ENVIRONMENT

Parker Strategic Land
Bodkin Farm
Chestfield, Whitstable
Flood Risk & Drainage Technical Note

January 2023

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Notice

1. SITE OVERVIEW

1.1 The site is located to the south of Thanet Way, Whitstable and comprises land east of Bodkin Farm extending to approximately 27ha across the existing farm and associated fields. The location of the site is shown in **Figure 1.1.**

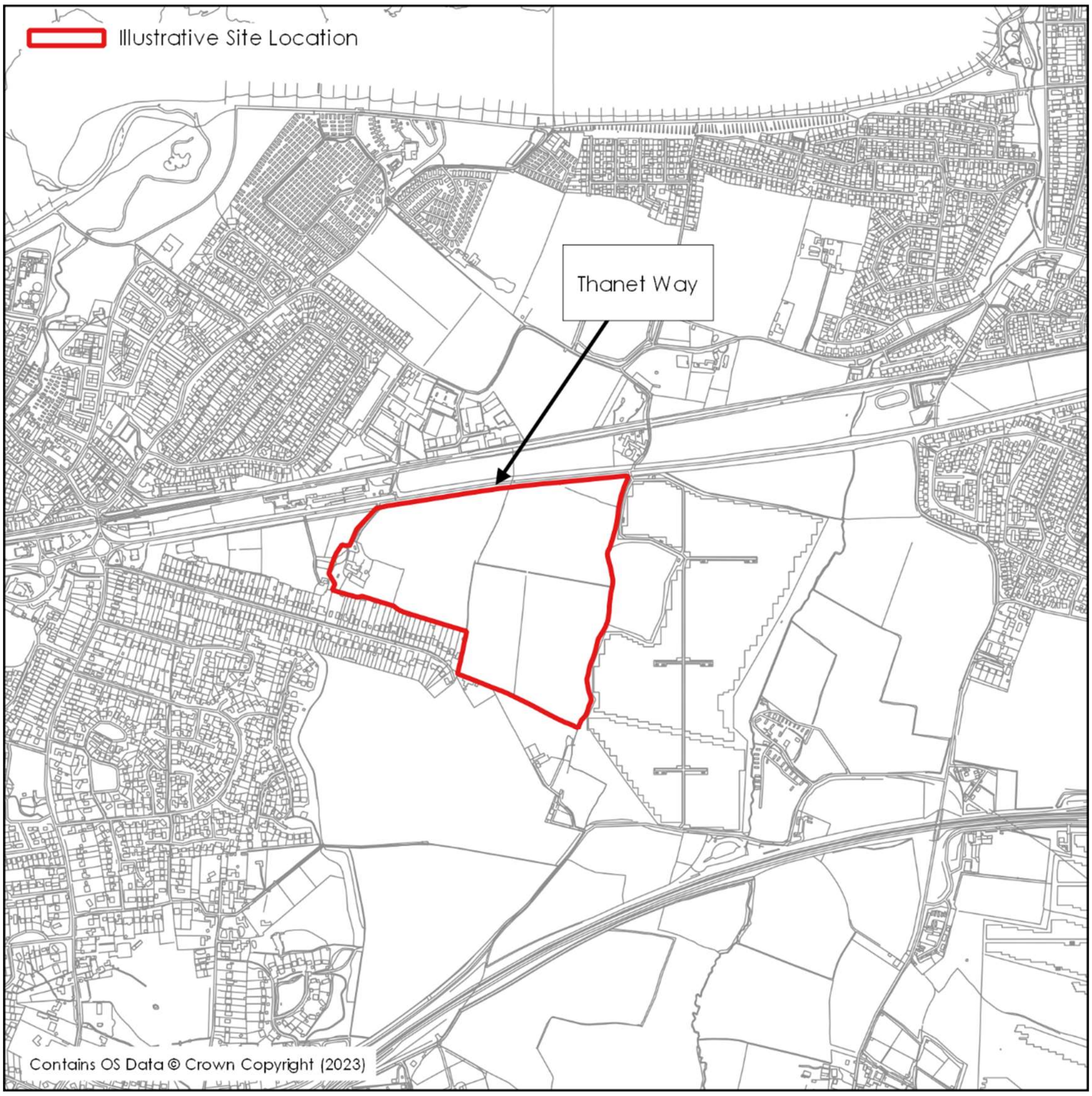

Figure 1.1: Site Location

1.2 BWB have been appointed to assess the existing site's deliverability in terms of flood risk and drainage including a review of constraints. The assessment is based on the intention to develop the site for a residential end use, which is classed as 'More Vulnerable' in planning terms. Other uses and vulnerability classifications may be proposed however residential is likely to be the most significant land use and the site has been assessed on that basis. Flood risk is generally low and all types of development appropriate with the exception of a small corridor on the western boundary.

1.3 Topographically, the site has a localised high point with a maximum elevation of approximately 16mAOD at its centre, falling to the east (to 11mAOD) and west (8mAOD).

2. FLOOD RISK

Fluvial

National Datasets

2.1 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

2.2 The site is bound to the west by a watercourse (Kite Farm Ditch) which is a Main River and, therefore, under the jurisdiction of the Environment Agency (EA), although maintenance responsibility is riparian.

2.3 The eastern part of the site drains via a network of field ditches across, or through, the adjacent solar farm into another Main River, known as West Brook (or Westbrook).

2.4 With particular reference to planning and development, the Flood Map for Planning produced by the EA identifies Flood Zones in accordance with Table 1 of the Planning Practice Guidance.

2.5 Flood Zone 1 (Low Probability) is defined as land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability).

2.6 Flood Zone 2 (Medium Probability) is defined as land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1% AEP); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1% AEP).

2.7 Flood Zone 3a (High Probability) is defined as land having a 1 in 100 or greater annual probability of river flooding (>1% AEP); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP). This is represented by "Flood Zone 3" on the Flood Map for Planning.

2.8 Flood Zone 3b (The Functional Floodplain) is defined as land where water has to flow or be stored in times of flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

2.9 The site is shown to be predominantly located within Flood Zone 1, as shown in **Figure 2.1**. The Kite Farm Ditch has areas of Flood Zone 2 & 3 associated with it, although the encroachment into the site is minimal. There is also shown to be a merging of the floodplain (Flood Zone 2) between the Kite Farm Ditch and Swalecliffe Brook on land to the west of the site (on the opposite bank of the Kite Farm Ditch).

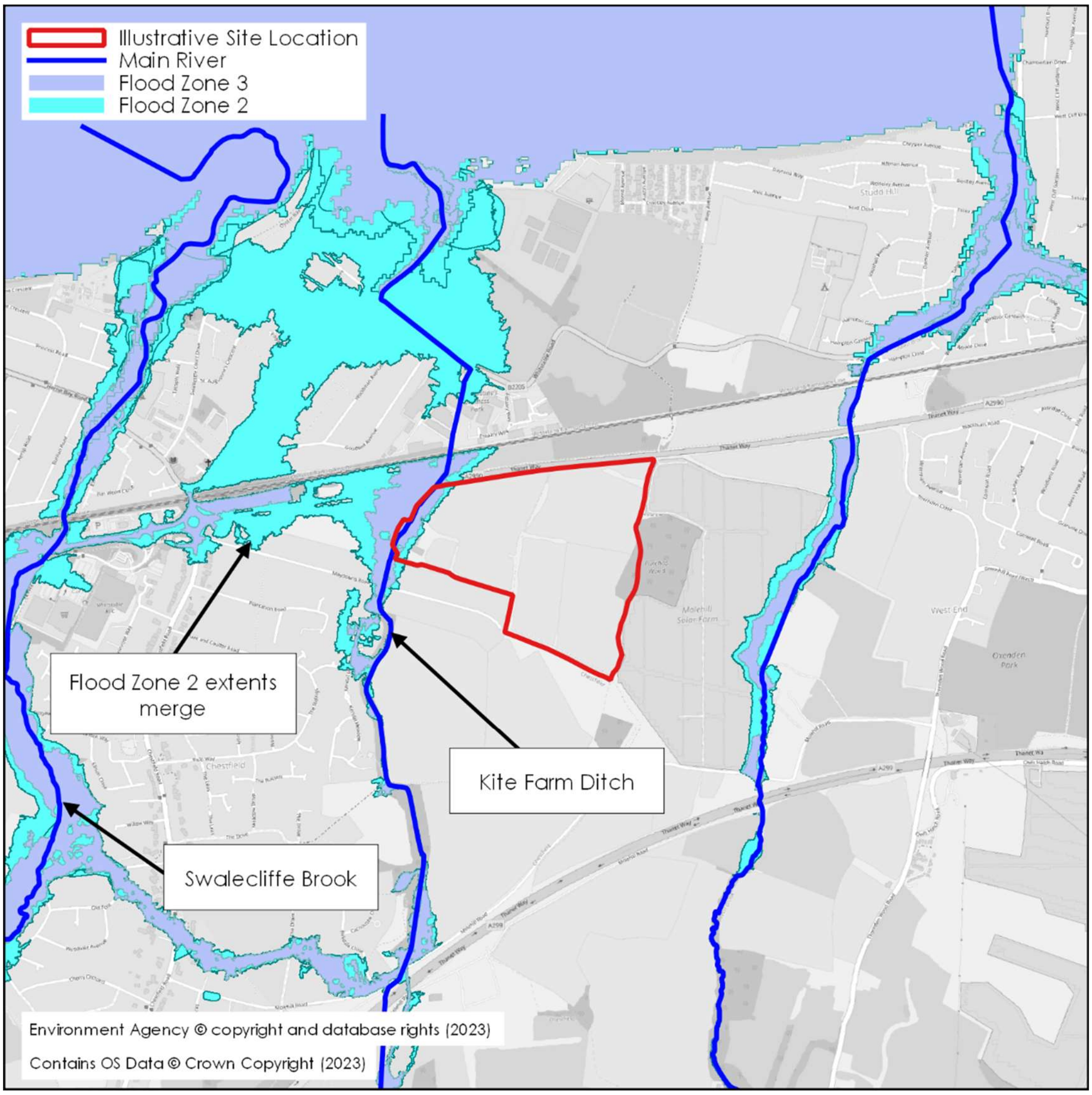

Figure 2.1: Flood Map for Planning

<u>Environment Agency Kite Farm Ditch Model</u>

2.10 A hydraulic model of the Kite Farm Ditch has been supplied by the Environment Agency[1], which was initially developed by JBA Consulting in 2014 and updated for climate change allowances that were released in 2016. It should be noted that the climate change allowances were updated again in July 2021. The latest allowances will need to be used to assess the impact of climate change in line with the current EA guidance. For the purposes of a Flood Risk Assessment (FRA), it is anticipated that the central allowance of +38% should be used. JBA Consulting previously ran a range of climate change scenarios (25%, 35%, 45%, 50% and 105%). The +45% allowance has been used to provide a conservative projection of the maximum flood extents with climate change in **Figure 2.2** below.

2.11 The risk to the site is largely a result of the 600mm diameter pipe that flows under the A299 (Thanet Way). The watercourse is culverted for approximately 60m, before converting back to open channel for an approximate 50m stretch, eventually

[1] 2012s6081 - Isle of Sheppey & Oyster Coast Brooks Final Report (v2.0 October 2014). JBA Consulting

becoming culverted under the railway for 240m, where it reverts to open channel at the B2205 (Colewood Road). Analysis of the results shows that the culvert becomes surcharged in the 1 in 5yr event, which is the smallest magnitude event previously modelled.

2.12 A short 400mm diameter pipe is also overtopped upstream of Thanet Way and causes flooding. This is 6m long and serves existing development within the southwest of the site.

2.13 The flood depths and levels at the site for the 1 in 100yr +45% climate change event are mapped in **Figure 2.2**. Interrogation of the results show that there is no interaction with the Swalecliffe Brook during this event.

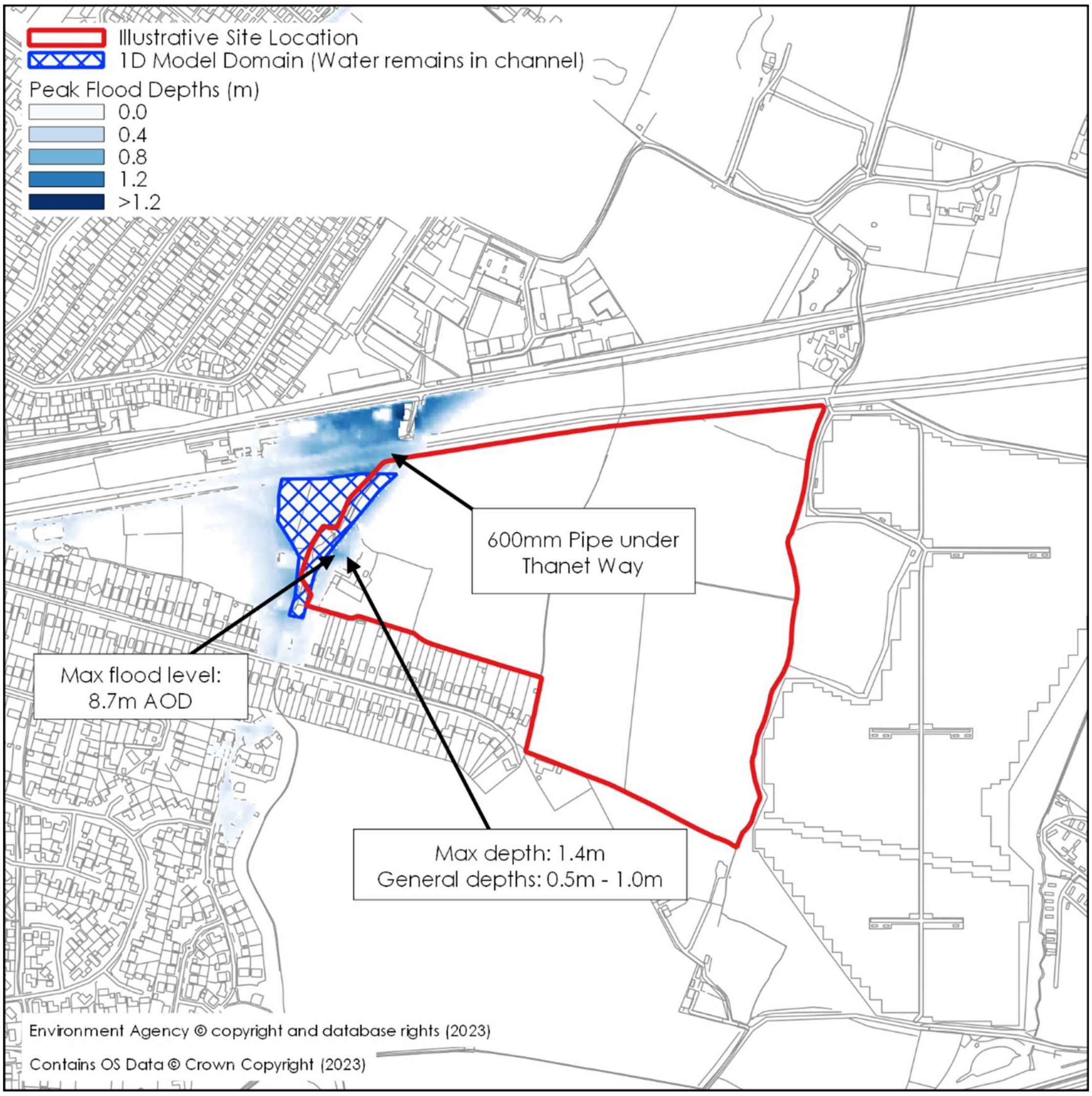

Figure 2.2: 1 in 100yr +38% CC Modelled Depths

2.14 It is not expected that amendments to the model will show substantially greater areas of flooding than currently mapped due to the existing topography. Development proposals should be able to avoid the areas of greatest risk whilst making use of the watercourse within any masterplan.

2.15 An initial review of the model setup has highlighted several areas that warrant further interrogation, namely as follows:

- The mannings 'n' roughness value for the Kite Farm ditch is relatively high (0.05), considering the channel appears straight without significant vegetation growth from available photographs.
- Orifice units are used in places as opposed to culvert inlet/outlet units to represent losses. This approach has probably been used to improve model stability.
- 1D/2D links around the channel adjacent to the site have relatively high loss coefficients applied. This approach has probably been used to improve model stability.
- The width of channel represented in the 1D upstream of the Thanet Way culvert is approximately 160m, despite the channel width being 2-4m. This is an uncommon approach that has likely been taken for stability purposes.
- The model cell size of 4m is large considering the small width of main channel.

Coastal/Tidal

2.16 Inundation of low-lying coastal areas by the sea may be caused by seasonal high tides, storm surges and storm driven wave action. Coastal/tidal flooding is most commonly a result of a combination of two or more of these mechanisms, which can result in the overtopping or breaching of sea defences. River systems may also be subject to tidal influences.

2.17 Although the site is close to the coast, it does not appear to be directly affected by such risk. The railway line to the north acts as a physical barrier and there appears to be little interaction between the on-site watercourses and the sea. A review of the Kite Farm Ditch hydraulic model has revealed that a tidal boundary is used at the downstream boundary, where the Kite Farm Ditch discharges into the sea. The tidal curve is informed by the Coastal Flood Boundary (CFB) dataset, and shows to peak at 2.66mAOD, which is equivalent to the Mean High-Water Spring (MHWS) level for all flood events.

2.18 The rise in sea levels at the downstream boundary due to climate change has been assessed in the existing model by raising the MHWS tidal curve by approximately 800mm. Whilst this may have been the best available information at the time, the amount of time that has surpassed and updated climate change allowances means that the increase in sea level in 2122 would be 1.04m. it is recommended that an updated climate change run should use this value as an increase to the MHWS tidal level.

2.19 The long section of results confirms that with the tidal conditions stated above, the site and downstream culvert is unaffected by the tide. Although no tests have been undertaken with more extreme tidal levels, coincidence of an extreme tidal event with an extreme fluvial event is considered unlikely and the use of a MHWS curve is a common approach.

Pluvial

2.20 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure, is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

2.21 Risk of flooding from surface water mapping has been prepared by the EA; this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. An extract from the mapping is included as **Figure 2.3.**

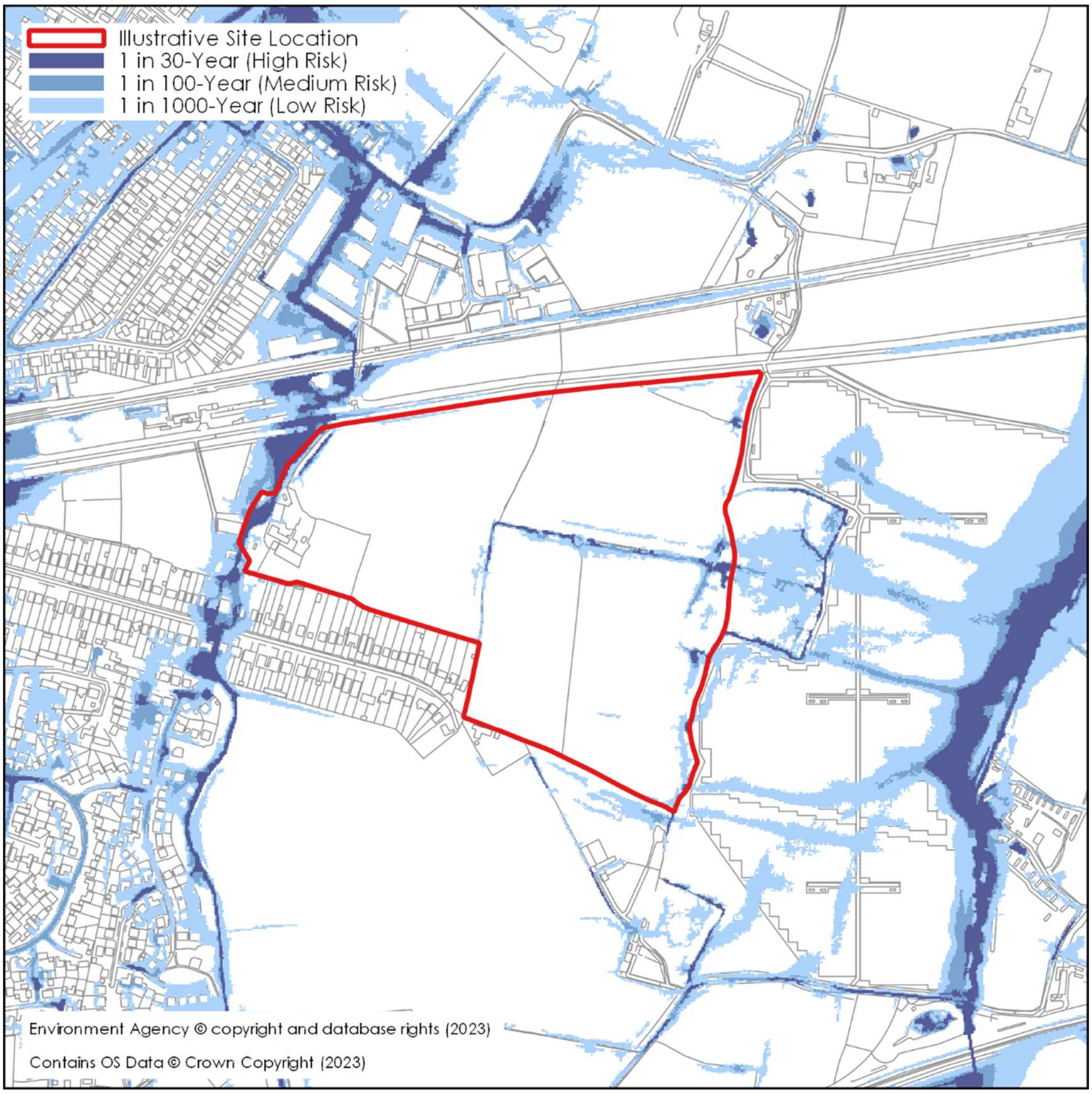

Figure 2.3: Surface Water Flood Risk

2.22 The areas at most risk are consistent with topographical depressions/watercourses within the site and indicate that the majority of the site is at a low risk. Existing topography, including field ditches and the like, should be utilised in the development of the site to provide conveyance for surface water and manage residual risk.

Other Sources of Risk

2.23 The NPPF requires that potential developments are assessed against all sources of flood risk. In addition to those mentioned above, groundwater, large waterbodies/reservoirs, canals and sewerage infrastructure can all present a risk, as well as other developments.

2.24 A review of relevant local and national guidance has been undertaken to inform a view on the other sources of risk and it can be concluded that they are low.

2.25 Relevant guidance includes, but is not limited to;

- Canterbury District Surface Water Management Plan Stage 1 (Jacobs, 2012)
- Flood Risk to Communities, Canterbury (Kent CC, 2017)

3. DRAINAGE

Surface Water

3.1 New developments are obligated to manage surface water runoff in a manner which does not affect flood risk elsewhere. This therefore means that increases in impermeable area resulting from development encourage water to flow off the surface rather than into the ground and this must be captured and released at a controlled rate.

3.2 Although infiltration is the idealised method of surface water disposal, the underlying geology is understood to comprise London Clay which does not provide sufficient permeability to allow soakaways to be utilised. The next most preferable discharge method is to a watercourse.

3.3 As the site is split into two catchments (east and west), a greenfield runoff rate can be calculated for each catchment for relevant storm return periods and used as a limiting rate in any redevelopment. The area draining to each catchment should ideally not be increased so as to prevent transfer of flows across catchments.

3.4 The implementation of Sustainable Drainage Systems (SuDS) is required on new developments and particularly so in Kent where the Lead Local Flood Authority (Kent CC) are a leading group nationally in the implementation of SuDS.

3.5 A detailed strategy would be required to support a masterplan but the presence of watercourses at low points and existing flow routes through the site should provide a framework to provide source control, conveyance and treatment features as well as any attenuation that is required to balance flows.

3.6 A reduction in peak flow rates leaving the site by limiting runoff from the site to the annual average runoff rate (QBAR) in line with best practice is likely to result in a small reduction in flood risk downstream in more extreme events.

Foul Water

3.7 There are understood to be a network of adopted sewers in the vicinity of the site which are owned and maintained by Southern Water. A connection point has not been determined but the wide site frontage and surrounding development are likely to provide multiple options for disposal.

3.8 Additionally, it is understood there are plans for Southern Water to provide additional capacity in the local foul water network and treatment works through removal of surface water flows which are likely to provide substantial betterment in due course.

4. SUMMARY

4.1 Flood risk to the site from all sources has been reviewed and it is concluded that it does not prevent a barrier to development, which should be placed in areas of Flood Zone 1.

4.2 Adequate provision for surface and foul water drainage can be provided in order to meet the needs of the site and, through careful design, provide betterment off site.

4.3 There is opportunity to mitigate flood risk on and off site exists through further development of watercourse modelling and stakeholder liaison.