present).
- The other sources of flood risk that can potentially be included in the Sequential Test are surface water, groundwater, sewer flooding and reservoir flooding (or other water impounding features such as canals).
- It follows that proposed new development placed in locations at high or medium risk from flooding from other sources now and in the future (note that the explicit requirement to include climate change in the test, as set out in the PPG will require the preparation of additional modelling and mapping or use of proxies) should be accompanied by evidence that the Exception Test can be satisfied (in a Level 2 SFRA).

A basic requirement for the Sequential Test to be performed is that appropriate, competent mapping can be prepared to enable logical comparison of the flood risk from different sources at alternative locations, both now and in the future, as this is fundamental to establishing a logical “risk sequence”.

Appendix L describes the implications of including different sources of flooding both now and in the future in the Sequential Test. It also highlights matters to be considered and identifies a preferred approach.

### 4.2.3 The Exception Test

It will not always be possible for all new development to be located 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. **Diagram 3 of the PPG** summarises the Exception Test (Figure 4-3).

**Table 2 of the PPG** sets out the requirements for the Exception Test but does not reflect the need to avoid flood risk from sources other than rivers and the sea. There is no guidance on how to consider other sources of flood risk. The Exception Test should only be applied, following the application of the Sequential Test, in the following instances:

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

While the Exception Test is not explicitly required for sites at risk from other sources of flooding, the LPA should follow a similar principle where sites are proposed that are at risk from other sources of flooding, carefully weighing up the wider benefits of development

against the risk, ensuring that site users can be kept safe through the lifetime of the development and ensuring residual risk can be safely managed.

For sites proposed for allocation within the Local Plan, the LPA should use the information in this SFRA to inform the Exception Test. At the planning application stage, the developer must design the site such that it is appropriately flood resistant and resilient in line with the recommendations in national and local planning policy and supporting guidance and those set out in this SFRA. This should demonstrate that the site will still pass the flood risk element of the Exception Test based on the detailed site level analysis.

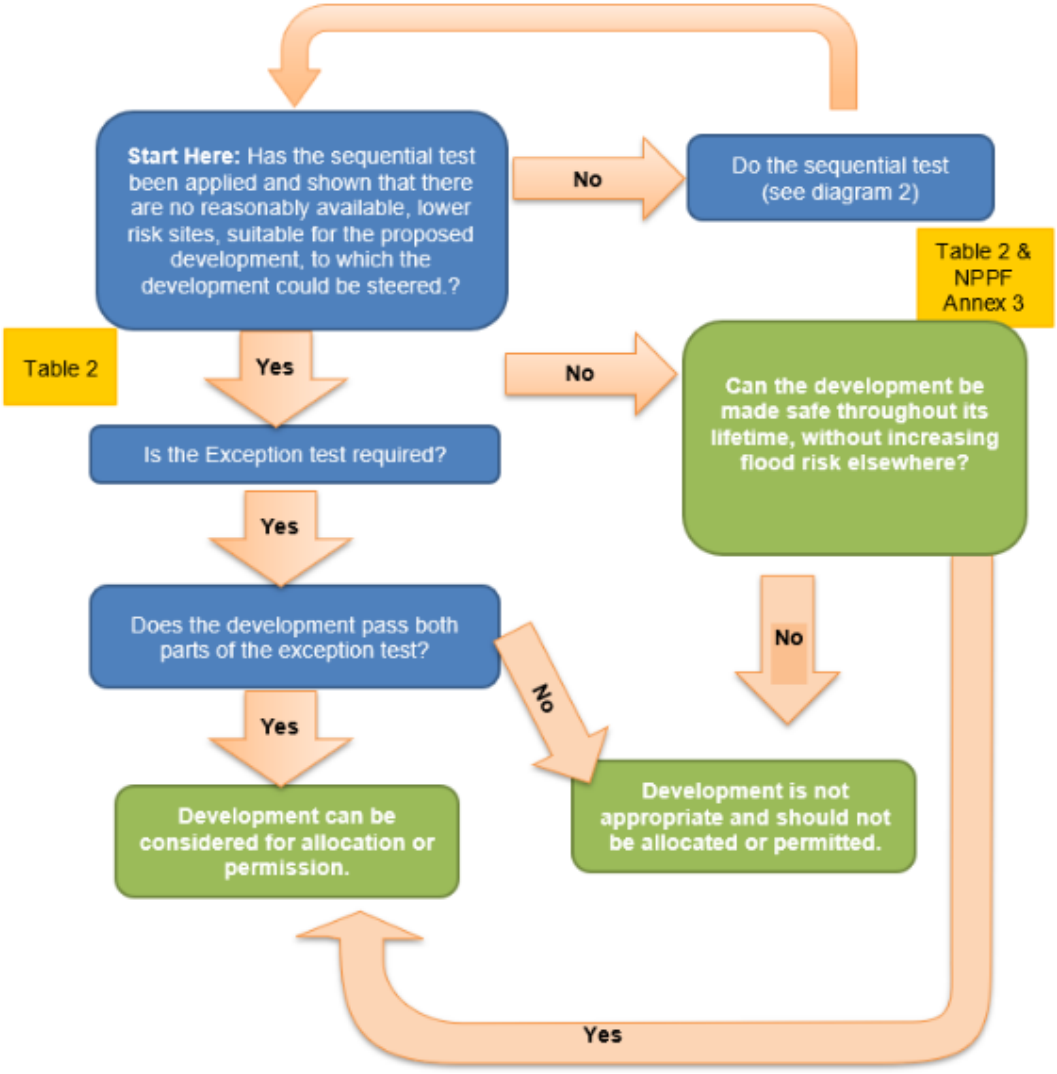



Diagram 3 of PPG: Flood Risk and Coastal Change (033 Reference ID: 7-033-20220825).

Figure 4-3: Application of the Exception Test to plan preparation.

As referenced above, there are two parts to demonstrating a development passes the Exception Test that should be considered by the LPA when allocating development sites, and developers when required (see Section 4.3 for Exception Test requirements for individual planning applications).

**Part A: Demonstrating that the development would provide wider sustainability benefits to the community that outweigh the flood risk.**

The LPA will need to set out the criteria used to assess the Exception Test and provide clear advice to enable applicants to provide evidence to demonstrate that it has been passed. If the application fails to prove this, the LPA should consider whether the use of planning conditions and/or planning obligations could allow it to pass the Exception Test. If this is not possible, this part of the Exception Test has failed, and planning permission should be refused.

Wider sustainability objectives should be considered, such as those set out in Local Plan Sustainability Appraisals. These generally consider matters such as biodiversity, green infrastructure, housing, historic environment, climate change adaptation, flood risk, green energy, pollution, health, transport etc.

The sustainability issues the development will address and how far doing so will outweigh the flood risk concerns for the site should also be considered, e.g., by facilitating wider regeneration of an area, providing community facilities, infrastructure that benefits the wider area etc.

**Part B: Demonstrating that 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.**

In circumstances where the potential effects of proposed development are material a Level 2 SFRA is likely to be needed to inform the Exception Test for strategic allocations to provide evidence that the principle of development can be supported. At the planning application stage, a site-specific FRA will be needed in addition to a Level 2 SFRA. Both will need to consider the actual and residual risk and how this will be managed over the lifetime of the development.

## 4.3 Applying the Sequential Test and Exception Test to individual planning applications

### 4.3.1 Applying the Sequential Test

The LPA are responsible for considering the extent to which Sequential Test considerations have been satisfied.

Developers should consult with the LPA in the first instance before commencing on a site-specific FRA to determine the Sequential Test requirements for their site. Developers are required to apply the Sequential Test to all development sites, unless the site is:

- A strategic allocation and the test has already been carried out by the LPA as part of preparing the Local Plan, or
- A change of use with no discernible alteration to building footprints (except to a caravan, camping or chalet site, or to a mobile home or park home site), or
- A minor development (householder development, small non-residential extensions with a footprint of less than 250m²), or

- A development in fluvial Flood Zone 1 unless there are other flooding issues in the area of the development (i.e. surface water, groundwater, reservoir, sewer flooding).

In applying paragraph 175 of the NPPF a proportionate approach should be taken. Where a site-specific flood risk assessment demonstrates clearly that the proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the Sequential Test need not be applied.

It should also be noted that residential sub-divisions are exempted from the definition of minor development and therefore, by default, should also be subject to the Sequential Test.

The SFRA contains information on all sources of flooding and takes into account the impact of climate change. This should be considered when a developer undertakes the Sequential Test, including the consideration of reasonably available sites at lower flood risk.

The Swale Borough Council **Advice Note: undertaking Sequential and Exception Tests for Planning Applications** defines the geographical scope of the Sequential Test for different parts of the borough (within which it is appropriate to identify reasonably available alternatives). It also gives local detail on undertaking Sequential and Exceptions Tests in the borough and may be periodically updated. The latest version of the document should always be used.

The sources of information on reasonably available sites may include but is not restricted to:

- Site allocations in Local Plans.
- Sites with planning permission but not yet built out.
- Strategic Housing and Economic Land Availability Assessments (SHELAAs)/five-year land supply/annual monitoring reports.
- Locally listed sites for sale.

It may be that a number of smaller sites or part of a larger site at lower flood risk form a suitable alternative to a development site at high flood risk.

Ownership or landowner agreement in itself is not acceptable as a reason not to consider alternatives.

### 4.3.2 Applying the Exception Test

Where a development proposal is in accordance with an allocation made in a Local Plan following the application of the Sequential and Exception Tests, the Exception Test will only be required to be repeated if:

- Elements of the development that were key to it satisfying the Exception Test at the plan-making stage (such as wider sustainability benefits to the community or measures to reduce flood risk overall) have changed or are not included in the proposed development; or
- The understanding of current or future flood risk has changed significantly.

For developments that have not been allocated in the Local Plan or where the Sequential Test was not applied at the development plan stage and new information becomes available that identifies a flood risk, developers must undertake the Sequential and Exception Tests and present this information to the LPA for approval. The Level 1 SFRA can be used to scope the flooding issues that a site-specific FRA should investigate in more detail to inform the Exception Test for windfall sites.

The applicant will need to provide information that the application can pass both parts of the Exception Test.

# 5 Sources of information used in preparing the SFRA

This section outlines the data sources used in preparing the SFRA. A summary of the data sources can be found in Appendix M.

## 5.1 Historic flood risk

The historic flood risk in the Local Plan area has been assessed using information of recorded incidents provided by Kent County Council, the Environment Agency's recorded flood outline dataset and Southern Water's Sewage Incident Reporting Form (SIRF). This has been supplemented with other information collected during the preparation of the SFRA. The key considerations from these sources are outlined in Section 7.2. The Environment Agency's recorded flood outlines and Kent County Council historic flood events are presented in Appendix A and on Swale Borough Council's **interactive maps.**

## 5.2 Flood Zones

Fluvial and tidal flood risk across the borough is assessed based on Flood Zones.

The Flood Zones do not consider defences, except when considering the functional floodplain. This is important for planning long term developments as long-term policy and funding for maintaining flood defences over the lifetime of a development may change over time.

The Flood Zones are:

- **Flood Zone 1:** Low risk: land having less than a 0.1% (1 in 100 year) chance of flooding from rivers or the sea in any given year.
- **Flood Zone 2:** Medium risk: land having between a 1% (1 in 100-year) and 0.1% (1 in 1,000-year) chance of flooding from rivers or between a 0.5% (1 in 200-year) and 0.1% (1 in 1,000-year) chance of flooding from the sea in any given year.
- **Flood Zone 3a:** High risk: land having between a 3.3% (1 in 30-year) and 1% (1 in 100-year) chance of flooding from rivers or between a 3.3% (1 in 30-year) and 0.5% (1 in 200-year) chance of flooding from the sea in any given year.
- **Flood Zone 3b:** This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:
  - land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
  - land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

Flood Zones 2 and 3a are taken from the Environment Agency's **Flood Map for Planning**. Flood Zone 3b has been derived as part of this SFRA. Flood Zone 1 covers areas not contained within Flood Zones 2, 3a or 3b.

A concept diagram showing the classification of the Flood Zones is included in Figure 5-1.

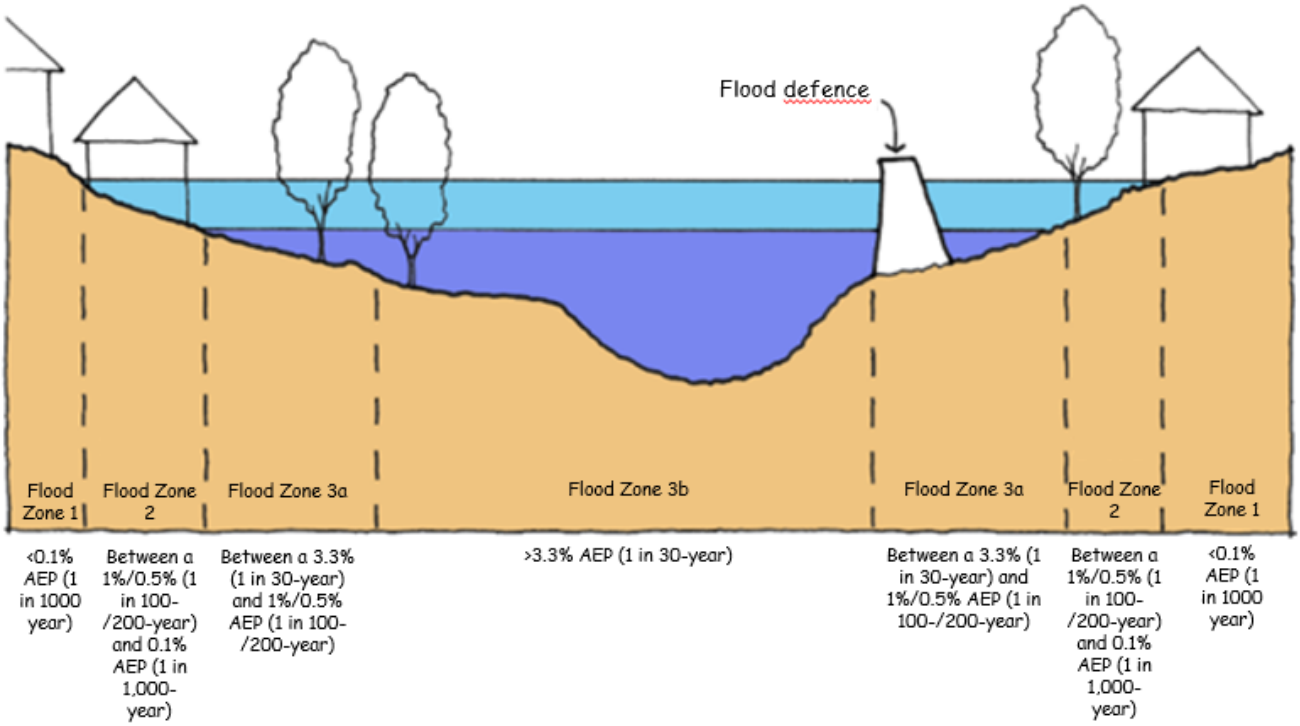



Figure 5-1: Definition of Flood Zones

**Delineation of Flood Zone 3b**

Flood Zone 3b (the functional floodplain) shows flood risk that accounts for the presence of existing flood risk management features and flood defences, unlike the Zones 3a and 2 (which do not take account of defences).

The mapping in the SFRA identifies Flood Zone 3b as land which would flood during a 3.3% AEP (1 in 30-year) flood event. This includes the detailed model outputs below:

| Source of flooding | Model name | Defended/Undefended | Return period |
|---|---|---|---|
| Coastal | North Kent Coast model (2024) | Defended | 3.3% AEP (1 in 30-year) |
| Fluvial | Iwade Stream | Defended | 3.3% AEP (1 in 30-year) |
| Fluvial | Scrapsgate Drain | Defended | 3.3% AEP (1 in 30-year) |
| Fluvial | Warden Bay | Defended | 3.3% AEP (1 in 30-year) |

The effect of wave overtopping along the coastline has been included in the Flood Zone 3b delineation at locations considered appropriate by the Environment Agency within the North Kent Coast model. Further information on wave overtopping can be found in Section 7.6.1.

Where detailed modelling is not available, the gaps have been filled with the **Environment Agency's River and Sea 3.3% AEP defended flood risk extents – present day** dataset as agreed with the Environment Agency. This is based on generalised modelling.

There are no water storage areas within Swale Borough, so these have not been considered.

If existing buildings are shown in Flood Zone 3b, additional consideration can be given to whether the specific location is appropriate for designation as 'Functional' with respect to the storage or flow of water in time of flood. This should be demonstrated through a site-specific FRA.

Care should be taken when interpreting how Flood Zone 3b is predicted to change as a consequence of climate change effects, particularly at locations where the risk of flooding is affected by a change to the mean sea level. At such locations it is possible that the assessment performed to estimate the frequency of inundation (3.3% AEP/1 in 30-year for Flood Zone 3b) will not include an allowance for the potential increase in standard of protection provided by flood risk management features. In these circumstances more detailed assessments should be performed when considering whether development is appropriate to understand the commitment required to improve the standard of protection and how this affects the extent of Flood Zone 3b.

Present day Flood Zone mapping for the Local Plan area can be found in Appendix C.

## 5.3 Detailed models

There are three detailed fluvial models and one coastal model available from the Environment Agency within the borough. These are outlined in Sections 5.3.1 and 5.3.2 and are form the Flood Map for Planning Flood Zones 2 and 3.

At the time of preparing the site screening for the SFRA (Appendix K), the Environment Agency confirmed that only the Iwade Stream detailed model had been included in the Flood Map for Planning. As such the detailed models outlined in this section were assessed in addition to the available Flood Zones at the time.

Present day flood extents from the detailed models can be found in Appendix C and the climate change events in Appendix D. These datasets are also presented on Swale Borough Council's **interactive mapping portal**.

### 5.3.1 Fluvial flood risk models used in this SFRA

Table 5-1 lists the detailed fluvial models available from the Environment Agency in the borough which have been assessed as part of the SFRA. These are included in the Flood Map for Planning Flood Zones.

Table 5-1: Fluvial flood risk models

| Model Name | Year | Software (type) |
|---|---|---|
| Iwade Stream | 2017 | Flood Modeller/TUFLOW |
| Warden Bay Stream | 2016 | Flood Modeller/TUFLOW |
| Scrapsgate Drain | 2014 | ISIS/TUFLOW |

A list of the watercourses located within Swale Borough are found in Section 7.4 and are shown in Appendix B and on Swale Borough Council's **interactive maps**.

For further information on climate change allowances please refer to Section 6.2.

### 5.3.2 Coastal modelling used in this SFRA

The North Kent Coast coastal modelling study (2024) has been used to understand the coastal flood risk within the Local Plan area and is included in the Flood Map for Planning Flood Zones.

For further information on climate change allowances used within the SFRA please refer to Section 6.2.

## 5.4 Coastal erosion risk

In coastal locations the risk of flooding is linked to the stability of the coastline. If the coast is eroding, then the potential effect is that tidal flood defences near to the sea will be lost and flood risk will increase. To maintain an appropriate standard of safety from flooding it is sometimes necessary to implement works to slow down or stop the rate of coastal erosion and so maintain the integrity of the tidal defences. This is based on analysis of costs and benefits.

### 5.4.1 Coastal change

The NPPF defines Coastal Change Management Areas (CCMAs) as areas identified in a Local Plan as an area likely to be affected by physical change to the shoreline through erosion, coastal landslip, permanent inundation, or coastal accretion.

The PPG states a CCMA will only be defined where rates of shoreline change are significant over the next 100 years, taking account of climate change. They will not need to be defined where the accepted shoreline management plan policy is to hold or advance the line (maintain existing defences or build new defences) for the whole period covered by the plan, subject to evidence of how this may be secured.

The CCMA has been prepared for Swale Borough Council as part of this SFRA. The methodology and policy recommendations can be found in Appendix J.

## 5.5 Surface Water

Mapping of surface water flood risk in Swale Borough Council's Local Plan area has been taken from the surface water dataset within the Flood Map for Planning, also known as the Risk of Flooding from Surface Water (RoFSW)

The RoFSW mapping was revised in 2025 as part of the NaFRA2 updates. These maps are intended to provide a consistent standard of assessment for surface water flood risk across England and Wales in order to help LLFAs, the Environment Agency and any potential developers to focus their management of surface water flood risk. The different surface water risk categories used in the RoFSW mapping are defined in Table 5-2[2].

The RoFSW is derived primarily from identifying topographical flow paths of existing watercourses or dry valleys that contain some isolated ponding locations in low lying areas. They provide a map which displays different levels of surface water flood risk depending on the annual probability of the land in question being inundated by surface water.

Table 5-2: Surface water risk categories used in the RoFSW mapping

| Category | Definition |
|---|---|
| High | Flooding occurring as a result of rainfall with a 3.3% AEP (greater than 1 in 30-year) chance in any given year. |
| Medium | Flooding occurring as a result of rainfall of between 1% AEP (1 in 100-year) chance in any given year and a 3.3% AEP (1 in 30-year) chance in any given year. |
| Low | Flooding occurring as a result of rainfall of between a 0.1% AEP (1 in 1,000-year) chance in any given year and 1% AEP (1 in 100-year) chance in any given year. |
| Very Low | Flooding occurring as a result of rainfall with a less than a 0.1% AEP (1 in 1,000-year) chance in any given year. |

Although the RoFSW offers an improvement on previously available datasets, the results should not be used to understand flood risk for individual properties. The results should be used for high level assessments such as SFRAs for local authorities. If a particular site is indicated in the Environment Agency mapping to be at risk from surface water flooding, a more detailed assessment should be considered to more accurately illustrate the flood risk at a site-specific scale. Such an assessment will use the RoFSW in partnership with other sources of local flooding information, to confirm the presence of a surface water risk at that particular location.

The RoFSW map for the Local Plan area can be found in Appendix E and on Swale Borough Council's **interactive mapping portal**.

A draft Flood Investigation report (Section 19 report) prepared by Kent County Council reviewed the major surface water flood event that was experienced in May 2018. The 2025 SFRA has drawn on the findings of the Section 19 report, as presented in Section 7.

2 Note that the risk categories for surface water risk are different to the fluvial/tidal risk.

### 5.5.1 Surface water flood risk with climate change uplifts

At the time of preparing the Level 1 SFRA, the Risk of Flooding from Surface Water climate change outputs were not considered to be suitable for planning purposes. As such, the low risk 0.1% AEP (1 in 1000-year) surface water extent has been used as a proxy for climate change in this report.

Updated surface water climate change outputs were released by the Environment Agency on 28th May 2026, coinciding with completion of this Level 1 SFRA. A comparison was carried out between the present day 0.1% AEP (1 in 1000-year) extent and 1% AEP (1 in 100 year) plus climate change extent. The present day 0.1% AEP (1 in 1000-year) extent was found to generally be larger than the 1% AEP (1 in 100-year) plus climate change extent. As a result, a precautionary approach has been adopted in representing surface water with climate change within this SFRA by using the present day 0.1% AEP (1 in 1,000-year) extent.

The latest surface water climate change outputs should be used within any Flood Risk Assessments and will be used in the Level 2 SFRA.

## 5.6 Groundwater

JBA has developed a range of Groundwater Flood Map products at the national scale. The 5m resolution JBA Groundwater Flood Map has been used within the SFRA. The modelling involved simulating groundwater levels for a range of Annual Exceedance Probabilities. Groundwater flood levels were then compared to ground surface levels to determine the head difference in metres. The JBA Groundwater Flood Map categorises the head difference (m) into five feature classes based on the 1% AEP (1 in 100-year) model outputs which are outlined in Table 5-3.

Table 5-3: JBA Groundwater flood risk map categories

| Flood depth range during a 1% AEP (1 in 100-year) flood event | Groundwater flood risk |
|---|---|
| **Groundwater levels are either at or very near (within 0.025m of) the ground surface.** | Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots. |
| **Groundwater levels are between 0.025m and 0.5m below the ground surface.** | Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally. |
| **Groundwater levels are between 0.5m and 5m below the ground surface.** | There is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely. |
| **Groundwater levels are at least 5m below the ground surface.** | Flooding from groundwater is not likely. |
| **Low risk.** | This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits. |

It is important to note that the modelled groundwater levels are flood levels i.e. groundwater levels that might be expected after a winter recharge season with 1% AEP (a 1 in 100-year event), so would represent an extreme scenario rather than an everyday occurrence.

The methods used to prepare the JBA Groundwater Flood Map are broadscale and so will not necessarily identify site specific local conditions. Thus, the JBA Groundwater flood map is suitable for general broad-scale assessment of the groundwater flood hazard in an area, but is not explicitly designed for the assessment of flood hazard at the scale of a single property. The mapping is based on the general geology of the area and does not take account of local circumstances. The mapping will thus not provide indications of specific local problems and it should be augmented, as appropriate, by reference to recorded historic data that is available.

For all development sites where a risk of groundwater flooding (i.e. not in an areas with "low risk") has been identified in the SFRA, a site-specific flood risk assessment will need to consider the risk of groundwater in greater detail to fully inform the likelihood of groundwater flooding and so that the proposed development can be implemented safely. Groundwater levels should be surveyed during winter or early spring, and the amount of rainfall in the months prior to the testing should be assessed. Monitoring should be undertaken, and a geotechnical engineer should then assess the results in an interpretive report and give an assessment of the risk of shallow groundwater.

The JBA Groundwater Flood Map for the Local Plan area can be found in Appendix F. This dataset is not available on Swale Borough Council's interactive mapping portal due to licencing arrangements.

## 5.7 Sewers

Historic incidents of flooding are detailed by Southern Water through their Sewer Incident Report Form (SIRF). This database records incidents of flooding relating to public foul, combined or surface water sewers and displays which properties suffered flooding.

The SIRF data for the Local Plan area can be found in Table 7-3.

## 5.8 Reservoirs

The risk of inundation due to reservoir breach or failure of reservoirs within the area has been mapped using the outlines available from the Risk of Flooding from Reservoirs dataset made available by the Environment Agency.

The Environment Agency Risk of Flooding from Reservoirs mapping for the Local Plan area can be found in Appendix G and on Swale Borough Council's **interactive mapping portal**.

The reservoirs located in the Local Plan area are listed in Section 7.11.

## 5.9 Suite of maps

All the mapping can be found in the appendices to this SFRA and on Swale Borough Council's **interactive mapping**. The JBA Groundwater Flood Map dataset is not available on Swale Borough Council's interactive mapping portal due to licencing arrangements.

## 5.10 Other relevant flood risk information

Users of this SFRA should also refer to other relevant information on flood risk where available and appropriate. This information includes:

- **North Kent Rivers Catchment Flood Management Plan** (Environment Agency, 2009). Further information can be found in Section 2.2.2.
- **Kent Local Flood Risk Management Strategy 2024-2034** (Kent County Council, 2017). Further information can be found in Section 2.2.6.
- **Thames River Basin District River Basin Management Plan** (Environment Agency, 2016). Further information can be found in Section 2.2.3.
- **Isle of Grain to South Foreland Shoreline Management Plan** ( (South East Coastal Group, 2010). Further information can be found in Section 2.2.11.
- **Medway Estuary and Swale Shoreline Management Plan** (2010) (South East Coastal Group). Further information can be found in Section 2.2.11.
- **Kent County Council Drainage and Planning Policy** (Kent County Council, adopted November 2019).
- **Medway Estuary and Swale flood and coastal risk management strategy** (Environment Agency, 2019). Further information can be found in Section 8.5.
- **Kent County Council Flood Response Plan** (Kent County Council, 2023)

  Provides information on the principles determining the response of KCC to a flooding event within their local authority administrative area. This document details the actions, roles and responsibilities in response to a flood event.

- **Kent County Council Flood Risk to Communities in Swale** (Kent County Council, 2017)

  This document provides anecdotal information on the nature and magnitude of flood risk across Swale Borough. Kent County Council has noted that some reports of historic flooding within the report have not been confirmed as they hold no evidence of these floods occurring.

- Kent County Council **Preliminary Flood Risk Assessment** (2011) and **addendum** (2017).

  These documents provide some details of historic flood events across the county.

# 6 Climate change

## 6.1 Climate change, the NPPF and PPG

The updated NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. The NPPF (Paragraph 164) states that new development should be planned for in ways that avoids increase vulnerability to the range of effects that result from climate change.

NPPF and PPG describe how FRAs should demonstrate how flood risk will be managed over the lifetime of the development, taking climate change into account.

## 6.2 Climate change guidance

The **Climate Change Act 2008** creates a legal requirement for the UK to put in place measures to adapt to climate change and to reduce carbon emissions by at least 80% below 1990 levels by 2050. This was updated in June 2019 under the **Climate Change Act 2008 (2050 Target Amendment) Order** to a 100% reduction (or net zero) by 2050.

In 2018, the Met Office published new **UK Climate Projections (UKCP18)**. The Environment Agency used these projections to update their guidance on climate change allowances for new developments for river flow (July 2021) and rainfall intensity (May 2022). This includes information on how these allowances should be included in both SFRAs and FRAs. The guidance adopts a risk-based approach considering the vulnerability of the development and considers risk allowances on a management catchment level, rather than a river basin level. The management catchments for the borough can be found on the **climate change allowance map**. Swale Borough is located in the North Kent, Medway and Stour Management Catchments.

Developers should check **Flood risk assessments: climate change allowances** for the most recent guidance before undertaking a detailed FRA.

## 6.3 Peak river flows

Climate change is expected to increase the frequency, extent and impact of flooding, reflected in peak river flows. Wetter winters and more intense rainfall may increase fluvial flooding and surface water runoff and there may be increased storm intensity. Rising river levels may also increase flood risk. Also influential for Swale is the predicted increase in mean sea level, as predicted flood levels along extensive lengths of the estuary reaches of rivers are greatly affected by tide levels.

The **peak river flow allowances** provided in the guidance show the anticipated changes to peak flow for the management catchment within which the subject watercourse is located. The range of allowances are based on percentiles which describe the proportion of possible scenarios that fall below an allowance level:

- The central allowance is based on the 50th percentile (exceeded by 50% of the projections in the range).

- The higher central allowance is based on the 70th percentile (exceeded by 30% of the projections in the range).
- The upper end allowance is based on the 95th percentile (exceeded by 5% of the projections in the range).

These allowances (increases) are provided in the form of figures for the total potential change anticipated, for three climate change periods:

- The '2020s' (2015 to 2039).
- The '2050s' (2040 to 2069).
- The '2080s' (2070 to 2125).

The time period used in the assessment depends upon the expected lifetime of the proposed development. Residential development should be considered for a minimum of 100 years, whilst the lifetime of a non-residential development depends upon the characteristics of that development but a period of at least 75 years is likely to form a starting point for assessment. Further information on what is considered to be the lifetime of development is provided in the **PPG**.

### 6.3.1 Peak river flow allowances

The borough is located within the North Kent Management Catchment, the north west is located in the Medway Management Catchment, and a small area in the southeast of the borough is within in the Stour Management Catchment for peak river flow allowances. Table 6-1 - Table 6-3
display the peak river flow allowances that apply for each of these management catchments.

Table 6-1: Peak river flow allowances for the North Kent Management Catchment.

| Allowance category | Total potential change (%) anticipated for '2020s' (2015 to 2039) | Total potential change (%) anticipated for '2050s' (2040 to 2069) | Total potential change (%) anticipated for '2080s' (2070 to 2125) |
|---|---|---|---|
| Upper end | 28% | 36% | 67% |
| Higher Central | 15% | 17% | 34% |
| Central | 10% | 9% | 22% |

Table 6-2: Peak river flow allowances for the Medway Catchment.

| Allowance category | Total potential change (%) anticipated for '2020s' (2015 to 2039) | Total potential change (%) anticipated for '2050s' (2040 to 2069) | Total potential change (%) anticipated for '2080s' (2070 to 2125) |
|---|---|---|---|
| Upper end | 29% | 37% | 62% |
| Higher Central | 19% | 21% | 37% |
| Central | 14% | 15% | 62% |

Table 6-3: Peak river flow allowances for the Stour Management Catchment.

| Allowance category | Total potential change (%) anticipated for '2020s' (2015 to 2039) | Total potential change (%) anticipated for '2050s' (2040 to 2069) | Total potential change (%) anticipated for '2080s' (2070 to 2125) |
|---|---|---|---|
| Upper end | 40% | 55% | 101% |
| Higher Central | 25% | 30% | 55% |
| Central | 18% | 20% | 38% |

### 6.3.2 Which peak river flow allowance to use?

The Environment Agency guidance states that both the central and higher central allowances should be assessed in SFRAs.

The Flood Zone and **flood risk vulnerability classification** should be considered when deciding which allowances apply to the development or the plan. Specific guidance for which climate change allowance estimates should be applied can be found in the **Environment Agency climate change guidance.**

### 6.3.3 Representation of fluvial climate change within the Level 1 SFRA

As part of the SFRA, the fluvial models of the Iwade, Scrapsgate Drain and Warden Bay have been run with the most up to date climate change allowances and can be found in Appendix D. These are the 22%, 34% and 67% allowances for the North Kent Management catchment for the 2080s (2070 to 2125) epoch.

## 6.4 Peak rainfall intensity allowance

Climate change is predicted to result in wetter winters and increased summer storm intensity in the future. This increased rainfall intensity will affect land and urban drainage systems, resulting in surface water flooding, due to the increased volume of water entering the systems. The Environment Agency have developed a **peak rainfall allowances map** which shows anticipated changes in peak rainfall intensity which can be used for site-scale applications (like urban drainage design) and surface water flood mapping in small catchments (<5km$^2$).

The guidance suggests that direct rainfall modelling may not be suited to larger (>5km$^2$) catchments with rural land use. In these instances, the guidance states that the fluvial flood risk affected by climate change should be assessed using uplifts from peak river flow allowances (Section 6.3).

### 6.4.1 Peak rainfall intensity allowances for the borough

The borough is located within the North Kent Management Catchment, the northwest is located in the Medway Management Catchment, and a small area in the southeast of the

borough is within in the Stour Management Catchments for peak rainfall allowances. Table 6-4 - Table 6-6 shows the peak rainfall allowances that apply to the borough.

Table 6-4: Peak rainfall intensity allowances for small and urban catchments for North Kent Management Catchment.

| Allowance category | Total potential change (%) anticipated for '2050s' (2022 to 2060) 3.3% AEP | Total potential change (%) anticipated for '2050s' (2022 to 2060) 1% AEP | Total potential change (%) anticipated for '2070s' (2061 to 2125) 3.3% AEP | Total potential change (%) anticipated for '2070s' (2061 to 2125) 1% AEP |
|---|---|---|---|---|
| Upper end | 40% | 45% | 40% | 40% |
| Central | 20% | 20% | 20% | 20% |

Table 6-5: Peak rainfall intensity allowances for small and urban catchments for Medway Management Catchment.

| Allowance category | Total potential change (%) anticipated for '2050s' (2022 to 2060) 3.3% AEP | Total potential change (%) anticipated for '2050s' (2022 to 2060) 1% AEP | Total potential change (%) anticipated for '2070s' (2061 to 2125) 3.3% AEP | Total potential change (%) anticipated for '2070s' (2061 to 2125) 1% AEP |
|---|---|---|---|---|
| Upper end | 35% | 45% | 35% | 40% |
| Central | 20% | 20% | 20% | 20% |

Table 6-6: Peak rainfall intensity allowances for small and urban catchments for Stour Management Catchment.

| Allowance category | Total potential change (%) anticipated for '2050s' (2022 to 2060) 3.3% AEP | Total potential change (%) anticipated for '2050s' (2022 to 2060) 1% AEP | Total potential change (%) anticipated for '2070s' (2061 to 2125) 3.3% AEP | Total potential change (%) anticipated for '2070s' (2061 to 2125) 1% AEP |
|---|---|---|---|---|
| Upper end | 40% | 45% | 40% | 45% |
| Central | 20% | 20% | 20% | 20% |

### 6.4.2 Which peak rainfall intensity allowance to use?

Kent County Council require that for surface water flood risk, climate change allowances should be applied to both the 3.3% AEP (1 in 30-year) and 1% AEP (1 in 100-year) return periods.

The recommended epoch and use of either the Central or Upper End allowances should be based on the design lifetime of the proposed development. Further details are provided

within the **Environment Agency climate change guidance**. For FRAs and SFRAs the Upper End allowance should be used. The Environment Agency guidance recommends that the Upper End allowance is considered for both the 3.3% and 1% AEPs for the 2070's epoch (2061 to 2125), unless the allowance for the 2050's epoch (2022 to 2060) is higher, in which case this should be used. This is appropriate for development with a lifetime beyond 2100. For development with a shorter lifetime the Central allowance can be used.

### 6.4.3 Representation of surface water climate change within the Level 1 SFRA

The RoFSW data has been used to inform the SFRA. At the time of preparing the SFRA, only the 2050s epoch Central allowance had been released by the Environment Agency. The climate change guidance requires SFRAs and FRAs to assess the Upper End 2070s allowance. Where there is uncertainty in understanding the design flood extent (1% AEP (1 in 100-year) plus a climate change allowance) it was recommended that the 0.1% AEP (1 in 1000-year) present day extent may be used as a suitable proxy in the absence of a full set of outputs or detailed surface water modelling.

Updated surface water climate change outputs were released by the Environment Agency on 28th May 2026, coinciding with completion of this Level 1 SFRA. A comparison was carried out between the present day 0.1% AEP (1 in 1000-year) extent and 1% AEP (1 in 100 year) plus climate change extent. The present day 0.1% AEP (1 in 1000-year) extent was found to generally be larger than the 1% AEP (1 in 100-year) plus climate change extent. As a result, a precautionary approach has been adopted in representing surface water with climate change within this SFRA by using the present day 0.1% AEP (1 in 1,000-year) extent.

The latest surface water climate change outputs should be used within any Flood Risk Assessments and will be used in the Level 2 SFRA.

## 6.5 Sea level rise

Increasing global temperatures are leading to ocean warming. This is resulting in sea level rise due to the oceans warm seawater expanding and the melting of ice over land is resulting in further water adding to the ocean. Additionally, the allowances account for 'glacial isostatic adjustment' from the release of pressure at the end of the last ice age. The northern part of the UK is slowly rising and the southern part is slowly sinking.

### 6.5.1 Sea level rise allowances for the borough

The borough is located within the Thames River Basin District. Table 6-7 shows the sea level rise allowances that apply to the borough.

Table 6-7: Sea level allowances for the Thames River Basin District for each epoch in mm for each year (based on a 1981 to 2000 baseline). The total sea level rise for each epoch is in brackets.

| Allowance category | 2000 to 2035 (mm) | 2036 to 2065 (mm) | 2066 to 2095 (mm) | 2096 to 2125 (mm) | Cumulative rise 2000 to 2125 (metres) |
|---|---|---|---|---|---|
| Upper End | 6.9 (242) | 11.3 (339) | 15.8 (474) | 18.2 (546) | 1.60 |
| Higher Central | 5.7 (200) | 8.7 (261) | 11.6 (348) | 13.1 (393) | 1.20 |

### 6.5.2 Which sea level rise allowance to use?

FRAs and SFRAs should assess both the Higher Central and Upper End allowances. The H++ climate change allowance should be applied where it is appropriate to apply a credible maximum scenario. Further details are provided within the **Environment Agency climate change guidance**.

### 6.5.3 Representation of climate change within the Level 1 SFRA

The North Kent Coast flood risk coastal modelling study (2024) has been used to understand the tidal and coastal flood risk along the Local Plan area. The tidal and coastal mapping provides information for present day (Appendix C.3) and for the climate change event for the years 2100 and 2125 (Appendix D.3) and Swale Borough Council's **interactive maps**.

## 6.6 Groundwater

The effect of climate change on groundwater flooding problems, and those watercourses where groundwater has a large influence on winter flood flows, is much more uncertain. Milder wetter winters may increase the frequency of groundwater flooding incidents in areas that are already susceptible, but warmer drier summers may counteract this effect by drawing down groundwater levels to a greater extent during the summer months. The effect of climate change on groundwater levels for sites in areas where groundwater is known to be an issue should be considered at the planning application stage.

## 6.7 The impact of climate change in the Local Plan area

### 6.7.1 Previous studies

The **UKCP18** provides a number of future projections for different variables across the UK. Climate change will cause changes in trends and mean values in temperature and rainfall.

However, the more influential effect of climate change with respect to flood risk and drought is to increase the chance of occurrence and severity of more extreme wet and dry events. It is important that development is planned with consideration of these extreme events.

### 6.7.2 Adapting to climate change

The PPG on Climate Change contains information and guidance for how to identify suitable mitigation and adaptation measure in the planning process to address the impacts of climate change. Examples of adapting to climate change include:

- Considering future climate risks when allocating development sites to ensure risks are understood over the development's lifetime
- Considering the impact of and promoting design responses to flood risk and coastal change for the lifetime of the development
- Considering availability of water and water infrastructure for the lifetime of the development and design responses to promote water efficiency and protect water quality
- Promoting adaptation approaches in design policies for developments and the public realm for example by building in flexibility to allow future adaptation if needed, such as setting new development back from watercourses

At the county level, KCC adopted the **Kent Environment Plan** in 2025. The plan's priorities include integrating strategy and policy, changing behaviours, conserving and enhancing natural resources, improving resource efficiency, improving resilience to environmental change, and encouraging sustainable growth. Supporting the plan, the **Environmental data** provide statistics and information about Kent, including greenhouse gas emissions, energy consumption, waste, air quality and flood risk.

At the borough level, the **Swale Borough Local Plan** outlines the policies of the borough for meeting the challenges of climate change.

# 7 Understanding flood risk in the Local Plan area

This section explores what flood risk is, key sources of flooding in the borough, and the factors that affect flooding including topography, soils, and geology.

This is a strategic summary of the risk in the borough to inform the application of the sequential and exceptions tests. Developers should use this section to scope out the flood risk issues they need to consider in greater detail in a site-specific FRA to support a planning application. Information in this section should not be used to inform flood risk at a property-level.

## 7.1 Defining flood risk

Section 3 (subsection 1) of the **Flood and Water Management Act 2010 (FWMA)** defines the risk of a potentially harmful event (such as flooding) as 'a risk in respect of an occurrence is assessed and expressed (as for insurance and scientific purposes) as a combination of the probability of the occurrence with its potential consequences.' Figure 7-1 sets out this definition of risk.


Figure 7-1: Conceptual model depicting how risk can be defined.

### 7.1.1 Probability

The probability of flooding is expressed as a percentage based on the average frequency measured or extrapolated from records over many years. A 1% AEP (1 in 100-year) indicates the flood level that is expected to be reached on average once in a hundred years, i.e., it has a 1% chance of occurring in any one year, not that it will occur at least once every hundred years.

### 7.1.2 Consequences

The consequences of flooding include fatalities, property damage, disruption to lives and businesses, with severe implications for people (e.g., financial loss, emotional distress, health problems). Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality), the receptors that are present and the vulnerability of these receptors (type of development, nature, e.g., age-structure of the population, presence and reliability of mitigation measures etc).

### 7.1.3 Source-Pathway-Receptor model

Flood risk can be assessed using the Source-Pathway-Receptor model (Figure 7-2) where:

- The source is the origin of the floodwater, principally rainfall.
- A pathway is a route or means by which a receptor can be affected by flooding, which includes rivers, drains, sewers, and overland flow.
- A receptor is something that can be adversely affected by flooding, which includes people, their property, and the environment.

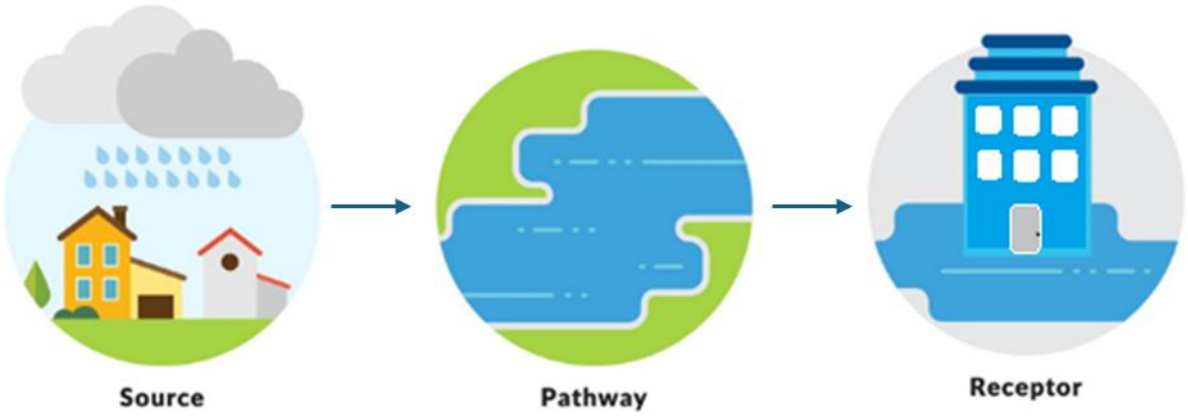



Figure 7-2: Source-Pathway-Receptor model.

This is a standard environmental risk model common to many hazards and should be the starting point of any assessment of flood risk. All these elements must be present for flood risk to arise. Having applied the Source-Pathway-Receptor model it is possible to mitigate the flood risk by addressing the source (often very difficult), blocking, or altering the pathway, or removing the receptor, e.g., steer development away.

The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk. It is therefore important to define the components of flood risk to apply this guidance in a consistent manner.

## 7.2 Historic flooding

The Local Plan area has a long history of recorded flood events caused by multiple sources of flooding. Information collated from the Environment Agency's recorded flood outlines, Kent County Council's recorded flood incidents and Southern Water's SIRF datasets were assessed to understand the historic flooding in the Local Plan area.

The data shows that large areas of Swale Borough have been impacted by tidal flooding in the past, including key settlements of Sittingbourne, Faversham, Sheerness and Queenborough. Tidal flooding is considered to have been the most significant cause of

historic flooding in the borough and has a significant influence on the flood levels in the lower reaches of rivers.

Surface water flooding has been recorded in almost every settlement across the Local Plan area. Although surface water is not the most significant source of flooding in the borough, it is the most widespread.

Fluvial flood events have been recorded along Iwade Stream, Scrapsgate Drain and Warden Bay.

Groundwater flooding has been recorded in Sittingbourne, Boughton and Faversham.

The key historic incidents of flooding identified are summarised as follows:

- **January 1953** – A large storm surge coincided with spring high tides, with extensive flooding recorded in Sheerness, Queenborough, Faversham and the south of the Isle of Sheppey. Tidal defences were overtopped along Faversham Creek and Milton Creek, as well as at Sheerness, Warden and the Isle of Harty, with widespread flooding of property reported.
- **January 1978** – Tidal defences were overtopped at Faversham and at marshes in the west of the SFRA area by a storm surge. Defences along Conyer Creek and at the Isle of Harty were breached or failed, though no properties were reported to have experienced flooding.
- **October 2000** – The Environment Agency's recorded flood outlines show that the channel capacity in the Iwade Stream was exceeded and caused flooding in the area.
- **December 2013** – A tidal surge overtopped defences north of Faversham resulting in the flooding of several properties along Faversham Creek
- **July 2015** – Heavy rainfall resulted in surface water flooding across Kent and parts of Sussex, notably impacting Faversham.
- **May 2018** – Heavy rainfall led to widespread surface water flooding in many settlements across the study area. The findings of a Section 19 Flood Investigation Report on the event are summarised in Section 7.2.1.

Appendix A shows the historic flood extents provided by the Environment Agency. The Kent County Council historic data was provided as point data with an easting and northing. Due to protection of data, the eastings and northings were plotted on GIS and number of points counted with a 0.85km$^2$.

Southern Water data has been provided on a partial postcode basis and can be found in Table 7-3.

### 7.2.1 Kent County Council May 2018 Flood Event Report

A **Section 19 Flood Investigation Report** reviewing the major flood event on May 29th 2018 has been prepared by Kent County Council. The findings of the report identify that the extremity of the rainfall (informed by analysis of the depth of rain that fell and its duration) varied across Swale Borough, ranging from an estimated 1.8% AEP (1 in 55.5-

year) event in Sittingbourne to over an estimated 0.9% AEP (1 in 111.1-year) event at Doddington.

Widespread surface water flooding was observed across Swale Borough following intense rainfall on May 29th 2018. Flooding was reported in many settlements across the study area, including Bapchild, Borden, Bredgar, Doddington, Faversham, Iwade, Lynstead, Newington, Oare, Sittingbourne, Stalisfield Green, Teynham and Tunstall. It should be noted that this list of affected locations is not exhaustive, and many other localised incidences of road flooding were also reported at this time. In addition to surface water flooding sources being an issue, the heavy rainfall also led to flooding from watercourses in places, most notably in Iwade where fluvial flooding occurred as culverts in the settlement were overwhelmed. Approximately 90 properties in Swale Borough were reported to have flooded.

## 7.3 Topography and geology

### 7.3.1 Topography

As shown in Figure 7-3 the topography of the local plan area comprises low-lying ground in the north of the mainland, associated with the area surrounding The Swale, and areas of higher elevations in the south of the mainland. The Kent Downs National Landscape Area of Outstanding Natural Beauty runs through the south of the Local Plan mainland area, wherein the highest elevation is approximately 277m AOD.

The Isle of Sheppey is low lying in the south, along The Swale, with higher elevations in the north at approximately 75m AOD. The majority of Swale Borough is just above sea level.

### 7.3.2 Geology

The geology of a catchment can be an important influencing factor on the way that water runs off the ground surface. This is primarily due to variations in the permeability of the surface material and bedrock stratigraphy.

Figure 7-4 and Figure 7-5 show the bedrock (solid permeable) formations and the superficial deposits (permeable, unconsolidated) in the Local Plan area respectively.

The bedrock layers and superficial deposits are identified as being aquifers that are classified as follows and are shown in Figure 7-6 and Figure 7-7 respectively:

- **Principal**: layers of rock or drift deposits with high permeability and, therefore, provide a high level of water storage
- **Secondary A**: rock layers or drift deposits capable of supporting water supplies at a local level and, in some cases, forming an important source of base flow to rivers
- **Secondary B**: lower permeability layers of rock or drift deposits which may store and yield limited amounts of groundwater
- **Secondary undifferentiated**: rock types which do not fit into either category A or B.
- **Unproductive Strata**: rock layers and drift deposits with low permeability and, therefore, have a negligible impact on water supply or river base flow.

The bedrock geology in the Local Plan area is classified as a mixture of Principal and Secondary A aquifers and unproductive strata.

The superficial deposits in Swale Borough are classified as Secondary A aquifers, which are associated with areas of alluvium, Secondary (undifferentiated) aquifers and unproductive deposits.

Figure 7-3: Topography of the Local Plan area

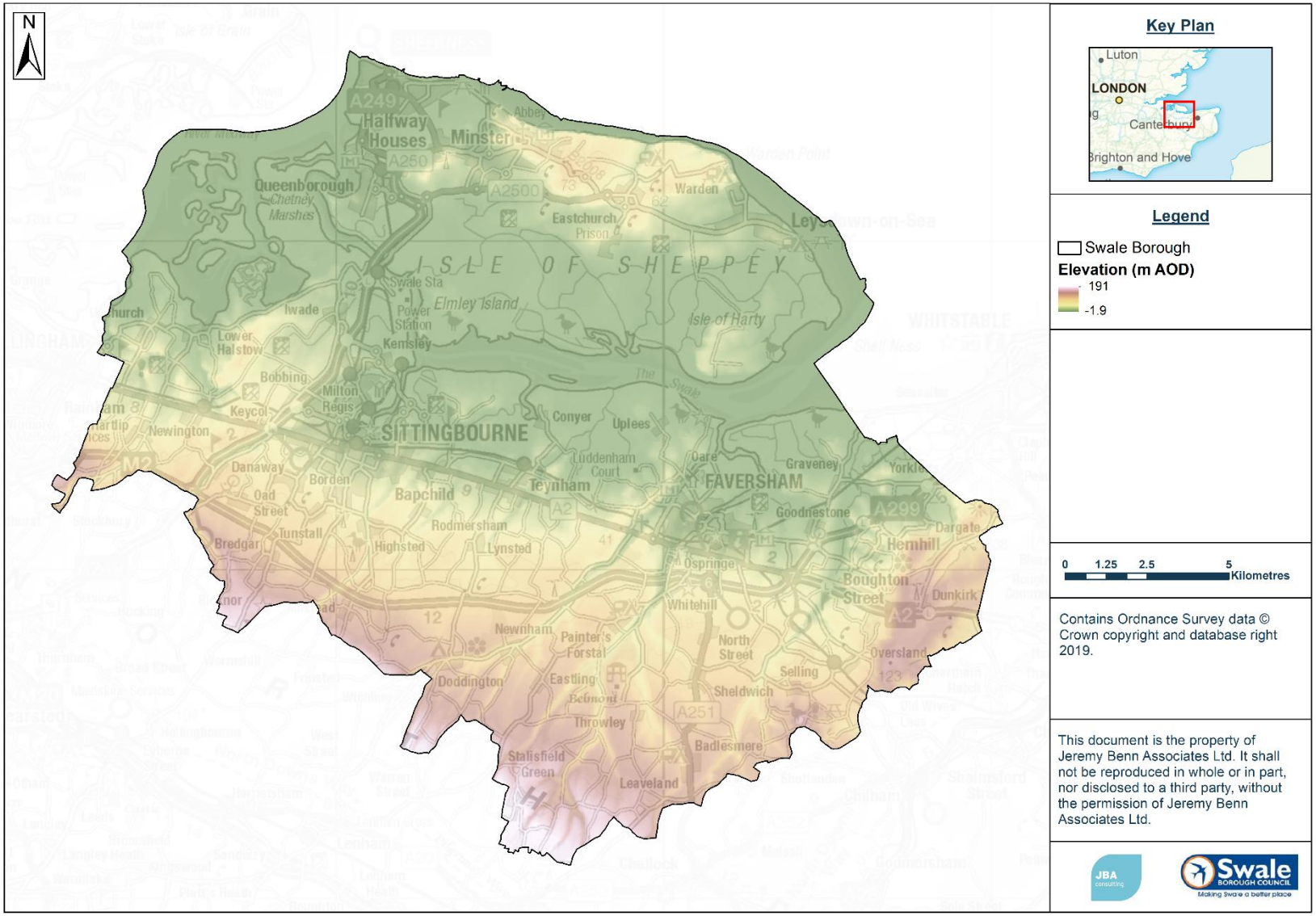


Figure 7-4: Bedrock geology in the Local Plan area

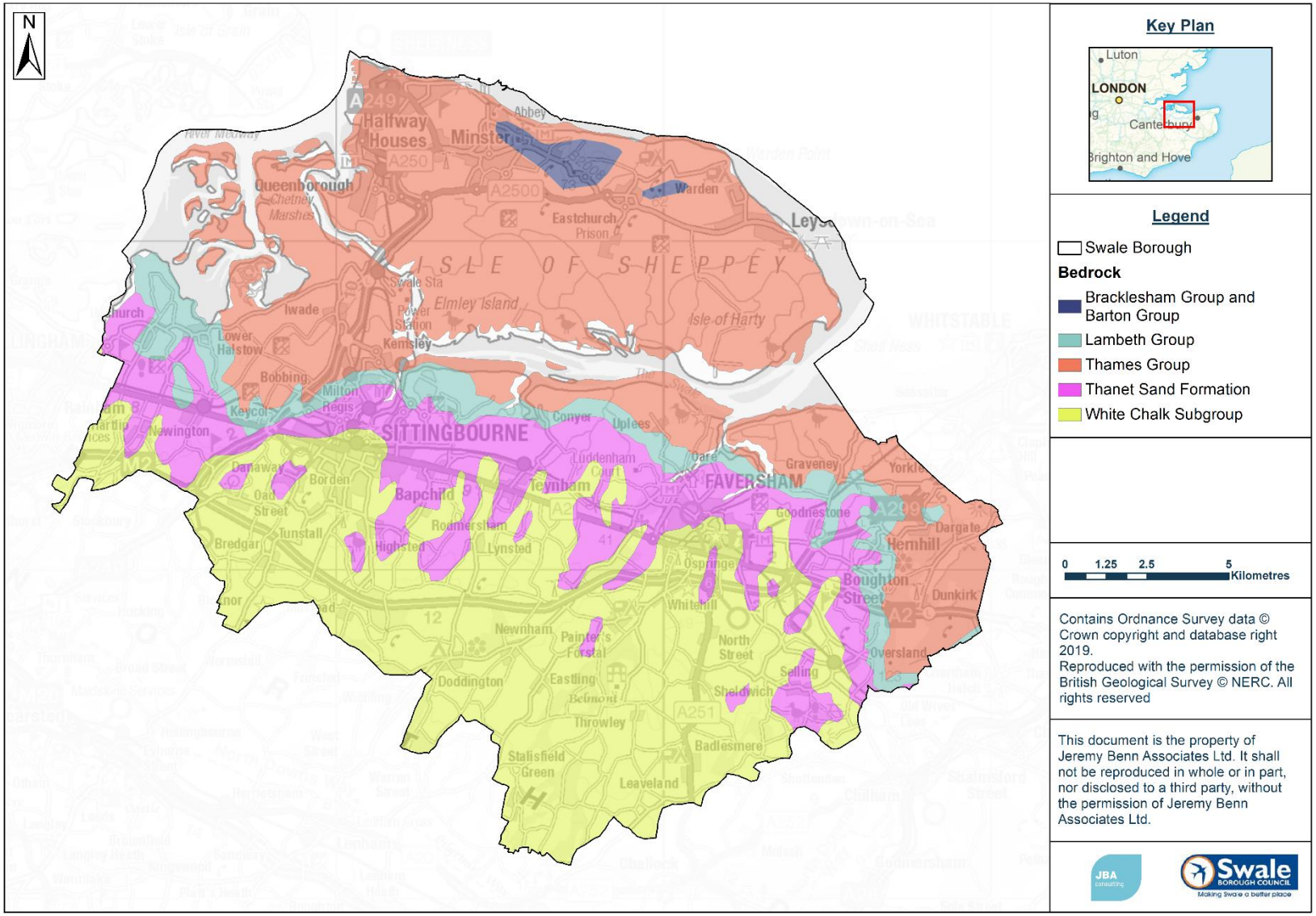


Figure 7-5: Superficial deposits in the Local Plan area

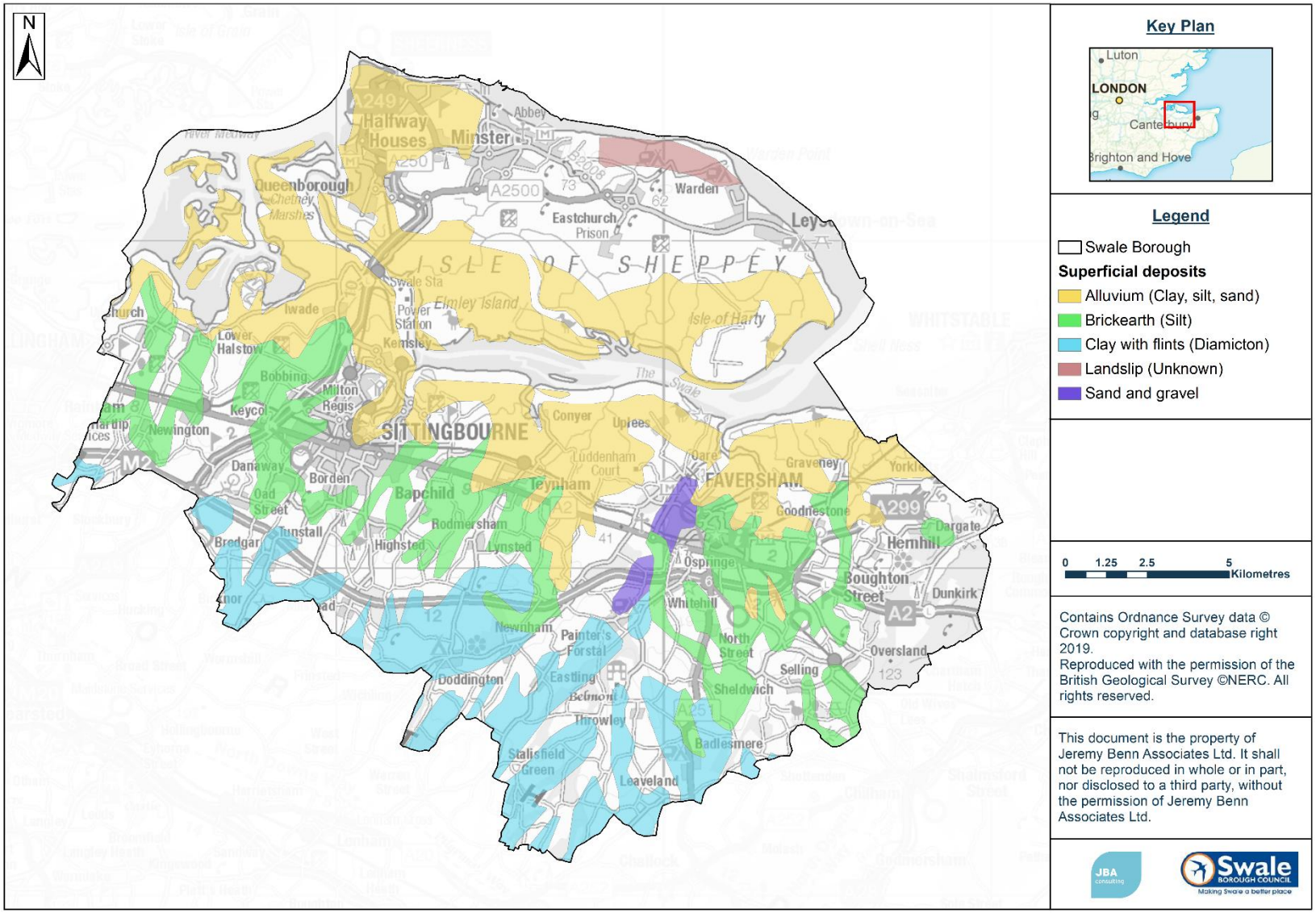


Figure 7-6: Bedrock aquifer designation in the Local Plan area

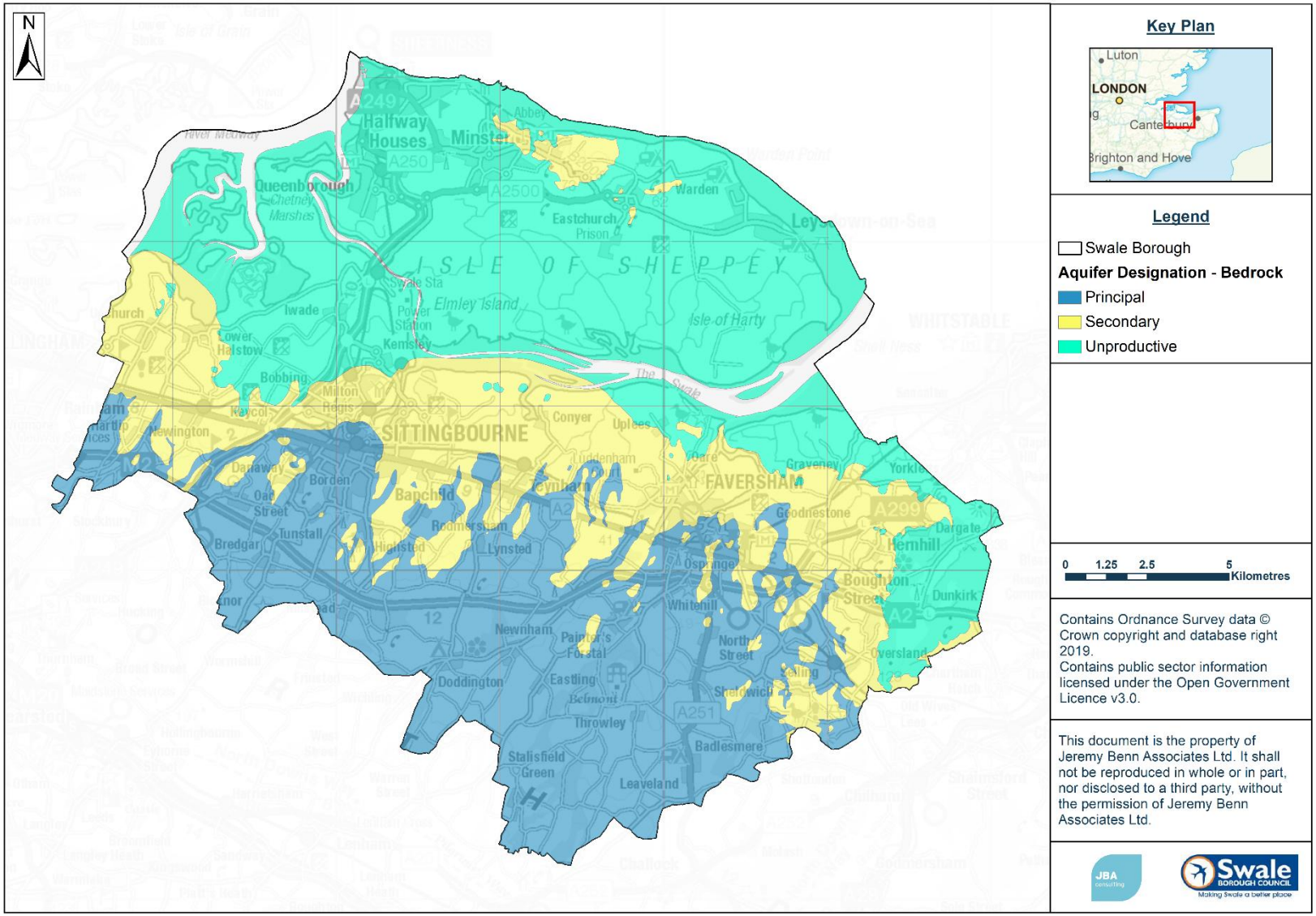
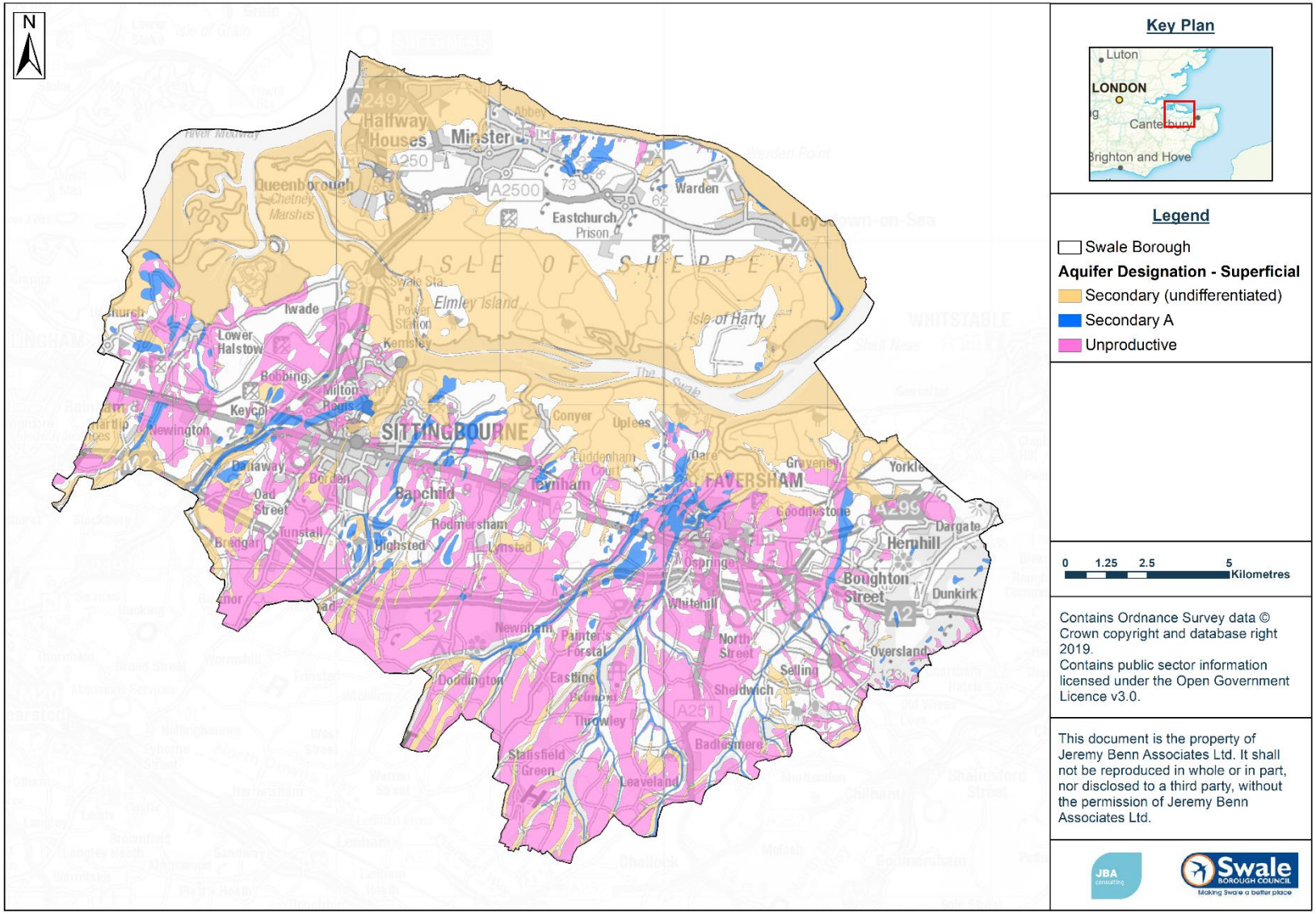


Figure 7-7: Superficial aquifer designation in the Local Plan area



## 7.4 Watercourses and channels

The Swale and the River Medway tidal channels are the largest water features within the Local Plan area. The Swale runs through the centre of the Local Plan borough, separating the Isle of Sheppey from the mainland, with several watercourses joining which drain the land to the north and south. The River Medway runs along the northwest border of Swale Borough. There are also two smaller principal watercourses draining the north of the Isle of Sheppey.

A summary of the main watercourses in the Local Plan area is provided below in Table 7-1. Mapping of the watercourse can be found in Appendix B.

Table 7-1: Watercourses and channels in the study area

| Watercourse / channel | Description |
|---|---|
| The Swale | An estuarine area through the centre of Swale Borough, separating the Isle of Sheppey from the mainland. The Swale runs between the Thames Estuary / North Sea and the Medway Estuary. |
| River Medway | The end of the River Medway flows along the northwest corner of the SFRA area before joining the Thames Estuary. The reach of River Medway in the Local Plan area is a tidal channel. |
| Otterham Creek | Otterham Creek is tidally influenced and runs along the western border of the SFRA area where it joins the River Medway. |
| Iwade Stream | The Iwade Stream flows north-eastwards through the town of Iwade and joins The Swale. This watercourse is tidally influenced from the east of Iwade town. |
| Milton Creek | Milton Creek is tidally influenced and flows northeast from Sittingbourne before flowing into The Swale. |
| Faversham Creek | A tidally influenced watercourse, Faversham Creek flows northeast from Faversham before joining The Swale at Oare Marshes. |
| White Drain | The White Drain flows north from its source to the south of Boughton. The watercourse exits the SFRA area near Graveney, continuing north to The Swale. The watercourse is tidally influenced from the Staplestreet area to the mouth. |
| Windmill Creek | The tidally influenced creek flows southeast from its source in the centre of the Isle of Sheppey to The Swale. |
| Capel Fleet Drain | The watercourse drains the eastern area of the Isle of Sheppey, flowing west where it joins Windmill Creek as a |

| Watercourse / channel | Description |
|---|---|
| | tributary just upstream of the confluence with The Swale. The Capel Fleet Drain is tidally influenced |
| Scrapsgate Drain | Scrapsgate Drain is tidally influenced and runs north from Minster-on-Sea before flowing directly into the Thames Estuary / North Sea. |
| Warden Bay Stream | Warden Bay Stream is tidally influenced and flows northeast from its source in the north of the Isle of Sheppey, entering the Thames Estuary / North Sea at Warden. |

## 7.5 Fluvial flood risk

Iwade has been affected by fluvial flood events in the past, notably in October 2000 and winter 2013, when a series of prolonged and heavy rainfall events led to the channel capacity of Iwade Stream being exceeded. Local reports indicate that around 50 properties were flooded in October 2000, with several 'near misses' of internal property flooding occurring during the winter 2013 event.

Anecdotal evidence suggests that many of the watercourses in Swale Borough have been impacted by tide-locking, notably Scrapsgate Drain and Warden Bay where incoming high tides prevent fluvial flows from discharging into the sea.

The key settlements at fluvial flood risk, and the source, are summarised in Table 7-2. Although these watercourses are at risk of fluvial flooding, the most significant risk is from tidal flooding.

Table 7-2 Settlements at risk of fluvial flooding

| Settlement | Source of fluvial flood risk |
|---|---|
| **Sittingbourne** | Milton Creek |
| **Minster** | Scrapsgate Drain |
| **Faversham** | Faversham Creek/The Westbrook |
| **Iwade** | Iwade Stream |
| **Warden** | Warden Bay Stream |
| **Lower Halstow** | Ordinary watercourse (The Libbet) |

It should be noted that flood risk management measures (defences) are present within the Local Plan area which act to reduce the risk of flooding. Such defences potentially inhibit the function of the river floodplain as during flood events they can prevent water being stored on the land adjacent to the river channel. This may be particularly important when considering the functional floodplain (Flood Zone 3b) for development, but the presence of such defences could also evidence that measures must be in place to make existing

development and infrastructure safe. Further details on the defences in Swale Borough are presented in Section 8 and the Zones are described in Section 5.2.

The extents of the fluvial Flood Zones are shown in Appendix C. Consideration of how climate change may influence the fluvial flood risk is presented in Appendix D.

In addition to flood risk shown by the flood risk mapping, there are potentially a number of small watercourses and field drains which may pose a risk to development. Generalised Flood Zone mapping (where more detailed modelling investigations are not available) has only been prepared for watercourses with a catchment greater than 3km$^2$. Therefore, whilst these smaller watercourses may not be shown as having flood risk on the flood risk mapping, it does not necessarily mean that there is no flood risk.

## 7.6 Tidal flood risk

Tidal flooding is caused by extreme tide levels exceeding ground and / or defence levels and is the most significant source of flood risk in the borough. The tidal flood risk to the Local Plan area has been assessed based on the North Kent Coast flood risk modelling study. Flood Zone mapping can be found in Appendix C and the effects of climate change can be found in Appendix D.

The three most notable recorded flood events within the SFRA area in 1953, 1978 and 2013 were primarily caused by tidal flooding related to storm surges.

The watercourses mentioned in Table 7-1 are all at risk of tidal flooding in their lower reaches.

### 7.6.1 Wave overtopping

Tidal flooding along parts of the North Kent coastline is characterised by the presence of risk associated with wave overtopping. In exposed locations along the coast, landward flooding is more likely to occur as a consequence of wave overtopping than inundation.

Inundation is where flood water encroaches upon normally dry land.

Wave overtopping is a term, which encompasses a number of complex physical processes, which result in the transfer of water from the sea onto the coastal floodplain. The amount of wave overtopping that occurs during an extreme event is dependent on the local water depth, the properties of incoming waves and the geometry of local flood defences.

Wave overtopping is one of the principal mechanisms of flooding for the coastal frontage. The effect of wave overtopping along the coastline has been included in the Flood Zone 3b delineation at locations considered appropriate by the Environment Agency.

## 7.7 Coastal flood risk

In coastal locations the risk of flooding is linked to the stability of the coastline. If the coast is eroding, then the potential effect is that tidal flood defences near to the sea will be lost and flood risk will increase. To maintain an appropriate standard of safety from flooding it is

sometimes necessary to implement works to slow down or stop the rate of coastal erosion and so maintain the integrity of the tidal defences.

The **Isle of Grain to South Foreland Shoreline Management Plan** (2010) and the **Medway Estuary and Swale Shoreline Management Plan** (2010) describe the arrangements and strategy for managing coastal erosion and the influential measures.

The **North Sheppey Erosion Study Part 1** and **Part 2** (2011) assess the risk of cliff erosion between Minster and Warden for the next 100 years, estimating the future position of the cliff top. The study provides guidance to help Swale Borough Council inform planning decisions and provide advice to the public on how to manage the risks associated with cliff retreat. The report emphasises the importance of the coastal communities in the area adapting to coastal change, particularly given the potential impacts of climate change, with the areas of the highest predicted erosion rate between Barrows Brook and Warden Point.

The National Coastal Erosion Risk Map (NCERM) provides the most up to date national picture of coastal erosion risk for England. It reflects the latest coastal management approaches set out in shoreline management plans and identifies the impacts of coastal erosion. It does this with SMPs being funded and delivered compared to the worst case where the SMPs are not funded or delivered.

A Coastal Change Management Area (CCMA) has been identified by Swale Borough Council in line with the NPPF. The CCMA is defined as areas of coastline likely to be affected by physical changes to the coast, with further details on its delineation and mapping provided in Appendix J.

## 7.8 Surface water flood risk

Flooding from surface water runoff (or 'pluvial' flooding) is caused by intense, usually short, periods of rainfall and mostly affects lower lying areas, often where the natural (or artificial) drainage system is unable to cope with the volume of water. Surface water flooding problems are inextricably linked to issues of poor drainage, or drainage blockage by debris, and sewer flooding.

Tide locking is also an issue where high tides prevent surface water from draining from gravity outfalls along the defended coastal plain.

Although tidal flooding poses the greatest potential of severe flood risk in Swale, surface water flooding is the most common cause of flood events. The Risk of Flooding from Surface Water (RoFSW) map shows predicted flood extents that predominantly follow topographical flow paths of existing watercourses or dry valleys with some isolated ponding located in low lying areas. Mapping of the RoFSW throughout the Local Plan area is provided in Appendix E.

The **Swale SWMP** has identified that the surface water flood risk in much of Swale Borough is exacerbated by the low-lying nature of the land, particularly the Isle of Sheppey, which limits the drainage of surface water.

KCC's LFRMS has identified Sittingbourne as an area that is susceptible to surface water flooding due to poor drainage.

## 7.9 Groundwater flood risk

Groundwater flooding is the term used to describe flooding caused by unusually high groundwater levels. It occurs as excess water emerges at the ground surface or within manmade underground structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, in some cases lasting for weeks or months, and it can result in significant damage to property.

The 5m resolution JBA Groundwater Flood Map for Swale Borough can be found in Appendix F.

As illustrated in Appendix F, a large proportion of Swale Borough is at risk from groundwater flooding, with some of the highest risk areas around Sittingbourne, Faversham, Teynham, Bapchild and Boughton. The JBA Groundwater Flood Map shows that there is a widespread area of potential groundwater flood risk in the south of the borough that is underlain by chalk bedrock. There is also an area of potential groundwater flood risk along parts of the northern coast of the Isle of Sheppey.

## 7.10 Flooding from sewers

Sewer flooding occurs when intense rainfall overloads the sewer system capacity (surface water, foul or combined), and / or when sewers cannot discharge properly to watercourses due to high water levels. Sewer flooding can also be caused when problems such as blockages, collapses or equipment (such as pumps) failure occur in the sewerage system. The flow of surface water into manhole openings, the soil or groundwater may cause high flows in sewers for prolonged periods of time.

Existing sewers can also become overloaded as new development adds to their catchment, even with restrictions in place on permitted discharge, or due to incremental increases in roofed and paved surfaces at the individual property scale (urban creep). Sewer flooding is therefore a problem that could occur in many locations across the study area.

Southern Water provides records of incidents of flooding relating to public foul, combined or surface water sewers and identifies which properties suffered flooding. For confidentiality reasons, this data has been supplied on a postcode basis from the Sewer Incident Report Form (SIRF) hydraulic overload database. Data covers all reported incidents between January 2015 and January 2025. The information from the SIRF database is shown in Table 7-3.

The SIRF database indicates a total of 271 recorded flood incidents in the Local Plan area since 2015. The most frequently flooded postcodes are: ME12 3 (85 incidents), ME10 2 (17 incidents) and ME13 7 (20 incidents). It is important to recognise that the information does not indicate the cause of the sewer flooding incidents. Also, the register represents a snapshot in time and may become outdated following future rainfall events, when new properties are added. Risk of flooding may be reduced in some locations by capital

investment to increase of the capacity of the network. As such, the sewer flooding risk register is not a comprehensive 'at risk register' and updated information should be sought to enhance understanding of flood risk from sewers at a given location.

Additionally, the Swale SWMP identifies that when there are high groundwater levels there is a risk of infiltration into the sewer network at Minster-on-Sea, potentially reducing the capacity. Poorly designed, constructed and maintained drainage systems will permit ingress of groundwater flows and reduce the capacity of drainage systems.

Table 7-3 Sewer Incident Report Form database for Swale Borough SFRA area

| Post code | Recorded flood incidents | Post code | Recorded flood incidents |
|---|---|---|---|
| **ME9 7** | 28 | **ME11 5** | 4 |
| **ME9 8** | 2 | **ME12 1** | 5 |
| **ME9 9** | 9 | **ME12 2** | 25 |
| **ME10 1** | 15 | **ME12 3** | 85 |
| **ME10 2** | 17 | **ME12 4** | 18 |
| **ME10 3** | 17 | **ME13 7** | 20 |
| **ME10 4** | 1 | **ME13 8** | 13 |
| **ME10 5** | 5 | **ME13 9** | 7 |
| **Total recorded flood incidents: 271** | | | |

## 7.11 Flooding from reservoirs

Reservoirs with an impounded volume greater than 25,000 cubic metres are governed by the **Reservoirs Act 1975** and are on a register held by the Environment Agency. The level and standard of inspection and maintenance required by a Supervising Panel of Engineers under the Act means that the risk of flooding from reservoirs is very low.

Reservoirs have a designated "risk category" set by the potential damage and loss of life in circumstances where there is a breach or an extreme flood event. Reservoirs designated as high risk are subject to increased inspection and maintenance requirements. However, this designation does not mean they are at a high risk of flooding. Allocation of new development downstream of an existing reservoir could potentially change the risk category and result in a legal requirement to improve the structural and hydraulic capacity of the dam. As the cost of implementing such works can be substantial, consideration should be given to whether it would be more appropriate to place development in alternative locations not associated with such risk.

Flooding from reservoirs occurs following partial or complete failure of the control structure designed to retain water in the artificial storage area. Reservoir flooding is very different from other forms of flooding; it may happen with little, or no warning and evacuation will need to happen immediately. The likelihood of such flooding is difficult to estimate but is extremely low compared to flooding from other sources. It may not be possible to seek

refuge upstairs from floodwater as buildings could be unsafe or unstable due to the force of water from the reservoir breach or failure.

The Environment Agency hold mapping showing what might happen if reservoirs fail. Developers and planners should check the **Long-Term Risk of Flooding** before using the reservoir data shown in this SFRA to make sure they are using the most up to date mapping.

The Environment Agency provide two flooding scenarios for the reservoir flood maps: a 'dry-day' and a 'wet-day'. The 'dry day' scenario shows the predicted flooding which would occur if the dam or reservoir fails when rivers are at normal levels. The 'wet day' scenario shows the predicted worsening of the flooding which would be expected if a river is already experiencing an extreme natural flood. It should be noted that these datasets give no indication of the likelihood or probability of reservoir flooding. The Environment Agency maps represent a credible worst-case scenario. In these circumstances it is the time to inundation, the depth of inundation, the duration of flooding and the velocity of flood flows that will be most influential.

The Risk of Flooding from Reservoirs mapping for the Local Plan area can be found in Appendix F. The reservoirs within Local Plan area, as detailed in Table 7-4.

Table 7-4 Reservoirs in the Swale Borough Local Plan area

| Reservoir | Location (grid ref) | Reservoir owner | Environment Agency area | Flood authority |
|---|---|---|---|---|
| Kemsley Mill Lagoon 1 | 591884, 167215 | DS Smith Paper Limited | Kent, South London and East Sussex | Kent County Council |
| Culnell's Fishing Lake | 589129, 166899 | A.C. Goatham & Son | Kent, South London and East Sussex | Kent County Council |

Reservoir flooding is very different from other forms of flooding. It may happen with little or no warning.

## 7.12 Summary of flood risk to key settlements

A high-level review of the flood risk to key wards in the Swale Borough Local Plan area has been undertaken. Table 7-5summarises the flood risk to the main settlements in Swale Borough. The table does not include sewer flood risk as the data is provided on a partial postcode basis.

| Settlement | Fluvial/tidal/coastal flood risk | Formal flood defences | Surface water flood risk | Predicted groundwater levels across the settlement during the 1% AEP event according to JBA Groundwater Flood Map (note that predicted groundwater levels may vary across the settlement so more than one level category could be ticked) | | | | | Reservoir inundation |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Low risk | 5m below surface | 0.5m to 5m below surface | 0.025m to 0.5m below surface | Within 0.025m of surface | |
| Sittingbourne | The Swale is located north of Sittingbourne and Milton Creek and flows through the centre of the settlement.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of tidal flooding at the settlement. | See Section 8 | Mapping shows there are large areas of surface water ponding to the south of London Road and the railway line around Chalkwell Road, Snipeshill and St Michael's Road. There are also several overland flow paths in the settlement that cross buildings and roads, with the residential, commercial and industrial properties in these areas at risk of surface water flooding. High risk areas include Bell Road, Eurolink Way, Crown Quay Lane and Rectory Road. | ✓ | | ✓ | ✓ | ✓ | Inundation from Kemsley Mill Lagoon 1, may affect areas to the west around Barge Walk. |
| Sheerness | The mouth of the River Medway is located to the west of the settlement, with the North Sea to the north.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of tidal flooding at the settlement. | See Section 8 | Mapping shows that there are large areas of surface water flood risk throughout Sheerness, broadly following roads, such as New Road, Brielle Way and St George's Avenue. Residential, commercial and industrial properties surrounding these areas are also at risk of surface water flooding. There are areas of surface water ponding in the low-lying areas around The Fleet and nearer the coast in the northwest of the settlement. | ✓ | | | | | None |
| Queenborough | The confluence of The Swale and the River Medway is located to the west of the settlement.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of tidal flooding at the settlement. | See Section 8 | Mapping shows that surface water flood risk is largely concentrated in the area around Queenborough Creek, with surrounding buildings along Thomsett Way and Rushenden Road at risk. Elsewhere in the settlement, surface water flood risk generally follows roads, including Moat Way, High Street and Chalk Road. | ✓ | | | | | None |
| Minster | Scrapsgate Drain flows through the centre of Minster before flowing north along the western edge of the settlement. Minster is located on the coast of the North Sea.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of tidal flooding at the settlement. | No | Mapping shows there are large areas of surface water flood risk following the course of Scrapsgate Drain in the south and west of Minster, with surrounding residential buildings at risk. There are areas where surface water flood risk follows the road network, including Minster Road, Scocles Road and Lynmouth Drive, though the surface topography appears to be an important control on surface water flood risk. There are several surface flood risk paths crossing roads and buildings in the Minster built up area, including the areas around Halfway Houses, Seaside Avenue and The Glen. | ✓ | ✓ | ✓ | ✓ | | None |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Faversham | Faversham Creek flows northeast from the centre of the settlement.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of tidal flooding at the settlement. | See Section 8 | Mapping shows there are large areas of surface water ponding to the south of London Road and the railway line around Ospringe and Preston, where surface water flows off the elevated land south of Faversham. There is also surface water flood risk through the centre of the settlement following the drainage network of Faversham Creek. There is widespread surface water flood risk across Faversham following the path of roads, with the residential and commercial properties around them at risk. These roads include Whitstable Road, South Road and Forbes Road. | ✓ | | ✓ | ✓ | ✓ | None |
| Iwade | Iwade Stream flows northeast through the centre of the settlement.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of fluvial flooding at the settlement. | No | Mapping shows that surface water flood risk largely follows the course of Iwade Stream, with risk in residential and commercial areas through the centre of the settlement adjacent to the watercourse. Elsewhere in Iwade, surface water flood risk generally follows roads, including Springvale, School Lane and Kingfisher Close. | ✓ | | | | | Inundation from Culnell's fishing lake southwest of Iwade, may affect areas surrounding Iwade Stream. |
| Teynham | Not in Flood Zones. | No | Mapping shows that surface water flood risk generally follows the routes of roads, including London Road, Station Road and Honeyball Walk. There is also a risk of surface water ponding at the junction of Lower Road and Harrys Road, as well as in areas of open space in the west of Teynham. Residential properties in the centre of Teynham are also at risk. | ✓ | | | ✓ | ✓ | None |
| Newington | Not in Flood Zones. | No | Mapping shows that surface water flow paths generally flow north through Newington, with flood risk following roads including Church Lane, Playstool Road and School Lane. Residential areas and gardens in part of the settlement are also predicted to be at risk of surface water flooding. | ✓ | | | | | None |
| Boughton | Not in Flood Zones | No | Mapping shows that low lying residential areas and open land around Staplestreet Road and Berkeley Close are at risk of surface water flooding. Surface water flood risk in the settlement also follows the White Drain and roads, such as Colonel's Lane, Horselees Road and The Street. | ✓ | | | ✓ | ✓ | None |
| Warden | Warden Bay Stream flows north to the east of the settlement, with Warden located on the coast of the North Sea.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of tidal flooding at the settlement. | See Section 8 | Mapping shows that there is high surface water flood risk in the south and east of Warden around Warden Bay Stream and one of its tributaries, including residential areas. Surface water flood risk also follows roads in the settlement, including Imperial Drive, Emerald View and Leicester Gardens. | ✓ | | | | | None |
| Upchurch | Not in Flood Zones. | No | Mapping shows that surface water flood risk in Upchurch is generally confined to open spaces and roads, including Oak Lane and Church Farm Road, though there are some residential areas predicted to be at risk of surface water ponding. | ✓ | | | ✓ | | None |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Bapchild | Not in Flood Zones. | No | Mapping shows that surface water flood risk in Bapchild generally follows the roads, such as The Street, Ashtead Drive and Doubleday Drive. There are also some residential areas and open land also predicted to be at risk of surface water flooding.<br>Kent County Council has recently undertaken a surface water improvement scheme at Snipehill which should assist with reducing surface water flood risk at Bapchild. | ✓ | | | ✓ | ✓ | None |
| Borden | Not in Flood Zones | No | Mapping shows there is a large surface water flow path along Hearts Delight Road that then flows northeast towards Sittingbourne.<br>Elsewhere in Borden, surface water flood risk is largely confined to roads including Borden Lane, Homestead View and Mountview. | ✓ | | ✓ | | | None |
| Lower Halstow | A small watercourse flows north through the centre of the settlement, and the estuarine extent of the River Medway is located north of Lower Halstow.<br><br>The Environment Agency historic flood outline dataset shows that there has been no previous history of flooding in the area, though Kent County Council record flooding from the ordinary watercourse through the centre of the settlement. | See Section 8 | Mapping shows that surface water flood risk generally follows the path of a small watercourse through the centre of the settlement, largely in areas of open space. Roads also mapped to be at risk include The Street, Lapwing Drive and Cumberland Drive. | ✓ | | | | | None |
| Leysdown | Leysdown is located on the coast of the North Sea.<br><br>The Environment Agency historic flood outline dataset shows that there has been a history of tidal flooding at the settlement. | See Section 8 | Mapping shows that surface water flood risk in Leysdown generally follows roads, with those most at risk including Shellness Road, Wing Road and Manor Way. | ✓ | | ✓ | | | None |
| Eastchurch | Not in Flood Zones | No | Mapping shows that surface water flood risk generally follows roads in Eastchurch. The roads most at risk include Leysdown Road, High Street, Church Road and Warden Road. The mapping also shows some areas of surface water ponding in residential areas and open spaces. | ✓ | | | | | None |
| Conyer | Lies to the south east of Conyer Creek.<br><br>Located in Flood Zone 2, 3a and 3b. | See Section 8 | Mapping shows that surface water risk is generally along Conyer Road. | ✓ | | | | | None |

Table 7-5: Summary of flood risk to the key settlements in the study area

# 8 Fluvial and coastal defences

A high-level review of flood defences was carried out for this SFRA and this involved an interrogation of existing information on asset condition and standard of protection. The Environment Agency's Spatial Flood Defences dataset was primarily used to understand the flood risk associated with defences in the borough.

Defences are categorised as either raised flood defences (e.g. walls/embankments) or Flood Storage Areas. The assessment of the Environment Agency dataset has considered raised defences which potentially provide a standard of protection from a 5% AEP (1 in 20-year) event or more. Man-made and natural defences which may arise for instance due to the presence of naturally high ground adjacent to a settlement have not been considered. The defences and their locations are summarised in the following sections.

## 8.1 Defence standard of protection and residual risk

One of the principal aims of the SFRA is to outline the present risk of flooding across Swale Borough Local Plan area including consideration of the effect of flood risk management measures (including flood banks and defences). The modelling that informs the understanding of flood risk within the Local Plan area is typically of a catchment wide nature, suitable for preparing evidence on possible site options for development. In cases where a specific site risk assessment is required, detailed studies should seek to refine the results used to provide a strategic understanding of flood risk from all sources.

Consideration of the residual risk behind flood defences has been undertaken as part of this study. Residual risk includes the consideration of flood events that exceed the design thresholds of the flood defences or circumstances where there is a failure of the defences, e.g. flood banks collapse. Developers should also consider the standard of protection provided by defences and residual risk when preparing detailed Flood Risk Assessments.

**Standard of Protection**

Flood defences are designed to give a specific standard of protection, reducing the risk of flooding to people and property in flood prone areas. For example, a flood defence with a 1% AEP (1 in 100-year) standard of protection means that the flood risk in the defended area is reduced to a 1% AEP (1 in 100-year) chance of flooding in any given year.

Although flood defences are designed to a standard or protection it should be noted that, over time, the actual standard of protection provided by the defence may decrease, for example due to deterioration in condition or increases in flood risk due to the increased magnitude of the flood hazard caused by climate change effects (e.g. rise in mean sea level over time).

For raised flood defences (bunds or banks), a standard of protection can be straightforward to define. However, sometimes it is not possible to define the standard of protection for Flood Storage Areas as there are a number of factors that determine the protection that

they can provide e.g. outflow rates, number of watercourses that flow into the Flood Storage Area.

## 8.2 Defence condition

Formal structural defences are given a rating by the Environment Agency based on a grading system for their condition. A summary of the grading system used by the Environment Agency for condition is provided in Table 8-1.

Table 8-1 Defence asset condition rating

| Grade | Rating | Description |
|---|---|---|
| 1 | Very Good | Cosmetic defects that will have no effect on performance. |
| 2 | Good | Minor defects that will not reduce the overall performance of the asset. |
| 3 | Fair | Defects that could reduce the performance of the asset. |
| 4 | Poor | Defects that would significantly reduce the performance of the asset. Further investigation required. |
| 5 | Very Poor | Severe defects resulting in complete performance failure. |

The condition of existing flood defences and whether they are planned to be maintained and/or improved in the future must be considered with respect to the safety and sustainability of development over its intended life and also with respect to the financial and economic commitment to the long-term provision of appropriate standards of protection. In some cases, the relevant strategy may suggest that it is not appropriate to maintain the condition of the assets, which may prove influential for the development over its intended life. In addition, detailed FRAs undertaken by developers (if a defence is influential to the proposed development) will need to thoroughly explore the condition of defences, especially where these defences are informal and demonstrate a wide variation of condition grades. It is important that all of these assets are maintained to a good condition and their function remains unimpaired in accordance with the policy and strategy for Flood Risk Management.

## 8.3 Coastal, Tidal and fluvial defences in the Local Plan area

The majority of defences in the Local Plan area provide protection against tidal flood events, with large areas elsewhere protected by coastal defences.

Tidal defences are designed to protect the coast from flood risk from the sea e.g. still water levels exceeding the defence crest, or waves overtopping the defence. Coastal defences are constructed to protect the coastal frontage from erosion (being washed away by waves and tidal currents). Each of these types of defence are present in the Local Plan area but are not designed to necessarily fulfil the dual purpose of managing flood risk and coastal protection. However, with climate change, it is likely that many of locations with coastal defences will need to include provision for tidal defence in the future. The **North Sheppey Erosion Study** mentions that the eastern end of the coastal erosion defences along

Minster Leas will require raising the rear wave wall to prevent overtopping and scour at the toe of the slopes at some point in the future.

The maps shown in Appendix H.1-4 provide a summary of the defences included in the Environment Agency's spatial defence dataset with a standard of protection against a 5% AEP (1 in 20-year) event or greater in Swale Borough. Defences with a standard of protection of 5% AEP (1 in 20-year) or greater are shown as these defences are considered in the delineation of Flood Zone 3b. Natural and engineered high ground have been removed as are not considered formal defences. The maps in Appendix H.2-4 show the defence type, condition and standard of protection, using the spatial defence data provided by the Environment Agency.

There are no defences designed solely for fluvial flooding with a standard of protection of 5% or more within the Local Plan area, though there are defences that protect against both tidal and fluvial flood events along Milton Creek, Faversham Creek and Conyer Creek.

The majority of defences in Swale Borough provide a standard of protection of at least 2% AEP (1 in 50-year), with large areas with defences that provide a standard of protection of 0.1% AEP (1 in 1000-year). The Environment Agency defence data shows that the majority of defences within the Local Plan area are in 'good', 'fair' or 'poor' condition.

## 8.4 Alleviation Schemes

There are a limited number of alleviations schemes within the Local Plan area, and there are no Flood Storage Areas recorded in Swale Borough in the Environment Agency's 'Flood Map for Planning – Flood Storage Areas' dataset.

The Front Brents Flood Alleviation Scheme at Faversham was introduced by the Environment Agency to reduce the risk of tidal flooding from Faversham Creek. The scheme involved the construction of an embankment between 600 and 800mm high in 2016, with the aim of providing protection to over 30 residences and businesses in the Front Brents area.

## 8.5 Future schemes

The **Medway Estuary and Swale Strategy (MEASS)** describes the planned approach for managing the coastline of the Local Plan area. It includes details of where coastal and tidal defences will be maintained, raised or not maintained. The MEASS also details how the potential impact of climate change on sea level rise will be accounted for in the management of defences along the coastline.

The area covered by the strategy is divided into several 'Benefit Areas', based on the extents of discrete flood cells, which are then divided into a further 35 sub-Benefit Areas based on Policy Units from the Shoreline Management Plans. The relevant Benefit Areas to Swale Borough will be Benefit Areas 4 to 11.

## 8.6 Residual flood risk

Residual risks are those remaining after applying the sequential approach and taking mitigating actions. In circumstances where measures are put in place to manage the flood risk there remains a possibility of flooding being experienced, either as a consequence of the event exceeding the design capacity or the failure of the asset providing the appropriate standard of protection. It is the responsibility of the developer to fully assess flood risk, propose measures to mitigate it and demonstrate that any residual risks can be safely managed through an FRA.

This SFRA does not assess the probability of failure other than noting that such events are very rare. However, in accordance with NPPF, all sources of flooding need to be considered. If a breach or overtopping event were to occur, then the consequences to people and property could be high. Developers should be aware that any site that is at or below defence level may be subject to flooding if an event occurs that exceeds the design capacity of the defences, or the defences fail, and this should be considered when building resilience into low level properties.

### 8.6.1 Overtopping

Overtopping conditions occur when a wave meets a structure lower than the maximum wave height or when the mean sea level exceeds the top of the defences. The risk from overtopping of defences is based on the relative heights of property or defence, the distance from the defence level and the height of water above the crest level of the defence. During these conditions there is a regular intermittent discharge of sea water over the defences which can cause flooding. The Defra and Environment Agency **Flood Risks to People** guidance document provides standard flood hazard ratings based on the distance from the defence and the level of overtopping.

The risk of violent waves overtopping sea walls in particular can lead to a significant flood hazard. As part of this SFRA, the effect of wave overtopping along the coastline has only been included in the Flood Zone 3b delineation at locations considered appropriate by the Environment Agency along the North Kent Coast. The locations where wave overtopping has been included in the delineation of Flood Zone 3b is shown in Appendix C.

### 8.6.2 Defence breach

A breach of a defence occurs when there is a failure in the structure and a subsequent ingress of flood water. Flood flows from breach events can be associated with significant and rapid change in depths and flow velocities in the immediate vicinity of the breach location and so FRAs must include assessment of the hazards that might be present so that the safety of people and structural stability of properties and infrastructure can be appropriately considered. Whilst the area in the immediate vicinity of a breach can be subject to high flows, the whole flood risk area associated with a breach must also be considered as there may be areas remote from the breach that might, due to topography, involve increased depth hazards.

# 9 Flood risk management requirements for developers

## 9.1 Over-arching principles

This SFRA focuses on delivering a strategic assessment of flood risk within the Swale Borough Local Plan area. Prior to any construction or development, site-specific assessments will need to be undertaken, as appropriate so all forms of flood risk at a site are fully addressed. It is the responsibility of the developer to provide an FRA with an application.

It should be acknowledged that a detailed FRA may show that a site is not appropriate for development of a particular vulnerability or even at all. Where the FRA shows that a site is not appropriate for a particular use, a lower vulnerability classification may be appropriate.

Some sites may additionally require the application of the Exception Test following the Sequential Test which is detailed in Section 4.

## 9.2 Early consultation with statutory and non-statutory consultees

Developers should consult with the EA, the LLFA and the relevant sewerage undertaker at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling and foul and surface water drainage assessment and design. It should be noted that some of these consultees may need to charge for data and/or advice requested by developers or landowners.

## 9.3 Requirements for site-specific flood risk assessments

### 9.3.1 What are site specific FRAs?

Site specific FRAs are carried out by (or on behalf of) developers to assess flood risk to and from a site. They are submitted with planning applications and should demonstrate how flood risk will be managed over the development's lifetime, taking into account climate change and vulnerability of users. It is recommended that the assessment is undertaken by a suitably qualified person.

The developer should check with Swale Borough Council whether they are required to apply the Sequential Test prior to commencing with a site-specific FRA.

The objectives of a site-specific FRA are to establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source.
- Whether a proposed development will increase flood risk elsewhere.
- Whether the measures proposed to deal with these effects and risks are adequate and appropriate.

- The nature of residual risk and whether this can be safely managed.
- The evidence, if necessary, for the LPA to apply the Sequential Test.
- The evidence, if applicable, to show whether the development will be safe and pass the Exception Test.

### 9.3.2 When is a site specific FRA required?

As set out in **Flood risk assessments: applying for planning permission**, a site-specific FRA is required for all development (including minor development and changes of use) proposed:

- in Flood Zones 2, 3a, or 3b.
- within Flood Zone 1 with a site are of 1 hectare or more.
- within Flood Zone 1 and the flood map for planning shows it is at increased risk of flooding from rivers or sea during its lifetime
- with Flood Zone 1 and the flood map for planning shows it is at risk of flooding from surface water
- in areas with critical drainage problems.
- within Flood Zone 1 where the LPA's SFRA shows it will be at increased risk of flooding during its lifetime.
- that increases the vulnerability classification and may be subject to sources of flooding other than rivers or sea.

### 9.3.3 What level of detail is needed in a site-specific FRA?

Site-specific FRAs should be proportionate to the degree of flood risk and the scale, nature, and location of the development. The SFRA can be used by developers as a starting point to identify the initial flood risk to a site however a pre-application consultation with the EA and LLFA is key to define the scope of the FRA and identify data requirements, making sure that latest available datasets are used.

### 9.3.4 Guidance for FRAs

FRAs should follow the approach recommended by the NPPF (and associated guidance) and guidance provided by the Environment Agency and the LLFA. Guidance and advice for developers on the preparation of site-specific FRAs is available from the following websites with hyperlinks provided:

- **Standing Advice on Flood Risk**
- **Flood Risk Assessment for Planning Applications**; and
- **Site-specific Flood Risk Assessment: Checklist**
- Local advice such as that found in the Emerging/adopted Local Plan

Guidance should be sought from the Environment Agency and Kent County Council at the earliest possible stage, and opportunities should be taken to incorporate environmental enhancements and reduce flooding from all sources both to and from the site through development proposals. Developers should seek to go beyond managing the flood risk and

support opportunities to reduce the causes and impacts of flooding, whilst enhancing and conserving the natural environment. **PPG: Flood risk and coastal change** Paragraphs 062 - 067 provide further information.

### 9.4 Emergency planning

Safe access and escape routes from the site should be provided. The developer should seek to incorporate an emergency plan and a safe refuge point if the development site has been identified to be at risk of flooding. The local authority Emergency Planning Teams should be consulted when designing an emergency plan. For further details on emergency planning, see Section 13.2.

# 10 Principles for site design and master planning

Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development.

The NPPF states that a sequential, risk-based approach should be applied to try to locate more vulnerable land uses away from high-risk areas to higher ground and lower flood risk areas, while more flood-compatible development (e.g., vehicular parking, recreational space) can be located in higher risk areas. Higher risk areas can also be retained and enhanced as natural green space. Whether parking in floodplains is appropriate will be based on the likely flood depths and hazard, evacuation procedures and availability of flood warning. The nature of risk to water quality also needs to be considered and mitigated to ensure that accumulated hydrocarbons and other vehicle related pollutants are not released to the aquatic environment.

Waterside areas, or areas along known flow routes, can act as green infrastructure, being used for recreation, amenity, and environmental purposes, allowing the preservation of flow routes and flood storage, and at the same time providing valuable social and environmental benefits contributing to other sustainability objectives. Landscaping should provide safe access to higher ground from these areas and avoid the creation of isolated islands as water levels rise.

## 10.1 Modification of ground levels

Modifying ground levels to raise the land above the design flood level is an effective way of reducing flood risk to a particular site in circumstances where the land does not act as conveyance for flood waters. However, care must be taken as raising land above the flood level could reduce conveyance or flood storage in the floodplain and could adversely impact flood risk downstream or on neighbouring land. Raising ground levels can also deflect flood flows, so analysis should be performed to demonstrate that there are no adverse effects on third party land or property.

Compensatory flood storage should be provided, and would normally be on a level for level, volume for volume basis on land that does not currently flood but is adjacent to the floodplain (for it to fill and drain by gravity). It should be in the vicinity of the site and within the red line of the planning application boundary (unless the site is strategically allocated). **Appendix A3 of the CIRIA Publication C624** provides guidance on how to address floodplain compensation.

Raising levels can also create areas where surface water might pond during significant rainfall events. Any proposals to raise ground levels should be tested to check that it would not cause increased ponding or build-up of surface runoff on third party land.

Any proposal for modification of ground levels within areas of flood risk will need to be discussed at an early stage with the Environment Agency and the LLFA and its impacts assessed as part of a detailed FRA.

## 10.2 Raised floor levels

If raised floor levels are proposed, these should be agreed with the Swale Borough Council and the EA. The minimum Finished Floor Level (FFL) may change dependent upon the vulnerability and flood risk to the development.

Developers should refer to the **Preparing a flood risk assessment: standing advice** for the latest guidance on FFLs . Finished floor levels should be a minimum of whichever is higher of 600mm above the:

- average ground level of the site
- adjacent road level to the building
- estimated river or sea flood level

Where there is a high level of certainty about your estimated flood level, it may be appropriate to reduce this to 300mm. If there is a particularly high level of uncertainty it may need to be increased.

Lowering existing FFLs below the existing levels within the 1% AEP (1 in 100-year) or 0.5% (1 in 200-year) plus climate change floodplain would not be acceptable and should be discouraged. New development offers opportunities to improve the resilience of buildings.

Building design and raised floor levels is the only way to fully reduce groundwater flood risk, through ensuring FFLs are raised above predicted groundwater levels considering known groundwater issues.

Allocating the ground floor of a building for less vulnerable, non-residential, or non-habitable residential use is an effective way of raising living space above flood levels. Single storey buildings such as ground floor flats or bungalows are especially vulnerable to rapid rise of water (such as that experienced during a breach of flood defences). This risk can be reduced by use of multiple storey construction and raised areas that provide a point of refuge. However, access and escape routes are likely to be an issue, particularly when flood duration covers many days.

Similarly, the use of basements should be avoided in areas of flood risk. Habitable uses of basements within Flood Zone 3 and areas at high risk of surface water flooding should not be permitted, whilst basement dwellings (classed as 'highly vulnerable') in Flood Zone 2 will be required to pass the Exception Test.

Where the ground level of a site is below the ground level at the point where the drainage connects to the public sewer, care must be taken to ensure that the proposed development is not at an increased risk of sewer surcharge. It is good practice for the finished floor levels and manhole cover levels (including those that serve private drainage runs) to be higher than the manhole cover level at the point of connection to the receiving sewer. Alternatively, mitigation measures may need to be incorporated into the proposals to protect against sewer surcharge.

## 10.3 Development and raised defences

### 10.3.1 Undefended and residual risk

Construction of localised raised floodwalls or embankments to protect new development is not a preferred option, as a residual risk of flooding will remain. Compensatory storage must be provided where raised defences remove storage from the floodplain.

Where development is located behind, or in an area benefitting from defences, both the undefended risk and residual risk of flooding must be considered by the developer and demonstrated that they can be safely managed in an FRA. The assessment of the risk should consider:

- Improvements required to the level of protection afforded by existing defences for future development.
- The future commitment to maintain the current Standard of Protection (SoP) of any existing defences.
- Any disparities between the proposed level of commitment to maintain the current standard of protection and the level of protection required to support future development.
- The effects of climate change on the future SoP afforded by the defences and the associated maintenance and upgrade commitments required.
- Any land required to be safeguarded for affordable future flood risk management measures.

### 10.3.2 Breach assessment

The assessment of the residual risk from a breach event should consider an assessment of the hazards that might be present from flood flows from a breach event, considering depth and flow velocities, so that the safety of people and structural stability of properties and infrastructure can be appropriately considered.

Considerations should include the location of a breach, when it would occur and for how long, the depth of the breach (toe level), the loadings on the defence, and the potential for multiple breaches.

There are various ways of assessing breaches using hydraulic modelling. **Environment Agency LIT56413 Breach of Defences Guidance (2021)** provides some guidance for breach assessment. It is recommended that the Environment Agency is consulted if a development site is located near to a flood defence, to understand the level of assessment required and to agree the approach for the breach assessment.

### 10.3.3 Overtopping assessment

The assessment of the residual risk from overtopping of defences should consider the risk which is based on the relative heights of property or defence, the distance from the defence level, and the height of water above the crest level of the defence. The **Defra and Environment Agency Flood Risks to People guidance document** provides standard flood hazard ratings based on the distance from the defence and the level of overtopping. Overtopping modelling or assessments should be undertaken for any sites located next to defences or perched ponds/reservoirs, accounting for climate change.

### 10.3.4 Developer contributions

In some cases, and following the application of the Sequential Test, it may be appropriate for the developer to contribute to the improvement of flood defence provision that would benefit both proposed new development and the existing local community. Developer contributions can also be made to maintenance and provision of flood risk management assets, flood warning and the reduction of surface water flooding (i.e. SuDS).

A **Medway Estuary & Swale Coastal Risk Management Strategy (MEAS) Contribution Advice Note** has been prepared by Swale Borough Council for developments within the MEAS Contribution Zone. The Advice Note outlines the need for payments to contribute to flood defence works through Planning Obligations/S106 Agreements. The Advice Note sets out the location of the contribution area and requirements for contributions.

The document sets out two zones:

- **MEAS Contribution Zone 1** - The Environment Agency Flood Map for Planning Flood Zones plus Climate Change dataset with the fluvial only flood risk removed (accessed April 2026).
  The Flood Map for Planning Flood Zones plus Climate Change dataset shows how the combined extent of Flood Zones 2 and 3 could increase with climate change over the next century, ignoring the benefits of any existing flood defences. The dataset uses the 'Upper End' allowance for risk of flooding from the sea, accounting for cumulative sea level rise to 2125.
  The Defra Data Services Platform provides further information on both the **Flood Map for Planning - Flood Zones plus Climate Change** dataset and the **Flood Map for Planning - Flood Zones dataset.**
- **MEAS Contribution Zone 2** - The Isle of Sheppey

## 10.4 Buffer strips

The provision of a buffer strip allows additional capacity to accommodate climate change and means access to the watercourse, structures and defences is maintained for future maintenance purposes. It also enables the avoidance of disturbing riverbanks, adversely impacting ecology, and having to construct engineered riverbank protection. A buffer strip of 8m is required from any non-tidal main river or ordinary watercourse and 16m from tidal

main rivers. Where flood defences are present, these distances should be taken from the landward toe of the defence.

Building adjacent to riverbanks can cause problems to the structural integrity of the riverbanks and the building itself, making future maintenance of the river much more difficult. **Flood Risk Activity Permits** from the Environment Agency are likely to be required for development in these areas alongside any planning permission. There should be no built development within these distances from main rivers/flood defences (where present).

### 10.5 Property Flood Resilience (PFR)

PFR includes a range of measures that can be installed around the perimeter of a building to reduce the risk of internal flooding. PFR can also be used within a building, to minimise the damage done if internal flooding stills occurs. PFR aims to help households and businesses reduce the damage caused by flooding, helping to speed up recovery and reoccupation.

PFR encompasses two main elements:

- Resistance - Resistance measures are installed around the perimeter of a building. These measures aim to reduce the amount of water entering the building, reducing the damage caused internally. Examples include flood doors/barriers, automatic airbricks, and non-return valves.
- Resilient Adaptation (Recoverability) - Adaptions made within a property, which aim to reduce the damage caused if internal flooding still occurs.

The consideration of resistance measures and resilient adaptation should not be used to justify development in inappropriate locations. However, having applied planning policy there may be some instances where development is permitted in high flood risk areas where application of resistance and resilience measures may be required.

There may also be opportunities for 'change of use' developments to be used to improve the flood resistance and resilience of existing development, which may not have been informed by a site-specific FRA when it was first constructed.

Further information and guidance on best practice can be found in the following locations:

- Department for Communities and Local Government **Improving the Flood Performance of New Buildings: Flood Resilient Construction**
- **CIRIA Property Flood Resilience Code of Practice**
- **EA Flood resilience construction of new buildings**

# 11 Surface water management and SuDS

## 11.1 Sustainable Drainage Systems (SuDS)

Sustainable Drainage Systems (SuDS) are management practices which enable surface water to be drained in a more sustainable manner and to mimic the local natural drainage. The inclusion of SuDS within developments is an opportunity to enhance ecological and amenity value, and promote Green Infrastructure, incorporating above ground facilities into the development landscape strategy.

It is essential that developers consider sustainable drainage at an early stage of the development process – ideally at the pre-application or master-planning stage. To further inform development proposals at the master-planning stage, pre-application submissions are accepted by Kent County Council. This will assist with the delivery of well designed, appropriate, and effective SuDS. Applicants are also encouraged to engage with Southern Water to discuss their surface water proposals, especially where adoption is proposed.

## 11.2 Sources of SuDS guidance

**The C753 CIRIA SuDS Manual (2015)** provides guidance on planning, design, construction, and maintenance of SuDS. The manual is divided into five sections ranging from a high-level overview of SuDS, progressing to more detailed guidance with progression through the document.

As of June 2025, the **Defra National standards for sustainable drainage systems (SuDS)** were brought in to comply with principles laid out in Section 11.4. Whilst remaining as a non-statutory specification, these now form a material consideration for LPAs when assessing planning applications. These standards aim to reflect and reinforce good practice and use of SuDS as detailed in Section 11.4, reflecting the four pillars of SuDS design.

The national standards contain two sets of standards. The first type (Standard 1) is known as the hierarchy standard and gives criteria for the prioritisation of final runoff destinations. The other standards (Standards 2-7) detail the minimum requirements of design criteria that surface water drainage systems should satisfy alongside how they are to be appropriately built, maintained, and operated.

The **Design and Construction Guidance (DCG)**, part of a new Codes for Adoption covering the adoption of new water and wastewater infrastructure by water companies, contains details of the water sector's approach to the adoption of SuDS.

### 11.2.1 Kent County Council's Drainage and Planning Policy (adopted November 2019)

KCC's **Drainage and Planning Policy** sets out the requirements for sustainable drainage and how drainage strategies and surface water management provisions will be reviewed for SuDS schemes specific to Kent.

The policy provides the following requirements for developments on greenfield and previously developed sites:

- For developments on greenfield sites peak runoff rates from the 1 in 1-year (100% AEP) to the 1 in 100-year (1% AEP) rainfall events should be limited to the peak greenfield runoff rates for the same events.
- For developments on brownfield sites, the peak runoff rate must be as close as reasonably practicable to the greenfield runoff rate but should never exceed the existing rate of discharge prior to redevelopment. Unless it can be demonstrated to be reasonably impracticable, a 50% reduction in the peak runoff rate is expected.
- The drainage system must be designed to operate without flooding on any part of the site during any rainfall event up to (and including) a 1 in 30-year (3.3% AEP) rainfall event.
- The drainage system must also be designed to operate without flooding in any building up to (and including) a 1 in 100-year (1% AEP) plus climate change rainfall event, without exacerbating off-site flood risk.
- Exceedance flows that cannot be managed within the drainage system must be managed via exceedance routes that minimise the risks to people and property.
- Attenuation storage volumes provided by drainage areas must half empty within 24 hours to enable runoff from subsequent storms to be received. If the time taken to drain from full to empty exceeds 24 hours long duration events should be assessed to ensure drainage is not negatively impacted by inundation.

Kent County Council expect betterment of runoff rates from the majority of potential developments on brownfield sites wherever possible

A new policy statement is currently being prepared by Kent County Council and the emerging document should be referred to for the latest requirements for development applications once available. Until updated, Kent County Council advise all applicants submitting drainage strategies should reflect the latest national standards. Any Local Plan policies should also be referenced within submissions.

The policy statement is supported by Kent County Council's **Making it Happen**, guidance which consists of technical appendices advising on the construction and design of SuDS features. This guidance is currently being updated.

Additionally, Kent County Council and partner LLFAs produced a document on SuDS design and guidance, aimed at developers and planners involved in designing small and large developments in the South East of England. This document is called **Water, People, Places: A guide for master planning sustainable drainage into developments**.

More information and guidance on SuDS is available on the **Susdrain** website.

### 11.3 Role of the LLFA and Local Planning Authority in surface water management

Kent County Council as the LLFA are a statutory planning consultee. They provide technical advice on surface water drainage strategies and designs put forward for major

development proposals, to confirm that onsite drainage systems are designed in accordance with the current legislation and guidance.

When considering planning applications, the drainage/flood risk engineering team will provide advice to the LPA on the management of surface water. The LPA should satisfy themselves that the development's proposed minimum standards of operation are appropriate and, using planning conditions or planning obligations, that there are clear arrangements for on-going maintenance over the lifetime of the development.

In their respective roles as LLFA and LPA, Kent County Council and Swale Borough Council should:

- Promote the use of SuDS for the management of run off;
- Ensure their policies and decisions on applications support and compliment the building regulations on sustainable rainwater drainage, giving priority to infiltration over watercourses and then sewer conveyance;
- Incorporate favourable policies within development plans;
- Adopt policies for incorporating SuDS requirements into the Local Plan; and
- Encourage developers to utilise SuDS whenever practical, if necessary, through the use of appropriate planning conditions.

### 11.3.1 Schedule 3 of the Flood and Water Management Act (2010)

Currently the implementation of SuDS is driven through planning policy. Schedule 3 of the FWMA 2010 will provide a framework for the approval and adoption of drainage systems, a SuDS Approving Body (SAB) within Unitary and County Councils, and national standards on the design, construction, operation, and maintenance of SuDS for the lifetime of the development. Timescales for enactment of Schedule 3 by the Government are unknown.

## 11.4 Considerations for SuDS design

### 11.4.1 Four pillars of SuDS design

SuDS are designed to maximise the opportunities and benefits that can be secured from surface water management practices. SuDS design should consider the four pillars of SuDS (Figure 11-1): water quantity, water quality, amenity, and biodiversity.

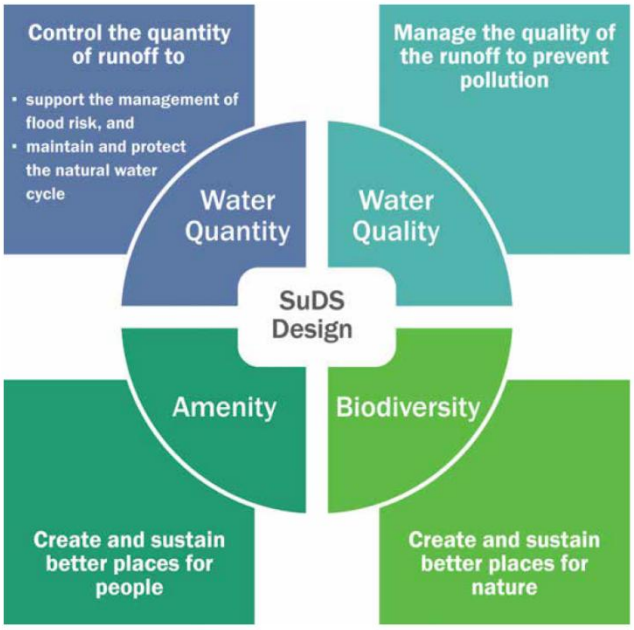



Figure 11-1: Four pillars of SuDS design (The SuDS Manual C753, 2015).

Given the flexible nature of SuDS, they can be used in most situations within new developments as well as being retrofitted into existing developments. SuDS can also be designed to fit into most spaces, for example, permeable paving could be used in parking spaces or rainwater gardens as part of traffic calming measures.

It is a requirement that *'applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity*' (NPPF Paragraph 182).

It is important that SuDS are maintained for the lifetime for the development so that features can function as designed. Consideration should be given to enhancing SuDS to achieve biodiversity net gain.

### 11.4.2 Types of SuDS System

There are many different SuDS techniques that can be implemented in attempts to mimic pre-development drainage. Techniques can include soakaways, infiltration trenches, permeable pavements, grassed swales, green roofs, ponds and wetlands. Many of which do not necessarily need to take up a lot of space. The suitability of the techniques will be dictated in part by the development proposal and site conditions. Advice on best practice is available from the Environment Agency and the Construction Industry Research and Information Association (CIRIA) e.g. **the CIRIA SuDS Manual C753** (2015).

### 11.4.3 SuDS management train

SuDS should not be used individually but as a series of features in an interconnected system designed to capture water at the source and convey it to a discharge location. Collectively this concept is described as a SuDS Management Train (see Figure 11-2).

The number of treatment stages required within the Management Train depends primarily on the source of the runoff and the sensitivity of the receiving waterbody or groundwater.

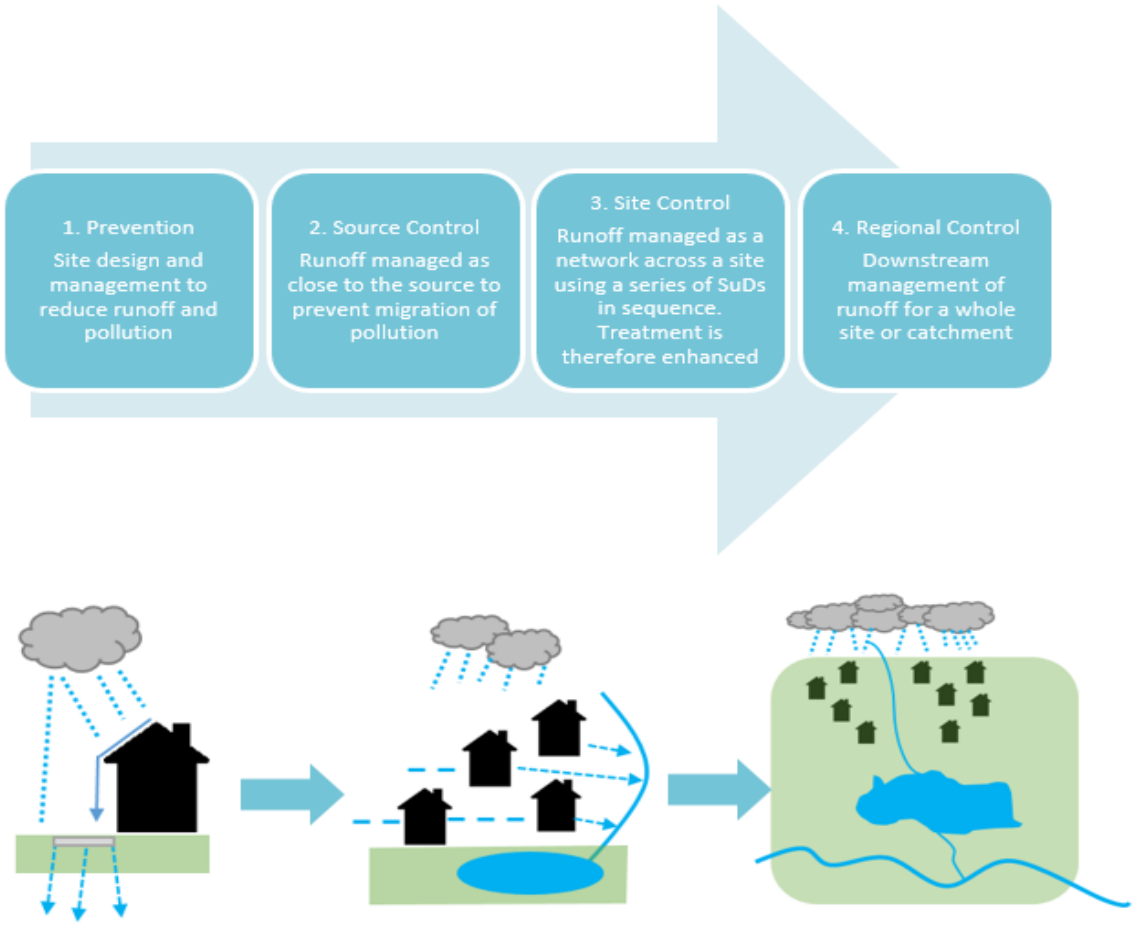



Figure 11-2: SuDS Management Train.

### 11.4.4 SuDS considerations

The design of a SuDS system will be influenced by a number of physical and policy constraints. These should be taken into account and reflected upon during the conceptual, outline and detailed stages of SuDS design. Table 11-1 details some possible constraints and how they may be overcome.

Drainage from new development sites or redeveloped sites should be designed in line with the drainage hierarchy (**PPG: Flood Risk and Coastal Change Paragraph: 056 Reference ID: 7-056-20220825**) which initially promotes the use of infiltration prior to considering alternative drainage. For SuDS techniques that are designed to encourage infiltration, it is imperative that the water table is low enough to receive surface run-off

waters. Most types of SuDS will be suitable in areas with permeable bedrock including features such as soakaways and infiltration basins. In areas with more impermeable geology, off-site discharge in accordance with the drainage hierarchy may be required to discharge surface water runoff from the site. In some cases, above-ground features such as attenuation ponds may be practical with a managed outlet or discharge point. Infiltration should be considered with caution within areas of possible subsidence or sinkholes.

A site-specific infiltration test will need to be conducted early on as part of the design of the development in order to determine the impact of groundwater levels on the effectiveness of the drainage system. Groundwater monitoring is also encouraged and may be required in some locations.

Where sites lie within or close to aquifers (11.5.1) or Groundwater Source Protection Zones (GSPZs) (Section 11.5.2) further restrictions may be applicable, and guidance should be sought from the LLFA and the EA.

Table 11-1: Example SuDS design constraints and possible solutions

| Constraints | Solution |
|---|---|
| Land availability | SuDS can be designed to fit into small areas by utilising different systems. For example, features such as permeable paving and green roofs can be used in urban areas where space may be limited. |
| Contaminated soil or groundwater below site | SuDS can be placed and designed to overcome issues with contaminated groundwater or soil. Shallow surface SuDS can be used to minimise disturbance to the underlying soil. The use of infiltration should also be investigated as it may be possible in some locations within the site. If infiltration is not possible linings can be used with features to prevent infiltration. |
| High groundwater levels | Non-infiltrating features can be used. Features can be lined with an impermeable line or clay to prevent the escape of water into the feature. Additional, shallow features can be utilised which are above the groundwater table. |
| Steep slopes | Check dams can be used to slow flows. Additionally, features can form a terraced system with additional SuDS components such as ponds used to slow flows. |
| Shallow slopes | Use of shallow surface features to allow a sufficient gradient. If the gradient is still too shallow pumped systems can be considered as a last resort. |
| Ground instability | Geotechnical site investigation should be done to determine the extent of unstable soil and dictate whether infiltration would be suitable or not. |
| Sites with deep backfill | Infiltration should be avoided unless the soil can be demonstrated to be sufficiently compacted. Some features such as swales are more adaptable to |

| Constraints | Solution |
|---|---|
| | potential surface settlement. |
| Open space in floodplain zones | Design decisions should be done to take into consideration the likely high groundwater table and possible high flows and water levels. Features should also seek to not reduce the capacity of the floodplain and take into consideration the influence that a watercourse may have on a system. Facts such as siltation after a flood event should also be taken into account during the design phase. |
| Future adoption and maintenance | The LPA should ensure development proposals, through the use of planning conditions or planning obligations, have clear arrangements for on-going maintenance over the development's lifetime. |

## 11.5 Other surface water considerations

### 11.5.1 Groundwater Vulnerability Zones

The Environment Agency published new groundwater vulnerability maps in 2015. These maps provide a separate assessment of the vulnerability of groundwater in overlying superficial rocks and those that comprise the underlying bedrock. The maps show the vulnerability of groundwater at a location based on the hydrological, hydrogeological and soil properties within a one-kilometre grid square.

Two maps are available:

- **Basic groundwater vulnerability map:** this shows the likelihood of a pollutant discharged at ground level (above the soil zone) reaching groundwater for superficial and bedrock aquifers and is expressed as high, medium and low vulnerability
- **Combined groundwater vulnerability map:** this map displays both the vulnerability and aquifer designation status (principal or secondary). The aquifer designation status is an indication of the importance of the aquifer for drinking water supply.

The Environment Agency's groundwater vulnerability map can be found on **Defra's Magic Interactive mapping website**. The groundwater vulnerability maps should be considered when designing SuDS. Depending on the height of the water table at the location of the proposed development site, restrictions may be placed on the types of SuDS appropriate to certain areas.

### 11.5.2 Groundwater Source Protection Zones (GSPZ)

The Environment Agency also defines Groundwater Source Protection Zones in the vicinity of groundwater abstraction points. These areas are defined to protect areas of groundwater that are used for potable supply, including public / private potable supply, (including mineral and bottled water) or for use in the production of commercial food and drinks. **The Environment Agency's approach to groundwater protection** document defines what restrictions are placed on infiltration in these zones.

GSPZs can be viewed on **Defra's interactive mapping.** The definition of each zone is shown below:

- **Zone 1 (Inner Protection Zone)** – Most sensitive zone: A groundwater SPZ1 is the area immediately around an abstraction point for domestic supply or for food production purposes. Groundwater in a SPZ1 is most vulnerable to pollution given the close proximity of the abstraction point and the water's intended use for human consumption. It is defined within the Environmental Permitting (England and Wales) Regulations 2016 as one of the following.
  1. The area within 50 metres of a point where the groundwater is abstracted for domestic supply or food production purposes.
  2. The area where it takes groundwater that is intended to be used to supply water for domestic or food production purposes up to 50 days to travel to the groundwater abstraction point.
  For any given abstraction point, whichever area is largest applies.
- **Zone 2 (Outer Protection Zone)** – Also sensitive to contamination: A groundwater SPZ2 is the area around an abstraction point for domestic supply or for food production purposes that meets one of the following definitions.
  1. The area within 250 metres of the abstraction point if the maximum allowable annual volume, divided by 365, is less than 2,000 cubic metres per day. This is when this is authorised by either:
     - an abstraction licence under section 24 of the Water Resources Act 1991
     - the right to abstract small quantities under section 27 of the Water Resources Act 1991

  2. The area within 500 metres of the abstraction point if the maximum allowable annual volume, divided by 365, is equal to or greater than 2,000 cubic metres per day. This is when this is authorised by an abstraction licence under section 24 of the Water Resources Act 1991
  3. The area where it takes groundwater that is used to supply water for domestic or food production purposes up to 400 days to travel to the groundwater abstraction point.

  For any given abstraction point, whichever area is largest applies.

- **Zone 3 (Total Catchment)** - This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.
- **Zone 4 (Zone of special interest)** – This zone is where local conditions require additional protection.

### GSPZs in the Local Plan area

Large areas in the south of the Local Plan area are within Groundwater Source Protection Zones, as well as two small patches in the northwest of the Isle of Sheppey (Figure 10 1).

The following built up areas have been identified to be at least partially within a Groundwater Source Protection Zone:

- Bapchild (Zone 2 and 3)
- Borden (Zone 1 and 2)
- Bredgar (Zone 2)
- Doddington (Zone 1)
- Eastling (Zone 2)
- Faversham (Zone 1 and 2)
- Hartlip (Zone 2)
- Minster (Zone 1)
- Neames Forstal (Zone 2 and 3)
- Newnham (Zone 1 and 3)
- Rodmersham (Zone 1, 2 and 3)
- Selling (Zone 2 and 3)
- Sittingbourne (Zone 1, 2 and 3)

### 11.5.3 Nitrate Vulnerable Zones

Nitrate Vulnerable Zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. Nitrate levels in waterbodies are affected by surface water runoff from surrounding agricultural land entering receiving waterbodies. The level of nitrate contamination will potentially influence the choice of SuDS and should be assessed as part of the design process.

NVZs can be viewed on the **EA's interactive mapping**.

### 11.5.4 Critical Drainage Areas

Areas with Critical Drainage Problems (ACDPs) is land formally notified to the LPA by the Environment Agency as having critical drainage problems. Local Authorities can also choose to designate Critical Drainage Areas (CDAs) within their authority area. Within ACDPs, proposed development may present increased risks of flooding both on and off site if the surface water runoff is not effectively managed.

There are currently no ACDPs identified within Swale.

# 12 Special Areas for consideration

## 12.1 Faversham Creek

In addition to the Flood Zones described in the PPG, Swale Borough Council previously made provision for consideration of Flood Zone 3a(i) for the purpose of performing the Sequential and Exception Tests in Faversham Creek. Flood Zone 3a(i) was initially described within the Faversham Creek SFRA 2010 to help deliver development with the Faversham Creek Neighbourhood Plan area.

Since the tidal flood event in December 2013, there have been increasing frequency of flood events in low lying areas in Faversham Creek. Furthermore, sea level rise in the estuary has risen 19cm in 35 years and there has been frequent flooding of low-lying land, increasing the flood risk to sites surrounding Faversham Creek.

There are also concerns regarding the economic and technical viability of development sites in areas of significant flood risk, where there is a need for significant flood defences or land raising. Development needs to take into account the 16m Environmental Permitting byelaw margin for works near tidal main rivers or sea defence structures, as well as providing safe access and escape during design flood events. Any loss of floodplain storage within the creek, as a result of development, must also be assessed. In doing so, it is likely that there will be an increased risk to existing vulnerable locations, due to the constrained tidal floodplain within the area.

As a result, in consultation with the Environment Agency, Flood Zone 3a(i) has not been taken through to this 2025 SFRA update. Flood Zone 2, 3a and 3b can be found in Appendix C.1 and Swale Borough Council's **interactive mapping portal.**

## 12.2 Iwade

The Iwade catchment is 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 where flow paths are culverted, with future development 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.

## 12.3 Minster

Some of the land within the area to the west and south of Minster 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.

# 13 Flood warning and emergency planning

## 13.1 NPPF requirements

The NPPF **Flood Risk Vulnerability and Flood Zone "incompatibility" table** seeks to avoid inappropriate development in areas at risk from all sources of flooding. It is essential that any development which will be required to remain operational during a flood event is located in the lowest flood risk zones to ensure that, in an emergency, operations are not impacted upon by flood water, or that such infrastructure is resistant to the effects of flooding such that it remains serviceable/operational during 'Upper End' allowance events, as defined in the **Environment Agency's Climate Change allowances.**

The outputs of this SFRA should be compared and reviewed against any emergency plans and continuity arrangements. This includes the nominated rest and reception centres (and prospective ones), so that evacuees are outside of the high-risk Flood Zones and will be safe during a flood event.

## 13.2 Emergency planning

The Civil Contingencies Act 2004 lists Local Authorities, the Environment Agency and emergency services as Category 1 responders, responsible for reducing, controlling, and mitigating the effects of emergencies in both response and recovery phases.

The 2025 NPPF (Paragraph 181) requires site-level FRAs to demonstrate that "any residual risk can be safely managed; and safe access and escape routes are included where appropriate, as part of an agreed emergency plan."

In accordance with the NPPF, documents including SFRAs, PFRAs and SWMPs can be used in the preparation and execution of a flood emergency plan as they can indicate areas that may be at risk of flooding. These can be provided as part of an FRA or as a separate document. Decisions regarding whether an emergency plan is required sits with the LPA, with advice from their Emergency Planning Teams, the Environment Agency and LLFA.

According to the PPG flood risk and coastal change guidance, an emergency plan is needed wherever emergency flood response is an important component of making a development safe; this includes the free movement of people during a 'design flood' and potential evacuation during an extreme flood.

Emergency plans are essential for any site with transient occupancy in areas at risk of flooding, such as holiday accommodation, hotels, caravan, and camping sites (PPG: Flood risk and coastal change paragraph 043).

Emergency plans should consider:

- An analysis of flood risk;
- The number of people that would require evacuation from the area potentially at risk;
- The vulnerability of site occupants;

- The impact of the flooding on essential services e.g., electricity, gas, telecommunications, water supply and sewerage;
- Flood warning procedures and hazard prevention;
- Evacuation procedures;
- Safe access and escape routes for users and emergency services (Section 13.2.1) and safe refuge procedures;
- Details of flood resilient and resistant building techniques/materials and details and calculations relating to the structural stability of buildings during a flood;
- How applications have responded to guidance on preparing prior to flood events, as set out in the Environment Agency's **personal flood plan** and **business flood plan checklists**; and
- Advice and information for the site owner/residents, including whether insurance can be gained or not.

Further emergency planning information links:

- **The National Planning Policy Guidance**
- **2004 Civil Contingencies Act**
- **ADEPT Flood Risk Plans for new development**
- **Defra (2014) National Flood Emergency Framework for England**
- **FloodRe**
- **Sign up for Flood Warnings with the Environment Agency**
- **The National Flood Forum**
- **Environment Agency 'Prepare for flooding'**
- **Environment Agency (2023) community flood plan**
- **Environment Agency (2023) personal flood plans**
- **Environment Agency (2023) business plan checklists**
- **Environment Agency (2026) Preparing a flood risk assessment: standing advice**

### 13.2.1 Safe access and escape routes

Safe access and escape routes will need to be demonstrated and mapped during the design flood event. Access requirements are set out in the **PPG: Flood Risk and Coastal Change**

As part of an FRA, the developer should review the acceptability of the proposed access in consultation with the LLFA and the EA. Site and plot specific velocity and depth of flows should be assessed against standard hazard criteria to ensure safe access and escape routes can be achieved.

## 13.3 Local arrangements for managing flood risk

The **Flood Risk to Communities in Swale** report details the Category 1 and Category 2 responders for a flooding emergency in the borough, as well as their roles and responsibilities. The Swale Borough Council's **website** also provides information on

emergency planning, community resilience planning and useful contacts in case of a flood incident. Additionally, the **Kent County Council Flood Response Plan** outlines the response of the Local Authority to a flooding event, with information on actions, roles and responsibilities, with coastal, fluvial, surface water and groundwater flooding all accounted for.

### 13.4 Flood warning systems

Flood warnings can be derived and, along with evacuation plans, can inform emergency flood plans or flood response plans. The Environment Agency is the lead organisation for providing warnings of fluvial flooding (for watercourses classed as Main Rivers) and coastal flooding in England. Flood Warnings are supplied via the Flood Warning Service (FWS), to homes and business within Flood Zones 2 and 3. The different levels of warnings are shown in Table 13-1.

Table 13-1 Environment Agency Warnings

| Flood Warning Symbol | What it means | What to do |
|---|---|---|
|  | Flood Alerts are used to warn people of the possibility of flooding and encourage them to be alert, stay vigilant and make early preparations. It is issued earlier than a flood warning, to give customers advance notice of the possibility of flooding, but before there is full confidence that flooding in Flood Warning Areas is expected. | • Be prepared to act on your flood plan<br>• Prepare a flood kit of essential items<br>• Monitor local water levels and the flood forecast on the Environment Agency website<br>• Stay tuned to local radio or TV<br>• Alert your neighbours<br>• Check pets and livestock<br>• Reconsider travel plans |
|  | Flood Warnings warn people of expected flooding and encourage them to take action to protect themselves and their property. | • Move family, pets and valuables to a safe place<br>• Turn off gas, electricity and water supplies if safe to do so<br>• Seal up ventilation system if safe to do so<br>• Put flood protection equipment in place<br>• Be ready should you need to evacuate from your home<br>• 'Go In, Stay In, Tune In' |

| Flood Warning Symbol | What it means | What to do |
|---|---|---|
|  | Severe Flood Warnings warn people of expected severe flooding where there is a significant threat to life. | • Stay in a safe place with a means of escape<br>• Co-operate with the emergency services and local authorities<br>• Call 999 if you are in immediate danger |
| **Warning no longer in force** | Informs people that river or sea conditions begin to return to normal and no further flooding is expected in the area. People should remain careful as flood water may still be around for several days. | • Be careful. Flood water may still be around for several days<br>• If you've been flooded, ring your insurance company as soon as possible |

It is the responsibility of individuals to sign-up to the Flood Warning Service in order to receive the flood warnings via FWS. Registration and the service is free and publicly available through **https://www.gov.uk/sign-up-for-flood-warnings** or call 0345 988 1188. It is recommended that any household considered at risk of flooding signs-up. Developers should also encourage those owning or occupying developments, where flood warnings can be provided, to sign up to receive them. This applies even if the development is defended to a high standard.

### 13.4.1 Flood Alert and Warning Areas in the Local Plan area

There are currently three Flood Alert Areas (FAAs) and five Flood Warning Areas (FWAs). These are displayed in Appendix I.

A list of the FAAs in the study area is shown in Table 13-2 and a list of the FWAs is shown in Table 13-3.

Table 13-2: Flood Alert Areas within Swale Borough Local Plan area

| Flood Alert Code | Flood Alert Name | Source of flooding | Description |
|---|---|---|---|
| 064WAC1ShepSwale | Isle of Sheppey and coast from Kemsley to Seasalter | The Swale, North Sea | Coastal areas on the Isle of Sheppey and North Kent Coast from Kemsley to Seasalter, including Sheerness, Minster, Queenborough, Leysdown, Sittingbourne and Faversham. |
| 064WAT1MedEst | Tidal Medway, Medway Estuary and Isle of Grain | River Medway | Areas at risk of tidal flooding from the River Medway, including Lower Halstow. |
| 064WAF331 | Rivers on the Isle of Sheppey | Scrapsgate Drain, Warden Bay Drain | Scrapsgate Drain from the B2008 to the sea, through Minster and Scrapsgate, and Warden Bay Drain from Bay View to the sea, including Warden and surrounding holiday villages. |

Table 13-3: Flood Warning Areas within Swale Borough Local Plan area

| Flood Warning Code | Flood Warning Name | Source of flooding | Description |
|---|---|---|---|
| 064FWC1Leysdown | Coast from Warden Bay to Hamlet of Shellness | North Sea | Coastal areas from Warden Bay to Shellness, including Warden, Bay View and Leysdown on Sea |
| 064FWC1Sheerness | Sheerness, Minster and Queenborough | North Sea | Coastal areas in Sheerness, Minster and Queenborough, including Rushenden, Scrapsgate and West Minster |
| 064FWC1Kemsley | Coast from Kemsley to Seasalter | North Sea and The Swale | Coastal areas from Kemsley to Seasalter, including Sittingbourne, Conyer and Faversham |
| 064FWT1Medway | Tidal River Medway and Medway Estuary | River Medway | Areas at risk of tidal flooding from the River Medway, including Lower Halstow. |
| 064FWF9A1 | Scrapsgate Drain and Warden Bay Drain | Scrapsgate Drain, Warden Bay Drain | Scrapsgate Drain and Warden Bay Drain on the Isle of Sheppey |

## 13.5 Reservoirs

Reservoir flooding is very different from other forms of flooding. It may happen with little or no warning and evacuation will need to happen immediately. The likelihood of such flooding is difficult to estimate, but it is very much less likely than flooding from rivers, the sea or surface water. It may not be possible or safe to seek refuge upstairs from floodwater as buildings could be unsafe or unstable due to the force of water from the reservoir breach or failure.

# 14 Strategic flood risk solutions

Strategic flood risk solutions may offer a potential opportunity to reduce flood risk in the borough. Section 16 considers the cumulative impacts of development across the borough and the catchments which are most sensitive to these impacts, and as such where strategic flood risk solutions may be most beneficial.

Where possible developments should seek to help reduce flood risk in the wider area. The following sections outline different options which could be considered for strategic flood risk solutions. Any strategic solutions should ensure they are consistent with wider catchment policy and the local policies.

It is important that the ability to deliver strategic solutions in the future is not compromised by the location of proposed development. When assessing the extent and location of proposed development, consideration should be given to the requirement to secure land for flood risk management measures that provide wider benefits.

## 14.1 Partnership working

Flood risk to an area or development can often be attributed to multiple different sources, including fluvial, surface water and/or groundwater, which can become intertwined. Where complex flood risk issues are highlighted, it is important that all stakeholders are actively encouraged to work together to identify issues and provide suitable solutions.

### 14.1.1 Catchment Based Approach

The **Catchment Based Approach (CaBA)** was introduced by the Government in 2013 to establish catchment partnerships throughout England to jointly deliver improved water quality and reduce flood risk, directly supporting achievement of many of the targets set out within the Government's 25-year Environment Plan. CaBA partnerships are actively working in all 100+ river catchments across England and cross-border with Wales.

Swale Borough sits within the North Kent, East Kent and River Medway Catchments.Swale Borough Council forms part of the **North Kent Catchment Improvement Group.**

## 14.2 Biodiversity Net Gain

Biodiversity Net Gain (BNG) is a strategy to develop land and contribute to the recovery of nature. It is about making sure the habitat for wildlife is in a better state after development than it was before development. BNG has been applicable since November 2023 for developments in the Town and Country Planning Act 1990, unless exempt, and has been applicable to small sites since April 2024. Further information is available on the **Government BNG webpage**. Strategic flood risk solutions can help developments achieve BNG requirements.

## 14.3 Natural Flood Management

Development can provide opportunities to work with natural processes to help reduce flood and erosion risk, benefit the natural environment and reduce costs of schemes. This is known as Natural Flood Management (NFM), a process whereby action is taken to mitigate flood risk by protecting, restoring and emulating natural processes. This approach aims to reduce flow volumes and delay the arrival of peak flood flows downstream.

Techniques and measures, which could be applied in the borough include:

- Creation of offline storage areas.
- Re-meandering streams (creation of new meandering courses or reconnecting cut-off meanders to slow the flow of the river).
- Targeted woodland planting.
- Reconnection and restoration of functional floodplains.
- Restoration of rivers and removal of redundant structures, i.e. weirs and sluices no longer used or needed
- Installation or retainment of large woody material in river channels.
- Improvements in management of soil and land use.
- Creation of rural and urban SuDS.

To maximise the benefits of NFM, it is important that land which is likely to be needed for NFM is protected by safeguarding the land. This is particularly important for infrastructure that reduces the risk of flooding to large amounts of existing development, or where options for managing risk in other ways are limited to achieve multiple benefits for flood risk and the environment.

It is important to recognise the value of maintenance or restoration of natural riparian zones, such as grasslands, which protect the soils from erosion and 'natural' meadows which can tolerate flood inundation. The use of green infrastructure throughout river corridors can also play a vital role in enhancing the river environment as well as safeguarding land from future development, protecting people and buildings from flooding and reducing flood risk downstream.

### 14.3.1 Working with natural processes

The Environment Agency published their updated evidence base in February 2025 **Working with natural processes to reduce flood risk 2024** to support the implementation of NFM, with maps showing locations with the potential for NFM measures. These maps are intended to be used alongside the evidence directory to help practitioners think about the types of measure that may work in a catchment and the best places in which to locate them.

The **Rivers Trust NFM National Map** website provides further information about ongoing NFM schemes and community works. There are currently no schemes noted in Swale Borough.

### 14.3.2 Catchment and Floodplain restoration

Floodplain restoration represents the most sustainable form of strategic flood risk solution, by allowing watercourses to return to a more naturalised state, and by creating space for naturally functioning floodplains working with natural processes.

Although the restoration of floodplain is difficult in previously developed areas where development cannot be rolled back, the following measures should be adopted:

- Promoting existing and future brownfield sites that are adjacent to watercourses to naturalise banks as much as possible. Buffering areas around watercourses to provide an opportunity to restore parts of the floodplain.
- Removing redundant structures to reconnect the river and the floodplain.
- Applying the sequential approach to avoid new development within the floodplain.

### 14.3.3 Structure Removal and/ or modification (e.g. Weirs)

Structures, both within watercourses and adjacent to them can have significant impacts upon rivers including alterations to the geomorphology and hydraulics of the channel through water impoundment and altering sediment transfer regime, which over time can significantly impact the channel profile including bed and bank levels, alterations to flow regime and interruption of biological connectivity, including the passage of fish and invertebrates.

Many artificial in-channel structures (examples include weirs and culverts) are often redundant and / or serve little purpose and opportunities exist to remove them where feasible. The need to do this is heightened by climate change, for which restoring natural river processes, habitats and connectivity are vital adaptation measures. However, it also must be recognised that some artificial structures may have important functions or historical/cultural associations, which need to be considered carefully when planning and designing restoration work.

In the case of weirs, whilst weir removal should be investigated in the first instance, in some cases it may be necessary to modify a weir rather than remove it. For example, by lowering the weir crest level or adding a fish pass. This will allow more natural water level variations upstream of the weir and remove a barrier to fish migration.

Developers should open up existing culverts where possible and should not construct new culverts on site except for short lengths to allow essential infrastructure crossings.

### 14.3.4 Bank Stabilisation

Bank erosion should be avoided, and landowners are encouraged to avoid using machinery and vehicles close to or within the watercourse unless in the circumstances where machinery and vehicles are required for watercourse maintenance such as desilting. Care should be taken not to destabilise the banks.

There are several techniques that can be employed to restrict the erosion of the banks of a watercourse. In an area where bankside erosion is particularly bad and/or vegetation is

unable to properly establish, ecologically sensitive bank stabilisation techniques, such as willow spiling, can be particularly effective. Live willow stakes thrive in the moist environment and protect the soils from further erosion allowing other vegetation to establish and protect the soils. Other approaches include the planting of brash or small trees, large wood, large trees and root wads.

### 14.3.5 Re-naturalisation

There is potential to re-naturalise a watercourse by re-profiling the channel, removing hard defences, re-connecting the channel with its floodplain and introducing a more natural morphology (particularly in instances where a watercourse has historically been modified through hard bed modification). Detailed assessments and planning would need to be undertaken to gain a greater understanding of the response to any proposed channel modification.

### 14.3.6 Habitat creation

There are also opportunities to deliver sites through the Environment Agency's Regional Habitat Creation Programme which seeks to replace intertidal habitats that are lost through coastal squeeze. The **Swale Green Grid Strategy** (2016) highlights the estuarine environments of the River Medway and The Swale that provide potential sites for habitat creation or enhancement, including possible locations at Graveney Marshes, Shellness and Elmley National Nature Reserve.

## 14.4 Green Infrastructure

Green Infrastructure (GI) is a planned and managed network of natural environmental components and green spaces that intersperse and connect the urban centres, suburbs and rural fringe and consist of:

- Open spaces – parks, woodland, nature reserves, lakes
- Linkages – River corridors and canals, and pathways, cycle routes and greenways
- Networks of "urban green" – private gardens, street trees, verges and green roofs.

The identification and planning of Green Infrastructure is critical to sustainable growth. It merits forward planning and investment as much as other socio-economic priorities such as health, transport, education and economic development. GI is also central to climate change action and is a recurring theme in planning policy. With regards to flood risk, green spaces can be used to manage storm flows and free up water storage capacity in existing infrastructure to reduce risk of damage to urban property, particularly in city centres and vulnerable urban regeneration areas. Green Infrastructure can also improve accessibility to waterways and improve water quality, supporting regeneration and improving opportunity for leisure, economic activity and biodiversity.

The **Kent and Medway Growth and Infrastructure Framework** (2018) illustrates the role of GI for development in Swale Borough and the surrounding area. Additionally, the **Swale Borough Local Plan** (2017) and **Swale Green and Blue Infrastructure Strategy** provide

more detailed information about the Borough's natural assets and GI network and strategy, highlighting existing and potential GI.

### 14.5 Flood storage schemes

Flood storage schemes aim to reduce the flows passed downriver to mitigate downstream flooding. Development increases the impermeable area within a catchment, creating additional and faster runoff into watercourses. Flood storage schemes aim to detain this additional runoff, releasing it downstream at a slower rate, to avoid any increase in flood depths and/or frequency downstream. Methods to provide these schemes include :

- enlarging the river channel;
- raising the riverbanks; and/or
- constructing flood banks set back from the river.

Flood storage schemes have the advantage that they generally benefit areas downstream, not just the local area.

### 14.6 Flood defences

There are a number of formal flood and coastal defences present within the study area (see Section 8 for further information). The flood risk at several potential sites identified within Swale Borough could be influenced by the presence of these defences. 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.

### 14.7 Land raising

Increasing the elevation of land for whole or parts of the sites could be implemented to prevent flood flows affecting the land up to the design level. The elevation selected could be determined to coincide with the re-designation of the site (or part of the site) from one Flood Zone to another (e.g. from Flood Zone 3a to Flood Zone 2).

Raising of land which floods would reduce the volume of storage on the floodplain in a flood event. Such ground level adjustments would therefore require level for level floodplain volume compensation (so no loss of floodplain storage occurs) and also analysis to evidence that the increase in ground levels does not result in adverse changes in flood risk (or other environmental issues) elsewhere, e.g. through deflection of flood water or loss of conveyance.

In low-lying areas of land with little topographic gradient it is likely that conveyance of non-tidal fluvial flood water may be less critical than the loss of floodplain volume, whereas in areas with greater topographic gradient, conveyance may become more critical.

For tidal/coastal areas, flood volumes may be less critical given the role of the tidal ingress or coastal water levels. However, conveyance and constriction may be a critical

consideration if the development obstructs the ingress or outflow of tidal water, for instance in the tidal Swale floodplain, potentially leading to deflection of water and elevation of water levels from the pre-development case. Also, in circumstances where there is land raising in a coastal flood cell consideration would need to be given that the loss of storage volume in the cell due to land raising did not exacerbate flooding elsewhere.

### 14.8 Promotion of SuDS

By considering SuDS at an early stage in the development of a site, the risk from surface water can be mitigated to a certain extent within the site as well as reduce the risk that the site poses to third party land. The policies and guidance produced by KCC as the LLFA are summarised in Section 11.

### 14.9 Engaging with key stakeholders

Flood risk to an area or development can often be attributed to a number of sources such as fluvial, surface water and/or groundwater. In rural areas the definition between each type of flood risk is generally more distinguished. However, within urban areas flooding from multiple sources can become intertwined. Where complex flood risk issues are highlighted it is important that all stakeholders are actively encouraged to work together to identify issues and provide suitable solutions.

Engagement with riparian owners is also important to ensure they understand their rights and responsibilities including:

- maintaining river bed and banks;
- allowing the flow of water to pass without obstruction; and
- controlling invasive alien species e.g. Japanese knotweed.

More information about riparian owner responsibilities can be found in the Environment Agency's guidance on **Owning a Watercourse** (2024).

# 15 Assessment of flood risk in potential development areas

## 15.1 Introduction

A total of 636 sites were provided by Swale Borough Council. The screened sites along with the flood risk data can be found on Swale Borough Council's **interactive mapping portal.**

The sites that were screened include potential development locations, existing committed development locations, and development allocations and regeneration areas that were adopted in the most recent Local Plan. The data sources used to identify the sites screened are summarised in Table 15-1.

Table 15-1: Data sources for the sites screened in the Level 1 summary assessment

| Data source | Number of sites for screening |
|---|---|
| Boughton and Dunkirk Neighbourhood Plan Allocation | 1 |
| Brownfield sites winter 2023 | 46 |
| Employment sites for assessment | 30 |
| Employment land review 2017 | 57 |
| Existing committed employment allocations | 2 |
| Existing committed housing allocations | 1 |
| Faversham Town Neighbourhood Plan allocations | 10 |
| Faversham Creek Neighbourhood Plan | 1 |
| All promoted sites | 321 |
| Call for sites 2024 | 101 |
| Gypsy and Traveller intensification expansion sites 2023 | 13 |
| Proposed employment allocations | 5 |
| Proposed housing allocations | 41 |
| Proposed mixed use allocations | 7 |
| **Total number of sites for screening** | 636 |

These sites were screened against a suite of available flood risk information and spatial data to provide a summary of risk to each site (see Appendix K).

The information considered includes the flood risk datasets listed below:

- Environment Agency Flood Zones 2 and 3
- Flood Zone 3b
- Detailed model for present day and climate change - North Kent Coast 2024, Iwade Stream 2017, Scrapsgate Drain 2016 and Warden Bay Stream 2014.

- Environment Agency's Rivers and Sea undefended flood risk extents – climate change dataset
- Surface water flooding within the EA's Flood Map for Planning (also known as Risk of Flooding from Surface Water RoFSW)
- Environment Agency's reservoirs maps
- JBA Groundwater Flood Map
- Environment Agency Historic Flood Map
- Kent County Council's recorded incidents of flooding dataset

## 15.2 Overview of risk at identified sites

A summary of flood risk at each of the sites in light of the screening is provided below:

- Flood Zone composition is varied across the sites. However, the majority of the sites have Flood Zone 1 comprising the largest proportion of their area, with 477 sites completely located within Flood Zone 1.
- 133 sites are partially located within Flood Zone 2
- 152 sites are partially located within Flood Zone 3
- 82 sites are partially located within Flood Zone 3b
- 17 sites are predicted to be at risk of fluvial flooding in the future 0.1% AEP (1 in 1000 year) Upper End 2125 event due to climate change
- 185 sites are predicted to be at risk from tidal flooding in the future 0.1% AEP (1 in 1000 year) event due to climate change
- During a 0.1% AEP (1 in 1000-year) surface water event, 115 sites are predicted to have greater than 10% of their area at risk of flooding
- 28 sites are predicted to be at risk from reservoir inundation when there is also flooding from rivers
- 80 sites are predicted to have groundwater flood levels during a 1% AEP event which are either at or very near (within 0.025m of) the ground surface
- 55 sites intersect the Environment Agency's historic flood outlines
- 486 sites are located within 50m of a flood incident recorded by KCC

## 15.3 Sequential Testing

The SFRA does not include the Sequential Test of the development sites that were screened. However, Appendix K summarises the flood risk to the potential and confirmed development sites and provides evidence for use in the completion of the Sequential Test.

Inclusion of the Strategic Housing Land Availability Assessment (SHLAA) and Employment Land Review sites in the SFRA does not imply that development can be permitted without further consideration of the Sequential Test. The Sequential Test will be demonstrated through a free-standing document. The PPG for Flood Risk and Coastal Change describes how the Sequential Test should be applied in the preparation of a Local Plan Review. The assessments undertaken for this SFRA will assist Swale Borough Council in the preparation of the Sequential Test.

# 16 Cumulative impacts of development on flood risk

Cumulative impacts are defined as the effects of past, current and future activities on the environment. Under the NPPF, strategic policies and their supporting Strategic Flood Risk Assessments, are required to 'consider cumulative impacts in, or affecting, local areas susceptible to flooding' (para 171).

When allocating land for development, consideration should be given to the potential cumulative impact on flood risk within a catchment. Development increases the impermeable area within a catchment, which if not properly managed, can cause loss of floodplain storage, increased volumes and velocities of surface water runoff, and result in heightened downstream flood risk. Whilst individual development with appropriate site mitigation measures should not result in measurable local effects with respect to hydrology and flood risk, the cumulative effect of multiple development may be more severe at downstream locations in the catchment. Locations where there are existing flood risk issues with people, property or infrastructure will be particularly sensitive to cumulative effects.

The cumulative impact should be considered throughout the planning process, from the allocation of sites within the Local Plan, to the planning application and development design stages. Once preferred options are identified, their cumulative impact can be considered in more detail within a Level 2 SFRA, where necessary. In addition, site-specific FRAs must consider the cumulative impact of the proposed development on flood risk within the wider catchment area if there are potentially material effects.

As part of the Level 1 SFRA, an assessment of the cumulative effects within catchments in Swale has been undertaken.

## 16.1 Approach and methodology

The approach is based on providing an assessment of catchments where the allocation of more than one site could result in effects that increase the flood risk to third parties. At a strategic level this involves comparison of catchments, to assess the quantum of proposed development and the sensitivity of the catchment to changes in flood risk. Historic flooding incidents are also included in the assessment, as these are an indicator of the actual sensitivity of locations within a catchment to flood events.

The methodology deploys a range of metrics to assess the potential cumulative impacts, which provide a balance between predicted and observed flooding data recorded by Kent County Council and the Environment Agency. In addition, it was considered important to identify those catchments where an increase in flows (as a result of development) would potentially have the greatest impact upon downstream flood risk.

## 16.2 Datasets

### Catchments

The WFD river catchments defined in the River Basin Management Plans, WLMB catchments and LIDAR data were used to divide Swale Borough into manageable areas on which to base a cumulative impact assessment.

### Current developed area

OS Open Zoomstack data buildings layer was used to assess the current developed area in each catchment.

### Proposed level of growth

To understand areas of the catchments that are likely to experience the greatest pressure for future growth, all potential future development sites received for consideration within the Local Plan process have been analysed. The sites allocated through the Local Plans of neighbouring authorities have also been taken into account within the proposed level of growth for each catchment.

This allowed the calculation of the overall increase in development from the existing scenario, to identify catchments likely to be under the greatest pressure for development. The context for this being that in circumstances where the proportion of proposed new development is greater, then it is more likely to give rise to cumulative effects.

It should be noted that it was assumed that all sites will be developed, and the entire footprint will be developed.

### Historic and Predicted Flood Risk

A composite flood risk score was derived for each catchment within the study area by taking an average ranking of both recorded (historic incidents) and modelled (predicted) flood risk.

The risk metrics calculated for historic flood risk were:

- Number of recorded flood incidents, recorded by Kent County Council
- The percentage of existing buildings within the Environment Agency's historic flood map

The risk metrics calculated for predicted (modelled) flood risk were:

- Percentage of properties within the merged Flood Zone 3a and the Risk of Flooding from Surface Water 1% AEP (1 in 100-year) extent to create a combined layer showing predicted flood risk.

### Scoring

A relative risk score of 1 to 3 (low to high) was applied to each flood risk metric and summed to give an overall relative flood risk score for each WFD catchment (Table 16-1).

Table 16-1 Individual components of relative cumulative impacts score for flood risk (per WFD Catchment)

| Point Score | % of existing buildings within EA's historic flood outlines map | Recorded flood incidents (KCC) | % of building outlines within combined Flood Zone 3a and 1% AEP (1 in 100-year) surface water flood risk extent |
|---|---|---|---|
| 1 - Low risk | <2% | 0-10 | <10% |
| 2 - Medium risk | 2 to 20% | 10-40 | 10 to 13% |
| 3 - High risk | >20% | >40 | >13% |

Table 16-2 was then used to identify the combined risk of development growth and flood risk and takes account of:

- Indicator of potential change in developed area within a catchment (%)
- The catchment flood risk ranking relative to all other catchments (the ranking value will vary subject to the number of catchments within the study area)

Table 16-2 Matrix of flood risk and future development pressure

| Whole catchment | | | | |
|---|---|---|---|---|
| % Change in development | | Existing flood risk (total points) | | |
| | | 3 to 4 | 5 to 6 | 7 to 9 |
| | | Low | Medium | High |
| 0 to 175% | Low | | | |
| 175% to 700% | Medium | | | |
| >700% | High | | | |

## 16.3 Conclusions of the Cumulative Impact Assessment

A summary of the Cumulative Impacts Assessment results is shown in Figure 14 2. The Cumulative Impact Assessment highlights areas where there is a high chance of encountering cumulative effects from planned development. In these catchments this should be considered by developers and specifically addressed within FRAs for proposed development.

Including consideration of cumulative effects requires that FRAs should assess:

- The location and sensitivity of receptors to cumulative effects and the mechanisms that potentially result in flooding (e.g. locations that are reliant on the performance of pumped drainage systems to manage flood risk, locations where existing flooding is experienced and can be exacerbated by relatively small changes in flood flow magnitude, volume or flood duration, etc)
- The potential quantum of proposed cumulative development within a River Basin and assessment of the effect on sensitive receptors of the cumulative benefit afforded by piecemeal mitigation at the respective allocation sites.

- The requirement for measures to address potential cumulative effects (these can be both ‘on-site’ measures and contributions to strategic ‘off-site’ measures)
- The opportunity to integrate site mitigation measures with strategic flood risk management measures planned in the River Basin
- The long-term commitments to management and maintenance

### 16.4 Next steps

The Cumulative Impact Assessment is used in the following ways:

- The assessment highlights the catchments in the borough where the cumulative impacts of development on flood risk could potentially be greatest. Developers and Swale Borough Council should take the assessment into consideration when identifying appropriate sites for development.
- For sites in catchments identified as being at high or medium risk of cumulative impacts FRAs should contain an assessment of the potential cumulative impacts of development further as outlined within Section 16.3.
- For sites taken forward to a Level 2 SFRA, the cumulative impacts of development are considered in further detail.

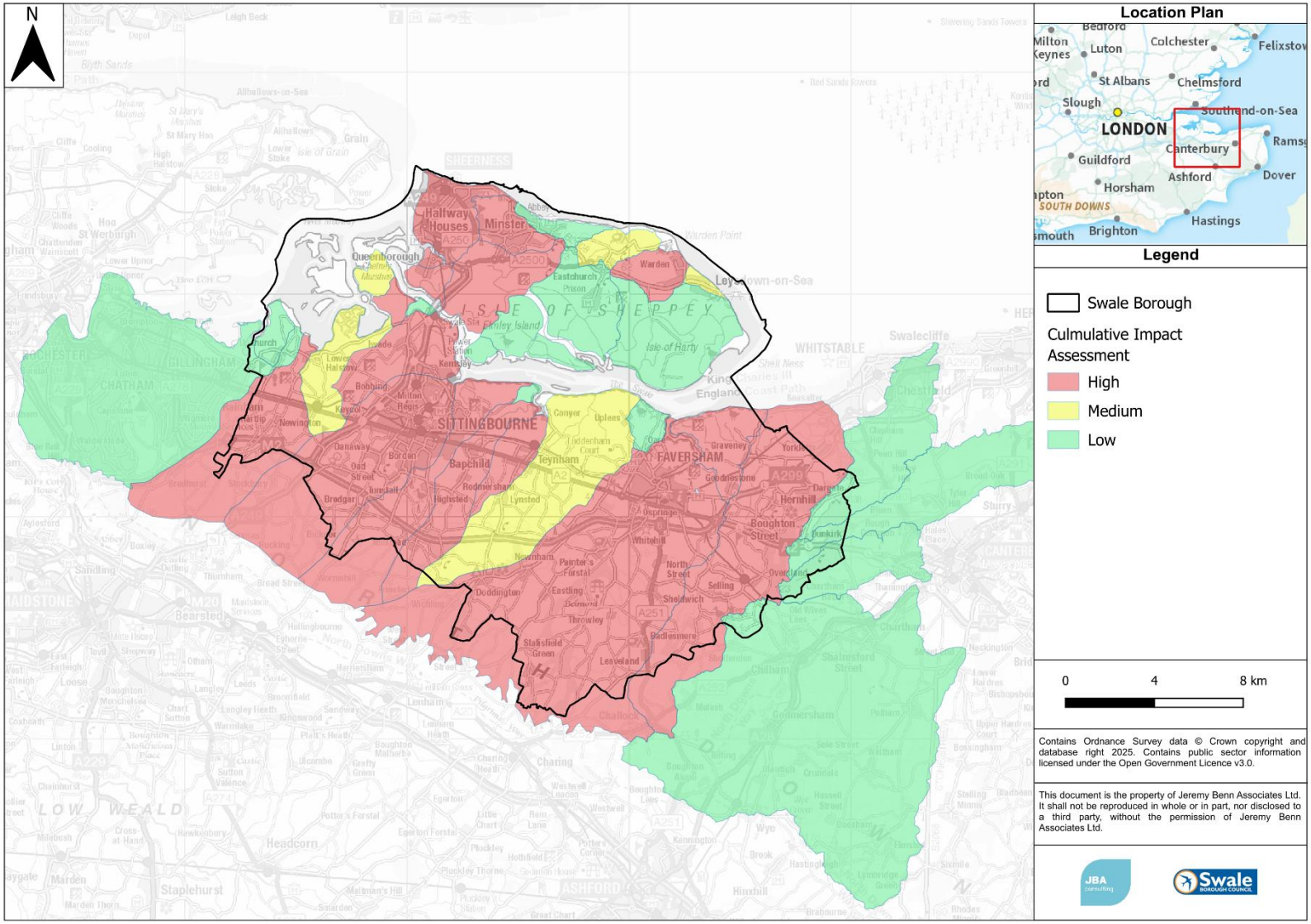



Figure 16-1: Relative sensitivity to cumulative impacts by catchment

# 17 Summary

## 17.1 Overview

This Level 1 SFRA delivers a strategic assessment of all sources of flooding in the Local Plan area. It also provides an overview of policy and provides guidance for planners and developers. The study area comprises the administration area of Swale Borough Council.

## 17.2 Sources of flood risk

The sources of flood risk in Swale have been assessed, further information on the data sources used can be found in Section 5 and the findings can be found in Section 7. A summary is outlined below.

### 17.2.1 Historic flooding

There have been several recorded flood incidents across the study area, with tidal flooding the most significant but surface water the most frequent cause of flooding.

The study area has also been affected by several historic tidal flood events, impacting a large area each time. The most significant events were during 1953, 1978 and 2013.

Surface water flooding has been recorded across the borough, with flooding reportedly impacting most settlements in Swale Borough during the May 2018 event.

Fluvial contributions to flooding are generally negligible compared to the volume of water from tidal flooding, though records of flood incidents from the Environment Agency and Kent County Council show there have been recorded fluvial flood incidents in Iwade and Lower Halstow.

Groundwater flooding has been recorded in Sittingbourne, Faversham and Boughton. Additionally, sewer flooding has been recorded in settlements across the Local Plan area, most frequently in Minster, Sheerness, Faversham and Sittingbourne.

The Environment Agency's Recorded Flood Outline mapping can be found in Appendix A and on Swale Borough Council's **interactive mapping portal**.

### 17.2.2 Fluvial flood risk

There are several watercourses throughout the study area which are identified to contribute to fluvial flood risk. Flood Zone mapping and climate change mapping of the fluvial flood risk in the Local Plan area has been prepared as part of the Level 1 SFRA and can be found in Appendices C and D and on Swale Borough Council's **interactive mapping portal**.

### 17.2.3 Tidal flood risk

The study area is bound by the Thames Estuary and North Sea to the north and as such there is a significant tidal flood risk. Additionally, many of the river networks are tidally influenced. The combination of high tides and high river levels can result in tidal locking of watercourses as they are unable to discharge. There is also the possibility that tidal defences can fail or be overtopped. The assessment of the 'residual' risk of defence failure should be considered on a site by site basis. Appendix C shows the tidal Flood Zones and the 2024 North Kent Coast model and Appendix D includes the effect of climate change on the tidal flood risk. These maps are also shown on Swale Borough Council's **interactive mapping portal**.

### 17.2.4 Coastal flood risk

Coastal erosion is a prominent process along much of the study area's coastline, notably along the northern coast of the Isle of Sheppey between Minster and Warden. The risk of flooding is linked to the stability of the coastline, with flood risk potentially increasing if tidal flood defences are lost due to coastal erosion. The Swale Borough Coastal Change Management Area and Erosion Zones have been prepared as part of the SFRA and are shown in Appendix J.

### 17.2.5 Surface water flood risk

The Risk of Flooding from Surface Water dataset shows that surface water predominantly follows topographical flow paths of existing watercourses, dry valleys or roads, with some areas of ponding in low lying areas, often upslope of railway lines or roads. The Risk of Flooding from Surface Water maps are shown in Appendix E and on Swale Borough Council's **interactive mapping portal**.

### 17.2.6 Groundwater flood risk

The JBA Groundwater Flood Map shows that a large proportion of the Swale Borough Local Plan area is at risk of groundwater flooding, with the most vulnerable settlements including Sittingbourne, Faversham, Teynham, Bapchild and Boughton. There is a widespread area of groundwater flood risk in the south of the study area that is underlain by chalk bedrock. There is also an area of groundwater flood risk along parts of the northern coast of the Isle of Sheppey. The JBA Groundwater Flood Map can be found in Appendix F.

### 17.2.7 Sewer flood risk

Historic incidents of sewer flooding are detailed by the Southern Water SIRF and a summary can be found in Table 7-3. This database records incidents of flooding related to public foul, combined or surface water sewers and identifies which postcode areas have been impacted by flooding. There have been 271 recorded sewer flood incidents in the Local Plan area since 2015.

The sewer flood risk in the Local Plan area is exacerbated by groundwater infiltrating into the sewer network and outfalls that can experience tidal locking or back-flow through the system.

### 17.2.8 Flooding from reservoirs

Outlines from the Risk of Flooding from Reservoirs dataset show worst case inundation extents of two reservoirs impacting the Local Plan area. The mapping can be found in Appendix G and on Swale Borough Council's **interactive mapping portal**.

## 17.3 Flood defences

A high-level review of formal flood defences was carried out using existing information to provide an indication of their condition and standard of protection. Details of the flood defence locations and condition were provided by the Environment Agency for the purpose of preparing this assessment and can be found in Appendix H.

## 17.4 Key policies

There are many relevant regional and local key policies which have been considered within the SFRA (Section 2), such as the Shoreline Management Plans for the Isle of Grain to South Foreland and the Medway Estuary and Swale, the North Kent Rivers Catchment Flood Management Plan, Thames River Basin Management Plan, the Preliminary Flood Risk Assessment, the Medway Estuary and Swale Strategy and Kent Local Flood Risk Management Strategy. Other policy considerations have also been incorporated, such as sustainable development principles, climate change and flood risk management.

## 17.5 Development and flood risk

The Sequential and Exception Test procedures for both Local Plans and Flood Risk Assessments have been documented, along with guidance for planners and developers (Section 4 and Appendix L). Links have been provided for various guidance documents and policies published by other Risk Management Authorities, such as the LLFA and the Environment Agency.

# 18 Recommendations

A review of national and local policies has been conducted against the information collected on flood risk in this SFRA. Following this, several recommendations have been made for Swale Borough Council to consider as part of Flood Risk Management in the study area.

## 18.1 Development management

### 18.1.1 For Swale Borough Council

#### Sequential and Exception tests

The SFRA has identified that areas of Swale Borough are at high risk of flooding from, tidal, surface water and fluvial sources. Therefore, it is expected that several proposed development sites will be required to pass the Sequential and, where necessary, Exception Tests in accordance with the NPPF. Swale Borough Council should use the information in this SFRA when deciding which development sites to take forward in the emerging Local Plan.

The Sequential Test will be undertaken through a free-standing document. It is the responsibility of Swale Borough Council to be satisfied that the Sequential Test has been passed.

#### Council review of planning applications

The Council should consult the Environment Agency's '**Flood Risk Assessment: Local Planning Authorities**', last updated October 2025, when reviewing planning applications for proposed developments at risk of flooding.

The Council will consult the relevant statutory consultees as part of the planning application assessment and they may, in some cases, also contact non-statutory consultees (e.g. Southern Water) that have an interest in the planning application.

#### Future flood management

For successful future flood risk management, it is recommended that local planning authorities adopt a catchment partnership working approach in tackling flood risk and environmental management.

### 18.1.2 For developers

#### Sequential approach to development

The NPPF supports a risk-based and sequential approach to development and flood risk in England, so that development is located in the lowest flood risk areas where possible; it is recommended that this approach is adopted for all future developments within the borough.

New development and re-development of land should wherever possible seek opportunities to reduce overall level of flood risk at the site, for example by:

- Reducing volume and rate of runoff through the use of SuDS, as informed by the **Water, People, Places: A guide for master planning sustainable drainage into developments**, the **Kent County Council Drainage and Planning Policy**, Kent County Council's **Making it Happen** guidance for the relevant wastewater treatment catchment
- Relocating development to zones with lower flood risk
- Creating space for flooding
- GI should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space
- Consideration must be given to the potential cumulative impact of development on flood risk.

### Site-specific flood risk assessments

Site specific FRAs are required by developers to provide a greater level of detail on flood risk and any protection provided by defences and, where necessary, demonstrate the development passes part b of the Exception Test. The requirements for developers in preparing FRAs are set out in Section 9.3.

Developers should, where required, undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood extents (including latest climate change allowances), inform development zoning within the site and prove, if required, whether the Exception Test can be passed. Where a site-specific FRA has produced modelling outlines which differ from the Flood Map for Planning then a full evidence-based review would be required. Where the watercourses are embanked, the effect of overtopping and breach must be considered and appropriately assessed.

All new development within the 1% AEP (1 in 100-year) fluvial or 0.5% AEP (1 in 200-year) tidal flood extent including an allowance for climate change (for the lifetime of the development) must not normally result in a net loss of flood storage capacity. Where possible, opportunities should be sought to achieve an increase in the provision of floodplain storage. Where proposed development results in a change in building footprint, the developer should ensure that it does not impact upon the ability of the floodplain to store or convey water and seek opportunities to provide floodplain betterment. Similarly, where ground levels are elevated to raise the development out of the floodplain, compensatory floodplain storage within areas that currently lie outside the floodplain should normally be provided so the total volume of the floodplain storage is not reduced. Any flood risk management measures should be consistent with the wider catchment policies set out in the Catchment Flood Management Plan, Flood Risk Management Plan and Local Flood Risk Management Strategy.

The **NPPF** was last updated in February 2025 and sets out the Government's planning policies for England and how these are expected to be applied.

There are also several guidance documents which provide information on the requirements for site-specific Flood Risk Assessments:

- **Standing Advice on Flood Risk (Environment Agency)**
- **Flood Risk Assessment for Planning Applications (Environment Agency)**
- **Site-specific Flood Risk Assessment: CHECKLIST (PPG, Defra)**

It should be noted that the **UKCP18** was published on 26 November 2018. The UKCP18 projections replace the UKCP09 projections and is the official source of information on how the climate of the UK may change over the rest of this century. When undertaking an FRA, please refer to the most up to date climate change allowances provided by the Environment Agency.

Developers should consult with Swale Borough Council, Kent County Council, the Environment Agency and Southern Water at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling, and drainage assessment and design.

Further considerations for development in Iwade and Minster can be found in Section 12.

### Residual risk

Residual risk is the risk that remains after mitigation measures are considered. The residual risk includes the consideration of flood events that exceed the design thresholds of the flood defences or circumstances where there is a failure of the defences, e.g. flood banks collapse. Residual risks should be considered as part of site-specific Flood Risk Assessments.

Further, any developments located within an area protected by flood risk management measures, where the condition of those defences is ‘fair’ or ‘poor’, where the standard of protection is not of the required standard or where the failure of the intended level of service gives rise to unsafe conditions should be identified.

The risk to development from reservoirs is residual but developers should consider reservoir flooding during the planning stage. They should seek to contact the reservoir owner to obtain information and should apply the sequential approach to locating development within the site. Developers should also consult with relevant authorities regarding emergency plans in case of reservoir breach.

### Safe access and escape

Minimum finished floor levels for development is set out in Section 10.2. If it is not practical to raise floor levels to those specified above, consultation with the Environment Agency will be required to determine alternative approaches.

Safe access and escape will need to be demonstrated at all development sites. Emergency vehicular access should be possible during times of flood.

Where development is located behind, or in an area benefitting from, defences, consideration should be given to the potential safety of the development, finished floor

levels and for safe access and escape in the event of rapid inundation of water due to a defence breach with little warning.

Resilience measures will be required if buildings are situated in the flood risk area, and opportunities to enhance Green Infrastructure and reduce flood risk by making space for water should be sought.

### Drainage strategies and SuDS

Planners should be aware of the conditions set by the LLFA for surface water management and ensure development proposals and applications are compliant with the **Kent County Council Drainage and Planning Policy** for the relevant catchment.

Special consideration should be given to development in Iwade and Minster, details of which can be found in Section 12.2 and Section 12.3 respectively.

### Future flood management

Developments should demonstrate opportunities to create, enhance and link green assets. This can provide multiple benefits across several disciplines including flood risk and biodiversity/ ecology and may provide opportunities to use the land for an amenity and recreational purposes. Development that may adversely affect green infrastructure assets should not be permitted.

The information provided in the SFRA should be used as a basis for investigating potential strategic flood risk solutions within the study area. Opportunities could consist of the following:

- Catchment and floodplain restoration;
- Flood storage areas;
- Opening up culverts, weir removal, and river restoration;
- The Regional Habitat Creation Programme; and
- Green infrastructure.

### MEAS and Sheppey Contribution Zones

A **Medway Estuary & Swale Coastal Risk Management Strategy (MEAS) Contribution Advice Note** has been prepared by Swale Borough Council for developments within the MEAS Contribution Zones. The Advice Note outlines the need for payments to contribute to flood defence works through Planning Obligations/S106 Agreements. The Advice Note sets out the location of the contribution area and requirements for contributions.

## 18.2 Requirements for Level 2

This report fulfils Level 1 SFRA requirements. Following the application of the Sequential Test, where sites cannot be appropriately accommodated in Flood Zone 1, Swale Borough Council may need to apply the NPPF's Exception Test. In these circumstances, a Level 2 SFRA may be required, to consider the detailed nature of the flood characteristics within a Flood Zone and assessment of other sources of flooding.

## 18.3 Technical recommendations

### 18.3.1 Potential modelling improvements

The Environment Agency regularly reviews its flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a site-specific FRA.

### 18.3.2 Updates to SFRA

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 a range of sources, and the potential impacts of future climate change.

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 available from Risk Management Authorities.

It is recommended that the SFRA is reviewed internally, in line with the Environment Agency's Flood Zone map updates to ensure latest data is still represented in the SFRA, allowing a cycle of review and a review of any updated data by checking for any new information available from RMAs including the Environment Agency, Swale Borough Council, Kent County Council and Lower Medway Internal Drainage Board.

# APPENDICES

**Offices at**

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