



CROSSRAIL
ASSESSMENT OF ARCHAEOLOGY
IMPACTS, TECHNICAL REPORT.
PART 1 OF 6, INTRODUCTION AND
SUMMARY
1E0318-G0E00-00001

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**CROSSRAIL
ASSESSMENT OF ARCHAEOLOGY IMPACTS,
TECHNICAL REPORT
PART I OF 6, INTRODUCTION AND SUMMARY**

FEBRUARY 2005

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16/02/2005

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1 Introduction

1.1 Background

1.1.1 Crossrail: a general introduction

Crossrail is a major new cross-London rail link project that has been developed to serve London and the south-east of England. Crossrail will support and maintain the status of London as a world city by providing a world class transport system. The project includes the construction of a twin-bore tunnel on an east–west alignment under central London and the upgrading of existing National Rail lines to the east and west of central London. The Crossrail route is shown in *Figure 1.1*.

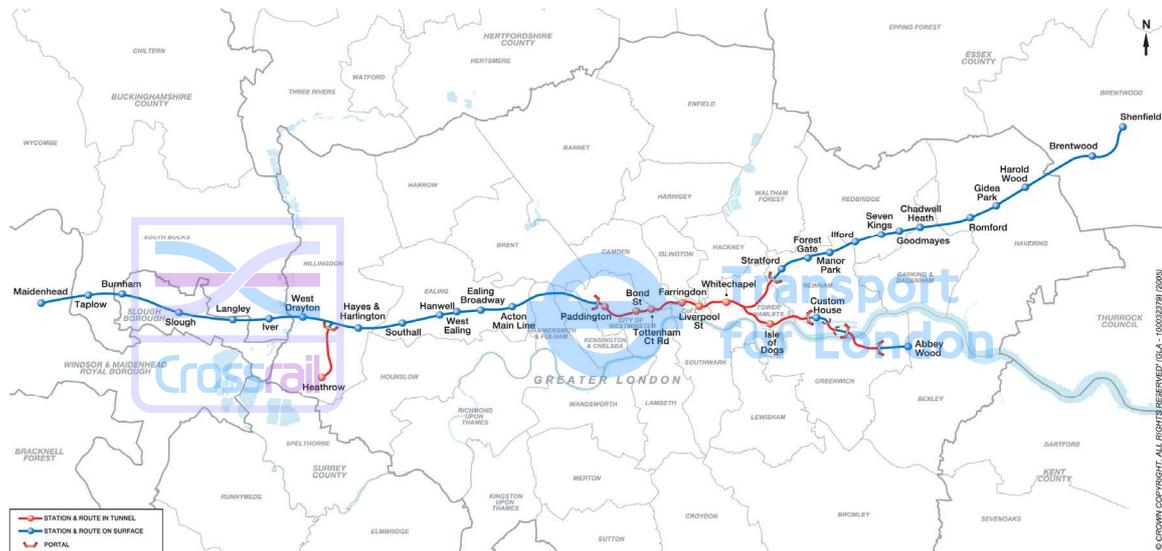


Figure 1.1 Overview of Crossrail Route

The project will enable the introduction of a range of new and improved rail journeys into and through London. It includes the construction of seven central area stations, providing interchange with London Underground, National Rail and London bus services, and the upgrading or renewal of existing stations outside central London. Crossrail will provide fast, efficient and convenient rail access to the West End and the City by linking existing routes from Shenfield and Abbey Wood in the east with Maidenhead and Heathrow in the west.

Crossrail will be a significant addition to the transport infrastructure of London and the south-east of England. It will deliver improved services for rail users through the relief of crowding, faster journeys, and the provision of a range of new direct journey opportunities. The project will also have wider social and economic benefits for London and the south-east of England.

1.2 Project description

1.2.1 Introduction

This chapter provides an overview of the permanent works that will be constructed as part of the project, information on the operation of Crossrail and a description of how the permanent works will be constructed.

1.2.2 Overview of the Crossrail route

Crossrail's route has four distinct sections: a central section within central London and, outside central London, western, north-eastern and south-eastern sections.

In the west, Crossrail will use the Great Western Main Line between Maidenhead and Westbourne Park. The existing 25 kV overhead electrification between Paddington and Airport Junction will be extended to Maidenhead and bridge alterations will be undertaken as necessary. The main infrastructure changes are the construction of a flyover structure (the Stockley flyover) to allow Crossrail trains to access the existing tunnelled spur to Heathrow and the provision of a rail underpass (a dive-under) west of Acton Yard. A new line, within the existing railway corridor, will be provided between Langley and West Drayton. Enhancements will also be made to stations, with the most significant works being at Ealing Broadway, Southall, Hayes and Harlington, West Drayton, Slough and Maidenhead. New stabling sidings are also proposed at Old Oak Common, West Drayton and west of Maidenhead station.

The central route section will consist largely of a twin-bore tunnel beneath central London with portals at Royal Oak in the west, Pudding Mill Lane in the north-east and Victoria Dock Road in the south-east. The central route section extends from a point around 200m west of the A40 Westway to a point around 500m to the east of the portal at Pudding Mill Lane in the north-east and a point just to the east of Poplar Dock and the A1206 Prestons Road in the Isle of Dogs in the south-east. New stations and associated structures, such as ventilation shafts, will be provided along this part of the route.

On the north-east route section, Crossrail will use the existing Great Eastern Main Line between Pudding Mill Lane and Shenfield. The main infrastructure changes are a new train maintenance depot west of Romford and the reinstatement of a track between Goodmayes and Chadwell Heath. Enhancements will also be made to stations, with the most significant works being proposed at Ilford and Romford.

The south-east route section runs between a point to the east of the Isle of Dogs station and the eastern terminus at Abbey Wood, where Crossrail will serve a reconstructed station. Crossrail will operate in a twin-bore tunnel to Victoria Dock portal where it will serve a reconstructed station at Custom House. The route will then follow the existing alignment currently used by the North London Line through the Connaught Tunnel to Silvertown. At North Woolwich, a new twin-bore tunnel to Plumstead, referred to as the Thames Tunnel, will pass beneath the River Thames. Two new tracks will be provided between Plumstead and a point east of Abbey Wood station to accommodate Crossrail services on the North Kent Line corridor.

Detailed scheme descriptions are included in the assessments of each Crossrail route section, which form Parts 2 to 5 of the archaeology technical report.

1.3 Structure of the archaeology technical report

Within the Crossrail Environmental Impact Assessment (EIA), the Archaeology specialist topic covers archaeological resources below- and above-ground, but excludes statutorily listed historic buildings, and their settings, (dealt with in the Heritage and Townscape technical report). For more information on scope, see 1.5 below.

The Assessment of Archaeology Impacts Technical Report (Parts 1 to 6) provides detailed information on baseline resources and potential impacts on them, supporting the synthesis provided in the Environmental Statement. It forms an initial archaeological impact assessment for the proposed scheme, at the stage of the design reached in January 2004.

Note that where route windows are omitted from the technical report, this is because there are no archaeological impacts in those route windows. References are placed at the appropriate points in individual sections of the technical report volumes.

1.3.1 Structure of this document: Part 1

Part 1 includes introductory information on the Crossrail proposals, and on the archaeological study, including the methodology adopted. Following this introduction, Part 1 contains summaries of archaeological baseline, potential impacts, proposed mitigation, and residual impacts (any net effects of the scheme after mitigation) for the whole of the Crossrail route. These subjects are covered in greater detail in Parts 2 to 5, the assessments for each Crossrail route section.

1.3.2 Structure of Parts 2 to 6

Parts 2 to 5 comprise archaeological impact assessments for each of the four proposed Crossrail route sections:

- Part 2: Central (Westbourne Park to Stratford and Isle of Dogs),
- Part 3: North-East (Stratford to Shenfield),
- Part 4: South-East (Isle of Dogs to Abbey Wood), and
- Part 5: West (Maidenhead to Westbourne Park).

Each of these parts consists of an initial overview of the changing patterns of past settlement and land use across the route concerned (see 1.3.5 below for an explanation of the route overviews). The overview is followed by the scheme description for that route section, and then by more detailed assessments for each Crossrail site where the proposed works may affect archaeological remains (see 1.3.4 below for an explanation of the division of the proposed works into Crossrail 'sites'). These are ordered by the route window, as per the Environmental Statement, and are arranged from west to east.

The levels of information in the archaeological impact assessment form a pyramid, with the synthesis in the Environmental Statement supported by summaries in Part 1 of the archaeology technical report. The latter are in turn supported by route overviews and the detailed site assessments, in Parts 2 to 5. The base of the pyramid consists of all the unpublished data, available for reference purposes in digital or hard copy form.

Part 6 consists of figures illustrating the archaeological assessments in Parts 1 to 5. They show the distribution of baseline resources within the route windows (Sites and Monuments Records, excavated sites, burial grounds, Scheduled Ancient Monuments, etc).

1.3.3 Using the technical report

Users will require different levels and types of information from these documents, and may not wish to read the whole of each part. The reports may therefore be accessed in various ways:

- For the assessment scope and methodology, refer to Part 1 sections 1.5 and 1.6.
- For a summary of the archaeology along a particular route section, refer to the relevant overview in Part 2 to 5.
- To review potential impacts along a particular route section (in more detail than in the Environmental Statement) see section 2 of Part 1. The figures in Part 6 may be referred to for the location of the works.
- To consider an individual Crossrail site, its archaeological potential and the works proposed there, in more detail, determine the appropriate route section, route window, and site number (from the summaries in Part 1 or the figures in Part 6) and then refer to the relevant route section volume (Parts 2 to 5)
- Similarly, to consider resources and potential impacts across a particular geographical location or area: use the figures in Part 6 determine which route section, route window(s), and ‘site(s)’ the area covers, then refer to the individual site assessments in Parts 2 to 5 (see 1.3.2 above). Route overview zone(s) covering the chosen area can be determined using the figures in Part 6, and then found in section 2 of the corresponding volume from Parts 2 to 5. Specific baseline resources mentioned in the assessments are located on the mapping in Part 6.

For example, to consider baseline resources in the area around Iver, Bucks., use Part 6 to determine that it lies in Route Windows W14 and W15 of the Western route section, and that it includes Site 25, (Iver Station and Thorney Lane Bridges), and Site 24 (Dog Kennel Bridge and Chequers Bridge). The full assessments for Sites 24 and 25 are then found in section 4 of Part 5. The mapping in Part 6 would also identify that Iver lies in route overview Zone Y, which could be consulted in section 2 of Part 5.

1.3.4 ‘Crossrail Sites’

Within the Route Windows, the proposed works are grouped into numbered Sites, designated by MoLAS for use in its technical report. These sites are those where proposed Crossrail construction, temporary landtake for construction compounds or

depots, and areas of temporary or other works, may potentially affect archaeological resources. Whilst the ‘Site numbers’ were originally a single sequence per route element, subsequent changes to the scheme and boundaries between the routes have meant that a ‘Site number’ no longer provides a simple indication of the location of a site. A concordance table is provided below.

The division into individual ‘sites’ is one devised by MoLAS for its archaeological EIA work, documented in the archaeology technical report, and may not necessarily correspond with any similar division formulated by other specialists working for the EIA.

Concordance table for Crossrail Route Windows and Sites

Crossrail Route	Crossrail Route Window	Site numbers (designated by MoLAS)
Western	W1	91 (part)
Western	W2	91 (part)
Western	W3	8, 91 (part)
Western	W4	7
Western	W5	6
Western	W6	5
Western	W7	4
Western	W8	3
Western	W9	None
Western	W10	2
Western	W11	1
Western	W12	28, 29
Western	W13	26, 27
Western	W14	25
Western	W15	24
Western	W16	23
Western	W17	21, 22
Western	W18	19, 20
Western	W19	16, 18
Western	W20	14, 15
Western	W21	13
Western	W22	None
Western	W23	12
Western	W24	None
Western	W25	10, 11
Central	C1	199, 200
Central	C2	201
Central	C3	202, 203
Central	C4	204, 290
Central	C5	205, 291, 206
Central	C6	292, 207, 229
Central	C7	208, 293
Central	C8	209, 231, 210, 294, 238
Central	C8A	238

Crossrail Route	Crossrail Route Window	Site numbers (designated by MoLAS)
Central	C9	211
Central	C10	214
Central	C11	215, 230
Central	C12	234, 235
Central	C13	236, 239
Central	C13A	239
Shenfield	NE1	301
Shenfield	NE2	303
Shenfield	NE3	304
Shenfield	NE4	318, 305
Shenfield	NE5	306
Shenfield	NE6	307
Shenfield	NE7	308
Shenfield	NE8	316 (part)
Shenfield	NE9	309, 316 (part)
Shenfield	NE10	310
Shenfield	NE11	315
Shenfield	NE12	311
Shenfield	NE13	None
Shenfield	NE14	None
Shenfield	NE15	312
Shenfield	NE16	None
Shenfield	NE17	313
Shenfield	R1	237
South-east	SE1	232, 217
South-east	SE2	219, 220
South-east	SE3	412, 222
South-east	SE4	225, 233, 295 (part)
South-east	SE5	295 (part), 411
South-east	SE6	227
South-east	SE6A	413
South-east	SE7	400
South-east	SE8	400

1.3.5 Introduction to the route overviews

The detailed archaeological impact assessments forming Parts 2 to 5 of the archaeology technical report include ‘route overviews’. These consider the changing patterns of past settlement and land use, across broad landscape zones (defined on archaeological, historical and topographic grounds), in order to set archaeological resources within a wider context, at a scale larger than individual search areas around Crossrail sites, or single route windows.

The aim is to provide a context within which the significance of baseline resources may be evaluated, reflecting the strategic framework provided by local development plans, research agendas and syntheses of fieldwork. This particularly applies to the assessment of collective aspects of the resources, such as their coherence, group value and the extent to which they typify the local landscape, as key components of its historic character.

The zones are discussed under the following sub-headings:

- *Boundaries and layout* – defines the zone and describes its general layout and character, including designated archaeological priority areas. Whilst the zones have defined end points along the route, they are not specifically restricted in width, in order that patterns of topography and human settlement may be compared.
- *Topography and geology* – describes the geology underlying the zone, and its topographical features.
- *Archaeological and historical background* – discusses thematically the major archaeological and historical topics and how the zone developed over time. It includes a relative grading of the overall archaeological potential of the zone, on a period by period basis.
- *Selected research themes* – summarises archaeological priorities, from the relevant research agenda, eg *A Research Framework for London Archaeology* (Museum of London 2002) for Greater London. Page numbers in brackets refer to this publication. The majority of themes from these agendas are inevitably general, addressing issues of human development and interaction with the landscape comparatively, at a broad regional level. For this reason, research priorities have only been included where considered more specifically applicable to the zone in question.

1.4 Acknowledgments

MoLAS would like to thank the following people and organisations, on behalf of Crossrail, for their assistance with archaeological information contributing to the Environmental Impact Assessment:

Barry Taylor and Suzanne Gailey of the Greater London Sites and Monuments Record, and Alison Bennett of the Essex Heritage Conservation Record, for supplying baseline SMR and other data. Sandy Kidd and Julia Wise of Buckinghamshire County Council for information and discussion of the baseline in the county. Fiona MacDonald, Teresa Hocking, Mike Hall and Frances Raymond of the Berkshire Sites and Monuments Record for information for, and discussion of, the baseline report in the county. Stuart Cakebread of Kent Sites and Monuments Record for supplying baseline SMR data, although subsequently not required.

Jane Jephcote of English Heritage for Scheduled Ancient Monument data.

Cath Maloney and Alan Thompson of the London Archaeological Archive & Research Centre for access to unpublished site summaries and archival material.

Helen J. Glass of CTRL, Rail Link Engineering, and Peter Moore and Josephine Brown of Pre-Construct Archaeology, for information about recent excavations.

Fred Nash of Essex County Council for information about the WWII defences of Shenfield.

Drew Bennellick of English Heritage for information about Historic Parks and Gardens on the inner West Route.

Alan Evans, Ian Frostick and Ian Nulty of Network Rail for information about the construction and subsequent alterations to the small road bridges crossing the GWR.

Nicholas Ashton of the Quaternary Section of the British Museum, for advice concerning Palaeolithic finds from Hyde Park.

1.5 Methodology and incorporated mitigation

1.5.1 Approach to the assessment

This section summarises the main stages of the archaeological impact assessment process, which is dealt with in more detail in sections **Error! Reference source not found.** to 1.5.4.

1. *Baseline.* The assessment is not a whole-route survey and is targeted on the Crossrail proposals. *Proposed works* have therefore been located and summarised, from the overall scheme description, allowing appropriate study areas to be drawn around them. Data concerning archaeological resources within the study areas have been assembled, and mapped to form a database. The wider historic context and landscape have also been considered via *route overviews* (see 1.3.5). The data have then been assessed for both their considered *importance* and (given that most are hidden, buried remains) their *potential* to actually be present on the Crossrail site in question. Potential includes consideration of past and present land uses, such as quarrying, that may have affected archaeological deposit survival. Individual resources have been grouped into evaluated themes, for example the potential for prehistoric settlement and associated land use at a particular location. This stage establishes the archaeological baseline (the situation without the proposed scheme).
2. *Impacts.* Not all proposed works will affect the historic environment. The nature and scale of works and their likely effect on archaeological resources have therefore been examined in detail, leading to a descriptive inventory of *potential impacts*. The *magnitude* of the impact is the degree of alteration to the baseline, usually physical removal, that is implied by the proposals. Comparing the impact magnitude with the importance of the resources affected by it then establishes the overall *significance* of what the impact would be for each Crossrail site if no mitigation measures were enacted.
3. *Mitigation.* Quantifying and evaluating impacts will lead to the development of suitable safeguards that will reduce or eliminate them (a *mitigation strategy*). There may well be opportunities to achieve this by conservation-based design, allowing historic resources to be protected and retained (*preservation in situ*). This is the preferred option, in particular for resources of national importance. Where it is not achievable, mitigation focuses on making a full record of affected resources in advance of their removal during development, via archaeological investigations (*preservation by record*). Often a mixture of the two strategies will be used. The Crossrail scheme incorporates a full programme of archaeological mitigation measures, starting with detailed desk-based assessment and/or field evaluation, followed by archaeological excavation and/or watching brief, and where appropriate localised *preservation in situ*, to be completed by analysis and publication of the results, and deposition of the finds and records in a public archive (see 1.5.4).
4. *Residual impacts.* The conclusion of the assessment identifies and grades any net effect on the historic environment that may remain after mitigation has been carried out, the *residual impact*. Such effects may be negative (if mitigation measures are not able to completely compensate for the impact) or positive, where Crossrail works will

lead to an improvement in the condition, setting or appreciation of historic resources. The net significance of the residual impact is then assessed, by comparing the magnitude of the impact after mitigation with the importance of the resources affected.

The archaeological impact assessment has identified very few residual impacts, because *preservation by record*, and where appropriate *preservation in situ*, has been considered suitable mitigation for nearly all of the potential impacts on archaeological resources.

5. *Work following the EIA*. Because of the uncertainty in predicting buried or hidden historic resources, further assessment (both technical and archaeological) will be required before mitigation can be fully defined. This requires access to detailed engineering and geotechnical data, and to selected sites for exploratory fieldwork. The additional information will allow an archaeological project design (*Written Scheme of Investigation*) to be finalised. The mitigation strategies it contains are then carried out on site before and during the main works. The quantification and mitigation of impacts on the historic environment, therefore, forms a continuing process that would normally extend through the EIA, detailed design, enabling works and construction phases of a major project such as Crossrail.

1.5.2 *Scope and Methodology*

Introduction

The archaeology assessment addressed the documentary and physical resources that constitute the historic environment. This is defined as the evidence of prehistoric and later societies, their cultures, and their interaction with the landscape and its natural resources.

Potential Impacts

A scoping exercise was undertaken to identify potential impacts. Potential impacts associated with construction and operation were addressed. These included:

- construction works which require the physical excavation, demolition, removal, alteration of, or damage to archaeological resources, whether below-ground or above-ground;
- movement of machinery resulting in damage to exposed archaeological deposits, extant earthworks or finds scatters; heavy machinery working on the surface causing damage to buried archaeological deposits; and ground consolidation causing damage to buried archaeological deposits;
- settlement of archaeological remains induced by tunnelling, deep excavations or construction of retaining walls;
- loss of the setting and coherence of archaeological resources including severance and islanding; and
- loss of access to archaeological resources, including buried deposits and surface features, restricting the potential for future research.

Potential indirect negative impacts were considered to include:

- contamination of resources, usually below ground, from accidental spillages at construction or work sites (such contamination might hinder or prevent future excavation of deposits);
- temporary or permanent changes in the groundwater regime or the chemical balance of the soil, resulting in deterioration in the preservation conditions of below-ground deposits; and
- loss of integrity of structures arising from the need to carry out repairs as a result of the construction work.

In addition to the above, cumulative impacts from the accumulation of different impacts on the same resource, or the accumulation of impacts of the same type on different resources which have a coherent historic character were considered. Further fragmentation of the archaeological resources, reducing the potential for future research was also considered. This was particularly relevant in the urban areas where archaeological deposits will have already been extensively disturbed by modern basements and foundation.

Positive impacts were considered to include:

- increased knowledge resulting from the recording, analysis and publication of archaeological sites carried out as part of the mitigation strategy;
- potential improvements to the setting and coherence of archaeological resources; and
- the opportunity to involve and inform local business and residential communities about local archaeological resources, both during the construction programme and the operation of Crossrail.

Definition of Scope

Spatial Scope

Possible direct and indirect impacts upon archaeological resources and receptors were assessed within:

- the limits of land to be acquired or used (LLAU) and the limits of deviation (LOD) for direct impacts;
- a distance of at least 150m from the works in urban areas, and at least 500m elsewhere, for impacts upon the settings of historical resources; and
- the zone of impact as advised by other specialists for indirect impacts (eg noise, visual intrusion, settlement, vibration, dewatering etc.).

Temporal Scope

Potential impacts on archaeological resources will occur primarily in the construction phase of the project (2007–2013) and will be concerned principally with activities likely to remove, disturb or alter built or buried resources, be they as a result of enabling, construction or permanent works. Although they will occur during the enabling or construction phase, such impacts will, by their nature, be permanent.

Inventory of Resources and Receptors

The assessment considered the following resources:

- World heritage sites;
- Scheduled ancient monuments;
- local authority archaeological priority zones (APZ) or equivalents;
- National Monuments Record (NMR)/Sites and Monuments Record (SMR) data;
- burial grounds;
- other registered landscapes (if their classification includes historical significance), such as registered battlefields or historic parks and gardens;
- archaeological sites and strata;
- historic transport systems; and
- industrial archaeology.

The assessment also addressed potential impacts on receptors of the above resources. Such receptors were defined as private individuals, groups or ‘communities’ whose use, perception, understanding, and appreciation of the archaeological environment could be changed by the construction and operation of Crossrail.

Consultation

Initial consultation on the Scoping and Methodology Report included:

- English Heritage;
- archaeology officers at local authorities: county archaeologists, and their equivalent within Greater London, and English Heritage’s Greater London Archaeology Advisory Service; and
- relevant national and local amenity societies.

Establishment of Baseline

Baseline data was sourced from:

- NMR/SMR records, held by English Heritage and local authorities;

- Records of archaeological priority zones or equivalent areas designated by local authorities;
- lists, plans, and information held by English Heritage on scheduled ancient monuments and the draft register of historic battlefields;
- geological mapping (held by the British Geological Survey);
- aerial photographs;
- published secondary sources dealing with the geology, archaeology, and built environment along the Crossrail route;
- maps and records held by local history collections and groups;
- archaeological and geological data held in MoLAS' Geographic Information System (GIS);
- data from preliminary works, such as boreholes or test pits, conducted in advance of construction;
- consultation with users, custodians, and interested bodies; and
- fieldwork comprising monitoring of geotechnical trial pits and boreholes plus site visits to all sites where access was available.

Evaluation of Baseline Resources

The importance of each resource was graded using low, medium or high based on the following:

- statutory protection;
- other formal identification, that is, on non-statutory governmental registers or within defined zones (eg APZs);
- published priorities where resources have the potential to contribute to local, regional or national policies and research objectives;
- diversity/complexity, that is, the presence of multi-phase resources that exhibit evidence of continuity or development over time. Conversely, if the resource is characteristic of a particular period;
- rarity, that is, resources that have a rarity value (even if once common);
- supporting data, particularly if there is a corpus of related information (eg historical documentation or SMR entries);
- historical association, resources with documented associations with notable socio-economic developments, events, or people;
- coherence/group value, that is, resources with a wider comparative potential, in terms of their collective interpretation and status;
- survival quality, which is the state of preservation and the extent to which resources may have been altered or degraded by past impacts, which, for Crossrail surface routes, is likely to include an assessment of whether the land is in a cutting, at grade or on an embankment;

- fragility/vulnerability: are resources particularly susceptible to damage;
- topography/deposit type: is the extent to which the study area and its natural resources would have attracted past settlement and land use (eg agricultural or industrial), including the presence of specific deposit types likely to preserve evidence of the historic environment;
- landscape: the extent to which individual resources are key features of the local landscape and are a component of its historic character; and
- amenity or social values: is the resource valued by local and wider communities for reasons other than historic ones?

Once the impacts were identified the assessment considered the effectiveness of mitigation. Mitigation measures include:

- design adjustments to the project, if feasible, to reduce or remove the impact (preservation in situ); and
- preservation by record: of structures or buried remains, allowing resources to be thoroughly investigated, so that although subsequently removed by Crossrail works, a permanent record of them is preserved for posterity (including publication and deposition in a public archive).

The assessment matched the importance of the resources (including their wider settings and survival qualities) with the severity (nature and scale) of the proposed impacts, taking account of mitigation.

Evaluation of Impacts

The impacts from the project prior to mitigation were identified and documented in detail. There is no accepted standard scale of comparison against which the severity of impacts upon the archaeological environment could be measured. The assessment took into consideration the physical proportion of the resource affected, and consideration of the fragility and condition of the resource affected.

The magnitude of significant impacts were graded using high, moderate and low. High magnitude impacts were classified as:

- physical loss of evidence and/or features fundamental to the understanding and character of the resource; and
- the loss or severance of the physical and visual integrity of parts of a resource, such that key relationships between the parts are lost.

Moderate magnitude impacts were classified as:

- the physical loss of evidence and/or features which contribute substantially to the understanding and character of the resource, but are not fundamental to it (ie where sufficient evidence or features survive the impact for the resources essential character to be understood and interpreted); and

- the loss or severance of the physical and visual integrity of parts of a resource, such that important relationships between the parts are lost, but not those fundamental to the character of the resource and its interpretation (these are most likely to be where the impact is peripheral, or affects features where their integrity or relationships have already been diminished to a significant extent).

Low magnitude impacts were classified as:

- the physical loss of evidence and/or features likely to be replicated to a significant degree in the remaining, unaffected, parts of the resource, or which are of minor importance; and
- where the physical and visual integrity of resource is already limited, and additional loss or severance does not lead to the loss of important surviving relationships.

Each type of residual impact was allocated a level of significance as shown in the following table. This process used relevant guidelines in combination with professional judgement.

Evaluation of Significance

Impact magnitude	Low importance	Medium importance	High importance
Low magnitude	Nsig	sig	sig
Moderate magnitude	Sig	sig	sig / pisig
High magnitude	Sig	sig / pisig	pisig

Key: Nsig: non-significant impact; Sig: significant interest; Pisig: Impact of particular importance

In some instances, a series of impacts was grouped together because they were of greater relevance cumulatively than individually. In particular, a series of non-significant impacts may collectively have a significant impact on a group of related resources.

Generic Mesolithic potential

Note that it is assumed that there is a generic very low potential for isolated and redeposited Mesolithic artefacts on sites across the Crossrail route where later deposits have not been removed by recent activity. Such remains would be of low importance, and are not assessed in the individual site assessments in Parts 2 to 5. However, on sites where there is a potential for *in situ* Mesolithic remains, eg where they may be sealed within or by alluvium, these would be of greater importance, and have been assessed on an individual basis.

1.5.3 Ground settlement assessment methodology

The following methodology for assessing the impacts of ground settlement on archaeological remains was agreed at a meeting between representatives of Crossrail and English Heritage, held on 1st December 2003.

The degrees of settlement currently predicted from the proposed construction for Crossrail Line 1 would have a negligible impact upon non-structural remains, and they,

and all potential archaeological remains, have been excluded from the assessment of impacts resulting from ground settlement.

Consequently, the resources that were considered in relation to settlement issues are known structural remains, whether constructed of brick or stone masonry, timber, or metal.

There is insufficient technical data available to be able set threshold levels for impacts on archaeological remains. Settlement impacts on structural remains have been assessed on an individual, site-by-site, basis.

1.5.4 Incorporated mitigation measures

This section outlines measures incorporated into the Crossrail scheme to safeguard archaeological resources. Such remains are generally concealed below ground or in urban areas by later buildings, their extent and significance being difficult to predict. Many are therefore potential, rather than known resources, and any impacts upon them are also unlikely to be defined in detail at the Environmental Statement stage. The sequential process set out below is intended to manage this uncertainty, so that archaeological remains are anticipated and planned for, minimising risks to the construction programme. The measures consist of data gathering (to quantify resources and the effect the scheme may have upon them) and subsequently the design of safeguards to mitigate any impacts. They will be carried out by professional archaeologists and in accordance with the legislation, planning consents, statutory consultations, standards and codes of practice applicable to the Crossrail project (*see below*).

Data gathering

An overall archaeological impact assessment forms a technical study supporting the Crossrail Environmental Statement. It highlights the most sensitive archaeological sites and provides a general basis for mitigation measures. However, where the Environmental Statement identifies construction impacts on archaeological resources, either above or below ground, there will generally be a need for more detailed information, via desk or site-based assessment.

Detailed desk-based assessment will focus on the potential for, and survival of, archaeological resources, and the detailed impacts from the scheme. However, in many cases concealed archaeological resources can only be quantified through fieldwork.

Site-based assessment (archaeological field evaluation) is a selective sampling exercise, targeted to key locations identified in the desk studies. It is designed to gather data on the nature and significance of remains without itself causing damage, so as not to prejudice any subsequent mitigation measures. Techniques range from the non-intrusive (standing building appraisal, fieldwalking, geophysics, ground-penetrating radar) through limited intervention (geotechnical investigation; geo-archaeological boreholes) to archaeologically designed trial trenches. Programming is crucial, as the data allows the mitigation stage to proceed. Early access for field evaluation will therefore be arranged, if possible prior to demolition and vacant possession. For example, it may be feasible to integrate geotechnical investigation and archaeological field evaluation - both assess ground conditions for forward planning purposes.

Mitigation measures

Data gathering allows mitigation strategies to be defined and implemented. The preferred option is to reduce or eliminate construction impacts on archaeological resources by good design, allowing them to be permanently retained in their original environment on site (*preservation in situ*). For particularly important resources, this may be achieved by relocating the works. However, in most cases impacts are reduced by adjustments to the detailed design (eg to foundations, formation levels or construction method). Where *preservation in situ* is not feasible, the historic resources will be archaeologically investigated to an appropriate level so that, although removed, a permanent record of them is retained (*preservation by record*). Both strategies may be used for a given site, so that archaeological investigation is confined to those areas where permanent preservation is not achievable.

The level of archaeological intervention for *preservation by record* depends upon the nature and significance of remains, and the severity and extent of the impacts. It may range from limited sample-based investigation up to full *archaeological excavation*, but in all cases recording is targeted to just those areas that will be affected by the scheme. Again, the aim is to complete the majority of archaeological works early, well in advance of the main contract (eg at the demolition and enabling works stage). This minimises the need for archaeologists to be on site during construction. There will however be a general monitoring presence at that stage (*watching brief*) allowing any unexpected discoveries to be recorded without causing delay. The Watching Brief will cover areas of low archaeological potential or impact, for example track works and OHLE masts within the existing permanent way, and the implementation of measures to achieve *preservation in situ*.

Archaeological Project Designs

The scope of incorporated mitigation measures will be set out in more detail in archaeological project designs, developed in conjunction with the Crossrail project team and relevant statutory consultees. These specifications will together constitute the *Written Scheme of Investigation* that is normally required under the terms of planning consent, for approval by the Local Planning Authority. The previous site-based assessment stage will also need to be specified in this way.

The archaeological designs will contain a research agenda (setting out the objectives and priorities for mitigation); a scope of works (including sampling strategies, specialist inputs etc) and method statements; plus a list of equipment and facilities to be provided for the archaeologists carrying out the works. There will be a *route-wide project design* specifying the overall sequence, classes and techniques of archaeological works to be carried out on the Crossrail project, supported by *site-specific designs* defining in more detail the measures proposed for individual locations along the route.

Post-excavation Programme

The project designs will also specify off-site archaeological works. Completion of fieldwork will result in a corpus of finds, samples and records. The concept of mitigation (especially *preservation by record*) implies that this project archive and the historical information it contains are made publicly available. The archaeological project designs for Crossrail will therefore include a *post-excavation programme*. It will consist of collating and ordering the data archive; assessing and prioritising its potential and (where

justified from the assessment) an appropriate level of analysis leading to a published report on the fieldwork results. This is followed by preparation of the project archive for transfer to an approved public *receiving body* (such as a local museum) where it can be permanently maintained.

Policies and Guidelines

The mitigation strategy will be carried out in accordance with relevant legislation, policies and guidelines, including the following:

- Association of Local Government Archaeological Officers, 2003 *Standards for Field Archaeology in the East of England*, East Anglian Archaeology occasional paper 14.
- *Ancient Monuments and Archaeological Areas Act 1979*, as amended by the *National Heritage Act 1983*
- Brown, N & Glazebrook J, 1997 and 2000, *Research and Archaeology: A Framework for the Eastern Counties* (2 vols).
- Corporation of London Department of Planning and Transportation, 2004 Planning Advice Note 3: Archaeology in the City of London, Archaeology Guidance, London
- Cultural Heritage Committee of the Council of Europe, 2000 *Code of Good Practice On Archaeological Heritage in Urban Development Policies; adopted at the 15th plenary session in Strasbourg on 8-10 March 2000* (CC-PAT [99] 18 rev 3)
- Department of the Environment, 1990 *Planning Policy Guidance 16, Archaeology and Planning* (PPG 16)
- English Heritage, 1991 *Management of Archaeological Projects* (MAP2)
- English Heritage, May 1998 *Capital Archaeology. Strategies for sustaining the historic legacy of a world city*
- English Heritage Greater London Archaeology Advisory Service, June 1998 *Archaeological Guidance Papers 1-5*
- English Heritage Greater London Archaeology Advisory Service, May 1999 *Archaeological Guidance Papers 6*
- Institute of Field Archaeologists (IFA), rev. 2001 *By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists, Standard and guidance: Desk Based Assessment*
- Institute of Field Archaeologists, (IFA), 2001 *By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists, (rev. 2001), Standard and guidance: Field Evaluation*
- Institute of Field Archaeologists (IFA), 2001 *By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists, (rev. 2001), Standard and guidance: Excavation*
- Institute of Field Archaeologists (IFA), 2001 *By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists (rev. 2001), Standard and guidance: Watching Brief*

- Institute of Field Archaeologists (IFA), supplement 2001, *By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists: Standards and guidance: the collection, documentation conservation and research of archaeological materials*
- Museum of London, 1994 *Archaeological Site Manual*, 3rd edition
- Museum of London, 1994 *Finds Procedures Manual*
- Museum of London, 2002 *A research framework for London archaeology*
- Museum of London, 1998 *General Standards for the preparation of archaeological archives deposited with the Museum of London*

1.6 Assumptions and limitations as agreed

1.6.1 General assumptions

Existing ground conditions

Where there is an absence of available data about existing ground disturbance on a site, it has been assumed that archaeological remains are unlikely to survive within the following approximate depths below existing ground level (*ie* the *minimum* depths of existing truncation):

Existing surface conditions	Approximate minimum depth of existing truncation
Most built-up areas	<i>c</i> 1m
Built-up areas where there appears to have been little previous development or disturbance	<i>c</i> 0.5m
Open ground	<i>c</i> 0.2m, but minimal in upslope areas
Railway track bed	<i>c</i> 0.6m

The depth of previous disturbance may be considerably greater than this in part or all of an individual site.

Impacts

1. Structures below ground level

It is assumed that the construction of structures excavated below ground level, such as floor slabs and foundations (not including any piles below them) of shafts or basements, ground beams, lift pits, or service trenches would cause up to 0.5m of disturbance of archaeological deposits into which the structure has been excavated, below that of the nominal base of the structure. Thus the level of truncation of archaeological deposits will be estimated as *c* 0.5m below that of the formation level at the base of a structure. In addition, it is assumed that the disturbance may extend up to 1.0m beyond the perimeter of any works.

2. Piles

It is assumed that, unless stated to the contrary, piles will extend below the base of archaeological deposits, including terrace gravels and Head deposits where these

have the potential to contain Palaeolithic remains, and alluvium, as well as ‘made ground’

3. Existing tracks

It is assumed that the construction of the existing tracks has caused *c* 0.6m of truncation below track level throughout the permanent way.

4. Construction of new track

It is assumed that the construction of new trackwork would require excavation of *c* 0.6m below final track level. Note that track drainage and other associated works, and also gradient changes and track lowering are excluded from this statement, and will need to be considered individually.

5. Construction worksites: General clearance

It is assumed that there would be a generic level of truncation of *c* 0.5m below ground level for ‘work sites’ (*ie* construction yard/depot/accommodation sites, not the sites where construction is actually taking place; this generally equates to ‘temporary landtake’ on the parliamentary plans).

It is noted that some equipment will require footings deeper than 0.5m. These are listed below.

6. Construction worksites: Foundations for construction equipment

It is assumed that the footing depths for the following items would be greater than 0.5m. Footing depths are listed below.

Equipment	Footing Depth	
	From	To
Gantry cranes	0.6m	1.0m
Tower cranes	1.5m	2m
NB - Assume that in addition to the footing, that tower cranes would require shallow piles of up to 10m.		
Offices and portacabins	0.4m	0.8m
Temporary services	0.2m	1.2m
Hoarding support posts	0.8m	1.5m
Substations	0.5m	0.9m
Conveyor supports, and associated hoppers, transfer points, etc	0.5m	0.9m
Bentonite plant for diaphragm walling	0.5m	0.9m
Batch plants - concrete, grout	0.5m	1.0m
Lighting columns	1.0m	1.5m
Gateposts etc	0.8m	1.5m

7. Construction worksites: Pre-piling obstruction removal

The requirement for pre-piling obstruction removal (pile probing) will be determined on a case by case basis as required. No assumptions are made for pre-piling obstruction removal.

8. Signals

It is assumed that signals will require excavation of a maximum of 3m. It is assumed that piling will not be required for signals.

9. Spoil Conveyors

Foundations for supports are as described above (section 5). Where the conveyor is to be bolted onto existing structures or fixed onto steelwork bolted on existing structures, it is assumed that the bolts will not exceed 0.5m in length, that the diameter of the hole required will not exceed 50mm and that there would be no additional impact on the existing structure other than the holes required for the bolts

10. Dewatering

It is assumed that the establishment of perimeter pipework to link the dewatering boreholes at shaft sites will result in disturbance to 1m depth.

11. OHLE masts

The masts would each have a single 0.61–0.76m diameter pile, a minimum of 3m deep, and would typically be located at 20–70m intervals.

1.6.2 Effect of Assumptions

The assumptions above have been used in the detailed assessments of the impacts of the proposed scheme, but they have no material effect on whether or not there would be a significant residual impact from Crossrail works.

1.6.3 Limitations

1. Uncertainty about below-ground archaeological resources

The majority of the baseline archaeological resources are concealed below-ground, and thus there is uncertainty about the presence, nature, survival quality, and importance of potential archaeological remains. This environmental impact assessment, therefore, has used records of the previous finds made within the areas surrounding the sites of the Crossrail works, in order to predict the archaeological resources which are likely to be present.

The sequential mitigation strategy set out in the incorporated mitigation is intended to manage this uncertainty, so that archaeological remains are anticipated and planned for, and appropriate mitigation measures enacted.

2 Environmental Baseline and Assessment of Impacts – Maidenhead to Westbourne Park

2.1 Route-wide impacts

2.1.1 OHLE masts

OHLE mast construction would take place from Maidenhead to a point just to the east of Stockley Road bridge. The impacts of this on archaeological resources would be mitigated by a procedure commencing with detailed desk based assessment to identify areas where archaeological watching briefs would be necessary. This would exclude areas of deep cuttings where archaeological remains would not survive, and embankments higher than the depth of the mast foundations. The archaeological watching briefs would pay particular attention to areas where there is either a high potential for archaeological remains to survive beneath the existing permanent way, or where there is low to high potential for remains of high importance, with a more general coverage elsewhere. This fieldwork would be followed by appropriate post-excavation assessment, analysis, publication, and archiving. This methodology is consistent with the Incorporated Mitigation procedure. These measures would constitute *preservation by record*, and result in no significant residual impact.

2.2 Route Window W25

2.2.1 Site 10 Maidenhead Stabling and Turnback Facility

The Maidenhead Stabling and Turnback Facility site has a moderate potential for Neolithic and Early Bronze Age settlement and isolated finds, for Iron Age and Roman activity, and for field systems dating to the Saxon to post-medieval periods. There is a low potential for Palaeolithic and Mesolithic artefacts, and for Late Bronze Age field systems. *In situ* Palaeolithic artefacts would be of high importance, although reworked or redeposited artefacts would be of low importance. Other remains would be of moderate importance.

Six sidings, an engineering siding, platforms, a construction compound, and site clearance involving the demolition of existing structures would partially or completely remove potential archaeological remains in areas which are not on the embankment or within the cutting of the former goods yard.

Two shafts for sewer diversion would completely remove potential archaeological remains within the footprint of each shaft, and works within two associated utilities construction compounds (worksites) would partially remove them.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

2.2.2 Site 11 Maidenhead Station

The existing Maidenhead station building, western half of Platforms 3, 4/5, and the waiting room and canopy on Platform 4/5 all date to 1871. The westernmost subway may be contemporary with a later extension to the south. The southern station building, the waiting room on Platform 2/3 and the remaining canopies, Platform 1 and the eastern half of Platforms 2/3, and 4/5, are associated with rebuilding following the addition of two lines on the southern side of the track, between 1879 and 1884. The station is not statutorily or locally listed.

The Maidenhead Station site has a moderate potential for Neolithic and Early Bronze Age settlement, Iron Age and Roman activity, and for Saxon to post-medieval field systems. There is also a moderate potential for late 19th-century railway structures, and a low potential for Middle and Late Bronze Age field systems. All remains are of moderate importance.

Demolition of the existing north station building and goods shed, the Platform 5 canopy and waiting rooms on Platforms 2/3 and 4/5, and a section of subway wall, would remove late 19th-century Great Western Railway (GWR) features. Piling for new buildings, lifts, and canopy supports, subway extension, a new bay platform, new lifts and stairs, and alongside Platform 5 would completely remove potential archaeological remains locally. Construction of new station buildings, including excavations beneath the embankment for the buildings and for lifts and stairs, would partially or completely remove potential archaeological remains. Ground works within four construction compounds, along with service diversions where located off the embankment, and alterations to the forecourt, could also partially or completely remove potential archaeological remains. Excavations for gabions at the base of a reprofiled embankment would partially remove potential archaeological remains.

The impact of the works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated and site-specific mitigation measures would constitute *preservation by record* for below- and above-ground remains, respectively, producing no residual impact.

2.2.3 Route Window W25 Summary Table

Route window W25 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance

<p>Maidenhead stabling and turnback facility: sidings, platforms, construction compound (work site) and site clearance; Underbridge reconstruction</p> <p>Two sewer diversion shafts with construction compounds</p>	<p>Potential for a significant impact</p>	<p>Incorporated mitigation forms preservation by record</p>	<p>None</p>	<p>Non-Significant</p>
<p>Maidenhead Station: demolition and replacement of existing north station ticket hall, new southern entrance building, subway alterations, embankment reprofiling, new platform, alterations to platforms including demolition of canopies and waiting rooms, four construction compounds</p>	<p>Potential for a significant impact</p>	<p>Incorporated and site-specific mitigation forms preservation by record for below- and above-ground resources</p>	<p>None</p>	<p>Non-Significant</p>

2.3 Route Window W23

2.3.1 Site 12 Taplow Station

The existing Taplow Station building on platform 4, the waiting room on Platforms 2/3, and the footbridge all date to c 1884, and are of moderate importance. The site has a high potential for prehistoric agriculture and settlement; Roman activity along the Bath Road, possibly including burials; medieval and post-medieval agriculture, settlement, and roadside activity; including the potential for medieval and later mineral extraction, and for 19th-century infrastructure from Brunel's Great Western Railway, including remains of the earlier (1871) station building. There is moderate potential for Saxon agricultural features and dispersed settlement. Medieval and later agriculture and mineral extraction would be of low importance, other resources of moderate importance.

Piling for the platform extensions would completely remove any archaeological remains located beneath the existing railway embankment, within the footprint of each pile. Ground disturbance within the southern construction compound is likely to partially remove below-ground remains of the original station building.

The impact of the works would be of low magnitude before mitigation, with potential for

a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.3.2 Route Window W23 Summary Table

<i>Route window W23 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Taplow Station: platform extensions and construction compounds.	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

2.4 Route Window W21

2.4.1 Site 13 Burnham Station

Burnham Station building was constructed between 1900–1910 with alterations possibly undertaken in the 1930s. It is locally listed and of moderate importance. The site has a moderate potential for prehistoric agriculture and settlement and for medieval and later agriculture and activity associated with the Bath Road. There is a low potential for Roman and Saxon agricultural and roadside activity. All resources are of moderate importance.

Platform extensions, and ground works within two construction compounds would partially or completely remove potential archaeological remains. A ground level pathway may also partially remove potential archaeological remains.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.4.2 Route Window W21 Summary Table

<i>Route window W21 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Burnham Station: platform extensions, new fenced pathway, and two construction compounds	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

2.5 Route Window W20

2.5.1 Site 14 Dover Road Bridge

The Dover Road Bridge site has a high potential for remains of the early 20th-century Slough Trading Estate; and a moderate potential for Middle–Late Bronze Age settlement and for field systems from the Bronze Age to Roman periods. A low potential exists for redeposited Palaeolithic artefacts, for Neolithic artefacts and occupation and for field systems from the Saxon to post-medieval periods. All these remains are of moderate importance, with the exception of reworked or redeposited Palaeolithic artefacts which are of low importance (any *in situ* Palaeolithic remains, although unlikely, would be of high importance). The bridge is of late 20th-century date.

Track lowering would have no or minimal archaeological impact as it takes place in a cutting, where any archaeological remains would have been removed, with the possible exception of reworked Palaeolithic remains. Potential impacts are confined to works within three construction compounds, which would be located outside the railway cutting. These could partially or completely remove potential archaeological remains.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.5.2 Site 15 Leigh Road Bridge

Leigh Road Bridge is a well-preserved standard Brunel 30ft-span (broad-gauge) arched road overbridge of 1838, extended at its north end with a 25ft brick arched span in matching style, built when the track was widened from two to four tracks in 1879–84. The original elements together with the later additions form a single historic entity. It is of moderate importance.

The site has a moderate potential for Middle–Late Bronze Age settlement; and for field systems from the Bronze Age to Roman periods, and for remains of the early 20th-century Slough Trading Estate. A low potential exists for redeposited Palaeolithic artefacts, for Neolithic artefacts and occupation, and for field systems from the Saxon to post-medieval periods. All below-ground remains are of moderate importance with the exception of reworked or redeposited Palaeolithic artefacts would be of low importance (any *in situ* Palaeolithic remains, although unlikely, would be of high importance).

The proposals for Leigh Road Bridge entail the complete demolition of the historic bridge. The proposals include reconfiguration of the cutting slope and, outside the railway cutting, there would be works within three construction compounds and possibly temporary service diversions. These works are likely to partially or completely remove potential archaeological remains. Piling into the sides of the cutting for new abutments would also completely or partially remove any archaeological remains within the footprints of the piles.

The impact upon the existing GWR bridge would be of high magnitude before mitigation, resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the

significance of the cumulative impact upon the nine surviving GWR overbridges on the Western Route.

The impact of these works on below-ground archaeological remains would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.5.3 Route Window W20 Summary Table

Route window W20 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Dover Road Bridge: three construction compounds	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Leigh Road Bridge: demolition of an 1838 GWR bridge with later (1879–84) addition. Piling and landscaping for new bridge abutments. Temporary diversion of services. Three construction compounds.	Existing historic bridge: significant impact Below-ground archaeological remains: potential for a significant impact	Incorporated and site-specific mitigation form preservation by record of below- and above-ground remains	None	Non-Significant (see also Cumulative Impacts)

2.6 Route Window W19

2.6.1 Site 16 Farnham Road Bridge

The Farnham Road Bridge site has a moderate potential for Middle–Late Bronze Age settlement and field systems, and for post-medieval occupation. A low potential exists for Palaeolithic artefacts, Neolithic remains, and occupation and field systems from the Iron Age to the post-medieval periods. Post-medieval occupation and reworked or redeposited Palaeolithic artefacts would be of low importance (any *in situ* Palaeolithic remains, although unlikely, would be of high importance). All other remains are of moderate importance. The bridge is of 20th-century date.

Track lowering and associated works within the cutting have the potential to partially remove any Palaeolithic remains surviving within the brickearth or Taplow gravels. Service and drainage diversions and works in the two construction compounds could partially or completely remove potential archaeological remains.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.6.2 Site 18 Stoke Poges Lane Bridge

The Stoke Poges Lane Bridge site consists of a 20th-century overbridge, which lies at grade in the north and in a cutting on the south. In undisturbed areas outside the railway cutting there is a moderate potential for Bronze Age settlement and land use and for field systems of Iron Age through to post-medieval date. There is also a low potential for redeposited Palaeolithic artefacts and isolated Neolithic artefacts (of low importance). Any *in situ* Palaeolithic remains, although unlikely, would be of high importance. All other remains are of moderate importance.

Any strengthening of the bridge abutments in the side of the cutting, possible spread footings for retaining walls, and the establishment of two construction compounds may wholly or partially remove any potential archaeological deposits.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

2.6.3 Route Window W19 Summary Table

<i>Route window W19 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Farnham Road Bridge: track lowering and two construction compounds	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Stoke Poges Lane Bridge: alterations to bridge and approach road. Two construction compounds	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

2.7 Route Window W18

2.7.1 Site 19 Slough Station

The Slough Station site has a moderate potential for medieval and post-medieval brick making, for 19th-century nursery gardens, and for 19th and 20th-century railway structures (any impacts on the Grade II listed station, platforms, and footbridge are

covered in the Built Heritage section of the ES). There is a low potential for Palaeolithic remains, Neolithic artefacts and for field systems from the Bronze Age to the medieval period. Any *in situ* Palaeolithic artefacts (although unlikely) would be of high importance, but reworked or redeposited Palaeolithic artefacts, isolated Neolithic artefacts, and evidence of the 19th-century nursery gardens are of low importance. All other remains would be of moderate importance.

The platform alterations, new siding and permanent way alterations, station access, MIP access, emergency escape footbridge and five construction compounds could partially or completely remove any surviving archaeological remains. The track lowering either side of William Street Bridge would be of superficial depth, and most potential archaeological remains have already been removed from that part of the cutting. It is therefore likely to have minimal or no archaeological impact.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

2.7.2 Site 20 Uxbridge Road Bridge and Wexham Road Bridge

Wexham Road Bridge is a very poorly preserved standard Brunel 30ft-span road overbridge of 1838, with ugly and inappropriate extensions over and to the north, south, east and west. A second, buried, smaller brick arch dated to 1838–75 might be of interest as it may be an additional non-standard original Brunel-period single-track arch. The bridge is of low importance. (The Uxbridge Road Bridge dates to the 1960s).

At the sites of both bridges, there is also a moderate potential for medieval and post-medieval brick making and for 19th-century nursery gardens and housing. There is a low potential for redeposited Palaeolithic flints, and activity from the Neolithic to the Saxon periods. Redeposited Palaeolithic flint artefacts, and the 19th-century gardens and housing are of low importance (any *in situ* Palaeolithic remains, although unlikely, would be of high importance). All other remains are of moderate importance.

Demolition of the majority of Wexham Road Bridge would remove original 1838 and 1838–75 elements of a bridge which has already been heavily altered. Piling and pile caps to support the Wexham Road bridge abutment would also completely remove any archaeological remains locally. Possible minor track lowering either side of Uxbridge Road Bridge is unlikely to have a significant archaeological impact. Service diversions and works within three construction compounds are likely to partially or completely remove potential archaeological remains.

The impact upon the GWR Wexham Road Bridge would be of high magnitude before mitigation, resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the significance of the cumulative impact upon the nine surviving GWR overbridges on the Western Route.

The impact of these works on below-ground archaeological remains would be of low magnitude before mitigation, with potential for a significant impact. The incorporated and

site-specific mitigation measures would constitute *preservation by record* for below-ground remains and for the bridge, producing no residual impact.

2.7.3 Route Window W18 Summary Table

<i>Route window W18 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Slough Station: platform alterations, an escape footbridge, MIP lifts, new siding, permanent way alterations and five construction compounds, track lowering.	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Wexham Road Bridge: demolition of heavily modified original 1838 GWR bridge arch and 1838–75 buried brick arch, piling to stabilise abutment, temporary service diversions, two construction compounds.	Wexham Road 1838 GWR bridge: significant impact Below-ground archaeological remains: Potential for a significant impact	Incorporated and Site-specific mitigation forms preservation by record of below- and above-ground remains	None	Non-Significant (see also Cumulative Impacts)
Uxbridge Road Bridge: possible slight lowering of existing track, possible temporary service diversions, one construction compound.	Potential for significant impact	Incorporated mitigation forms preservation by record	None	Non-significant

2.8 Route Window W17

2.8.1 Site 21 Middlegreen Road Bridge

Middlegreen Road Bridge is a well-preserved standard Brunel 30ft-span (broad-gauge) arched road overbridge of 1838, extended at its north end with a 25ft brick arched span in matching style, built when the track was widened from two to four tracks in 1879–84. The bridge was widened again on its north side with a less sympathetic steel span in 1914. The original elements together with the later additions form a single historic entity. The bridge is of moderate importance.

There is also a moderate potential for medieval and post-medieval brick making and field systems and for 19th-century nursery gardens. There is a low potential for redeposited Palaeolithic flints; Neolithic to Saxon activity (including a suggested Roman road route) and for construction of the Grand Union Canal, although this potential may be generally understated due to a lack of archaeological fieldwork in the area. Residual Palaeolithic flint artefacts, together with medieval and post-medieval field systems and market gardening, are of low importance (any *in situ* Palaeolithic remains, although unlikely, would be of high importance). All other remains are of moderate importance.

The impact of the demolition of the upper half of the historic bridge (other than the 1914 steel deck extension) would be to remove the major and most characteristic part of this historic structure, leaving the retained abutments and pier with little historical integrity or potential for understanding and appreciation. Service diversions and works within one construction compound are likely to partially or completely remove any potential archaeological remains.

The impact upon the existing GWR bridge would be of high magnitude before mitigation, resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the significance of the cumulative impact upon the nine surviving GWR overbridges on the Western Route.

The impact of these works on below-ground archaeological remains would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

2.8.2 Site 22 Trenches Bridge and St Mary's Road Bridge

Trenches Bridge and St Mary's Road Bridge are well-preserved standard Brunel 30ft-span (broad-gauge) arched road overbridges. Both bridges have the original 1838 GWR brick arch and abutments intact. Trenches Bridge has a wrought-iron girder extension dated to 1879–84 and a later steel extension in matching style, dated to 1914. St Mary's Road Bridge has a surviving 1879–84 brick arch built in the same style on the northern side, along with a single-line level-beam steel girder span of 1914. For each bridge, the original elements together with the later additions form single historic entities. Both form part of a group of nine surviving original GWR overbridges on the Western Route, and individually are of moderate importance.

There is a moderate potential for medieval and post-medieval brick making and field systems, features associated with construction of the Grand Union Canal, and for WWII defensive structures. There is a low potential for Palaeolithic remains, and isolated remains from the Roman and medieval periods. Redeposited Palaeolithic artefacts and isolated remains are of low importance (any *in situ* Palaeolithic remains, although unlikely, would be of high importance), all other below-ground remains are of moderate importance.

The impact of the demolition of the upper half of both historic bridges would be to remove the major and most characteristic part of these historic structures, leaving the

retained abutments and piers with little historical integrity and potential for understanding and appreciation. Ground disturbance associated with support for existing abutments, footings for a temporary access bridge and two construction compounds, would potentially partially or completely remove any below-ground archaeological remains.

The impact upon the existing historic GWR bridges would be of high magnitude before mitigation, each resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the significance of the cumulative impact upon the group of nine surviving GWR bridges on the Western Route.

The impact of these works on below-ground archaeological remains would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.8.3 Route Window W17 Summary Table

<i>Route window W17 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Middlegreen Road Bridge: partial demolition of a historic bridge, one construction compound.	Existing historic bridge: significant impact Below-ground archaeological remains: potential for a significant impact	Incorporated and site-specific mitigation forms preservation by record of below- and above-ground remains	None	Non-Significant (see also Cumulative Impacts)
Trenches Bridge: demolition of historic bridge, regrading of slope, new pad footing, a construction compound.	Existing historic bridge: significant impact Below-ground archaeological remains: potential for a significant impact	Incorporated and site-specific mitigation forms preservation by record of below- and above-ground remains	None	Non-Significant (see also Cumulative Impacts)

<p>St Mary's Road Bridge: demolition of historic bridge, support for existing abutment, footings for temporary bridge, a construction compound.</p>	<p>Existing historic bridge: significant impact Below-ground archaeological remains: potential for a significant impact</p>	<p>Incorporated and site-specific mitigation forms preservation by record of below- and above-ground remains</p>	<p>None</p>	<p>Non-significant (see also Cumulative Impacts)</p>
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2.9 Route Window W16

2.9.1 Site 23 Langley Station

Langley Station building is locally listed and dated to c 1879–84, with later brick extensions on its west and east sides. The brick outbuilding currently in use as a bicycle shed on its eastern side is contemporary, as is the canopy on Platform 4. The site has a high potential for below-ground remains associated with the original 1838 GWR station, comprising a station building, sidings and platform. A moderate potential exists for Bronze Age activity, medieval and post-medieval brick making and activity associated with manorial estates. There is a low potential for redeposited Palaeolithic artefacts and Neolithic, Roman, and Saxon activity. Redeposited Palaeolithic and Neolithic artefacts would be of low importance (any *in situ* Palaeolithic artefacts, although unlikely, would be of high importance). All other remains would be of moderate importance.

Demolition of the small brick outbuilding to the east of the station building would result in the removal of a structure dated to c 1879–84. Footings for platform extensions; new signals and lighting, and probably works within one construction compound and for new and modified services, would partially or completely remove potential archaeological remains within their footprints.

The impact on below-ground archaeological remains would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated and site-specific mitigation measures would constitute *preservation by record* for below and above-ground remains, producing no residual impact.

2.9.2 Route Window W16 Summary Table

<i>Route window W16 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Langley Station: demolition of a small late 19th-century outbuilding, platform extensions, signals and lighting, services, one construction compound.	Below-ground archaeological remains: potential for a significant impact Existing historic GWR station outbuilding: significant impact	Incorporated and site-specific mitigation forms preservation by record for below and above-ground remains	None	Non-significant

2.10 Route Window W15

2.10.1 Site 24 Dog Kennel Bridge and Chequers Bridge

The original 1838 GWR structure of both bridges is still in place. Dog Kennel Bridge is a well-preserved standard Brunel 30ft-span (broad-gauge) arched road overbridge of 1838, extended at its north end with a 25ft brick arched span in matching style, built when the track was widened from two to four tracks in 1879–84. Chequers Bridge is an underbridge of 1838. It was extended on its north side in 1879–84, and was partially reconstructed in 1908. For each bridge, the original elements together with the later additions form a single historic entity. Dog Kennel Bridge is one of a group of nine surviving original GWR overbridges on the Western Route. Both bridges are individually of moderate importance. Both sites have a high potential for post-medieval brickworks and quarrying. They also have moderate potential for Palaeolithic remains, Neolithic to Iron Age agriculture and possibly settlement, medieval and post-medieval agriculture and settlement. There is a low potential for Roman agricultural activity. *In situ* Palaeolithic artefacts would be of high importance, although reworked or redeposited artefacts would be low importance. Other remains would be of moderate importance.

The impact of the demolition of Dog Kennel Bridge would be the complete removal of an original GWR structure, along with a brick arch built in 1879–84 in the same style.

Footings for the new Dog Kennel Bridge would partially remove potential archaeological remains, and piling for this and for the abutments for the additional span to Chequers Bridge would completely remove any surviving remains within their footprints. Ground disturbance associated with the widening of the existing embankment (where not previously quarried) within parts of the Hollow Hill Lane to Dog Kennel Bridge construction compound, for stream diversions and culvert lengthening, and for landscaping, are likely to partially or completely remove potential archaeological remains.

Excavation of a cut-and-cover trench and a pipe jack pit for the utilities diversion on the southern side of the railway would completely remove potential archaeological remains. Initial ground preparation for the utilities worksites would partially or completely remove archaeological remains. Pipejacking beneath the embankment would have minimal archaeological impact.

The impact upon the existing Dog Kennel Bridge would be of high magnitude before mitigation, resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the significance of the cumulative impact upon the nine surviving GWR overbridges on the Western Route.

The impact of these works on below-ground archaeological remains would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.10.2 Route Window W15 Summary Table

<i>Route window W15 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Dog Kennel Bridge: demolition of the historic bridge, piling for the new steel bridge, one construction compound.	Existing historic GWR Bridge: significant impact Below-ground archaeological remains: potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-significant (see also Cumulative Impacts)
Chequers Bridge: piling for the additional span to Chequers Bridge, embankment widening and trackworks, one construction compound, alterations to the stream and culvert. Cut-and-cover trench and construction compound for utilities diversions	Below-ground archaeological remains: potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-significant

2.11 Route Window W14

2.11.1 Site 25 Iver Station and Thorney Lane Bridge

Thorney Lane Bridge is a very well-preserved Brunel skew 30ft-span (broad-gauge) arched road overbridge of 1838, extended at its north end with a 25ft brick arched span in matching style, built when the track was widened from two to four tracks in 1879–84, and a further matching brick arch built on the northern side in 1913–4. The original elements together with the later additions form a single historic entity. It forms one of a group of nine surviving original GWR overbridges on the Western Route, and is the only example built to the higher specification required for carrying a public turnpike road. The bridge is of moderate importance. A second bridge at this site is a 20th-century concrete footbridge. Iver Station dates to 1924.

The site has a high potential for post-medieval activities associated with brickearth and gravel extraction, and brick making. There is a moderate potential for prehistoric to Roman agriculture and settlement, and medieval to post-medieval agricultural activity, and possibly settlement. There is a low potential for Palaeolithic remains. *In situ* Palaeolithic artefacts would be of high importance, although reworked or redeposited artefacts would be of low importance. Post-medieval quarrying would be of low importance, and other remains would be of moderate importance.

The proposals for Thorney Lane Bridge entail the complete demolition of the historic bridge. Piles for the new bridge, platform extensions, a retaining wall, and a footbridge would take place within the deep cutting, and therefore would only have an archaeological impact on potential Palaeolithic remains if present. Works outside the cutting and north of the railway, or east of Thorney Lane South, lie in areas where quarrying may have removed potential archaeological remains. The following works only have potential to partially remove remains where quarrying has not taken place: diversion of the access road, temporary vehicle access/crossing, realignment of Thorney Lane South, and works within four construction compounds.

Road realignment and the associated extensive construction compounds are likely to partially remove archaeological remains, in particular remains associated with the prehistoric landscape as indicated by the presence of crop marks and the near-by Scheduled Ancient Monument (within 15m).

The construction of two new electricity pylons and ground disturbance within associated construction compounds (worksites) and access roads would partially remove surviving archaeological remains where quarrying has not taken place, and completely remove them within the footprints of individual piles.

The impact upon the existing GWR bridge would be of high magnitude before mitigation, resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the significance of the cumulative impact upon the nine surviving GWR overbridges on the Western Route.

The impact of these works on below-ground archaeological remains is likely to be of low magnitude before mitigation, depending on the extent of previous quarrying, with

potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.11.2 Route Window W14 Summary Table

Route window W14 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Iver Station and Thorney Lane Bridge: complete demolition of historic bridge. New bridge, platform extensions/ alterations, track realignment of access road, temporary vehicle access, regrading of existing access road, emergency escape footbridge, retaining wall, realignment of Thorney Lane South, four construction compounds. Two new electricity pylons and associated construction compounds	Below-ground archaeological remains: potential for a significant impact	Incorporated and site-specific mitigation forms preservation by record	None	Non- significant (see also Cumulative Impacts section)

2.12 Route Window W13

2.12.1 Site 26 West Drayton Stabling Site

The West Drayton Stabling site contains a surviving WWII Type 24 pillbox, and has a high potential for Saxon activity, and 19th-century railway buildings and infrastructure. The site also has a moderate potential for Mesolithic remains, and for field systems and settlements from the Neolithic to the Iron Age. There is also a moderate potential for medieval and post-medieval settlement, industry, field systems and landscaping associated with nearby settlements. The site has a low potential for Roman features. Any *in situ* Mesolithic remains are likely to be of high importance. Other potential remains are of moderate importance.

The main impacts would be from piled abutments for a new bridge and a widened road bridge, and possibly piled foundations for the depot buildings, which would completely remove potential archaeological remains within the footprint of the piles and would partially remove archaeological remains within the footprint of other foundation structures. A retaining wall, river training works, service diversions outside the embanked area, and possibly a carriage washing facility, oil interceptor, and pumping stations, would partially remove potential archaeological remains. East of the Fray's River, there is potential for trackwork and an access road to partially remove any surviving remains of the 19th-century Goods Depot and other railway resources. It is unlikely that potential remains of the original mid 19th-century West Drayton station would be affected by the proposed works.

Four shafts and two cut-and-cover trenches excavated for a sewer diversion would completely remove potential archaeological remains, and works within associated construction compounds would partially remove them.

The impact of these works would be of moderate magnitude before mitigation with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*. Crossrail has revised the design for the sidings, which has resulted in the pillbox being *preserved in situ*. These mitigation measures will produce no residual impact.

2.12.2 Site 27 West Drayton Station

The original West Drayton Station opened in 1838, but was located to the west of, and outside, the existing station site and the Crossrail works. The existing station dates to 1878–81 and is locally listed, and forms a good example of the GWR style of the period. The GWR building on the northern side of the railway, alongside the canal may also be contemporary and there is a high potential for below-ground remains of contemporary GWR structures. The site has a moderate potential for settlements and field systems from the Neolithic to the Iron Age. There is a moderate potential for Saxon activity, for medieval and post-medieval settlement, industry, field systems and landscaping associated with nearby settlements, and for features associated with the Grand Junction Canal. The site has a low potential for Palaeolithic remains and Mesolithic, and for Roman features. Any *in situ* Palaeolithic remains would be of high importance, and reworked or redeposited Palaeolithic artefacts would be of low importance. Other remains, including the existing GWR station, are of moderate importance.

Alterations to the locally listed 1878 station include the formation of larger openings in internal walls and the demolition of the western end of Platforms 4/5 and the existing passage leading to a subway, the roof of which would be removed. An associated late 19th-century building would also be demolished. A new piled abutment would completely remove potential archaeological remains, while a new station building and signal footings, and possibly works within a construction compound would partially remove such remains.

These impact of the works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation and site-specific measures

would constitute *preservation by record* for below and above-ground remains, respectively, producing no residual impact.

2.12.3 Route Window W13 Summary Table

<i>Route window W12/13 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
West Drayton Stabling Site: piled abutments for two bridges, retaining wall, river works, service diversions outside the embankment, possible impacts from depot buildings and facilities, trackwork, access road. Four shafts, two cut-and-cover trenches, and associated construction compounds for a sewer diversion	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-significant
West Drayton Station: demolition of the western end of Platforms 4/5, subway passage and roof, a late 19th-century railway building, and alterations to the locally listed station. New station building, piled abutment, signalling, construction compound	Potential for a significant impact	Incorporated and site-specific mitigation forms preservation by record for below and above-ground remains	None	Non-Significant

2.13 Route Window W12

2.13.1 Site 28 Kingston Lane Bridge

Kingston Lane Bridge is a well-preserved standard Brunel 30ft-span (broad-gauge) arched road overbridge of 1838, extended at its south end with a 25ft brick arched span in matching style, built when the track was widened from two to four tracks in 1879–84. The bridge has a smaller brick arch extension built in matching style on its northern side,

of later (late 19th-century) date. The original elements together with the later additions form a single historic entity. It forms one of a group of nine surviving original GWR overbridges on the Western Route, and is of moderate importance.

The site has moderate potential for prehistoric settlement and field systems, medieval and post-medieval field systems, and for evidence of the construction of the Grand Union Canal (including associated industrial activity, principally brick making). There is a low potential for Palaeolithic flint artefacts and for settlement and field systems from the Roman and Saxon periods. Any *in situ* Palaeolithic remains would be of high importance, and reworked or redeposited Palaeolithic artefacts would be of low importance. Other remains are of moderate importance.

The proposals entail the complete demolition of the historic bridge. Piling for the new footbridge and footbridge approach ramps and retaining walls would completely remove potential archaeological remains within the footprints of the piles. Works within one construction compound are likely to partially remove potential archaeological remains, where they have not been previously quarried.

The impact upon the existing GWR bridge would be of high magnitude before mitigation, resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the significance of the cumulative impact upon the nine surviving GWR overbridges on the Western Route.

The impact of these works on below-ground archaeological remains would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.13.2 Site 29 Old Stockley Road Bridge

Old Stockley Road Bridge is a well-preserved standard Brunel 30ft-span (broad-gauge) arched road overbridge of 1838, extended at its south end with a 25ft brick arched span in matching style when the track was widened from two to four tracks in 1879–84. The bridge has a smaller brick arch extension on its north side, built in matching style, and is of contemporary or later (late 19th-century) date. The original elements together with the later additions form a single historic entity. It is one of a group of nine surviving original GWR overbridges on the Western Route and is of moderate importance.

The Crossrail site also has a moderate potential for prehistoric settlement and field systems, medieval and post-medieval field systems and for evidence of the construction of the Grand Junction Canal (including associated industrial activity, principally brick making). There is a low potential for Palaeolithic and Mesolithic remains; and for settlement and field systems from the Roman and Saxon periods. Any *in situ* Palaeolithic remains would be of high importance, and reworked or redeposited Palaeolithic or Mesolithic artefacts would be of low importance. Other remains are of moderate importance.

The proposals entail the complete demolition of the historic bridge, associated ground works, service diversions, and works within one construction compound are likely to partially remove potential archaeological remains.

The impact upon the existing GWR bridge would be of high magnitude before mitigation, resulting in a significant impact. Site-specific mitigation would constitute *preservation by record*, producing no residual impact. See the Cumulative Impacts section, below, for the significance of the cumulative impact upon the nine surviving GWR overbridges on the Western Route.

The impact of these works on below-ground archaeological remains would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.13.3 Route Window W12 Summary Table

<i>Route window W12 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Kingston Lane Bridge: demolition of historic bridge, piling for new bridge and associated structures, one construction compound.	Existing historic bridge: significant impact Below-ground archaeological remains: potential for a significant impact	Incorporated and site-specific mitigation forms preservation by record for below and above-ground remains	None	Non-Significant (see also Cumulative Impacts section)
Old Stockley Road Bridge: demolition of historic bridge, associated groundworks, temporary diversion of services, one construction compound.	Existing historic bridge: significant impact) Below-ground archaeological remains: potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant (see also Cumulative Impacts section)

2.14 Route Window W11

2.14.1 Site 1 Stockley Flyover (Airport Junction)

There is a moderate potential for settlement and agriculture from the Bronze and Iron Ages and from the medieval and post-medieval periods (the latter including formal landscapes, ie estates and gardens) with a low potential for the Roman and Saxon periods. There is also low potential for Palaeolithic remains and for features associated with the Grand Junction Canal (including industry, such as brick manufacture). For the latter, although quarrying was widespread, the associated brick works and kilns are less likely to occur in the vicinity of the Crossrail site. Any *in situ* Palaeolithic remains would be of high importance, and reworked or redeposited Palaeolithic artefacts would be of low importance. Other remains are of moderate importance.

Piled foundations for a retaining wall, viaducts, some wall foundations for the Western Flyover and western sections of the twin Crossrail approach ramps would completely remove potential archaeological remains within their footprint. Associated pile caps and pad and strip foundations for other flyover walls, and retaining walls for the twin ramps, would partially remove such remains. Construction compounds on the north side of the permanent way are likely to have a minimal impact, as much of this has previously been quarried for brickearth. Foundations for temporary bridges and a construction gantry, ground reduction at the Stockley Close construction compound, and tree planting in the allotments would probably partially remove potential archaeological remains.

The impact of the works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.14.2 Route Window W11 Summary Table

<i>Route window W11 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Stockley Flyover a retaining wall, viaducts, two flyovers, approach ramps, temporary bridges, construction compounds (worksites) and tree planting.	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non- Significant

2.15 Route Window W10

2.15.1 Site 2 Hayes and Harlington Station

The Hayes and Harlington Station site has a moderate potential for 19th-century brickfields and associated features. There is a low potential for Palaeolithic remains, field systems and settlement from the Neolithic to post-medieval periods and for evidence relating to the construction of the adjacent Grand Junction Canal. To the east of the station the rail bridge over the canal is of 20th-century date, although there are some elements of the original bridge on the northern side. Any *in situ* Palaeolithic evidence would be of high importance, and 19th-century brickworks of moderate importance. Other remains, including reworked or redeposited Palaeolithic artefacts, would be of low importance.

The foundations of the new station building are likely to either partially or completely remove any potential archaeological remains. Piles for a station canopy, platform canopies and works on Station Road Bridge would completely remove any surviving archaeological remains, whilst associated pile caps for the canopies would partially remove such remains, as would a new overbridge, platform extensions, lifts, new track bed, temporary footbridge and works construction compounds. However, partial brickearth extraction across the Hayes and Harlington Station site will have greatly reduced the potential for archaeological deposits to survive. Only deeply stratified deposits in the underlying gravels may survive.

For below-ground remains these works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

There may be a *possible* impact of low magnitude on 19th-century elements of the rail bridge over the Grand Union Canal: *if required*, further assessment is likely to involve a structural appraisal of the existing bridge. Recommended mitigation consists of minimising any works that would affect the fabric of the 19th-century railway bridge and, where such works are unavoidable, suitable reinstatement of any damage to the historic fabric.

2.15.2 Route Window W10 Summary Table

Route window W10 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance

<p>Hayes and Harlington Station: replacement of station building, platform alterations, new overbridge, MIP lifts, track bed, subway entrance relocation, temporary footbridge and ticket office and construction compounds (work sites). Also works to Station Road Bridge and possibly the rail bridge over the Grand Union Canal</p>	<p>Potential for a significant impact</p>	<p>Incorporated mitigation forms preservation by record</p>	<p>None</p>	<p>Non-Significant</p>
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2.16 Route Window W8

2.16.1 Site 3 Southall Station

Southall Station was built in 1859 and is locally listed as a building ‘of Facade or Group Value’. The site has high potential for remains of minor landscaping and planting of the grounds of Southall Park, and moderate potential for *in situ* Palaeolithic remains. There is low potential for prehistoric field systems and settlement, and for medieval manorial estates, settlements and field systems. *In situ* Palaeolithic remains would be of high importance, and reworked or redeposited Palaeolithic artefacts or remains of Southall Park would be of low importance. All other resources are of moderate importance.

Piled foundations for the new station building and footbridge would completely remove any surviving archaeological remains, while platform extensions and canopies, MIP lifts, track reconfiguration, and works in a construction compound could either partially or completely remove any surviving archaeological remains. However, refurbishment of the existing ticket hall would not alter the fabric of the locally listed building.

The impact of these works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

2.16.2 Route Window W8 Summary Table

<i>Route window W8 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>

Southall Station: new station building, footbridge, MIP lifts, platform extensions, possible footbridge reconstruction, track reconfiguration, construction compound (worksite).	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non- Significant
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2.17 Route Window W7

2.17.1 Site 4 Hanwell and Elthorne Station

One of the three construction compounds at the Hanwell and Elthorne Station lies within an Archaeological Interest Area, but the main works are outside it. The site lies c 50m east of the location of the original 1839 station, and c 25m east of an underbridge over Station Road, which may be contemporary. The present station 100m to the east of the Crossrail site dates to 1875, and is Grade II listed. The site has a low potential for settlement and agriculture from the Neolithic to Saxon periods, increasing to moderate potential for the medieval and post-medieval periods. There is also a low potential for redeposited Palaeolithic artefacts, of low importance. All other remains are of moderate importance.

Piling for the platform extensions and a new footbridge would completely remove archaeological remains within their footprints. Service diversions and works within three construction compounds are likely to partially or completely remove potential archaeological remains.

The impact of these works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.17.2 Route Window W7 Summary Table

<i>Route window W7 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Hanwell and Elthorne Station: platform extensions and escape footbridge, construction compounds	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non- Significant

2.18 Route Window W6

2.18.1 Site 5 West Ealing Station

West Ealing Station was added to the Great Western Railway in the late 1890s. The main building is constructed on an overbridge comprising a brick arch probably dated to 1879–84 and a concrete deck on brick abutments that probably represent the remnants of the original 1838 GWR bridge. The proposed works lie outside the footprint of the late 19th-century station structures and earlier overbridge. The site has a moderate potential for medieval and post-medieval settlement and agriculture. There is a low potential for Neolithic to Saxon settlement and agriculture; and for Palaeolithic remains. Any *in situ* Palaeolithic evidence would be of high importance, and reworked or redeposited Palaeolithic artefacts would be of low importance; all other resources are of moderate importance.

Construction of platform extensions would partially or completely remove potential archaeological remains. The new station building and footbridge, service diversions, and works within construction compounds are likely to partially or completely remove potential archaeological remains. Track reconfiguration is unlikely to have an archaeological impact.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.18.2 Route Window W6 Summary Table

<i>Route window W6 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
West Ealing Station: platform extensions and canopies, reconfiguring, trackwork, footbridge, stairs, MIP lifts, station building, services and construction compound	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-significant

2.19 Route Window W5

2.19.1 Site 6 Ealing Broadway Station

The original GWR Ealing Broadway station building is no longer extant and very little of the original station layout survives. There is a moderate potential for below-ground remains associated with the original station, which would be of moderate importance. The

station lies in a cutting that has removed all pre-mid 19th-century archaeological remains, except for a low potential for Palaeolithic remains in any surviving Lynch Hill gravel. The construction compounds outside the cutting (Haven Green and Ealing Broadway Station South) also have this potential, in addition to moderate potential for medieval and post-medieval agriculture, a building shown on 18th- and 19th-century maps, and possibly other occupation. They also have a low potential for evidence of settlement and agriculture from the Neolithic to the Saxon period. *In situ* Palaeolithic material would be of high importance, but redeposited artefacts are of low importance. Other remains are of moderate importance.

Piling for a new ticket hall, transfer overbridge, and escape bridge would result in the complete removal of potential Palaeolithic remains within the footprints of individual piles in the existing railway cutting. Ground reduction for platform extension foundations, possible additional impacts from new and diverted services and drainage, toilets, and new station canopies would result in the complete or partial removal of any Palaeolithic remains within the existing railway cutting. Outside the area of the railway cutting, works within the two construction compounds outside of the cutting, and possible service diversions, would potentially result in the partial or complete removal of archaeological remains dating from the prehistoric period onwards.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.19.2 Route Window W5 Summary Table

<i>Route window W5 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Ealing Broadway Station: new ticket hall and canopy, new transfer bridge with stairs, lifts and escalators to platforms, platform extensions, platform canopies, escape bridge, new services and drainage, replacement toilets. Two (of three) construction compounds.	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-significant

2.20 Route Window W4

2.20.1 Site 7 Acton Station and Dive-under

A small part of the Acton Station and dive-under site, south of the Noel Road bridge, lies within an Archaeological Priority Zone. The site has high potential for Palaeolithic and Mesolithic remains, but only a low potential within the existing cutting. There is a moderate potential for prehistoric to post-medieval remains (including palaeo-environmental evidence) from two former courses of the Stamford Brook. There is also a low potential for agricultural remains and isolated artefacts from the Neolithic to the Roman periods, and for medieval and post-medieval settlement and agricultural remains. *In situ* Palaeolithic remains and large Mesolithic flint assemblages, like those from the nearby Creffield Road excavations, would be of high importance. Reworked, residual or isolated artefacts would be of low importance. Other remains are of moderate importance.

Archaeological remains within the base of the existing cutting are likely to have been removed with the exception of potential Palaeolithic remains within the terrace gravels. The dive-under, and associated works including service diversions would partially or completely remove any surviving potential Palaeolithic remains within the terrace gravels, and potential Mesolithic remains where brickearth survives. Works, as yet undefined, across the area of the existing sidings have the potential to remove archaeological remains of all periods, depending on archaeological survival at their locations. Platform extensions, the new station building south of the cutting and footbridge, and service diversions are likely to partially or completely remove any surviving archaeological remains. Works within two construction compounds are likely to remove partially potential archaeological remains.

The impact of the works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

2.20.2 Route Window W4 Summary Table

Route window W4 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Acton Dive-under: dive-under and associated trackworks and works in freight sidings, construction compound (work site) Acton Station: new station building and footbridge, platform extensions, construction compound.	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

2.21 Route Window W3

2.21.1 Site 8 Old Oak Common Depot

There is a moderate potential for historic railway infrastructure, from the extensive GWR depot that has occupied the site since the end of the 19th century. However, its construction included widespread reconfiguration and truncation of the original topography, particularly in the north and west of the site, resulting in a low potential for all other archaeological remains (principally features associated with the Stamford Brook stream channel and medieval and later settlement and agriculture). These resources would be of moderate importance, or low importance where surviving remains are heavily damaged or fragmented by later construction, with the exception of the stream bed deposits which appear to have been largely removed and are therefore of low importance.

There would be potential impacts from new stabling facilities (construction of new sidings, excavation for trackbeds, track drainage, access road from with retaining wall, OHLE and lighting masts, raised carriage level walkways, carriage washing facility; new and diverted services; and works in construction compounds). These are likely to completely or partially remove any surviving archaeological remains, *within the footprints of the works*.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

2.21.2 Site 91 Track works (part)

N.B. The track works in Route Window W3 cover a distance of *c* 100m east of Old Oak Common Depot (Site 8 above), before continuing eastwards in Route Windows W2 and W1. In the Crossrail Environmental Statement, the works in W3 are considered with those in W2, and do not appear separately in that document.

The area of proposed track works within the permanent way in Route Window W3 has been partially truncated by previous railway construction, resulting in a low potential for surviving archaeological remains which, if present, would be limited to 19th-century railway infrastructure, and any deep deposits within stream beds. Both would be of moderate importance, or low importance if heavily disturbed by previous works.

Track works, new signalling, alterations to services and drainage and any deep excavations within construction compounds have minimal potential to partially or completely remove any surviving archaeological remains.

The impact of the works would be of low magnitude before mitigation. The incorporated mitigation measures would constitute *preservation by record*, probably in the form of an archaeological watching brief, producing no residual impact.

2.21.3 Route Window W3 Summary Table

Route window W3 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Old Oak Common Depot: new Crossrail sidings, new EWS depot and associated works.	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Track works between Old Oak Common Depot and Westbourne Park	Minimal potential for a significant impact	Incorporated mitigation forms preservation by record, probably in the form of an Archaeological Watching Brief, if required	None	Non-Significant

2.22 Route Window W2

2.22.1 Site 91 Track works (part)

The area of proposed track works within the permanent way in Route Window W2 has been partially truncated by previous railway construction, resulting in a low potential for surviving archaeological remains, which, if present, would be limited to 19th-century railway infrastructure, and any deep deposits within stream beds, notably from Counter's Creek (in the area of Kensal Green Cemetery). Both would be of moderate importance, or low importance if heavily disturbed by previous works.

Track works, new signalling, alterations to services and drainage and any deep excavations within construction compounds have minimal potential to partially or completely remove any surviving archaeological remains.

The impact of the works would be of low magnitude before mitigation. The incorporated mitigation measures would constitute *preservation by record*, probably in the form of an archaeological watching brief, producing no residual impact.

2.22.2 Route Window W2 Summary Table

<i>Route window W2 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Track works between Old Oak Common Depot and Westbourne Park	Minimal potential for a significant impact	Incorporated mitigation forms preservation by record, probably in the form of an Archaeological Watching Brief, if required	None	Non-Significant

2.23 Route Window W1

2.23.1 Site 91 Track works (part)

The area of proposed track works within the permanent way has been partially truncated by previous railway construction, resulting in a generally low potential for surviving archaeological remains (original features of the Great Western Railway, of moderate importance and medieval and later agriculture, of low importance).

Track works, new signalling, alterations to services and drainage and any deep excavations within construction compounds have minimal potential to partially or completely remove any surviving archaeological remains.

The impact of the works would be of low magnitude before mitigation. The incorporated mitigation measures would constitute *preservation by record*, probably in the form of an archaeological watching brief, producing no residual impact.

2.23.2 Route Window W1 Summary Table

<i>Route window W1 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Track works between Old Oak Common Depot and Westbourne Park	Minimal potential for a significant impact	Incorporated mitigation forms preservation by record, probably an Archaeological Watching Brief, if required	None	Non-Significant

3 Environmental Baseline and Assessment of Impacts – Westbourne Park to Stratford and Isle of Dogs

3.1 Route-wide impacts

Protective measures to mitigate the effects of ground settlement from tunnelling could require techniques, such as underpinning, which would require localised excavations. The location and details of any such measures that are required will not be determined within the timescale of the EIA, but they could partially or completely remove potential archaeological remains within the footprints of individual excavations.

3.2 Route Window C1

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C1.

3.2.1 Site 199 Westbourne Park

This site has low potential for remains of Westbourne Green medieval and post-medieval village, and other 18th- to 19th-century occupation. The Westbourne Green village resources are of moderate importance, the others of low importance.

Construction of new tracks, and foundations for platforms and access bridges, and new batching plant, including new siding roads, ground lowering and retaining wall construction would partially or completely remove any surviving archaeological remains, although localised truncation through terracing has occurred in the works area, and may have removed potential archaeological remains.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

3.2.2 Site 200 Royal Oak Portal

This site has a moderate potential for palaeo-environmental data and associated prehistoric and later finds within the in-filled channel of the former River Westbourne. This site also has a low potential for remains of medieval Westbourne Place, Westbourne Green and Paddington medieval and post-medieval villages, and post-medieval occupation at Westbourne Park. These potential remains are of moderate importance. Some localised truncation as a result of the cutting has occurred in the works area.

The approach to the tunnel eye, consisting of the ramp, tunnel and Westbourne Bridge shaft, portal escape stairs, and other below-ground works would remove all surviving archaeological remains along the works. The impact of individual works in the construction compounds (worksites) would be to partially remove any archaeological remains which survived within their individual footprints.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

3.2.3 Route Window C1 Summary Table

Route window C1 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Westbourne Park turnback facility: new platforms, footbridges, trackwork and new batching plant	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Royal Oak portal: retained cut leading to open ramp/cutting, tunnel portal, cut-and-cover section, tunnel eye with construction/ventilation shaft	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.3 Route Window C2

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C2.

3.3.1 Site 201 Paddington Station

The north-eastern part of the site has a high potential for wharves, structures and other industrial archaeology features associated with the Grand Junction (Union) Canal and Paddington Basin. There is moderate potential for features associated with a medieval water conduit, and for post-medieval garden features, quarries and associated artefact assemblages. The site also has low potential for remains of Saxon and medieval Paddington village, and Brunel's original GWR station of 1838. The post-medieval garden features, quarries etc are of low importance, the other remains are of moderate importance.

Construction of the station box would remove all surviving archaeological remains within its footprint, as would links to the mainline Lawn Concourse and cut-and-cover link to the District and Circle lines. A tunnel to the Bakerloo line, and an entrance and other works through the basements of Macmillan House would be unlikely to have an impact on archaeological remains, except for extremely deep features such as wells.

Works in three construction compounds, and service diversions and protective works, are likely to partially or completely remove potential archaeological remains. The construction of a ramp at the Triangle site (Hammerson/Domaine Scheme) could remove surviving archaeological remains.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. They are likely to involve extensive field evaluation and excavation works in the station box structure.

3.3.2 Route Window C2 Summary Table

<i>Route window C2- Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Paddington Station: below-ground station box and passenger links to the mainline and underground, construction compounds, service diversions	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.4 Route Window C3

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C3.

3.4.1 Site 202 Hyde Park Vent Shaft

The Crossrail site is within Hyde Park, a Grade I Registered Park/Garden, where there is high potential for post-medieval parkland features and medieval field systems. There is moderate potential for Palaeolithic remains in a palaeochannel representing a former tributary of the Westbourne, **if** it extends to the Crossrail site. There is also moderate potential for features, such as gravel pits and occupation sites, associated with the Roman (and later) road, *Via Trinobantia* (Bayswater Road). There is low potential for isolated finds, and possibly settlement, of later prehistoric date. Any *in situ* Palaeolithic remains would be of high importance, but reworked or residual prehistoric artefacts would be of low importance. Other resources are of moderate importance.

The ventilation shaft, terminal structure, and cut and cover plenum and access passage would completely remove potential archaeological remains within their footprints. Service diversions and new service trenches are likely to partially or completely remove potential archaeological remains. However, enabling works and landscaping would probably have a minor impact.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* resulting in no residual impact.

3.4.2 Site 203 Park Lane Vent Shaft

The site has high potential for previous layouts and landscaping of Hyde Park, and a moderate potential for the Roman (and later) road *Watling Street*, and associated activity such as gravel quarrying and possibly occupation, as well as prehistoric features. These remains are of moderate importance.

The ventilation shaft, adjoining basement plant room (plenum), and access structure would completely remove potential archaeological remains within their footprints. Ground reduction and footings in the construction compound (worksite), utility diversions and landscaping could partially or completely remove archaeological remains. Curtain grouting around the perimeter of the vent shaft and basement plant room is likely to remove the information value of potential archaeological features cut into the surface of the terrace gravels within the affected area, by consolidating the deposits to a degree which prevents future access and investigation.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* resulting in no residual impact.

3.4.3 Route Window C3 Summary Table

<i>Route window C3 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Hyde Park Vent Shaft: vent shaft, adjoining cut and cover plenum and access passage, terminal structure, and construction compound (worksite).	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

Park Lane Vent Shaft: vent shaft and adjoining basement plant room and access; possible curtain grouting; and construction compound (worksite).	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
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3.5 Route Window C4

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C4.

3.5.1 Site 204 Bond Street Station

Part of the Crossrail site (temporary landtake for grouting in Davies Street) falls within an Area of Special Archaeological Priority. This site has a high potential for palaeo-environmental and organic remains in the Tyburn alluvium, including river management features such as timberwork. There is a moderate potential for prehistoric remains within the alluvium. There is also a moderate potential for remains of the Roman through to post-medieval settlement around the Tyburn crossing, including buildings, river crossings and bridges, and roadside activity such as field systems and possibly burials. There is low potential for remains of Civil War defences, which *may* be present in Hanover Square. All of these potential remains are of moderate importance.

Construction of the western ticket hall and associated structures would completely remove all potential archaeological and palaeo-environmental remains, including prehistoric and later remains within the Tyburn alluvium, and Roman through to post-medieval settlements around the Tyburn crossing. The piled tower crane bases outside the box would completely remove, or heavily damage and partially remove, potential archaeological remains.

Construction of the eastern ticket hall and associated structures would completely remove potential remains of Roman and medieval field systems and post-medieval urbanisation.

Temporary access shafts in Hanover Square would completely remove any potential archaeological remains within their footprints. Ground reduction in the construction compound at Hanover Square would probably partially remove potential archaeological remains within Hanover Square Gardens. Minor service diversions are likely to partially or completely remove potential archaeological remains.

Compensation grout shafts at Davies Mews, Haunch of Venison Yard, and Derring Yard would completely remove potential archaeological remains within their footprints. Additionally, if permeation grouting were required around the shafts, this would destroy

the information value of any archaeological features cut deeply into the terrace gravels, by consolidating the deposits to a degree which prevents future access and investigation.

The diversion of the Davies Street sewer is likely to completely remove potential archaeological remains.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. They are likely to involve extensive field evaluation and excavation works, in particular at the western ticket hall site.

3.5.2 Route Window C4 Summary Table

<i>Route window C4 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Bond Street Station: two sub-basement station boxes/ticket halls, interchange to LUL lines, grout shafts, and two work access shafts, diversion of the Davies Street Sewer	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.6 Route Window C5

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C5.

3.6.1 Site 205 Tottenham Court Road Station

Crossrail works lying east of Charing Cross Road lie within an Archaeological Priority Area. This site has a high potential for post-medieval urbanisation, including remains of Fauconberg House and a moderate potential for the Roman road system, the medieval village of St Giles and Civil War defences. All remains are of moderate importance.

The two new ticket halls and associated shafts and entrances will remove all surviving archaeological deposits in their footprints. Compensation grout shafts at Sheraton Street, to the rear of Goldbeaters House, and the four corners of Soho Square would completely

remove potential archaeological remains within their footprints. Additionally, if permeation grouting were required around the shafts, this would destroy the information value of any archaeological features cut deeply into the terrace gravels, by consolidating the deposits to a degree which prevents future access and investigation.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. Measures are likely to involve extensive field evaluation which may lead to excavation works.

3.6.2 Site 206 Fisher Street Vent Shaft

The Crossrail site lies within an Archaeological Priority Area. The site has high potential for remains of post-medieval urbanisation, and a moderate potential for remains (including burials) associated with the Roman road c 50m to the south. There is low potential for prehistoric and Saxon remains. These resources are of moderate importance.

Piles to support the retained facades and ground reduction to the new basement level will remove all archaeological deposits that survive beneath the existing basement, down to the new formation level. Construction of the vent shaft from new basement level would remove all archaeological deposits within the footprint of the shaft that survive beneath the formation level of the new basement. Service diversions are likely to partially or completely remove potential archaeological remains. A compensation grout shaft at Proctor Street would completely remove potential archaeological remains within its footprint. Additionally, if permeation grouting were required around the shaft, this would destroy the information value of any archaeological features cut deeply into the terrace gravels, by consolidating the deposits to a degree which prevents future access and investigation.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

3.6.3 Route Window C5 Summary Table

<i>Route window C5 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Tottenham Court Road Station: two new ticket halls associated shafts, and grout shafts	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

Fisher Street: vent shaft and grout shaft	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
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3.7 Route Window C6

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C6.

3.7.1 Site 207 Farringdon Station

The site falls within a LB Islington Archaeological Priority Area, and the City of London, which is considered to be equivalent to such an area. The site has high potential for the post-medieval urbanisation of the area. There is moderate potential for medieval religious institutions and associated burial grounds; prehistoric, Roman and medieval secular remains and also for the topography of the Fleet valley. There is a low potential for Early–Middle Saxon burials, and possibly occupation. Any Saxon or medieval ecclesiastical evidence would be of high importance. All other remains are of moderate importance.

All works within the existing railway cutting and the basement of Cardinal House will have no impact on archaeological deposits (including much of the work associated with the western ticket hall). Ground works for the eastern ticket hall and associated shafts at 38–42 Charterhouse Street and 3 Hayne Street are not confined to the railway cutting and are likely to impact on archaeological remains as are other associated works.

Compensation grout shafts at the rear of 67–69 Cowcross Street, Green Hills Rents, and St John Street would completely remove potential archaeological remains within their footprints. Additionally, if permeation grouting were required around the shaft at St John Street, this would destroy the information value of any archaeological features cut deeply into the terrace gravels, by consolidating the deposits to a degree which prevents future access and investigation.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. They are likely to involve extensive field evaluation and excavation works, in particular works associated with the Eastern Ticket Hall.

3.7.2 Site 229 Farringdon crossover cavern

The Crossrail site is within the City of London, which is considered to be equivalent to an archaeological priority zone. The site has moderate potential for Roman and medieval activity outside the City walls as well the Moorfields marsh. There is low potential for prehistoric, Saxon and medieval ecclesiastical remains. However, it is likely that most archaeological remains were removed by the construction of the Barbican centre. Any medieval ecclesiastical remains would be of high importance; other remains of medium importance.

A shaft in Aldersgate Street is likely to remove all archaeological remains that have survived earlier construction; these would not include the ecclesiastical remains. Other works at this site consist of underground tunnelling, taking place at a level below all known archaeological deposits, and it is therefore predicted that they will have no impact.

Any open cut work required for the diversion of the Aldersgate Street sewer would completely remove any surviving archaeological deposits.

The impact of the works for the shaft would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

3.7.3 Route Window C6 Summary Table

<i>Route window C6 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Farringdon Station: two new ticket halls, associated shafts, and grout shafts	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Farringdon Crossover: access shaft with construction compound (worksite), Aldersgate Street sewer diversion	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.8 Route Window C7

3.8.1 Ground settlement in RW C7

Ground settlement could have an impact on the Armourers and Brasiers Hall, a listed building and a Scheduled Ancient Monument (LO 32). The building lies within the 5–25mm settlement contours. The building is dealt with in the Built Heritage section of the ES.

Ground settlement could also have an impact on three sections of the Roman and medieval London city walls which form parts of a Scheduled Ancient Monument (LO

26J, 26P, 26N). These sections fall within the 1–5mm, 1–25mm, and 1–25mm settlement contours respectively. Sections 26N and 26P are below-ground and 26J lies in an underground car park. It is not likely that there would be a significant impact upon the Scheduled Ancient Monument.

Ground settlement could have an impact upon the below-ground remains of the 16th-century wall of the Artillery Ground at Spitalfields. This lies within the 1–10mm settlement contours, and an Area of Archaeological Importance. The only accessible, known, sections of the wall are built into the basements and foundations of later buildings, and this issue is therefore inseparable from the assessment of the impact of ground settlement on the current buildings in this area. It was decided in consultation with representatives of EH and GLAAS on 1.12.03 that this issue would be dealt with as part of the assessment of settlement impacts on Historic Buildings, see the Heritage and Townscape technical report.

There are no other known structural archaeological remains which might be affected by ground settlement in Route Window C7.

3.8.2 Site 208 Liverpool Street Station

The Crossrail site is within the City of London, which is considered to be equivalent to an archaeological priority zone. The site has a high potential for Roman activity, including the extra-mural cemetery and the former Walbrook stream system and for post-medieval urbanisation and industry. There is moderate potential for fragmented evidence of prehistoric activity, possibly including settlement; for Roman occupation; the Roman and later city ditch; for medieval and later religious establishments and for former layouts of the Grade II listed gardens at Finsbury Circus. There is a low potential for other medieval activity or occupation. However, this potential is reduced by the presence of existing basements and railway cuttings. All remains are of moderate importance.

The eastern and western ticket halls, temporary access shaft in Finsbury Circus, main passenger route in Liverpool Street, and an emergency shaft in Blomfield Street would completely remove surviving archaeological remains within their footprints. A compensation grout shaft in New Broad Street would completely remove potential archaeological remains within its footprint. Additionally, if permeation grouting were required around the shaft, this would destroy the information value of any archaeological features cut deeply into the terrace gravels, by consolidating the deposits to a degree which prevents future access and investigation. Other works, including the construction compound at Finsbury Circus and service diversions, are likely to partially or completely remove surviving archaeological remains.

Excavation of five ‘manholes’ for the diversion of the London Bridge sewer on Moorgate and the sewer at Moorgate Station would completely remove potential archaeological remains within their footprints.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. They are likely to require extensive archaeological field evaluation and excavation works.

3.8.3 Route Window C7 Summary Table

<i>Route window C7 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Liverpool Street Station: two new ticket halls, temporary access shaft, three construction compounds, grout shaft, service diversions, five 'manholes' for diversion of the London Bridge sewer on Moorgate and the sewer at Moorgate Station	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.9 Route Window C8

Ground settlement could have an impact on the section of the original 1839–40 viaduct, part of which may be removed as part of the Crossrail works in the Pedley Street construction compound, although any substantial well-preserved sections would be preserved *in situ* if possible (see below). Ground settlement could also have an impact upon the existing railway viaduct at Pedley Street, constructed in 1891. Both of these resources lie within the 1–25mm settlement contours (and within an Area of Archaeological Importance). A range of measures will be deployed in order to monitor, control and, where necessary, mitigate or remedy the impact of any settlement which may result from the construction of the railway and associated works. Those measures are described in Appendix B1, Volume 6 of the Environmental Statement. Consequently, there will be no significant impacts on these structures.

There are no other known structural archaeological remains which might be affected by ground settlement in Route Window C8.

3.9.1 Site 209 Hanbury Street vent shaft

The site has high potential for remains of post-medieval urbanisation of the area. There is moderate potential for medieval remains and a low potential for Roman and Saxon remains. The medieval remains are of low importance, the other resources of moderate importance.

Construction of the vent shaft would remove all surviving archaeological deposits within the footprint of the shaft. Footings for a tower crane would completely remove potential archaeological remains, and those for a batching plant, if required, would partially remove them. Service diversions are likely to partially or completely remove surviving archaeological remains.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

3.9.2 Site 231 Pedley Street

The Pedley Street site has high potential for remains of the 1839–40 Eastern Counties Railway viaduct, and later railway infrastructure, including a goods depot. It also has moderate potential for post-medieval urbanisation and Civil War defences. There is a low potential for Saxon and medieval remains.

Any well-preserved remains of the original 1839–40 viaduct would be of high importance, but survival quality is unclear, and may well be reduced across much of the area that would be affected by the proposed demolitions. Where the viaduct has been heavily damaged, it would only be of moderate importance. Medieval remains would be of low importance, and other remains of moderate importance.

Construction of the access shaft would remove all surviving archaeological deposits within its footprint, which is likely to include a section of the 1839–40 viaduct. A c 210m length of the 1839–40 viaduct, and associated later railway resources, would be demolished to ground level. However, the survival quality of the viaduct may well be reduced in the affected area. An access ramp requires demolition of part of the surviving stub of the spur of a late 19th-century viaduct that formerly lead into the Spitalfields Coal Depot, but is unlikely to have an impact on potential archaeological remains below ground level. Preparatory ground reduction for the construction compounds, and footings for accommodation and grout plant, may damage or partially remove buried railway structures. Service diversions and local investigation of the viaduct foundations are likely to partially or completely remove potential archaeological remains. Grouting within the terrace gravels would destroy the information value of any archaeological features cut deeply into the terrace gravels, by consolidating the deposits to a degree which prevents future access and investigation.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. Mitigation measures are likely to involve field evaluation (including a structural appraisal of the existing viaduct and any other historic railway features affected by the scheme, and determination of the condition of the 1839–40 viaduct and remains of the later goods depot). In addition, demolition will be undertaken carefully, and where possible, demolition will cease if substantial well-preserved elements of the 1839–40 viaduct are encountered (to allow *preservation in situ*). Should preservation *in situ* not be possible, or where survival condition is reduced, then the remains of the viaduct should be the subject of appropriate levels of recording before they are demolished. In addition, mitigation should include minimising works affecting the fabric of the existing railway infrastructure, and carrying out suitable

reinstatement where appropriate. This would be coupled with archaeological recording of above- and below-ground remains, to achieve *preservation by record* where impacts are unavoidable.

With this mitigation, there will be no residual impact if potential well-preserved elements of the 1839–40 viaduct are preserved *in situ*.

3.9.3 Site 238 (part) Mile End Conveyor: Brady Street to Mile End Park

The part of the Pedley Street to Mile End conveyor site in RW C8 has high potential for 19th-century railway infrastructure (including elements of the original *c* 1839–40 Eastern Counties Railway viaduct, although known elements of this date would not be affected by the proposals) and for post-medieval urbanisation. It also has moderate potential for Roman and medieval roads and field systems, and possibly settlement or Roman burials. Any well-preserved elements of the original railway would be of high importance, whereas surviving post-medieval urbanisation is likely to be of low importance, and other remains of moderate importance.

The conveyor in RW8 has potential to cause minor damage to the fabric of the 19th-century railway viaduct. Foundations at ground level for conveyor support stilts are unlikely to affect below-ground archaeological remains in this Route Window.

The impact of these works would be of low magnitude before mitigation, with potential for a significant impact. Further assessment is likely to involve field evaluation (including a structural appraisal of the existing viaduct and any other historic railway features). Recommended mitigation consists of minimising works affecting the fabric of the existing railway infrastructure, and where such works are unavoidable, suitable reinstatement of any damage to the historic fabric on removal of the temporary works. In particular, where the conveyor would be located adjacent to the viaduct, it is recommended that stilts at ground level are used to support the conveyor wherever feasible, in preference to brackets on the face of the viaduct. This would be coupled with archaeological recording of above and below-ground remains, to achieve *preservation by record* where impacts are unavoidable. These mitigation measures would produce no residual impact.

3.9.4 Site 210 Whitechapel Station

Parts of the Crossrail site lie within an Area of Archaeological Importance along the conjectured line of the London-Colchester Roman road, for which there is a moderate potential. There is moderate potential for 18th-century urban development of the area. There is also low potential for Roman burials, and a very low potential for remains of the 16th-century Red Lion theatre. Documentary research commissioned by Crossrail has concluded that it is unlikely that the Red Lion theatre was located within the Crossrail site, and that it is most likely that it was located on the opposite side of Whitechapel Road from the Crossrail works. Such remains (if present) would be of high importance; other resources are of moderate importance.

The Scheme: the construction of the Durward Street intermediate concourse and ventilation shaft, the East London Line interchange, the District Line link, the Cambridge

Heath Road ventilation and escape shaft, the temporary construction shaft, crane bases, and foundations for the Western (Court’s Street) Ticket Hall (where outside the existing District Line cutting), would remove all potential archaeological remains within their footprints. In addition, construction of the school caretaker’s house, electrical substation, and temporary car park would either partially or completely remove potential archaeological remains. A compensation grout shaft in the Sainsbury’s Car Park worksite would completely remove potential archaeological remains within its footprint. Additionally, if permeation grouting were required around the shaft, this would destroy the information value of any archaeological features cut deeply into the terrace gravels, by consolidating the deposits to a degree which prevents future access and investigation.

- **Variation 1:** the Eastern (Cambridge Heath Road) Ticket Hall would completely remove potential archaeological remains over a larger area than the Cambridge Heath Road ventilation and escape shaft which it replaces, but there would be no impact from the foundations of the Court Street (western) ticket hall, nor from the District Line Link. Other works would be as for the principal scheme, above.
- **Variation 1A:** adding the District Line Link to Variation 1 would, in addition, completely remove potential archaeological remains within its footprint (as in the principal scheme, above).
- **Variation 2:** The Eastern (Cambridge Heath Road) Ticket Hall would be constructed first, but with provision for the subsequent construction of the Court’s Street Ticket Hall. The works would be as for the principal scheme, with the exception of the Cambridge Heath Road vent and escape shaft, which would be replaced with the larger area of the Eastern (Cambridge Heath Road) Ticket Hall as in Variation 1.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, resulting in no residual impact. English Heritage and GLAAS have accepted the principle that *preservation by record* would be appropriate for any remains of the Red Lion theatre, if they were present (N. Truckle, GLAAS, Consultation on 13.7.04).

3.9.5 Route Window C8 Summary Table

Route window C8 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Hanbury Street: vent shaft	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

<p>Pedley Street: temporary access shaft, demolition of southern side of viaduct, access ramp, construction compounds spoil conveyor, service diversions, local grouting of terrace gravels</p>	<p>Potential for a significant impact</p>	<p>Incorporated mitigation forms preservation by record</p> <p>Site-specific mitigation: cease demolition if substantial well-preserved elements of the viaduct are encountered, constituting <i>preservation in situ</i>;</p> <p>minimise impacts to historic railway infrastructure; and preservation by record where these are unavoidable</p>	<p>If a substantial section of the 1839–40 viaduct were present in good condition and demolition takes place, this would form a residual impact.</p> <p>Otherwise: None</p>	<p>If a substantial section of the 1839–40 viaduct were present in good condition and demolition takes place, this would be significant.</p> <p>Otherwise: Non-Significant</p>
<p>Mile End conveyor: conveyor supports and/or brackets</p>	<p>Potential for a significant impact</p>	<p>Incorporated mitigation forms preservation by record</p> <p>Site-specific mitigation: minimise impacts to viaduct wherever feasible, in particular use of stilts in preference to brackets on the face of the viaduct</p>	<p>None (depending on detailed design, and implementation of site-specific mitigation)</p>	<p>Non-Significant (depending on detailed design, and implementation of site-specific mitigation)</p>

<p>Whitechapel Station (four variations): western and/or eastern ticket halls, Durward Street boxes (access shafts) and vent shaft, East London Line interchange, optional District Line link, construction shaft, construction compounds (work sites), school caretaker's house, electrical substation and grout shaft</p>	<p>Potential for a significant impact</p>	<p>Incorporated mitigation forms preservation by record</p>	<p>None</p>	<p>Non-Significant</p>
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3.10 Route Window C8A

3.10.1 Site 238 (part) Mile End Conveyor: Brady Street to Mile End Park

The part of the Mile End conveyor and stockpile site in RW C8A falls within an archaeological priority zone based on the Roman road from London to Colchester at two points: east of Portelet Road for a distance of c 300m; and the north-western edge of Mile End Park.

The part of the site in RW C8A contains a known area of survival of the original c 1839–40 Eastern Counties Railway viaduct, and has high potential for 19th-century railway infrastructure (including other elements of the original viaduct, goods yard, and wharf); for post-medieval urbanisation, and for Globe Street Chapel burial ground. It also has moderate potential for Roman and medieval roads and field systems, and possibly settlement or Roman burials. Well-preserved elements of the original railway are of high importance, whereas post-medieval urbanisation is likely to be of low importance, due to poor survival quality. All other remains are of moderate importance.

The conveyor in RW8A has potential to cause minor damage to the fabric of the 19th-century railway viaduct, including the southern face of the original 1839–40 viaduct north of Bancroft Road, and the Bancroft Road bridge. Individual foundations for the conveyor support stanchions could also partially or completely remove below-ground archaeological remains, if deep foundations are required where the conveyor crosses the railway, canal, and an access road. Details of works within the existing sand sidings

(viaduct level) and at the spoil stockpile site in Mile End Park (ground level) are not yet available, but any impact on archaeological remains would be minor.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. Further assessment is likely to involve field evaluation (including a structural appraisal of the existing viaduct and any other historic railway features). Recommended mitigation consists of minimising works affecting the fabric of the existing railway infrastructure, and where such works are unavoidable, suitable reinstatement of any damage to the historic fabric on removal of the temporary works. In particular, where the conveyor would be located adjacent to the viaduct, it is recommended that stilts at ground level are used to support the conveyor wherever feasible, in preference to brackets on the face of the viaduct, especially for the stretch of 1839–40 viaduct north of Bancroft Road, and the Bancroft Road bridge. This would be coupled with archaeological recording of above and below-ground remains, to achieve *preservation by record* where impacts are unavoidable. With this mitigation, there would be no residual impact.

3.10.2 Route Window C8A Summary Table

<i>Route window C8A - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Mile End conveyor: conveyor supports and/or brackets, track works at Sand End Sidings, stockpile at Mile End Park:	Potential for a significant impact	Incorporated mitigation forms preservation by record Site-specific mitigation: minimise impacts to viaduct wherever feasible, in particular use of stanchions at ground level in preference to attachments to the face of the viaduct, especially to the stretch of 1839–40 viaduct north of Bancroft Road; suitable reinstatement of any unavoidable damage	None (depending on detailed design, and implementation of site-specific mitigation)	Non-Significant (depending on detailed design, and implementation of site-specific mitigation)

3.11 Route Window C9

3.11.1 Ground settlement in RW C9

Ground settlement could have an impact upon the above-ground remains of the 19th-century Baptist Chapel and the Congregational Church, at Stepney Green, both of which lie within an Area of Archaeological Importance. The former lies within the 1–10mm settlement contours, and the latter within the 50–75mm settlement contours. This impact is dealt with in Assessment of Settlement Impacts on the Built Heritage - Technical Report, 1E0317-G0E00-00001. The buried remains of the 16th-century Worcester House, which lie within the 1–10mm contours, might also be affected, but it is not likely that there would be a significant impact upon these remains.

There are no other known structural archaeological remains which might be affected by ground settlement in Route Window C9.

3.11.2 Site 211 Stepney Green

Baseline Resources

Known resources include below-ground remains of the 16th-century Worcester House and standing walls from a Baptist Chapel and a Congregational Church, which are the 19th-century continuation of a long tradition of non-conformist worship on the site. The site also has high potential for below-ground remains within the grounds of Worcester House, including non-conformist institutions such as the Stepney Meeting House of 1674 and those associated with the standing remains, and for the Saxon and medieval village of Stepney. There is moderate potential for Late Bronze Age/Early Iron Age remains, possibly including funerary deposits.

The group formed by Worcester House and associated standing and buried remains within its grounds is of high importance, and is located in the eastern construction compound (Stepping Stones Farm). Other resources, including all those predicted in the western construction compound (Stepney Green), are of moderate importance.

Impact

The box to contain the basement structures would completely remove archaeological deposits within its footprint including, potentially, remains associated with Worcester House.

Preparatory ground reduction, footings for accommodation, service diversions, mobile concrete batch plant and works such as excavations for a dewatering system have potential to damage or partially remove potential archaeological remains in the eastern construction compound (Stepping Stones Farm), including the below-ground remains from the Worcester House group of resources described above. Works and vehicle movements in the eastern construction compound also have potential to damage the standing remains.

A temporary access shaft to the west of Garden Street would completely remove archaeological deposits within its footprint. In the western construction compound

(Stepney Green), a crane base would completely remove potential archaeological remains within its footprint, and other works including footings for a gantry crane, Bentonite silo/lagoon, accommodation, and service diversions have potential to partially remove them. These remains are not predicted to be of high importance.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. *Preservation in situ* of the Worcester House group of remains lying in the construction compound east of Garden Street has been achieved by relocating proposed works with deep footings to the western construction compound, and by the design of protective measures for the above- and below-ground remains.

Incorporated mitigation will form *preservation by record* for potential archaeological remains in the western construction compound, predicted to be of moderate importance, and for those within the box to contain the basement structures. In initial consultations, English Heritage and GLAAS have advised that *preservation by record* will be considered adequate mitigation for the impacts of this box, including any remains associated with Worcester House affected by these permanent works.

Site-specific measures to remove or reduce impacts via redesign and protective measures will achieve *preservation in situ* wherever feasible for high importance resources within the eastern construction compound. Crossrail has redesigned the distribution of works between the two construction compounds, which has removed those requiring substantial excavations from the eastern construction compound where high importance resources are present, to the western one. A protective layer of granular material will be used over the known and potential below-ground remains of high importance. In addition, protective works for the standing structures will be enacted, such as propping and hoarding, and if required, suitable remedial measures.

This combination of *preservation in situ* and *preservation by record* would produce no significant residual impacts.

3.11.3 Route Window C9 Summary Table

<i>Route window C9 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Stepney Green: twin vent shafts in walled box; temporary access shaft, two construction compounds ('worksites') and service diversions	Potential for a significant impact	Incorporated mitigation: preservation by record for resources of moderate importance Site-specific mitigation: design review, primarily for temporary works (to include desk and site-based archaeological assessment). Leading, wherever feasible, to protective measures for high importance remains (<i>preservation in situ</i>).	None (if site-specific mitigation measures achieve <i>preservation in situ</i> for all high importance resources)	Non-Significant (if site-specific mitigation measures achieve <i>preservation in situ</i> for all high importance resources)

3.12 Route Window C10

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C10.

3.12.1 Site 214 Lowell Street Shaft

The site has high potential for industrial archaeology of the 19th-century railway, canal and dock systems, and a moderate potential for other 19th-century urbanisation. There is low potential for isolated prehistoric and Roman artefacts. The latter are of low importance, the remaining resources are of moderate importance.

The vent shaft in a rectangular box would remove all surviving archaeological deposits within its footprint. The sheet pile cut-off wall employed for dewatering would damage or remove potential archaeological deposits along its line.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. They are likely to involve archaeological field evaluation and excavation works.

3.12.2 Route Window C10 Summary Table

Route window C10 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Lowell Road: Intervention shaft, sheet pile cut-off wall	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.13 Route Window C11

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C11.

3.13.1 Site 230 Hertsmere Road Shaft

The site has high potential for prehistoric and later palaeo-environmental and topographic evidence, including medieval and later land reclamation and water management. There is also high potential for 19th-century industrial archaeology features associated with West India Docks, including remains of a demolished 1803 guard tower. There is moderate potential for prehistoric timber trackways, and a low potential for prehistoric human remains. Any prehistoric timber trackways or human remains *in situ* would be of high importance. All other remains are of moderate importance.

The basement around the intervention shaft would completely remove potential archaeological deposits within its footprint to a depth of c 6.10m below ground level. Below that level, piling for the basement foundations, and excavation of material for the shaft would remove any remaining archaeological deposits within its footprint. Works and structures within the construction compound, possible ground remediation, service diversions and subsequent hard landscaping of the car park, have potential to disturb or remove remains of the demolished 1803 guard house, and later industrial buildings.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. In a consultation meeting of 28th July 2004, EH and GLAAS agreed that *preservation by record* was suitable for prehistoric timber trackways. This is likely to include both field evaluation and further archaeological investigation, constituting *preservation by record*.

If remains of the previously demolished 1803 guardhouse survive in good condition, they could require protective measures (eg suitable hard landscaping design) to achieve

preservation in situ, either by reburial, or by possibly by permanent display (depending on land ownership issues), within the landscaped area.

3.13.2 Site 215 Isle of Dogs Station

The site has high potential for palaeo-environmental and topographic evidence and for 19th-century industrial archaeology associated with the West India Docks. There is also moderate potential for prehistoric timber trackways, and a low potential for prehistoric human remains. Any prehistoric trackways or human remains *in situ* would be of high importance. All other remains are of moderate importance.

The main construction works for the station box at the Isle of Dogs will have no impact upon below-ground remains as these works take place within the North Dock, which has removed earlier archaeological deposits. However, some associated activities would have an impact. Individual temporary structures and plant in the Billingsgate and North Quay construction compounds have potential to partially remove or disturb remains of the 19th and early 20th-century industrial archaeology associated with the West India Docks, depending on the depth at which these survive. A spoil conveyor to take spoil from the station box to the canal loading site is unlikely to affect below-ground archaeological remains, however the route of the conveyor should be placed to avoid any dock infrastructure surviving above ground-level.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*. Metal detecting and other examination of silt removed by suction dredging for 19th and early 20th-century artefacts relating to the history of the docks would form site-specific mitigation. These measures would result in no residual impact. In a consultation meeting on 28th July 2004, EH and GLAAS agreed that *preservation by record* was suitable for prehistoric timber trackways. This is likely to involve field evaluation and further archaeological investigation.

3.13.3 Route Window C11 Summary Table

<i>Route window C11 – Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Hertsmere Road: Intervention shaft and basement structure around its head, construction compound (worksite), service diversions and landscaping.	Potential for a significant impact	Incorporated mitigation forms preservation by record Site-specific mitigation: if remains of 1803 guard house survive in good condition, they could require protective measures (eg suitable hard landscaping design) to achieve <i>preservation in situ</i> , either by reburial, or by permanent display	No negative impact	Non-Significant
Isle of Dogs Station: construction compounds, spoil conveyor	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.14 Route Window C12

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C12.

3.14.1 Site 234 Mile End Park Vent Shaft

This site has a moderate potential for remains of 19th-century urbanisation, of low importance, and low potential for evidence from earlier periods.

The basement level box to contain the shaft and associated basement structures would completely remove all archaeological deposits within its footprint. Works associated with the construction compound, including a tower crane, may partially remove archaeological deposits.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

3.14.2 Site 235 Eleanor Street Vent Shaft

This site has a moderate potential for 19th-century urbanisation and a low potential for prehistoric and medieval remains. The prehistoric resources are of moderate importance, the others of low importance.

Construction of the intervention and ventilation shaft would completely remove any surviving archaeological remains within the footprint of the shaft and a crane base. A ring beam, slab, and a protective wall may partially remove potential archaeological remains.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

3.14.3 Route Window C12 Summary Table

Route window C12 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Mile End Park: ventilation shaft: construction compound (worksite).	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Eleanor Street Vent Shaft: intervention and ventilation shaft, shaft head building, landscaping, protective wall and construction compound (worksite).	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

3.15 Route Window C13

There are no known structural archaeological remains which might be affected by ground settlement in Route Window C13.

3.15.1 Site 236 Pudding Mill Lane Portal

The majority of the Pudding Mill Lane Portal site lies within either an Area of Archaeological Importance or a contiguous Archaeological Priority Area. The site has a high potential for evidence allowing palaeo-environmental reconstruction of Late Glacial and Holocene landscape change preserved in alluvial deposits, and for medieval settlement and industry, and for post-medieval industry, settlement, and infrastructure. It has a moderate potential for remains of prehistoric and later date preserved within river deposits, including timber trackways or structures; for other (dry land) prehistoric activity, and for features associated with the Roman and later road (including field systems, burials, and remains associated with a Roman ford). There is also a low potential for Saxon activity. Any prehistoric trackways or structures would be of high importance, other remains are of moderate importance.

The TBM shaft, cut-and-cover tunnel and associated works such as the River Lea protection box, would completely remove all surviving archaeological remains within the footprint of these constructions, other than the eastern end of the cut-and-cover tunnel. Extensive piling for the retained cut section of the tunnel, bridges, the pedestrian access culvert, and widened DLR embankment and viaduct, would completely remove potential archaeological remains within the footprints of the piles, and partially remove them within the footprints of pile caps, abutments, etc. Possible lowering of Marshgate Lane by 1m, groundworks for a new DLR ticket hall, works associated with the construction compounds at the Main Tunnel, Bow Midland Yard and City Mill River work sites and minor service diversions are likely to partially remove potential archaeological remains.

The diversion of the electricity cables at the River Lea and the construction of a new electricity pylon at Pudding Mill Lane are likely to partially or completely remove potential archaeological remains.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. In a consultation meeting on 28th July 2004, EH and GLAAS agreed that *preservation by record* was suitable for prehistoric timber trackways.

3.15.2 Site 239 Hackney and Abbey Mills and Wick Lane Sewer Diversion

Note that this site extends into RW C13A

The route of the Hackney and Abbey Mills and Wick Lane Sewer Diversion has a high potential for palaeo-environmental evidence within the alluvial sequence, with a good potential for organic preservation and information on the changing river regime and past environments. It has a high potential for post-medieval industry and residential development. It has a moderate potential for prehistoric to Roman activity in the former marshes, for subsequent medieval and early post-medieval (and possibly Roman) flood management and economic activity within the reclaimed marsh, and for prehistoric and later settlement activity on the gravel terrace. There is a low potential for Saxon activity. Any *in situ* prehistoric timber structures, such as trackways, would be of high importance, and below ground remains of post-medieval residential buildings would be of low importance. Other resources would be of moderate importance.

The shafts would completely remove archaeological remains within the footprint of each construction. Ground works within the associated worksites would partially or completely (two worksites on the gravel terrace west of the River Lea), or partially (remaining worksites on floodplain), remove potential archaeological remains. The bored tunnel would possibly partially remove Late Devensian/Late Glacial palaeo-environmental evidence within deep Pleistocene channels.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. In a consultation meeting on 28th July 2004, EH and GLAAS agreed that *preservation by record* was suitable for prehistoric timber trackways.

3.15.3 Route Window C13 Summary Table

<i>Route window C13 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Pudding Mill Lane portal: TBM shaft and cut-and-cover tunnel, new retaining wall, railway & sewer bridges, DLR viaduct, service diversions, three construction compounds	High, with potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Hackney and Abbey Mills and Wick Lane Sewer Diversion: six shafts, four construction compounds, bored sewer tunnel.	Potential for a significant impact	Incorporated mitigation forms preservation-by-record	None	Non-Significant

3.16 Route Window C13A

3.16.1 Site 239 Hackney and Abbey Mills and Wick Lane Sewer Diversion

Note that this site extends into RW C13

The route of the Hackney and Abbey Mills and Wick Lane Sewer Diversion site has a high potential for palaeo-environmental evidence within the alluvial sequence, with a good potential for organic preservation and information on the changing river regime and past environments. It has a high potential for post-medieval industry. It has a moderate potential for prehistoric to Roman activity in the former marshes, and for subsequent medieval and early post-medieval (and possibly Roman) flood management and economic activity within the reclaimed marsh. There is a low potential for Saxon activity. Any *in situ* prehistoric timber structures, such as trackways, would be of high importance, and below-ground remains of post-medieval residential buildings would be of low importance. Other resources would be of moderate importance.

The two shafts, pumping station, and the cut-and-cover trench, would completely remove archaeological remains within the footprint of each construction. Ground works within the associated worksites would partially, remove potential archaeological remains. The bored tunnel would possibly partially remove Late Devensian/Late Glacial palaeo-environmental evidence within deep Pleistocene channels.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. In a consultation meeting on 28th July 2004, EH and GLAAS agreed that *preservation by record* was suitable for prehistoric timber trackways.

3.16.2 Route Window C13A Summary Table

<i>Route window C13A – Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation'</i>	<i>Residual Impact</i>	
			<i>Description'</i>	<i>Significance</i>
Hackney and Abbey Mills and Wick Lane Sewer Diversion: two shafts, substation, two construction compounds, cut and cover trench, sewer tunnel.	Potential for a significant impact	Incorporated mitigation forms preservation-by-record	None	Non-Significant

4 Environmental Baseline and Assessment of Impacts- Stratford to Shenfield

4.1 Route Window NE1

4.1.1 Site 301 Stratford Station

The Stratford Station site lies within an Archaeological Priority Area. There is a high potential for prehistoric dry-land activity on a gravel terrace beneath the alluvium, and for geoarchaeological and palaeo-environmental evidence allowing reconstruction of topographic change, for late Saxon remains associated with the Channelsea watercourse, and for 19th-century railway infrastructure, in particular, the Stratford Goods Station and Mechanics Institute. There is a moderate potential for Roman and medieval activity associated with the London to Colchester road. Any Saxon structural remains would be of high importance, and other resources would be of moderate importance.

Foundations for the filling-in of the DLR bay, relocation of waiting rooms, kiosks, etc, and the refurbishment of the Eastern Tunnel would have no impact as the station lies on an embankment. If any works in the construction compound require excavation they have potential to damage or partially remove any surviving 19th-century railway infrastructure, but would not affect Saxon remains.

The impact of these works would be of low magnitude before mitigation, with potential for a non-significant impact. The incorporated mitigation measures, if required, would probably take the form of an archaeological watching brief, and constitute *preservation by record*, resulting in no residual impact.

4.1.2 Route Window NE1 Summary Table

<i>Route window NE1 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Stratford Station: construction compound	Potential for a non-significant impact	Incorporated mitigation forms preservation by record, probably a watching brief	None	Non-Significant

4.2 Route Window NE2

4.2.1 Site 303 Forest Gate Station

Forest Gate Station is a locally listed building, and the site falls within an Archaeological Priority Area. Outside of the cutting there is low potential for features associated with a Roman road running *c* 260m to the south of the Crossrail site, and with a documented medieval and post-medieval manor house and for 19th-century railway infrastructure. All of these remains would be of moderate importance. Within the cutting, there is only a low potential for reworked Palaeolithic artefacts of low importance from the Taplow gravels.

The works within the cutting, where there is little chance of archaeological survival, would have no or minimal archaeological impact, apart from the possible removal of any reworked Palaeolithic artefacts within the Taplow gravels. The construction compounds would have minimal impact upon archaeological remains.

These works have a low potential for a non-significant impact of low magnitude, and incorporated mitigation would form *preservation by record*, probably in the form of an archaeological watching brief, leaving no significant residual impact.

4.2.2 Route Window NE2 Summary Table

<i>Route window NE2 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Forest Gate Station: Platform extensions; construction compounds (work sites)	Potential for a non-significant impact	Incorporated mitigation forms preservation by record, probably a watching brief	None	Non-Significant

4.3 Route Window NE3

4.3.1 Site 304 Manor Park Station

At the Manor Park Station site the main construction compound (but not the construction works) lies within an Archaeological Priority Area relating to a documented Saxon/medieval manor. The precise location of the original house is unknown, and the site has a low potential for remains from the manor. There is high potential for garden features associated with the 1799 mansion from which Manor Park derives its name. There is also moderate potential for Palaeolithic animal remains, but low potential for artefacts of this period. Similarly, there is low potential for features associated with the Roman London to Colchester road (240m south of Crossrail site) and for 19th-century railway infrastructure. *In situ* Palaeolithic remains would be of high importance, but

reworked or residual remains of low importance. Other resources are of moderate importance.

The works are located in a railway cutting where they would have a minimal impact, confined to potential Palaeolithic remains in the terrace gravels or potential 19th-century railway remains, if present: piled foundations for platform extensions could completely remove potential Palaeolithic remains within the footprints of the piles, and works in the construction compound, track works including revised layout, signalling and services, and foundations to the new and temporary footbridges could partially truncate potential Palaeolithic remains within the footprints of individual foundations.

The impact of the works would be of low magnitude before mitigation, with a low potential for a non-significant impact. The incorporated mitigation measures would constitute *preservation by record*, probably an archaeological watching brief, producing no residual impact.

4.3.2 Route Window NE3 Summary Table

<i>Route window NE3 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Manor Park Station: platform extensions, construction compound	Low potential for a significant impact	Incorporated mitigation forms preservation by record, probably a watching brief	None	Non-Significant

4.4 Route Window NE4

4.4.1 Site 318 Aldersbrook Sidings

The Aldersbrook Sidings site lies within an Archaeological Priority Zone. It has moderate potential for features associated with the Roman London to Colchester road, for Mesolithic and later prehistoric remains, in particular at the former wetland/dryland interface, and for palaeo-environmental evidence within the alluvium, allowing reconstruction of prehistoric and later topography and landscape change. It also has a low potential for medieval and post-medieval features associated with the agricultural hinterland of Ilford and Aldersbrook, and industry associated with the River Roding. If prehistoric remains included timber structures, such as trackways, these would be of high importance, other potential remains are of moderate importance.

The relevant proposed works consist of new sidings, bridge works, and a temporary construction compound. These occur mainly on the present embankment and potential archaeological impacts are confined to works on the periphery, at ground level. The bridge works may partially or completely remove any surviving archaeological remains.

Minority parts of the construction compound area are also at ground level, where remains might be partially removed.

The impact of these works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

4.4.2 Site 305 Ilford Station

The majority of the Ilford Station site is located in a cutting which decreases in depth to the west. There is a low potential for Palaeolithic remains within the terrace gravels, and for 19th-century railway infrastructure. Outside of the cutting, there is a moderate potential for features associated with the Roman London to Colchester road (which lies immediately to the south of the Ilford Worksite South (construction compound), the medieval and later settlement of Ilford and an estate associated with a leper hospital, and also a low potential for later prehistoric agriculture and settlement. Any *in situ* Palaeolithic remains would be of high importance, but reworked or residual remains of low importance. All other resources are of moderate importance.

The majority of the foundations for the new station buildings; platform extensions, an optional access road and the construction compounds occur within the existing railway cutting where archaeological impacts would be minimal, confined to the possible presence of Palaeolithic remains or 19th-century railway infrastructure. However, a minority of works occur outside the cutting, where archaeological survival is likely to be better. The outer edge of the station deck and retaining wall, access ramps and possibly works in two construction compounds may partially or completely remove potential archaeological remains.

These impact of the works would be of low magnitude before mitigation, with low potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

4.4.3 Route Window NE4 Summary Table

<i>Route window NE2 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Aldersbrook Sidings: new sidings, bridge works and a temporary construction compound. Retaining walls	Low potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

Ilford Station: new station; platform extensions; optional access road and construction compound.	Low potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
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4.5 Route Window NE5

4.5.1 Site 306 Seven Kings Station

Seven Kings Station is a locally listed building, and the site has high potential for features associated with the Roman and later London to Colchester road, the conjectured line of which crosses the station within *c* 10m of the Crossrail works, and for the medieval village of Seven Kings. It also has a low potential for Palaeolithic remains and for subsequent prehistoric agriculture and settlement. *In situ* Palaeolithic remains would be of high importance, but reworked or residual remains of low importance. All other resources are of moderate importance.

Piled platform extensions within the cutting would partially truncate potential Palaeolithic remains, only. Widening the existing railway cutting and extending the retaining wall could partially or completely remove potential Palaeolithic and later archaeological remains. The construction compound would have minimal impact upon archaeological remains.

The impact of the works would probably be of low magnitude before mitigation, with low potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, probably confined to an archaeological watching brief, producing no residual impact.

4.5.2 Route Window NE5 Summary Table

<i>Route window NE5 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Seven Kings Station: platform extensions, widening existing railway cutting, retaining wall, construction compound	Low potential for a significant impact	Incorporated mitigation forms preservation by record, probably a watching brief	None	Non-Significant

4.6 Route Window NE6

4.6.1 Site 307 Goodmayes Station and freight line

The Goodmayes Station site has moderate potential for Bronze Age or later activity, and for features associated with the Roman London to Colchester road (c 120m north of Crossrail site), and the documented medieval and later settlement of Goodmayes. It also has a low potential for Palaeolithic remains and for 19th-century railway infrastructure. *In situ* Palaeolithic remains would be of high importance, but reworked or residual remains of any period would be of low importance. Nineteenth-century railway evidence would be of low importance, and other potential resources of moderate importance. Archaeological remains within the permanent way are likely to have been partially truncated by the existing and earlier shallow cuttings, and are likely to be confined to the possibility of Palaeolithic remains.

Piled platform extensions would either partially or completely remove any surviving archaeological remains. The construction compound would have minimal impact upon archaeological remains. Works for the Goodmayes Freight Loop, however, would have no or minimal archaeological impact, confined to the possibility of late railway features.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, probably confined to an archaeological watching brief, producing no residual impact.

4.6.2 Route Window NE6 Summary Table

<i>Route window NE6 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Goodmayes Station: platform extensions, construction compound	Low potential for a significant impact	Incorporated mitigation forms preservation by record, probably a watching brief	None	Non-Significant

4.7 Route Window NE7

4.7.1 Site 308 Chadwell Heath Station

The Chadwell Heath Station site has moderate potential for the remains of medieval/post-medieval Wangey House and its associated gardens, adjacent to (and possibly within) the Crossrail site, and for features associated with the documented medieval and later hamlet of Chadwell. There is also low potential for Palaeolithic remains, for later prehistoric agriculture and settlement, and for features associated with the Roman and later London

to Colchester road (c 200m north of the railway at this point), and for 19th-century railway infrastructure. *In situ* Palaeolithic remains would be of high importance, but reworked or residual remains would be of low importance, as would 19th-century railway features. Other potential remains are of moderate importance.

Piled platform extensions would either partially or completely remove any archaeological remains within their footprints. Ground reduction and accommodation in three construction compounds would have minimal impact on surviving archaeological remains.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, probably confined to an archaeological watching brief, producing no residual impact.

4.7.2 Route Window NE7 Summary Table

Route window NE7 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Chadwell Heath: platform extensions and construction compounds	Potential for a significant impact	Incorporated mitigation forms preservation by record, probably a watching brief	None	Non-Significant

4.8 Route Window NE8

4.8.1 316 Romford Depot (part)

Approximately 60% of the part of the Romford Depot site in Route Window NE8 lies within an Area of Archaeological Priority. Foundation arches for the unfinished Crowlands station of 1900 survive in the northern face of the embankment, and possibly in the southern face. This site has a moderate potential for prehistoric agricultural, settlement, and ritual remains. It also has moderate potential for medieval and post-medieval agriculture, but a low potential for the associated settlement, and for Palaeolithic and Saxon remains. There is a low potential for Roman activity in Route Window NE8. Any *in situ* Palaeolithic remains would be of high importance, but reworked or residual material is of low importance, as are medieval and post-medieval agricultural remains, and the foundations for the unfinished station. Other potential remains are of moderate importance.

Construction of a dive-under (underpass) with its temporary works; replacement of Jutsums Lane bridge and possible road lowering; extensive retaining walls and a possible slurry wall cut-off would completely remove potential archaeological deposits. Screwfast

piles for a temporary cable bridge would damage and destroy the information value of potential archaeological remains within their individual footprints (assuming that they penetrate below the embankment). Approach ramps for the dive-under box would vary between partial and complete removal of potential archaeological remains. Extensive embankment widening and other earthworks, the establishment of two construction compounds, access roads, and some of the extensive reinstatement and landscaping (eg tree planting) would partially remove potential archaeological remains. A pump station and reservoir for the dive-under box, wash plant and waste tank for carriage washers, replacement sports facility, and sustainable urban drainage system are likely to partially or completely remove potential archaeological remains.

Diversion of utilities would include: demolition of an electrical control room and sub station; and diversion of high pressure gas pipes (that extend into RW NE9), a sewer and a water main. These works would involve local ground works that would partially or completely remove any surviving archaeological remains.

The impact of the works would be of high magnitude before mitigation, with potential for significant impacts. For the majority of the works, the incorporated mitigation measures would constitute *preservation by record*, resulting in no residual impact. In one local area (excavation through the existing railway embankment for the dive-under box, over a distance of *c* 40m, plus individual Screwfast piles for a temporary cable bridge) archaeological recording will not be possible because of the need to minimise closure of the GEML. However, there are no known archaeological remains in this location, and the works will only affect a small percentage of the Crossrail site. The residual impact is therefore considered non-significant.

4.8.2 Route Window NE8 Summary Table

<i>Route window NE8 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Romford Depot: dive-under, pump station, and reservoir for the dive-under box, embankment widening, retaining walls, landscaping, bridge, and enabling works including construction compounds (work sites), replacement sports facility, access roads, sustainable urban drainage system, wash plant, a waste tank, and diversion of utilities	Potential for a significant impact	Incorporated mitigation forms preservation by record	Removal without record of any surviving potential archaeological remains beneath embankment by excavations for the dive-under box over an area c 40m x 17.5m. Removal of information value from potential archaeological remains by individual Screwfast piles for a cable bridge (if they penetrate below the embankment)	Non-Significant

4.9 Route Window NE9

4.9.1 316 Romford Depot (part)

The part of the Romford Depot site in Route Window NE9 site lies within an Area of Archaeological Priority. A bridge from the original two track railway of c 1838 may survive within the core of the Nursery Walk subway, whereas a redundant overbridge to be removed is probably of 20th-century date. There is a high potential for below-ground remains of a late 19th-century gasworks. There is a moderate potential for prehistoric agricultural, settlement, and ritual remains and for medieval and post-medieval agriculture. There is a moderate potential for Roman activity, possibly settlement. However, there is a low potential for the nucleus of medieval and later Romford, which lies to the east and south and for Palaeolithic and Saxon remains. *In situ* Palaeolithic remains are of high importance, but redeposited artefacts would be of low importance, as

would medieval and post-medieval agricultural remains, remains of the gasworks, and the redundant overbridge. Other potential remains are of moderate importance.

Extensive retaining walls and a possible slurry wall cut-off would completely remove potential archaeological remains. Extension of a pedestrian underpass; extensive embankment widening and other earthworks; the main depot maintenance building; and Romford Dive-under Worksite North would partially or completely remove them. The other worksites (construction compounds); access roads and parking areas; and some of the extensive reinstatement and landscaping (eg tree planting) would partially remove potential archaeological remains. Extension of the underpass would also require removal of the redundant overbridge. The Route Control Centre, security gatehouse, car parks, access roads, and sustainable urban drainage system may partially or completely remove any surviving archaeological remains locally (subject to detailed design information) whereas works such as a wheel lathe facility, carriage paint shed and maintenance contractors' facilities are unlikely to have an impact as they are at a higher level.

Diversion of utilities would include: demolition of a gas holder; relocation of existing gas valve infrastructure; and diversion of high pressure gas pipes (that extend into RW NE8) and of a sewer. These works would involve local ground works that would partially or completely remove any surviving archaeological remains.

The impact of the works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* for resources of low to high importance, resulting in no residual impact.

4.9.2 Site 309 Romford Station

Romford Station is a locally listed building, and the majority of the site lies within an Area of Archaeological Priority, with the exception of the platform extensions. There is a high potential for below-ground remains of an early (established 1825) gasworks. There is moderate potential for palaeo-environmental evidence, and a low potential for Mesolithic or later remains, sealed beneath or within the River Rom alluvium. There is moderate potential for later prehistoric remains, and also for outlying features associated with medieval and later Romford and for 19th-century railway infrastructure. In addition, there is low potential for Palaeolithic remains in the Hackney Gravels, for Roman, and Saxon remains. *In situ* Palaeolithic or Mesolithic remains would be of high importance, but reworked or residual remains of all periods would be of low importance. Other potential remains are of moderate importance.

A new station concourse (including new and diverted utilities); widening the bridge over the river Rom and construction compounds would partially or completely remove potential archaeological remains. Together with platform extensions (at embankment level) they may also affect concealed structural elements of the original Eastern Counties/Great Eastern Railway. Works within Romford Station Worksite North would partially remove potential below-ground remains of the early gasworks.

The impact of the works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated and site-specific mitigation measures would constitute *preservation by record*, for below- and above-ground remains, respectively producing no residual impact.

4.9.3 Route Window NE9 Summary Table

<i>Route window NE9 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Romford Depot: embankment widening, retaining walls, landscaping, pedestrian underpass extension, maintenance depot and stabling sidings (including wheel lathe facility, carriage paint shed, maintenance contractors' offices). Route Control Centre, security gatehouse, car parks, access roads, and sustainable urban drainage system. Enabling works, including construction compounds (work sites) and diversion of utilities	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Romford Station: new station concourse, bridge widening and construction compounds at ground level. Platform extensions at embankment level.	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

4.10 Route Window NE10

4.10.1 Site 310 Gidea Park Station

The Gidea Park Station site lies within an Area of Archaeological Priority based on the potential for prehistoric and Roman remains on the terrace gravel, although this has yet to be demonstrated in the locality of the Crossrail site. Therefore the potential for such remains on the Crossrail site is considered to be low. There is also low potential for

outlying post-medieval features focused on the Tudor and later route of Balgores Lane. All of the potential resources are of moderate importance.

There would be no impact upon archaeological remains from the works within the cutting where no archaeological remains are expected to survive, and minimal impact from works in the construction compound.

The works have a low potential for a non-significant impact of low magnitude, and incorporated mitigation would probably be confined to an archaeological watching brief, leaving no significant residual impact.

4.10.2 Route Window NE10 Summary Table

<i>Route window NE10 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Gidea Park Station: platform extensions and construction compound	Non- Significant	Incorporated mitigation forms preservation by record, probably a watching brief	None	Non- Significant

4.11 Route Window NE11

4.11.1 Site 315 Gidea Park Sidings

The south-western c 100m of the Gidea Park Sidings site lies within an Area of Archaeological Priority. There is low potential for Palaeolithic remains (and moderate potential for palaeo-environmental data) buried within or beneath Head deposits, Mesolithic remains within any alluvium from the Ravensbourne, later prehistoric or Roman agriculture or occupation, outlying features associated with the medieval and settlement of Ardleigh Green and historic railway infrastructure. *In situ* Palaeolithic or Mesolithic remains would be of high importance. Other potential resources are of moderate importance.

The main impacts of the proposed sidings would result from cutting back the cutting edge, construction of retaining walls, a temporary access road, and a construction compound which would completely remove any surviving archaeological remains, with the probable exception of those deeply buried within or beneath Head or alluvium deposits, which are likely to be only partially removed. The impacts of the extension of a stream culvert, and new trackwork and drainage (outside of their existing footprints), would be confined to partially or completely removing potential archaeological remains within or beneath Head or alluvium deposits.

Diversion of utilities would include the diversion of a gas main, two sewers and two high voltage cables. These ground works would occur within the existing cutting, and so would have a low impact, confined to the possibility of Palaeolithic remains beneath the Head deposits, which would be partially or completely removed.

The impact of the works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

4.11.2 Route Window NE11 Summary Table

Route window NE11 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Gidea Park Sidings: cutting back the existing cutting edge, new retaining wall, new trackwork and drainage, culvert extension, levelling for a construction compound, temporary access road, utility diversions	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

4.12 Route Window NE12

4.12.1 Site 311 Harold Wood Station

Harold Wood Station lies within two separate Areas of Archaeological Priority, one of which is focused on the post-medieval ‘Gubbins’ manor house (200m west of Crossrail main works). The site has moderate potential for outlying features associated with the post-medieval house, and low potential for other post-medieval settlement activity and railway infrastructure, and also prehistoric, and possibly Roman, agriculture and settlement. All resources would be of moderate importance.

Piled platform extensions would completely remove any surviving archaeological remains, whilst other works (including those in the construction compound) would have no or minimal impact.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures, if required, would constitute *preservation by record*, probably an archaeological watching brief, producing no residual impact.

4.12.2 Route Window NE12 Summary Table

<i>Route window NE12 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Harold Wood Station: platform extensions, construction compound	Potential for a Significant impact	Incorporated mitigation, if required, forms preservation by record, probably a watching brief	None	Non-Significant

4.13 Route Window NE15

4.13.1 Site 312 Brentwood Station

The Brentwood Station site has a high potential for below-ground remains of the original 1840 Eastern Counties Railway terminal and station, and later 19th-century additions. The Brentwood Station site lies in a cutting where no archaeological remains earlier than mid 19th-century date are expected to survive. It is possible that some remains might survive north of the station and permanent way, if these areas were not terraced down to the level of the cutting. If this is the case, these areas would have a low potential for isolated Roman remains, and outlying features associated with the medieval and later town of Brentwood and its surrounding farmland. Isolated Roman features would be of low importance, other remains of moderate importance. Any well-preserved structures from the 1840s could be of high importance.

Ground disturbance for the construction compound would partially remove any surviving below-ground railway features, and ground disturbance for the piled platform extensions would partially or completely remove any surviving below-ground railway features, both might affect the site of an engine shed, turntable and sidings.

The impact of the works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, but where possible, impacts on potential below-ground 19th-century railway features in the Brentwood Station construction compound should be prevented by minimising or avoiding ground reduction, eg for accommodation footings and hard standing. This would result in no residual impact.

4.13.2 Route Window NE15 Summary Table

<i>Route window NE15 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Brentwood Station: platform extensions and construction compound	Potential for a significant impact	Incorporated mitigation forms preservation by record Site-specific mitigation: Where possible, impacts on potential below-ground 19th-century railway features within the Brentwood Station car park construction compound should be prevented by avoiding or minimising ground reduction, eg for accommodation, footings and hard standing	None	Non-Significant

4.14 Route Window NE17

4.14.1 Site 313 Shenfield Station and Turnback Sidings

The Shenfield Station site has moderate potential for palaeo-environmental evidence, and a low potential for Palaeolithic remains, sealed within or beneath Head deposits filling former stream channels. There is also low potential for Roman and medieval activity. Any *in situ* Palaeolithic remains would be of high importance, other potential remains are of moderate importance.

Excavations and retaining walls for the turnback sidings and a stabling siding, piles for a new platform and extensions to existing platforms and a ditch diversion are likely to partially or completely remove any surviving archaeological remains. Works in the construction compound could partially remove potential archaeological remains.

The impact of the works would probably be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

4.14.2 Route Window NE17 Summary Table

<i>Route window NE17 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Shenfield Station and Sidings: excavations and a retaining wall for the turnback sidings and stabling sidings; new platform; platform extensions, ditch diversion; construction compound (worksite)	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

4.15 Route Window R1

4.15.1 Site 237 Pitsea Sidings

The works at Pitsea Sidings would be confined to the refurbishment of the disused sidings with no new excavations: the track would be relaid in an area of existing ballast. This would have no impact on archaeological remains, therefore this site has not been assessed further.

5 Environmental Baseline & Assessment of Impacts - Isle of Dogs to Abbey Wood

5.1 Route-wide impacts

5.1.1 Protective Measures

Protective measures to mitigate the effects of ground settlement from tunnelling could require techniques, such as underpinning, which would require localised excavations. The location and details of any such measures that are required will not be determined within the timescale of the EIA, but they could partially or completely remove potential archaeological remains within the footprints of individual excavations.

5.1.2 OHLE masts

OHLE mast construction would take place from Victoria Dock Portal to Abbey Wood turnback sidings. The impacts of this on archaeological resources would be mitigated by a procedure commencing with detailed desk-based assessment to identify areas where archaeological watching briefs would be necessary. This would exclude areas of deep cuttings where archaeological remains would not survive, and embankments higher than the depth of the mast foundations. The archaeological watching briefs would pay particular attention to areas where there is either a high potential for archaeological remains to survive beneath the existing permanent way, or where there is low to high potential for remains of high importance, with a more general coverage elsewhere. This fieldwork would be followed by appropriate post-excavation assessment, analysis, publication, and archiving. This methodology is consistent with the Incorporated Mitigation procedure. These measures would produce *preservation by record*, and result in no significant residual impact.

5.2 Route Window SE1

There are no known structural archaeological remains which might be affected by ground settlement in Route Window SE1.

5.2.1 Site 232 Blackwall Way Shaft

The Blackwall Way Shaft site lies within an Area of Archaeological Importance. The site has high potential for prehistoric palaeo-environmental and topographic evidence, and for industrial archaeology associated with the Docks and the Thames riverfront, including railway infrastructure. There is low potential for prehistoric, Roman, medieval and later remains. Prehistoric structures such as timber trackways would be of high importance, and other remains of moderate importance, except for isolated Roman artefacts which are of low importance.

The basement housing the shaft would probably completely or almost completely remove all archaeological deposits down to the formation level. The underlying shaft would remove any remaining archaeological resources below that depth within its smaller footprint. Foundations for the boundary wall, works within the Blackwall Way

construction compound (worksite), and dewatering systems are likely to partially remove any potential archaeological remains.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.2.2 Site 217 Limmo Peninsula Vent Shaft

The Limmo Peninsula vent shaft site lies within an Archaeological Priority Area. The site has high potential for remains of the 19th to 20th-century Thames Ironworks shipyard. It also has moderate potential for evidence of past environments, and for Roman and later river management. In addition, it has low potential for the site of the medieval manor of Covelees, which may lie near the mouth of the river Lea. These resources are of moderate importance.

The ventilation and escape shaft would completely remove all surviving archaeological remains within its footprint.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.2.3 Route Window SE1 Summary Table

<i>Route window SE1 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Blackwall Way: intervention shaft: basement and shaft, construction compound	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Limmo Peninsula vent shaft	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

5.3 Route Window SE2

There are no known structural archaeological remains which might be affected by ground settlement in Route SE2

5.3.1 Site 219 Victoria Dock Portal

The Victoria Dock Portal site lies within an Archaeological Priority Area. The site has high potential for prehistoric and later palaeo-environmental remains, including peat beds, and moderate potential for prehistoric remains, including structures such as timber trackways, and for remains of the medieval manor house of Sudbury, whose location is uncertain. There is also high potential for industrial archaeology, including railway infrastructure and a filled-in drain, the Royal Victoria & Albert Docks Cut. Any remains of prehistoric structures such as trackways would be of high importance, other resources of moderate importance.

The tunnel portal, consisting of an emergency access and escape shaft, cut-and-cover tunnel, and tunnel approach ramp would completely remove all surviving archaeological remains within the footprint of these constructions, other than the eastern end of the ramp, where they may only be partially removed. The diversion of services and a gas main is likely to partially remove potential archaeological remains. Footings for structures within the construction compound, the Victoria Dock/Custom House Worksite, and a dewatering system may partially remove any surviving 19th-century railway or remains of the Royal Victoria & Albert Docks Cut.

Construction shafts for the diversion of the Royal Docks surface water sewer, Royal Docks foul sewer, and local surface water sewers would completely remove potential archaeological remains within their footprints.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.3.2 Site 220 Custom House Station

The site lies within an Archaeological Priority Area. The site has high potential for prehistoric and later palaeo-environmental remains, including peat beds, and moderate potential for prehistoric remains, including structures such as timber trackways. There is also high potential for industrial archaeology, including railway infrastructure and a filled-in drain, the Royal Victoria & Albert Docks Cut. Any remains of prehistoric structures, such as trackways would be of high importance, other resources of moderate importance.

Ground reduction for the below-ground tracks and platforms and service diversions are likely to partially or completely remove potential archaeological remains. Foundations for the new station, entrance building, footbridges, escape bridges, walkway extension, retaining walls/noise barriers, and a crane outside the area of ground reduction are likely to partially remove potential archaeological remains, and completely remove them within the footprints of piles, where used. In addition, structures within the construction compound, the Victoria Dock/Custom House Worksite, dewatering systems and an access ramp are likely to partially remove archaeological remains.

Construction shafts for the diversion of the Royal Docks surface water sewer, Royal Docks foul sewer, and local surface water sewers would completely remove potential archaeological remains within their footprints.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.3.3 Route Window SE2 Summary Table

Route window SE2 - Permanent Impacts				
Works & potential impact	Significance	Committed Mitigation	Residual Impact	
			Description	Significance
Victoria Dock Portal: retained cut leading to open ramp/cutting, tunnel portal, cut-and-cover section, tunnel eye with construction/evacuation shaft, construction compound, construction shafts for the diversion of the Royal Docks surface water sewer, Royal Docks foul sewer, and local surface water sewers	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Custom House Station: ground reduction for tracks and platforms, new station and entrance, retaining walls, foot and escape bridges, construction compounds, construction shafts for the diversion of the Royal Docks surface water sewer, Royal Docks foul sewer, and local surface water sewers	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

5.4 Route Window SE3

5.4.1 Site 412 Connaught Tunnel

The Connaught Tunnel was constructed in 1878. The site is located within an Archaeological Priority Area, and has high potential for prehistoric and later palaeo-

environmental remains, including peat beds, industrial archaeology associated with Royal Victoria and Royal Albert Docks, and for the below-ground remains of a late 19th-century vicarage. There is a moderate potential for evidence of prehistoric wetland activity including trackways, for Roman and later flood management, land reclamation and economic activity, and the below-ground remains of the later medieval manor house of Sudbury. Any remains of prehistoric structures such as timber trackways would be of high importance. Remains of the vicarage would be of low importance, other resources would be of moderate importance.

Possible major utility diversions are likely to partly or completely remove potential archaeological remains. Ground disturbance within three construction compounds (two of which are shared with other Crossrail sites) and for the replacement drainage system (where such works lie outside the area of the existing drainage system) would partially remove potential archaeological remains. There is also potential for damage to, or removal of, historic fabric of the tunnel.

The impact of these works would be of low magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* for below-ground remains, and site-specific mitigation of impacts to the tunnel would comprise assessment of architectural, visual, and historic qualities in order to determine the appropriate level of recording from those specified by RCHM(E) 1996, to constitute *preservation by record*. This is likely to take the form of a photographic record in advance of works followed by an archaeological watching brief during works. With this mitigation there would be no residual impact.

5.4.2 Site 222 Silvertown

The demolition of the existing Silvertown station, the bridge to the Tate and Lyle works, and associated works would have **no impact** on archaeological resources.

5.4.3 Route Window SE3 Summary Table

<i>Route window SE3 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Connaught Tunnel: replacement of drainage system, possible major utility diversion, and ground disturbance within three construction compounds (two of which would be shared with other Crossrail sites).	Potential for a significant impact	Incorporated and site-specific mitigation forms preservation by record for below-ground remains and for the tunnel	None	Non-Significant

5.5 Route Window SE4

There are no known structural archaeological remains which might be affected by ground settlement in Route Window SE4.

5.5.1 Site 225 North Woolwich Portal

The North Woolwich Portal site lies within an Archaeological Priority Area. It has high potential for palaeo-environmental and topographic evidence within the alluvium. There is moderate potential for prehistoric activity at the wetland/dry land interface (particularly Mesolithic to Bronze Age), and for Roman and later flooding, river management, and land reclamation, and for industrial and railway archaeology. Any prehistoric structures, such as timber trackways, would be of high importance. Other remains are of moderate importance.

The cut-and-cover tunnel approach ramp and emergency access shaft would vary between partially and completely removing potential archaeological remains. Service diversions are likely to partially or completely remove potential archaeological remains. Structures within the North Woolwich construction compound have the potential to partially remove potential archaeological remains.

Open cuts for the diversion of the Royal Dock sewer at Factory Road and reconstruction of the sewer at Albert Road, as well as shafts for the diversion of the sewer at Albert Road would completely remove potential archaeological remains within their footprints.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact.

5.5.2 Site 233 Warren Lane vent shaft

The Warren Lane vent shaft site lies within an Area of Archaeological Potential. The site has high potential for medieval and later occupation and industrial use of the area, and moderate potential for Roman occupation and burials. It has low potential for later prehistoric occupation. In addition, it has low potential for Palaeolithic remains, and moderate potential for palaeo-environmental evidence, buried within or below Head deposits. Any *in situ* Palaeolithic remains would be of high importance, but other remains are of moderate importance.

The vent shaft and associated basement would completely remove potential archaeological remains. Temporary services and a dewatering system in the construction compound, the Warren Lane Worksite, and probable service diversions may partially remove potential archaeological remains within their individual footprints.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.5.3 Route Window SE4 Summary Table

<i>Route window SE4 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
North Woolwich Portal: tunnel eye, cut-and-cover tunnel and approach ramp, construction compound and service diversions, open cuts for the diversion of the sewer at Factory Road and reconstruction of the sewer at Albert Road, as well as shafts for the diversion of the sewer at Albert Road	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Warren Lane Shaft: basement, shaft, construction compound and service diversions	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

5.6 Route Window SE5

There are no known structural archaeological remains which might be affected by ground settlement in Route Window SE5.

5.6.1 Site 411 Arsenal Way vent shaft

The Arsenal Way vent shaft site lies within an Area of Archaeological Potential. It has high potential for remains of the late 17th to 20th-century Woolwich Arsenal, and moderate potential for Roman burials. It also has low potential for Roman to medieval occupation and land management, and for convict burials from the Woolwich Warren. In addition, it has low potential for Palaeolithic remains, and moderate potential for palaeo-environmental evidence, buried within or below Head deposits. Any *in situ* Palaeolithic remains would be of high importance, and other remains of moderate importance.

The vent shaft and associated basement would completely remove potential archaeological remains. Footings for a pedestrian overbridge for construction staff, structures in the construction compound, the Arsenal Way Worksite, dewatering systems, and service diversions could partially remove any remains of Woolwich Arsenal surviving close to the modern ground surface.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.6.2 Route Window SE5 Summary Table

<i>Route window SE5 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Arsenal Way Shaft: basement and shaft, pedestrian overbridge, construction compound and service diversions	Potential for a significant impact	Incorporated mitigation forms preservation by record.	None	Non-Significant

5.7 Route Window SE6

There are no known structural archaeological remains which might be affected by ground settlement in Route Window SE6.

5.7.1 Site 227 Plumstead Portal

The Plumstead Portal site has high potential for palaeo-environmental and topographic evidence within the alluvium and Head deposits, and for post-medieval quarry pits. There is moderate potential for prehistoric activity at the wetland/dry land interface, medieval and later land management on the edge of the floodplain, and low potential for both Palaeolithic remains beneath Head deposits and for Roman or later occupation. Any *in situ* Palaeolithic remains, or prehistoric structures such as timber trackways, would be of high importance. All other remains are of moderate importance except for isolated Roman and later remains, which are of low importance.

The approach to the tunnel eye (consisting of the 670m long cut-and-cover tunnel, retained cut, approach ramp, and an emergency access shaft) would remove all potential archaeological remains along the works. In addition, works such as the North Kent Line track realignments, embankments, noise barriers, conveyor footings, structures in the construction compounds, particularly in the Plumstead Worksite West, and service diversions are likely to partially remove potential archaeological remains, and completely remove them within deep groundworks.

Cut-and-cover trenches and pipejacking reception pits for the diversion of electricity cables at White Hart Road would completely remove potential archaeological remains, and the pipejacked tunnel may partially remove potential archaeological remains.

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.7.2 Route Window SE6 Summary Table

<i>Route window SE6 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Plumstead Portal: tunnel eye, cut-and-cover tunnel, approach ramp, and construction compound, cut-and-cover trenches and pipejacking for the diversion of electricity cables at White Hart Road	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

5.8 Route Window SE6A

5.8.1 Site 413 Manor Wharf

The Manor Wharf site lies in an Archaeological Priority Area, and is located on the reclaimed alluvial floodplain of the River Thames and extends into the intertidal and sub-tidal areas. It has a high potential for palaeo-environmental evidence within the alluvial sequence, with a good potential for organic preservation and information on the changing river regime and past environments. In the foreshore zone, there is potential for exposed former prehistoric and later land surfaces, which, further inland, are buried beneath substantial depths of alluvium. The site has a high potential for medieval and early post-medieval (and possibly Roman) flood management and economic activity within the reclaimed marsh, for subsequent post-medieval industry, and for wrecks and structures of unknown date in the intertidal and sub-tidal zones. It has a moderate potential for prehistoric to Roman activity in the former marshes, including the Thames foreshore zone, where such remains may be exposed (see above). The site has a low potential for prehistoric timber structures, such as trackways or hulked boats, which would be of high importance. All other remains would be of moderate importance.

Dredging would partially or completely remove potential archaeological remains within the channel silts. Construction of the conveyors would partially remove potential archaeological remains if the footings extended below the existing modern made ground (of unknown depth). Ground disturbance associated with one, possibly two, stockpile areas and a haul road is likely to have no or minimal impact. Restoration of the existing jetty is likely to have no impact.

The impact of these works would be of low magnitude (depending on the extent of dredging) before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record* producing no residual impact. In a consultation meeting on 28.7.04, EH and GLAAS agreed that *preservation by record* was suitable for prehistoric timber trackways.

<i>Route window SE6A – Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description¹</i>	<i>Significance</i>
Manor Wharf: dredging of channel, conveyors, one, possibly two, stockpile areas and a haul road	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

5.9 Route Window SE7

5.9.1 Site 400 (part) Plumstead to Abbey Wood 4-tracking

The area of the 4-tracking within Route Window SE7 has high potential for Mesolithic and later prehistoric evidence including palaeo-environmental remains, which could include timber structures such as trackways. There is also moderate potential for medieval and later land management. Any remains of prehistoric structures, such as trackways would be of high importance, other resources of moderate importance.

Embankment widening for 4-tracking, associated retaining walls, noise barriers and replacement footbridges, are likely to partially remove potential archaeological remains, and completely remove them within the footprints of individual piles, where used. Individual works in the construction compounds: the Church Manorway Worksite North, Church Manorway Worksite South, Eynsham Drive Worksite North, Eynsham Drive Worksite South, Bostall Manorway Worksite North and Bostall Manorway Worksite South are likely to partially remove potential archaeological remains.

A trench and pipejacked tunnel for the diversion of electricity cables at Church Manorway, a pipejacked tunnel for the reconstruction of sewers at Mottisford Road/Bracondale Road, and other service diversions are likely to partially remove potential archaeological remains.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.9.2 Route Window SE7 Summary Table

<i>Route window SE7 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Plumstead to Abbey Wood 4-tracking (part): embankment, noise barriers, possible retaining walls, two replacement footbridges, strengthening Eynsham Drive bridge, construction compounds, a trench and pipejacked tunnel for the diversion of electricity cables at Church Manorway, a pipejacked tunnel for the reconstruction of sewers at Mottisford Road/Bracondale Road	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

5.10 Route Window SE8

5.10.1 Site 400 (part) Abbey Wood Station and Plumstead to Abbey Wood 4-tracking

The area of the 4-tracking within Route Window SE8 and Abbey Wood Station has high potential for Mesolithic and later prehistoric evidence including palaeo-environmental remains. There is also moderate potential for medieval and later land management, including land reclamation within the estate of Lesnes Abbey. Any remains of prehistoric structures, such as trackways, would be of high importance, other resources of moderate importance.

Foundations for the new Abbey Wood station, including platform extensions, entrance building, footbridges, and reconstructing Harrow Manorway bridge, would partially remove potential archaeological remains, and completely remove them within the footprints of any piles, where used. The pedestrian subway and approach ramps would partially or completely remove potential archaeological remains. Individual works in the construction compounds at Harrow Manorway Worksite North and Abbey Wood Station Worksite South are likely to partially remove potential archaeological remains.

Platform foundations, new trackbeds and drainage for reversing sidings, embankment widening for 4-tracking, associated retaining walls, noise barriers and works in the

Fendyke Road and Abbey Wood Sidings worksites would partially remove potential archaeological remains.

A cut-and-cover trench for diversion of the sewer at Abbey Wood station is likely to partially remove potential archaeological remains.

The impact of these works would be of moderate magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute *preservation by record*, producing no residual impact.

5.10.2 Route Window SE8 Summary Table

<i>Route window SE8 - Permanent Impacts</i>				
<i>Works & potential impact</i>	<i>Significance</i>	<i>Committed Mitigation</i>	<i>Residual Impact</i>	
			<i>Description</i>	<i>Significance</i>
Abbey Wood Station: new station, platforms, strengthen bridge, subway, escape bridges, construction compounds, cut-and-cover trench for sewer diversion	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant
Plumstead to Abbey Wood 4-tracking (part): embankment widening, noise barriers, possible retaining walls, two replacement footbridges, two new platforms, trackbeds, and drainage for reversing sidings, construction compounds	Potential for a significant impact	Incorporated mitigation forms preservation by record	None	Non-Significant

6 Cumulative Impacts

The historic remains of the Great Western Railway, in the Western Route Section (Route Windows W1 to W25), form part of the most complete railway of its date in the world, which has considerable historical associations with Isambard Kingdom Brunel, and the primary phase of world railway development (DCMS 1999, 58). Although the historic elements of the GWR affected by the Crossrail scheme are *not* amongst the selected parts included in the Tentative List of World Heritage Sites (those being proposed for World Heritage Site status), the List does draw attention to the contribution made by lesser structures to the value of the whole GWR.

As part of the assessment of the historical railway aspects of the proposed scheme, Crossrail has commissioned a specialist appraisal of the importance of the GWR bridges. The results of that work have been taken into account in this assessment (*see the assessment report which forms Appendix 2 to Part 5 of the archaeology technical report*).

In order to determine the severity of impacts upon the (unlisted) GWR bridges, MoLAS adopted the assessment methodology used by Alan Baxter & Associates in their assessment of built heritage resource (statutorily listed buildings). The MoLAS assessment methodology was designed primarily to assess likely severity of impacts upon below ground archaeological remains, and it was felt that the Alan Baxter & Associates methodology was more appropriate for assessing the severity of impacts upon the GWR bridges. This has also ensured that there is consistency between disciplines.

The Crossrail proposals include the demolition of nine bridges which incorporate substantial surviving elements of the original 1838 Brunel period structures. These bridges also include subsequent extensions which demonstrate the historical development of the railway, each constituting a single historic entity. These bridges are *individually* of moderate importance, with the exception of the Wexham Road bridge which is of low importance, but when considered as parts of the GWR as a whole, the group is of *high importance*. The proposals, however, entail the complete or substantive loss of every surviving Brunel period over-line structure over a 13km section of railway.

The bridges affected are:

Bridge	MoLAS Site No.	Route Window
Leigh Road Bridge	15	W20
Wexham Road Bridge (low importance)	20	W18
Middlegreen Road Bridge	21	W17
Trenches Bridge	22	W17
St Mary's Road Bridge	22	W17
Dog Kennel Bridge	24	W15
Thorney Lane Bridge	25	W14
Kingston Lane Bridge	28	W12
Old Stockley Road Bridge	29	W12

The individual impacts could be mitigated by *preservation by record* (recording to the appropriate level from those specified by RCHM(E) 1996).

However, no form of *preservation by record* would adequately compensate for the cumulative loss of historic fabric over a 13km length of the GWR, the importance of which lies in its completeness and collective value. *Preservation by record* would thus only have a minor mitigating effect on the cumulative impact of this group of demolitions.

The loss of these bridges would, therefore, *cumulatively* represent a *Significant* impact on the overall historic fabric of the GWR, a proposed World Heritage site.

As an alternative to demolition, track lowering would require a more extensive work area and would result in additional works including at each site some or all of track drainage, additional utility diversions, underpinning works to bridge foundations and construction of retaining walls. Track lowering at certain bridges would affect other rail infrastructure such as Dolphin Junction and Iver Station platforms. These works would cause severe disruption to the operational railway for the period of construction. Consequently, track lowering is not considered an appropriate solution for the retention of these bridges, although measures to retain a limited number of them will continue to be reviewed.

7 Principal Findings and Summary

The potential impacts of virtually all of the proposed works on archaeological remains would be mitigated by *preservation by record*.

At Stepney Green, possible impacts from the temporary works on 16th-century and later post-medieval remains will be mitigated by the redesign of the construction compounds which Crossrail has undertaken, and by protective works providing *preservation in situ*.

At the Pedley Street construction compound (worksite), potential impacts on any substantial well-preserved elements of the 1839–40 viaduct would be prevented by demolition being undertaken carefully, and ceasing if substantial well-preserved elements of the 1839–40 viaduct are encountered, allowing *preservation in situ*.

Therefore, significant residual impacts from the Crossrail scheme are confined to the cumulative impact on the historic fabric of the GWR of the removal of a group of nine bridges with mid 19th-century and later components (see 6 above).

There are no residual impacts assessed as particularly significant.

8 Appendices

8.1 Glossary

At grade	Where the railway is at the same level as the surrounding land; <i>ie</i> neither in a cutting nor on an embankment.
BGS	British Geology Survey; in particular the geological mapping produced by them and published by the Ordnance Survey
BP	Years before present, conventionally taken to be 1950
Bronze Age	<i>c</i> 2000–650 BC
Crannog	Piled platform for a dwelling in a lake or marsh; in south-east England, these would usually be of prehistoric date.
Crossrail Site, Site number	A division of the works along the Crossrail route for use solely in the Archaeology technical reports, see section 1.3.4.
DDBA	Detailed desk-based assessment(s); intensive site-specific archaeological impact assessment(s) that would be carried out <i>after</i> the scheme has been approved. In particular, these would address in detail issues of the survival or past removal of potential archaeological remains, localised truncation of from individual basements <i>etc.</i> , and any pertinent historical records. They would also identify in detail the impacts of the scheme from the latest, most detailed, engineering designs. Their purpose is to focus and refine the mitigation measures for works at a single site, of which they would form the initial stage. Where minimal further assessment is required, this could be included with the project design for the site.
Devensian	Geological era from 70,000 to 10,000 BP
Dive-under (underpass)	A short tunnel with ramps that carries one or more lines beneath existing track(s) that remain at grade.
DLR	Docklands Light Railway
ELL	East London Line
Eyot	A small island (in this work, one within the existing or former courses of the Thames or its tributaries)
GEML	Great Eastern Mainline
GER	Great Eastern Railway, originally the Eastern Counties Railway
GLSMR	Greater London Sites and Monuments Record (see SMR)
GWR	Great Western Railway
Holocene	Geological era from 10,000 BP to the present day

Iron Age	c 650 BC–AD 43
LB	London Borough
LTS	London, Tilbury & Southend Railway
m OD	Metres above Ordnance Datum (Newlyn). To obtain Crossrail project datum heights (mATD) add 100m to OD heights.
M & E	Mechanical and Engineering
Medieval	AD 1066–1485
Mesolithic	c 12,000–4000 BC
MIP	Mobility Impaired Person
Neolithic	c 4000–2000 BC
NKL	North Kent Line
NLL	North London Line
OS	Ordnance Survey
Palaeochannel	Deposits representing a former stream channel
Palaeolithic	c 500,000–12,000 BC
Pleistocene	Geological era from 2,000,000 to 10,000 BP
Post-medieval	AD 1485–present
RCHM(E)	Royal Commission on the Historic Monuments of England
Roman (Romano-British)	AD 43–c 410
RW	Route Window
Saxon (early-medieval)	AD 410–1066
Solifluction, Soliflucted	Creeping of soil down a slope during periods of freeze and thaw in periglacial environments. Such material can seal and protect earlier landsurfaces and archaeological deposits which might otherwise not survive later erosion.
SSSI	Site of Special Scientific Interest, as defined by English Nature. Some of these are designated on the basis of Palaeolithic, or other archaeological, deposits.
Sitecodes	Unique identifying codes centrally allocated to archaeological fieldwork sites, <i>eg</i> evaluation, excavation, or watching brief sites, in Greater London and Essex. In Kent no sitecodes are centrally allocated, but individual archaeological units may allocate their own sitecodes; where no sitecode has been allocated, or it is not available from the publicly available data, a number prefixed with the letter ‘K’ has been allocated by MoLAS for the purposes of this assessment.

SMR	Sites and Monuments Record(s): databases of archaeological finds (including antiquarian and chance finds, as well as more systematic excavation results) and related information held by local authorities. It should be noted that many of the older records are not closely located, and presence of a 'spot' in the mapping (see Part 6) does not necessarily indicate the precise location of a find.
TBM	Tunnel boring machine.
Underpass	See dive-under

8.2 Sources of Data used for ES Mapping

NB Technical report figures show only those Sites and Monuments Records and Site codes most relevant to the Crossrail works.

Legend Feature	Definition	Source	Extent of mapping	Date Data Obtained
Scheduled Ancient Monument	Archaeological sites designated by the Secretary of State for Culture, Media & Sport in accordance with the Ancient Monuments and Archaeological Areas Act 1979.	Schedule held by English Heritage on behalf of the Department of Culture, Media & Sport	Within search areas of a minimum of 200m around the Crossrail works, depending on the type of area (eg urban or rural) and the density of archaeological records.	C&E: May to October 2003; updated for RW C12-3, NE7-9 & NE13 Feb 2004. W: W1-W14: Feb 2004; W15-W29 May 2004.
Historical Burial Ground	Post-medieval burial grounds recorded in historical (not archaeological) documents and maps.	Current Ordnance Survey maps; Sites and Monuments Records; historic maps; Basil Holmes, 1896, <i>The London Burial Grounds</i> ; other documentary sources.	Within a minimum of 200m of the Crossrail works as defined by Parliamentary Plans Revision E.	C&E: April to June 2003 W: W1-W14: Feb/Mar 2004; W15-W29: April to May 2004.

Legend Feature	Definition	Source	Extent of mapping	Date Data Obtained
Archaeological Priority Zone	Areas of archaeological priority, significance, potential or other titles, designated by local authorities (LAs). Note: the whole of the City of London is considered the equivalent of an archaeological priority zone, and some LAs chose not to designate such zones, but treat all planning applications on their individual merits.	Barking: UDP A4 Map 1996; Bexley: UDP 2nd deposit draft 2001; Brent: UDP Sept 1992; Camden: UDP adopted Mar 2000; Ealing: UDP proposals map, 2nd deposit October 2002; Greenwich: UDP 1st deposit draft Feb 2002; Hackney: UDP 2000; Hammersmith and Fulham: UDP proposals map August 2003; Havering: UDP March 1993 (via data supplied by English Heritage, Greater London Archaeology Advisory Service, 2003); Hillingdon: UDP proposals map, adopted Sept 1998; Hounslow UDP adopted 2003; Islington UDP adopted plan 2002; Kensington & Chelsea: UDP proposals map, adopted May 2002; Kent: Structure Plan deposit draft 2003; Newham UDP adopted June 2001; Redbridge UDP adopted 2000; Tower Hamlets: UDP 1998 – digital data supplied by LB Tower Hamlets 2001; Westminster UDP proposals map, 1st deposit September 2000	Route Window	C&E: 2002 to 2003, updated 2004 W: February 2004

Legend Feature	Definition	Source	Extent of mapping	Date Data Obtained
Sites and Monuments Record	Databases of archaeological sites and monuments maintained by, or on behalf of, local authorities. Mapped within search areas varying between 200m and 1000m around the Crossrail works, from data provided by the Sites and Monuments Records.	Greater London Sites and Monuments Record, Essex Heritage Conservation Record, Kent Sites and Monuments Record, Buckinghamshire Sites and Monuments Record, and East Berkshire Sites and Monuments Record (held by Reading Museum)	Within a search area varying between 200m and 1000m around the Crossrail works depending on the type of area and density of archaeological records (eg urban or rural).	C&E: November 2002 to June 2003 and February 2004 W: Heathrow To Westbourne Grove: February 2004; Maidenhead to Heathrow: April to July 2004
Archaeological fieldwork sites	Archaeological fieldwork sites. Mapped within search areas varying between 200m and 1000m around the Crossrail works, from data provided by the Sites and Monuments Records. Note that Kent does not issue codes to individual fieldwork sites (site codes); numbers for relevant sites in Kent have been assigned by MoLAS, and are preceded by the letter K.	MoLAS database, LAARC database, summaries published in London Archaeologist, Greater London Sites and Monuments Record, Essex Heritage Conservation Record, Kent SMR, Pre-Construct Archaeology, RLE CTRL (Union Railways (North) Limited), Buckinghamshire SMR, East Berkshire SMR (held by Reading Museum).	Within a search area varying between 200m and 1000m around the Crossrail works depending on the type of area and density of archaeological records (eg urban or rural).	C&E: November 2002 to October 2003 and February 2004 W: Heathrow To Westbourne Grove: February 2004; Maidenhead to Heathrow: April to July 2004