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Level 2 Strategic Flood Risk Assessment - Site HO/24/00018

Station Yard, Station Hill, Chiddingstone Causeway

FINAL

Prepared for

Sevenoaks District Council

Date

July 2026

Sevenoaks
DISTRICT COUNCIL

Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for site HO/24/00018. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the Sevenoaks Level 1 SFRA and read the Level 2 SFRA Main Report and is therefore familiar with the terminology used in this report.

1.1 Site details

- Location: Station Yard, Station Hill, Chiddingstone Causeway
- Site area: 0.86ha
- Existing site use: Brownfield, existing buildings onsite
- Proposed site use: Residential
- Proposed use flood risk vulnerability classification: More Vulnerable

The site is bordered by the Penhurst Railway Station to the east, with the railway track adjacent to the northern boundary. To the south and west of site lies agricultural land. Station Hill road meets the site in the southeastern corner of the boundary. A map showing the location of the site can be found below in Figure 1-1.

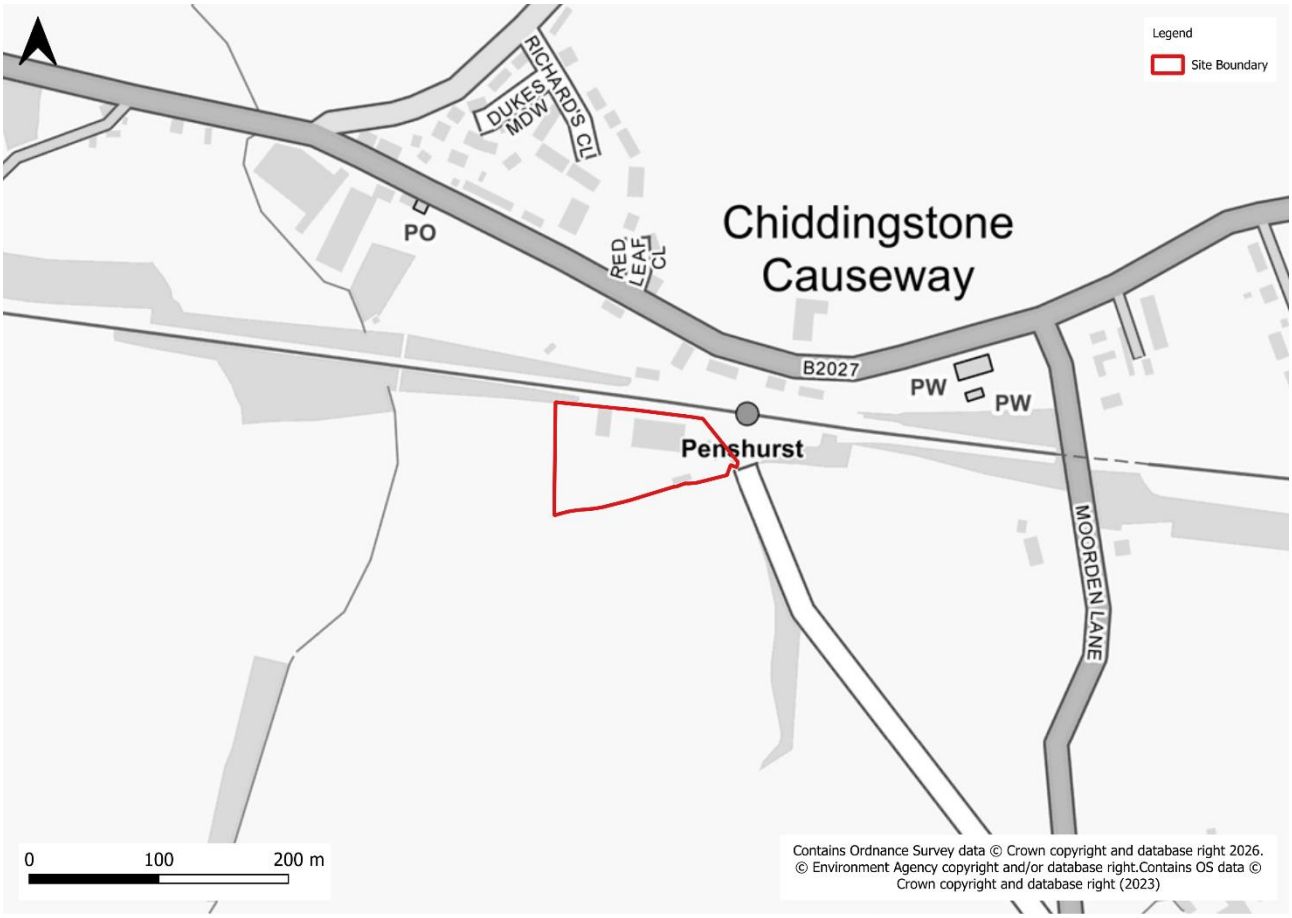

Figure 1-1: Location of site HO/24/00018

1.2 Topography

Figure 1-2 shows the topography of the site represented by the Environment Agency (EA) 1m resolution LiDAR. The railway line to the north of the site is on an embankment, and the topography of the site slopes downwards to the northwest, with the lowest point in the most northwestern corner is 39.08mAOD. The highest topographical point is in the southeastern corner of the site 41.83mAOD. In the southwestern corner there is a small mound with higher topography, assumed to be manmade.

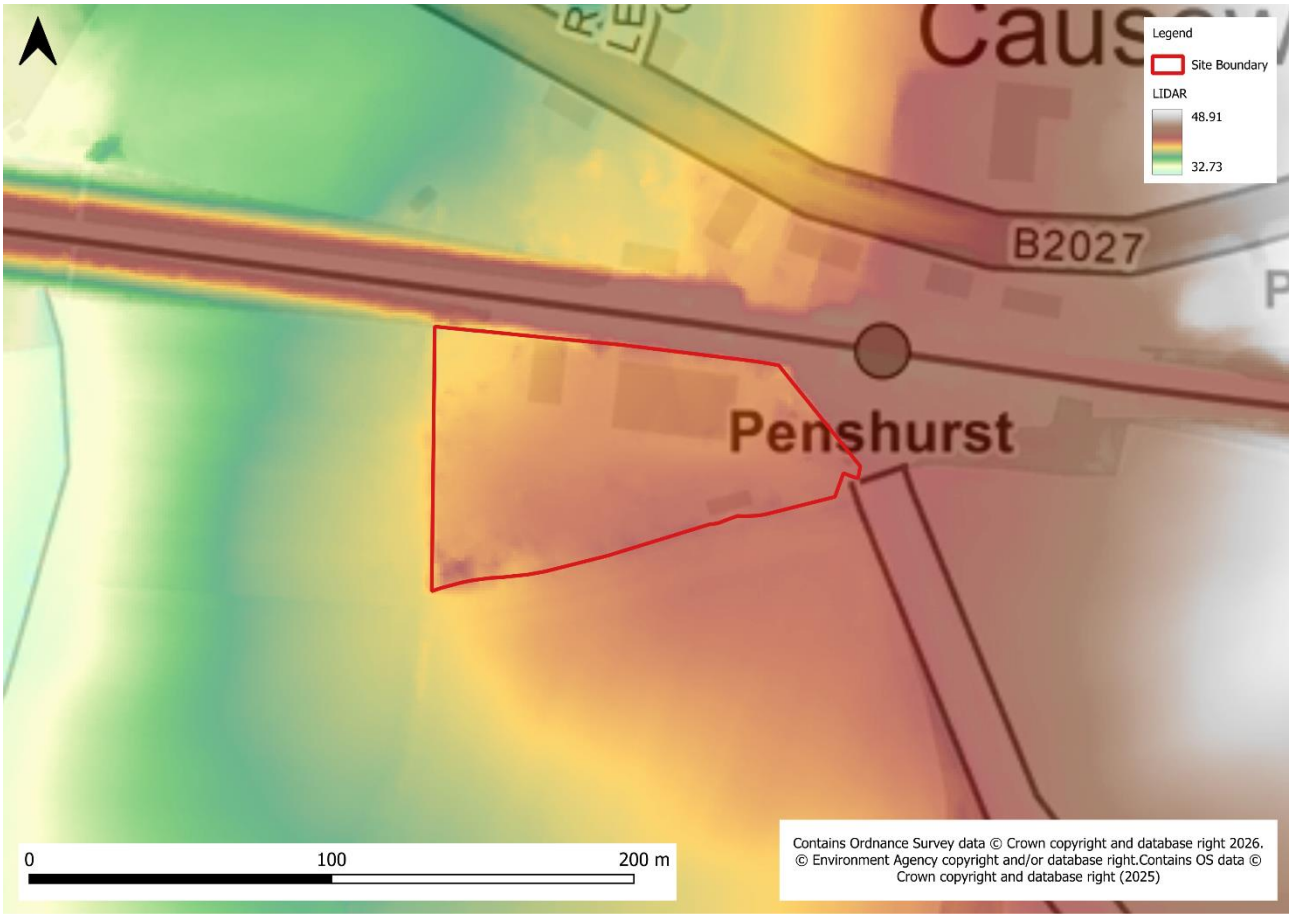

Figure 1-2: Topography of the site.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock - Weald Clay Formation consisting of Mudstone
- Superficial - No information available for this location.

Soils at the site consist of:

- Loamy and clayey soils that are slowly permeable and slightly acidic.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is located within the Lower Eden catchment which is part of the Eden Operational Catchment. The Lower Eden Waterbody catchment has a catchment area of 79.807m^2 and is described as heavily modified.

2.2 Existing drainage features

There are no identifiable drainage features at the site. However, as there is an existing development on the site, it is expected that the development is served by a surface water drainage system, which discharges into the local sewer systems.

The River Eden flows approximately 700m south of the site and there is an ordinary watercourse, a tributary of the River Eden, approximately 120m west of the site.

2.3 Fluvial

2.3.1 Available data

The EA's Flood Map for Planning (FMfP) has been used within this assessment to determine Flood Zones 3a and 2. The 3.3% AEP defended extent from the EA's Risk of Flooding from Rivers and Sea (RoFRS) mapping has been used to determine Flood Zone 3b. The percentage of the site at risk from fluvial sources can be found in Table 2-1.

2.3.2 Description of risk to the site

The site is located within Flood Zone 1 and is therefore predicted to be at a very low risk of fluvial flooding.

Table 2-1: Existing fluvial flood risk based on EA FMfP

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
100	0	0	0

2.4 Surface water

2.4.1 Available data

The EA's FMfP Surface Water Spatial Planning mapping has been used to assess the extent and depth of surface water flooding. The EA's Risk of Flooding from Surface Water (RoFSW) mapping has been used to assess the velocity and hazard of surface water flooding.

2.4.2 Description of risk to the site

Table 2-2 and Figure 2-1 shows that during the 3.3% AEP (high risk) event over 7% of the site is at risk of surface water flooding, impacting the north of the site, ponding occurs in the

northeastern corner of site along the boundary with the railway line. Ponding also occurs due to surface water backing up against the existing buildings on site, up to depths of 0.30m.

During the 1% AEP (medium) surface water flooding event, the surface water flood extent increases to cover 20% of the site. The flooding is seen in the northeast of the site, and has depths of up to 0.30, a velocity of 0.50m/s and a hazarding rating of Low (caution).

During the 0.1% AEP (low risk) event surface water impacts nearly 23% of the site. The flooding extent seen in the 1% AEP event extends further into the centre of the site. Flood depths increase to up to 0.60m along the railway line, with velocities up to 1.00m/s. The hazard rating across the site remains at Low (caution).

Table 2-2: Existing surface water flood risk based on the FMfP and RoFSW map

Event	3.3% AEP (high risk)	1% AEP (medium risk)	0.1% AEP (low risk)
Percentage of site at risk* (%)	7.35	20.09	22.70
Maximum depth (m)	0.30	0.30	0.60
Maximum velocity (m/s)	0.25	0.50	1.00
Maximum hazard classification	0.50 - Low - Caution: Flood zone with shallow flowing water or deep standing water.	0.50 - Low - Caution: Flood zone with shallow flowing water or deep standing water.	0.75 - Low - Caution: Flood zone with shallow flowing water or deep standing water.

** The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g., 1% AEP includes the 3.3% AEP percentage).*

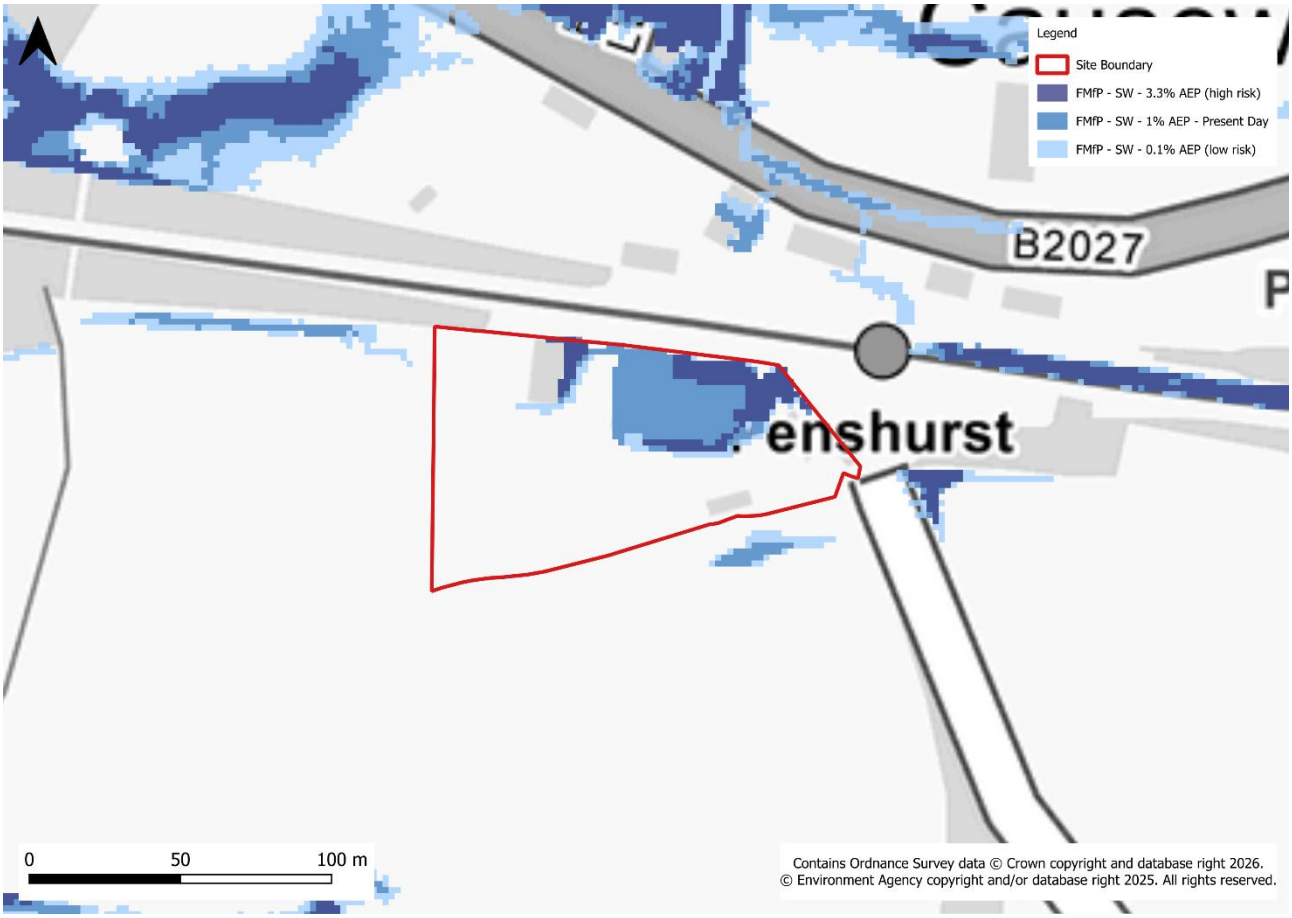

Figure 2-1: Flood Map for Planning - Surface Water Spatial Planning extents

2.5 Reservoir

This site is not shown to be at risk of reservoir flooding during the Dry Day or Wet Day scenario in the EA Reservoir Flood Maps.

2.6 Groundwater

The JBA Groundwater Emergence Map (Figure 2-2) shows that groundwater levels are likely to be greater than 5m below the ground surface in the 1% AEP event, therefore there is at no risk of groundwater emergence.

This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.

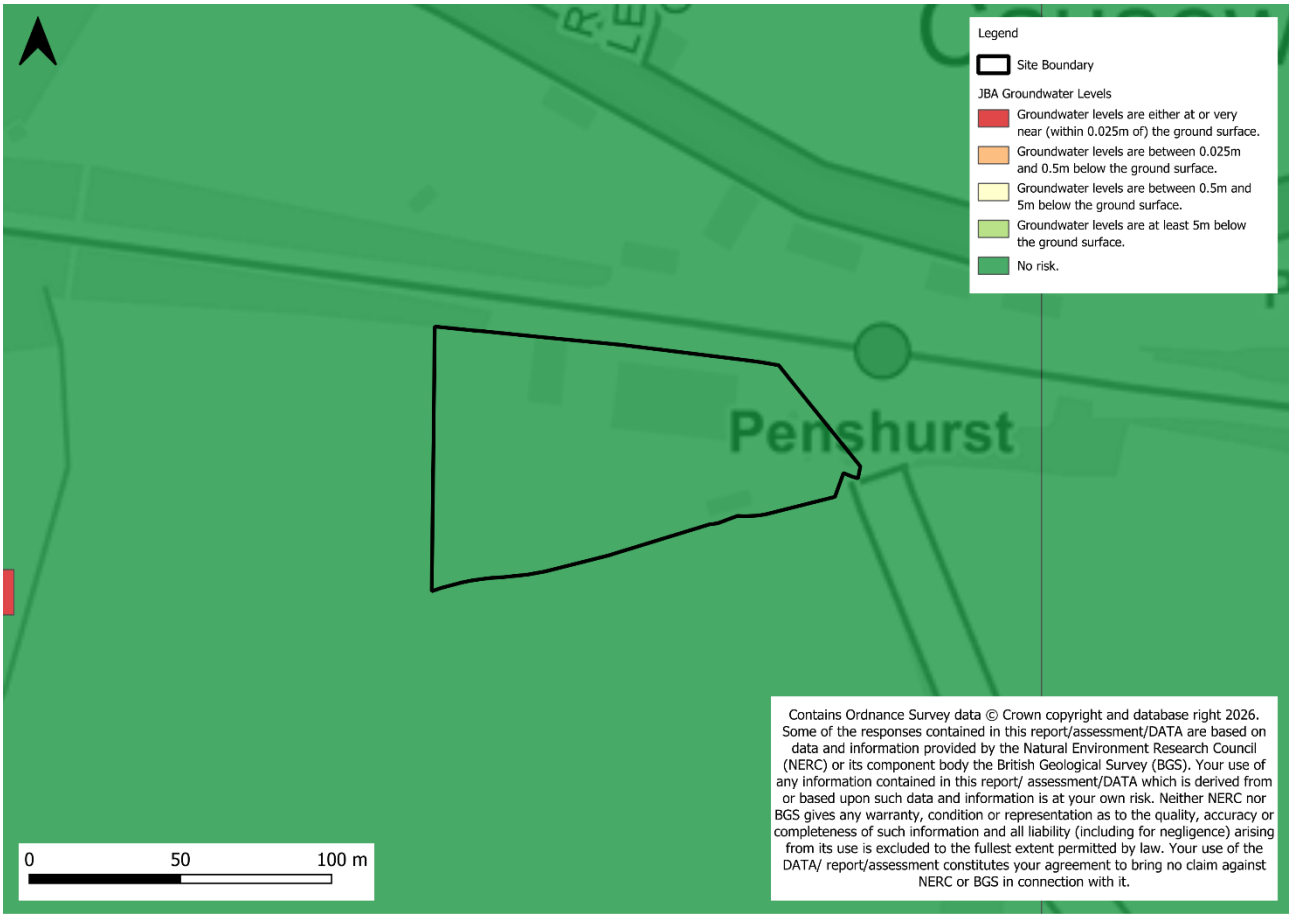

Figure 2-2: JBA Groundwater Emergence Mapping

2.7 Sewers

The site is located within the postcode TN11 8, at the time of writing there is no information relating to sewer flooding instances.

2.8 Flood history

The EA Historic Flood Map includes no flood records on the site, however, there is a record of a historical flooding 129m to the west of the site. The absence of a record in the EA Historic Flood Map dataset does not necessarily mean that no incident occurred; it indicates only that any such incident was not documented in that dataset.

Kent County Council LLFA flood incidents records include two records of flooding within 100m north of the site.

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 4.6 of the Sevenoaks District Level 2 SFRA for information on climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

The EA RoFRS maps have been used to assess the impact of climate change on flood risk to the site. The 1% AEP plus 35% ('2080s' epoch Central allowance) climate change extents are currently available, and are based on national modelling. These are shown in shown in Table 3-1. No local detailed flood modelling is available.

3.1.2 Description of risk to the site

As shown below in Table 3-1, the site is not predicted to be impacted by fluvial flooding during the 1% AEP event plus the central climate change allowances.

Table 3-1: Comparison of fluvial flood risk to the site between the 1% AEP and 1% AEP plus 35% climate change extents.

Event	1% AEP	1% AEP plus 35% CC
Percentage of site at risk (%)	0	0

3.2 Surface water

3.2.1 Available data

The EA's FMfP Surface Water Spatial Planning mapping has been used to assess the extent and depth of surface water flooding impact of climate change on flood risk to the site in the 1% AEP plus 40% event. The impact of climate change on surface water flood risk should be assessed as part of a site-specific Flood Risk Assessment, in line with the latest available climate change allowances and guidance.

3.2.2 Description of risk to the site

Table 3-2 indicates a slight increase in flood extent across the site between the present-day 1% AEP event and the 1% AEP event plus 40% climate change allowance. Ponding is

concentrated in the northeast of the site. During the climate change scenario surface water flooding extents increases by a small percentage to cover over 22% of the site (Figure 3-1). During the climate change scenario, the depths increase from 0.30 to 0.60m with the greatest depths seen in ponding against the railway line.

Table 3-2: Comparison of surface water flood risk to the site between the 1% AEP and 1% AEP plus 40% climate change extents.

Event	1% AEP	1% AEP plus 40% CC
Percentage of site at risk (%)	20.09	22.32
Maximum depth (m)	0.30	0.60

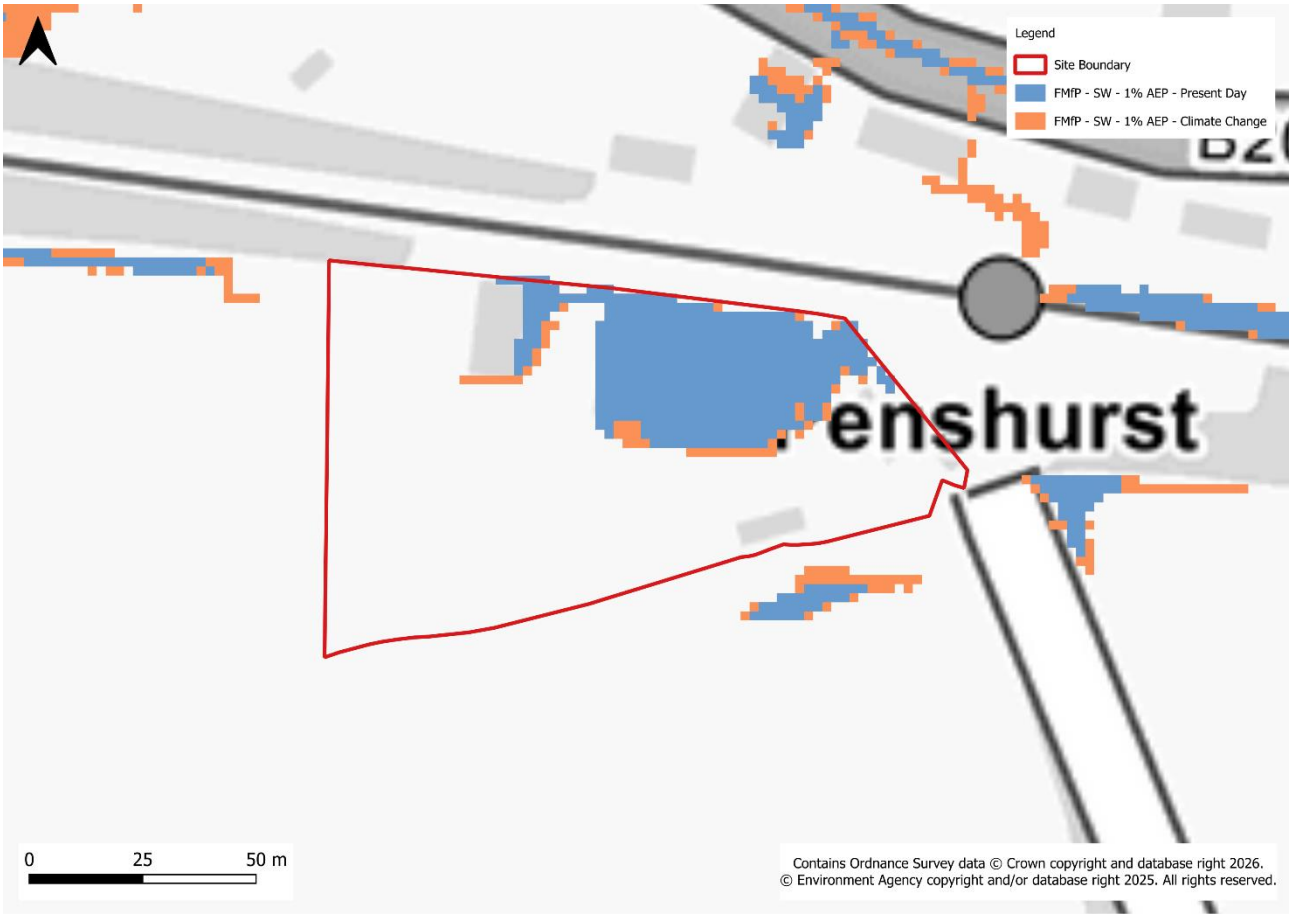

Figure 3-1: Comparison of surface water flood risk to the site between the 1% AEP and 1% AEP plus 40% climate change extents

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset shows that the site is not protected by any formal flood defences.

4.2 Residual risk

There is no residual risk to the site from flood risk management structures.

5 Emergency planning

5.1 Flood warnings and alerts

The site is not located in an EA Flood Warning or Flood Alert Area.

5.2 Existing emergency plans and procedures

Kent County Council's Kent Resilience Forum (KRF) is one of a number of Local Resilience Forums (LRFs) that have bene set up across England. The overall aim of an LRF is to ensure that the various agencies and organisations plan and subsequently work together so that responses to emergencies are coordinated appropriately. The KRF is made up of a number of different agencies and organisations that work together across a range of areas including planning for emergencies.

The Kent County Council Flood Response Plan (October 2023) sets out the principles that govern the Kent County Council's response to a significant flooding event within their local authority administrative area. The Plan is built upon the existence and maintenance by Category 1 and 2 Responders of their own plans for response to flooding. The response plan provides information on Kent County Council's actions, roles, and responsibility in response to a flood emergency in their administrative area.

5.3 Access and escape

Safe access and escape will need to be demonstrated in the 1% AEP plus climate change surface water events. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.3.1 Potential access

Current vehicular access to the site is via Station Hill to the southeast. There is also pedestrian access to the north of the site, through Penhurst Railway Station, via a footbridge over the railway line.

5.3.2 Fluvial

Safe access and escape from the site can be achieved during fluvial flood events.

5.3.3 Surface water

In the 1% AEP plus climate change scenario, Station Hill, to the south of the site, is at risk of surface water with depths up to 300mm across the road where it joins Moorden Lane.

Safe access and escape via this Station Hill may be impeded. Pedestrian access and escape over the railway line is achievable, however escape should be east along the B2027.

A site- specific Flood Risk Assessment (FRA) must show that the development can be designed to be safe and that there is adequate emergency planning provision.

5.4 Dry islands

The site is not located on a dry island.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible SuDS

- Groundwater levels are predicted to be 5m below the ground surface, however, BGS data indicates that the underlying geology is mudstone, which will have a low infiltration potential. The viability of managing surface water runoff via infiltration should be confirmed through site investigations and infiltration testing, in line with Kent County Council LLFA guidance. Off-site discharge in accordance with the SuDS hierarchy is likely to be required to discharge surface water runoff from the site.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
- The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access.
- The site is not located within a historic landfill site.

6.2 Opportunities for wider sustainability benefits and integrated flood risk management

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints.
- Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.
- The Surface Water Spatial Planning extent mapping indicates the presence of surface water ponding during the 3.3%, 1% and 0.1% AEP events.

7 NPPF and planning implications

7.1 Exception Test requirements

The Local Planning Authority will need to confirm that the Sequential Test has been carried out in line with national guidelines. The Sequential Test will need to be passed before the Exception Test is applied.

The NPPF classifies the housing development as More Vulnerable

The Exception Test is not required for this site because the site is within Flood Zone 1.

While the Exception Test is not explicitly required for sites at risk from other sources of flooding, the LPA should follow a similar principle, as the proposed site is at risk from other sources of surface water flooding. This includes ensuring that site users can be kept safe through the lifetime of the development and ensuring that residual risk can be safely managed.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site:

- within Flood Zone 1 and the flood map for planning shows it is at risk of flooding from surface water, now or in future

All sources of flooding should be considered as part of a site-specific FRA.

Consultation with the Local Authority, Lead Local Flood Authority, Water Company, and the EA should be undertaken at an early stage.

Any FRA should be carried out in line with latest guidance including the National Planning Policy Framework (NPPF), Flood Risk and Coastal Change Planning Practice Guidance (PPG), and Sevenoaks District Council Local Plan Policies.

The development should be designed with mitigation measures in place where required.

7.3 Guidance for site design and making development safe

- The site layout should adopt a sequential approach by steering the most vulnerable aspects of the development outside of areas at risk of surface water flooding, in the central north and northwestern area of site.
- The risk from surface water should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.

- Arrangements for safe access and escape will need to be provided for the 1% AEP surface events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.
- Provisions for safe access and escape should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.
- The site is located within a catchment identified as highly sensitive to the cumulative impacts of development on flood risk. The site-specific FRA and surface water drainage strategy should consider the recommendations outlined for catchments of high sensitivity in the Sevenoaks District Level 1 SFRA Cumulative Impacts Assessment.
- Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere.
- Flood resilience and resistance measures should be implemented where appropriate, e.g. raising of floor levels. These measures should be assessed to make sure that flooding is not increased elsewhere. If the floor levels cannot be raised to meet the minimum requirements, developers will need to:
    - raise them as much as possible.
    - consider moving vulnerable uses to upper floors.
    - include extra flood resistance and resilience measures.
- Other examples of flood resistance and resilience measures include:
    - using flood resistant materials that have low permeability to at least 600mm above the estimated flood level.
    - making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level.
    - by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level.

8 Conclusions

The site is located within Flood Zone 1 and is therefore predicted to be at a very low risk of fluvial flooding.

The site is at risk of surface water flooding; ponding occurs in the northeastern section of the site where water backs up against existing buildings and the railway line to the north.

The following points should be considered in development of this site:

- The site layout should adopt a sequential approach by steering the most vulnerable aspects of the development outside of areas at risk of surface water flooding, in the central north and northwestern area of site.
- The risk from surface water should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.
- Arrangements for safe access and escape will need to be provided for the 1% AEP surface events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.
- Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.

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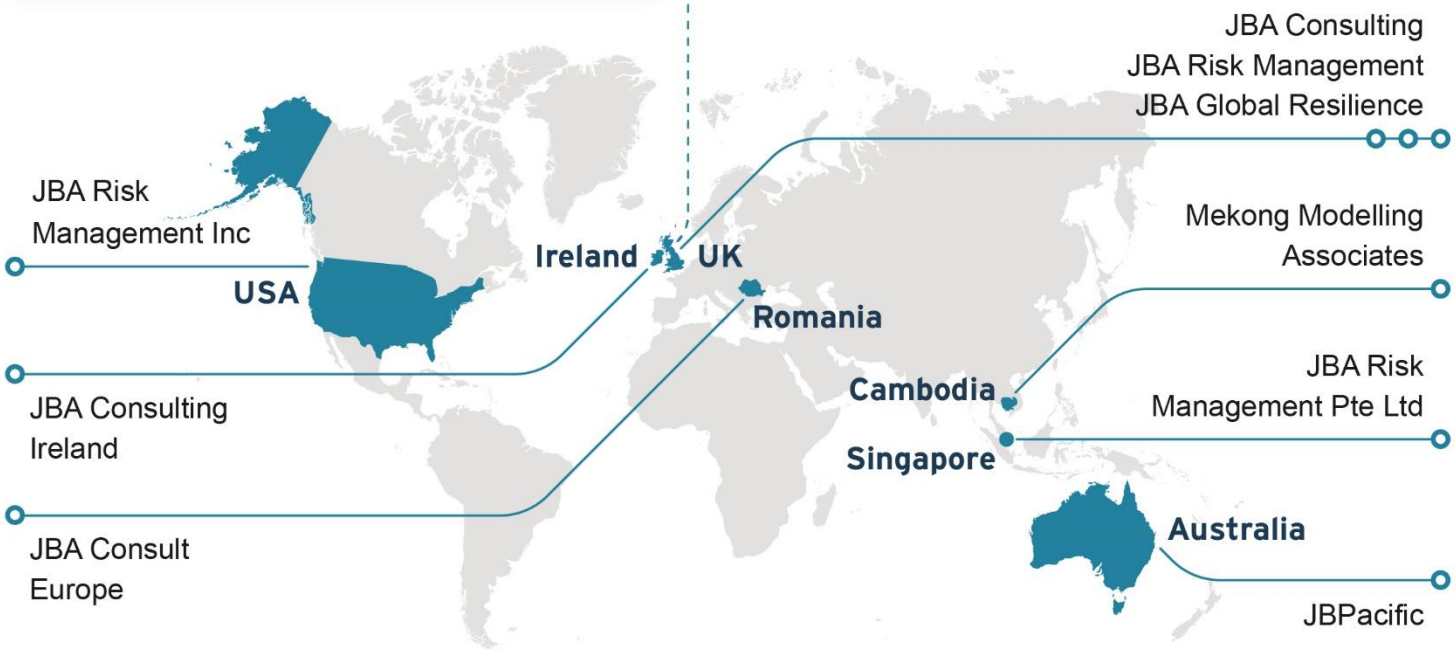

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