3.4 Site Levels and Topography

The existing site levels have been extracted from the Lidar Digital Terrain Model (DTM) provided by the Department for Environment, Food & Rural Affairs (DEFRA) Survey Data portal. The maps identify the existing levels to Ordnance datum as illustrated in Figure 4.

The DTM indicates that the site levels range between approximately 1.4 and 5.3 metres Above Ordnance Datum (m AOD), with the northern site parcel situated approximately 2.0 m higher than the southern parcel.

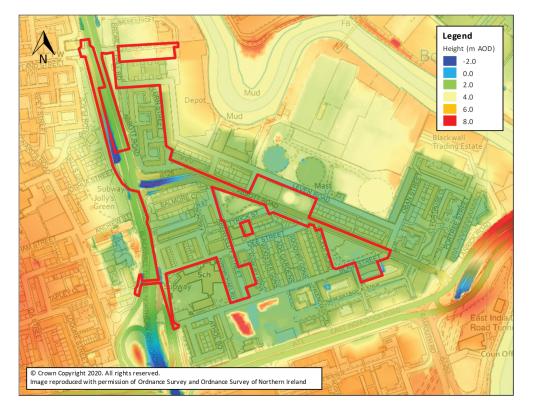


Figure 4 – Lidar level data

3.5 Site Geology and Hydrogeology

British Geological Survey (BGS) mapping indicates that the superficial deposits at the site comprise alluvium - clay, silt, sand and peat formed up to 2 million years ago in the Quaternary Period. (Figure 5).

The bedrock geology at the site comprises clay, silt and sand of the London Clay formation - sedimentary bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period (Figure 6).

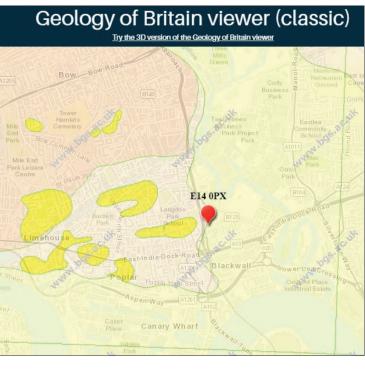


Figure 5 - Site Superficial deposits

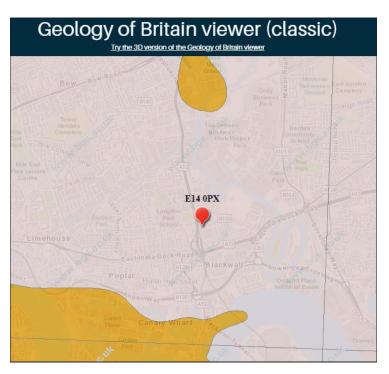


Figure 6 - Site Bedrock Geology

parmarbrook

The National Geoscience Data Centre's Single Onshore Borehole Index holds five records of boreholes within the site boundary. These indicate that made ground is present to a maximum depth of 2.5 m below ground level (bgl) underlain by silty sandy clay interlaid with gravel to a depth of 25.0 m bgl.

According to the MAGIC website the superficial deposits at the site are classified as a Secondary (undifferentiated) aquifer whilst the underlying London Clay Formation bedrock is classified as an Unproductive aquifer.

The site is not shown to be located within a designated groundwater source protection zone.

4 Assessment of Flood Risk

4.1 Flood Zone Designation

Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. The NPPF and PPG defines Flood Zones as follows:

- river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
- Land having a 1 in 200 or greater annual probability of sea flooding.
- d. Flood Zone 3b (The Functional Floodplain): This zone comprises land where water has to flow or be stored in times of flood.

The flood zones are shown on the Environment Agency Flood Map for Planning (Rivers and Sea). The flood zones shown on the flood map are defined by the predicted extent of flooding during the present day 1 in 100 (non-tidal rivers), 1 in 200 (tidal rivers and sea) and 1 in 1,000 (rivers and sea) annual exceedance probability (AEP) events. The zones do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

Flood zone 3b (functional floodplain) is not separately distinguished on the Flood Map for Planning but is usually identified by local planning authorities in their SFRAs. The boundary of flood zone 3b is normally defined as land that would flood during the present day 1 in 20 AEP event, although definitions may vary particularly in some districts and in urban areas.

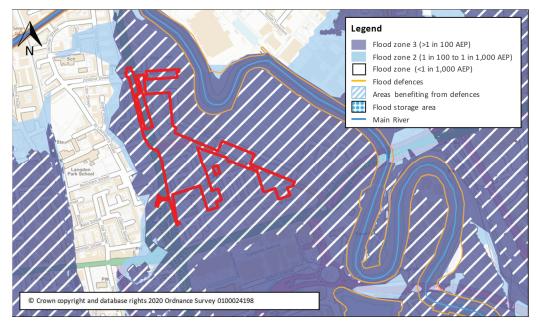


Figure 7 – EA Flood Map from Rivers & Sea

parmarbrook

a. Flood Zone 1 (Low Probability): Land having a less than 1 in 1,000 annual probability of river or sea flooding. b. Flood Zone 2 (Medium Probability): Land having between a 1 in 100 and 1 in 1,000 annual probability of

c. Flood Zone 3a (High Probability) Land having a 1 in 100 or greater annual probability of river flooding; or

Where an area benefits from formal flood defences providing a minimum standard of protection, the defended area may be indicated as an area benefiting from flood defences. However, not all areas are shown as such, and unless specifically indicated, the Flood Map for Planning conservatively shows land at risk of flooding in the absence of flood defences. The Flood Map for Planning (Figure 7) indicates the site to be located in flood zone 3 and is in an area benefiting from the presence of flood defences.

4.2 Historical Records of Flooding

The Environment Agency historic flood map indicates that extensive flooding of the site occurred in 1928 and that land beyond the south-east corner of the site was also flooded in 1947 (Figure 8).

It should be noted that raised defences were not present along the River Lee when flooding occurred at the site. The London Borough of Tower Hamlets SFRA indicates that flood defences were constructed following the 1947 flood event.

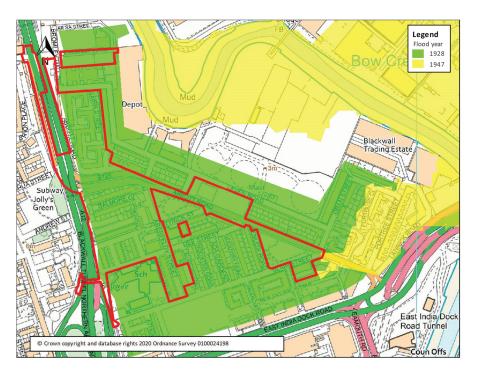


Figure 8 – Recorded Flood Outlines.

4.3 Flood Risk – River Lee

As detailed in Section 3.3, the River Lee is located a minimum of approximately 160 m east of the site and flows in a generally southerly direction to its confluence with the River Thames.

The Environment Agency (EA) has confirmed that the flood defences along the River Lee prevent flooding in up to the 1 in 1,000 AEP event and that the planning application should be informed by an assessment of flood risk from the River Thames.

4.4 Flood Risk – River Thames

As detailed in Section 3.3, the River Thames is located approximately a 550 m south of the site and flows in an easterly direction towards the Thames Estuary.

The extent of flooding presented by the Flood Map for Planning does not take into account the presence of flood defences. However, the site is located in an area benefitting from formal defences, including the Thames Barrier.

The Thames Barrier and the raised defences along the banks of the River Thames and are designed to provide a 1 in 1,000 annual probability Standard of Protection (SoP) and therefore mitigate the risk of flooding from the River Thames in up to the present day 1 in 1,000 annual probability event.

The crest level of the defences situated adjacent to the site is currently 5.23 m AOD. It is expected that the crest level of the defences will be raised to 6.20 m AOD in accordance with the TE2100 Plan in order to maintain the current SoP up to 2100.

Based upon the above, the site is assessed to be at a low risk of flooding form the River Thames. However, a residual risk of flooding exists due to potential overtopping of the defences for events exceeding the SoP, due to a structural failure of the flood defence walls, or due to a failure of Thames Barrier to operate as intended.

The Environment Agency has provided outputs from its 2017 Thames Tidal Upriver Breach Inundation Modelling Study. The extents of flooding resulting from a breach of the River Thames flood defences for the present day and 2100 climate change scenarios are presented by **Figure 9** and indicate that the site is at risk of flooding.

Maximum flood levels for the present day and 2100 climate change scenarios are presented by **Figure 10** and **Figure 11** respectively. The model results indicate that peak flood levels across the southern site parcel for the present day and 2100 climate change scenarios are 2.80 m AOD and 3.68 m AOD respectively. Peak flood levels within the northern site parcel are shown to range from 3.18 – 3.55 m AOD in the present day scenario and 3.65 – 5.10 m AOD in the 2100 climate change scenario.

Flood hazard mapping for the present day and 2100 climate change scenarios are presented by **Figure 12** and **Figure 13** respectively. The flood hazard at the site is generally shown to be significant (i.e. dangerous for most people), with areas of extreme hazard (i.e. dangerous for all) identified along the site access roads in the 2100 climate change scenario. Refer to **Appendix B** for the EA Product 4 Detailed Flood Risk Maps.

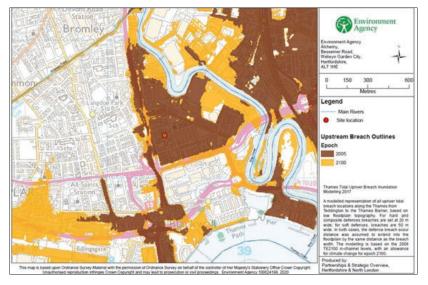
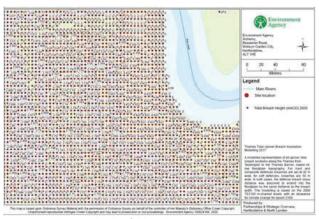
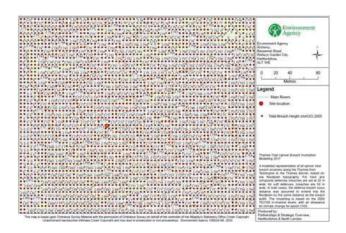


Figure 9 – Modelled Flood Extent – Breach. Tidal Upriver Breach Inundation Modelling Study 2017

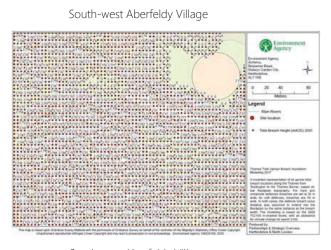
parmarbrook



North Aberfeldy Village

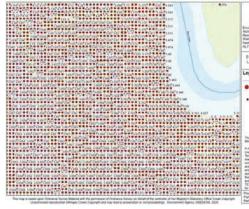


South-west Aberfeldy Village

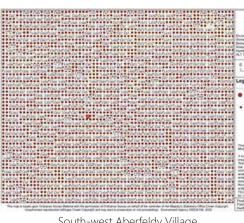


South-east Aberfeldy Village

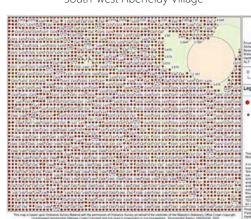
Figure 10 – Maximum Water Level – Breach (2005). Tidal Upriver Breach Inundation Modelling Study 2017



North Aberfeldy Village



South-west Aberfeldy Village



South-east Aberfeldy Village

parmarbrook

And the second of the secon	Agency	
<u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u> <u>been</u>	noment Agency entry anner Road, ryn Garden Cay, Indatan, HE	
<text></text>	20 40 40	
<text></text>	pend	
<text></text>	Mari Rivers	
<text></text>	Safe Excabon	
<text></text>	Telat Breach Height (mAOD) 2100	
memory manufactory	odeled representation of all spriver Islat activities along the Thartee Iron	
Amount 1 Joing 0 Joing 0 Hand Present 1 State States 1 Table Breach Henges (IndCOL) 2100 1 March Table States 1 Mare Table States<	ermant Agency to	
Image:	n Garden Cel.	
 Lan Rung Lan Kongan Tada Ibeaca Hagat (an-CO() 210) Na Paral Jacob Hagat (an-CO) 2100 		
 Lan Rung Lan Kongan Tada Ibeaca Hagat (an-CO() 210) Na Paral Jacob Hagat (an-CO) 2100 	25 40 60	
 Lan Rung Lan Kongan Tada Ibeaca Hagat (an-CO() 210) Na Paral Jacob Hagat (an-CO) 2100 	Metros	
<text><text><text></text></text></text>	Man Rivers	
	Sile location	
	Tubé Breach Height (mACO) 2100	
men flast (sp. 4) men flast (sp. 4) 20 40 40 <u>Berley</u> Perd Man Plaster Saar breach resign (sk40c)(279)	defed representation of all upriver bits chilocolonia along the Thanke from region to the Thankei Bankei, based ter Boodgian topography For hant and	
ret 20 40 80 <u>states</u> J send Man Reen Site scature fear breach meght pACO(2100	Environment Agency	
Main Powns Sile Rotation Teas Breach Height (InVOD) 2100	miy, amer Road, nys Garden Cdg.	
Main Powns Sile Rotation Teas Breach Height (InVOD) 2100	20 40 60	
Main Powns Sile Rotation Teas Breach Height (InVOD) 2100	Memos pend	
Tear breach respective/OC12100		
Their Breach Height (INACO) 2100	Sile location	
ning Turki (uning Bright) Incident	Tata Breach reight (INACO) 2100	
subtries approximations in of a quintee Mark constantiante approximation for the Transme Neuro Solgitare to the Transme Barray, Lassed can popolare interpreter for a near of an 20 m quintee Markets transmission and a 20 m quintee Markets and a 20 m quintee Markets and a 20 m population of the second state of the approximation of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second state of the second stat	Receiptain technologiages File Need and general behaviors, and all 20 m e. the call definition, invalues are 50 m e. in both cases, the phenois branch solution and and advected for school dirty the distant phe same determine and the (neurition). In the mobility is taken to the 2000 1000 in-channel levels, with an advectors formate change to space 1200	
Arrent by: recolups & Strategy: Overview, fonduture & North London	nershipi & Strategic Overview, fordature & North London	

-

Figure 11 – Maximum Water Level – Breach (2100). Tidal Upriver Breach Inundation Modelling Study 2017