Castle Point Borough Council Level 2 Strategic Flood Risk Assessment

Castle Point Borough Council

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Quality information

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1. Introduction

1.1 Project Background

1.1.1 "Flood risk" is a combination of the probability and the potential consequences of flooding. Areas at risk of flooding are those at risk from any source of flooding, now or in the future. Sources include rivers and the sea, direct rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems, reservoirs, canals and lakes and other artificial sources. Flood risk also accounts for the interactions between these different sources.

1.1.2 The National Planning Policy Framework[1] (NPPF) and associated Planning Practice Guidance (PPG) for Flood Risk and Coastal Change[2] set out the active role Local Planning Authorities (LPAs) should take to ensure that flood risk is understood and managed effectively and sustainably throughout all stages of the planning process. The NPPF outlines that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA) and LPAs should use the findings to inform strategic land use planning.

1.1.3 The overall approach of the NPPF to flood risk is broadly summarised in Paragraph 170:

"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere".

1.1.4 NPPF Paragraph 181 states:

"When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan".

1.1.5 Castle Point Borough Council (CPBC) is preparing a New Local Plan (Castle Point Plan) which contains the overall vision and framework for future development in the area, addressing needs and opportunities in relation to housing, the economy, community facilities and infrastructure, as well as providing a basis for conserving and enhancing the natural and historic environment, mitigating and adapting to climate change, and achieving well designed places. The emerging Castle Point Plan will set out planning policies and proposals for how communities and places in the Borough will develop up to 2043.

1.1.6 AECOM produced a **Level 1 SFRA** for CPBC, which was finalised in February 2025[3], as described in Section 1.2, and have since been commissioned by CPBC to prepare a **Level 2 SFRA** to inform the ongoing preparation of the emerging Castle Point Plan. This report and associated appendices form the **Level 2 SFRA** for CPBC.

[1] Department for Levelling Up, Housing and Communities. Updated February 2025. *National Planning Policy Framework*. https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] Department for Levelling Up, Housing and Communities. Ministry of Housing, Communities and Local Government. Updated August 2022. *Planning Practice Guidance: Flood Risk and Coastal Change.* https://www.gov.uk/guidance/flood-risk-and-coastal-change
[3] AECOM, February 2025, Castle Point Borough Council Level 1 SFRA.

1.2 Level 1 SFRA

1.2.1 The purpose of a **Level 1 SFRA** is to collate and analyse the most up to date readily available flood risk information for all sources of flooding and provide an overview of flood risk issues across the Borough. The **Level 1 SFRA** considers the risk of flooding now and in the future as a result of climate change.

1.2.2 In order to assess the risk of flooding from rivers (and the sea), the NPPF uses Flood Zones, which describe the risk of flooding from low to high probability. Table 1 in the PPG (Flood Risk and Coastal Change) defines the Flood Zones, and this is reproduced in Table 1-1.

Table 1-1: Flood Zones Definitions (PPG Flood Risk and Coastal Change Table 1)

Flood Zone	Definition	Probability of Flooding
Flood Zone 1	Land having a less than 0.1% annual probability of river or sea flooding. Shown as clear on the Flood Map – all land outside Flood Zones 2 and 3.	Low
Flood Zone 2	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. Shown as light blue on the Flood Map.	Medium
Flood Zone 3a	Land having a 1% or greater annual probability of river flooding; or land having a 0.5% or greater annual probability of sea flooding. Shown as dark blue on the Flood Map.	High
Flood Zone 3b	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% annual probability of flooding, with existing flood risk management features and structures operating effectively, • 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). LPAs should define Flood Zone 3b within their SFRA in agreement with the Environment Agency. It is not separately distinguished from Flood Zone 3a on the Flood Map for Planning (Rivers and Sea).	Functional Floodplain

1.2.3 The **Level 1 SFRA** Report provides guidance on:

- The application of the Sequential Test when allocating future development sites to inform the Local Plan, as well as by developers promoting development on windfall sites. The Sequential Test is the decision-making process whereby future development is steered towards areas of lowest flood risk.
- Managing and mitigating flood risk, the application of sustainable drainage systems (SuDS), and the preparation of site-specific Flood Risk Assessments (FRAs).
- Potential flood risk management objectives and policy considerations which may be developed and adopted by the LPA as formal policies within their emerging Local Plan.

1.3 Level 2 SFRA

1.3.1 The Environment Agency guidance 'How to prepare a strategic flood risk assessment'[4] states that where a **Level 1 SFRA** shows that land outside areas at risk of flooding now or in the future cannot appropriately accommodate all the necessary development, it may be necessary to increase the scope of the assessment to a **Level 2 SFRA** to provide the information necessary for application of the Exception Test, where appropriate. A **Level 2 SFRA** should consider the detailed nature of the flood characteristics within a flood zone including, where possible:

- flood probability;
- flood depth;
- flood velocity;
- rate of onset of flooding; and
- duration of flood.

1.3.2 This more detailed information about the nature of flood risk in the Borough enables users to:

- apply the Sequential Test by identifying the severity and variation in risk *within* medium and high flood risk areas for all sources of flood risk;
- establish whether proposed site allocations or windfall sites, on which the emerging Castle Point Plan will rely, are capable of being made safe throughout their lifetime without increasing flood risk elsewhere; and
- begin to consider the application of the Exception Test, where relevant.

Exception Test

1.3.3 Having applied the Sequential Test, if it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the Exception Test may have to be applied. The purpose of the Exception Test is to ensure that, where it may be necessary to locate development in areas at risk of flooding, new development is only permitted if it can be demonstrated that:

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

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

1.3.4 Both elements of the Exception Test should be satisfied for development to be allocated or permitted.

1.3.5 Table 2 in the PPG Flood Risk and Coastal Change (reproduced in Table 1-2) identifies when the Exception Test is required with regards to Flood Zones. It is noted that some types of development are not permitted, regardless of the application of the Exception Test.

1.3.6 Full details of the vulnerability classifications for different types of development can be found in Table 2[5] of the PPG Flood Risk and Coastal Change. The table does not show the application of the Sequential Test which should be applied first to guide development to the lowest flood risk areas, nor does it reflect the need to avoid flood risk from sources other than rivers and the sea.

[4] Environment Agency, May 2024, *How to prepare a strategic flood risk assessment* https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment
[5] *Planning Practice Guidance (PPG) flood risk and coastal change. Table 2: Flood risk vulnerability and flood zone 'incompatibility'* https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2

Table 1-2: Flood risk vulnerability and Flood Zone 'incompatibility' (PPG Table 2)

Vulnerability Classification		Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone	1	✓	✓	✓	✓	✓
	2	✓	Exception Test Required	✓	✓	✓
	3a	Exception Test Required [a]	×	Exception Test Required	✓	✓
	3b	Exception Test Required [b]	×	×	×	✓ [b]

✓ - Exception Test is not required × - Development should not be permitted

"a" In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
"b" In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- *remain operational and safe for users in times of flood,*
- *result in no net loss of floodplain storage,*
- *not impede water flows and not increase flood risk elsewhere.*

1.4 Report Structure

Datasets and Consultation

1.4.1 To inform the development of the **Level 2 SFRA**, the flood risk datasets presented within the **Level 1 SFRA** have been used which were acquired in February 2024. These have been provided by the Environment Agency, Essex County Council (ECC) (in their role as the Lead Local Flood Authority (LLFA)), and CPBC. **Section 2** of this Report provides information on the datasets used.

Mapping

1.4.2 Borough wide mapping of flood risk datasets is included in the online Story Map[6] to enable comparison of the flood risk across the study area. Mapping local to each of the sites considered in this **Level 2 SFRA** is provided in the site assessments in **Appendix A.**

Site Screening to support the Sequential Test

1.4.3 A number of factors are influencing the spatial strategy in the Castle Point Borough and a large pool of potential allocation sites has been under consideration during the preparation of the emerging Castle Point Plan.

1.4.4 A high level sieving exercise has been undertaken to identify:

- Proportion of the site in each Flood Zone as shown on the Flood Map for Planning and Reduction in Risk of Flooding from Rivers and Sea due to Defences.
- Flood Warning Area, Flood Priority Area and Recorded Flood Outline in which the site is located.
- The sites proximity to the nearest Main River and Ordinary Watercourse.
- Sewer flood records based on the site's postcode area.
- River Management, Operational and Body catchment in which the site is located.
- Groundwater Management, Operational and Body catchment in which the site is located.
- The sites Bedrock and Superficial Geology and Susceptibility to Groundwater Flooding status.

[6] AECOM, 2025, Castle Point Online Story Map.

- Proportion of the site at high, medium or low risk of surface water flooding, based on the Risk of Flooding from Surface Water map. The low risk of flooding from surface water layer can be used as an indication of future flood risk.
- Proportion of the site at risk of reservoir inundation.

1.4.5 This information was provided to CPBC in an MS Excel Workbook to enable the application of the sequential approach to their site selection.

1.4.6 CPBC has used the information from the high-level sieving exercise, alongside other evidence on general site suitability, sustainability, transport and biodiversity, to identify which sites should be included in the CPBC Local Plan. At this time, only suitable urban sites have been identified. CPBC have identified 35 sites for consideration within this **Level 2 SFRA**.

Site Assessment Proformas

1.4.7 AECOM have prepared site assessment proformas for sites that were identified to be within Flood Zone 2 and/or Flood Zone 3 or have access routes within the Flood Zones. These are included in **Appendix A**. The purpose of the **Level 2 SFRA** is to assess the flood risk posed to the sites and inform the Exception Test, as described in **Section 1.3**.

1.4.8 Consideration has also been made of those sites that are at surface water flood risk or have access routes at surface water flood risk. The online Story Map and mapping in **Appendix B** has been used to undertake these assessments.

1.5 Future Updates

1.5.1 SFRAs are intended to be living documents which are kept up to date as information on flood risk management changes.

1.5.2 The Environment Agency SFRA guidance[4] states that in order to remain up to date, it may be necessary to update a SFRA to incorporate any changes to:

- the predicted impacts of climate change on flood risk;
- flood products, for example surface water mapping, flood map for planning;
- detailed flood modelling - such as from the Environment Agency or LLFA;
- the local plan, spatial development strategy or relevant local development documents;
- local flood management schemes;
- flood risk management plans;
- local flood risk management strategies; and
- national planning policy or guidance.

1.5.3 In addition, the SFRA may also need to be reviewed after any significant flood event.

1.5.4 It is noted that future changes to modelling, planning guidance, or climate change impacts may alter the level of risk posed to a specific site. The most up-to-date flood risk data must be used throughout the planning process to inform ongoing site planning and development design.

NAFRA2

1.5.5 It is noted at the time of writing the Environment Agency are in the process of publishing a suite of datasets as part of the national flood and coastal erosion risk information[7] (NAFRA2) which might be useful in the future. As part of NAFRA2, the Environment Agency are publishing:

- New Flood Zone Data on the Flood Map for Planning.
- New risk of flooding from rivers and sea.
- New risk of flooding from surface water.
- New National Coastal Erosion Risk Map.

[7] Environment Agency, 2025, New national flood and coastal erosion risk information. Available at: https://www.gov.uk/guidance/updates-to-national-flood-and-coastal-erosion-risk-information

2. Datasets

2.1 Overview

2.1.1 The following datasets and sources of information (which were used as part of the **Level 1 SFRA**) have been obtained to inform the **Level 2 SFRA**.

2.2 River Modelling Outputs

2.2.1 A number of hydraulic river models were provided by the Environment Agency at the start of the **Level 1 SFRA** project in January/February 2024. The models were checked for completeness, date of preparation and the hydrological methods used. Outputs from the models have been used to define the Flood Zone 3b functional floodplain and to map the impacts of climate change on floodplain extents in the future.

2.2.2 For the purposes of the SFRA it was proposed that for flooding from fluvial sources only the Prittle Brook and Benfleet Hall Brook model will be used. There are a number of other Main Rivers on Canvey Island which currently do not have any flood zones directly associated with them (as this area is subsumed by the tidal flood zones).

2.2.3 The hydraulic models for the Prittle Brook and Benfleet Hall Brook were re-run for the latest climate change allowances as part of the **Level 1 SFRA**. In some cases, updates to the hydrological analysis informing the model have been updated. Section 2.3 of the **Level 1 SFRA** summarises the models that have been received, how they have been used in the SFRA and any updates that have been undertaken. Full details of re-simulations are documented in a separate standalone Technical Note [60725540-FF-001[8]].

Climate Change Allowances

2.2.4 The Environment Agency's online guidance 'Flood risk assessments: climate change allowances'[9] sets out the climate change allowances for peak river flows that should be considered for specific 'management catchments' and provides advice on applying climate change projections when preparing FRAs. The allowances for the management catchments of relevance to the Castle Point study area are set out in Table 2-1. The northern area of the Borough is located within the Combined Essex management catchment and Canvey Island is located within the South Essex management catchment.

2.2.5 A range of allowances are provided based on percentiles[10]. The guidance states that for SFRAs the *central* and *higher central* allowances should be used (shaded in grey). When preparing site specific FRAs, the allowance that should be considered is based on the Flood Zone and the vulnerability classification of the development. For example, where More Vulnerable or Less Vulnerable development is proposed in Flood Zones 2 or 3a, the *central* allowance should be applied.

2.2.6 The allowances that have been used within this **Level 2 SFRA** are detailed in the following sections. These take into account the allowance specified in the guidance (as noted in Table 2-1) as well as considering what modelled flood extents are *available* within the hydraulic models received from the Environment Agency.

[8] AECOM, 2024, Castle Point Strategic Flood Risk Assessment, Fluvial Modelling Technical Note, 60725540-FF-001.
[9] Environment Agency (published 2016 and updated May 2022) Flood risk assessments: climate change allowances. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
[10] A percentile describes the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flow fall below it, and half fall above it. The central allowance is based on the 50th percentile; higher central allowance is based on the 70th percentile; upper end allowance is based on the 95th percentile.

Table 2-1: Peak River Flow Allowances for management catchments in Castle Point (based on a 1981 to 2000 baseline)

Management Catchment	Allowance Category	Total potential change anticipated for the '2020's (2015 to 2039)	Total potential change anticipated for the '2050's (2040 to 2069)	Total potential change anticipated for the '2080's (2070 to 2125)
South Essex	Upper end (95th)	22%	27%	48%
	Higher central (70th)	11%	11%	**26%**
	Central (50th)	6%	5%	**17%**
Combined Essex	Upper end (95th)	27%	37%	72%
	Higher central (70th)	13%	16%	**38%**
	Central (50th)	7%	8%	**25%**

2.2.7 Hydraulic modelling of the Prittle Brook and Benfleet Hall Brook includes increases in peak river flow due to the impacts of climate change. Both watercourses are located in the Combined Essex Management Catchment. Scenarios have been undertaken to consider the change to the 3.3%, 1% and 0.1% Annual Exceedance Probability (AEP) flood extents (excluding the presence of defences) when applying increases of 25% (central) and 38% (higher central) to peak river flow. These provide a suitable indication of the central and higher central allowances for the 2080s epoch. These are mapped in the online Story Map and the **Level 1 SFRA**.

Design Event Flood Outlines

2.2.8 The available modelled outputs for the 1% AEP + 25% climate change (central) have been used as the design event within this **Level 2 SFRA** and the site assessments in **Appendix A.**

Flood Zone 3b Flood Outlines

2.2.9 A conservative approach has been taken to define areas of Flood Zone 3b functional floodplain using the 3.3% AEP undefended model results. This is due to the absence of defended models. The only AIMS flood defence within the Prittle Brook model has been removed as it is located outside of the Castle Point administrative area and has no impact on the model outputs in the area of interest. The formal AIMS defences for the Benfleet Hall Brook have been removed from the 1D model. This includes the raised flood embankments around the flood storage area and the wall around the downstream tidal outfall culvert.

2.2.10 The 3.3% AEP flood extents have been used as the starting point from which to delineate Flood Zone 3b Functional Floodplain for CPBC, as mapped in the online Story Map and the site assessments in **Appendix A**.

2.3 Tidal Modelling Outputs

2.3.1 In order to determine the risk of flooding from the Thames Estuary, the scope of the **Level 1 SFRA** included modelling of overtopping and breach in the tidal defences throughout the study area for the 0.5% and 0.1% AEP events for both the present day (2025) and for 2125, taking account of climate change. Full details are documented in a separate standalone Technical Note [60725540-TF-001[11]].

2.3.2 The breach locations cover two flood cells (Canvey Island and Hadleigh Marshes). All of the breach locations are at walls, embankments or barriers. There are no breaches at structures (i.e. gates, sluices etc.). In total, 9 breach locations are located around Canvey Island and 1 further breach location at Hadleigh Marsh.

2.3.3 The following outputs were produced from the hydraulic modelling: maximum flood extents, maximum flood depth, maximum flood hazard grids and maximum water level grids.

[11] AECOM, 2024, Castle Point Strategic Flood Risk Assessment, Tidal and Breach Modelling Technical Note, 60725540-TF-001

2.3.4 Time to inundation mapping has also been produced which illustrates the length of time it would take floodwater from a breach to reach a particular site during a 0.1% AEP 2125 upper end climate change scenario.

2.3.5 Flood 'hazard' categorises the danger to people for different combinations of flood water depth and velocity. The derivation of these categories is based on the methodology set out by Defra in their Flood Risk Assessment Guidance for New Development FD2320/TR2[12] using the following equation:

- *Flood Hazard Rating = ((v+0.5) *D) + DF Where v = velocity (m/s), D = depth (m), DF = debris factor*

2.3.6 The resulting values are grouped into hazard ratings as shown in Table 2-2.

Table 2-2: Flood Hazard Categories

Flood Hazard		Description
Low	HR < 0.75	Caution – Flood zone with shallow flowing water or deep standing water
Moderate	0.75 ≥ HR ≤ 1.25	Dangerous for some (i.e., children) – Danger: flood zone with deep or fast flowing water
Significant	1.25 > HR ≤ 2.0	Dangerous for most people – Danger: flood zone with deep fast flowing water
Extreme	HR > 2.0	Dangerous for all – Extreme danger: flood zone with deep fast flowing water

2.3.7 The following outputs from the modelling undertaken to inform the **Level 1 SFRA** have been used in this **Level 2 SFRA** and are available on the online Story Map.

Overtopping Results

- 0.5% AEP (2125 Higher Central) – Maximum Depth (m)
- 0.5% AEP (2125 Higher Central) – Maximum Hazard Rating
- 0.1% AEP (2125 Higher Central) – Maximum Depth (m)
- 0.1% AEP (2125 Higher Central) – Maximum Hazard Rating

Breach Modelling Results

- 0.5% AEP (2125 Higher Central) – Maximum Depth (m)
- 0.5% AEP (2125 Higher Central) – Maximum Hazard Rating
- 0.1% AEP (2125 Higher Central) – Maximum Depth (m)
- 0.1% AEP (2125 Higher Central) – Maximum Hazard Rating
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS01
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS02
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS03
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS04
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS05
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS06
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS07
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS08
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location CAS09
- 0.1% AEP (2125 Upper End) – Time to Inundation Breach Location SOU01

Design Event Flood Outlines

2.3.8 The design event for tidal flooding is the 0.5% AEP 2125 higher central climate change overtopping scenario.

[12] Defra and Environment Agency (2005) FD2320/TR2 Flood Risk Assessment Guidance for New Development.

2.4 Risk of Flooding from Surface Water

2.4.1 The Environment Agency's Risk of Flooding from Surface Water (RoFSW) dataset includes GIS layers showing the extent of flooding from surface water that could result from a flood with a 3.3%, 1% and 0.1% AEP in any given year.

2.4.2 It is noted that the RoFSW mapping is not to be used at property level. This is due to the way the maps have been produced and the fact that they are indicative. The maps are therefore not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

2.4.3 The scope of the **Level 1 SFRA** included updated modelling of surface water throughout the study area. The modelling was simulated for the 3.3% AEP, 1% AEP and 0.1% AEP events and these events including climate change using the upper end peak rainfall allowance for the 2080s epoch. The upper end peak rainfall allowance in the 2080s epoch for both management catchments in the Borough is 40% as outlined below. Further details are documented in a separate standalone Technical Note [60725540-SWF-001[13]].

2.4.4 The outputs from the surface water modelling undertaken to inform the **Level 1 SFRA** have been used in this **Level 2 SFRA.** Mapping for the whole study area, including the sites considered in this **Level 2 SFRA**, is included within the online Story Map. Mapping local to each of the sites considered in this **Level 2 SFRA** is provided in the site assessments in **Appendix A**.

Climate change

2.4.5 The Environment Agency's online guidance 'Flood risk assessments: climate change allowances'[14] sets out the climate change allowances for peak rainfall intensity allowances for specific 'management catchments' and provides advice on applying climate change projections when preparing flood risk assessments. The allowances for the management catchments of relevance to Castle Point are set out in Table 2-3.

Table 2-3: Peak Rainfall Intensity Allowances for management catchments in Castle Point

Management Catchment	AEP	Epoch 2050s (2022-2060) or 2070s (2061-2125)	Central Allowance	Upper End Allowance
South Essex	3.3%	'2050s'	20%	35%
	3.3%	'2070s'	20%	35%
	1%	'2050s'	20%	45%
	1%	'2070s'	25%	40%
Combined Essex	3.3%	'2050s'	20%	35%
	3.3%	'2070s'	20%	35%
	1%	'2050s'	20%	45%
	1%	'2070s'	25%	40%

2.5 Groundwater Flooding

BGS Susceptibility to Groundwater Flooding

2.5.1 The British Geological Survey (BGS) dataset 'Susceptibility to Groundwater Flooding' can be used to identify where there is potential for groundwater flooding to occur based on geological and hydrogeological information.

2.5.2 The information shown in the Susceptibility to Groundwater Flooding mapping is based on conceptual understanding of the regional geology and hydrogeology and is therefore only an indication of where

[13] AECOM, 2024, Castle Point Strategic Flood Risk Assessment, Surface Water Modelling Technical Note, 60725540-SWF-001.
[14] Environment Agency (published 2016 and updated May 2022) Flood risk assessments: climate change allowances. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

groundwater flooding may occur. It does not indicate hazard or risk, any information on the depth to which groundwater flooding may occur, nor the likelihood of the occurrence of an event of a particular magnitude. This information should not be used in isolation to make planning decisions at any scale or to indicate the risk of groundwater flooding, but it does provide a high level overview of the potential for groundwater flooding. The map shows the following information:

- **Limited potential for groundwater flooding to occur**: In this area there is a limited potential, based on an understanding of the underlying geology and hydrogeological conditions, that groundwater flooding may occur.
- **Potential for groundwater flooding of property situated below ground level**: In this area there is the potential, based on an understanding of the underlying geology and hydrogeological conditions, that groundwater flooding may occur in property or infrastructure *below ground level*, such as basements.
- **Potential for groundwater flooding to occur at surface**: In this area there is the potential, based on an understanding of the underlying geology and hydrogeological conditions, that groundwater flooding may occur *above the ground*.

2.5.3 All other areas are not considered to be prone to groundwater flooding.

2.5.4 Most climate change models indicate an increased likelihood of drier summers, albeit with more intense rainfall when it occurs, and wetter winters. As groundwater flooding occurs primarily as a response to extended periods of rain during late autumn and early winter, there may be an increased risk of groundwater flooding arising from these changing rainfall patterns. However, the complex relationship between rainfall, recharge, groundwater storage and flow make the response to climate change uncertain. As a result, no further modelling or mapping has been undertaken to specifically identify the risk of groundwater flooding in the future as a result of climate change. It is considered that the locations of groundwater flooding are likely to remain similar to those identified in the BGS mapping, however the impact of climate change may be to increase the frequency and severity of groundwater flooding in those locations.

2.5.5 Mapping for the whole study area, including the sites considered in this **Level 2 SFRA**, is included within the online Story Map and **Level 1 SFRA**. Mapping local to each of the sites considered in this **Level 2 SFRA** is provided in the site assessments in **Appendix A**.

2.6 Reservoir Flooding

2.6.1 The Environment Agency's reservoir flood extents include the extents for all large, raised reservoirs in the event that they were to fail and release the water held on both a dry and wet day when local rivers are at normal levels. This is a 'worst case scenario' and it is unlikely that any actual flood would be this large. This data does not give an indication of the probability of reservoir flooding occurring.

2.6.2 The likelihood of reservoir flooding is much lower than other forms of flooding. Current reservoir regulation, which has been further enhanced by the Flood and Water Management Act, aims to make sure that all reservoirs are properly maintained and monitored in order to detect and repair any problem[15].

2.6.3 Mapping local to each of the sites considered in this **Level 2 SFRA** is provided in the site assessments in **Appendix A**.

2.7 Historic Flood Records

Recorded Flood Outlines

2.7.1 The Environment Agency dataset 'Recorded Flood Outlines[16]has been used to inform the **Level 2 SFRA** site assessments. The dataset shows there has been one significant fluvial flood event associated with the Benfleet Hall Brook (September 1968)[16]. No fluvial flood events associated with the Prittle Brook are indicated by the dataset in the Borough.

[15] Press Release: 'Reservoir flood maps published' https://www.gov.uk/government/news/reservoir-flood-maps-published
[16] Environment Agency Recorded Flood Outlines https://www.data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines (Accessed February 2024)

2.7.2 Mapping for the whole study area, including the sites considered in this **Level 2 SFRA**, is included within the online Story Map and the **Level 1 SFRA**. Mapping local to each of the sites considered in this **Level 2 SFRA** is provided in the site assessments in **Appendix A**.

Lead Local Flood Authority Records

2.7.3 In their role as the LLFA, ECC has duties to record and investigate flood incidents relating to local sources of flooding, namely flooding from surface water, groundwater and ordinary watercourses. ECC has provided a GIS layer of Flood Incidents to inform the **Level 1 SFRA**.

2.7.4 This dataset is presented spatially in the online Story Map and the **Level 1 SFRA**. Mapping local to each of the sites considered in this **Level 2 SFRA** is provided in the site assessments in **Appendix A**.

Sewer Flooding Records

2.7.5 Anglian Water Services Limited (AWSL) provided an extract from their register of flooded properties for the study area. This shows properties that have been affected by sewer flooding (as reported to AWSL) since April 2013. Due to data protection requirements, this data has not been provided at the individual property level; rather the register comprises the number of properties within 4-digit postcode areas that have experienced flooding, either internally or externally, since April 2013. It should be noted that it is likely that there have also been unreported sewer flooding incidents in this area over this time period.

2.7.6 This data has been referred to within the **Level 2 SFRA** site assessments in **Appendix A**.

3. Level 2 SFRA Site Assessments

3.1 Overview

3.1.1 Table 3-1 provides a summary of flood risk issues and constraints for all 35 sites which have been grouped into clusters. It is noted in Table 3-1 whether or not the Exception Test is required in accordance with Table 2 of the PPG (Table 1-2), based on Flood Zone and development vulnerability classification.

3.1.2 AECOM have prepared site assessment proformas for sites that were identified to be within Flood Zone 2 and/or Flood Zone 3 or have access routes within the Flood Zones. These are included in **Appendix A**.

Table 3-1: Summary of flood risk issues and constraints

Site Reference / Allocation Number	Area (ha)	Address	Units	Year in Local Plan (when development is likely to occur)	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Proportion of site at risk of flooding from rivers during design event (1% AEP + central CC allowance)	Proportion of site at risk of flooding from overtopping during design event (0.5% AEP + higher central CC allowance)	Proportion of site at risk of flooding from breach (0.5% AEP + higher central CC allowance)	Risk of Flooding from Surface Water: from modelled data	Susceptibility to Groundwater Flooding (BGS Dataset)	Exception Test Required?	Summary of Flood Risk Constraints and Safety of Development (Refer to Appendix A for full details and recommendations for each site highlighted in Orange).
Benfleet															
40014 / B8c	0.224	312-320 London Rd (Queen Bee's)	22	Developable 6-17	100	0	0	0	0	0	0	Majority of site at very low risk with small area at low risk. Access route at high risk.	Not shown to be prone to groundwater flooding.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water with a small area to the north of the site (4%) at low risk (≥0.1% AEP). The access route to the west on London Road (A13) is at high risk of surface water flooding including climate change.
40081 / B5	0.644	Canvey Supply, 223 London Road	80	Developable 6-17	100	0	0	0	0	0	0	Majority of site at very low risk with small area of low to high risk. Access route at high risk.	Potential at surface.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water with a small area to the south of the site (9%) at low to high risk. The access route to the west on London Road (A13) is at high risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates the potential for groundwater flooding to occur at surface in the area.
40120 / B8a	0.391	Richmond Avenue Car Park	27	Developable 6-17	97	1	0	2	2.6	0	65	Site at high risk. Surrounding area at high risk.	Not shown to be prone to groundwater flooding.	Development is not permitted in Flood Zone 3b. Exception Test is not required for More Vulnerable development in Flood Zone 1 and 2. Where possible, development should be sequentially located outside of the surface water flood risk area.	The Benfleet Hall Brook (Main River) runs along the western boundary of the site. Most of the site (97%) is defined as Flood Zone 1, 1% is defined as Flood Zone 2 and 2% is defined as Flood Zone 3b (derived from the Benfleet Hall Brook model). Development is not permitted in Flood Zone 3b. Modelling for the Benfleet Hall Brook shows that during the design event (1% AEP plus a 25% climate change allowance), a small area (2.6%) on the western boundary of the site is at risk of flooding. The site is at residual risk of flooding in the event of the failure of flood risk management infrastructure. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants. The modelled surface water risk mapping indicates a surface water flow path to the west of the site associated with the Benfleet Hall Brook. 24% of the site is at low risk, 14% at medium risk and 18% at high risk, a total of 56% of the site. The local road network is at high risk of surface water flooding including the access road to the north along High Road. New development within 8m of a Main River will require consent from the Environment Agency. (Guidance on Environment Agency Flood Risk Activity Permits is available online https://www.gov.uk/guidance/flood-risk-activities-environmental-permits). An 8m wide undeveloped buffer strip should be retained from top of bank alongside Main Rivers. Finished Floor Levels for residential accommodation must be above the design fluvial flood event (1% AEP including central climate change allowance) plus a minimum 300mm freeboard. Development should be steered away from areas within the fluvial design event along the western edge of the site. If this part of the site is considered for development, level for level and volume for volume floodplain compensation storage must be provided. Refer **Level 1 SFRA** Section 5.6. Safe access/egress is achievable to the north along Richmond Avenue which leads to the B1006 High Road.
40155 / B8b	0.145	L/a Villa Park, Tarmarisk	10	Developable 6-17	100	0	0	0	0	0	0	Site at low to medium risk. Surrounding roads at low to medium risk.	Not shown to be prone to groundwater flooding.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates there is a low to medium risk surface water flow path through the site. The access route to the north on Kents Hill Road is at low risk with a small area of medium risk.
40204 / B6	0.402	159-169 Church Road	22	Developable 6-17	100	0	0	0	0	0	0	Site is at very low risk. Access route at high risk.	Potential at surface.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk indicates the site is at very low risk of surface water flooding. The access road to the south of the site along Church Road is not at risk directly outside of the site, however further south, towards the junction with the London Road (A13), it is at high risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates the potential for groundwater flooding to occur at surface in the area.
40267 ' B7	0.462	Rear of 179-181 Church Road	62	Developable 6-17	100	0	0	0	0	0	0	Site is at very low risk. Access route at high risk.	None shown to be prone to groundwater flooding.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk indicates the site is at very low risk of surface water flooding. The access road to the south of the site along Church Road is not at risk directly outside of the site, however further south, towards the junction with the London Road (A13), it is at high risk of surface water flooding.

Site Reference / Allocation Number	Area (ha)	Address	Units	Year in Local Plan (when development is likely to occur)	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Proportion of site at risk of flooding from rivers during design event (1% AEP + central CC allowance)	Proportion of site at risk of flooding from overtopping during design event (0.5% AEP + higher central CC allowance)	Proportion of site at risk of flooding from breach (0.5% AEP + higher central CC allowance)	Risk of Flooding from Surface Water: from modelled data	Susceptibility to Groundwater Flooding (BGS Dataset)	Exception Test Required?	Summary of Flood Risk Constraints and Safety of Development (Refer to Appendix A for full details and recommendations for each site highlighted in Orange).
Canvey Island															
40115 / C2	2.104	Knightswick Shopping Centre	210	Developable 6-17	0	0	100	0	0	0	100	Site is at high risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water. A small area of the site in the north is at high risk of flooding from surface water, including an allowance for climate change and a small area of the site in the south east is at high risk from a surface water flow path along Folksville Road. The access route to the south on Furtherwick Road is at high risk of surface water flooding and Central Wall Road to the north is at low risk of surface water flooding.
40236 / C3	0.093	Canvey Library + Barclays	9	Developable 6-17	0	0	100	0	0	0	100	Site is at high risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants. The modelled surface water risk mapping indicates that the majority of the site is at risk of flooding from surface water with 39% at low risk, 13% at medium risk and 13% at high risk. The access route to the south on Furtherwick Road is at high risk of surface water flooding and Central Wall Road to the north is at low risk of surface water flooding.
40392 / C4	0.479	Grouts and land to rear	23	Developable 6-17	0	0	100	0	0	0	71	Site is at low risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40462 / C5	0.29	Long Rd & Furtherwick Rd Cluster	29	Developable 6-17	0	0	100	0	0	0	97	Site is at very low risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40112 / C7	1.559	L/a The Paddocks	124	Developable 6-17	0	0	100	0	0	0	100	Site is at high risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants. A tributary of Thorneycreek Fleet runs along the south west boundary of the site and flows in a south westerly direction before flowing into the Thames Estuary. The watercourse may be culverted and should therefore be investigated further as part of a site specific Flood Risk Assessment. An 8m wide buffer strip should be retained alongside Ordinary Watercourses and opportunities should be explored for riverside restoration and deculverting (where applicable). New development within 8m of an Ordinary Watercourse will require consent from Essex County Council (as LLFA). The modelled surface water risk mapping indicates the site is at low to high risk of flooding from surface water, predominantly in the south of the site with a flow path to the watercourse along the south west

Site Reference / Allocation Number	Area (ha)	Address	Units	Year in Local Plan (when development is likely to occur)	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Proportion of site at risk of flooding from rivers during design event (1% AEP + central CC allowance)	Proportion of site at risk of flooding from overtopping during design event (0.5% AEP + higher central CC allowance)	Proportion of site at risk of flooding from breach (0.5% AEP + higher central CC allowance)	Risk of Flooding from Surface Water: from modelled data	Susceptibility to Groundwater Flooding (BGS Dataset)	Exception Test Required?	Summary of Flood Risk Constraints and Safety of Development (Refer to Appendix A for full details and recommendations for each site highlighted in Orange).
															boundary. The access route to the south on Furtherwick Road is at high risk of surface water flooding and Central Wall Road to the north is at low risk of surface water flooding.
40298 / C8(a)	0.407	Oak Road Car Park	44	Developable 6-17	0	0	100	0	0	0	100	Site is at very low risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40273 / C8(b)	0.533	Venables Close Cluster	55	Developable 6-17	0	0	100	0	0	0	100	Site is at low to medium risk. Access routes are at low to medium risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants. An unnamed tributary of Leigh Beck flows south through the centre of the site. Leigh Beck is located approximately 6m south of the site and flows south into the Thames Estuary. The watercourse may be culverted and should therefore be investigated further as part of a site specific Flood Risk Assessment. An 8m wide buffer strip should be retained alongside Ordinary Watercourses and opportunities should be explored for riverside restoration and deculverting (where applicable). New development within 8m of an Ordinary Watercourse will require consent from Essex County Council (as LLFA). The modelled surface water risk mapping indicates the site is at low to medium risk of flooding from surface water which is associated with the ordinary watercourse through the site. The access route to the north on the High Street is at low to medium risk of surface water flooding.
10010 / C8(c)	0.13	Canvey Job Centre	13	Developable 6-17	0	0	100	0	0	0	100	Site is at very low risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40276 / C15	2.648	Land at The Point	172	Developable 6-17	0	0	100	0	0	0	97	Majority of site at very low risk with small area at low to high risk. Access routes are at medium to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants. change), capable of accommodating the likely number of occupants. An unnamed tributary of Smallgains Creek flows west along the northern boundary of the site. The watercourse may be culverted and should therefore be investigated further as part of a site specific Flood Risk Assessment. An 8m wide buffer strip should be retained alongside Ordinary Watercourses and opportunities should be explored for riverside restoration and deculverting (where applicable). New development within 8m of a Main River will require consent from the Environment Agency. A 19m wide undeveloped buffer strip should be retained from the tidal flood defences to the north of the site at Smallgains Marina. New development within 19m of the tidal flood defences will require consent from the Environment Agency (guidance on Environment Agency Flood Risk Activity Permits is available online https://www.gov.uk/guidance/flood-risk-activities-environmental-permits). The modelled surface water risk mapping indicates the majority of the site is at very low risk of surface water flooding. There are some small areas of low to high surface water flood risk towards the site boundary which increases when taking climate change into account. The access route to the west on Point Road is at medium to high risk of surface water flooding.

Site Reference / Allocation Number	Area (ha)	Address	Units	Year in Local Plan (when development is likely to occur)	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Proportion of site at risk of flooding from rivers during design event (1% AEP + central CC allowance)	Proportion of site at risk of flooding from overtopping during design event (0.5% AEP + higher central CC allowance)	Proportion of site at risk of flooding from breach (0.5% AEP + higher central CC allowance)	Risk of Flooding from Surface Water: from modelled data	Susceptibility to Groundwater Flooding (BGS Dataset)	Exception Test Required?	Summary of Flood Risk Constraints and Safety of Development (Refer to Appendix A for full details and recommendations for each site highlighted in Orange).
40082 / C16(a)	0.106	Former Admiral Jellicoe, High Street	7	Developable 6-17	0	0	100	0	0	0	100	Site is at very low risk. Access routes are at low to medium risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40125 / C16(b)	0.404	Land to the rear of North Avenue	21	Developable 6-17	0	0	100	0	0	0	100	Majority of site at very low risk with small area at low to high risk. Access routes are at low to medium risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants. An unnamed ordinary watercourse flows south along the eastern boundary of the site, before flowing south into Thorneycreek Fleet and out to the Thames Estuary. The watercourse may be culverted and should therefore be investigated further as part of a site specific Flood Risk Assessment. An 8m wide buffer strip should be retained alongside Ordinary Watercourses and opportunities should be explored for riverside restoration and deculverting (where applicable). New development within 8m of an Ordinary Watercourse will require consent from Essex County Council (as LLFA). The modelled surface water risk mapping indicates the majority of the site is at very low risk of surface water flooding with a small area to the south of the site boundary at low to high risk of surface water flooding which increases slightly with climate change. The map indicates the local road network may be susceptible to low to medium risk surface water ponding.
40231 / C16(c)	0.19	Essex Coachworks, 218 High Street	19	Developable 6-17	0	0	100	0	0	0	100	Site is at very low risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
38042 / C16(d)	0.322	Former Council Offices, Long Rd	32	Developable 6-17	0	0	100	0	0	0	100	Site and access routes are at very low risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40134 / C16(e)	0.107	Corner of Little Gypps Rd & Willow Cl	7	Developable 6-17	0	0	100	0	0	0	100	Majority of site at very low risk with small area at low risk. Access routes are at low risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.

Site Reference / Allocation Number	Area (ha)	Address	Units	Year in Local Plan (when development is likely to occur)	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Proportion of site at risk of flooding from rivers during design event (1% AEP + central CC allowance)	Proportion of site at risk of flooding from overtopping during design event (0.5% AEP + higher central CC allowance)	Proportion of site at risk of flooding from breach (0.5% AEP + higher central CC allowance)	Risk of Flooding from Surface Water: from modelled data	Susceptibility to Groundwater Flooding (BGS Dataset)	Exception Test Required?	Summary of Flood Risk Constraints and Safety of Development (Refer to Appendix A for full details and recommendations for each site highlighted in Orange).
40130 / C16(f)	0.189	Ozonia Gardens, Eastern Esplanade	12	Developable 6-17	0	0	100	0	0	0	100	Majority of site at very low risk with small area at low risk when including climate change. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40129 / C16(g)	0.171	Land between Station Rd & Seaview Rd	11	Developable 6-17	0	0	100	0	0	0	100	Site is at very low risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
39880 / C1	0.1	Matrix House, 12-16 Lionel Rd	10	Developable 6-17	0	0	100	0	0	0	100	Majority of site at very low risk with area at low risk. Access routes are at low to high risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
40255 / C10(c)	0.121	Kushi, Furtherwick Rd	8	Developable 6-17	0	0	100	0	0	0	100	Site is at very low risk. Access routes are at low to medium risk.	Not shown to be prone to groundwater flooding.	Exception Test required: Site is fully located within Flood Zone 3a. Proposed development has a vulnerability classification of More Vulnerable.	The site, and the whole of Canvey Island, is defined as Flood Zone 3a 'High probability' of flooding from the Thames Estuary. Canvey Island is surrounded by tidal flood defences which provide a high level of protection. During the design event (0.5% AEP) for the year 2125, the site and Canvey Island is shown to be protected from flooding from the Thames. The site is therefore at residual risk of flooding from the sea, in the event of a breach or failure of flood defences. An internally accessible place of safety should be defined within the proposed development above the breach flood level (0.1% AEP including climate change), capable of accommodating the likely number of occupants.
Hadleigh															
38024 / Had2	0.628	The Island Site, High St / London Rd	74	Developable 6-17	100	0	0	0	0	0	0	Site is at very low risk. Access routes at low to medium risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or the sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the site is at very low risk of surface water flooding. The access road to the south of the site on the High Street is at very low risk of surface water flooding, however there is some low to medium risk ponding further east. The access road to the north of the site along London Road (A13) is at low risk of flooding when including an allowance for climate change.
39985 / Had3	0.375	Johnsons Factory, London Road	44	Developable 6-17	100	0	0	0	0	0	0	Majority of site is at very low risk. Access routes at low to medium risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or the sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water. The surrounding roads are at low to medium risk of surface water flooding including the access routes to the west on London Road and to the north on Meadow Road.

Site Reference / Allocation Number	Area (ha)	Address	Units	Year in Local Plan (when development is likely to occur)	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Proportion of site at risk of flooding from rivers during design event (1% AEP + central CC allowance)	Proportion of site at risk of flooding from overtopping during design event (0.5% AEP + higher central CC allowance)	Proportion of site at risk of flooding from breach (0.5% AEP + higher central CC allowance)	Risk of Flooding from Surface Water: from modelled data	Susceptibility to Groundwater Flooding (BGS Dataset)	Exception Test Required?	Summary of Flood Risk Constraints and Safety of Development (Refer to Appendix A for full details and recommendations for each site highlighted in Orange).
40118 / Had4(a)	0.317	Castle Lane Car Park	38	Developable 6-17	100	0	0	0	0	0	0	Majority of site is at very low risk with a small area of low risk. Access routes at very low to low risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or the sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water with a small area in the centre of the site (7%) at low risk. The access route to the south of the site on Castle Lane is at low risk of surface water flooding. The access route to the north on Castle Lane is at very low risk of surface water flooding.
40195 / Had6	0.093	Hadleigh Clinic, 49 London Road	11	Developable 6-17	100	0	0	0	0	0	0	Site is at very low risk. Access routes at low to high risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the site is at very low risk of surface water flooding. The access route to the south east of the site along Kiln Road (A13) is at very low risk of flooding, although there are areas of low to medium risk through Hadleigh. The access route leading north along the A129 has a small area of high risk.
40034 / Had7	1.142	Land South of Scrub Lane	80	Developable 6-17	100	0	0	0	0	0	0	Site is at very low risk. Access routes at low risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. . The modelled surface water risk mapping indicates there is a very low risk of surface water flooding at the site. The access route to the west on Scrub Lane and New Road has a small area of low risk ponding. The access route to the east along Scrub Lane is at low risk of flooding.
40220 / B8	0.07	Osbourne Motor Company, London Road	8	Developable 6-17	100	0	0	0	0	0	0	Site is at very low risk. Access routes at low risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates there is a very low risk of flooding from surface water at the site. The access road to the north of the site along London Road has some small areas of low risk ponding. This ponding increases with some areas of high risk when an allowance for climate change is considered.
Kiln Road															
40223 / Thun2(a)	3.598	USP College, Kiln Road	380	Developable 6-17	100	0	0	0	0	0	0	Site at low to high risk. Access route at low risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water, with small areas of low to high risk surface water ponding including a 40% allowance for climate change. There is a small area of low risk ponding on Kiln Road (A13) outside the site boundary.
40268 / Thun3(b)	0.178	Thames Loose Leaf, 289 Kiln Road	22	Developable 6-17	100	0	0	0	0	0	0	Site at low to high risk. Access routes at low to high risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates an area of low to high surface water flood ponding towards the south and west of the site. There is a small area of high risk ponding on Kiln Road (A13) outside the site boundary.
40279 / Thun2(b)	2.705	Council Offices, Kiln Road	237	Developable 6-17	100	0	0	0	0	0	0	Majority of site at very low risk with some areas of high risk ponding. Access route at low to high risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water. There are some high risk areas of surface water ponding including a 40% allowance for climate change. There is a small area of low risk ponding on the access route to the west along Kiln Road (A13).
Thundersley															
40224 / Thun3(a)	0.19	Thundersley clinic, Kenneth Road	13	Developable 6-17	100	0	0	0	0	0	0	Site is at very low risk. Access routes at low to high risk.	Limited potential for groundwater flooding to occur.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates there is a very low risk of surface water flooding at the site. The access road to the south of the site along Kenneth Road is at low to medium risk along the majority of its length with areas of high-risk ponding. The access road to the north of the site along Hart Road is at low risk of surface water flooding.
40197 / B3	0.321	Furniture Kingdom	48	Developable 6-17	100	0	0	0	0	0	0	Majority of site is at very low risk. Access	Potential below ground level.	Exception Test is not required	The site is in Flood Zone 1, low probability of flooding from rivers and/or sea. This site is not indicated to be at risk of flooding from rivers and/or sea during the design events. Safe access/egress (i.e. that is dry or Low hazard during the 1% AEP event including central climate change allowance) is achievable for the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk

Site Reference / Allocation Number	Area (ha)	Address	Units	Year in Local Plan (when development is likely to occur)	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Proportion of site at risk of flooding from rivers during design event (1% AEP + central CC allowance)	Proportion of site at risk of flooding from overtopping during design event (0.5% AEP + higher central CC allowance)	Proportion of site at risk of flooding from breach (0.5% AEP + higher central CC allowance)	Risk of Flooding from Surface Water: from modelled data	Susceptibility to Groundwater Flooding (BGS Dataset)	Exception Test Required?	Summary of Flood Risk Constraints and Safety of Development (Refer to Appendix A for full details and recommendations for each site highlighted in Orange).
												routes at high risk.			of flooding from surface water with a small area of the site (1%) at low to high risk including an allowance for climate change. The area around the site is at risk of localised surface water ponding with a high risk surface water flow path to the north and west of the site. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is potential for groundwater flooding of property situated below ground level.

3.2 Site Assessment Proforma Template

3.2.1 Site assessment proformas have been prepared for sites that are identified to be within Flood Zone 2 and/or Flood Zone 3 or have access routes within the Flood Zones. These are included in **Appendix A**.

3.2.2 Table 3-2 provides an overview of the fields in the site assessment proformas and the source of the information or dataset. An overview of the risk of flooding is provided, based on the available datasets, followed by recommendations for how development could be delivered on the site to meet part (2) of the Exception Test.

Table 3-2: Datasets and information used for Level 2 Site Assessment Proformas

Proforma Field	Dataset / information used
Site Description	
Site Reference and Allocation Number	As provided by CPBC (Excel sheet and GIS layer of sites).
Cluster	As provided by CPBC (Excel sheet and GIS layer of sites).
Site Area (ha)	The area of the site (hectares).
Site Name	As provided by CPBC (Excel sheet and GIS layer of sites).
Proposed Units	As provided by CPBC (Excel sheet and GIS layer of sites).
Vulnerability Classification	Defined in accordance with Flood Risk and Coastal Change PPG Table 2.
Flood Zones and Historic Flooding	
Proportion within each Flood Zone	Flood Map for Planning (Rivers and Sea) Flood Zone 2; Flood Map for Planning (Rivers and Sea) Flood Zone 3; Flood Map for Planning (Rivers and Sea); Flood Zone 3b Functional Floodplain outline created from 3.3% AEP Prittle Brook and Benfleet Hall Brook.
Flood Warning Area	Environment Agency Flood Warning Areas.
Recorded River Flooding Outlines in which the site is located	The dates of the flood events that have affected the site, as detailed in the Environment Agency 'Recorded Flood Outlines'.
Proximity to Main River/Watercourse	Calculated using the Environment Agency Main River dataset obtained from the Defra Data Services Platform and the Detailed River Network layer provided by CPBC.
Sewer flooding records within the post code area in which the site is located:	As provided by AWSL. Described in Section 2.6.
Fluvial Flooding	
Maximum Flood Extents	Maximum flood extent map(s) for the watercourses relevant to the site (Prittle Brook and Benfleet Hall Brook), as described in Section 2.2.
Surface Water Flooding	
Risk of Flooding from Surface Water Modelling (present day)	Modelled surface water flood risk, as described in Section 2.4.
Risk of Flooding from Surface Water Modelling (climate change)	Modelled surface water flood risk including an allowance for Climate Change, as described in Section 2.4.
Groundwater Flooding	
Bedrock Geology	Bedrock geology underlying the site, based on BGS mapping.
Superficial Geology	Superficial geology underlying the site, based on BGS mapping.
BGS Susceptibility for Groundwater Flooding	A BGS dataset which gives a high level overview of where groundwater flooding may occur based on a conceptual understanding of regional geology and hydrogeology. Described further in Section 2.5.
Tidal Flooding	
Overtopping Design Event	Maximum depth and hazard from the modelled 2125 0.5% AEP + Higher Central scenario.
Breach Event	Maximum depth and hazard from the modelled 2125 0.5% AEP + Higher Central scenario.
Breach Fastest Time to Inundation	Fastest Time to Inundation from the modelled 0.1% AEP 2125 Upper End scenario and location of the breach.
Other Sources	
Flooding from Reservoirs in the Event of a Break or Failure (when river levels are normal and when there is also flooding from rivers)	Environment Agency datasets obtained from the Defra Data Services Platform.
Exception Test	
An overview of whether the Exception Test is required for the site.	

Flood Risk Summary
An overview of the risk of flooding to the site now and in the future (as a result of the impacts of climate change) based on the information within the proforma.
Site Specific Recommendations
Recommendations for how development could be delivered on the site to meet the requirements of part 2 of the Exception Test (where required) i.e., that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall. Recommendations are made in line with the development management measures presented within the **Level 1 SFRA**[3] and typically address the following: - Applying the sequential approach within the development site, - Setting back development from the edge of watercourses, - Finished floor levels, - Floodplain compensation storage, - Access and egress arrangements, - Flood warning and evacuation procedures, - Surface water management and considerations for SuDS, - Further investigation of groundwater levels.

3.3 Summary of Sites in Flood Zone 1

3.3.1 All of the sites in this section are located in Flood Zone 1 with no risk of fluvial flooding, no risk of overtopping and no residual risk from a breach event. The sites also have no historic flood risk and are not at risk of flooding from reservoirs in the event of a breach or failure when both river levels are normal or when there is also flooding from rivers area. **Appendix B** shows the modelled surface water flood risk from present day and with climate change for the sites. Table 3-3 provides an overview of the risk from surface water to each site and the surrounding access roads and also provides an overview of the sites at risk from groundwater flooding. More Vulnerable development (e.g. residential) is permitted in Flood Zone 1 and the Exception Test is not required. The following recommendations are made for these sites:

- Development proposals for the sites should seek to restrict surface water runoff rates to greenfield rates; demonstrate sustainable approaches to the management of surface water in accordance with the drainage hierarchy; make use of SuDS (including green/blue roofs, permeable paving, downpipe planters, attenuating tree pits, rain gardens and other innovative technologies); and incorporate soft landscaping, planting and permeable surfacing. For sites with a surface water flow path, development should be sequentially located away from these areas where possible.
- A preliminary Hydrogeological Risk Assessment (HRA) should be undertaken to determine ground conditions and groundwater levels in proximity to the site, and to identify whether the proposed development will impact on groundwater, either from subsurface construction or from changes to surface water drainage. The potential impact of climate change should be included within this assessment. Should the preliminary HRA identify potential for impact, a full HRA should be prepared to identify proposed mitigation measures.
- It is good practice to raise finished floor levels of any new buildings by a minimum of 300mm above the surrounding ground level to address the surface water flood risk and the residual risk of exceedance events or blockages to the surface water system occurring.

Table 3-3: Summary of Surface Water and Groundwater Flood Risk to sites in Flood Zone 1.

Site Reference / Allocation number	Surface Water and Groundwater Risk Summary
40204 / B6	The site is located in Benfleet. Ground levels are approximately 25.7m AOD to the north of the site and 28m AOD to the south of the site. The modelled surface water risk mapping indicates the site is at very low risk of surface water flooding. The access road to the south of the site along Church Road is not at risk directly outside of the site, however further south, towards the junction with the London Road (A13), the road is at high risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates the potential for groundwater flooding to occur at surface in the area.
40267 / B7	The site is located in Benfleet. Ground levels are approximately 28 - 29m AOD across the site. The modelled surface water risk indicates the site is at very low risk of surface water flooding. The access road to the south of the site along Church Road is not at risk directly outside of the site, however further south, towards the junction with the London Road (A13), the road is at high risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates this area is not considered to be prone to groundwater flooding.
40197 / B3	The site is located in Tarpots. Ground levels are approximately 23.6m AOD to the north of the site and 25.5m AOD to the south of the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water with a small area of the site (1%) at low to high risk including an allowance for climate change. The area around the site is at risk of localised surface water ponding with a high risk surface water flow path to the north and west of the site. The access route to the west on London Road (A13) is at high risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is potential for groundwater flooding of property situated below ground level.
40081 / B5	The site is located in Benfleet. Ground levels are approximately 26m AOD to the north of the site and 27m AOD to the south of the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water with a small area to the south of the site (9%) at low to high risk. These areas of ponding increase with climate change to 16% of the site at low to high risk. The map indicates the local road network may be susceptible to surface water ponding. The access route to the west on London Road (A13) is at high risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates the potential for groundwater flooding to occur at surface in the area.
40014 / B8c	The site is located in Benfleet. Ground levels are approximately 33m AOD to the west of the site and 34m AOD to the east of the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water with a small area to the north of the site (4%) at low risk. 18% of the site is at low risk of flooding from surface water including climate change. The map indicates the local road network may be susceptible to surface water ponding. The access route to the west on London Road (A13) is at high risk of surface water flooding including climate change. The BGS Susceptibility to Groundwater Flooding dataset indicates this area is not considered to be prone to groundwater flooding.
40155 / B8b	The site is located in Benfleet. Ground levels are approximately 29m AOD across the site. The modelled surface water risk mapping indicates there is a low to medium risk surface water flow path through the site. With climate change, there is a small area in the south west of the site (7%) which is at high risk. The surrounding roads are at low to high risk of surface water flooding. The access route to the north on Kents Hill Road is at low risk with a small area of medium risk. The BGS Susceptibility to Groundwater Flooding dataset indicates this area is not considered to be prone to groundwater flooding.
40224 / Thun3(a)	The site is located in Thundersley. Ground levels are approximately 76m AOD across the site. The access road to the north of the site along Hart Road is at low risk of surface water flooding. The access road to the south of the site along Kenneth Road is at low to medium risk along the majority of its length with areas of high risk ponding. The access road to the north of the site along Hart Road is at low risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
40223 / Thun2(a)	The site is located in Kiln Road. Ground levels are approximately 80m AOD to the south of the site and 83m AOD to the north of the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water, with small areas of low to high risk surface water ponding including a 40% allowance for climate change. There is a small area of low risk ponding on Kiln Road (A13) outside the site boundary. The access route to the west along Kiln Road (A13) is not at risk of flooding from surface water for approximately 1km. At this point, the access road is at high risk. The access route to the east is also at low risk, with some areas of high risk ponding further east. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
40279 / Thun2(b)	The site is located in Kiln Road. Ground levels are approximately 78.4m AOD in the south of the site and 80m AOD in the north of the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water. There are some high risk areas of surface

	water ponding including a 40% allowance for climate change. There is a surface water flow path to the east of the site with low risk areas which extend slightly into the site boundary. There is a small area of low risk ponding on the access route to the west along Kiln Road (A13). The access route along Kiln Road (A13) is at high risk of surface water flooding approximately 1.3km west of the site. The access route to the east is also at low risk, with some areas of high risk ponding further east. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
40268 / Thun3(b)	The site is located in Thundersley. Ground levels are approximately 72m AOD across the site. The modelled surface water risk mapping indicates an area of low to high surface water flood ponding towards the south and west of the site. These areas of ponding increase with climate change and extend to the north of the site. There is a small area of high risk ponding on Kiln Road (A13) outside the site boundary. The access route leading north along the A129 is also at high risk of surface water flooding. The access route to the east on the A13 is at low to medium risk through Hadleigh. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
40195 / Had6	The site is located in Hadleigh. Ground levels are approximately 75m AOD across the site. The modelled surface water risk mapping indicates the site is at very low risk of surface water flooding. The access route to the south east of the site along Kiln Road (A13) is at very low risk of flooding, although there are areas of low to medium risk through Hadleigh. The access route leading north along the A129 has a small area of high risk. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
40034 / Had7	The site is located in Hadleigh. Ground levels are approximately 69m AOD across the site. The modelled surface water risk mapping indicates there is a very low risk of surface water flooding at the site. The access route to the west on Scrub Lane and New Road has a small area of low risk ponding. The access route to the east along Scrub Lane is at low risk of flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
38024 / Had2	The site is located in Hadleigh. Ground levels are approximately 75m AOD across the site. The modelled surface water risk mapping indicates the site is at very low risk of surface water flooding. The access road to the south of the site on the High Street is at very low risk of surface water flooding, however there is some low to medium risk ponding further east. The access road to the north of the site along London Road (A13) is at low risk of flooding when including an allowance for climate change. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
39985 / Had3	The site is located in Hadleigh. Ground levels are approximately 67m AOD across the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water. A small area to the west of the site (3%) is at high risk including a 40% allowance for climate change. The surrounding roads are at low to medium risk of surface water flooding including the access routes to the west on London Road and to the north on Meadow Road. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
40118 / Had4(a)	The site is located in Hadleigh. Ground levels are approximately 73m AOD across the site. The modelled surface water risk mapping indicates the majority of the site is at very low risk of flooding from surface water with a small area in the centre of the site (7%) at low risk. A small area in the centre of the site (4%) is at high risk of flooding from surface water including a 40% allowance for climate change. The access route to the south of the site on Castle Lane is at low risk of surface water flooding. The access route to the north on Castle Lane is at very low risk of surface water flooding. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.
40220 / B8	The site is located in Hadleigh. Ground levels are approximately 74m AOD across the site. The modelled surface water risk mapping indicates there is a very low risk of flooding from surface water at the site. The access road to the north of the site along London Road has some small areas of low risk ponding. This ponding increases with some areas of high risk when an allowance for climate change is considered. The BGS Susceptibility to Groundwater Flooding dataset indicates that there is limited potential for groundwater flooding to occur in the area.

4. Summary of Recommendations

4.1.1 CPBC is preparing a Local Plan (Castle Point Plan) which contains the overall vision for future development across the Borough. Using the information within the **Level 1 SFRA**, and the high level sieving exercise, alongside other evidence on general site suitability, sustainability, transport and biodiversity, CPBC have identified 35 sites for consideration within this **Level 2 SFRA**. At this time, only suitable urban sites have been identified.

4.1.2 For **all** proposed development sites:

- Peak surface water runoff rate from the development must be as close as reasonably practicable to the greenfield runoff rate from the same rainfall event. Supporting evidence must be submitted to justify the proposed discharge rate. Development proposals must demonstrate that the surface water will be managed and discharged from the site in accordance with the drainage hierarchy. Development offers the opportunity to utilise a range of sustainable surface water management techniques which not only contribute to a reduction in discharge rates from the site, but provide amenity, biodiversity and water quality improvements and contribute to mitigating climate change by considering both drought and flood conditions. Development proposals must demonstrate sustainable approaches to the management of surface water making use of SuDS and incorporate soft landscaping, planting, and permeable surfacing. For sites with a surface water flow path, development should be sequentially located away from these areas where possible.

4.1.3 For sites where the BGS Susceptibility to Groundwater Flooding mapping shows that there may be risk of groundwater flooding at surface or below ground:

- A preliminary Hydrogeological Risk Assessment (HRA) should be undertaken to determine ground conditions and groundwater levels in proximity to the site, and to identify whether the proposed development will impact on groundwater, either from subsurface construction or from changes to surface water drainage. The potential impact of climate change will be included within this assessment. Should the preliminary HRA identify potential for impact, a full HRA should be prepared to identify proposed mitigation measures. Further details are provided within the **Level 1 SFRA** Section 5.7.

4.1.4 For sites in close proximity to a Main River or other watercourse:

- The Environmental Permitting Regulations 2016 require a Flood Risk Activity Permit (FRAP) to be obtained for works on or near a Main River, on or near a flood defence structure, or in a floodplain. Applicants should review the Environment Agency flood risk activities: environmental permit information[17] to determine if a permit is required.
- Responsibility for the consenting of works by third parties on Ordinary watercourses, under Section 23 of the Land Drainage Act 1991 (as amended by the Flood and Water Management Act 2010), lies with the LLFA. ECC is responsible for the consenting of works to Ordinary Watercourses and has powers to enforce un-consented and non-compliant works. This includes any works (including temporary) that affect flow within the channel (such as in channel structures or diversion of watercourses). Enquiries and applications for Ordinary Watercourse consent should be directed through the ECC website[18].

4.1.5 Site B8a has a proportion of its area within the 3.3% AEP modelled flood extent. Within **undeveloped areas** of the 3.3% AEP flood extent, development should not be permitted, rather land should be safeguarded for flood storage. Within **developed areas** of the 3.3% AEP flood extent, any proposals to regenerate/replace such building(s) should not increase the footprint any greater than the existing footprint. For areas around the upper reaches of the Benfleet Hall Brook, further discussion will need to take place with CPBC, and further hydraulic modelling may be required to determine Flood Zone 3b. For this site, Finished Floor Levels for residential accommodation must be above the design fluvial flood event (1% AEP including central climate change allowance) plus a minimum 300mm freeboard.

4.1.6 For the following sites, CPBC, in consultation with Emergency Planners, will need to determine whether reliance on evacuation prior to a flood event and the provision of places of safety are an

[17] Flood risk activities: environmental permits. https://www.gov.uk/guidance/flood-risk-activities-environmental-permits
[18] Essex County Council, Apply for a watercourse consent. Available at: https://flood.essex.gov.uk/maintaining-or-changing-a-watercourse/apply-for-a-watercourse-consent/

appropriate approach to demonstrate safety of development and satisfy the Exception Test. CPBC should also consider and identify opportunities to improve access routes in the future as part of wider infrastructure delivery in these areas.

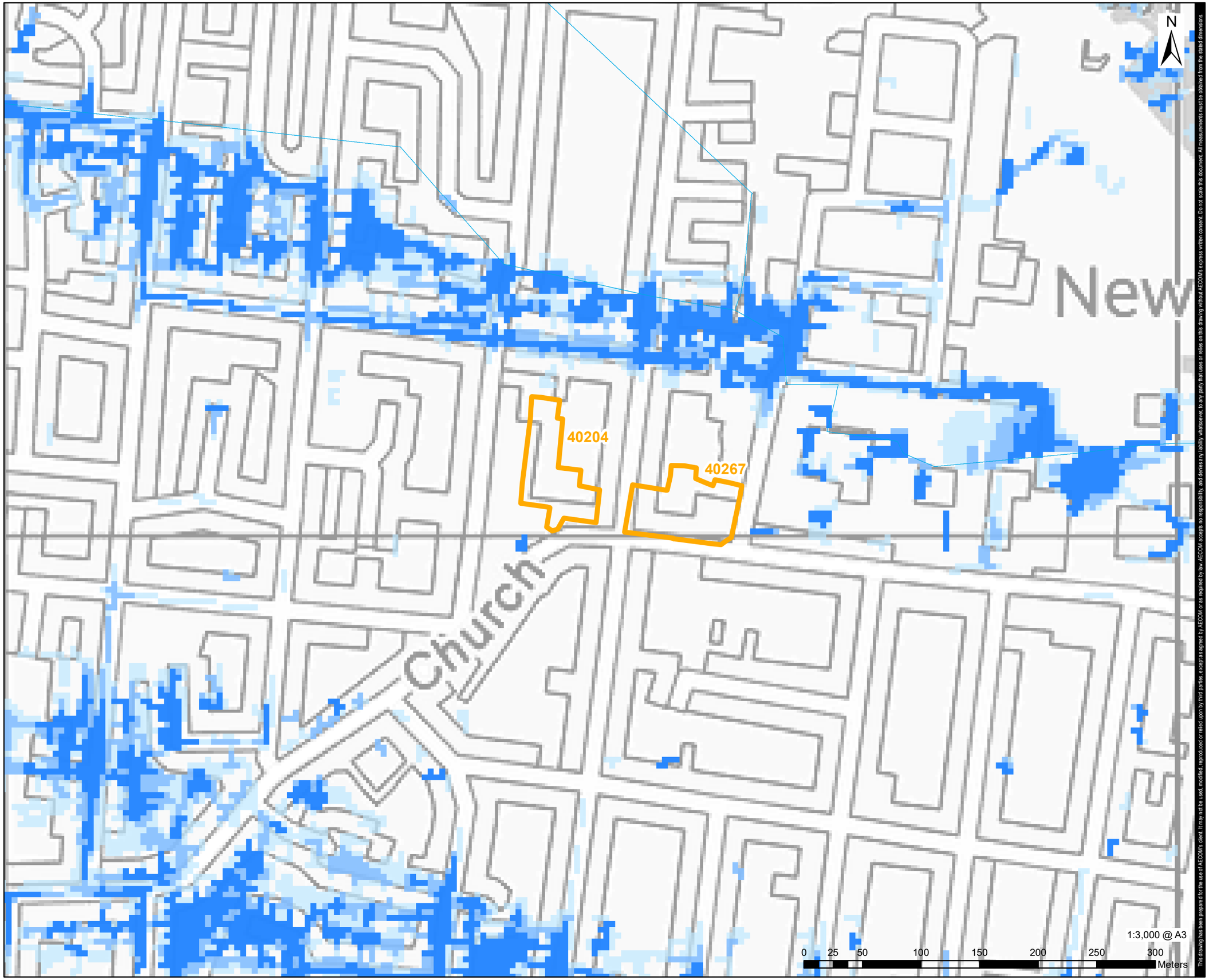
4.1.7 This applies to the following sites and further detail is provided in Table 3-1 and **Appendix A**:

- 40276 (Land at The Point)
- 40082 (Former Admiral Jellicoe, High Street)
- 40125 (Land to the rear of North Avenue)
- 40231 (Essex Coachworks, 218 High Street)
- 38042 (Former Council Offices, Long Rd)
- 40134 (Corner of Little Gypps Rd & Willow Cl)
- 40130 (Ozonia Gardens, Eastern Esplanade)
- 40129 (Land between Station Rd & Seaview Rd)
- 40115 (Knightswick Shopping Centre)
- 40236 (Canvey Library + Barclays)
- 40392 (Grouts and land to rear)
- 40462 (Long Rd & Furtherwick Rd Cluster)
- 40112 (L/a The Paddocks)
- 40298 (Oak Road Car Park)
- 40273 (Venables Close Cluster)
- 10010 (Canvey Job Centre)
- 39880 (Matrix House, 12-16 Lionel Rd)
- 40255 (Kushi, Furtherwick Rd)

Appendix A Site Proformas

Appendix B Surface Water Mapping

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26



AECOM

PROJECT

Castle Point Borough Council Level 2 Strategic Flood Risk Assessment

CLIENT

Castle Point Borough Council

CONSULTANT

AECOM Limited
Midpoint, Alencon Link,
Basingstoke, Hampshire
RG21 7PP
www.aecom.com

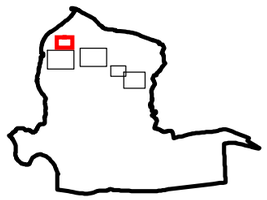
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP
- 1% AEP
- 0.1% AEP

EXTENT INDICATOR



NOTES

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2: This map displays results from the South Essex model.
3: This map is intended to provide a strategic overview of surface water flood risk and should not be used to assess the flood risk for individual properties.

ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

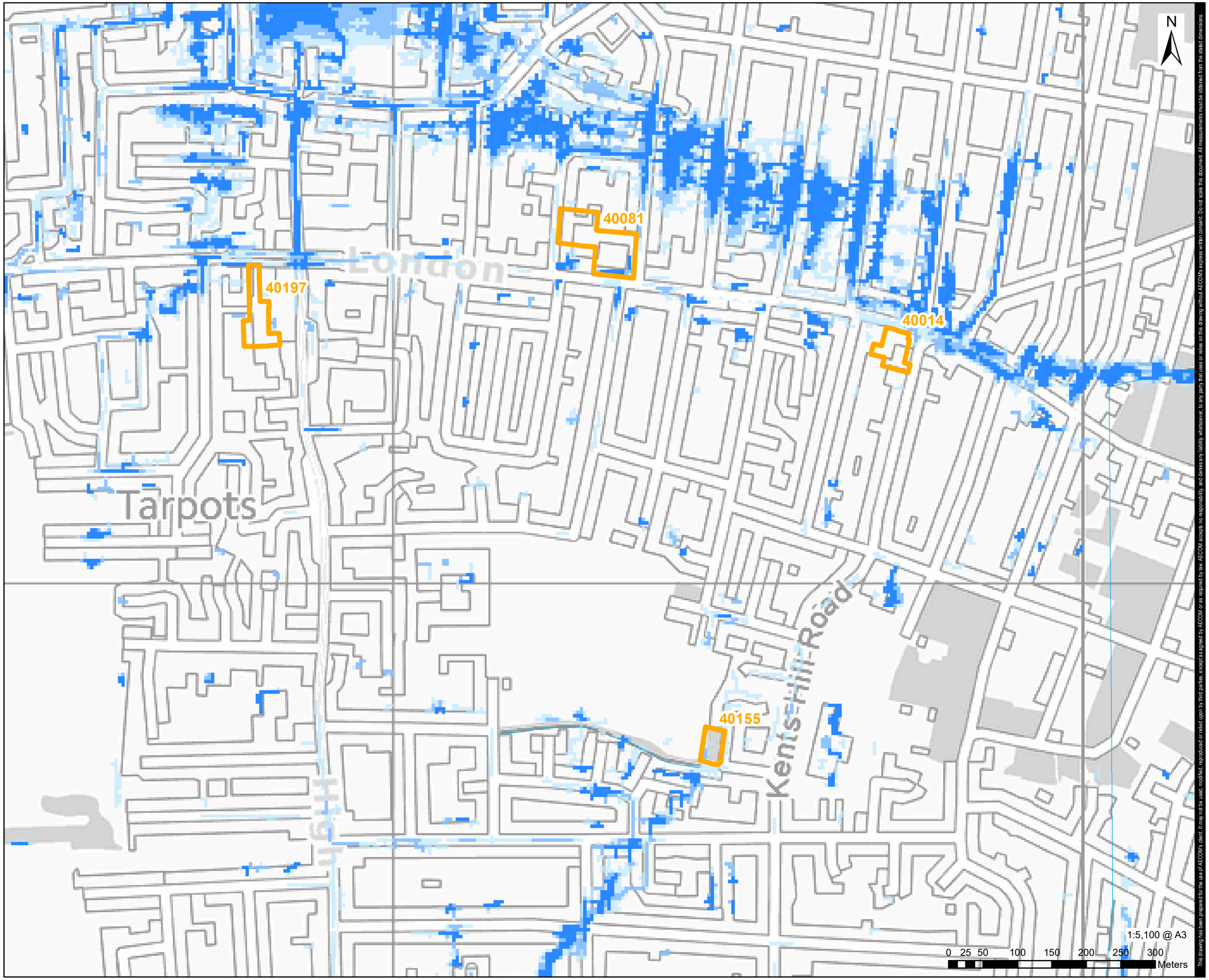
Modelled Surface Water Flood Risk - Present Day Area A

MAP NUMBER

Appendix B Map 1A

Filename: \\na.aecomnet.com\fls\EMEA\Basingstoke-UKBAS1\Legacy\UKBAS1PFILW001\WP\5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\920_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_SurfaceWater.mxd

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26



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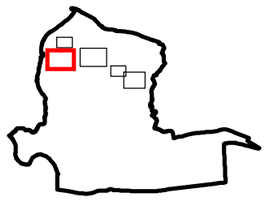
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP
- 1% AEP
- 0.1% AEP

EXTENT INDICATOR



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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

Modelled Surface Water Flood Risk - Present Day Area B

MAP NUMBER

Appendix B Map 1B

Filename: \\na.aecomnet.com\lfs\EMEA\Basingstoke-UKBAS1\Legacy\UKBAS1\PFILW0011\WP\5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\920_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_SurfaceWater.mxd

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26

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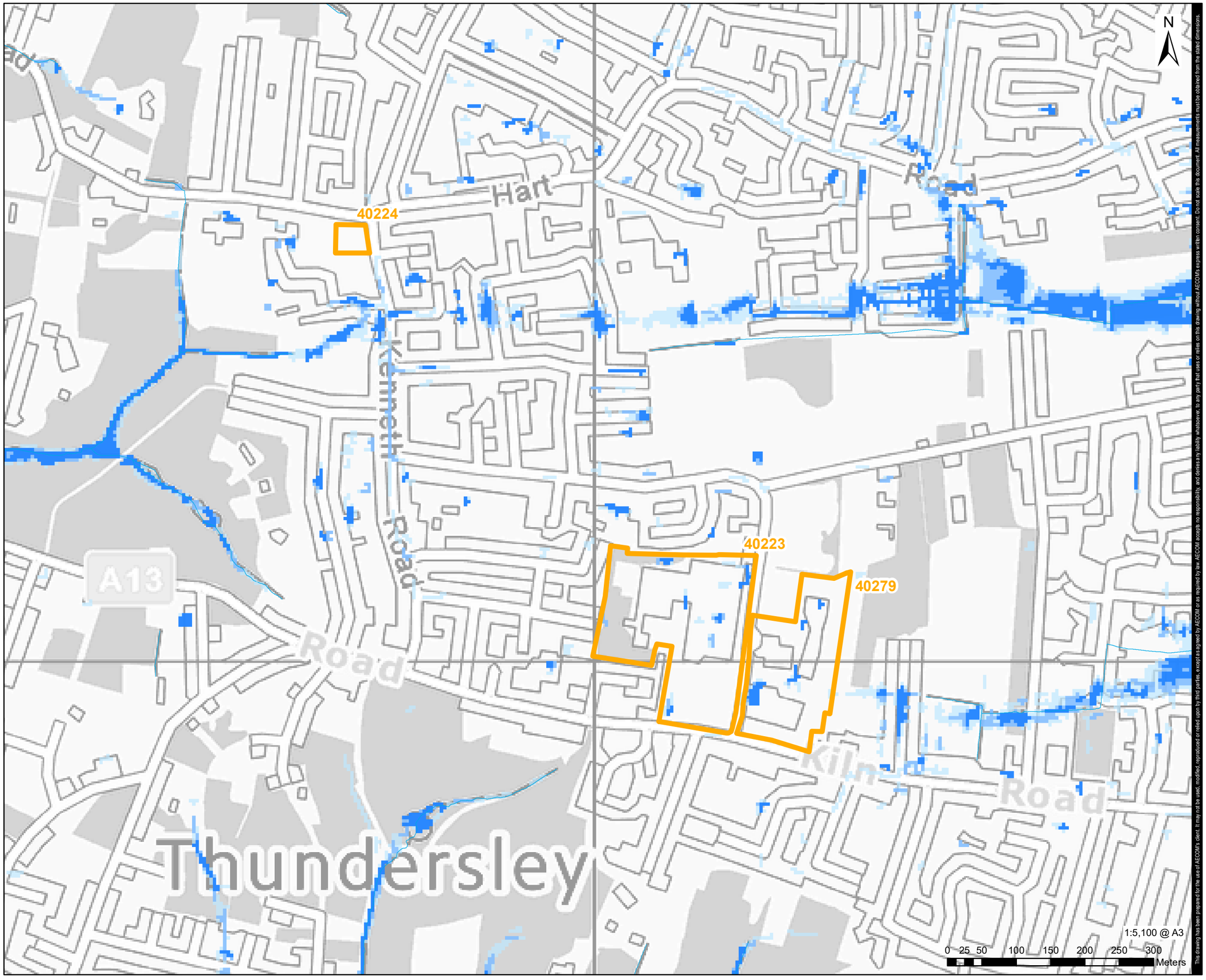

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PROJECT

Castle Point Borough Council Level 2 Strategic Flood Risk Assessment

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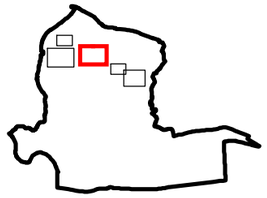
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP
- 1% AEP
- 0.1% AEP

EXTENT INDICATOR



NOTES

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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

Modelled Surface Water Flood Risk - Present Day Area C

MAP NUMBER

Appendix B Map 1C

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26

Filename: \\na.aecomnet.com\tkEMEA\Basingstoke-UKBAS1\Legacy\UKBAS1\PILW001\WPP\5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\920_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_SurfaceWater.mxd

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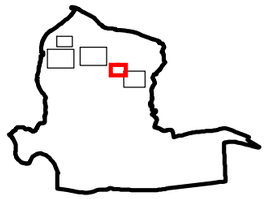
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP
- 1% AEP
- 0.1% AEP

EXTENT INDICATOR



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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

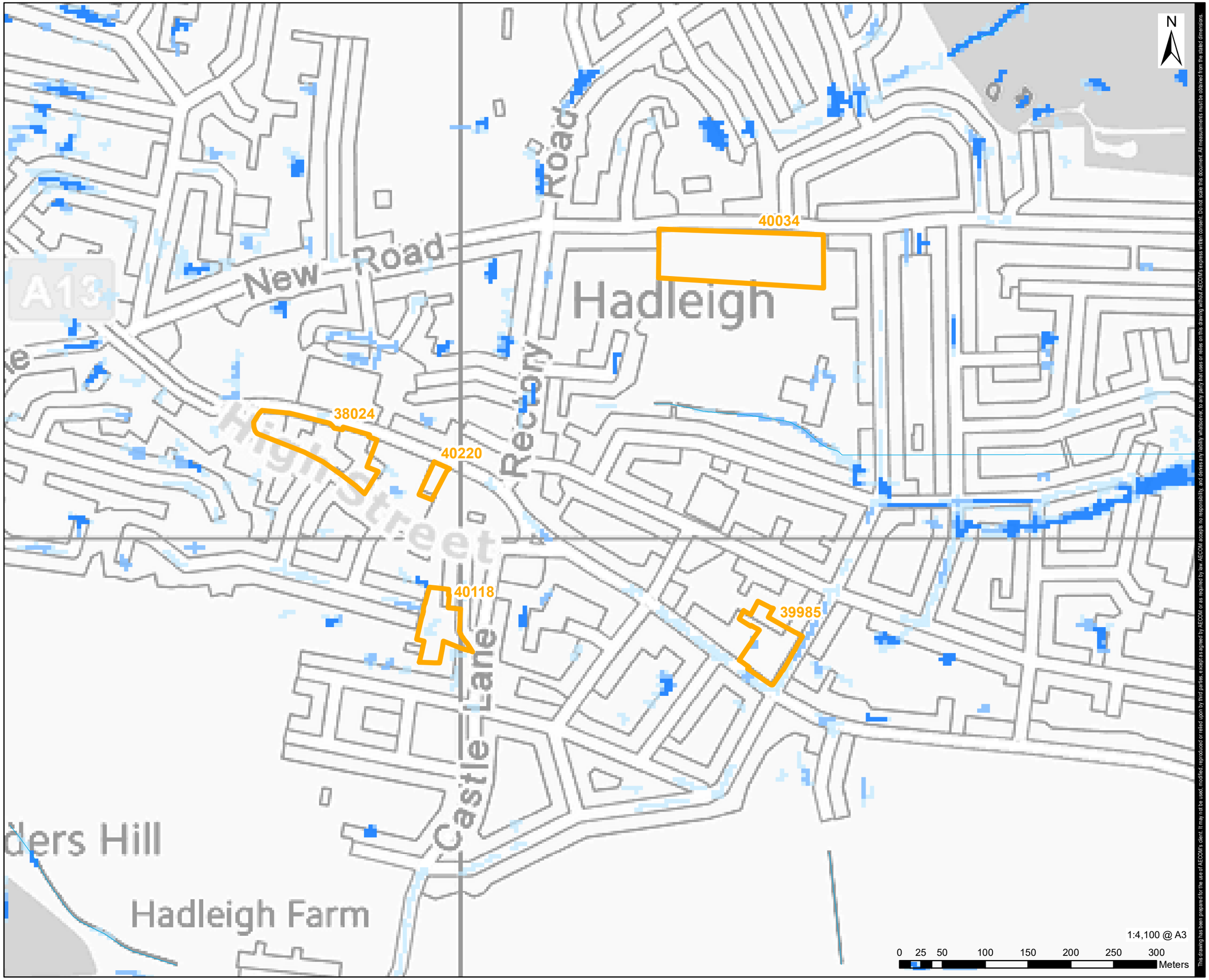
Modelled Surface Water Flood Risk - Present Day Area D

MAP NUMBER

Appendix B Map 1D

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26

Filename: \\na.aecomnet.com\ifs\EMEA\Basingstoke-UKBAS1\Legacy\UKBAS1PFILW001\WP\5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\920_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_SurfaceWater.mxd



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Castle Point Borough Council Level 2 Strategic Flood Risk Assessment

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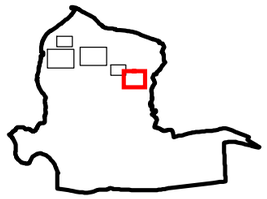
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP
- 1% AEP
- 0.1% AEP

EXTENT INDICATOR



NOTES

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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

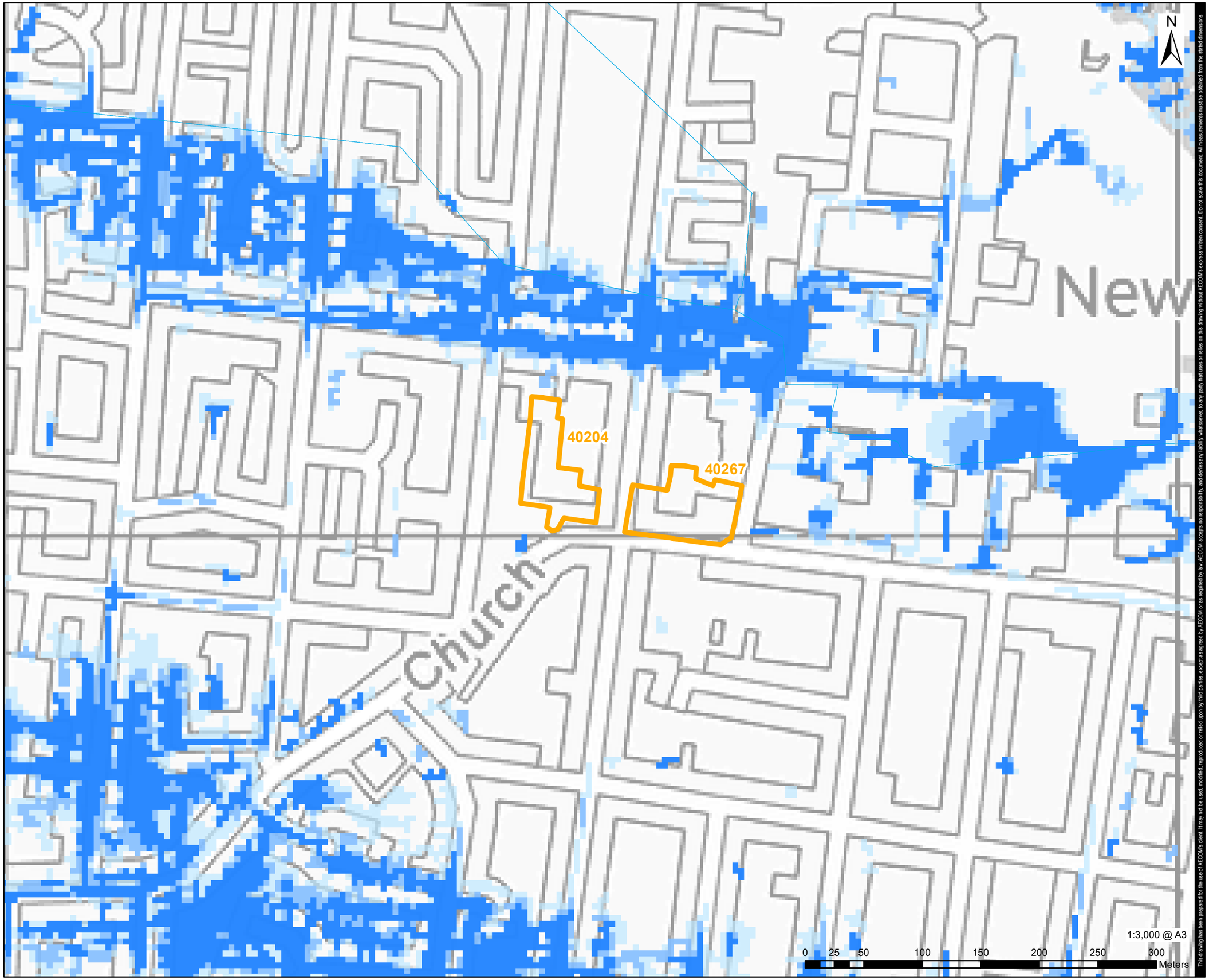
Modelled Surface Water Flood Risk - Present Day Area E

MAP NUMBER

Appendix B Map 1E

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26

Filename: \\na.aecomnet.com\tkEMEA\Basingstoke-UKBAS1\Legacy\UKBAS1\PILW001\WPP\5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\920_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_SurfaceWaterCC.mxd



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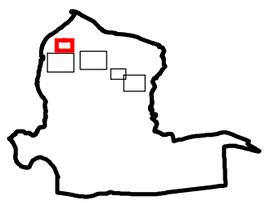
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP + 40% Climate Change
- 1% AEP + 40% Climate Change
- 0.1% AEP + 40% Climate Change

EXTENT INDICATOR



NOTES

1: This map shows the predicted likelihood of surface water flooding based on modelling undertaken by AECOM for the 3.3%, 1% and 0.1% annual exceedance probability (AEP) events including a 40% allowance for climate change. Refer to the SFRA report for details on the surface water modelling methodology, assumptions and limitations.
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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

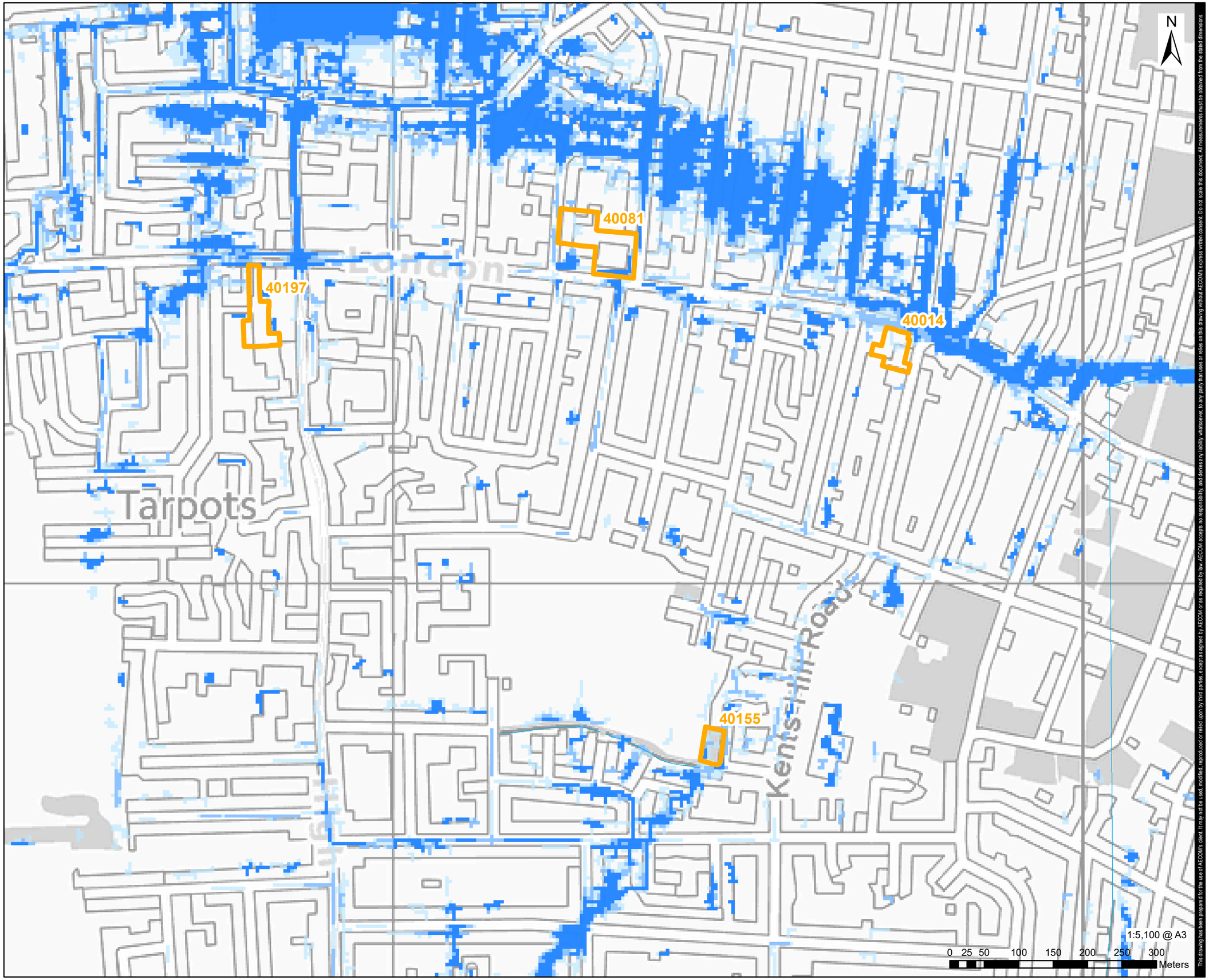
MAP TITLE

Modelled Surface Water Flood Risk - Climate Change Area A

MAP NUMBER

Appendix B Map 2A

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26



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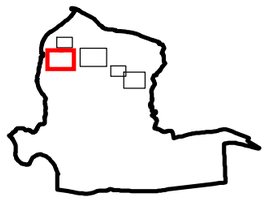
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP + 40% Climate Change
- 1% AEP + 40% Climate Change
- 0.1% AEP + 40% Climate Change

EXTENT INDICATOR



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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

Modelled Surface Water Flood Risk - Climate Change Area B

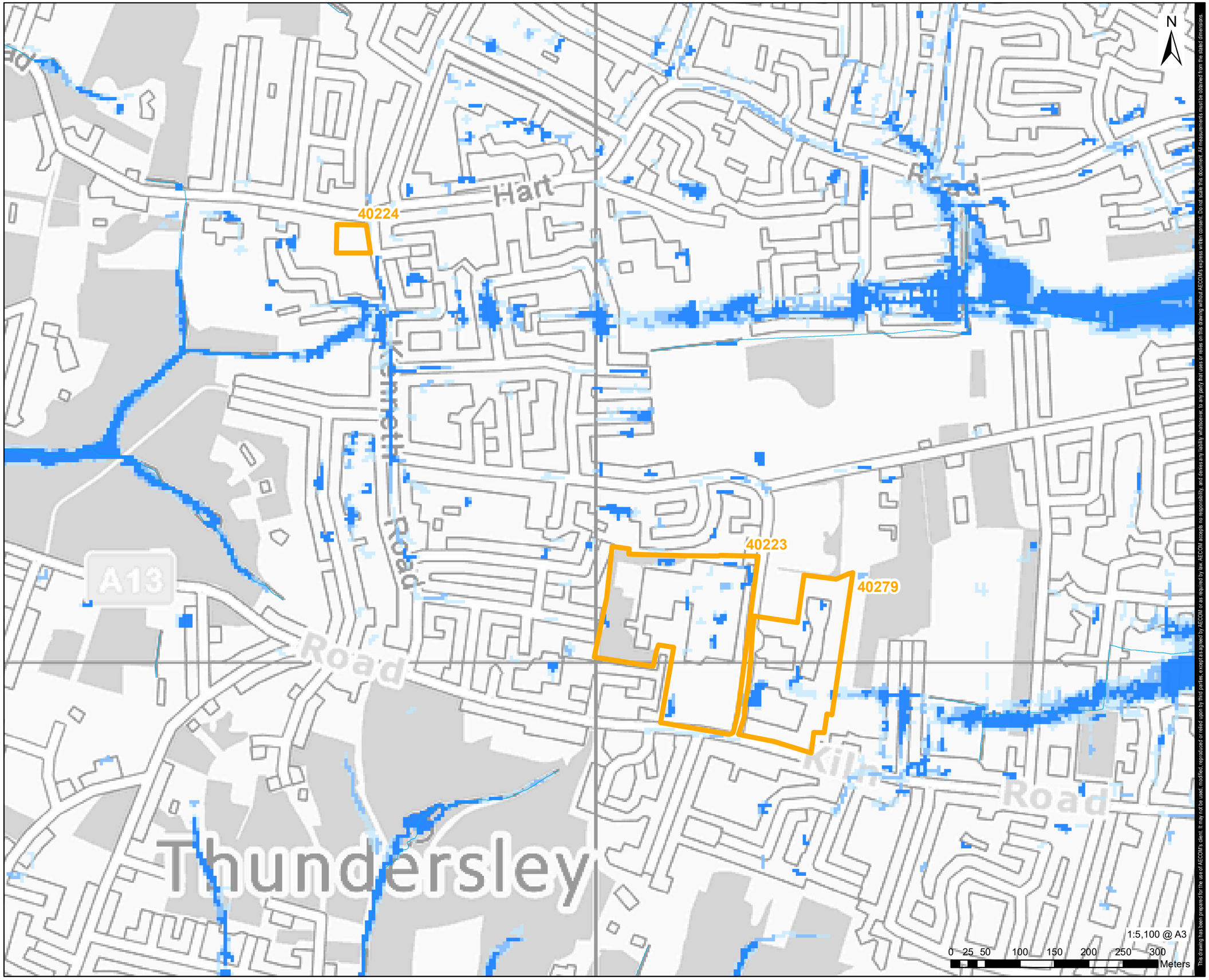
MAP NUMBER

Appendix B Map 2B

Filename: \\na.aecomnet.com\ifs\EMEA\Basingstoke-UKBAS1\Legacy\UKBAS1\PFILW001\WP\5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\920_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_SurfaceWaterCC.mxd

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26

Filename: \\na.aecomnet.com\file\EMEA\Basingstoke-UKBAS1\Legacy\UKBAS1\PFILW0011\WP\P5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\920_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_ SurfaceWaterCC.mxd



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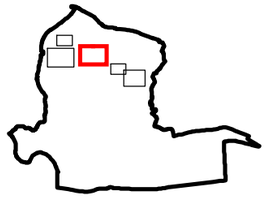
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP + 40% Climate Change
- 1% AEP + 40% Climate Change
- 0.1% AEP + 40% Climate Change

EXTENT INDICATOR



NOTES

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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

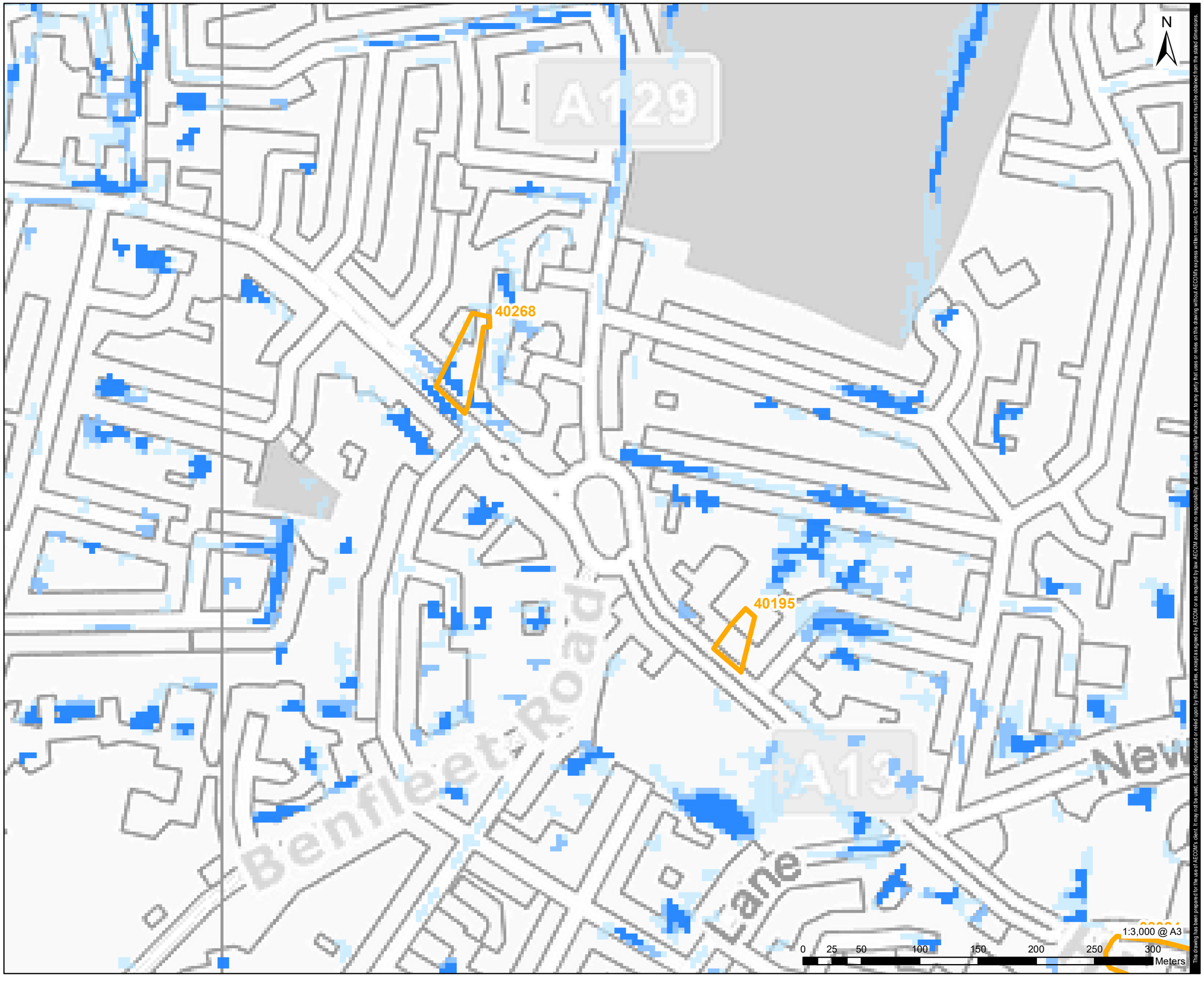
Modelled Surface Water Flood Risk - Climate Change Area C

MAP NUMBER

Appendix B Map 2C

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26

Filename: \\na.aecomnet.com\fs\EMEA\Basingstoke-UKBAS1\Legacy\UKBAS1\PFILW0011\WP\5 - Projects\60725540 - Castle Point SFRA\900_CAD_GIS\20_GIS\L2_SurfaceWater\CPSFRA_L2_MapX_SurfaceWaterCC.mxd



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Castle Point Borough Council Level 2 Strategic Flood Risk Assessment

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LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

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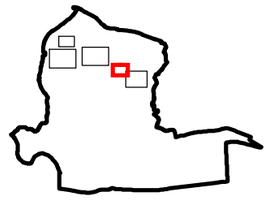
- 1% AEP + 40% Climate Change
- 0.1% AEP + 40% Climate Change

EXTENT INDICATOR



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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

Modelled Surface Water Flood Risk - Climate Change Area D

MAP NUMBER

Appendix B Map 2D

Revision: 2 Drawn: LL Checked: BW Approved: RM Date: 2025-03-26

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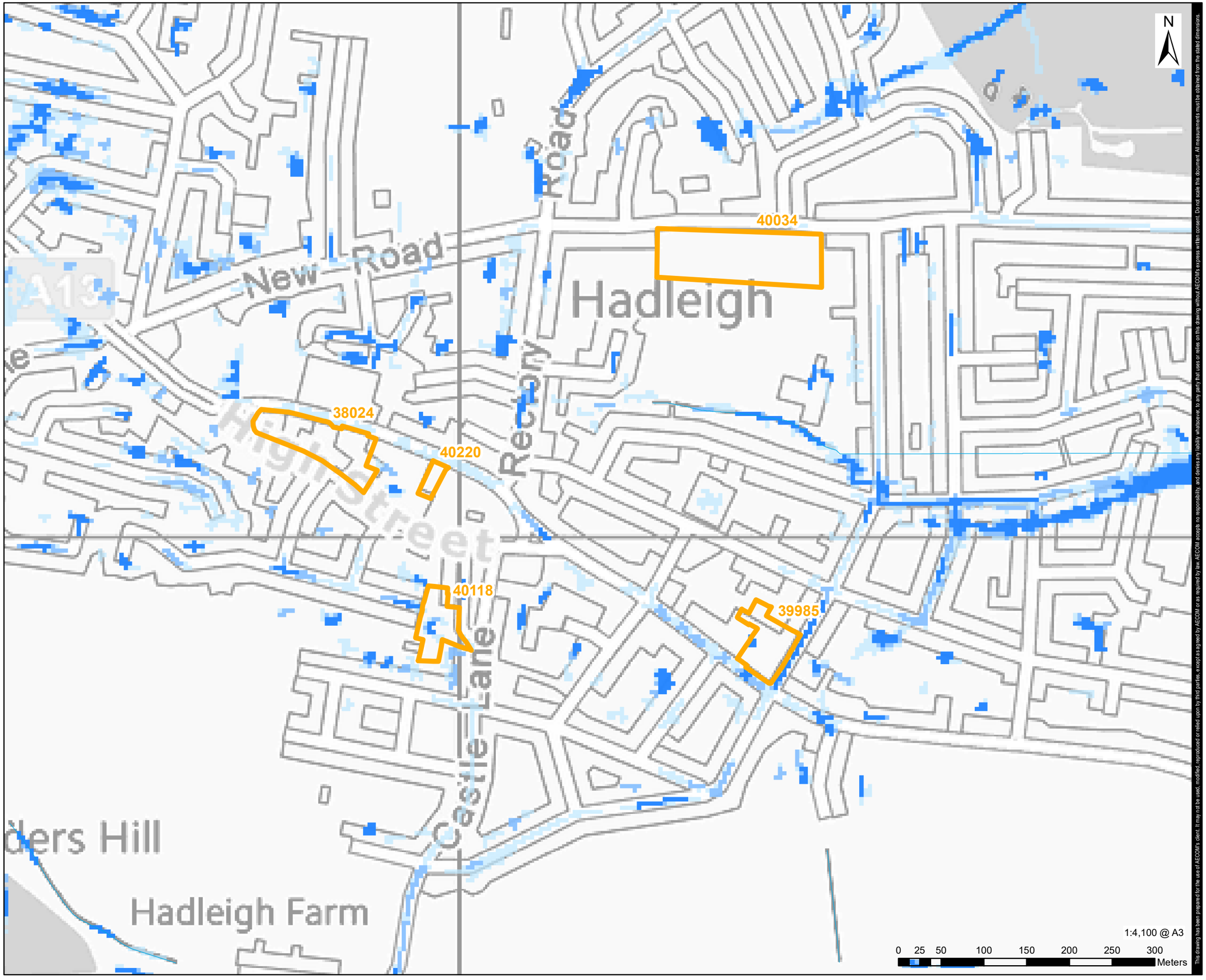

AECOM

PROJECT

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CLIENT

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CONSULTANT

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www.aecom.com

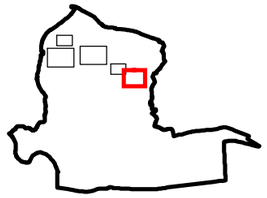
LEGEND

- Castle Point Borough Council
- EA Main River
- Watercourse

Modelled Surface Water Flood Risk Extents

- 3.3% AEP + 40% Climate Change
- 1% AEP + 40% Climate Change
- 0.1% AEP + 40% Climate Change

EXTENT INDICATOR



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ISSUE PURPOSE

SFRA

PROJECT NUMBER

60725540

MAP TITLE

Modelled Surface Water Flood Risk - Climate Change Area E

MAP NUMBER

Appendix B Map 2E