

Chapter 13: Archaeology

ARCHAEOLOGY	
AUTHOR	Wessex Archaeology
SUPPORTING Annex	ES Volume 3: Appendix: Archaeology Annex 1: Relevant Policy, Guidance and Legislation Annex 2: Archaeological Desk-Based Assessment Annex 3: Geoarchaeological Desk-Based Assessment
KEY CONSIDERATIONS	This ES chapter considers potential impacts of the Proposed Development with regard to below ground archaeology which may occur during the construction and operational phases of the development. Consideration of Aspdins Kiln is contained within this chapter as both an above and below ground asset. Built Heritage is considered separately within ES Volume 2, Townscape and Visual Impact Assessment, Appendix: Heritage Statement .
CONSULTATION	An EIA Scoping Report was prepared and submitted to Gravesham Borough Council (GBC) on the 11th August 2022 requesting a Scoping Opinion from GBC. A copy of the EIA Scoping Report is provided in ES Volume 3, Appendix: EIA Methodology – Annex 1. A formal Scoping Opinion was received on 16th September 2022, as provided in ES Volume 3, Appendix: Chapter 2: EIA Methodology – Annex 2. The following comments from Historic England are relevant to this ES chapter. A response as to where this can be found in the ES chapter is provided below: • Comment: The separation of above and below ground heritage is inappropriate. The industrial archaeology of the site will encompass both above and below ground heritage assets with archaeological interest; - Response: Industrial archaeology has been included within this chapter as above and below ground archaeology including an assessment of Aspdin's Kiln (paragraphs 13.87-13.90, 13.104-5, 13.107-8). An assessment of above ground Built Heritage is provided within ES Volume 2, Townscape and Visual Impact Assessment, Appendix Heritage Statement. • Comment: This location has potential for deeply buried waterlogged archaeology similar to that found in Scheduled Monument (1004206). Such nationally important but non-designated archaeology should be treated in a similar way; - Response: potential for undesigned waterlogged archaeology of possible high significance is included within this chapter (paragraph 13.97). • Comment: A geoarchaeological approach is needed to inform the ES. This should include assessment of existing boreholes, drilling of additional boreholes, test pits, deep geophysics all feeding into a deposit model; - Response: A geoarchaeological desk-based assessment has been prepared including an assessment of existing boreholes (ES Volume 3, Appendix: Archaeology – Annex 3). Due to time constraints surrounding the application, no intrusive or geophysical surveys have been undertaken. • Comment: Historic England's deposit modelling guidance should be referred to; - Response: Historic England's deposit modelling guidance has been used as part of the geoarchaeological desk-based assessment (ES Volume 3, Appendix Archaeology – Annex 3) and is listed as relevant guidance within ES Volume 3, Appendix: Archaeology – Annex 1. • Comment: Non-designated but nationally important waterlogged remains relating to the prehistoric, roman, anglo-saxon and Norman periods were found as part of High Speed Rail 1 (HS1) and similar should be expected within the site; - Response: Potential for non-designated waterlogged remains of possible medium to high significance has been assessed within this chapter (paragraph 13.97). • Comment: Direct and indirect impacts in particular from changes in hydrology during construction and operation, might affect preservation and significance; - Response: Direct and indirect effects to waterlogged deposits arising from changes in hydrology have been assessed within this chapter (paragraphs 13.97, 3.105 and 13.108).

	• Comment: Historic England's guidance on preserving archaeological remains should also be used in the ES; - Response: Preserving Archaeological Remains has been used as part of this assessment, see ES Volume 3, Appendix: Archaeology – Annex 1. • Comment: There is also potential for operational impacts arising from changes to hydrology of the site and development within the setting of Aspdins Kiln and industrial archaeology of the site; - Response: operational impacts relating to changes in hydrology and the setting of Aspdins Kiln have been included in this chapter (paragraphs 13.107-13.108) • Comment: A 1km study area is proportionate for below ground archaeology; - Response: A 1km Study Area has been used for below ground archaeology. The following comments from Kent County Council (KCC) Heritage Team are relevant to this ES chapter: • Comment: The desk-based assessment should include existing borehole data from the site and 500m around; - Response: This is provided within the Geoarchaeological Desk-Based Assessment (ES Volume 3, Appendix Archaeology – Annex 3). • Comment: Field evaluation to inform the ES should comprise purposive boreholes to ground truth and develop a deposit model; - Response: Due to time constraints purposive boreholing has not been undertaken to inform the assessment. • Comment: As well as considering Aspdins Kiln under built heritage it should also be included as archaeology; - Response: Aspdins Kiln has been included as part of this chapter (paragraphs 13.104, 13.107). • Comment: Results from the investigations at the adjacent Grove Road should be used; - Response: The results from the investigations at Grove Road have formed part of the baseline and are presented in summary in this chapter and in greater detail in ES Volume 3, Appendix: Archaeology – Annex 2. • Comment: The ES should include consideration of potential positive benefits of the Proposed Development; - Response: Following the results of intrusive archaeological investigations, potential positive benefits of the Proposed Development through heritage interpretation can be formulated as appropriate.
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ASSESSMENT METHODOLOGY

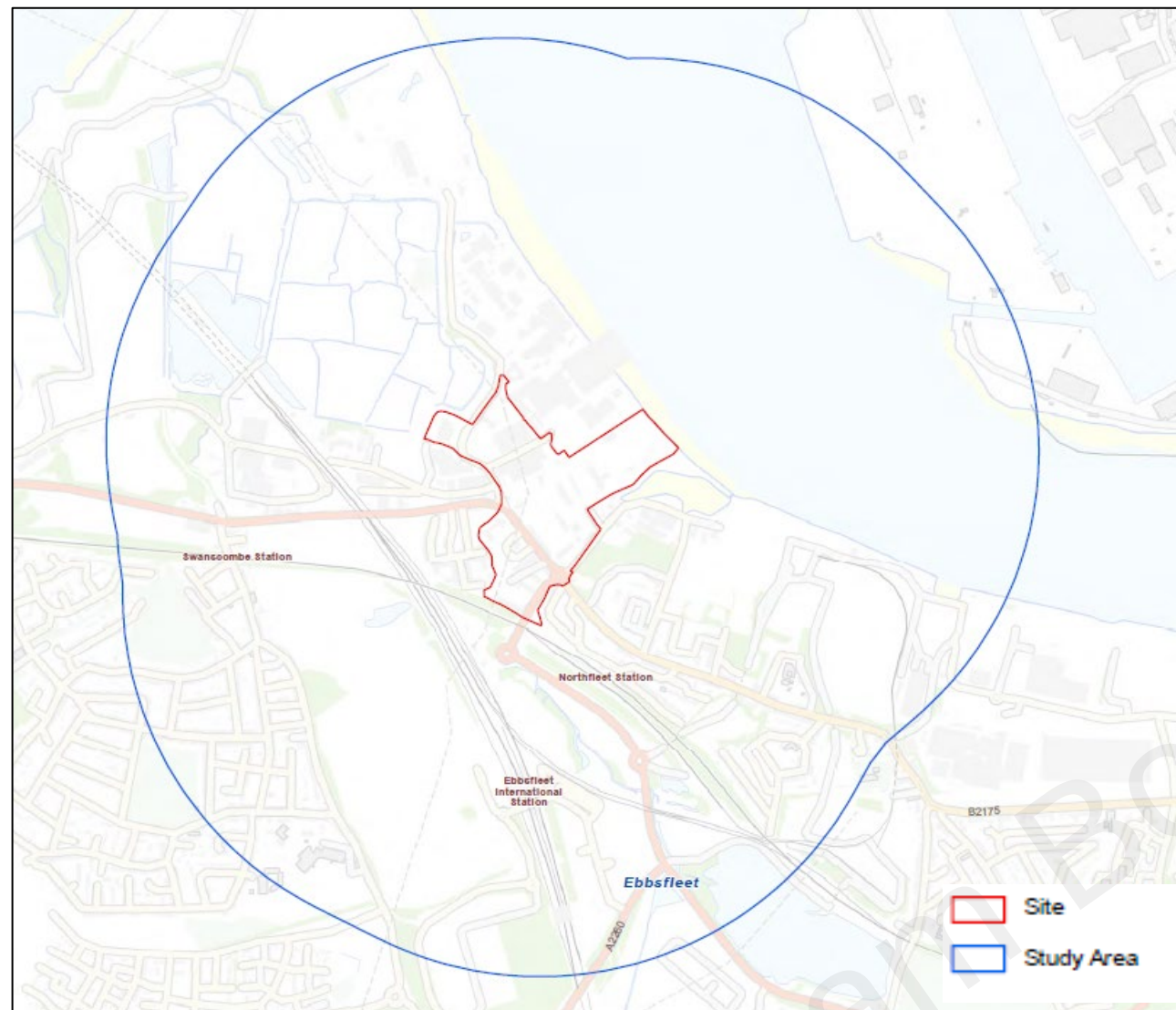
Outline Assessment Methodology

Defining the Baseline

Study Area

- 13.1
- A study area was established within a 1km radius of the site boundary, as shown on **Figure 13.1**. The use of a 1km study area was based on professional judgement and was agreed by Historic England in the Scoping Opinion.
- 13.2
- The recorded historic environment resource within the study area was considered in order to provide a context for the discussion and interpretation of the known and potential resources within the site.

Figure 13.1 1km Study Area around the Site



Data Sources

13.3 Several publicly accessible sources of primary and synthesised information were consulted, these comprised;

- The National Heritage List for England (NHLE), which is the only official and up to date database of all nationally designated heritage assets;¹
- The Kent Historic Environment Record (KHER), comprising a database of recorded archaeological sites, find spots and archaeological events within the county;
- South East Research Framework (SERF)²
- National heritage datasets including the Archaeological Data Service (ADS)³, Heritage Gateway⁴, OASIS, and the National Record of the Historic Environment (NRHE) Excavation Index⁵;
- Historic manuscripts, surveyed maps and Ordnance Survey maps;
- LiDAR and aerial photographs;
- A site walkover; and

¹ National Heritage List for England, available at: Search the List - Find listed buildings, monuments, battlefields and more | Historic England

² Kent County Council, 2019, South East Regional Research Framework.

³ Archaeological Data Service, available at: Archaeology Data Service

- Relevant Primary and Secondary sources including published and unpublished archaeological reports relating to excavations and observations in the vicinity of the site.

Relevant Policy and Guidance

13.4 Relevant Policy and guidance is presented within **ES Volume 3, Appendix: Archaeology – Annex 1.**

Baseline Research

13.5 An Archaeological Desk-Based Assessment (**ES Volume 3, Appendix: Archaeology – Annex 2**) was undertaken within the study area to provide context for the known and potential archaeological resource within and surrounding the site and to identify any designated or non-designated archaeological assets.

13.6 The Archaeological Desk-Based Assessment was informed by a site walkover with the objective to assess the general aspect character, condition and setting of the site and to identify any prior impacts not evident from secondary sources. The site walkover also sought to ascertain if the site contained any previously unidentified features of archaeological or historic interest. Access to the Asphalt and Aggregates Works was unavailable during the preparation of the desk-based assessment. These works are operational and as such access was refused on health and safety grounds.

13.7 A Geoarchaeological Desk-Based Assessment has been prepared for the site which outlines the sub-surface superficial deposits underlying the site and provides an initial assessment of their archaeological and geoarchaeological potential. This is part of a staged approach to understanding the potential impact of the Proposed Development on the geoarchaeological resource. The Geoarchaeological Desk-Based Assessment is presented in **ES Volume 3, Appendix: Archaeology – Annex 3.**

Evolution of the Baseline

13.8 In the absence of the Proposed Development, the archaeological resource within the site will remain unaffected and with no predicted change occurring to the baseline. Therefore, for the purposes of the assessment of effects and to provide a realistic worst-case scenario, the assessment has been undertaken on the current baseline rather than an evolved baseline.

Development Parameters

13.9 The following assessment has been carried out based upon the maximum development shown on the Parameter Plans and described in **ES Volume 1, Chapter 5: Demolition and Construction**. This represents a reasonable worst case scenario in terms of development impacts to below ground archaeological remains. Such impacts include:

- Demolition of existing buildings and removal of hardstanding/existing surfaces;
- Piling for new foundations (to a maximum depth of 30m below ground level (bgl); and
- Excavation for utilities, highway works and hard and soft landscaping.

Impact Assessment Methodology

Phasing

13.10 The Proposed Development is to be constructed in two phases; Phase 1 in the southern, western and central parts of the site and Phase 2 in the north eastern part of the site (as set out in **ES Volume 1, Chapter 2: EIA Methodology**). The Proposed Development will therefore have two separate demolition and construction phases taking place at different times in the lifespan of the project. For the purposes of this ES chapter, these two phases have been combined to present a worst case scenario for effects to below ground archaeological assets. No new archaeological receptors will be introduced as a result of the Phase 1 demolition and construction works.

⁴ Heritage Gateway, available at: HeritageGateway - Home *

⁵ NRHE Excavation Index, available at: Archaeology Data Service

Demolition and Construction

Direct Effects

13.11 The predicted effects upon the archaeological resource during the demolition and construction phase are likely to be associated with ground disturbance and excavations including;

- Preliminary site investigation works;
- Removal of areas of former foundations and areas of hardstanding/concrete;
- Setting up a secure construction compound;
- Plant movement;
- Piling and/or excavation for new foundations;
- Installation of services, drainage and other infrastructure;
- Establishment of new car parking areas, roads and access points;
- Creation of new stadium;
- Hard landscaping works (levelling/remodeling);
- Changes to hydrology; and
- Soft landscaping and environmental enhancement works, including planting.

13.12 The activities associated with the ground disturbance and excavations listed above within the site, have the potential to result in the complete or partial removal of any archaeological remains or deposits within the footprint of construction activities and demolition activities that involve breaking ground. Presently the depth of archaeological remains/deposits within the site are unconfirmed. To present a worst-case scenario it is assumed that archaeological remains would exist immediately below the surface of the site. Some of the details surrounding the depth of foundations/other below ground impacts are also unavailable at present and therefore a reasonable worst-case scenario has been assumed where depths are unknown. Impacts resulting from demolition and construction activities upon buried archaeological assets would be permanent and irreversible.

Indirect Effects

13.13 In some cases, an indirect effect can also occur which results in potential change to heritage significance arising from physical damage or disturbance to buried archaeological remains associated with an asset. In this context, these effects will generally arise through change to the settings of heritage assets and how this contributes to the archaeological interest of an asset.

13.14 It is defined in NPPF as: "The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve."

13.15 Historic England guidance⁶ follows this definition, and sets out a methodology for considering any effects on the significance of heritage assets arising from change to setting. The guidance accords NPPF in recognising that it is effects on the significance of an asset that are of concern. Paragraph 9 specifically states that setting is not an asset or a designation in itself; what is important about setting is the contribution it makes to the significance of the asset.

13.16 Assessment of settings is primarily associated with designated heritage assets or non-designated heritage assets of equivalent heritage significance (where such assets are identified). The scope of the assessment is restricted to Aspdins Kiln as this has both above and below ground archaeological interest. The appraisal of Aspdins Kiln follows Steps 1-3 of the five-step sequential process set out in Historic England guidance, which is set out below:

- Step 1: Identifying the heritage assets affected and their settings;
- Step 2: Assessing whether, how and to what degree these settings make a contribution to the significance of the heritage asset(s);

- Step 3: Assessing the effect of the proposed development on the significance of the asset(s);
- Step 4: Maximising enhancement and minimising harm; and
- Step 5: Making and documenting the decision and monitoring outcomes.

13.17 In order to better understand the potential effect, a clear statement of the asset's overall significance is required, as well as the contribution that the setting makes to that significance, as it is the final effect on the overall significance of an asset that is being assessed, not simply the degree to which the contribution made by its setting is changed.

Operational

13.18 Archaeological remains are receptive to below ground works associated with construction activities (direct effects). It is not anticipated that any below ground works will be required during the operational phase of the Proposed Development as these below ground works will have already been completed. There are, therefore, not anticipated to be any direct effects to buried archaeological remains during the operational phase of the Proposed Development and this has been scoped out of the assessment.

13.19 Indirect operational effects can also occur as those which result in potential change to heritage significance but do not give rise to physical damage or disturbance to the asset. In this context, these effects will generally arise through change to the settings of heritage assets. The assessment of indirect operational effect will follow the same methodology as that which is outlined above for indirect effects during the demolition and construction phase. For the purposes of this assessment on above and below ground archaeology, this is limited to Aspdins Kiln. Indirect effects to other built heritage assets are considered as part of the Heritage Statement provided in **ES Volume 2, Townscape and Visual Impact Assessment, Appendix: Heritage Statement**.

Assumptions and Limitations

13.20 Data used to compile the baseline assessments consists of secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of the baseline. The assumption is made that this data, as well as that it is derived from other secondary sources, is reasonably accurate.

13.21 The records held by the KHER are not a record of all surviving heritage assets, but a record of the discovery of a wide range of archaeological and historical components of the historic environment. The information held within it is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.

Methodology for Defining Effects

13.22 The following sections describe the methods used to determine the significance of effects during the demolition and construction phase and the completed development phase of the Proposed Development on archaeological assets. The assessment considers the following;

- The importance (heritage significance) of a receptor to an effect;
- Magnitude of impact; and
- The significance of effect upon receptors.

13.23 This ES chapter identifies and assesses potential direct and indirect effects upon the heritage significance of known and potential archaeological receptors. The significance of the effect of the Proposed Development on baseline conditions has been assessed through a process of combining an evaluation of the importance of the resource and the scale of the effect (magnitude of change) that would arise due to the demolition/construction and the operational and completed development phase, taking into account mitigation measures incorporated into the design (embedded mitigation/avoidance measures) or delivered during the pre-construction or construction phase.

13.24 The heritage significance of resource is analogous to importance/value and is considered in relation to statutory designations, and priorities or recommendations set out in regional research agenda, in conjunction with professional judgement. The assessment of physical effects will consider direct effects upon features of archaeological and historic interests, where sites or potential sites and any buried archaeological remains are at risk of being disturbed or destroyed. Physical effects to buried archaeological remains are likely to occur during below ground works associated with the Proposed Development. Indirect physical effects may occur

⁶ Historic England 2017, *The Setting of Heritage Assets, Historic Environment Good Practice in Planning 3*; 2nd edition

where the Proposed Development affects the hydrology of the surrounding area resulting in a drying out of waterlogged deposits, and subsequently, resulting in a degradation of preservation and therefore a loss of heritage significance.

Receptors and Receptor Sensitivity

- 13.25** An assessment of effects on a heritage asset involves an understanding of the heritage significance of the asset. The effect being assessed is whether the asset loses significance as a result of the Proposed Development. The National Planning Policy Framework (NPPF) ⁷ sets out that the level of detail should be proportionate to the heritage significance of the asset and no more than is sufficient to understand the potential impact of the proposal.
- 13.26** Guidance discusses the conservation of the heritage significance of assets as change as an inevitable process but one that can be managed. Heritage significance is not necessarily dependent on the preservation of a feature as it can be enhanced through sensitive management⁸.
- 13.27** Rather than just characterising the potential physical effects of a Proposed Development, any assessment therefore needs to understand the effects on the heritage significance of heritage assets and/or significant places. This assessment uses the definition of significance provided in the NPPF: *‘The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage assets physical presence but also from its setting’*⁹
- 13.28** Effectively, the designation of an asset is the recognition of the special interests inherent in that asset that are deemed worthy of statutory protection. These assets are therefore typically regarded as more important than non-designated heritage assets. However, where non-designated heritage assets are deemed to be of equivalent significance to designated heritage assets they should be treated as such¹⁰.
- 13.29** The significance of archaeological assets has been assessed using the Secretary of State’s non-statutory criteria for the selection of monuments for scheduling¹¹, as modified by Historic England for the designation of ancient monuments as part of its Monument Protection Plan. The criteria for archaeological remains are based on their:
- Survival;
 - Documentation (archaeological and historical);
 - Group value (association and clustering);
 - Diversity (features);
 - Potential; and
 - Amenity value

13.30 The significance of an archaeological asset is based on the relative importance/sensitivity of the asset using the scale in **Table 13.1**.

Table 13.1 Heritage Significance of Designated and Non-Designated Buried Heritage Assets

Buried Heritage Asset Description	Heritage Significance
Scheduled monuments of acknowledged international importance	Very High
Scheduled Monuments and undesignated assets of schedulable quality and importance Archaeological assets that can contribute significantly to acknowledged national research objectives Known submerged prehistoric sites and landscapes with the confirmed presence of largely in situ artefactual material. Palaeographic features with demonstrable potential to include artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.	High
Designated or undesignated archaeological assets that contribute to regional research objectives	Medium

⁷ Ministry of Housing, Communities and Local Government, 2021. National Planning Policy Framework
⁸ English Heritage/Historic England, 2008, Conservation Principles, Policies and Guidance.
⁹ NPPF 2021, Annex 2 Glossary

Buried Heritage Asset Description	Heritage Significance
Prehistoric deposits with moderate potential to contribute to an understanding of the Palaeoenvironment Local Authority designated sites. Previously unknown and undesignated sites that would justify Local Authority designation (i.e., sites of regional importance). Sites with specific and substantial importance to the local community.	
Archaeological assets of limited value, but with potential to contribute to local research objectives	Low
Assets with little or no surviving archaeological interest Sites or features that are so badly damaged that too little now remains to justify their inclusion in a higher grade.	Negligible
The importance of the archaeological resource cannot be ascertained due to limited existing information; therefore, the value of the resource is classified as ranging from High to Low importance/sensitivity.	Unknown

- 13.31** In consideration of sensitivity and importance, designation status (and the implicit recognition of the special interests vested in designated heritage assets) is a starting point. However, some assets might be more or less sensitive to the demolition and construction of the Proposed Development whatever their grading or designation status. The assignment of an asset to a particular level of sensitivity or importance is based in part on designation and in part on professional judgement on the inherent significance of the assets and degree to which that asset is sensitive to the type of change expected.
- 13.32** Direct effects are qualified by the extent and nature of remains associated with an asset that would be disturbed or lost and the effect of that loss on the heritage significance of the asset. In respect of archaeological remains with no visible above ground expression, this would normally result in the loss of archaeological interest.

Magnitude of Impact

- 13.33** The assessment of the magnitude of impact is the identification of the magnitude of change that the Proposed Development has upon the significance of the archaeological asset. The magnitude of effect can be adverse of beneficial and is ranked without regard to the importance of the asset. The table below provides a guide for assessing the magnitude of effect in respect of the archaeological resource.

Table 13.2 Assessment Criteria for Determining the Magnitude of Impact on Heritage Assets

Magnitude		Criteria
Very High/High	Adverse	• Major physical damage to or significant alteration to a site or feature
	Beneficial	• Large scale of major improvement of a heritage asset, extensive restoration or enhancement, major improvement in attribute quality
Medium	Adverse	• Damage or alteration to a site or feature. Encroachment on an area considered to have high archaeological potential
	Beneficial	• Benefit to, or addition of, key characteristics, features or elements or improvements of a heritage asset
Low	Adverse	• Minor damage or alteration to a site or other feature. Encroachment on an area where it is considered that low archaeological potential exists.
	Beneficial	• Minor benefit to features or elements, some beneficial impact on heritage asset or a reduction in the risk of negative impact occurring
Negligible	Adverse	• Very minor changes to archaeological remains
	Beneficial	• Very minor benefit
No change		• No change would be perceptible either positive or negative

¹⁰ Department for Culture Media and Sport (DCMS) 2013, Scheduled Monuments and nationally important but non-scheduled monuments and NPPF 2021, para 200b footnote 83.
¹¹ Department for Culture Media and Sport (DCMS) 2013, Scheduled Monuments and nationally important but non-scheduled monuments

Defining the Effect

- 13.34** The assessment of the significance of an effect on a heritage asset is largely a product of the heritage significance of an asset and the magnitude of the impact that might give rise to harm (or perhaps beneficial change) qualified by the application of professional judgement. An assessment of effects on a heritage asset involves an understanding of the heritage significance of an asset. The effect being assessed is whether the asset loses heritage significance as a result of the Proposed Development. Planning policy recommends that the level of detail should be proportionate to the heritage significance of the assets and no more than is sufficient to understand the potential impact of the Proposed Development.
- 13.35** Table 13.3 below illustrates how the heritage significance of the asset and the magnitude of the impact are combined to produce an assessment of the significance of effect.

Table 13.3 Scale of Effect Matrix

Heritage Significance		Magnitude of Impact				
		Very High	High	Medium	Low	Negligible
	Very High	Major	Major	Moderate	Minor	Negligible
	High	Major	Major	Moderate	Minor	Negligible
	Medium	Moderate	Moderate	Moderate	Minor	Negligible
	Low	Minor	Minor	Minor	Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

- 13.36** In most cases, scale and geographic extent of the effects would be restricted to those within the site boundary and furthermore to those within the footprint of the Proposed Development activities. This includes activities such as enabling works, landscaping and utilities as well as the construction of structures. However, dewatering and changes to hydrology is an effect that can extend beyond the site boundary into areas where waterlogged deposits extend. This would be restricted to areas where waterlogged deposits are likely to occur such as former marshland at the edge of the River Thames and the area surrounding the former course of the Ebbsfleet.
- 13.37** The assessment of effects considers the following criteria:
- Duration of effect (short, medium or long-term);
 - Permanence of the effect (temporary or permanent);
 - Geographical extent (site or local) and
 - Nature of effect (direct or indirect, reversible or irreversible).

- 13.38** In most cases the effects to archaeological remains would be direct effects which would take place during the demolition and construction phase due to the asset being physically damaged or disturbed, which gives rise to a loss of heritage significance. However indirect effects could occur to waterlogged deposits which may lie adjacent to the site or within the immediate local area through changes to the hydrology of the local area as a result of the Proposed Development. Whilst this is a physical effect, it is an indirect effect.
- 13.39** The duration of the direct and indirect physical effects to archaeological remains would be permanent and irreversible as the archaeological resource is non-renewable. Despite the fact that the effects take place predominantly during the demolition and construction phase these effects are considered to be long-term and permanent.

Categorising the Likely Significant Effects

- 13.40** Effects that are identified as being moderate or major adverse/beneficial effects are classified as significant effects for the purposes of the assessment. Effects assessed here as minor or negligible are not significant in terms of the EIA regulations.

BASELINE CONDITIONS

- 13.41** The Archaeological Desk-Based Assessment (ES Volume 3, Appendix: Archaeology – Annex 2) and the Geoarchaeological Desk-Based Assessment (ES Volume 3, Appendix: Archaeology – Annex 3) provide a comprehensive background of the existing baseline conditions, as such the following text provides a summary only.
- Geoarchaeological and Palaeoenvironmental Background**
- 13.42** The underlying bedrock geology across the site is mapped as undifferentiated Cretaceous chalk of the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (deposited 72–94 million years ago (Ma)).
- 13.43** Superficial deposits are recorded across the site, including Pleistocene Head and Holocene alluvial sediments of the Ebbsfleet. It should be noted that previous investigations in the area have demonstrated that the British Geological Survey (BGS) mapping does not accurately capture the superficial deposits present.
- 13.44** There is currently insufficient data to map the specific Quaternary deposits present across the site. However, the data available from the site and immediate surrounding area enables the likely range of deposits present to be assessed.
- 13.45** Data from previous investigations indicate that Pleistocene terraces of the Ebbsfleet are present within the site, which include fluvial and solifluction deposits. In areas located in the centre of the valley the terrace deposits are overlain by Holocene alluvium. Table 13.4 provides an initial archaeological and geoarchaeological framework for the site.

Table 13.4 Initial Quaternary Archaeological and Geoarchaeological Framework for the Site

Unit	Deposits	Age	Archaeological Period
1	Fluvial/alluvial/slopewash/solifluction along valley margins	?MIS 8 – MIS 3	Middle Palaeolithic
2	Fluvial/alluvial/slopewash/solifluction in centre of valley	?MIS 6-2	Middle and Upper Palaeolithic
3	Slopewash along valley margins	MIS 2	Upper Palaeolithic
4	Alluvium (Lower Clay Silts)	MIS 1	Mesolithic
5	Alluvium (Main Peat)	MIS 1	Late Mesolithic- early Bronze Age
6	Alluvium (Upper Clay Silts)	MIS 1	Late Bronze Age-Roman
7	Alluvium (Upper Peat)	MIS 1	Anglo-Saxon
8	Colluvium	MIS 1	Principally Mesolithic-Bronze Age
9	Made Ground		Recent

Pleistocene

- 13.46** The Pleistocene terraces of the Ebbsfleet that occur in the site are poorly characterised and their age is uncertain. Terrace deposits have been recorded in the south and west beneath alluvium^{12,13}. These likely broadly equate to deposits investigated in advance of South Thameside Development Route (STDR) 4 and HS1 immediately south of the site¹⁴.
- 13.47** Data indicates that Pleistocene terraces of the Ebbsfleet occur in the site along the valley margins (Unit 1). These occur either beneath thin Holocene sequences, or directly beneath recent deposits (made ground and topsoil). The basal heights of these terrace deposits are at approximately 6m and 0m above Ordnance Datum (aOD). They have not been subject to previous archaeology or geoarchaeological investigation. The basal heights suggest that may be broadly contemporary with late Middle and early Upper Pleistocene deposits investigated further west, which include Burchell's 'Ebbsfleet Channel' sites and British Museum sites A and B, and younger deposits investigated in advance of the STDR 4 and HS1.

¹² Canterbury Archaeological Trust [CAT] (2007) Archaeological watching brief on test pits and proving pits along pipeline route, Northfleet Growth Scheme, Kent

¹³ QUEST (2016) Phase 1a: Stonebridge Road Stand, Stonebridge Road Stadium, Northfleet, Kent Geoarchaeological Fieldwork and Deposit Modelling Report

¹⁴ Wenban-Smith F F et al. (eds) (2020) Prehistoric Ebbsfleet Excavations and Research in Advance of High speed 1 and South Thameside Development Route 4, 1989-2003

13.48 The lowest terraces (Phase 2), which are located beneath up to approximately 10m of Holocene alluvium, have bedrock heights of between approximately -4 and -16m OD. These Pleistocene deposits were identified south of the site in work carried out for STDR 4 and HS1, but were not investigated in detail. Review of the STDR4 and HS1 data carried out for desk-top evaluation carried out for the area south of the site¹⁵ indicated that two terraces of different ages are present with bedrock heights of between approximately -4 to -8m and approximately -11 to -16m aOD. These sediments are undated but are likely to date to the later Pleistocene.

13.49 The east of the site follows the eastern edge of the Ebbsfleet Valley, at its confluence with the Thames. There is less information available to consider the Pleistocene stratigraphy present in this area. Desktop assessment of ground investigation data from the area immediately to the east¹⁶ indicate that later Pleistocene terraces of the Ebbsfleet/Thames confluence (Phase 2) occur beneath Holocene alluvium. It is currently unclear whether earlier Ebbsfleet/Thames terraces (Phase 1) occur in this area of the site along the eastern valley margin.

Holocene

13.50 Holocene alluvial sequences up to approximately 10m thick have been recorded in the south of the site^{17,18}. These can be related to those investigated as part of the STDR 4 and HS1 work¹⁹. The STDR 4 and HS1 investigation demonstrated that these Holocene deposits date from the Mesolithic through to the Anglo Saxon period. The previous investigation^{20,21} in the south of the site record sequences relatable to those in the STDR and HS1 investigations.

13.51 Details of the Holocene stratigraphy in the north-west of the site is less certain. It likely includes the continuation of sequences recorded in the south. These are likely to become shallower and thin out progressively to north-west, where the bedrock and underlying Pleistocene stratigraphy rise.

13.52 Geoarchaeological desktop assessment of ground investigation data from the area immediately to the south-east of the site²², combined with BGS archive logs from boreholes located to the north-west, indicates Holocene alluvial sequences up to approximately 12m thick may occur in the north-west of the site. This includes at least one major peat unit.

Archaeological and Historical Background

Mesolithic (8500-4000BC) to Iron Age (700 BC- AD43)

13.53 Recent work on the Swanscombe peninsula identified a series of channels and potential sand and gravels eyots along the northern extent, close to the present day foreshore. It has previously been suggested that a large area of the marsh would have been formed by eyots, similar to the landscape known to have existed in further west along the Thames²³.

13.54 The Kent Historic Environment Record (KHER) holds four entries for the Mesolithic period, comprising findspots of flints. Except for one of the findspots which relates to finds recovered from the River Thames, the remaining finds were to the south of the site around Ebbsfleet Station.

13.55 In the upper Ebbsfleet Valley a peaty land surface was discovered which contained well preserved pollen suggesting a predominantly wooded landscape during the early Neolithic dominated by lime, oak and hazel on drier ground with wet alder carr woodland on and along the fringes of the floodplain with an understorey of reed swamp. Closer to the mouth of the river Ebbsfleet, evidence of a marsh/fen like landscape would have existed with areas of peat accumulating from the 5th millennium BC²⁴. During the late Neolithic and early Bronze Age, the environmental evidence also suggests increased woodland clearance on the higher drier areas and arable cultivation²⁵.

13.56 The current evidence for Neolithic activity shows a concentrated presence in the upper Ebbsfleet Valley approximately 500m to the south of the site around Ebbsfleet Station, with stray, residual artefacts recovered in the western part of the Study Area. The site would still have been marshland during the Neolithic period and those that inhabited the Ebbsfleet Valley would have had limited use for the marsh.

13.57 The Bronze Age brought about substantial changes to the landscape of the upper Ebbsfleet Valley. As communities became well settled, large-scale deforestation took place. Over time, this level of deforestation began to impact upon the slopes of the valley, eventually leading to the accumulation of colluvial deposits at its base. The Bronze Age is also marked by an expansion of the Thames Estuary resulting in an increase in size of the mudflats and fringing saltmarsh, fen and reed swamp environments²⁶.

13.58 The focus of human activity during the Bronze Age remained in the upper valley with evidence of settlement, trackways and a number of findspots recorded within proximity to Ebbsfleet Station. There are early signs of encroachment into the marsh landscape north of the Ebbsfleet Station, but they do not reach as far as the site.

13.59 Environmental evidence recovered as part of HS1 investigations have shown that clay silts began to accumulate over the marsh during the late prehistoric with middle and upper saltmarsh well established by the late Iron Age²⁷.

13.60 The current evidence for the Iron Age suggests a reduction in inhabited areas within the Ebbsfleet Valley. All of the evidence to date is concentrated close to the Ebbsfleet Station whereas in other periods we see some use of the areas further downstream or on marsh fringes. The settlement found on the later site of the Romano-British villa (discussed below) may reflect the limits of the marshland and the area that was habitable. It is likely that the focus of the activity was further south at this time around Springhead where a possible ritual or ceremonial site was established including a processional way, terraces, enclosures and viewing platform overlooking the head of the Ebbsfleet.

Romano-British (AD43-410)

13.61 Environmental evidence was recovered during Channel Tunnel Rail Link (CTRL) works that shows during the Romano-British period, the salt marsh present up stream, close to the present-day location of Ebbsfleet Station, had begun to change to fresh water reed swamp²⁸. Further downstream the landscape likely remained as salt marsh though tidal regression, in addition to changes in climate (a shift to a wetter climate by 400AD) may have begun to alter the conditions of the marsh.

13.62 During the Romano-British period, the Ebbsfleet Valley developed into a site of religious importance. In the 1st century AD a sanctuary complex was established at Springhead, approximately 1.8km south of the site, that remained in use until the 4th century. The complex was supported by a Roman town, *Vagniacis*, that was located to the south of the religious complex on the opposite side of the Roman road known as Watling Street.

13.63 During excavations for the CTRL, the remains of a large Romano-British villa were found 560m to the south of the site. The villa was preceded in the 1st century by a timber-framed structure. A series of gullies and pits were associated with the structure which were suggested to have been used for malting and brewing, supported by a further series of ditches used to control water supply. A separate complex was located to its west which was used for agricultural purposes with a number of enclosure ditches found close to the complex, located 430m from the site. The complex was linked to the timber-framed building by an early Roman metalled surface²⁹.

13.64 The timber-framed building was abandoned by AD120 and a new structure (Phase 2) with stone foundations and wattle and daub walls was constructed on a slightly different alignment. A number of wells and cisterns were excavated around the building for use in the brewing process, which continued at the site.

¹⁵ Wessex Archaeology [WA] (2022a) Ebbsfleet Central, Ebbsfleet, Kent Geoarchaeological Deposit Model and Palaeolithic Desk-Based Assessment

¹⁶ WA (2022b) Grove Road, Northfleet Geoarchaeological Deposit Model and Desk-Based Assessment

¹⁷ Canterbury Archaeological Trust [CAT] (2007) Archaeological watching brief on test pits and proving pits along pipeline route, Northfleet Growth Scheme, Kent

¹⁸ QUEST (2016) Phase 1a: Stonebridge Road Stand, Stonebridge Road Stadium, Northfleet, Kent Geoarchaeological Fieldwork and Deposit Modelling Report

¹⁹ Stafford L, Bates, M, Cameron N G, Peglar S, Pelling R, Scaife R and Whittaker, J 2020a Chapter 12 Outer Basin (Zone 8). In Wenban-Smith F F, Stafford, L, Bates, M and Parfitt, S A (eds) Prehistoric Ebbsfleet Excavations and Research in Advance of High Speed I and South Thameside Development Route 4, 1989-2003, 211-232. Oxford Wessex Archaeology Monograph 7.

²⁰ Canterbury Archaeological Trust [CAT] (2007) Archaeological watching brief on test pits and proving pits along pipeline route, Northfleet Growth Scheme, Kent

²¹ QUEST (2016) Phase 1a: Stonebridge Road Stand, Stonebridge Road Stadium, Northfleet, Kent Geoarchaeological Fieldwork and Deposit Modelling Report

²² WA 2022b Grove Road, Northfleet Geoarchaeological Deposit Model and Desk-Based Assessment. Unpublished client report. Ref: 252650.1

²³ Bates M and Stafford M (eds) (2013) Thames Holocene A Geoarchaeological approach to the investigation of the river floodplain for High Speed I, 1994-2003

²⁴ Bates M and Stafford M (eds) (2013) Thames Holocene A Geoarchaeological approach to the investigation of the river floodplain for High Speed I, 1994-2003

²⁵ Bates M and Stafford M (eds) (2013) Thames Holocene A Geoarchaeological approach to the investigation of the river floodplain for High Speed I, 1994-2003

²⁶ Bates M and Stafford M (eds) (2013) Thames Holocene A Geoarchaeological approach to the investigation of the river floodplain for High Speed I, 1994-2003

²⁷ Bates M and Stafford M (eds) (2013) Thames Holocene A Geoarchaeological approach to the investigation of the river floodplain for High Speed I, 1994-2003

²⁸ Bates M and Stafford M (eds) (2013) Thames Holocene A Geoarchaeological approach to the investigation of the river floodplain for High Speed I, 1994-2003

²⁹ Andrews, P, Biddulph, E, Hardy, A. and Brown, R. 2011. Settling the Ebbsfleet Valley, High Speed I Excavations at Springhead and Northfleet, Kent, The Late Iron Age, Roman, Saxon and Medieval Landscape. Volume 1: The Sites: Oxford Wessex Archaeology

- 13.65** In the second half of the 2nd century, a new entrance and range of rooms were added to the north and western sides of the existing building (Phase 3). To the north a bath house was also built with a gravel surface laid around the structure to create a courtyard³⁰.
- 13.66** The villa (Northfleet Villa) was further extended on two separate occasions during the mid to late Romano-British period. This included refurbishment of the main aisled building, construction of a new range, addition of three buildings to the bath house and the development of a quay.
- 13.67** The remaining KHER entries for the Romano-British period pertain to further areas of settlement located to the southwest and southeast of Northfleet Villa, the recovery of stray finds and a small industrial site located at the southern edge of Swanscombe Peninsula that was used for the production of pottery.
- 13.68** The Northfleet Roman villa is largely believed to have marked the northern extent of roman settlement within the Ebbsfleet valley. The land further to the north is still considered to have been marsh and though there were some environmental changes happening along the course of the Ebbsfleet with a shift from salt to fresh water marsh, these are unlikely to have affected the site.

Anglo-Saxon (AD410-1066) and Medieval (AD1066-1500)

- 13.69** The environmental evidence recorded during CTRL works shows peat accumulation during the mid to late Anglo-Saxon period within the upper Ebbsfleet Valley along the course of the river³¹. The marsh along the course of the river, except for those closest to the mouth, were now completely freshwater marsh with sedge fen environments. Some woodland survived but the landscape was largely cleared with pasture and arable fields established across the valley.
- 13.70** The first evidence of Anglo-Saxon activity within the Study Area dates to the 5th century. A number of sunken feature buildings were excavated in the vicinity of the Northfleet Roman Villa buildings showing a continued use of the area into this period. A series of burials were also discovered. The burials together with the material culture indicate that the settlement was abandoned by the late Anglo-Saxon period.
- 13.71** A Saxon tidal mill was found in 2001 adjacent to the Roman quay 560m to the south of the site. Timber remains of the mill and associated features such as a spillway, revetments, and sluice gates were uncovered, thought to date to the late 7th century. The dual chuted construction of the mill and the size of the wheel-pit suggests that it was a horizontal wheeled mill³². The Ebbsfleet mill is one of the best-preserved pre-medieval structures ever found in Kent and as such is thought to be of national and regional importance. The presence of the water mill would suggest that the Ebbsfleet was still large enough to power the water mill. It also may have restricted access further upstream.
- 13.72** The only recorded evidence of medieval date within the Study Area relates to a possible pre-16th century mill pond at Robin's Creek, 15 m to the east of the site. The mill pond was identified during a characterisation study by Historic England.

Post-medieval (AD 1500-1900)

- 13.73** There is an account of a battle between Royalist and Parliamentary soldiers at 'Stone Bridge' on the 1st June 1648. The stone bridge is shown on later historic mapping as being at the eastern end of the present-day Stonebridge Road (within the site) and provided access across the river Ebbsfleet. Documentary sources refer to a Stone Bridge crossing the Ebbsfleet and providing access to the Northfleet marshes at the location of the modern Stonebridge Road. It is unlikely that remains of this earlier bridge survive beneath the modern road, however there is potential for its foundations to exist if these have not been truncated by later development. The foundations would have some limited archaeological interest, with its overall significance elevated by bridge being recorded as the site of a battle in 1648 between the royalists and the parliamentarians, giving it some historic interest
- 13.74** In the 1790s, a cement works was built by James Parker 130m to the east of the site. The works were said to be relatively small with Parker only employing 12 men, with most of the process completed by hand. The patent and site were sold to Charles Wyatt in 1798 with the works becoming Parker & Wyatt Co.³³
- 13.75** Sometime during the 18th century, a water mill was built within the site on the north bank of Robin's Creek adjacent to the mill pond. The earliest depiction of the water mill is on the 1840 Tithe Map of Northfleet, which

shows the mill on the bank of Robin's Creek and a second structure to its west believed to be associated with the mill (apportionment 35). The mill pond is represented by apportionment 37.

- 13.76** The 1840 Tithe map of Northfleet provides us with a good understanding of activity within the site. The marshland had been reclaimed by this point with apportionments 25, 26, 32, 49, 38, 50 and 39 in use as pastoral land. A windmill was constructed in apportionment 30 alongside a large L-shaped structure in 28 and 29. The watermill constructed in the 18th century is evident in apportionment 35 together with the building to its west and the road to its south, both discussed earlier. Outside the site, Robin's Creek Cement Works are illustrated to the east while most of the surrounding area was still either marsh or used as agricultural land.
- 13.77** In 1846, William Aspdin secured a deal to take over the Parker and Wyatt Co and used their existing premises located to the east of the site to produce Portland cement. Portland Cement was a new form of cement which was developed by his father, Joseph Aspdin. Following the purchase, William extended the works constructing new buildings along Grove Road and three new bottle kilns within the main works. The company was rebranded initially by William to Maude, Jones and Aspdin Works (Maud and Jones were partners of the company) before becoming Robins, Aspdin and Co. in 1848.
- 13.78** R.A. Gibbons was given management of the Aspdin Cement Works following William's departure and oversaw the expansion of the site on the north side of Robin's Creek, within the site, in 1867-69 with the construction of four 'Gibbons' chamber kilns. These were abandoned by 1880 due to low yield and were replaced by seven standard Johnson chamber kilns. The rest of the cement works was later moved north of the creek (into the site) and a new wharf was built.
- 13.79** The 1872 Ordnance Survey (OS) map shows the early development orchestrated by Gibbons of the cement works into the site. As mentioned above, the cement works had begun to move slowly to the north banks of the creek and this is evident on the map. Several areas of either slurry banks or drying flats are illustrated along with a single kiln and a large quarry pit. The windmill in the western part was still in use while the former L-shaped building appears to have been demolished. The location of the 'stone bridge' is shown at the eastern extent of Stonebridge Road.
- 13.80** The 1898 OS map shows the layout of the Robins Cement Works following the expansion of the works during the 1800's. The works comprised of three main buildings supported by a number of smaller structures scattered in close proximity. The three main structures likely housed the seven Johnson chamber kilns built in 1880, the six Michelle kilns built in 1887, wash mills and covered drying flats. A series of wharves were built on the Thames foreshore which were connected to recently built tram and railway lines. The map also shows that the windmill to the west was now disused and the quarry pit had been infilled. The 18th century buildings associated with the watermill appear to have been removed by 1898.

Modern (AD 1900-present day)

- 13.81** In 1900, the Associated Portland Cement Manufacturers (APCM) Ltd was created. The former Portland Cement works were purchased by the company and in 1910 Robins & Co Ltd, its parent company, was shut. The works were now combined with Bevans Works and the rest of the works purchased by APCM and renamed to the Portland Cement Works. Eventually the kilns within the site were phased out though the finish mills and wharves remained in use.
- 13.82** Three changes are shown on the 1909 OS map within the wider site area. The first is reduction in the size of the river Ebbsfleet. Part of the reason behind this change was the use of the rivers water in local industry and the recently established water company. The demand for water outstripped its water supply eventually leading to several parts of the river taking on the qualities of a small stream instead. The second change was the construction of the Northfleet United football ground. The ground was built in 1905 and comprised little more than a small wooden hut and a grass pitch. The final change was the demolition of the structures associated with the watermill in the western section of the site.
- 13.83** Aerial photographs taken in 1932 of the site show a number of changes (EPW040728, EPW040729 and EPW040730). The northernmost building shown on earlier maps was the only structure still in use as part of the Portland Cement Works. All except for one of the railway/tramlines had been removed and the wharf facilities located on the foreshore were greatly reduced. Aerial photograph EPW040728 shows that the Northfleet United football ground had been remodelled with two stands constructed. The 1937 OS map

³⁰ Andrews, P. Biddulph, E. Hardy, A. and Brown, R. 2011. *Settling the Ebbsfleet Valley, High Speed 1 Excavations at Springhead and Northfleet, Kent, The Late Iron Age, Roman, Saxon and Medieval Landscape. Volume 1: The Sites: Oxford Wessex Archaeology*

³¹ Bates M and Stafford M (eds) (2013) *Thames Holocene A Geoarchaeological approach to the investigation of the river floodplain for High Speed 1, 1994 –2003; p158*

³² Andrews, P. Biddulph, E. Hardy, A. and Brown, R. 2011. *Settling the Ebbsfleet Valley, High Speed 1 Excavations at Springhead and Northfleet, Kent, The Late Iron Age, Roman, Saxon and Medieval Landscape. Volume 1: The Sites: Oxford Wessex Archaeology*

³³ Kent County Council 1999. *The Cement Industry in Kent. Results of a Sites and Monument Records Enhancement Project 1996-8.*

corroborates what is shown on the aerial photographs. An aerial photograph dated to 1953 shows no changes within the site (EAW050795). The historic map of 1955 seems to suggest that the cement works within the site were disused and the surrounding area overgrown scrubland. The tramlines leading to the wharves appear to still be in place at this time.

- 13.84** By 1960 what remained of the former cement works had been demolished and the northern part of the site, north of the stadium had been cleared (Google Earth satellite imagery). Several circular features are shown on the aerial image that could be some form of open top tanks. On the historic map from the 1970s these circular features are shown and the site is labelled as depot. The tramways are still evident within the site at this time.
- 13.85** By the early 1980s, the site was completely redeveloped as part of Northfleet Industrial Park with many of the existing industrial buildings located within the site built during this period. This involved the removal or coverage of the tramlines within the site as these are no longer visible within the site. The Northfleet United football ground (now known as the Ebbsfleet United following a rebranding and merger with Gravesend United in the 1940s) was also redeveloped with two stands erected alongside the existing main building.

Aspdins Kiln Scheduled Monument (List Entry 1004227)

The Asset

- 13.86** The Scheduled Monument comprises a 19th century downdraught kiln, commonly known as a beehive kiln due to its shape. The kiln produced an early form of Portland Cement and this example is a particularly well preserved example of this type of kiln. It is thought to be the oldest cement kiln in the world and as such is of considerable historic interest. The kiln was built around 1846 by William Aspdin to the patented design of his father Joseph Aspdin who had patented Portland Cement, which was considerably stronger than previous forms of cement. During the 1850s the works is thought to have had nine kilns. The scheduled area also covers buried archaeological remains relating to its construction and the material it produced.

The Setting of the Asset

- 13.87** The asset survives as above and below ground remains within an industrial complex. The kiln is surrounded closely on all sides by a large industrial building. The kiln is not perceptible from the surrounding area. Historically the kiln would have formed part of a much larger cement works with associated kilns, structures and tunnels as well as tramways and wharves. Very little of its historic setting has survived above ground surrounding the Scheduled Monument aside from a few sections of historic wall.
- 13.88** The Scheduled Monument has a wider setting related to the cement working industry focussed within this part of north Kent along the Thames. Numerous cement works were set up here during the mid to late 19th century which was a thriving industry until their decline in the early to mid 20th century. Most of these areas were subsequently redeveloped for modern industrial use and as such there is potential for associated buried remains of cement works to exist within the local area. These associated remains form a non-visual aspect of the setting of Aspdins Kiln and contribute to the archaeological interest of the monument. The remaining upstanding and buried remains of the cement industry in north Kent represent what was an important and thriving industry in the area and are important to understanding the significance of the asset. Patents for kilns, technologies and the make up of the cement product itself were developed here and exported around the world.
- 13.89** Recent archaeological investigations outside of the Scheduled Monument area but within of the Northfleet cement works at Grove Road, have revealed extensive below ground archaeological remains of a kiln complex including numerous kilns, tunnels, walls, loading chambers, slurry back walls and other associated structural remains.

The Significance of the Asset and Contribution made by Setting to Significance

- 13.90** Aspdin's Kiln is scheduled in recognition of its inherent architectural, historic and archaeological interest. The monument's considerable historic interest stems from being the oldest Portland cement kiln in the world. The kiln is a well-preserved example of an Aspdin Kiln, illustrative of a particular early form of Portland cement production. The structure's archaeological interest relates to its potential for below-ground archaeological remains relating to the construction of the kiln as well as deposits of the material it produced. Archaeological remains relating to the cement works found outside of the scheduled area also contribute to the archaeological interest of the monument and are important to understanding the significance of the asset.
- 13.91** The monuments current setting makes very little contribution to the kiln's significance. The kiln was originally associated with a large 19th-century cement works, which extended along the south bank of the River Thames. During the 20th-century those works were demolished, with the subsequent development of the existing large modern industrial buildings which subsume the kiln. Though the kiln retains an inherent interest, that interest has been significantly impacted by the demolition of the historic cement works above ground which defined its intended function, however this has recently been found to be represented below ground as archaeological remains. The structure has little presence within the landscape, being masked from the public realm by the surrounding structures.

RECEPTORS AND RECEPTOR SENSITIVITY

Existing Receptors

- 13.92** The existing archaeological receptors that are known or predicted to exist within the site are presented below in **Table 13.5**, along with their known or anticipated heritage significance. The location of these are shown on **Figure 13.2** and **13.3**.

Table 13.5 Summary of Known or Predicted Archaeological Receptors

Existing or Predicted Archaeological Receptors	Heritage Significance
In situ Palaeolithic finds	High
In situ waterlogged archaeology within Peat or alluvial deposits	Medium to High
Post-medieval Stone Bridge foundations	Low
Post-medieval/19 th century mill pond and possible structures associated with the watermill	Low
Post-medieval/19 th century windmill foundations	Low
Remains of 19 th century cement works	Medium
Infrastructure associated with the cement works (tramlines/wharves)	Low
Unknown archaeological remains	Unknown
Aspdin's Kiln	High

Introduced Receptors

- 13.93** There will be no archaeological receptors newly introduced into the site as part of the phased Proposed Development.

Figure 13.2 Palaeolithic and Mesolithic Findspots

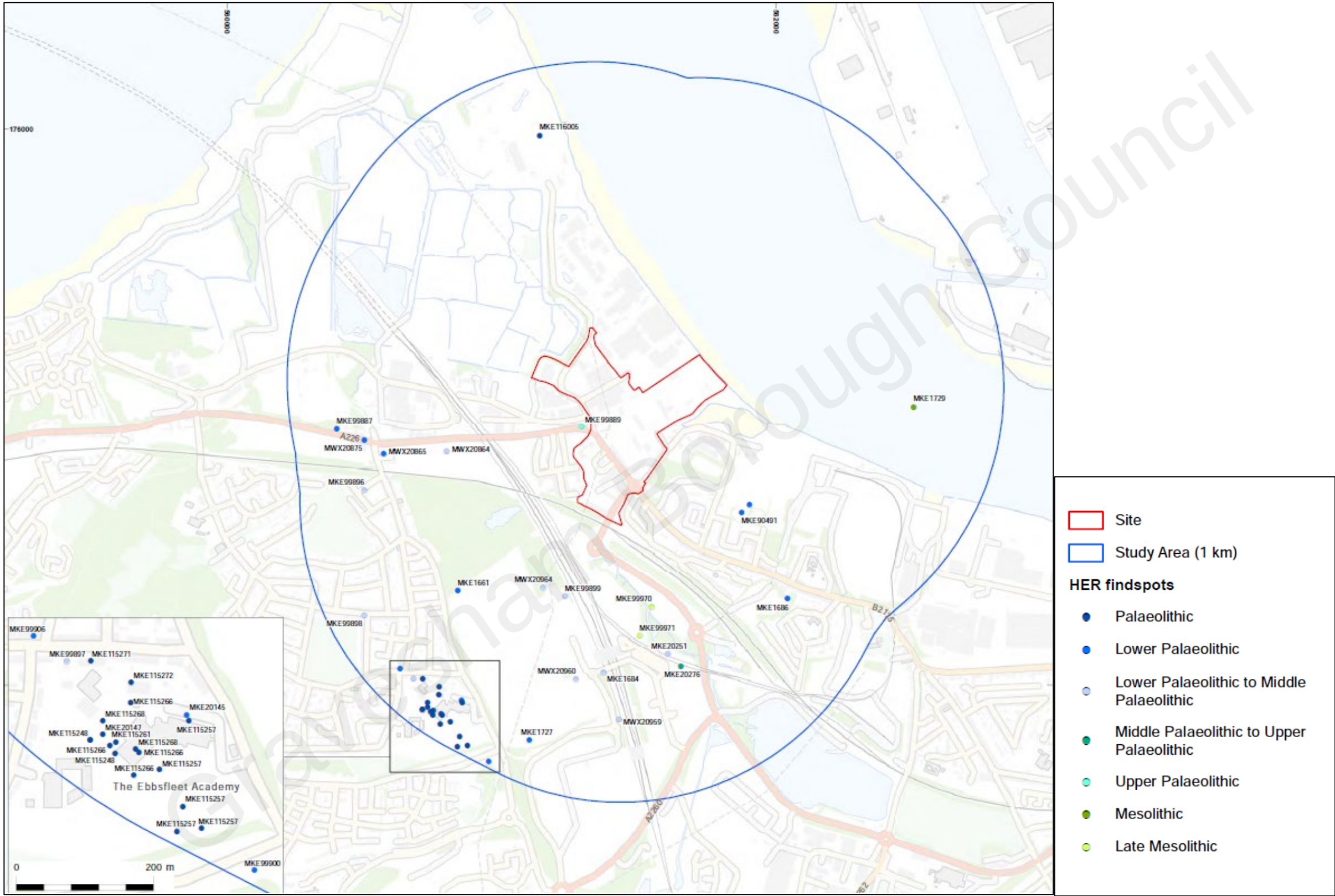
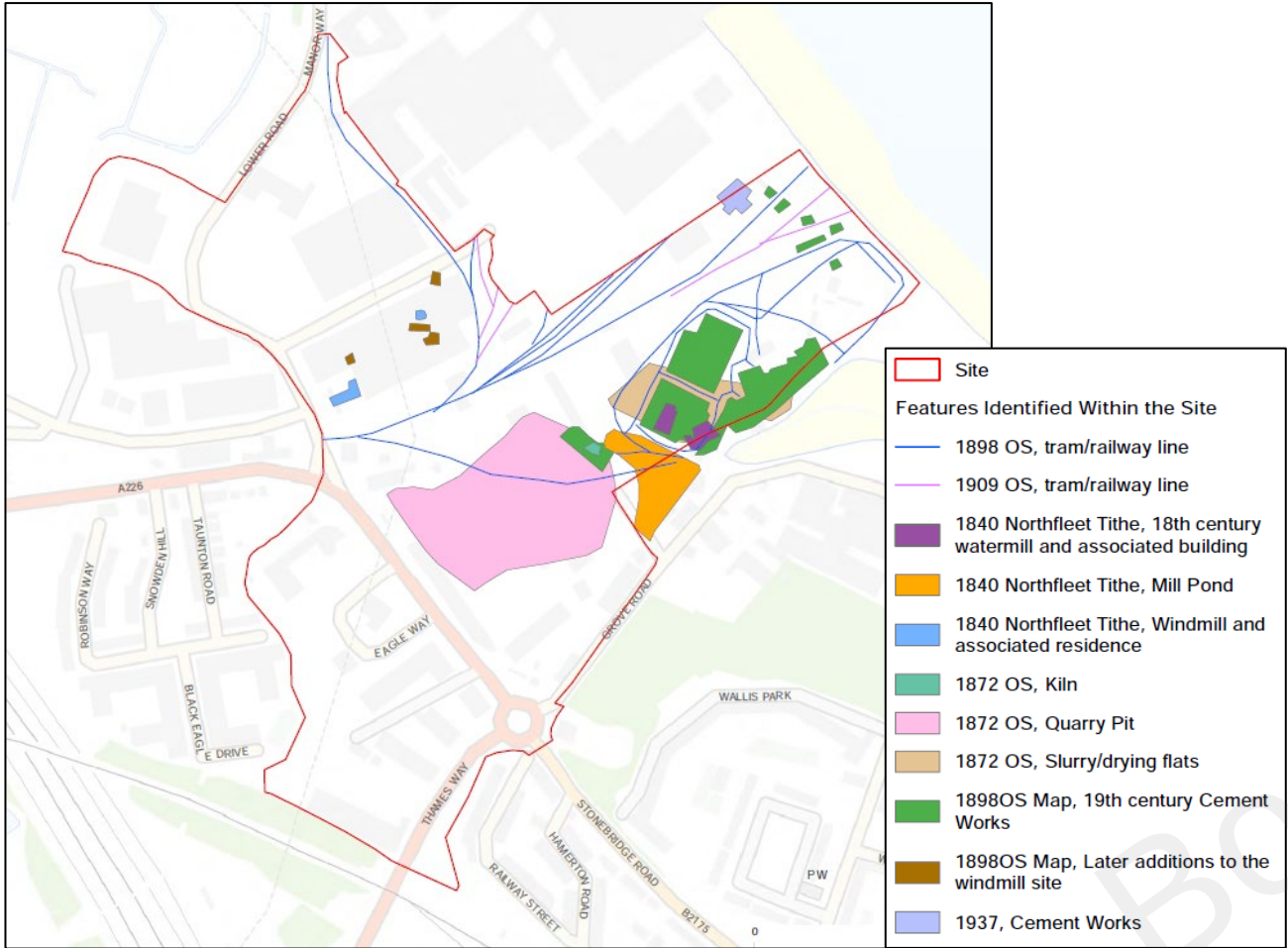


Figure 13.3 Features Identified within the Site through Historic Map Regression



POTENTIAL EFFECTS

Demolition and Construction

13.94 During the demolition and construction phase, any activities that include ground disturbance have the potential to adversely impact any buried heritage assets present within the site. All direct, physical impacts on buried archaeological remains would be permanent and irreversible.

Direct Effects

Palaeolithic Finds/Deposits

13.95 Across the site Palaeolithic and/or Palaeoenvironmental deposits could range between 20m below ground level to less than 5m below ground level. Due to the uncertainty surrounding this, a worst-case scenario has been adopted, assuming that the deposits will lie at less than 5m below ground level. Direct effects to Palaeolithic deposits could arise from construction activities such as the piling for foundations, earthmoving for landscaping, and excavations for associated infrastructure such as roads and utilities. As a worst-case scenario direct physical impacts from the demolition and construction phase of the Proposed Development to in situ Palaeolithic deposits/finds would have a high magnitude of impact. The heritage significance of these deposits/finds is expected to be high, resulting in a direct, long-term, permanent, local, major adverse effect (significant).

Waterlogged deposits within Peat and Alluvial Layers

13.96 In the absence of geotechnical information or field evaluation the presence and significance of Palaeoenvironmental or waterlogged deposits also remains unconfirmed. As a worst-case scenario, Palaeoenvironmental archaeology may have a heritage significance of medium to high, with the Proposed

Development impacts resulting in a high magnitude of impact. This would result in a direct, long-term, permanent, local, major adverse (significant) effect to these deposits/features.

Post-medieval Stone Bridge Foundations

13.97 The potential foundation remains associated with the bridge would be expected to be of low heritage significance. The Proposed Development impacts within this area would involve the construction of the stadium, car parking and retail structures around the stadium, and residential areas. As such, the effects of the Proposed Development are expected to result in a high magnitude of impact upon a heritage asset of low heritage significance resulting in a direct, long-term, permanent, local, minor adverse (not significant) effect.

Possible Mill Pond

13.98 Archaeological remains associated with the probable 19th century extension to the mill pond are predicted to be of low heritage significance. The magnitude of the impact from the demolition and construction works is expected to be high, resulting in a direct, long-term, permanent, local, minor adverse (not significant) effect.

Windmill

13.99 A windmill is recorded on the 19th century historic mapping within the central northern part of the site. Any remains of the windmill would be expected to be of low heritage significance. This part of the site is proposed as part of the area of public open space in the northern part of the site, which may involve some landscaping activities. The magnitude of the impact of landscaping upon a heritage asset of low significance would be high. This would result in a direct, long-term, permanent, local, minor adverse (not significant) effect.

Cement Works

13.100 The eastern part of the site has potential for archaeological remains associated with the Cement Works. Remains of the Cement works (structural remains of kilns, associated buildings and tunnel networks) would be considered to be of medium heritage significance. This part of the site is proposed for residential development and landscaping. Activities associated with construction such as excavation/piling for foundations, excavation for utilities and roads as well as excavation and earth movement for landscaping have the potential to result in direct effects to archaeological remains in this area. As such the magnitude of the impact is expected to be a high. The result of a high impact upon a receptor of medium heritage significance would result in a direct, long-term, permanent, local, moderate adverse (significant) effect.

13.101 Infrastructure associated with the cement industry such as wharves, tramlines and quarry pits may also exist within the site as indicated on the historic mapping, these would be expected to be of low heritage significance. The magnitude of the impact from the demolition and construction works is expected to be high, resulting in a direct, long-term, permanent, local, minor adverse (not significant) effect.

Unknown Archaeology

13.102 As the site has not been previously investigated the assessment has found there to be potential for archaeological remains that are as yet unknown to be discovered within the site. As the nature, survival and extent of these features is unknown, the heritage significance of these assets remains unknown. The magnitude of the demolition and construction impacts would be high but as the heritage significance of the heritage assets is unknown, the significance of the effect cannot be determined.

Indirect Effects

Aspdins Kiln

13.103 Aspdin's Kiln is of high heritage significance and is significant for its interests as defined above and the contribution that its setting makes to those interests. The site has potential to contain buried archaeological remains of contemporary cement works associated with Aspdins Kiln. It is anticipated that the physical impacts during the demolition and construction phase to the possible remains of the cement works within the site will not result in any meaningful indirect effects (negligible) to the significance of Aspdin's Kiln through a change within setting, this is considered to be a negligible (not significant) effect.

Waterlogged Deposits outside of the Site

13.104 It is possible that indirect effects to waterlogged deposits surrounding the site could occur through hydrological changes within the surrounding area caused by the Proposed Development. This could occur to deposits whose preservation is dependent upon their anaerobic waterlogged conditions whereby drying out of

such deposits would lead to a degradation of preservation and in turn a reduction in archaeological significance. Should such remains exist within the vicinity of the site these remains are likely to be of medium to high heritage significance. As these deposits are thought to be relatively widespread within the local area the magnitude of the impact of the changes to hydrology is considered to be of low magnitude to this resource overall. This would result in a minor adverse (not significant) effect on these deposits.

Completed Development

Direct Effects

- 13.105** There will be no direct impacts to archaeological remains during the operational phase of the Proposed Development. Any direct impacts on the below ground archaeological resource will have occurred during the demolition and construction phase of the Proposed Development.

Indirect Effects

- 13.106** There are not predicted to be any indirect effects to Aspdins Kiln during the operational phase. The relationship between the site and Aspdins kiln relates to a non-visual contribution to the archaeological interest of the Scheduled Monument from within its setting. Since the operational phase will not affect this aspect of its significance, there will be a negligible (not significant) effect on Aspdins Kiln during the operational phase of the Proposed Development.
- 13.107** There are not anticipated to be any indirect operational effects to waterlogged deposits which lie outside of the site due to hydrological changes as a result of the Proposed Development. As the Proposed Development will be completed and operational it is not expected that any activities that could cause changes to hydrology will occur within this phase.

MITIGATION AND MONITORING

Demolition and Construction

Direct Effects

- 13.108** Where practicable, preservation in situ would be the primary mitigation for archaeological remains, embedded into the project design through avoidance of archaeological remains of high heritage significance.
- 13.109** Mitigation of unavoidable direct physical impacts will comprise preservation by record which will include archaeological investigation, recording, analysis and dissemination of the results. The mitigation measures will reduce the severity of the impacts and hence the levels at which the effects are considered significant.
- 13.110** Mitigation will take place as part of a staged approach and at each stage a Written Scheme of Investigation (WSI) will be prepared to outline the scope and methodology of the work which will be agreed with KCC prior to the works taking place. To achieve preservation by record, the first stages of assessment will comprise archaeological trial trench evaluation and test pit evaluation. The staged approach to the archaeological investigations would be secured through a condition of planning.

Archaeological Trial Trench Evaluation

- 13.111** Archaeological trial trenching would be undertaken in accordance with a WSI agreed with the County Archaeologist at KCC, over a suitable sample size of the site. The aim of the trial trench evaluation will be to record and establish the extent, nature, date and significance of buried archaeological remains which may be present within the site. The results of the evaluation will be used to determine (in agreement with KCC) the measures taken to either preserve assets in situ or preserve by record through further archaeological mitigation (which commonly comprise archaeological excavation and/or archaeological watching brief). The archaeological evaluation would be undertaken in accordance with the Chartered Institute for Archaeologists (CIfA) guidance 'Standard and Guidance for Archaeological Field Evaluation'³⁴ and KCC's 'Manual of Specifications Part B, Evaluation-Trial Trenching requirements'³⁵.

Geoarchaeological Test Pit Evaluation/Purposive Boreholes

- 13.112** The available data indicates that Pleistocene and Holocene deposits with archaeological and geoarchaeological potential occur within the site. To clearly establish the specific nature and lateral and horizontal variations in this potential, a staged approach to evaluation and mitigation is recommended.
- 13.113** Should ground investigation (GI) works be carried out within the site, it is recommended that these are subject to geoarchaeological monitoring and that the data produced is used to update the deposit model for the site. This updated model will enable the need for, and scope of, archaeological and geoarchaeological evaluation to be clearly established.
- 13.114** A targeted program of evaluation is likely to be recommended based on the information provided by the updated deposit model.
- 13.115** In the first instance the suitability of the site for deep penetrating geophysical surveys such as Electromagnetic Induction (EMI) and Electrical Resistivity Tomography (ERT) will be ascertained (in particular for the ERT survey which requires metal probes to be inserted into the ground which may be unsuitable for the ground conditions).
- 13.116** A program of geoarchaeological evaluation through test pits is recommended for areas towards the valley margins where the deposit model records shallower Pleistocene and Holocene sequences (<4.0m), to be combined with the archaeological trial trenches mentioned above.
- 13.117** The aim of the trial trenches should be to investigate the potential for archaeology and geoarchaeological evidence in the Holocene sediments. These trenches may require stepping in some areas, the requirement for which can be identified from the updated deposit model. The focus of test pits should be to assess the potential of the Pleistocene sediments to contain significant Palaeolithic archaeological and/or geoarchaeological evidence. Dependent on the results of the evaluation, and consideration of them in relation to detailed development proposals (an impact assessment), targeted mitigative excavation may be required to offset impacts on the archaeological and geoarchaeological resources.
- 13.118** The most appropriate method of evaluating the deep Holocene sequences and underlying Pleistocene sediments (>4m bgl) recorded in the deposit model is through targeted boreholes, aimed at recovering suitable samples for palaeoenvironmental assessment and dating. It is recommended that the results of the survey, assessment and dating are then considered in relation to detailed development proposals (an impact assessment) in order to consider the requirements for and scope of any archaeological and geoarchaeological mitigation.
- 13.119** Should areas with potential to contain significant archaeology be identified that will be impacted on by the Proposed Development, mitigative archaeological excavation (likely to require cofferdam excavations and dewatering) may be required. Alternatively, the detailed development proposals could be altered to prevent impact in these areas.
- 13.120** Dependent on results of the assessment and dating, geoarchaeological mitigation through additional boreholes to obtain further palaeoenvironmental samples for analysis and additional dating may be required. **Table 13.6** presents the predicted effects post-mitigation.

Unknown Archaeological Remains

- 13.121** The effect to unknown archaeological remains could not be established as the significance of this resource is currently unknown. However, it is anticipated that unknown archaeological remains could be mitigated through archaeological trial trenching (which would establish the heritage significance of the resource) followed by appropriate mitigation in the form of archaeological excavation or watching brief, dependent upon the significance of the findings.

Indirect Effects

- 13.122** The indirect effect to waterlogged deposits in areas beyond the site boundary through changes to hydrology as a result of the development cannot be easily mitigated through preservation by record as these deposits lie outside of the site boundary and control of the Applicant. However, the proposed mitigation for similar deposits within the site will contribute to a better understanding of the deposits locally and help to inform a model for similar deposits within the area.

³⁴ Chartered Institute for Archaeologists (CIfA) 2014, Standard and Guidance for Archaeological Field Evaluation.

³⁵ Kent County Council, Undated, Manual for Specifications Part B, Evaluation-Trial Trenching Requirements

Completed Development

13.123 Effects during the completed development phase to Aspdins Kiln are reported as negligible and as such no mitigation is proposed. No other direct or indirect effects are reported during the operational phase.

RESIDUAL EFFECTS

13.124 All of the residual effects resulting from the Proposed Development, are presented in **Table 13.6**, identifying whether the effect is significant or not.

Table 13.6 Residual Effects

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
Demolition and Construction							
Palaeolithic deposits	Physical effect through construction activities	Minor Adverse	Not Significant	L	D	P	Lt
Palaeoenvironmental/waterlogged remains	Physical effect through construction activities	Minor Adverse	Not Significant	L	D	P	Lt
Stonebridge Foundations	Physical effect through construction activities	Negligible Adverse	Not Significant	L	D	P	Lt
Possible Mill Pond	Physical effect through construction activities	Negligible Adverse	Not Significant	L	D	P	Lt
19 th century Windmill Foundations	Physical effect through construction activities	Negligible Adverse	Not Significant	L	D	P	Lt
Infrastructure associated with Cement Works (wharves/tramlines etc)	Physical effect through construction activities	Negligible Adverse	Not Significant	L	D	P	Lt
Remains of Cement Works	Physical effect through construction activities	Minor Adverse	Not Significant	L	D	P	Lt
Unknown Archaeological Remains	Physical effect through construction activities	Minor Adverse	Not Significant	L	D	P	Lt
Aspdins Kiln	Indirect effect to significance through change within setting	No effect	Not Significant	L	I	P	Lt
Palaeoenvironmental/waterlogged remains outside of the site	Physical effect to deposits outside of the site through hydrological changes	Minor Adverse	Not Significant	L	I	P	Lt
Key/Notes: Residual Effect Scale = Negligible / Minor / Moderate / Major Nature = Beneficial or Adverse Geo (Geographic Extent) = Local (L), Borough (B), Regional (R), National (N) D = Direct / I = Indirect P = Permanent / T = Temporary St = Short Term / Mt = Medium Term / Lt = Long Term N/A = not applicable / not assessed							

ASSESSMENT OF THE FUTURE ENVIRONMENT**Evolution of the Baseline**

13.125 The archaeological baseline conditions would not evolve in the absence of the Proposed Development and would continue to exist as they currently are. As such no assessment of the future archaeological environment has been made as the baseline would remain as presented within this ES chapter.

Cumulative Effects Assessment

13.126 The cumulative impact assessment identifies any significant effects that the Proposed Development may have in combination with other nearby cumulative schemes.

13.127 As set out in **ES Volume 1, Chapter 2: EIA Methodology**, the cumulative effects assessment considers the potential for cumulative effects to arise as a result of the Proposed Development in-combination with defined 'Tier 1' (i.e. schemes which meet the defined criteria with regards to scale and distance from the site and have full planning consent, a resolution to grant consent, or have been submitted but not yet consented where considered appropriate) and 'Tier 2' (i.e. major planning applications and decisions which have not yet been submitted for approval, and are at varying stages in the pre-application stage) cumulative schemes.

13.128 The following schemes have been identified as potentially representing a cumulative effect upon buried archaeological remains due to their proximity to the site;

- Land North of Hive Lane, Northfleet Embankment West (EDC/21/0081) – Tier 1 Scheme;
- Land Adjacent to Northfleet Harbour, Grove Road, Northfleet (EDC/21/0102 - withdrawn) – Tier 2 Scheme; and
- The London Resort (BC080001 - withdrawn) – Tier 2 Scheme.

13.129 In general, the nature of the archaeological resource is such that the vicinity within which cumulative effects could occur is restricted to the immediate environs surrounding the site. In this instance cumulative effects could occur where assets or deposits extend beyond the boundary of the site or are predicted to do so. As such the schemes within 500m of the site have been considered for the cumulative assessment for archaeological remains.

Demolition and Construction

13.130 There is potential that some of the above schemes could affect the same type of archaeological resource as that which would be affected by the Proposed Development. This is particularly relevant to Palaeolithic deposits and waterlogged deposits with palaeoenvironmental potential where their extent is not constrained or defined. As these deposits could exist on a local landscape scale, it is likely that they could exist within sites in the local area, where the above developments are due to take place. The effects of these developments in conjunction with the Proposed Development will result in an incremental adverse effect on the same deposits. Overall, these incremental effects are expected to have a moderate adverse (significant) effect on the deposits overall. In addition, each site would be subject to assessment and mitigation by record or preservation in situ, should remains of high significance be found. This would reduce the effect to a minor adverse (not significant) residual effect on these types of deposits as a whole.

13.131 Numerous cement works were established along the Thames estuary within Northfleet and the surrounding area. As such there is potential for the remains of similar industrial archaeology to be affected by the proposals within the surrounding area. Particularly at Grove Road where investigations have revealed extensive structural remains associated with the cement works. As the cement industry was widespread within this area the above developments in conjunction with the Proposed Development are likely to incrementally affect the industrial archaeological resource. Each of these developments will be subject to archaeological assessment and mitigation which will reduce the effects through preservation by record, or preservation in situ to a minor adverse (not significant) residual effect.

Completed Development

13.132 No effects have been identified to buried archaeological remains as a result of the completed development, and therefore cumulative effects within this phase cannot occur.

LIKELY SIGNIFICANT EFFECTS

- 13.133** The assessment has found that no likely significant effects will occur as a result of the Proposed Development upon known and potential buried archaeological remains, based upon the information available at the time of writing. After the implementation of mitigation through preservation by record (or if required, preservation in situ), effects of the Proposed Development will be reduced to minor adverse or negligible effects which are not significant in EIA terms.
- 13.134** There were also found to be no likely significant effects arising from the cumulative schemes in combination with the Proposed Development. Each development would be subject to archaeological assessment and mitigation to either preserve archaeological remains by record or preserve in situ.