

# Technical Appendix 2.5: Historic Environment Assessment



**Reading Station Shopping Centre  
Vastern Road  
Reading  
RG1 8AL**

**Historic Environment Assessment**

NGR 471426 174045

Sign-off history

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Note: site outlines may appear differently on some figures owing to distortions in historic maps. North is approximate on early maps.

# Executive summary

Ramboll, on behalf of Aviva Life & Pensions UK Limited ('the Applicant'), has commissioned MOLA to carry out a historic environment assessment in advance of proposed development at Vastern Court Retail Park, Vastern Road, Reading, in the County of Berkshire.

The planning application is for:

'Outline planning permission with the details of access, appearance, landscaping, layout and scale reserved for later determination. Demolition and redevelopment to comprise: up to [115,000] sqm GEA in one or more land uses comprising: Residential (Class C3 and including PRS); Offices (Class B1(a); development in Classes A1, A2, A3 (retail), A4 (public house), A5 (take away), C1 (hotel), D1 and D2 (community and leisure); car parking; provision of new plant and renewable energy equipment; creation of servicing areas and provision of associated services, including waste, refuse, cycle storage, and lighting; and for the laying out of the buildings; routes and open spaces within the development; and all associated works and operations including but not limited to: demolition; earthworks; provision of attenuation infrastructure; engineering operations. All development, works and operations to be in accordance with the approved Development Parameters Schedule and Plans'.

The site is not within an area of archaeological potential as designated by the Local Planning Authority. This desk-based study assesses the impact of the scheme on buried heritage assets (archaeological remains). Above ground heritage assets (historic structures) are not discussed in detail, but they have been noted where they assist in the archaeological interpretation of the site.

Historically, the site was located within marshy ground to the north of the settlement at Reading and there is no evidence of extensive use or settlement in the vicinity of the site until the later post-medieval period.

Buried heritage assets that may be affected by the proposals comprise:

- **Post-medieval land reclamation remains.** The site was in open land until the urban centre of Reading began to expand northward towards the River Thames in the early 19th century. Drainage canals can be seen on early 19th century maps crossing the land in which the site was located. Evidence of the drainage canals is likely to be found cut into the underlying alluvial deposits and would be of low significance.
- **Remains of the Great Western Railway yards.** In the later 19th and 20th centuries the site was occupied by the marshalling yards of the Great Western Railway. There is high potential for evidence such as track beds of the railway lines connecting the coal depot to the station, throughout the site. Remains of this type would be of low significance.

Survival of earlier archaeological remains is likely to be limited due to the development of the railway depot across the site, and subsequent development.

Possible construction impacts are outlined in this report: shallow works would be likely to truncate or remove post-medieval railway remains, new foundations or other deep ground disturbance could remove entirely any archaeological remains within their footprint. Although the detailed proposals have not yet been finalised, a full assessment has been undertaken on the impacts of the outline scheme on the significance of buried heritage assets.

The archaeological potential of the site is likely to be limited to remains of no more than low significance and therefore further survey work (i.e. archaeological evaluation trial trenches or pits) is not considered to be necessary. It is recommended that an archaeological watching brief during preliminary ground preparation and subsequent foundation construction, would mitigate the impacts of the proposals and ensure that any archaeological assets were not removed without record. This strategy could be refined and targeted by the prior archaeological monitoring of geotechnical investigations, which would clarify the nature and depth of deposits: based on the results, it is possible that no further work may be necessary..

Any archaeological work would need to be undertaken in consultation with RBC and in accordance with an approved Written Scheme of Investigation (WSI) and could be carried out under the terms of a standard archaeological planning condition set out with the grant of planning consent.

# 1 Introduction

## 1.1 Origin and scope of the report

- 1.1.1 Ramboll, on behalf of Aviva Life & Pensions UK Limited (hereafter referred to as 'the Applicant'), has commissioned MOLA (Museum of London Archaeology) to carry out a historic environment assessment of a proposed development of land at Reading Station Park, Reading, (hereafter referred to as 'the site'), as shown in Fig 1. The proposal comprises:
- Construction of approximately four new buildings, up to approximately 112.9mAOD, indicatively up to 23 storeys;
  - Delivery of a total maximum floorspace of up to 115,000 m<sup>2</sup> gross external area (GEA), which could include;
  - Residential, retail, leisure and community, office and hotel use
  - Construction of a single level basement;
  - Demolition of existing buildings;
  - New vehicular, pedestrian and cycle routes
  - The proposed development would deliver below ground surface water attenuation. The parameter plans would allow for excavation up to 1.5mbgl for this within the areas shown in Parameter Plan 105.
- 1.1.2 This desk-based study assesses the potential impacts and likely effects of the proposed development on buried heritage assets (archaeological remains), if present, at the site. It forms a technical appendix of the Environmental Statement, and will enable the archaeological advisors to RBC to make an informed decision on the proposed development in the light of the likely effects upon any known or possible heritage assets. These are parts of the historic environment which are considered to be significant because of their historic, evidential, aesthetic and/or communal interest.
- 1.1.3 This report deals solely with the archaeological implications of the proposed development and does not cover possible built heritage issues, except where buried parts of historic fabric are likely to be affected. Above ground assets (i.e., designated and undesignated historic structures and conservation areas) on the site or in the vicinity that are relevant to the archaeological interpretation of the site are discussed. Whilst the significance of above ground assets is not assessed in this archaeological report, direct physical impacts upon such assets arising from the development proposals are noted. The report does not assess issues in relation to the setting of above ground assets (e.g., visible changes to historic character and views).
- 1.1.4 The assessment has been carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) (MHCLG 2019; see section 9 of this report) and to standards specified by the Chartered Institute for Archaeologists (CIfA 2014, 2017), Historic England (EH 2008, HE 2015), and Berkshire Council. Under the 'Copyright, Designs and Patents Act' 1988 MOLA retains the copyright to this document.

## 1.2 Designated heritage assets

- 1.2.1 Historic England's National Heritage List for England (NHL) is a register of all nationally designated (protected) historic buildings and sites in England, such as scheduled monuments, listed buildings and registered parks and gardens. The NHL does not include any nationally designated heritage assets within the site. The nearest nationally designated heritage asset is the Grade II listed Main Building of Reading General Station (NHL no 1321892), c 150m south of the site. The Scheduled Monument of Reading Abbey extends into the south-eastern edge of the study area, at its nearest c 375m south-east of the site boundary.
- 1.2.2 The site is not within either a conservation area or an area of archaeological potential as designated by the Local Planning Authority.

## 1.3 Aims and objectives

- 1.3.1 The aim of the assessment is to:
- identify the presence of any known or potential buried heritage assets that may be affected by the proposed development;
  - describe the significance of such assets, as required by national planning policy (see section 9 for planning framework and section 10 for methodology used to determine significance);
  - assess the potential impacts and likely effects upon the significance of the assets arising from the proposed development; and
  - provide recommendations for further assessment where necessary of the historic assets affected, and/or mitigation aimed at reducing or removing completely any adverse impacts upon buried heritage assets and/or their setting.

## 2 Methodology and sources consulted

### 2.1 Sources

- 2.1.1 For the purposes of this report, documentary and cartographic sources including results from any archaeological investigations in the site and the area around it were examined in order to determine the likely nature, extent, preservation and significance of any buried heritage assets that may be present within the site. This information has been used to determine the potential for previously unrecorded heritage assets of any specific chronological period to be present within the site.
- 2.1.2 In order to set the site into its full archaeological and historical context, information was collected on the known historic environment features within a 550 m-radius study area around it, as held by the primary repository of such information within Berkshire, the Berkshire Historic Environment Record (BHER). The BHER is managed by Berkshire Archaeology and includes information from past investigations, local knowledge, find spots, and documentary and cartographic sources. The study area was considered through professional judgement to be appropriate to characterise the historic environment of the site. Occasionally there may be reference to assets beyond this, where appropriate, e.g., where such assets are particularly significant and/or where they contribute to current understanding of the historic environment.
- 2.1.3 The extent of investigations as shown on Fig 2 may represent the site outline boundary for planning purposes, rather than the actual area archaeologically investigated. Where it has not been possible from archive records to determine the extent of an archaeological investigation (as is sometimes the case with early work), a site is represented on Fig 2 only by a centrepoint.
- 2.1.4 In addition, the following sources were consulted:
- MOLA – in-house Geographical Information System (GIS) with statutory designations GIS data from Historic England, and archaeological publications;
  - Historic England – information on statutory designations including scheduled monuments and listed buildings, along with identified Heritage at Risk;
  - Berkshire Record Office – historic maps and published histories;
  - Groundsure– historic Ordnance Survey maps from the first edition (1860–70s) to the present day;
  - British Geological Survey (BGS) – solid and drift geology digital map; online BGS geological borehole record data;
  - Aviva Investors – parameter plans (Collado Collins 2019), existing site topographical survey (Plowman Craven 2019);
  - Internet Sources (please see bibliography)– web-published material including the LPA local plan (Reading Borough Council, 2019), and information on conservation areas and locally listed buildings.
- 2.1.5 The assessment included a site visit carried out on the 8 April 2019 in order to determine the topography of the site and the nature of the existing buildings on the site, and to provide further information on areas of possible past ground disturbance and general historic environment potential. Observations made on the site visit have been incorporated into this report.

### 2.2 Methodology

- 2.2.1 Fig 2 shows the location of known historic environment features within the study area. These have been allocated a unique historic environment assessment reference number (**HEA 1, 2**, etc), which is listed in a gazetteer at the back of this report and is referred to in the text. Where there are a considerable number of listed buildings in the study area, only those within the vicinity of the site (i.e. within 200 m) are included, unless their inclusion is considered relevant to the study. Conservation areas are not shown. All distances quoted in the text are approximate (within 5 m) and unless otherwise stated are measured from the nearest part of the site boundary.

- 2.2.2 Section 10 sets out the criteria used to determine the significance of heritage assets. This is based on four values set out in Historic England's *Conservation principles, policies and guidance* (EH 2008), and comprise evidential, historical, aesthetic and communal value. The report assesses the likely presence of such assets within (and beyond) the site, factors which may have compromised buried asset survival (i.e. present and previous land use), as well as possible significance.
- 2.2.3 Section 11 includes non-archaeological constraints. Section 12 contains a glossary of technical terms. A full bibliography and list of sources consulted may be found in section 13 with a list of existing site survey data obtained as part of the assessment.

### 2.3 Assumptions and limitations

- 2.3.1 Within the limitations imposed by dealing with historical material and maps, the information in this document is, to the best knowledge of the author and MOLA, correct at the time of writing. Further archaeological investigation, more information about the nature of the present buildings, and/or more detailed proposals for redevelopment may require changes to all or parts of the document.

## 3 The site: topography and geology

### 3.1 Site location

- 3.1.1 The site is located at Reading Station Park, Vastern Rd, Reading RG1 8AL (National Grid Reference 471427 174045; Fig 1). The site area is 1.8ha and is bounded by Vastern Road to the north-east, Trooper Potts Way to the east and south-east, Vastern House Sorting Office to the south and south-west and Caversham Road to the west and north-west. The site falls within the historic parish of Reading St Lawrence within the county of Berkshire.
- 3.1.2 The River Thames is 210 m north of the site at the location of Fry's Island. The River Kennet is 765 m south of the site.

### 3.2 Topography

- 3.2.1 Topography can provide an indication of suitability for settlement, and ground levels can indicate whether the ground has been built up or truncated, which can have implications for archaeological survival (see section 5.2).
- 3.2.2 A topographical survey of the site was undertaken in April 2019 by Plowman Craven and showed that the site is mostly flat with variation between 38.2 m above Ordnance Datum (mAOD) in the north-east corner of the car park to 38.6 mAOD at the western end of the southern range of buildings then falling to 38.4 mAOD in the north-west corner of the car park and 38.2 mAOD in the west entrance to the site (Plowman Craven 2019).

### 3.3 Geology

- 3.3.1 Geology can provide an indication of suitability for early settlement, and potential depth of remains.
- 3.3.2 The underlying geology comprises alluvium. In places the alluvium is capped by a fine-grained silt known as 'brickearth', which was laid down as alluvial and/or wind-blown deposits during the last glaciation around 17,000 BC. This produced fertile soils but was often exploited for the manufacture of bricks and much has been removed by quarrying or by subsequent building development. The bedrock of the area is comprised of the Seaford Chalk Formation and Newhaven Chalk Formation which is sedimentary bedrock formed between 89.8 and 72.1 million years ago during the Cretaceous period.
- 3.3.3 No recent geotechnical investigations have been undertaken within the site and consequently historic BGS borehole data have been used to understand the geology of the site. The BGS records six boreholes within the site which records show are actually test pits excavated in 1988 as part of a geotechnical investigation (BGS borehole reference numbers SU77SW892–SU77SW897). The ground level of the pits was not noted, and depths were recorded as metres below ground level (mbgl). Two boreholes, SU77SW623 and SU77SW297, undertaken outside the site have also been used to understand the surrounding geology. SU77SW623 was taken in on Caversham Road 75m north-west of the site in 1999. SU77SW297 was taken on Vastern Road 95m east of the site in 1989. The locations of the boreholes and test pits are shown on Fig 3 and the results detailed in Table 1.
- 3.3.4 Table 1 differentiates between modern made ground (i.e. containing identifiably modern inclusions such as concrete and plastic) and undated made ground, which may potentially contain deposits of archaeological interest. In all likelihood, the undated made ground comprises post-medieval railroad development.

Table 1: summary of historic BGS borehole data (BGS 2019)  
Levels are in metres below ground level (mbgl)

BH ref.	Modern made ground	Undated made ground	Natural alluvium	Natural gravel	Top of natural chalk
SU77SW892	<0.3	0.3–1.7	1.7–2.6 (terminated)	–	Not reached
SU77SW897	<0.2	0.2–2.1	2.1–2.3 (terminated)	–	Not reached
SU77SW896	<0.4	0.4–1.8	1.8–2.5 (terminated)	–	Not reached
SU77SW895	<0.5	0.5–2.4	2.4–2.7 (terminated)	–	Not reached
SU77SW894	<0.3	0.3–1.4	1.4–1.9	1.9–2.5 (terminated)	Not reached
SU77SW893	<0.2	0.2–1.5	1.5–2.6 (terminated)	–	Not reached
SU77SW623	<1.9	–	1.9–2.4	2.4–6.9	6.9
SU77SW297	<1.4	1.4–1.8	1.8–2.4	2.4–10.0 (terminated)	Not reached

- 3.3.5 The results of the test pits excavated in 1988 suggest that the undated made ground overlies the site to a depth of 2.4 m in places overlying alluvial deposits. Although the BGS maps show the presence of brickearth within the site, none was found during the previous geotechnical investigation, possibly as a result of truncation through railway yard development in the later post-medieval period. Although the BGS does not record the presence of river terrace gravels underlying the alluvial deposits, a borehole taken within the site (SU77SW894) recorded gravels at 1.9mbgl and both boreholes taken in the vicinity of the site (SU77SW623 and SU77SW297) show gravel deposits are present to the east and west of the site under alluvial deposits.

## 4 Archaeological and historical background

### 4.1 Overview of past investigations

- 4.1.1 There have been no previous investigations within the site. 29 previous investigations, primarily comprising evaluations and watching briefs, have been conducted within the 550m-radius study area. The investigations were mostly undertaken to the south and east of the site within the bounds of the historic town of Reading.
- 4.1.2 The closest investigation to the site is an evaluation undertaken on Brigham Road in 1998–99 45 m north of the north-east corner of the site (HEA 2) which confirmed the presence of alluvium and localised peat deposits; however, no additional archaeological remains were identified. The results suggested that the evaluation site was located within a possible north-south inlet of the River Thames.
- 4.1.3 The results of these investigations, along with other known sites and finds within the study area, are discussed by period, below. The date ranges given are approximate.

### 4.2 Chronological summary

#### *Prehistoric period (800,000 BC–AD 43)*

- 4.2.1 The Lower (800,000–250,000 BC) and Middle (250,000–40,000 BC) Palaeolithic saw alternating warm and cold phases and intermittent perhaps seasonal occupation. During the Upper Palaeolithic (40,000–10,000 BC), after the last glacial maximum, and in particular after around 13,000 BC, further climate warming took place and the environment changed from steppe-tundra to birch and pine woodland. It is probably at this time that Britain first saw continuous occupation. Erosion has removed much of the Palaeolithic land surfaces and finds are typically residual. Two lower Palaeolithic hand axes were found by chance, one in 1904 in a drainage trench on Station Road 330m south of the site (HEA 48) and another in 1903 on Vachel Road 375m south-west of the site (HEA 50). A struck Levalloisian flake was found by chance near Caversham Road 435m south-west of the site (HEA 51).
- 4.2.2 The Mesolithic hunter-gatherer communities of the postglacial period (10,000–4000 BC) inhabited a still largely wooded environment. The river valleys would have been favoured in providing a dependable source of food (from hunting and fishing) and water, as well as a means of transport and communication. Evidence of activity is characterised by flint tools rather than structural remains and has been recovered from the Thames in two places noted by the BHER. This evidence consists of a tranchet axe, pick and blade found in the Thames River 230m west of the site (HEA 43) and seven tranchet axes, four picks, and a mace found in the Thames 330m north of the site (HEA 44).
- 4.2.3 The Neolithic (4000–2000 BC), Bronze Age (2000–600 BC) and Iron Age (600 BC–AD 43) are traditionally seen as the time of technological change, settled communities and the construction of communal monuments. Farming was established and forest cleared for cultivation. An expanding population put pressure on available resources and necessitated the utilisation of previously marginal land.
- 4.2.4 Evidence of Neolithic activity in the study area was primarily found by chance and consists of an unspecified number of Neolithic axes and a perforated hammer head dredged from the Thames 230m west of the site (HEA 43), a Late Neolithic to Early Bronze Age basin shaped decorated drinking cup found within the Thames 330m north of the site (HEA 44), and a flint axe found in St Laurence's Churchyard 420m south-east of the site (HEA 62).
- 4.2.5 Unspecified stray finds dated to the Bronze Age were found during excavation to the rear of 1 Friar Street in 1998–99, 420m south-east of the site (HEA 14). Additional evidence of Bronze Age activity, consisting of a Middle Bronze Age dagger, socketed knife, two palstaves, a socketed sickle, a socketed axehead, a leaf shaped spearhead, a basal looped spearhead and a Bronze Age pot, was dredged from the Thames 230m west of the site (HEA 43). An additional Bronze Age spearhead was noted as being retrieved from the Thames opposite Caversham 330m north of the site (HEA 44).
- 4.2.6 An Early Iron Age brooch was found by chance at Friar Street 365m south of the site

(HEA 55).

- 4.2.7 Although the site is located on a possible gravel terrace between the channels of two rivers, previous geotechnical investigations show the presence of deep alluvial deposits across the site suggesting that it may have been regularly inundated. No indication of occupation has been found within the study area and the evidence from this period is limited to chance finds. Although it is possible that extensive development of the study area in the later medieval and post-medieval periods has removed evidence of settlement and use during the prehistoric period, it is more likely that the marshy nature of the site did not allow for such use, and that activity in and around the site was confined to hunting and possibly, later, farming.
- Roman period (AD 43–410)*
- 4.2.8 The Roman town of *Calleva Atrebatum*, located at Silchester roughly 12.1km to the south-west of the site, likely represented the main urban centre in the region during this period. This is reflected in the fact that there is little archaeological evidence for the Roman occupation of Reading, although it is thought that this may be partly the result of extensive urban development of the area from the medieval period onwards (Norton and Poore 2007).
- 4.2.9 Although settlement within Reading is unlikely, the use of the Thames and the Kennet to transport goods and people is probable. Evidence for Roman activity within the study area is primarily limited to chance finds comprised of a 3rd century AD Brass coin of Magnentius found on Greyfriars Road 355m to the south-west of the site (HEA 49), a 1st century dupondius (coin) of Vespasian found in the sump of a new slipway on the Thames River in 1956 180m to the north-east of the site (HEA 42), and Romano-British coarseware sherds found on the site of the former Littlewoods store on Friar Street 460m to the south of the site (HEA 60). Unspecified stray finds dated to the Roman period were found during excavation to the rear of 1 Friar Street in 1998–99 420m south-east of the site (HEA 14).
- 4.2.10 The site was located outside any known settlements; however, given the site's location near the channel of the Thames it is possible that isolated finds may be present within the alluvium or at the interface between the gravels and the alluvium.

#### *Early medieval (Saxon) period (AD 410–1066)*

- 4.2.11 Following the withdrawal of the Roman army from England in the early 5th century AD, Germanic ('Saxon') settlers arrived from mainland Europe, with occupation in the form of small villages and an economy initially based on agriculture. By the end of the 6th century a number of Anglo-Saxon kingdoms had emerged, and as the ruling families adopted Christianity, endowments of land were made to the church. Landed estates (manors) can be identified from the 7th century onwards; some, as Christianity was widely adopted, with a main 'minster' church and other subsidiary churches or chapels. In the 9th and 10th centuries, the Saxon Minster system began to be replaced by local parochial organisation, with formal areas of land centred on settlements served by a parish church.
- 4.2.12 The place-name 'Reading' is thought to have derived from a Saxon tribe known as *Readingas*, who settled in this area in the 6th century (Reading Borough Council 2008). Reading is first mentioned in the Anglo-Saxon Chronicle in 871 AD, in the year that the Danes invaded Wessex, took Reading and put up fortifications between the Kennet and the Thames (Ditchfield and Paige 1923, fn. 1). It was during this period that Roman roads converging on Silchester begun to be replaced with roads meeting in Reading, and a church was established on the current site of Reading Minster, 670m to the south of the site (Reading Minster 2018). G. G. Astill's *Historic Towns in Berkshire* contains a possible projection of the extent of the Saxon settlement (not reproduced) which is thought to have been centred on the church suggesting that the site was located just outside of the settlement between the north edge and the Thames River. The lines of Danish defences of Reading were also illustrated in G. G. Astill's *Historic Towns in Berkshire* and a north-south eastern defence line was plotted by the BHER with the northern terminus located at 230m south-east of the site (HEA 33).
- 4.2.13 The burial of a man was found by chance in 1831, 100 yards east of the end of the engine sheds at Reading Station during the digging of ballast pits 60m south of the site (HEA 38). The skeleton was accompanied by a Scandinavian 'Gripping Beast' style sword dated to the late 8th to early 9th century and the skeleton of a horse (BHER Monument entry MRD3891). Unspecified stray finds dated to the Saxon period were found during excavation to the rear of 1

Friar Street in 1998–99 420m south-east of the site (**HEA 14**).

- 4.2.14 The site was likely within open cultivated fields or pasture between the north side of the settlement at Reading and the Thames.

#### *Later medieval period (AD 1066–1485)*

- 4.2.15 Reading Abbey was founded by Henry I in 1121 350m south-east of the site (**HEA 34**). The founding of the abbey focused attention away from the old market in St Mary's Butts to the gates of the new abbey, and this was reflected in the road layout with Broad Street (500m south of the site) and New Street (now Friar Street, 380m south of the site) laid out to provide access to it (Cotswold Archaeology 2015, 19). After the Norman invasion of 1066, William the Conqueror gave to the abbey of St Martin at Battle a church as well as 29 *mansurae* in the town of Reading. In the Domesday Survey, Reading is referred to as a borough, with the town and manor being surveyed separately (Ditchfield and Paige 1923, fn. 5–6).
- 4.2.16 The remains of a wall associated with Reading Abbey was found during a watching brief in 1987–89 on Forbury Road 385m to the south-east of the site (**HEA 25**). A medieval mortar floor of a cellar or undercroft associated with the dormitory area of Reading Abbey was identified during a watching brief and evaluation within Forbury Gardens and Abbey Ruins in 2004–05 385m south-east of the site (**HEA 22**).
- 4.2.17 A Franciscan Friary was founded in Reading in 1233 and was initially located by the River Thames, possibly in Vastern Meadows (**HEA 39**) which was reportedly given to the Friars Minor by the Abbot and Convent of Reading in 1233 and given the general location point 230m south of the site by the BHER (BHER Monument entry MRM16015). The Friary was moved to New Street (Friar Street) in c 1285. Building works at 7 Greyfriars Road revealed the footings of a large building thought to have been associated with the Friary and two gilt and enamelled bronze heraldic pendants were found near at the site of the Post Office on Friar Street 410m south-west of the site (**HEA 52**). At the Greyfriars Day Nursery (**HEA 20**) burials associated with the old Friary's cemetery were found 460m south-west of the site and near to the location of two extended skeletons found by workmen during the excavation of the foundations of Greyfriars Vicarage 470m south-west of the site (**HEA 59**).
- 4.2.18 Archaeological investigations within the study area have uncovered extensive evidence of the medieval development and use to the south of the site. Structural evidence of occupation during the 12th to 13th centuries has been found on 99–105 Friar Street (**HEA 21**) 470m south-west of the site. A series of earthen and chalk floors were found with a flint and chalk wall, a posthole, a hearth and flint nodule post pads during evaluation at the rear of 1 Friar Street 420m south of the site (**HEA 14**). Excavation at 1 Friar Street revealed the remains of a later medieval building with chalk floors and a drain thought to be part of the Hospitium Almshouses (**HEA 14**). Evidence of industrial activity including leather and metal working was identified during a watching brief on Friar Street (**HEA 11**) 390m south of the site. Dumping activity is thought to have occurred at Greyfriars Church (**HEA 30**) 480m south-west of the site during this time. Evidence of backland activity in the form of a possible hearth, pits, and linear ditch was found during evaluation in 2005 in Shoemiths Court 350m south of the site (**HEA 10**) and in medieval pits found during evaluation and excavation in 2003 at 25–26 Friar Street 305m south of the site (**HEA 9**).
- 4.2.19 It is expected that the site would have been outside of the area of medieval development in Reading possibly within open cultivated fields or pasture.

#### *Post-medieval period (AD 1485–present)*

- 4.2.20 During the early post-medieval period, development within Reading remained within the limits of the medieval town, as can be seen from John Speed's map of 1611 (not reproduced, Berkshire Record Office, D/Ex2385/1). The site was located to the north of the development between the northern boundary and the Thames. An undated linear feature thought to have been backfilled in the later medieval or early post-medieval periods was identified during a watching brief and evaluation on Station Hill and Friars Walk 270m south-west of the site (**HEA 7**).
- 4.2.21 During the Civil War, Reading was adopted as a Royalist garrison between 1642 and 1643. In 1642 the town was subject to fortification, comprising mostly bastions linked by earthen banks (Astill 1978). The site is located 240m north of an east–west aligned section of these defences

(**HEA 32**). Reading was besieged in April 1643 and fell to Parliamentary forces in May 1643. It remained under Parliamentary control until the end of the Civil War in 1651 (VCH 1923, *Berkshire iii*, 342–64).

- 4.2.22 The Ordnance Survey 1":mile map of 1830 (Fig 6) shows the site as part of open land labelled 'Vasterns', likely meadowland, to the north of Reading. Drainage canals are shown to the north and south of the site leading to the Thames to the north of the site. It is possible that the Vasterns were marshy requiring drainage and land reclamation activities in order to allow for consistent use.
- 4.2.23 The Great Western Railway was enabled by an act of Parliament in 1835 in order to create a double tracked railway line connecting London and Bristol. Isambard Kingdom Brunel was the engineer retained by Great Western Railway to construct the line and as a result the line was initially built using his broad-gauge tracks which required considerably more land within the railway cut. The work on the line began in 1836 at both ends with the line to Reading completed in 1840 and the full line's completion in 1841 (Great Western Archive 2013). Reading Station was originally designed by Isambard Kingdom Brunel and built in 1840. The main building of Reading General Station (**HEA 5**) is Grade II listed and an enlargement and remodelling of the original design was undertaken by Mr Lane, the Chief Engineer of the Great Western Railway Company between 1865 and 1867 (National Historic List 2019, entry 1321892). A railway works was constructed to the north of the station.
- 4.2.24 The Ordnance Survey 1st edition 25":mile map of 1879–81 (Fig 7) shows the development of the railway to the south of the site with a works building and railway tracks extending into the south-east corner of the site. The site is crossed by two drainage canals leading to a single canal from the north-east side of Vastern Road. Industrial buildings including a timber yard and malshouses have been constructed to the west of the site. The land to the north of Vastern Road remains open to the Thames.
- 4.2.25 The Ordnance Survey 2nd edition 25":mile map of 1899–1900 (Fig 8) shows the coal depot of the Great Western Railway Works has been constructed within the site. The land to the north of the site has been fully developed with terraced houses and industrial works including a saw mill, electric works and iron works. The land to the west of the site has been redeveloped as terraced houses. The railway works continued to expand and develop until it was at its largest extent as seen in the Ordnance Survey 1:1250 scale map of 1956–57 (Fig 9).
- 4.2.26 The Ordnance Survey 1:1250 scale map of 1969–72 (not reproduced) shows clearance of the railway work apparatus to the east of the site and the construction of a small car park in the west of the site suggesting that the works were no longer a priority.
- 4.2.27 The site has been completely cleared and redeveloped by the Ordnance Survey 1:1250 scale map of 1988–93 (Fig 10) and is now as existing in Fig 1. The railway works to the south-west of the site have been demolished and redeveloped as a sorting office.

## 5 Statement of significance

### 5.1 Introduction

- 5.1.1 The following section discusses historic impacts on the site which may have compromised archaeological survival from earlier periods, identified primarily from historic maps, and information on the likely depth of deposits.
- 5.1.2 In accordance with the NPPF, this is followed by a statement on the significance of buried heritage assets within the site, the potential impacts and likely effects derived from current understanding of the baseline conditions, past impacts, and professional judgement.

### 5.2 Factors affecting archaeological survival

#### *Natural geology*

- 5.2.1 Current ground level is at 38.2–38.6 mAOD. There is no geotechnical data for the site. Based on BGS boreholes in the vicinity, the predicted level of natural geology within the site is as follows:
- The top of truncated alluvium is at 35.8 – 37.2 mAOD (1.4–2.4 m below ground level/mbgl)
  - The top of untruncated Gravel is at 35.8–36.7 mAOD (1.9 –2 .4 mbgl)
- 5.2.2 Between the top of the natural and the current ground level is modern made ground and undated made ground. The latter may potentially contain remains of archaeological interest.

#### *Past impacts*

- 5.2.3 The site was developed as part of the Great Western Railway works at Reading with the primary impact being the construction of railway lines. These are likely to have locally affected the top 1.0 – 1.5 m of ground, although the entire area of the works may have been levelled prior to their construction, removing any earlier remains to the depth of the ground disturbance.
- 5.2.4 The scale and depth of clearance and removal of buried obstructions after the closure of the marshalling yard and subsequent redevelopment are not known.

#### *Likely depth/thickness of archaeological remains*

- 5.2.5 Post-medieval railway remains are possible within the undated made ground just underlying the modern foundations and hard standing. Earlier remains of post-medieval land reclamation activities and isolated remains from earlier periods are possible within the alluvial deposits.

### 5.3 Archaeological potential and significance

- 5.3.1 The nature of possible archaeological survival in the area of the proposed development is summarised here, taking into account the levels of natural geology and the level and nature of later disturbance and truncation discussed above.
- 5.3.2 *The site has low potential to contain prehistoric remains.* Although the site is located on a gravel terrace between the channels of two rivers, previous geotechnical investigations show the presence of deep alluvial deposits across the site suggesting that it may have been regularly inundated. No evidence of settlement has been found within the study area and the evidence from this period is limited to chance finds. It is likely that the marshy nature of the site did not allow for extensive use or settlement and its use was for intermittent resource exploitation.
- 5.3.3 *The site has low potential to contain Roman remains.* The site was located outside any known settlements; however, given the site's location near the channel of the Thames it is possible that isolated finds may be present within the alluvium or at the interface between the gravels and the alluvium.
- 5.3.4 *The site has low potential to contain medieval remains.* Reading was developed as a town in

the Anglo-Saxon (early medieval) period and continued to gain prominence and wealth throughout the later medieval period. The settlement was located to the south of the site and orientated around the high street and Reading Abbey. It is likely that the site was located within open fields or within a marshy interface of the Thames on the periphery of the settlement throughout these periods.

- 5.3.5 *The site has high potential to contain post-medieval remains.* Reading began to expand northward towards the Thames in the early 19th century. Drainage canals can be seen on early 19th century maps crossing the land in which the site was located. Evidence of the drainage canals is likely to be found cut into the underlying alluvial deposits and would be of **low** significance. Evidence of the later 19th and 20th century railway works is likely to be present throughout the site and would be of **low** significance.

## 6 Impact of proposals

### 6.1 Proposals

6.1.1 The Applicant will submit an outline planning application for the proposed development, which will reserve the details of access, appearance, landscaping, layout and scale for later determination. The proposed development would comprise:

- Construction of approximately four new buildings, up to approximately 112.9mAOD;
- Delivery of a total maximum floorspace of up to 115,000 m<sup>2</sup> gross external area (GEA), which could include;
- Residential, retail, leisure and community, office and hotel use
- Demolition of existing buildings;
- New vehicular, pedestrian and cycle routes
- The proposed development would deliver below ground surface water attenuation. The parameter plans would allow for excavation up to 1.5mbgl for this within the areas shown in Parameter Plan 105.

6.1.2 Piled foundations are anticipated.

### 6.2 Implications

6.2.1 The identification of physical impacts on buried heritage assets within a site takes into account any activity which would entail ground disturbance, for example site set up works, remediation, landscaping and the construction of new basement/attenuation areas and foundations. As it is assumed that the operational (completed development) phase would not entail any ground disturbance, there would be no additional archaeological impact and this is not considered further.

6.2.2 It is outside the scope of this archaeological report to consider the impact of the proposed development on upstanding structures of historic interest, in the form of physical impacts which would remove, alter, or otherwise change the building fabric, or predicted changes to the historic character and setting of historic buildings and structures within the site or outside it.

#### *Preliminary site works*

6.2.3 Works carried out as part of the initial site set up, including preliminary site stripping and demolition, the installation of site fencing and welfare facilities, is assumed for the purposes of this assessment to cause ground disturbance to a maximum depth of 0.5 mbgl.

6.2.4 This would extend into undated made ground, which potentially contains remains of archaeological interest, and would entirely remove any remains to this excavation depth. In all likelihood the undated made ground is of late 19<sup>th</sup>/early 20<sup>th</sup> century date and only post-medieval remains, of low heritage significance, would be affected.

#### *Breaking out foundation slab*

6.2.5 Breaking out of the existing foundation/floor slab would potentially have an impact, truncating or removing entirely any archaeological remains directly beneath the slab. This might include 19<sup>th</sup> century railway depot remains.

#### *Piled foundations*

6.2.6 Any archaeological remains within the footprint of each pile would be removed as the pile is driven downwards. The severity of the impact would therefore depend on the pile size, type and pile density. The pile type is not currently known. Augered piles/continuous flight auger (CFA) piles would minimise the impact upon possible archaeological remains, whereas vibro-compacted piles may cause additional impact through vibration and deformation of fragile surrounding remains, in particular at the level of the water table.

6.2.7 The insertion of pile caps and connecting ground beams, along with the excavation of a pile

guide trench, typically extend no more than 1.0 – 1.5 mbgl and would remove any archaeological remains within the footprint of these works to this depth.

#### *Service / utilities trenches/ drains*

6.2.8 The proposed excavation of new service trenches and drains would extend to a depth of 1.0 – 1.5 mbgl as assumed for the purposes of this assessment. This would entirely remove any archaeological remains within the trench footprint.

#### *Attenuation tanks*

6.2.9 The excavation of up to three attenuation tanks, , would extend to a depth of 1.5 mbgl. This would entirely remove any archaeological remains within the tank footprint.

## 7 Conclusion and recommendations

- 7.1.1 The site does not contain any nationally designated historic assets. The site is not within a conservation area or an area of archaeological potential as defined by RBC.
- 7.1.2 The site has a:
- low potential for prehistoric remains;
  - low potential for Roman remains;
  - low potential for medieval remains;
  - high potential for post-medieval remains.
- 7.1.3 Survival of archaeological remains is likely to be limited due to the development of the railway depot across the site during the late 19<sup>th</sup> century and 20<sup>th</sup> century. Remains of the railway may be of archaeological interest.
- 7.1.4 The proposed development would comprise the demolition of the existing buildings, and the construction of new buildings which are likely to have piled foundations. Preliminary groundworks would truncate or remove all heritage assets to the depth of the ground disturbance. Piled foundations would remove all heritage assets within the footprint of the pile and, depending on the density of the piling, potentially reduce future access to any remaining assets surviving between the piles.
- 7.1.5 Table 2 summarises the known or likely buried assets within the site, their significance, and the impact of the proposed scheme on asset significance.

Table 2: Impact upon heritage assets (prior to mitigation)

Asset	Asset Significance	Impact of proposed scheme
Post-medieval land reclamation and railway remains (high potential)	Low	Breaking out existing foundations, preliminary site works, piling, attenuation tanks, service trenches  Significance of asset reduced to negligible

- 7.1.6 The archaeological potential of the site is likely to be limited to remains of no more than low significance and therefore further survey work (i.e. archaeological evaluation trial trenches or pits) is not considered to be necessary. It is recommended that an archaeological watching brief during preliminary ground preparation and subsequent foundation construction, would mitigate the impacts of the proposals and ensure that any archaeological assets were not removed without record. This strategy could be refined and targeted by the prior archaeological monitoring of geotechnical investigations, which would clarify the nature and depth of deposits: based on the results, it is possible that no further work may be necessary.
- 7.1.7 Any archaeological work would need to be undertaken in accordance with an approved Written Scheme of Investigation (WSI) and could be carried out under the terms of a standard archaeological planning condition set out with the grant of planning consent.

## 8 Gazetteer of known historic environment assets

- 8.1.1 The gazetteer lists known historic environment sites and finds within the 550m-radius study area around the site. The gazetteer should be read in conjunction with Fig 2.
- 8.1.2 The BHER data contained within this gazetteer was obtained on 17/04/2019 and is the copyright of Berkshire County Council 2019.
- 8.1.3 Historic England statutory designations data © Historic England 2019. Contains Ordnance Survey data © Crown copyright and database right 2019. The Historic England GIS Data contained in this material was obtained in April 2019. The most publicly available up to date Historic England GIS Data can be obtained from <http://www.historicengland.org.uk>.

### Abbreviations

ASE – Archaeology South East  
 CA – Cotswold Archaeology  
 FA – Foundations Archaeology  
 HER – Historic Environment Record  
 JMHS – John Moore Heritage Service  
 NHL – National Heritage List for England (Historic England)  
 OAU – Oxford Archaeological Unit  
 TVAS – Thames Valley Archaeological Services  
 TWA – Trust for Wessex Archaeology  
 WA – Wessex Archaeology

HEA No.	Description	Site code/HER/NHL No.
1	<b>Great Western Railway (GWR) – London to Reading Station</b> The Great Western Railway was authorised by an Act of Parliament in 1835 to construct a line from London to Bristol. Construction of the line began in late 1835/1836, using a variety of contractors and some direct labour. The first section to be completed, from London to Maidenhead Riverside (Taplow), opened in 1838. This was followed by the opening of the line to Twyford in July 1839, Reading in March 1840, Steventon in June 1840, Challow (also known as Farringdon Road) in July 1840, Wootton Bassett in December 1840, Chippenham in May 1841 and Bridgwater and Bath in June 1841.	MRD6024 MRM17606 MRD6041 MRM17607 MRD6042
2	<b>Brigham Road, Reading, Berkshire</b> <i>Evaluation, TVAS, 1998–99</i> No archaeological features were present in any of the 12 trenches and no artefacts were recovered, either from the trenches or the spoil heaps. The presence of alluvium and localised peat deposits were, however, confirmed. It is possible that the position of the latter may indicate the former presence of a north-south orientated inlet channel of the River Thames. In the light of the evaluation results it is unlikely that archaeological deposits will be damaged or destroyed by the proposed development of the site.	ERD21 BRR98/80
3	<b>Vastern Road, Reading, Berkshire</b> <i>Evaluation, WA, 1995</i> Archaeological investigation of a vacant lot bordering the River Thames prior to redevelopment. Sixteen machine excavated trenches were dug. The work revealed the present ground level to be largely artificial, resting on approximately 1.5m of made ground comprised chiefly of ash and cinder dumps. A single linear feature, most probably a land drain of 19th century date, was revealed running north–south across the west end of the site, normal to the line of the River Thames. Alluvial silty clays were encountered in all trenches at depths between 1.4mbgl and 1.7mbgl.	ERM249 MRD6571 MRD6573
4	<b>Tudor Road, Reading, Berkshire</b> <i>Watching brief, FA, 2000</i> No significant archaeological features or deposits were identified. The whole of the study area had been highly disturbed in the late post-medieval and modern periods	ERD99
5	<b>Main Building of Reading General Station</b> <i>Grade II listed building</i> Main building of Reading General Station built in 1865–67, architect Mr Lane (Chief Engineer of the GWR Co). Enlargement and remodelling of I K Brunel's original station of c 1840 with Italianate details.	NHL1321892

HEA No.	Description	Site code/ HER/NHL No.
6	<b>St. Pauls Church, York Road, Reading</b> <i>Evaluation and standing building survey, FA, 2001</i> The church was recorded to Level 3 recording prior to its demolition. The measured survey encompassed the floor plan, one lateral cross-section, internal elevation of a section of the arcade and clerestory, and the external elevation of the main east window. On completion of demolition of the church the site was then subject to an archaeological field evaluation. The stratigraphic sequence identified during the evaluation works consisted of river terrace gravels at c. 2.0mbgl, beneath a layer of alluvial clay averaging 1m thick. The clays were sealed, with a clean layer of gravel make-up/hardcore up to 1.8m thick. The evaluation revealed no archaeological finds or features which pre-dated the construction of the church.	ERD61 MRD15611
7	<b>Station Hill and Friars Walk (Plots B &amp; D), Friar Street, Reading</b> <i>Watching brief and evaluation, ASE, 2016</i> The watching brief focused on two areas and recorded modern demolition material to a depth of at least 1.2bgl, most probably the result of the construction of the 1960's buildings. The evaluation showed that modern disturbance has occurred across the site, with thick layers of made ground 1.2–1.6m in depth covering the development area. Beneath the made ground layers a sequence of organic alluvial deposits were recorded. These were unable to be fully excavated due to water ingress. The artefacts recovered from these deposits may be intrusive due to the soft nature of the sediments. The function of the undated linear feature is unclear, although the deposits visible from the top of the trench suggest it was backfilled within the medieval or post-medieval periods. It is unclear whether the undated linear feature partially uncovered in the north sondage relates to the square watercourse feature illustrated on Coates 1802 map of Reading.	SHR15 ERM1955 MRM18235
8	<b>Station Hill and Friars Walk, Friar Street, Reading, Berkshire</b> <i>Evaluation, FA, 2009</i> A medieval or early post-medieval feature was identified in Trench 1, cut into the top of the natural gravel. Two layers identified in Trench 4 are also likely to be of similar date. Trenches 2 and 3 yielded a sequence of modern deposits, which directly overlaid the 'natural' clay.	SHR09 ERM1320 MRM16558
9	<b>25–26 Friar Street, Reading, Berkshire</b> <i>Evaluation and excavation, FA, 2003</i> During the evaluation and excavation archaeological features of medieval, late medieval and early post-medieval date were revealed including a possible Civil War ditch. These archaeological features predominantly consisted of medieval and post-medieval pits with occasional post holes. A number of pits showed evidence of recutting. The pits contained moderate quantities of pottery. Some animal bone was also recovered during the excavations. The distribution of medieval and post-medieval features is consistent with traditional backland activity. Six environmental samples were also taken from a number of pit fills. Analysis of these samples revealed charred cereal grains and chaff.	ERM483 MRM16013 MRM16014 MRM16016 MRM16042
10	<b>Shoemiths Court, Reading, Berkshire – Area 9</b> <i>Evaluation, FA, 2005</i> Evidence of 12–14th century traditional medieval backland activity was revealed in the form of a possible hearth, five pits of varying size and a linear ditch. This pattern of activity was subsequently disrupted with either the construction of a cellared structure in the southern half of the site or the excavation of a substantial gravel extraction quarry pit. A number of late medieval and early post-medieval (14th–16th century) pits and ditches were also identified. A number of pits of post-medieval date (16th–18th century) were also identified, late Post-medieval/modern features and three undated pits. The archaeological features at the site contained limited quantities of pottery. The pottery evidence does, however, point to several phases of activity spanning the 12th century through to the 19th century.	ERM541 MRM16017

HEA No.	Description	Site code/ HER/NHL No.
11	<b>Friar Street road repair, Reading, Berkshire</b> <i>Watching brief, TVAS, 2013</i> The trench observed measured 13m in length, 4.2m wide and c1.4m deep. The stratigraphy revealed consisted of 0.1m of tarmac overlying 0.15m of concrete, overlying 0.4m of mid grey flinty gravel made ground overlying 0.2m of mid grey gravelly clay. This in turn overlay 0.2m of a dark grey silty deposit containing material pressed in from the above layer but which may in fact be part of the layer below (60). This was a dark grey brown silty clay layer with frequent pieces of flint and measured 0.3m deep. It contained 13 sherds of 13th to 14th century pottery, 70 pieces of animal bone, 22 pieces of roof tile and 68 pieces of leather, mostly comprising shoe soles. The pottery comprised 13 sherds of Surrey Whiteware of mid-13th–mid-15th century date. Most are of 'Coarse Border Ware' type which is common in the town. A small assemblage of 70 fragments of animal bone was recovered from three contexts. Twenty-two fragments of brick and tile were also recovered. The uneven form and finish of these pieces suggests that they date broadly to the medieval period. A total of 68 pieces of leather were recovered suggesting the presence of shoemaking and leather working on or near the site dated to the late 14th and early 15th century. Three pieces of metalwork comprising iron nails were also recovered.	ERM1449 FSR13/42 MRM16784
12	<b>172 Friar Street, Reading</b> <i>Evaluation and excavation, OAU, 1997</i> Four phases of occupation were identified on the site. A consistency of activity was also indicated with three phases of hearths or fireplaces with robbing taking place after each phase. The first phase probably dates to the 13th and 14th centuries. The second phase can be tentatively dated to the 15th or 16th century on the basis of pottery from the layer that seals it. The next period is a large area of robbing, previously recorded during the evaluation, which produced 18th century clay pipes. The final phase is represented by a herringbone brick surface of 19th or early 20th century date. Finds from the site include pottery, a fragment of window glass, an annular brooch and a pin with a wire wound head, as well as ceramic building material.	ERD27 ERM831 REFMS97 MRD15495– MRD15508 MRD3938
13	<b>Aldwych House, Blagrove Street, Reading, Berkshire</b> <i>Evaluation and watching brief, TVAS, 2013</i> The upper levels of the natural geology have been heavily truncated by post medieval activity on site. Natural chalk geology was observed in Trench 2 at an excavated depth of 0.8m, a height of 41.0m OD. No deposits of archaeological interest were observed and no finds were recovered. Evidence for activity on the site is limited to constructions of mid-20th century date with any evidence for earlier activity having been removed or truncated by the 20th century constructions.	ERM1566 ERM1632 AHR13/214
14	<b>Rear of 1 Friar Street, Reading, Berkshire</b> <i>Evaluation and excavation, TVAS, 1998–99</i> A single trench was excavated covering an irregular rectangular area of 11.5 sq. m. Beneath layers of made ground and demolition deposits of late post-medieval date, were a series of earthen and chalk floors, a probable flint and chalk wall, a posthole, a hearth and possibly flint nodule post pads. One of the deposits produced pottery of 12th–13th century date. From within the overlying layers of made-ground were a number of decorated and glazed tiles of medieval date which almost certainly originate from the Abbey buildings. Six excavation trenches were dug prior to development of site. Several phases of activity were identified, the earliest being stray finds of probable Bronze Age, Roman and Saxon date. Elements of a medieval building comprising walls, foundations, chalk floors and a drain were recorded and probably represent a part of the Hospitium Almshouses. Post-medieval phases included evidence for the robbing out of the earlier walls, the digging of pits and evidence of metalworking.	ERD152 ERD153 RFS98/71 MRD15734 MRD15735
15	<b>21-23 Valpy Street, Reading, Berkshire</b> <i>Watching brief and evaluation, WA, 1997</i> There were no archaeological deposits revealed during the course of the watching brief, although significant amounts of modern disturbance and truncation were identified. Three evaluation trenches were subsequently dug. One of these was badly disturbed. The two remaining trenches both contained features dated to the post-medieval period. Trench 2 contained a robbed wall footing, a pit and a small scoop. Trench 3 contained a shallow pit containing pottery of post-medieval date.	ERM283 W4022 MRD7305 MRD7306 MRD7307 MRD7309 MRD7308



HEA No.	Description	Site code/ HER/NHL No.
24	<b>Former NCP Car Park, Forbury Road, Reading, Berkshire</b> <i>Evaluation and watching brief, WA, 2007–08</i> 10 interventions were undertaken, seven evaluation test pits during the first stage and three trenches during the second stage. Each trench/test pit was excavated to the top of archaeology or underlying natural deposits, with the exception of test pits 4 and 7, which were abandoned. The results of the evaluation trenching found no significant archaeological remains; however, it was possible to identify an alluvial sequence capped by a peat horizon.	ERM871
25	<b>Forbury Road, Reading</b> <i>Watching brief, TWA, 1987–89</i> The narrow cutting was exposed for only a limited period and was obscured by trench sheeting and could not be safely entered. An apparently deliberate cut into the gravel on the south (Abbey) side of the wall was infilled with a gravelly brown soil with chalk flecks. Within the cut was a structure composed of mortared chalk lumps, each approximately 0.2m x 0.2m, and seen to run south-west to north-east. The walling exposed was c. 1m thick and survived to a height of c 1.8m.	W236 ERM494 MRM15914
26	<b>Former Cooper BMW, Kings Meadow Road, Reading, Berkshire.</b> <i>Evaluation and watching brief, TVAS, 2018</i> Consistent stratigraphy was recorded across the site and comprised up to 1.5m of modern made ground, lying above between 1m and 1.5m of alluvial clay above red yellow sandy gravel. Due to the interventions being up to 3m deep, it was not possible to investigate in detail the gravel and alluvial deposits. No deposits of archaeological interest were identified and no finds were recovered.	KMR 14/191 ERM2254 ERM2255
27	<b>Caversham Flood Risk Management, Reading</b> <i>Watching brief, CA, 2017</i> In the west of the site the natural geological substrate was predominantly silty clay with deposits of sand and chert gravel occasionally present, particularly in the north of the area further from the river. It was encountered between 0.4m and 1.3m, below made ground layers or alluvial flood deposits. In the eastern part of the site the natural geology was encountered between 0.1m and 2.9m. It consisted of sandy and silty clays with deposits of sand and gravel. Subsoil deposits, where encountered, were consistent with alluvial or overbank flooding events. Deep made ground deposits were encountered most notably in Trial Pits 13, 14, and 19, where they were recorded up to 2m thick. No features or deposits of archaeological interest were observed during groundwork.	CFRM 17 ERM2113
28	<b>Elliott's Joinery Works, Gosbrook Road, Caversham, Berkshire</b> <i>Evaluation, AOC, 1998</i> A total of nine trenches were excavated. All the trenches were excavated until natural gravels were encountered, which was at a level of between 35.9m–36.9m OD. All trenches were sealed by recent overburden and fill material which ranged from 0.3m to 0.8m. No significant archaeological deposits or features and finds were encountered. The only features and finds were modern, including large quantities of wood chips and off-cuts, suggesting that the site was not developed until the early 20th century for Elliott's Joinery Works.	EJG 98 ERD16
29	<b>King's Meadow Lido, Kings Meadow Road, Reading</b> <i>Watching brief, TVAS, 2017</i> The groundwork, although limited, identified stratified deposits, dating to the construction of the Lido, and also identified river silts of unknown date. All other areas did not reach depths that would have been archaeologically relevant. The area close to the structure revealed that there was a reduced level of around 0.8m during the construction of the Lido. This ground reduction was backfilled with various rubble and gravels. No archaeologically relevant features were uncovered and no finds were retrieved.	KML15/58 ERM2157

HEA No.	Description	Site code/ HER/NHL No.
30	<b>Land at Greyfriars Church, Friar Street, Reading, Berkshire</b> <i>Evaluation, FA, 2012</i> The evaluation has identified the presence of later medieval and post-medieval/modern stratified deposits within the site. A large cut feature probably later medieval was found in Trench 3, although its form and function remain unclear. In Trench 2 another cut feature was revealed. This was poorly dated, although it was visually distinct from the cut feature and was not necessarily related to it. Numerous tip layers dated to the later medieval through post-medieval/modern were excavated in Trenches 1 and 3 indicated the site had been utilised as a dump. An additional cut feature contained later medieval pottery sherds within one of the fill layers at a depth of c 0.9mbgl (42.5m OD).	GFS12 ERM1648 MRD3938 MRM17581 MRD3939
31	<b>South Eastern and Chatham Railway - Reading line</b>	MRD6125
32	<b>Civil War Defences at Reading, Berkshire</b> Civil War Defences as shown on the 1643 siege of Reading map.	MRD15703
33	<b>Reading, Berkshire</b> Possible line of Danish Defences, as illustrated in G.G. Astill's Historic Towns in Berkshire.	MRD15633
34	<b>Reading Abbey, Reading, Berkshire</b> Benedictine monastery founded in 1121 and consecrated as Cluniac monastery in 1164 by Henry I. Contains St Laurence's hospitium and St Laurence's School. The Hospitium of St. John the Baptist for 13 poor people founded by the Abbey in the 1190s. It also consisted of guest apartments for possibly up to 400 people. It stood to the north of St Laurence's Church whose north aisle served as the hospital's chapel. The hospital appears to have elapsed in the 15th century and the building was converted into a grammar school. During internal alterations at the Hospitium in 1927, 3 wall foundations and two skeletons were found in a trench. The skeletons were reburied in St Laurence's Churchyard. Recorded by William Smallcombe 06/05/1927.	MRD1374 MRD1398 MRD3943 MRD15563
35	<b>Reading to Mortimer Station, Berkshire</b> Section of Basingstoke branch railway line between Reading and Mortimer Station.	MRD6122 MRD6048
36	<b>Caversham Road Underbridge, Reading, Berkshire</b> Steel girder railway underbridge, constructed c 1890s.	MRM16715
37	<b>The Vastern Road Brook - Vastern Road to Kings Meadow, Reading, Berkshire</b> The Vastern Road Brook is a storm/flood culvert that runs alongside the north of Vastern Road. It is shown on the 1st Edition OS Map as a linear feature running alongside the north part of Vastern Road and onto Kings Meadow, where there is a sluice. The culvert is still functional and was re-discovered in c 2005, under an iron cover. The full extent and exact alignment of the brook along the north of Vastern Road is not known, nor is the location from which it originates.	MRM15994
38	<b>Reading Station, Reading, Berkshire</b> <i>Findspot</i> The burial of a man and a horse, with a sword, was discovered in 1831 100 yards east from the end of the engine sheds at Reading Station. According to Peake, the burial was found during the digging of ballast pits. Analysis of the sword pommel suggests that it is a Scandinavian 'Gripping Beast' style of the 8th century. Its worn condition and advanced style accord with a date of interment soon after 800 AD.	MRD3891
39	<b>Vastern Meadows, Reading, Berkshire</b> Vastern Meadows comprised land given to the Friars Minor by the Abbot and Convent of Reading in 1233.	MRM16015
40	<b>Reading Station</b> <i>Findspot</i> Fragments of medieval pottery were found in the foundations of the new garage near the GWR Station.	MRD11371
41	<b>Corn Exchange, Reading, Berkshire</b> <i>Findspot</i> A 14–15th century pilgrim's bottle was found during building work at the site of the old Corn Exchange.	MRD11398
42	<b>Vastern Road, Reading, Berkshire</b> <i>Findspot</i> A dupondius of Vespasian was found in the sump of a new slipway to the Thames in 1956.	MRD11296

HEA No.	Description	Site code/ HER/NHL No.
43	<b>Thames River</b> <i>Findspot</i> A tranchet axe, a pick and a blade from the "Thames" at Reading. Neolithic axes and a perforated hammer head were dredged from the River Thames at Reading. Bronze Age artefacts, a Middle Bronze Age dagger blade, a socketed knife, two bronze palstaves, a bronze socketed sickle, a socketed axehead, a leaf shaped bronze spearhead, a basal looped spearhead and a Bronze Age pot dredged from the River Thames at Reading. An iron Merovingian bit and iron knife, iron spearhead and a 12th century battle axe was recovered. An arrowhead from the River Thames at Reading of suggested 13th–14th century date. A 17th Century bayonet recovered from the Thames at Reading.	MRD11164 MRD11185 MRD11218 MRD11346 MRD11395 MRD11401
44	<b>Thames River</b> <i>Findspot</i> Seven Mesolithic tranchet axeheads (2 light and 5 medium), four picks and a mace from the Thames at Caversham. A Prehistoric plano-convex knife was recovered from the River Thames at Caversham in 1998. Also found in the Thames at Caversham was the butt of a broken flint axe. Bronze Age spear-head from Thames opposite Caversham. Late Neolithic/Early Bronze Age basin shaped drinking cup decorated with punctured lines from the Thames at Caversham.	MRD11150 MRD11202 MRD11227 MRD11228
45	<b>Great Western Hotel, Reading, Berkshire</b> <i>Findspot</i> A silver halfpenny of Edward III was found below the ballroom of the Old Great Western Hotel in Reading.	MRD11367
46	<b>Blagrove Street, Reading, Berkshire</b> <i>Findspot</i> An undated flint wall was revealed under the service yards of the Grand Hotel.	MRD3964
47	<b>Wiston Terrace, Reading, Berkshire</b> <i>Findspot</i> Sherds of medieval pottery, glass, copper gross, clay pipes etc. were found during foundations digging in Wiston Terrace, Reading.	MRD11370
48	<b>Station Road, Reading, Berkshire</b> <i>Findspot</i> In 1904 a Lower Palaeolithic hand axe was found in a drainage trench in Station Road, Reading.	MRD9049
49	<b>Greyfriars Road, Reading</b> <i>Findspot</i> A 3rd brass of Magnentius was found in Greyfriars Road, Reading.	MRD11262
50	<b>Vachel Road, Reading, Berkshire</b> <i>Findspot</i> The Lower Palaeolithic hand axe was found in 1903. It is an ovate hand axe in a sharp, slightly stained and slightly patinated condition.	MRD9047
51	<b>Caversham Road, Reading, Berkshire</b> <i>Findspot</i> Finely struck Levalloisian flake was found in Caversham Road, Reading.	MRD9048
52	<b>7 Greyfriars Road, Reading, Berkshire</b> <i>Findspot</i> Demolition and building work at 7 Greyfriars Road revealed some fragmentary remains of the flint and mortar footings of a substantial building, almost certainly connected with the Friary which was built nearby after Abbot Robert of Burgate had given the Friars of Reading a new site in 1285. Two gilt and enamelled bronze heraldic pendants were found at the site of the Post Office in Friar Street.	MRD3933
53	<b>New Street/Friar Street, Reading, Berkshire</b> New Street/Friar Street was first documented in 1186.	MRD3931

HEA No.	Description	Site code/ HER/NHL No.
54	<b>Friar Street, Reading, Berkshire</b> <i>Findspot</i> During excavations for the foundations for new premises in Friar Street in Reading in August 1888, some fragments of human bone and a skull were dug out. These were at a depth of 4ft (1.2m) and were in association with animal bones. Later that year the remains of approximately six skeletons were recovered from a similar level. Also found was a Charles I farthing and two brass hand-made pins of rude construction	MRD3978
55	<b>Friar Street, Reading, Berkshire</b> <i>Findspot</i> An Early Iron Age brooch was found at Friar Street, Reading.	MRD11254
56	<b>Blagrove Street, Reading, Berkshire</b> <i>Findspot</i> A 12th/13th century jug of red hard ware was found in Blagrove Street, Reading.	MRD11365
57	<b>Blagrove Street, Reading, Berkshire</b> Blagrove Street is a post-medieval street in the centre of Reading.	MRD3987
58	<b>Reading Chronicle Building, Valpy Street, Reading</b> <i>Findspot</i> A post-medieval well was found whilst renovating a floor beneath the Reading Chronicle Building.	MRD3989
59	<b>Greyfriars Vicarage, Reading, Berkshire</b> <i>Findspot</i> Two extended skeletons were found by workmen during the digging of foundations for the new Greyfriars Vicarage (on west side). The burials are assumed to be connected with the old friary. The section showed that the fillings of the graves had already been disturbed by the footings for the previous vicarage built by Sir John Soane.	MRD4467
60	<b>Friar Street, Reading, Berkshire</b> <i>Findspot</i> Romano-British coarse sherds from the site of the former Littlewoods store.	MRD11257
61	<b>10 Queen Victoria Street, Reading, Berkshire</b> <i>Findspot</i> A quantity of 13th century pottery, including a thumb impressed rim sherd from a cooking pot in green glazed ware, was found 6ft (1.8m) down under 10 Queen Victoria Street in Reading.	MRD11369
62	<b>St Laurence's Churchyard, Reading, Berkshire</b> <i>Findspot</i> A Neolithic flint axe was found in St Laurence's Churchyard, Reading.	MRD11209
63	<b>Scottish and Southern Energy, 55 Vastern Road, Reading, RG1 8BU</b> <i>Locally listed building</i>	DRM2842

## 9 Planning framework

### 9.1 Statutory protection

#### *Listed Buildings and Conservation Areas*

- 9.1.1 The *Planning (Listed Buildings and Conservation Areas) Act 1990* sets out the legal requirements for the control of development and alterations which affect buildings, including those which are listed or in conservation areas. Buildings which are listed or which lie within a conservation area are protected by law. Grade I are buildings of exceptional interest. Grade II\* are particularly significant buildings of more than special interest. Grade II are buildings of special interest, which warrant every effort being made to preserve them.

### 9.2 National Planning Policy Framework

- 9.2.1 The Government issued the *National Planning Policy Framework (NPPF)* in March 2012 (DCLG 2012) and supporting *Planning Practice Guidance* in 2014 (DCLG 2014). The 2012 NPPF was revised and a new NPPF published in July 2018, with minor revisions in February 2019 (MHCLG 2019).

#### *Conserving and enhancing the historic environment*

- 9.2.2 The NPPF section concerning “Conserving and enhancing the historic environment” (section 12 of the NPPF 2012) has been replaced by NPPF 2018 Section 16 (unchanged in February 2019), reproduced in full below:

**Para 184.** Heritage assets range from sites and buildings of local historic value to those of the highest significance, such as World Heritage Sites which are internationally recognised to be of Outstanding Universal Value. These assets are an irreplaceable resource, and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations.

**Para 185.** Plans should set out a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. This strategy should take into account:

- a) the desirability of sustaining and enhancing the significance of heritage assets, and putting them to viable uses consistent with their conservation;
- b) the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;
- c) the desirability of new development making a positive contribution to local character and distinctiveness; and
- d) opportunities to draw on the contribution made by the historic environment to the character of a place.

**Para 186.** When considering the designation of conservation areas, local planning authorities should ensure that an area justifies such status because of its special architectural or historic interest, and that the concept of conservation is not devalued through the designation of areas that lack special interest.

**Para 187.** Local planning authorities should maintain or have access to a historic environment record. This should contain up-to-date evidence about the historic environment in their area and be used to:

- a) assess the significance of heritage assets and the contribution they make to their environment; and
- b) predict the likelihood that currently unidentified heritage assets, particularly sites of historic and archaeological interest, will be discovered in the future.

**Para 188.** Local planning authorities should make information about the historic environment, gathered as part of policy-making or development management, publicly accessible.

#### **Proposals affecting heritage assets**

**Para 189.** In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

**Para 190.** Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this into account when considering the impact of a proposal on a heritage asset, to avoid or minimise any conflict between the heritage asset's conservation and any aspect of the proposal.

**Para 191.** Where there is evidence of deliberate neglect of, or damage to, a heritage asset, the deteriorated state of the heritage asset should not be taken into account in any decision.

**Para 192.** In determining applications, local planning authorities should take account of:

- a) the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;
- b) the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and
- c) the desirability of new development making a positive contribution to local character and distinctiveness.

#### **Considering potential impacts**

**Para 193.** When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.

**Para 194.** Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of:

- a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional;
- b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II\* listed buildings, grade I and II\* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.

**Para 195.** Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:

- a) the nature of the heritage asset prevents all reasonable uses of the site; and
- b) no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and
- c) conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and
- d) the harm or loss is outweighed by the benefit of bringing the site back into use.

**Para 196.** Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.

**Para 197.** The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.

**Para 198.** Local planning authorities should not permit the loss of the whole or part of a heritage asset without taking all reasonable steps to ensure the new development will proceed after the loss has occurred.

**Para 199.** Local planning authorities should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.

**Para 200.** Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to the asset (or which better reveal its significance) should be treated favourably.

**Para 201.** Not all elements of a Conservation Area or World Heritage Site will necessarily contribute to its significance. Loss of a building (or other element) which makes a positive contribution to the significance of the Conservation Area or World Heritage Site should be treated either as substantial harm under paragraph 195 or less than substantial harm under paragraph 196, as appropriate, taking into account the relative significance of the element affected and its contribution to the significance of the Conservation Area or World Heritage Site as a whole.

**Para 202.** Local planning authorities should assess whether the benefits of a proposal for enabling development, which would otherwise conflict with planning policies but which would secure the future conservation of a heritage asset, outweigh the disbenefits of departing from those policies.

## 9.3 Local planning policy

9.3.1 The Reading Borough Local Plan was adopted 4 November 2019. The Local Plan replaces the previous development plans - the Core Strategy, Reading Central Area Action Plan and Sites and Detailed Policies Document – and is the main consideration in planning decisions. The relevant policies are as follows:

### **EN1: Protection and Enhancement of the Historic Environment**

Historic features, areas of historic importance and other elements of the historic environment, including their settings will be protected and where possible enhanced. This will include:

- Listed Buildings;
- Conservation Areas;
- Scheduled Monuments;
- Historic parks and gardens; and
- Other features with local or national significance, such as sites and features of archaeological importance, and assets on the Local List.

All proposals will be expected to protect and where possible enhance the significance of heritage assets and their settings, the historic character and local distinctiveness of the area in which they are located. Proposals should seek to avoid harm in the first instance. Any harm to or loss of a heritage asset should require clear and convincing justification, usually in the form of public benefits.

Applications which affect Listed Buildings will not have an adverse impact on those elements which contribute to their special architectural or historic interest including, where appropriate, their settings.

Applications which affect Historic Parks and Gardens will safeguard features which form an integral part of the special character or appearance of the park or garden. Development will not detract from the enjoyment, layout, design, character, appearance, features or setting of the park or garden, key views out from the park, or prejudice its future restoration.

Applications which affect, or have the potential to affect, the significant features of heritage assets should be justified by a Heritage Statement.

The Council will monitor buildings and other heritage assets at risk through neglect, decay or other threats, proactively seeking solutions for assets at risk including consideration of appropriate development schemes that will ensure the repair and maintenance of the asset, and, as a last resort, using its statutory powers.

Where there is evidence of deliberate neglect or of damage to a heritage asset, the deteriorated state of the heritage asset should not be taken into account in any decision.

### **EN2: Areas of Archaeological Significance**

Applicants should identify and evaluate sites of archaeological significance by consulting the Historic Environment Record. This will require an assessment of the archaeological impacts of development proposals to be submitted before the planning application is determined. Planning permission will not be granted in cases where the assessment of the archaeological impacts is inadequate.

Where remains cannot be preserved 'in situ,' remains should be properly excavated, investigated and recorded. This will require adequate provision for the identification, investigation, recording and publication of the archaeological resource. Where appropriate, Section 106 agreements will be negotiated to protect, enhance and interpret archaeological remains.

Development proposals which will have an adverse effect on scheduled monuments and other nationally important archaeological remains and their settings will not be allowed unless there is clear and convincing justification in the form of overriding public benefits.

### **EN4: Locally Important Heritage Assets**

Development proposals that affect locally important heritage assets will demonstrate that development conserves architectural, archaeological or historical significance which may include the appearance, character and setting of the asset.

Planning permission may be granted in cases where a proposal could result in harm to or loss of a locally important heritage asset only where it can be demonstrated that the benefits of the development significantly outweigh the asset's significance. Where it is accepted by the Local Planning Authority that retention is not important, recording of the heritage asset should be undertaken and submitted alongside development proposals. Replacement buildings should draw upon heritage elements of the previous design, incorporating historical qualities that made the previous building significant. This may include appearance, scale and architectural quality.

## 10 Determining significance

- 10.1.1 'Significance' lies in the value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic or historic. Archaeological interest includes an interest in carrying out an expert investigation at some point in the future into the evidence a heritage asset may hold of past human activity, and may apply to standing buildings or structures as well as buried remains. Known and potential heritage assets within the site and its vicinity have been identified from national and local designations, HER data and expert opinion. The determination of the significance of these assets is based on statutory designation and/or professional judgement against four values (EH 2008):
- **Evidential value:** the potential of the physical remains to yield evidence of past human activity. This might take into account date; rarity; state of preservation; diversity/complexity; contribution to published priorities; supporting documentation; collective value and comparative potential.
  - **Aesthetic value:** this derives from the ways in which people draw sensory and intellectual stimulation from the heritage asset, taking into account what other people have said or written;
  - **Historical value:** the ways in which past people, events and aspects of life can be connected through heritage asset to the present, such a connection often being illustrative or associative;
  - **Communal value:** this derives from the meanings of a heritage asset for the people who know about it, or for whom it figures in their collective experience or memory; communal values are closely bound up with historical, particularly associative, and aesthetic values, along with and educational, social or economic values.
- 10.1.2 Consultation on draft revisions to the original *Conservation Principles* document which set out the four values was open from November 2017 until February 2018. The revisions aim to make them more closely aligned with the terms used in the NPPF (which are also used in designation and planning legislation): i.e. as archaeological, architectural, artistic and historic interest. This is in the interests of consistency, and to support the use of the Conservation Principles in more technical decision-making (HE 2017).
- 10.1.3 Table 3 gives examples of the significance of designated and non-designated heritage assets.

Table 3: Significance of heritage assets

Heritage asset description	Significance
World heritage sites Scheduled monuments Grade I and II* listed buildings Historic England Grade I and II* registered parks and gardens Protected Wrecks Heritage assets of national importance	Very high (International/ national)
Historic England Grade II registered parks and gardens Conservation areas Designated historic battlefields Grade II listed buildings Burial grounds Protected heritage landscapes (e.g. ancient woodland or historic hedgerows) Heritage assets of regional or county importance	High (national/ regional/ county)
Heritage assets with a district value or interest for education or cultural appreciation Locally listed buildings	Medium (District)
Heritage assets with a local (i.e. parish) value or interest for education or cultural appreciation	Low (Local)
Historic environment resource with no significant value or interest	Negligible
Heritage assets that have a clear potential, but for which current knowledge is insufficient to allow significance to be determined	Uncertain

- 10.1.4 Unless the nature and exact extent of buried archaeological remains within any given area has been determined through prior investigation, significance is often uncertain.

## 11 Non-archaeological constraints

- 11.1.1 It is anticipated that live services will be present on the site, the locations of which have not been identified by this archaeological report. Other than this, no other non-archaeological constraints to any archaeological fieldwork have been identified within the site.
- 11.1.2 Note: the purpose of this section is to highlight to decision makers any relevant non-archaeological constraints identified during the study, that might affect future archaeological field investigation on the site (should this be recommended). The information has been assembled using only those sources as identified in section 2 and section 13.4, in order to assist forward planning for the project designs, working schemes of investigation and risk assessments that would be needed prior to any such field work. MOLA has used its best endeavours to ensure that the sources used are appropriate for this task but has not independently verified any details. Under the Health & Safety at Work Act 1974 and subsequent regulations, all organisations are required to protect their employees as far as is reasonably practicable by addressing health and safety risks. The contents of this section are intended only to support organisations operating on this site in fulfilling this obligation and do not comprise a comprehensive risk assessment.

## 12 Glossary

<i>Alluvium</i>	Sediment laid down by a river. Can range from sands and gravels deposited by fast flowing water and clays that settle out of suspension during overbank flooding. Other deposits found on a valley floor are usually included in the term alluvium (e.g. peat).
<i>Archaeological Priority Area/Zone</i>	Areas of archaeological priority, significance, potential or other title, often designated by the local authority.
<i>Brickearth</i>	A fine-grained silt believed to have accumulated by a mixture of processes (e.g. wind, slope and freeze-thaw) mostly since the Last Glacial Maximum around 17,000BP.
<i>B.P.</i>	Before Present, conventionally taken to be 1950
<i>Bronze Age</i>	2,000–600 BC
<i>Building recording</i>	Recording of historic buildings (by a competent archaeological organisation) is undertaken 'to document buildings, or parts of buildings, which may be lost as a result of demolition, alteration or neglect', amongst other reasons. Four levels of recording are defined by Royal Commission on the Historical Monuments of England (RCHME) and Historic England. Level 1 (basic visual record); Level 2 (descriptive record), Level 3 (analytical record), and Level 4 (comprehensive analytical record)
<i>Built heritage</i>	Upstanding structure of historic interest.
<i>Colluvium</i>	A natural deposit accumulated through the action of rainwash or gravity at the base of a slope.
<i>Conservation area</i>	An area of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance. Designation by the local authority often includes controls over the demolition of buildings; strengthened controls over minor development; and special provision for the protection of trees.
<i>Cropmarks</i>	Marks visible from the air in growing crops, caused by moisture variation due to subsurface features of possible archaeological origin (i.e. ditches or buried walls).
<i>Cut-and-cover [trench]</i>	Method of construction in which a trench is excavated down from existing ground level and which is subsequently covered over and/or backfilled.
<i>Cut feature</i>	Archaeological feature such as a pit, ditch or well, which has been cut into the then-existing ground surface.
<i>Devensian</i>	The most recent cold stage (glacial) of the Pleistocene. Spanning the period from c 70,000 years ago until the start of the Holocene (10,000 years ago). Climate fluctuated within the Devensian, as it did in other glacials and interglacials. It is associated with the demise of the Neanderthals and the expansion of modern humans.
<i>Early medieval</i>	AD 410–1066. Also referred to as the Saxon period.
<i>Evaluation (archaeological)</i>	A limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area.
<i>Excavation (archaeological)</i>	A programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological remains, retrieves artefacts, ecofacts and other remains within a specified area. The records made and objects gathered are studied and the results published in detail appropriate to the project design.
<i>Findspot</i>	Chance find/antiquarian discovery of artefact. The artefact has no known context, is either residual or indicates an area of archaeological activity.
<i>Geotechnical</i>	Ground investigation, typically in the form of boreholes and/or trial/test pits, carried out for engineering purposes to determine the nature of the subsurface deposits.
<i>Head</i>	Weathered/soliflucted periglacial deposit (i.e. moved downslope through natural processes).
<i>Heritage asset</i>	A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage assets are the valued components of the historic environment. They include designated heritage assets and assets identified by the local planning authority (including local listing).
<i>Historic environment assessment</i>	A written document whose purpose is to determine, as far as is reasonably possible from existing records, the nature of the historic environment resource/heritage assets within a specified area.
<i>Historic Environment Record (HER)</i>	Archaeological and built heritage database held and maintained by the County authority. Previously known as the Sites and Monuments Record
<i>Holocene</i>	The most recent epoch (part) of the Quaternary, covering the past 10,000 years during which time a warm interglacial climate has existed. Also referred to as the 'Postglacial' and (in Britain) as the 'Flandrian'.
<i>Iron Age</i>	600 BC–AD 43
<i>Later medieval</i>	AD 1066 – 1500

<i>Last Glacial Maximum</i>	Characterised by the expansion of the last ice sheet to affect the British Isles (around 18,000 years ago), which at its maximum extent covered over two-thirds of the present land area of the country.
<i>Locally listed building</i>	A structure of local architectural and/or historical interest. These are structures that are not included in the Secretary of State's Listing but are considered by the local authority to have architectural and/or historical merit
<i>Listed building</i>	A structure of architectural and/or historical interest. These are included on the Secretary of State's list, which affords statutory protection. These are subdivided into Grades I, II* and II (in descending importance).
<i>Made Ground</i>	Artificial deposit. An archaeologist would differentiate between modern made ground, containing identifiably modern inclusion such as concrete (but not brick or tile), and undated made ground, which may potentially contain deposits of archaeological interest.
<i>Mesolithic</i>	12,000 – 4,000 BC
<i>National Record for the Historic Environment (NRHE)</i>	National database of archaeological sites, finds and events as maintained by Historic England in Swindon. Generally not as comprehensive as the country HER.
<i>Neolithic</i>	4,000 – 2,000 BC
<i>Ordnance Datum (OD)</i>	A vertical datum used by Ordnance Survey as the basis for deriving altitudes on maps.
<i>Palaeo-environmental</i>	Related to past environments, i.e. during the prehistoric and later periods. Such remains can be of archaeological interest, and often consist of organic remains such as pollen and plant macro fossils which can be used to reconstruct the past environment.
<i>Palaeolithic</i>	700,000–12,000 BC
<i>Palaeochannel</i>	A former/ancient watercourse
<i>Peat</i>	A build-up of organic material in waterlogged areas, producing marshes, fens, mires, blanket and raised bogs. Accumulation is due to inhibited decay in anaerobic conditions.
<i>Pleistocene</i>	Geological period pre-dating the Holocene.
<i>Post-medieval</i>	AD 1500–present
<i>Preservation by record</i>	Archaeological mitigation strategy where archaeological remains are fully excavated and recorded archaeologically and the results published. For remains of lesser significance, preservation by record might comprise an archaeological watching brief.
<i>Preservation in situ</i>	Archaeological mitigation strategy where nationally important (whether Scheduled or not) archaeological remains are preserved <i>in situ</i> for future generations, typically through modifications to design proposals to avoid damage or destruction of such remains.
<i>Registered Historic Parks and Gardens</i>	A site may lie within or contain a registered historic park or garden. The register of these in England is compiled and maintained by Historic England.
<i>Residual</i>	When used to describe archaeological artefacts, this means not <i>in situ</i> , i.e. Found outside the context in which it was originally deposited.
<i>Roman</i>	AD 43–410
<i>Scheduled Monument</i>	An ancient monument or archaeological deposits designated by the Secretary of State as a 'Scheduled Ancient Monument' and protected under the Ancient Monuments Act.
<i>Site</i>	The area of proposed development
<i>Site codes</i>	Unique identifying codes allocated to archaeological fieldwork sites, e.g. evaluation, excavation, or watching brief sites.
<i>Study area</i>	Defined area surrounding the proposed development in which archaeological data is collected and analysed in order to set the site into its archaeological and historical context.
<i>Solifluction, Soliflucted</i>	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.
<i>Stratigraphy</i>	A term used to define a sequence of visually distinct horizontal layers (strata), one above another, which form the material remains of past cultures.
<i>Truncate</i>	Partially or wholly remove. In archaeological terms remains may have been truncated by previous construction activity.
<i>Watching brief (archaeological)</i>	A formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons.

## 13 Bibliography

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<https://content.historicengland.org.uk/content/docs/guidance/conservation-principles-consultation-draft.pdf>
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### 13.2 Other Sources

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- Berkshire Historic Environment Record
- Historic England designation data
- Internet – web-published sources:
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- Reading Borough Council (2019) Local Planning Policy [Online] Available at <https://www.reading.gov.uk/newlocalplan> Accessed 28-11-2019
- Groundsure historic Ordnance Survey mapping
- Berkshire Record Office

### 13.3 Cartographic sources

#### Ordnance Survey maps

- Ordnance Survey 1" map (1830)
- Ordnance Survey 1st edition 25" map (1879–81).
- Ordnance Survey 2nd edition 25" map (1899–1900).
- Ordnance Survey 1:1250 scale maps (1956–57, 1969–72, 1988–93)

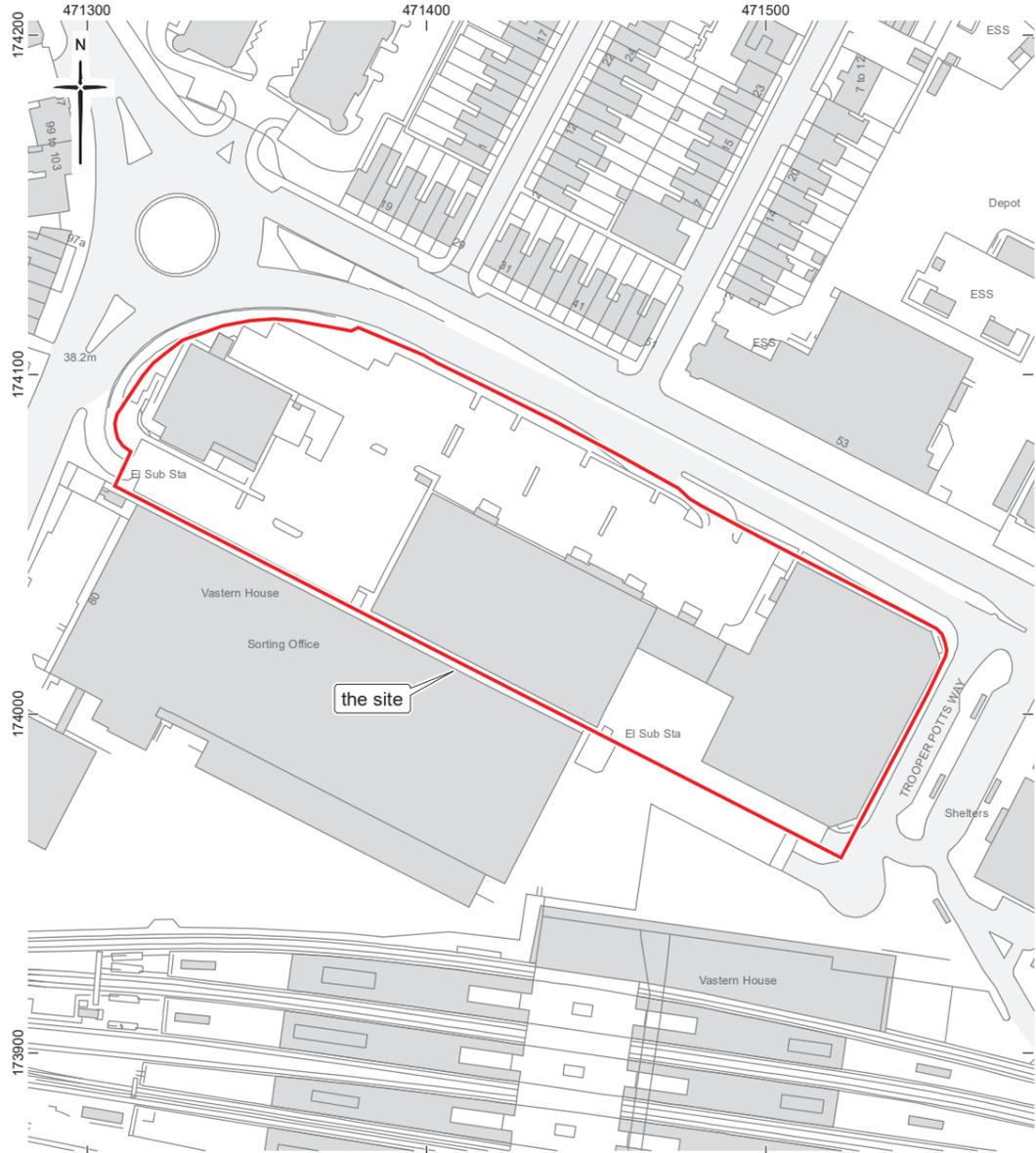
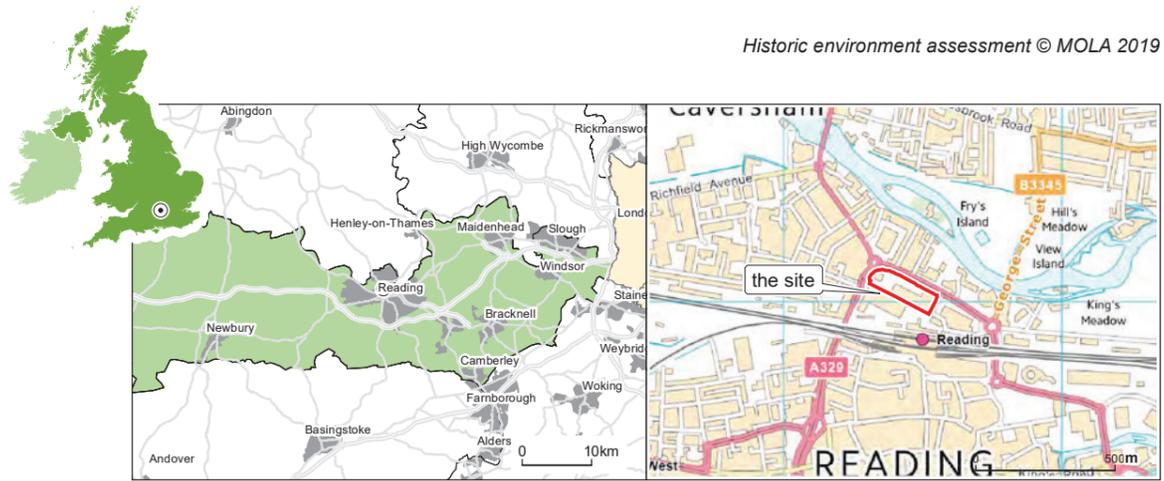
#### Engineering/Architects drawings

- Collado Collins Architects, Parameter Plan – Building Plots, dwg 17043, PP-102, Rev P10, 23-10-2019
- Collado Collins Architects, Parameter Plan – Plot Heights Non-Residential Use, dwg 17043, PP-103, Rev P6, 23-10-2019

- Collado Collins Architects, Parameter Plan – Plot Heights Residential Use, dwg 17043, PP-104, Rev P15, 23-10-2019
- Collado Collins Architects, Parameter Plan – Basement Footprint, dwg 17043, PP-105, Rev P1, 23-10-2019
- Plowman Craven, Reading Station North Topographical Survey, dwg. 40652-004T-01-1, Rev: A, 02-07-2019

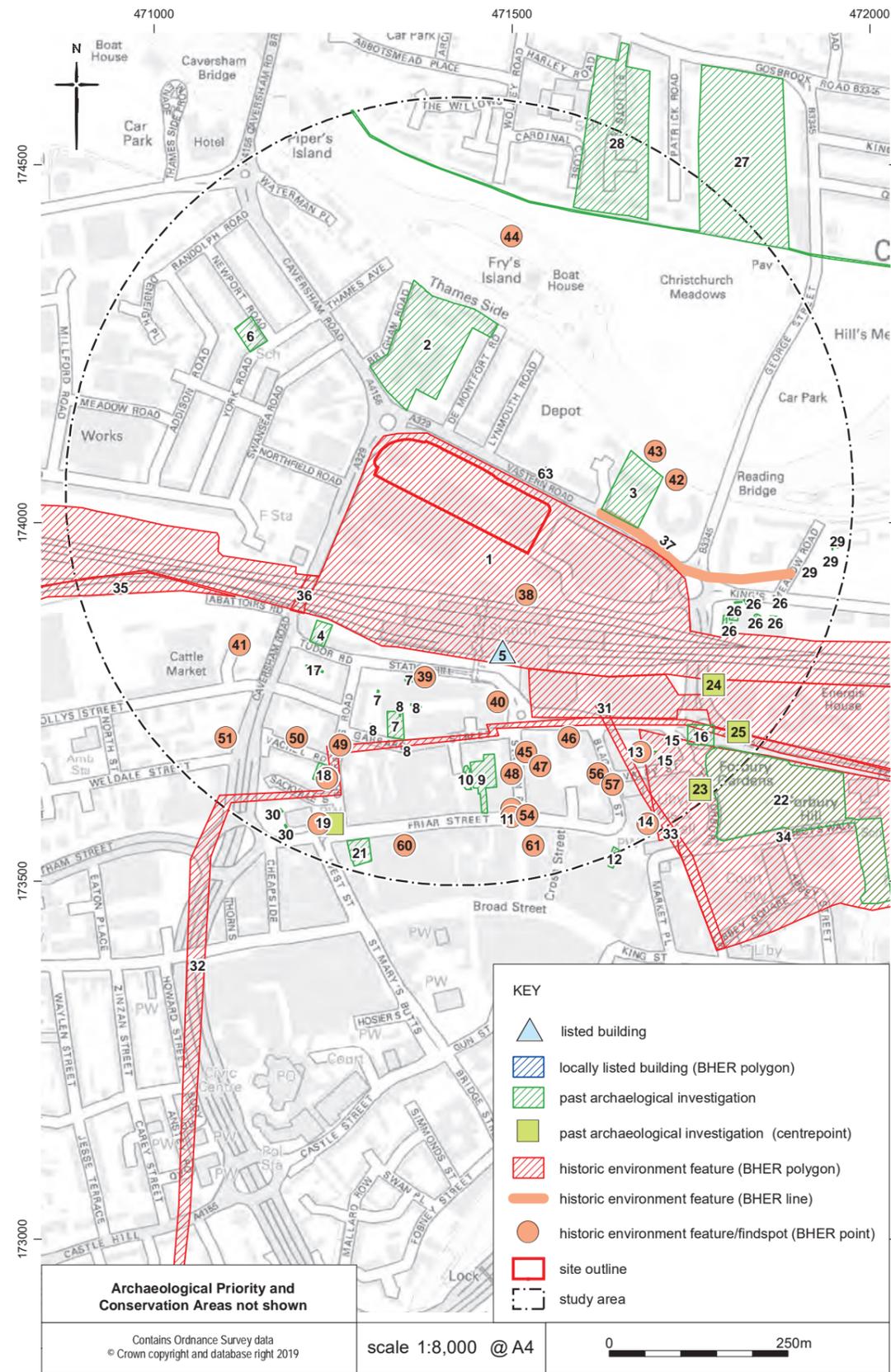
### 13.4 Available site survey information checklist

Information from client	Available	Format	Obtained
Plan of existing site services (overhead/buried)	not known	–	N
Levelled site survey as existing (ground and buildings)	Y	pdf/CAD	Y
Contamination survey data ground and buildings (inc. asbestos)	not known	–	N
Geotechnical report	N	–	N
Envirocheck report	not known	–	N
Information obtained from non-client source	Carried out	Internal inspection of buildings	
Site inspection	Y	Y	



© Crown Copyright 2019. All rights reserved. Licence Number 100047514  
 scale 1:2,000 @ A4  
 0 50m

Fig 1 Site location



Archaeological Priority and Conservation Areas not shown

Contains Ordnance Survey data © Crown copyright and database right 2019  
 scale 1:8,000 @ A4  
 0 250m

Fig 2 Historic environment features map

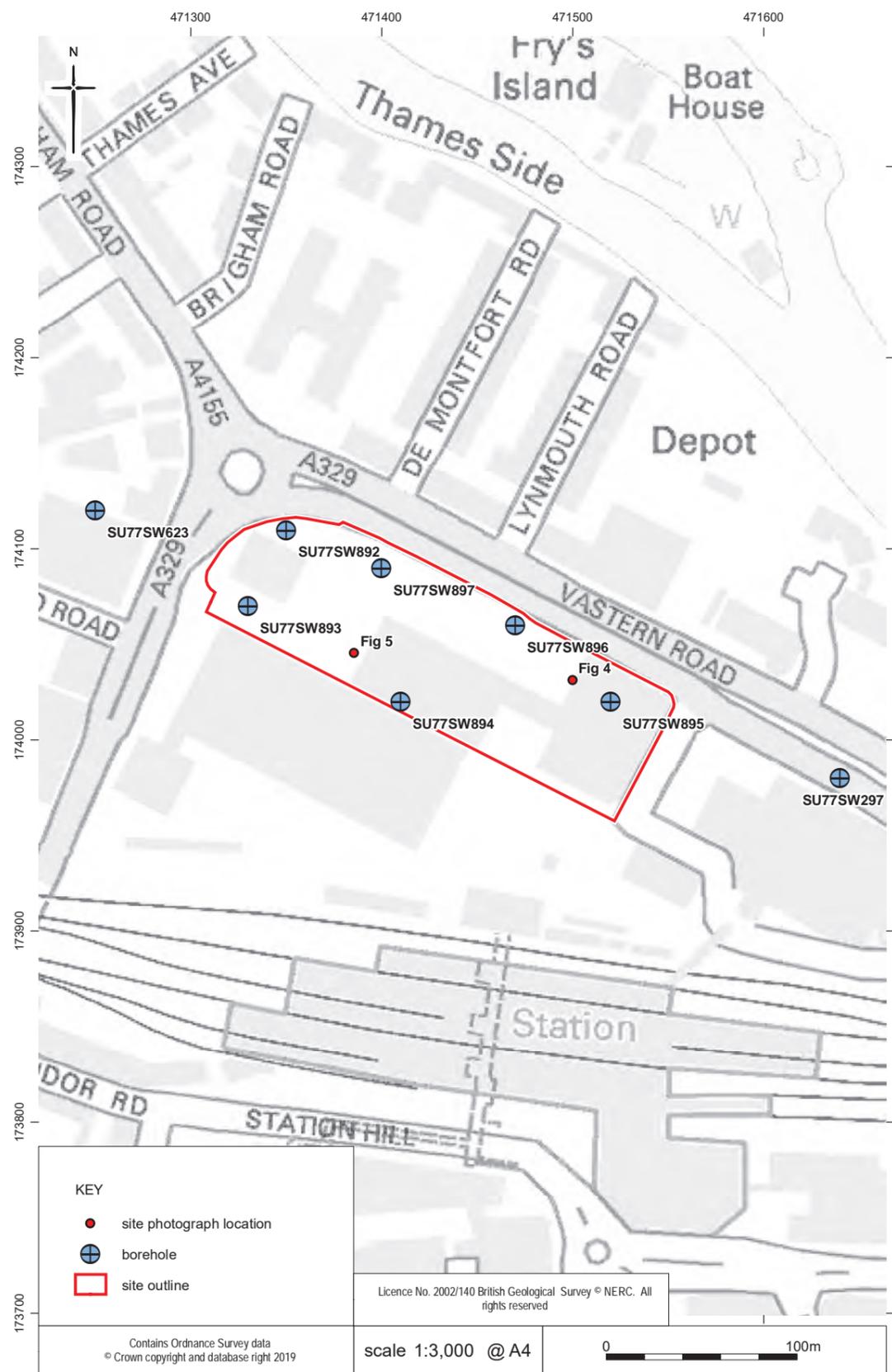


Fig 3 Historic British Geological Survey (BGS) borehole locations and existing site photograph locations

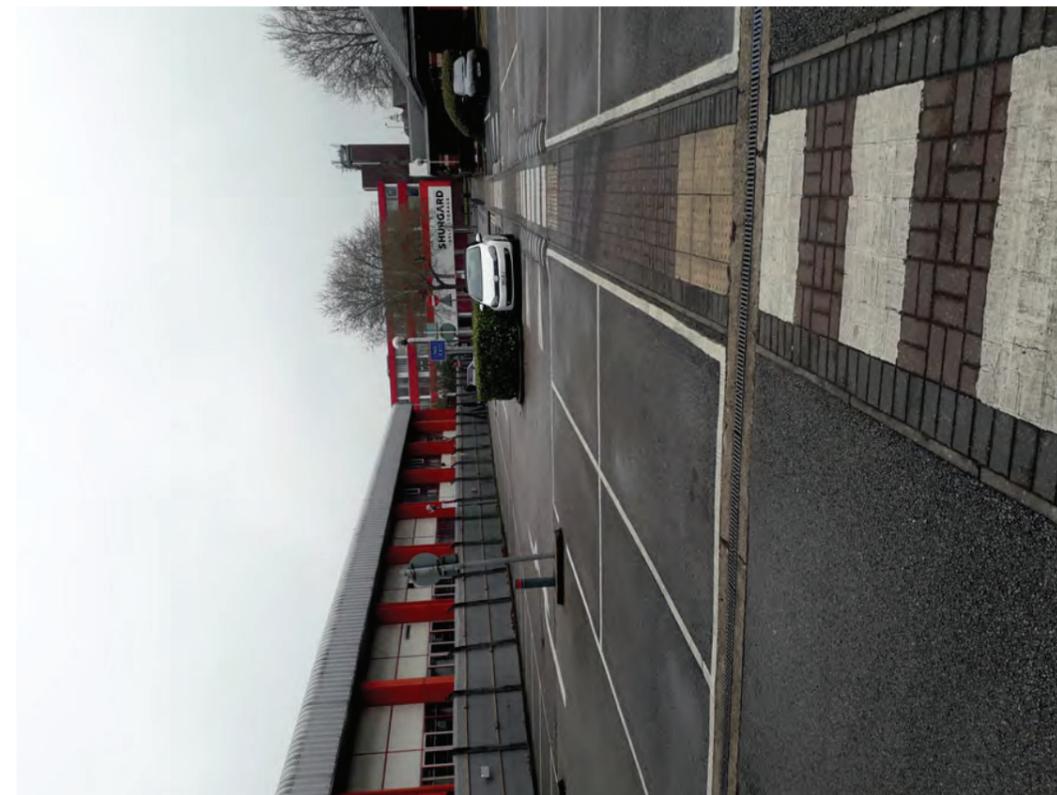


Fig 5 Looking west across the south-west of the site (MOLA photograph 2019)

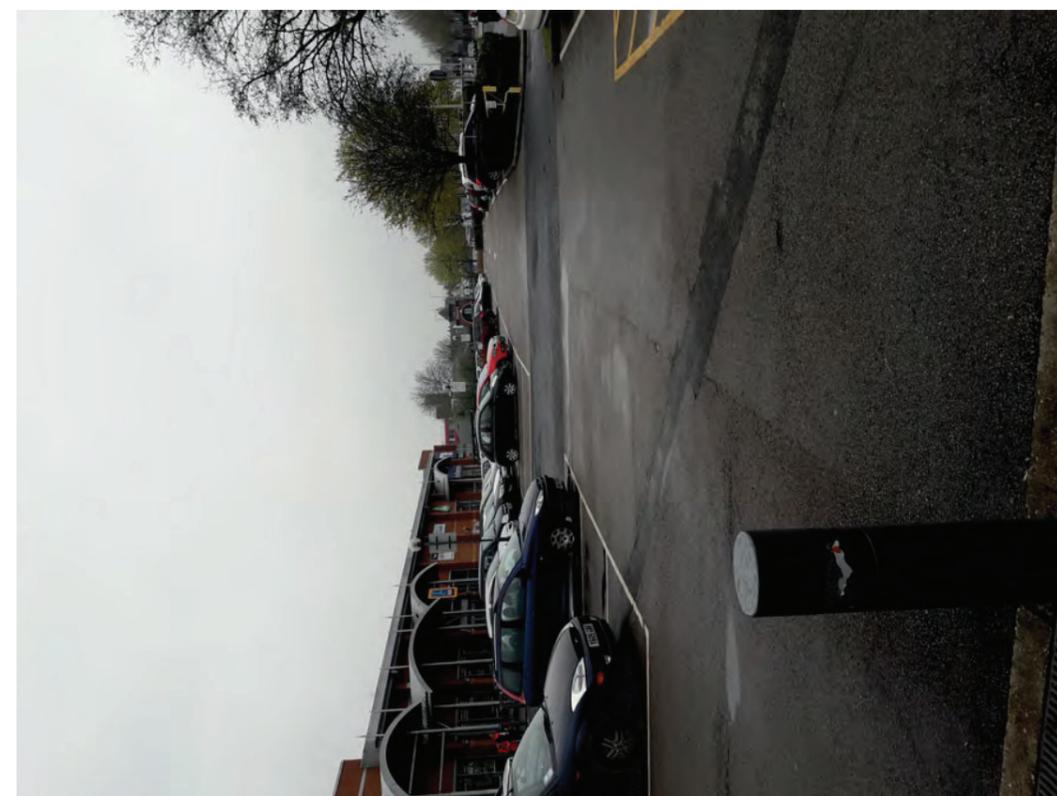


Fig 4 Looking north-west across the north of the site (MOLA photograph 2019)



Fig 1 Ordnance Survey 1 mile map of 1810 (not to scale)

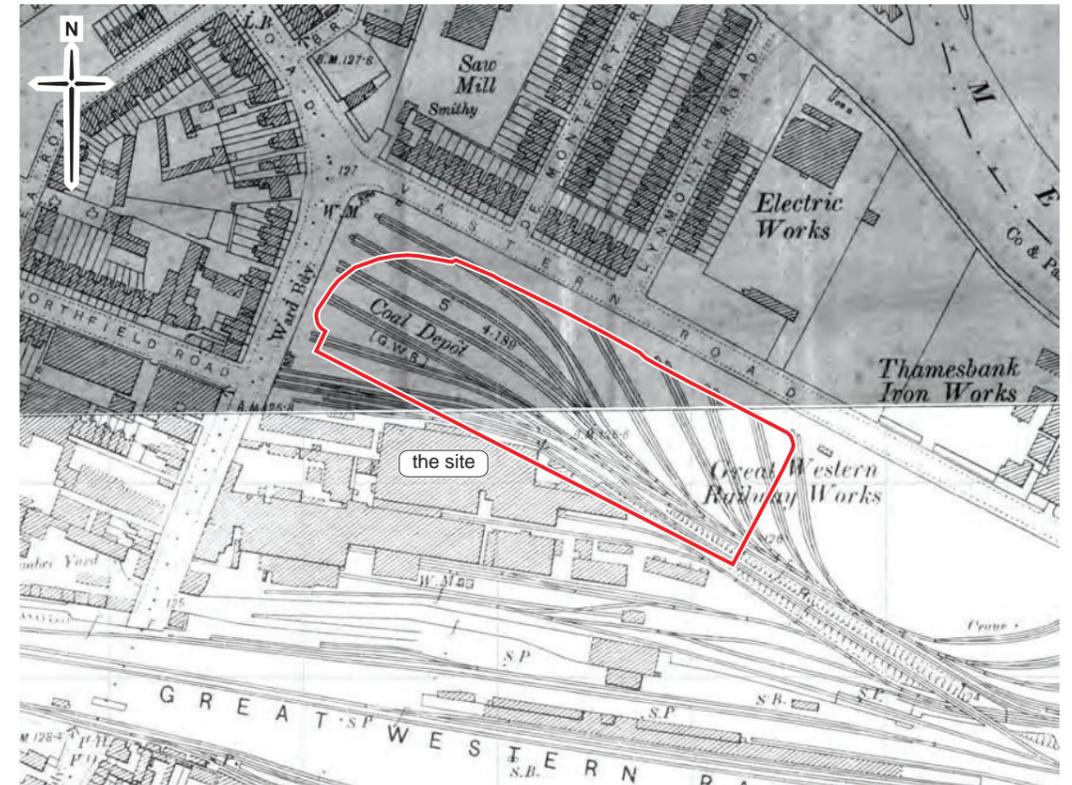


Fig 2 Ordnance Survey 2.5 mile map of 1825 (not to scale)

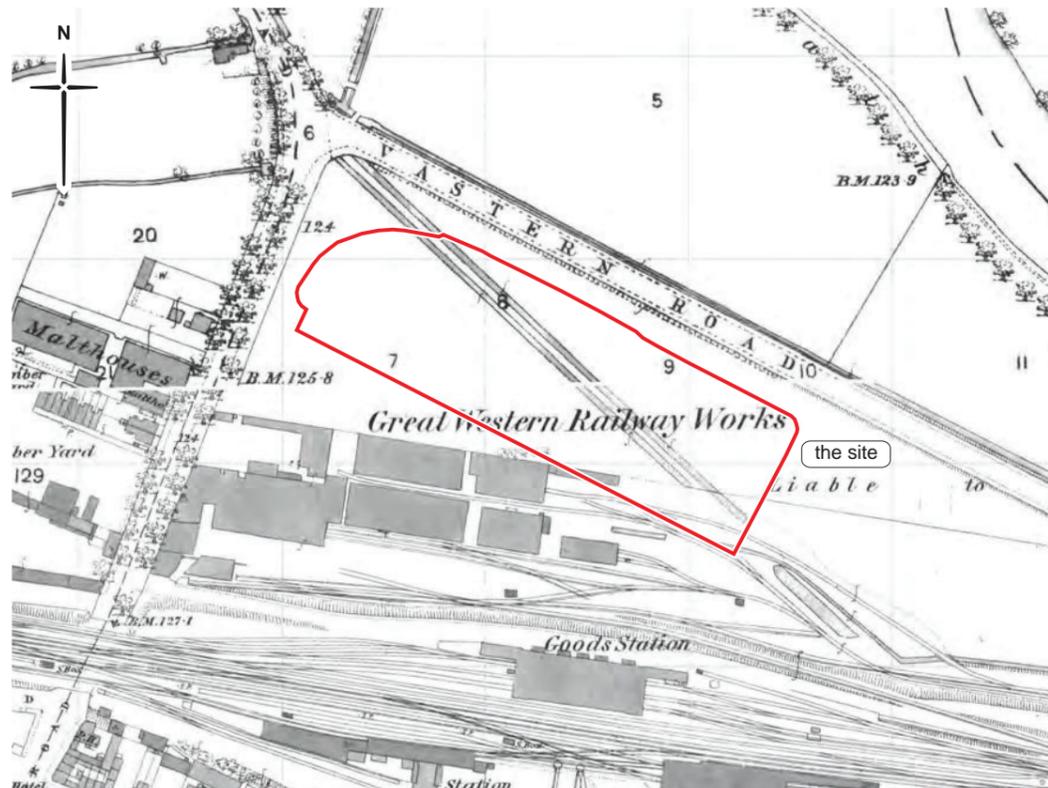


Fig 3 Ordnance Survey 1st edition 2.5 mile map of 1891 (not to scale)

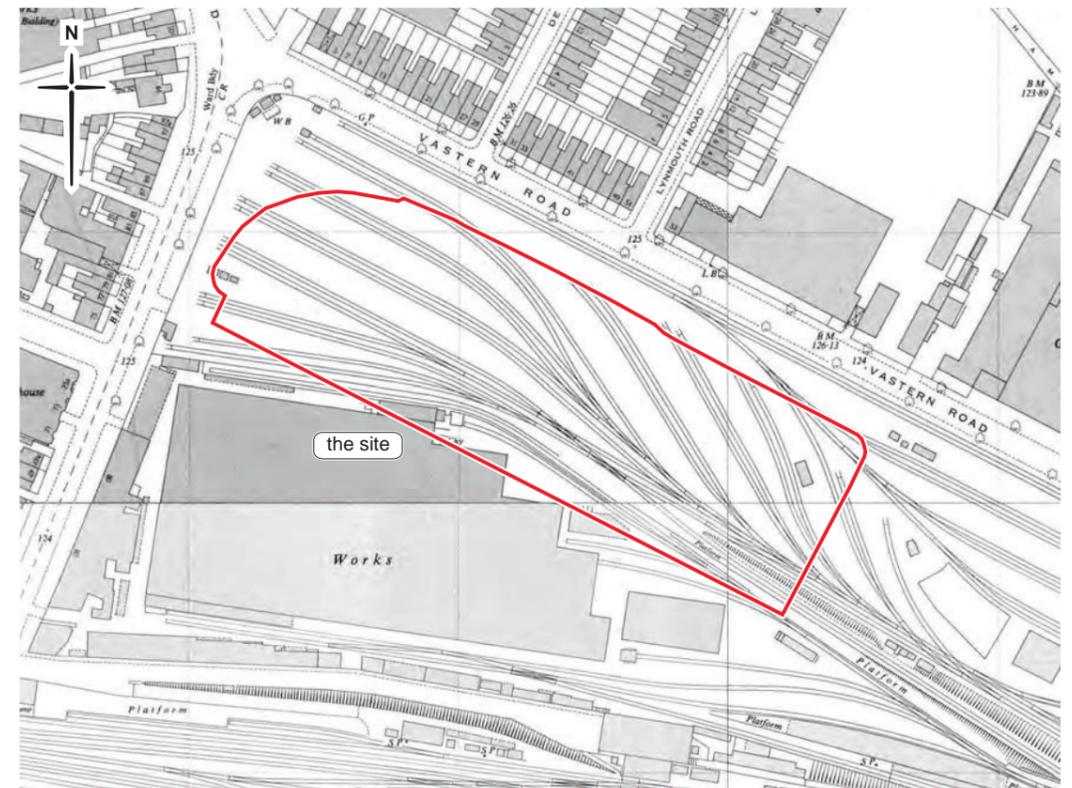


Fig 4 Ordnance Survey 1:250 scale map of 1925 (not to scale)

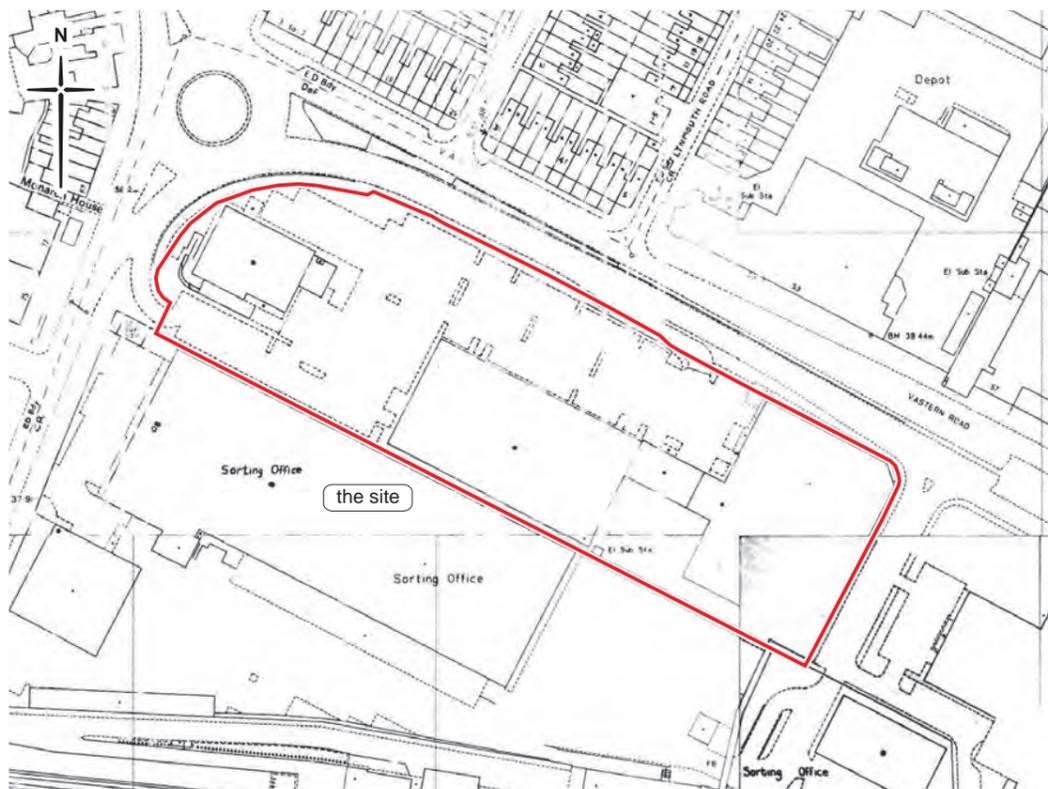


Fig 10 Ordnance Survey 1:250 scale map of 1909 (not to scale)

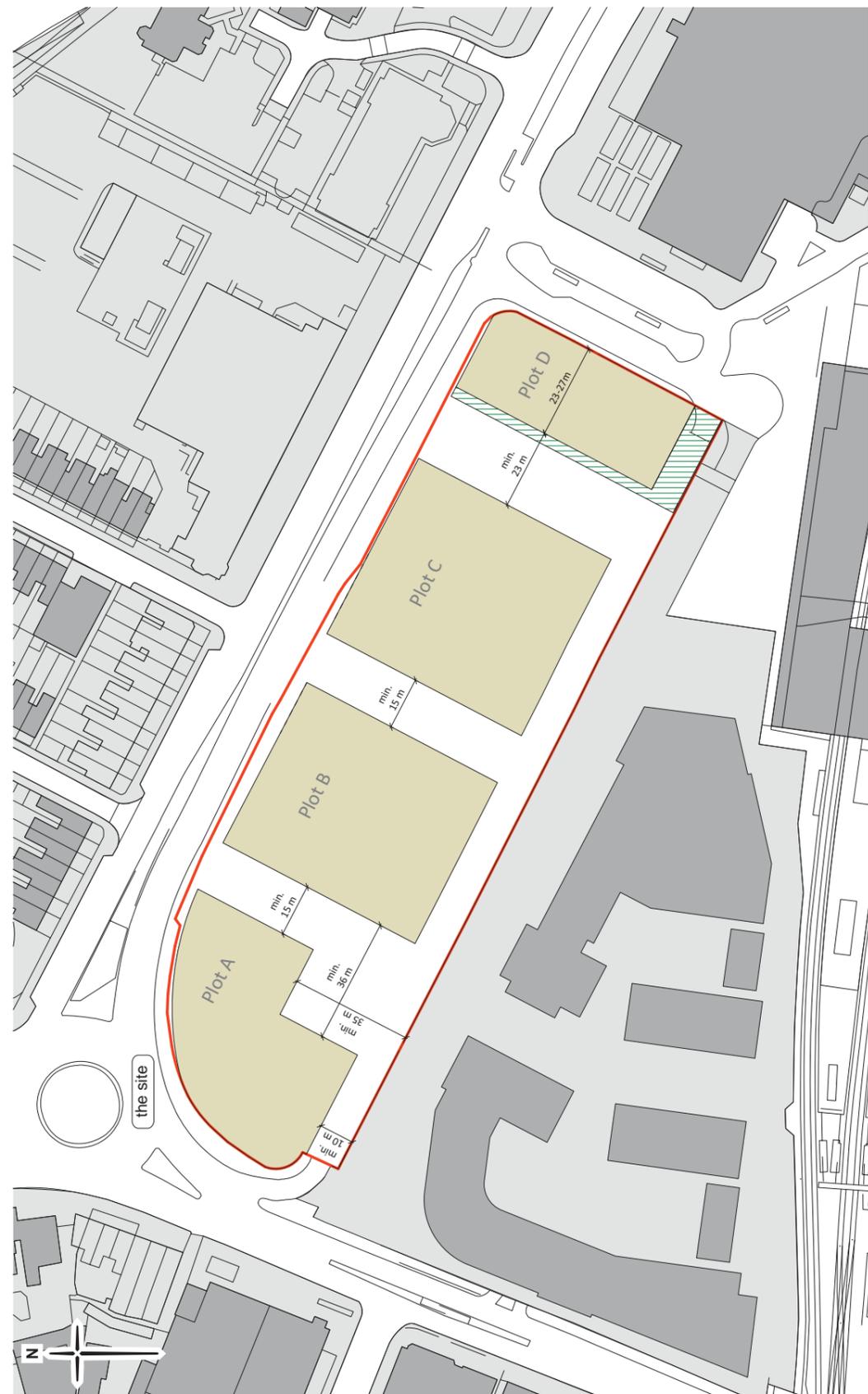


Fig 11 Outline of plots parameter plan (October 2019) by Jones Architects parameter plan (October 2019) by Jones Architects

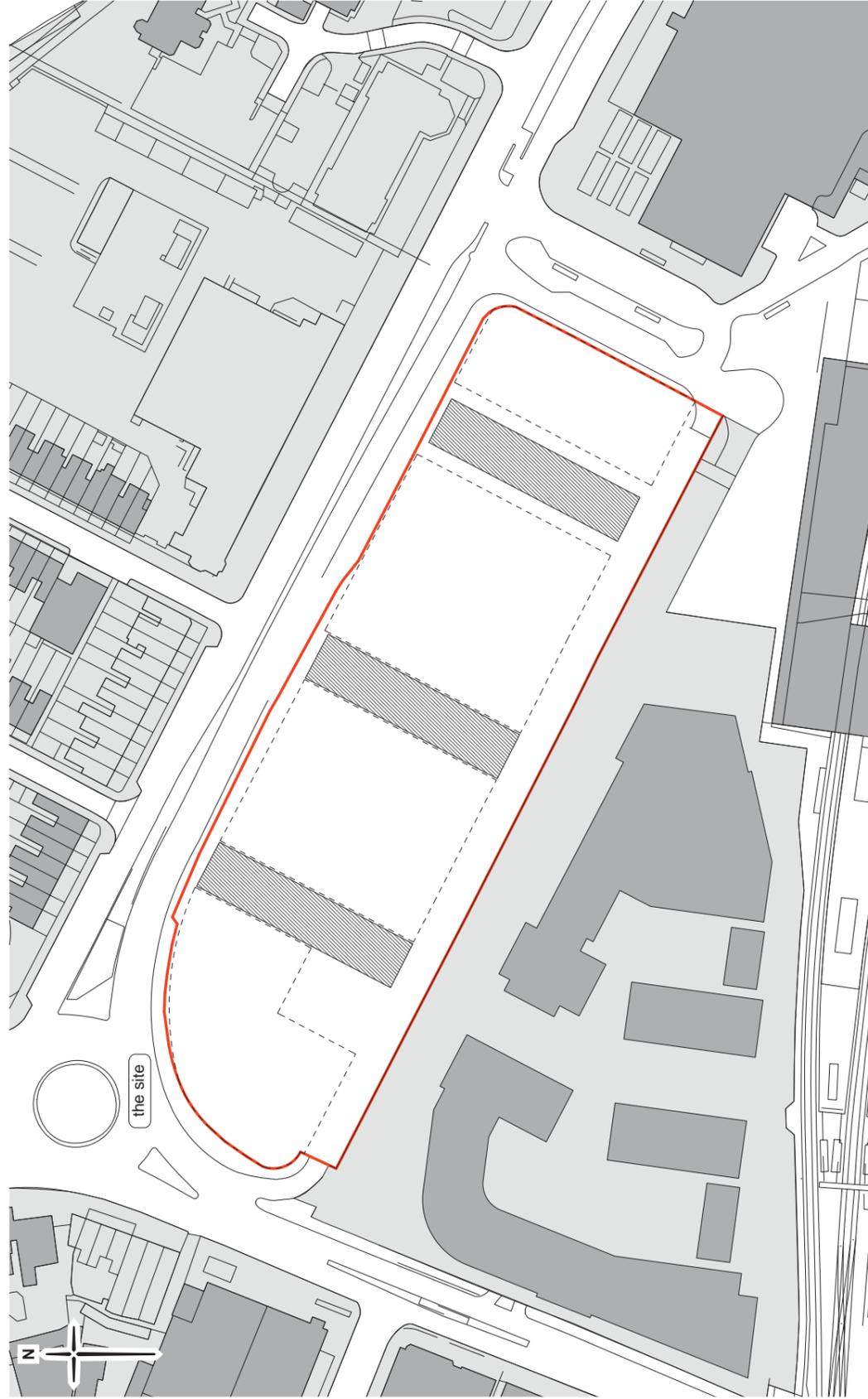


Fig 12 Out line attenuation tank parameter p an ( o a o o ins Architects arameter an asement Footprint wg 1 04 -105 e 1 2 -10-2019)

## **Technical Appendix 2.6: Summary Planning Policies**



Policy Matrix											
Policy	Environmental Statement Chapters							Technical Appendices			
	Socio-Economics	Air Quality	Noise and Vibration	Wind	Daylight, Sunlight and Overshadowing	Townscape and Visual	Built Heritage	Preliminary Risk Assessment	Ecological Impact Assessment	Flood Risk Assessment	Historic Environment Assessment
National Planning Policy Framework, 2019 <sup>1</sup>	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Planning Policy Guidance, 2019 <sup>2</sup>	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Reading Borough Local Plan, 2019 <sup>3</sup>	H1: Provision of Housing	✓									
	H3: Affordable Housing	✓									
	EN1: Protection and Enhancement of the Historic Environment										✓
	EN2: Areas of Archaeological Significance										✓
	EN4: Locally Important Heritage Assets										✓
	EN12: Biodiversity and the Green Network								✓		
	EN14: Trees, Hedges And Woodlands								✓		
	EN15: Air Quality		✓								
	EN16: Pollution and Water Resources			✓					✓	✓	
	EN17: Noise Generating Equipment			✓							
	CC3: Adaptation To Climate Change				✓						
	CC8: Safeguarding Amenity				✓						
	CR10: Tall Buildings				✓	✓	✓				
Reading Station Area Framework, 2010 <sup>4</sup>			✓		✓	✓					

<sup>1</sup> Secretary of State for Ministry of Housing, Communities and Local Government, 2019. National Planning Policy Framework.

<sup>2</sup> <https://www.gov.uk/government/collections/planning-practice-guidance>

<sup>3</sup> Reading Borough Council, 2019. Reading Borough Local Plan.

<sup>4</sup> Reading Borough Council, 2010. Reading Station Area Framework.

Policy Matrix											
Policy	Environmental Statement Chapters							Technical Appendices			
	Socio-Economics	Air Quality	Noise and Vibration	Wind	Daylight, Sunlight and Overshadowing	Townscape and Visual	Built Heritage	Preliminary Risk Assessment	Ecological Impact Assessment	Flood Risk Assessment	Historic Environment Assessment
Reading City Centre Framework, 2008 <sup>5</sup>						✓					
Reading Housing and Economic Land Availability Assessment, 2017 <sup>6</sup>						✓					
Reading Tall Buildings Strategy, 2008 <sup>7</sup>						✓					
Reading Biodiversity Action Plan <sup>8</sup>											
Reading Local Development Framework, Sites and Detailed Policies Document, (Altered 2015)					✓						
Reading Central Area Action Plan (AAP), 2009					✓						
The European Air Quality Framework Directive and Daughter Directives <sup>9, 10</sup>		✓									
Clean Air Strategy, 2019 <sup>11</sup>		✓									
Part IV of the Environment Act, 1995 (as amended) <sup>12</sup>		✓									
Air Quality Action Plan, 2009 (as revised) <sup>13</sup>		✓									
Air Quality Strategy, 2007 <sup>14</sup>		✓									
Air Quality Standards (Amendment) Regulations, 2016 <sup>15</sup>		✓									
Environmental Protection UK/Institute of Air Quality Management Guidance, Land-Use Planning Guidance, 2017 <sup>16</sup>		✓									
Local Air Quality Management Technical Guidance, 2016 (LAQM.TG(16)) <sup>17</sup>		✓									
IAQM guidance on the Assessment of Dust from Demolition and Construction, 2016 <sup>18</sup>		✓									

<sup>5</sup> Reading Borough Council, 2008. Reading City Centre Framework.

<sup>6</sup> Reading Borough Council, 2017. Reading Housing and Economic Land Availability Assessment.

<sup>7</sup> Reading Borough Council, 2008. Reading Tall Building Strategy.

<sup>8</sup> Reading Borough Council, 2005-2015. The Reading Biodiversity Action Plan.

<sup>9</sup> European Commission, 2008. Directive 2008/50/EC. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

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<sup>11</sup> Defra, 2019. Clean Air Strategy.

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<sup>15</sup> Statutory Instrument, 2016. No. 1184, The Air Quality Standards (Amendment) Regulations 2016. HMSO.

<sup>16</sup> Institute of Air Quality Management and Environmental Protection UK, 2017. Land-Use Planning & Development Control: Planning for Air Quality.

<sup>17</sup> Department of the Environment, Food and Rural Affairs (Defra) in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland, 2016. 'Local Air Quality Management Technical Guidance, LAQM.TG(16)'. HMSO, London.

<sup>18</sup> Holman et al, 2016. IAQM Guidance on the assessment of dust from demolition and construction V1.1. Institute of Air Quality Management, London.

Policy Matrix												
Policy		Environmental Statement Chapters						Technical Appendices				
		Socio-Economics	Air Quality	Noise and Vibration	Wind	Daylight, Sunlight and Overshadowing	Townscape and Visual	Built Heritage	Preliminary Risk Assessment	Ecological Impact Assessment	Flood Risk Assessment	Historic Environment Assessment
IAQM guidance on Land-Use Planning and Development Control: Planning for Air Quality, 2017 <sup>19</sup>			✓									
Control of Pollution Act, Part III – Noise, 1974 <sup>20</sup>				✓								
The Environmental Protection Act 1990, (as amended) <sup>21</sup>				✓								
Noise Policy Statement for England, 2010 <sup>22</sup>				✓								
Sustainable Design and Construction: Adopted Supplementary Planning Document, 2019 <sup>23</sup>				✓								
British Standards Institution	BS 4142:2014 <sup>24</sup> – ‘Methods for Rating and Assessing Industrial and Commercial Sound’			✓								
	BS 5228:2009+A1:2014 <sup>25</sup> – ‘Code of Practice for Noise and Vibration Control on Construction and Open Sites’			✓								
	BS 7385-2:1993 <sup>26</sup> - ‘Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Groundborne Vibration’			✓								
	BS 8233:2014 <sup>27</sup> – ‘Guidance on Sound Insulation and Noise Reduction for Buildings’			✓								
	BS 6472-1:2008 <sup>28</sup> – ‘Guide to Evaluation of Human Exposure to Vibration in Buildings. Vibration Sources Other Than Blasting’			✓								
	BS 8206-2:2008 <sup>29</sup> Lighting for buildings. Code of practice for daylighting					✓						
Calculation of Road Traffic Noise, 1988 <sup>30</sup>				✓								
Design Manual for Roads and Bridges, 2011 <sup>31</sup>				✓								

<sup>19</sup> Moorcroft and Barrowcliffe. et al., 2017. Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

<sup>20</sup> Secretary of State, 1974, Control of Pollution Act, HMSO.

<sup>21</sup> Secretary of State, 1990. Environmental Protection Act 1990. HMSO.

<sup>22</sup> Department of the Environment, Food and Rural Affairs (Defra), 2010. Noise Policy Statement for England (NPSE).

<sup>23</sup> Reading Borough Council, 2019. Sustainable Design and Construction – Supplementary Planning Document.

<sup>24</sup> British Standards Institution, 2014. BS 4142:2014. Method for Rating and Assessing Industrial and Commercial Sound.

<sup>25</sup> British Standards Institution, 2014. BS 5228:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites.

<sup>26</sup> British Standards Institution, 1993. BS 7385-2:1993. Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Groundborne Vibration.

<sup>27</sup> British Standards Institution, 2014. BS 8233 2014. Guidance on sound insulation and noise reduction for buildings, BSI.

<sup>28</sup> British Standards Institution, 2008. BS 6472:2008. Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting, BSI.

<sup>29</sup> British Standards Institution, 2009. BS 8206-2:2008. Lighting for buildings. Code of practice for daylighting.

<sup>30</sup> Department of Transport and the Welsh Office, 1988. Calculation of Road Traffic Noise, DoT & Welsh Office.

<sup>31</sup> Highways Agency, 2011. Design Manual for Roads and Bridges Volume 11 Section 3 Part 7, HA.

Policy Matrix											
Policy	Environmental Statement Chapters							Technical Appendices			
	Socio-Economics	Air Quality	Noise and Vibration	Wind	Daylight, Sunlight and Overshadowing	Townscape and Visual	Built Heritage	Preliminary Risk Assessment	Ecological Impact Assessment	Flood Risk Assessment	Historic Environment Assessment
IEMA Guidelines for Environmental Noise Impact Assessment, 2004 <sup>32</sup>			✓								
WHO Guidelines for Community Health, 1999 <sup>33</sup>			✓								
ProPG: Planning & Noise: Professional Practice Guidance on Planning & Noise <sup>34</sup>			✓								
ISO in 9613:1996 <sup>35</sup> : Part 2 Attenuation of sound during propagation outdoors			✓								
Site Layout Planning for Daylight and Sunlight. A Guide to Good Practice, 2011 <sup>36</sup>					✓						
CIE 146:2002 & CIE 147:2002: Collection on Glare <sup>37</sup>					✓						
Planning (Listed Building and Conservation Areas) Act, 1990 <sup>38</sup>							✓				
The Setting of Heritage Assets, 2015 <sup>39</sup>							✓				
Managing Significance in Decision-Taking in the Historic Environment, 2015 <sup>40</sup>							✓				
Department for Digital, Culture, Media and Sport's 'Principles of Selection for Listing Buildings', 2010 <sup>41</sup>							✓				
The Conservation of Habitats and Species Regulations, 2017 <sup>42</sup>									✓		
The Countryside and Rights of Way Act, 2000 <sup>43</sup>									✓		
The Wildlife and Countryside Act, 1981 <sup>44</sup>									✓		

<sup>32</sup> Institute of Environmental Management & Assessment (IEMA), 2014. Guidelines for Environmental Noise Impact Assessment.

<sup>33</sup> World Health Organisation, 1999. Guidelines for Community Noise. Geneva.

<sup>34</sup> The Association of Noise Consultants (ANC), Institute of Acoustics (IoA), Chartered Institute of Environmental Health, 2017. Professional Practice Guidance on Planning & Noise (ProPG): New Residential Development.

<sup>35</sup> International Organization for Standardization, 1996. ISO 9613: 1996 Part 2 Attenuation of sound during propagation outdoors, ISO.

<sup>36</sup> Building Research Establishment, 2011. Site Layout Planning for Daylight and Sunlight. A Guide to Good Practice.

<sup>37</sup> International Commission on Illumination, 2002. CIE Collection on Glare.

<sup>38</sup> HM Government, 1990. The Planning (Listed Buildings and Conservation Areas) Act.

<sup>39</sup> Historic England, 2015. The Setting of Heritage Assets. Historic Environment Good Practice Advice in Planning Note 3 (Second Edition).

<sup>40</sup> Historic England, 2015. Managing Significance in Decision-Taking in the Historic Environment. Historic Environment Good Practice Advice in Planning: 2.

<sup>41</sup> DCMS, 2010. Principles of Selection for Listing Buildings.

<sup>42</sup> Secretary of State, 2017. The Conservation of Habitats and Species Regulations. HMSO.

<sup>43</sup> Secretary of State, 2000. The Countryside and Rights of Way Act. HMSO.

<sup>44</sup> Secretary of State, 1981. Wildlife and Countryside Act. HMSO.

Policy Matrix											
Policy	Environmental Statement Chapters							Technical Appendices			
	Socio-Economics	Air Quality	Noise and Vibration	Wind	Daylight, Sunlight and Overshadowing	Townscape and Visual	Built Heritage	Preliminary Risk Assessment	Ecological Impact Assessment	Flood Risk Assessment	Historic Environment Assessment
Natural Environment and Rural Communities Act, 2006 <sup>45</sup>									✓		
The Protection of Badgers Act, 1992 <sup>46</sup>									✓		
UK Post-2010 Biodiversity Framework, 2012 <sup>47</sup>									✓		
Natural Environment White Paper, 2011 <sup>48</sup>									✓		
Biodiversity 2020, 2011 <sup>49</sup>									✓		
Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems <sup>50</sup>										✓	

<sup>45</sup> Natural Environment and Rural Communities Act, 2006. HMSO.

<sup>46</sup> Secretary of State, 1992. Protection of Badgers Act 1992. HMSO.

<sup>47</sup> JNCC and Defra (on behalf of the Four Countries' Biodiversity Group), 2012. UK Post-2010 Biodiversity Framework.

<sup>48</sup> Department of the Environment, Food and Rural Affairs (Defra), 2011. Natural Environment White Paper. The natural choice: securing the value of nature.

<sup>49</sup> Department of the Environment, Food and Rural Affairs (Defra), 2011. Biodiversity 2020.

<sup>50</sup> Department of the Environment, Food and Rural Affairs (Defra), 2015. Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems.

# Technical Appendix 7.1: EHO Consultation



---

**From:** Jarvis, Ross <Ross.Jarvis@reading.gov.uk>  
**Sent:** 19 December 2019 11:50  
**To:** Ana Gomes <ana.gomes@ramboll.co.uk>  
**Subject:** RE: Air Quality Consultation - Vastern Road

Hi Ana,

Although the train station is outside the 30m range recommended in guidance, Reading is a large busy train station with multiple lines. I therefore think that the impact of this on the proposed development should be looked at. I agree with the rest of the proposed methodology.

Regards

Ross

Ross Jarvis  
Senior Environmental Health Officer  
Environmental Protection & Nuisance | Directorate of Economic Growth and Neighbourhood Services  
Reading Borough Council  
Civic Offices  
Bridge Street  
Reading  
RG1 2LU

0118 937 2314 (72314)

[Website](#) | [Facebook](#) | [Twitter](#) | [YouTube](#)



---

**From:** Ana Gomes [<mailto:ana.gomes@ramboll.co.uk>]

**Sent:** 16 December 2019 16:19  
**To:** Jarvis, Ross  
**Subject:** Air Quality Consultation - Vastern Road

Classification)

**This is an EXTERNAL EMAIL. STOP. THINK before you CLICK links or OPEN attachments.**

Dear Jarvis,

Ramboll has been commissioned to undertake an air quality assessment as part of an EIA for the proposed development at Vastern Road.

The attached scoping opinion request report has been submitted recently to Reading Borough Council and includes all the proposed development relevant information. Air quality is one of the topics proposed to be scoped in and Section 7.2 of the report presents the methodology of the air quality assessment.

The report proposes to assess the potential impacts of demolition and construction activities, industrial, road and rail emissions and of a potential energy plant. However, given the proposed development relatively low base loads a CHP is not considered viable and therefore no energy plant is being proposed as part of the development.

The development is located approximately 50m from Reading Rail Station and no stationary or moving diesel locomotives have been identified within 15m or 30m, respectively, of potential future receptors within the proposed development (TG(16)). The rail emissions are considered to have an insignificant impact on the proposed development and therefore we proposed to scope out rail emissions from the assessment. Also, no existing off-site emissions from industrial sites in proximity to the proposed development have been identified.

We propose to use the closest monitoring tubes to the site for model verification (DT51 to 53). Unfortunately, we do not have all the relevant road links traffic data to be able to include the automatic site in the verification process.

The development would replace the current existing retail park and a net reduction of approximately 3000 daily vehicles has been predicted. Although we expect an improvement in local air quality due to traffic flows reduction, we proposed to model both site suitability and impact of development.

Please, could you let me know if you agree with the proposed methodology within the scoping report and the above? Also, do you have any further concerns regarding air quality?

Thank you for your time.

Kind regards

**Ana Gomes**

Senior Air Quality Consultant

M 07583 102977

[ana.gomes@ramboll.co.uk](mailto:ana.gomes@ramboll.co.uk)

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## **Technical Appendix 7.2: Air Quality**



Intended for  
**Aviva Life & Pensions UK Limited**

Date  
**February 2020**

Project Number  
**1700003910**

# READING STATION PARK

## AIR QUALITY TECHNICAL APPENDIX 7.2

Project No. **1700003910**  
Issue No. **1**  
Date **14/02/2020**  
Made by **Ana Gomes**  
Checked by **Lesley Vining**  
Approved by **Lesley Vining**

Made by:



Checked/Approved by:

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#### Version Control Log

Revision	Date	Made by	Checked by	Approved by	Description
1	14/02/2020	AG	LV	LV	Issue for Submission

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## GLOSSARY

Abbreviations	Meaning
AADT	Annual Average Daily Traffic
ADMS	Air Dispersion Modelling System
AQS	Air Quality Strategy
AQOs	Air Quality Objective
AQMA	Air Quality Management Area
CEMP	Construction Environmental Management Plan
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Diffusion Tube	A passive sampler used for collecting NO <sub>2</sub> in the air
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes Heavy Goods Vehicles and buses
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen oxides, generally considered to be nitric oxide and NO <sub>2</sub> . Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
NPPF	National Planning Policy Framework
PM <sub>10</sub>	Small airborne particles less than 10 µm in diameter
PPG	Planning Practice Guidance
Receptor	A location where the effects of pollution may occur
RBC	Reading Borough Council
SPG	Supplementary Planning Guidance

# 1. LEGISLATION AND POLICY FRAMEWORK

## 1.1 International Legislation and Agreements

### 1.1.1 European Union Ambient Air Quality and Clean Air for Europe, 2008

EU Directive 2008/50/EC<sup>1</sup> on ambient air quality and cleaner air for Europe (the CAFE directive) sets out the ambient air quality standards for nitrogen dioxide (NO<sub>2</sub>) and particulate matter with an aerodynamic diameter of less than 10 µm (PM<sub>10</sub>) to be achieved by 1 January 2010 and 2005 respectively. The Air Quality Standards Regulations 2010<sup>2</sup> implements the requirements of the Directive into United Kingdom (UK) legislation.

The Directive contains a series of limit values for the protection of human health and critical levels for the protection of vegetation. Compliance with the European Union (EU) Limit Values is mandatory. However, Member States can apply for a time extension for compliance, subject to approval of an action plan by the European Commission.

In December 2015, the Department for Environment Food and Rural Affairs (Defra) on behalf of the UK Government produced plans to improve air quality in the UK in order to meet the EU targets in the shortest possible time<sup>3</sup>. The adequacy of these plans to bring about the necessary improvements in air quality to meet the relevant NAQOs within the shortest time possible were successfully challenged within the High Court in 2016.

Subsequently, in 2017 a plan for the reduction in roadside NO<sub>2</sub> concentrations was released<sup>4</sup> which requires local authorities to identify local actions to accelerate the improvement in air quality in their jurisdictions. It also includes the national measures, including banning the sale of conventionally powered cars and light goods vehicles by 2040 and further investment in cleaner transport.

### 1.1.2 Clean Air Strategy

Defra published a new Clean Air Strategy 2019<sup>5</sup> in January 2019, setting out how the UK will significantly reduce harmful air pollutant emissions by 2020 and 2030. The Clean Air Strategy contains an intention of working towards the World Health Organisation guideline value for PM<sub>2.5</sub> of 10 µg/m<sup>3</sup>. The timetable for this has not been set.

## 1.2 Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995<sup>6</sup>, requires the UK Government to publish an Air Quality Strategy and local authorities to review, assess and manage air quality within their areas. This is known as Local Air Quality Management (LAQM).

The 2007 Air Quality Strategy<sup>7</sup> establishes the policy for ambient air quality in the UK. It includes the Air Quality Objectives (AQOs) for the protection of human health and vegetation for 11 pollutants. Those AQOs included as part of LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) (England) Regulations 2002. Table 2.1 presents the AQOs for NO<sub>2</sub> and PM<sub>10</sub> the two pollutants of most concern in urban areas.

<sup>1</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

<sup>2</sup> Secretary of State, 2010. Statutory Instrument 2010 No. 1001, Air Quality Standards Regulations 2010. HMSO.

<sup>3</sup> Defra, December 2015. Improving air quality in the UK, Tackling nitrogen dioxide in our towns and cities, UK overview document. Defra.

<sup>4</sup> Department for Environment, Food and Rural Affairs, 2017. UK plan for tackling roadside nitrogen dioxide concentrations. Defra.

<sup>5</sup> Defra, 2019. Clean Air Strategy.

<sup>6</sup> Secretary of State, 1995. The Environment Act part IV Air Quality, HMSO.

<sup>7</sup> Department for Environment, Food and Rural Affairs, 2007. Air Quality Strategy for England, Scotland, Wales and Northern Ireland. HMSO.

**Table 1.1: Objectives Included in Air Quality Regulations (England) 2000 for Purpose of Local Air Quality Management**

Pollutant	Air Quality Objective		
	Concentration	Measured As	Date to be Achieved By
NO <sub>2</sub>	200 micrograms per metre cubed (µg/m <sup>3</sup> ) not to be exceeded more than 18 times per year	1 hour	31 December 2005
	40 µg/m <sup>3</sup>	Annual mean	
PM <sub>10</sub>	50 µg/m <sup>3</sup> not to be exceeded more than 35 times per year	24 hour mean	31 December 2004
	40 µg/m <sup>3</sup>	Annual mean	

Analysis of long-term monitoring data suggests that if the annual mean NO<sub>2</sub> concentration is less than 60 µg/m<sup>3</sup> then the one-hour mean NO<sub>2</sub> objective is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the one-hour mean objective is likely to be achieved (Defra, 2016). Similar to NO<sub>2</sub>, a PM<sub>10</sub> annual mean below 32 µg/m<sup>3</sup> is used to screen whether the 24-hour PM<sub>10</sub> mean objective is likely to be achieved (Defra, 2016).

The 2007 Air Quality Strategy also introduced a new policy framework for tackling PM<sub>2.5</sub> which included an exposure reduction target and a 'backstop' annual mean NAQO. The exposure reduction target is focussed on reducing average concentrations across the most polluted urban areas and is therefore not applicable to individual schemes, whilst the annual mean NAQO can be considered a concentration cap to ensure environmental compliance. The UK NAQO for PM<sub>2.5</sub> are provided in Table 2.2.

**Table 1.2: UK Objectives for PM<sub>2.5</sub>**

Averaging Period	Objective	Target Date
Annual mean	25 µg/m <sup>3</sup>	2020
3 year running annual mean	15 % reduction in concentrations measured at urban background sites	Between 2010 and 2020

The NAQOs apply to external air where there is relevant exposure to the public over the associated averaging periods within each NAQO. Guidance is provided within LAQM.TG (16)<sup>8</sup> issued by Defra for Local Authorities, on where the NAQOs apply, as detailed in Table 2.3. The NAQOs do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e. centre of roadways).

**Table 1.3: Locations Where National Air Quality Objectives Apply**

Averaging Period	Objectives should apply at	Objectives should generally not apply at
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties.

<sup>8</sup> Department for Environment, Food and Rural Affairs, 2016. Local Air Quality Management Technical Guidance LAQM.TG (16). HMSO.

<b>Averaging Period</b>	<b>Objectives should apply at</b>	<b>Objectives should generally not apply at</b>
24 Hour Mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1 Hour Mean	All locations where the annual mean and: 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets).  Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more.  Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.	

It should be noted that the EU Limit Values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and legal responsibility. The compliance date for the NO<sub>2</sub> Limit Values was 1 January 2010, which is five years later than the date for the NAQO.

The Limit Values are mandatory whereas the NAQOs are policy objectives. Local authorities are not required to achieve them, but have to demonstrate effort of working towards their achievement. In addition, the Limit Values apply in all locations except:

- where members of the public do not have access and there is no fixed habitation;
- on factory premises or at industrial installations; and
- on the carriageway/central reservation of roads except where there is normally pedestrian access.

Where a local authority's review and assessment of its air quality identifies that air quality is likely to exceed the NAQOs, it must designate these areas as AQMAs and draw up an Air Quality Action Plan (AQAP) setting out measures to reduce pollutant concentrations with the aim of meeting the NAQOs.

### **1.3 National Planning Policy and Legislation**

#### **1.3.1 The National Planning Policy Framework**

The revised NPPF<sup>9</sup> sets out the Government's planning policies for England and how these are expected to be applied. In relation to achieving sustainable development, paragraph 8 states that:

*"Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives): ...*

*c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using*

<sup>9</sup> Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework.

*natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development. Paragraph 11 states that plans and decisions should apply a presumption in favour of sustainable development, which for decision-taking means:

*"... d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:...*

*ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."*

Paragraph 54 on planning conditions and obligations states:

*"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."*

Paragraph 102 on promoting sustainable transport states:

*"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: ...*

*d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; ..."*

Paragraph 103 continues to state:

*"Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health."*

Paragraph 170 on conserving and enhancing the natural environment states:

*"Planning policies and decisions should contribute to and enhance the natural and local environment by: ...*

*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land stability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans, and..."*

Paragraph 180 within ground conditions and pollution states:

*"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."*

Paragraph 181 states that:

*"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

Paragraph 182 states that:

*"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed..."*

## 1.4 Local Policy

### 1.4.1 Reading Borough Local Plan

Reading Borough Local Plan was adopted on 4<sup>th</sup> November 2019<sup>10</sup>. The Local Plan sets out RBC planning policies for development in Reading up to 2036, and is the main consideration in deciding planning applications. Policy EN15 on Air quality States:

*"Development should have regard to the need to improve air quality and reduce the effects of poor air quality.*

*i. Development that would detrimentally affect air quality will not be permitted unless the effect is to be mitigated. The following criteria should be taken into account:*

- Whether the proposal, including when combined with the cumulative effect of other developments already permitted, would worsen air quality;*
- Whether the development is within, or accessed via, an Air Quality Management Area; and*
- Whether it can be demonstrated that a local worsening in air quality that would not detrimentally affect human health or the environment would be offset by an overall improvement in air quality, for instance through reduction in the need to travel.*

*ii. Where a development would introduce sensitive uses (such as residential, schools and nurseries, hospitals, care facilities) into, or intensify such uses within, an Air Quality Management Area, detrimental effects on that use will be mitigated. Mitigation measures should be detailed in any planning application. If there are significant detrimental effects that cannot be mitigated, the application should be refused.*

*iii. Where required, planning obligations will be used to secure contributions to measures to tackle poor air quality or for air quality monitoring."*

### 1.4.2 Air Quality Action Plan

RBC reviewed its existing Air Quality Action Plan in 2016, which has been in place since 2009<sup>11</sup>. The revised Air Quality Action Plan contains measures to improve air quality across Reading, specifically targeting action on the key pollutants of concern – Nitrogen Dioxide and Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>). The actions within the plan are split into the two key areas: Intervention and Education/Promotion.

## 1.5 Additional Guidance

### 1.5.1 Institute of Air Quality Management: Construction Dust Guidance, 2016 v1.1

The IAQM produced guidance<sup>12</sup> to assist in the assessment of air quality impacts from demolition and construction activities. This guidance provides a consistent methodology for assessing the risks of dust impacts from demolition and construction activities and for identifying the correct level of mitigation which should be applied to avoid significant air quality effects.

<sup>10</sup> Reading Borough Council (2019). Reading Borough Local Plan.

<sup>11</sup> Reading Borough Council (2009) Air Quality Action Plan.

<sup>12</sup> Holman et al, 2016. IAQM Guidance on the assessment of dust from demolition and construction V1.1. Institute of Air Quality Management, London.  
Available: <http://www.iaqm.co.uk/text/guidance/construction-dust-2014>

### 1.5.2 Environmental Protection UK/Institute of Air Quality Management Guidance, Land-Use Planning Guidance, 2017

Environmental Protection UK (EPUK), together with the IAQM, produced updated guidance in 2017<sup>13</sup> on how air quality impacts should be assessed within the land-use planning and development control process. This guidance provides clear criteria to determine when a detailed air quality assessment is required and a methodology for assessing the significance of air quality effects.

<sup>13</sup> Institute of Air Quality Management and Environmental Protection UK, 2017. Land-Use Planning & Development Control: Planning for Air Quality. Available: <http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>  
R170003910\_1\_Ap 7.2\_Air Quality Technical Appendix

## 2. DUST RISK ASSESSMENT METHODOLOGY

**Table 2.1 Determining Dust Emission Magnitude**

Large	Medium	Small
<b>Demolition</b>		
<ul style="list-style-type: none"> <li>total building volume &gt;50,000 m<sup>3</sup></li> <li>potentially dusty construction material (e.g. concrete)</li> <li>on-site crushing and screening</li> <li>demolition activities &gt;20 m above ground level</li> </ul>	<ul style="list-style-type: none"> <li>total building volume 20,000m<sup>3</sup> – 50,000 m<sup>3</sup></li> <li>potentially dusty construction</li> <li>demolition activities 10-20 m above ground level</li> </ul>	<ul style="list-style-type: none"> <li>total building volume &lt;20,000 m<sup>3</sup></li> <li>construction material with low potential for dust release (e.g. metal cladding or timber)</li> <li>demolition activities &lt;10 m above ground</li> <li>during wetter months</li> </ul>
<b>Earthworks</b>		
<ul style="list-style-type: none"> <li>total site area &gt;10,000 m<sup>2</sup></li> <li>potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size)</li> <li>&gt;10 heavy earth moving vehicles active at any one time</li> <li>formation of bunds &gt;8 m in height</li> <li>total material moved &gt;100,000 tonnes</li> </ul>	<ul style="list-style-type: none"> <li>total site area 2,500 m<sup>2</sup> - 10,000 m<sup>2</sup></li> <li>moderately dusty soil type (e.g. silt)</li> <li>5-10 heavy earth moving vehicles active at any one time</li> <li>formation of bunds 4 m – 8 m in height</li> <li>total material moved 20,000 - 100,000 tonnes</li> </ul>	<ul style="list-style-type: none"> <li>total site area &lt;2,500 m<sup>2</sup></li> <li>soil type with large grain size (e.g. sand)</li> <li>&lt;5 heavy earth moving vehicles active at any one time</li> <li>formation of bunds &lt;4 m in height</li> <li>total material moved &lt;20,000 tonnes</li> <li>earthworks during wetter months</li> </ul>
<b>Construction</b>		
<ul style="list-style-type: none"> <li>total building volume &gt;100,000 m<sup>3</sup></li> <li>piling</li> <li>on-site concrete batching</li> <li>sandblasting</li> </ul>	<ul style="list-style-type: none"> <li>total building volume 25,000 m<sup>3</sup> - 100,000 m<sup>3</sup></li> <li>potentially dusty construction material (e.g. concrete)</li> <li>piling</li> <li>on-site concrete batching</li> </ul>	<ul style="list-style-type: none"> <li>total building volume &lt;25,000 m<sup>3</sup></li> <li>construction material with low potential for dust release (e.g. metal cladding or timber)</li> </ul>
<b>Trackout</b>		
<ul style="list-style-type: none"> <li>&gt;50 HDV (&gt;3.5t) movements in any one day</li> <li>potentially dusty surface material (e.g. high clay content)</li> <li>unpaved road length &gt;100 m</li> </ul>	<ul style="list-style-type: none"> <li>10-50 HDV (&gt;3.5t) movements in any one day</li> <li>moderately dusty surface material (e.g. high clay content)</li> <li>unpaved road length 50 m – 100 m</li> </ul>	<ul style="list-style-type: none"> <li>&lt;10 HDV (&gt;3.5t) movements in any one day</li> <li>surface material with low potential for dust release</li> <li>unpaved road length &lt;50 m</li> </ul>

**Table 2.2 Determining Receptor Sensitivity**

High	Medium	Low
<b>Sensitivities of People to Dust Soiling Effects</b>		
<ul style="list-style-type: none"> <li>users can reasonably expect enjoyment of a high level of amenity; or</li> <li>the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.</li> <li>indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.</li> </ul>	<ul style="list-style-type: none"> <li>users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or</li> <li>the appearance, aesthetics or value of their property could be diminished by soiling; or</li> <li>the people or property would not reasonably be expected to be present continuously or regularly for extended periods as part of the normal pattern of use of the land.</li> <li>indicative examples include parks and places of work.</li> </ul>	<ul style="list-style-type: none"> <li>the enjoyment of amenity would not reasonably be expected; or</li> <li>property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or</li> <li>there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</li> <li>indicative examples include playing fields, farmland(unless commercially-sensitive horticultural), footpaths, short term car parks and roads.</li> </ul>
<b>Sensitivities of People to the Health Effects of PM<sub>10</sub></b>		
<ul style="list-style-type: none"> <li>locations where members of the public are exposed over a time period relevant to the air quality objective for PM<sub>10</sub> (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).</li> <li>indicative examples include residential properties, hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.</li> </ul>	<ul style="list-style-type: none"> <li>locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM<sub>10</sub> (in the case of the 24-hour objectives,</li> <li>a relevant location would be one where individuals may be exposed for eight hours or more in a day).</li> <li>indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM<sub>10</sub>, as protection is covered by Health and Safety at Work legislation.</li> </ul>	<ul style="list-style-type: none"> <li>locations where human exposure is transient.</li> <li>indicative examples include public footpaths, playing fields, parks and shopping streets.</li> </ul>
<b>Sensitivities of Receptors to Ecological Effects</b>		
<ul style="list-style-type: none"> <li>locations with an international or national designation <i>and</i> the designated features may be affected by dust soiling; or</li> <li>locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain.</li> </ul>	<ul style="list-style-type: none"> <li>locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or</li> <li>locations with a national designation where the features may be affected by dust deposition.</li> </ul>	<ul style="list-style-type: none"> <li>locations with a local designation where the features may be affected by dust deposition.</li> <li>indicative example is a local Nature Reserve with dust sensitive features.</li> </ul>

**Table 2.2 Determining Receptor Sensitivity**

High	Medium	Low
<ul style="list-style-type: none"> <li>indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.</li> </ul>	<ul style="list-style-type: none"> <li>indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.</li> </ul>	

**Table 2.3 Determining Sensitivity of the Area - Dust Soiling Effects on People and Property**

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

**Table 2.4 Determining Sensitivity of the Area – Human Health Impacts**

	Annual Mean PM <sub>10</sub> concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m <sup>3</sup>	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	>28-32 µg/m <sup>3</sup>	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	>24-28 µg/m <sup>3</sup>	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
<24 µg/m <sup>3</sup>	>100	Medium	Low	Low	Low	Low	
	10-100	Low	Low	Low	Low	Low	
	1-10	Low	Low	Low	Low	Low	
Medium		>1	High	Medium	Low	Low	Low
Low		>1	Medium	Low	Low	Low	Low

**Table 2.5 Determining Risk of Dust Impacts - Demolition**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

**Table 2.6 Determining Risk of Dust Impacts - Earthworks**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

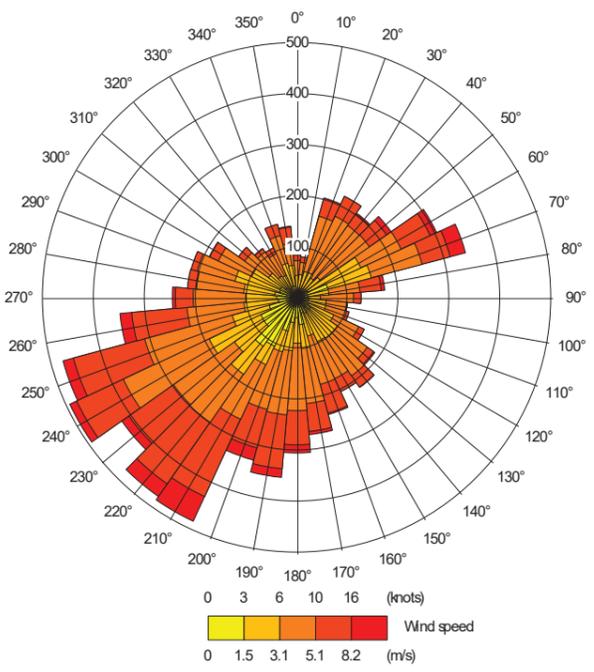
**Table 2.7 Determining Risk of Dust Impacts – Construction**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

**Table 2.8 Determining Risk of Dust Impacts –Trackout**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

### 3. MODEL INPUTS AND RESULTS PROCESSING TOOLS

Meteorological Data	<p>2018 Hourly meteorological data from Farnborough Station has been used in the model. The wind rose is shown below.</p> 
ADMS	Version 4.1.1
Street Canyon	<p>ADMS Advanced Street Canyon module was used to represent the effect of trapping and recirculating pollutants. The canyons included are shown in Traffic Data and Road Network.</p> <p>Building heights were assumed to be 3 m per floor</p>
Time Varying Emission Factors	Based on Department for Transport statistics. Table TRA0307. Motor vehicle traffic distribution by time of day and day of the week on all roads, Great Britain: 2018.
Latitude	51
Surface Roughness	A value of 1 for Citiie sand Woodlands was used to represent the modelled area. A value of 0.3 for agricultural areas was used to represent the meteorological station site.
Minimum Monin-Obukhov length	A value of 30 for Large Towns was used to represent the modelled area and the meteorological station site.
Emission Factor Toolkit (EFT)	V9.0 , May 2019.
NO <sub>x</sub> to NO <sub>2</sub> Conversion	NO <sub>x</sub> to NO <sub>2</sub> calculator version 7.1, May 2019
Background Maps	2017 reference year background maps

### 4. TRAFFIC DATA, RAIL EMISSIONS AND MODELLED ROAD NETWORK

Traffic data

**Table 4.1: Traffic Data Used Within the Assessment**

Road Link	2018 Baseline		2025 Without Development (DM)		2025 With Development (DS)	
	AADT	HDV	AADT	HDV	AADT	HDV
Caversham Road	23,004	1175	25891	1291	25196	1299
Caversham Road (South Vastern Road)	28,547	1,226	31,999	1,369	31242	1394
Vastern Road	22,805	1,675	26,535	1,888	23651	1934
Vastern Road (South Kings Meadow Road)	21,225	395	24563	452	23402	470
Bagnall Way	2,745	154	3002	168	3002	168
George Street	19,498	199	21892	224	21654	228
Troopers Potts Way	1,973	290	2694	367	2694	367

Rail Emissions

**Table 4.2: Rail Emissions Used Within the Assessment**

Rail	2017 Emissions	
	Tonnes/year 1x1 km	g/km/s
NO <sub>2</sub>	23.5	0.74
PM <sub>10</sub>	2.1	0.07
PM <sub>2.5</sub>	0.6	0.02

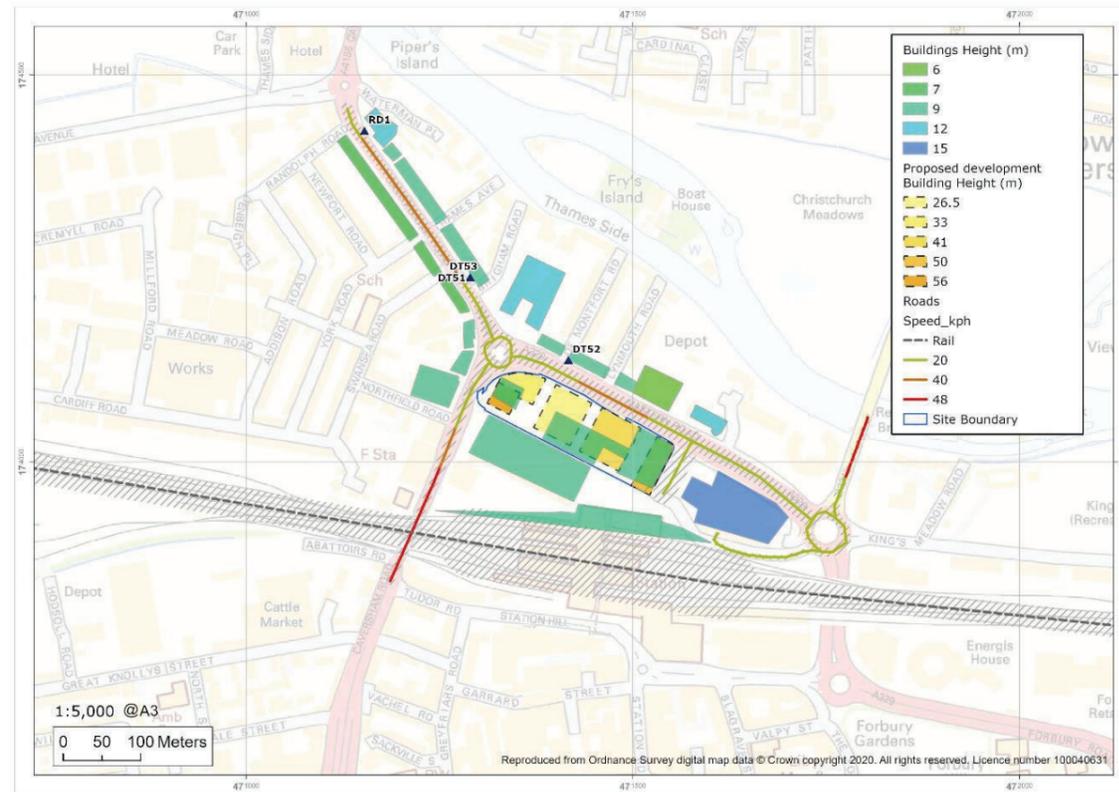


Figure 4.1: Model Inputs and Road Network

## 5. MODEL VERIFICATION

### 5.1 Nitrogen Dioxide

The model has been run to predict the 2018 annual mean road-NO<sub>x</sub> contribution at three monitoring locations (identified in Table 6.1). Concentrations have been modelled at 2 m height.

The model output of road-NO<sub>x</sub> has been compared with the 'measured' road-NO<sub>x</sub>, which was calculated from the measured NO<sub>2</sub> concentrations and the adjusted background NO<sub>2</sub> concentrations within the NO<sub>x</sub> from NO<sub>2</sub> calculator.

A primary adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution (Figure 6.1). This factor was then applied to the modelled road-NO<sub>x</sub> concentration for each monitoring site to provide adjusted modelled road-NO<sub>x</sub> concentrations. The total nitrogen dioxide concentrations were then determined by combining the adjusted modelled road-NO<sub>x</sub> concentrations with the predicted background NO<sub>2</sub> concentration within the NO<sub>x</sub> from NO<sub>2</sub> calculator. A secondary adjustment factor was finally calculated as the slope of the best fit line applied to the adjusted data and forced through zero (Figure 6.2).

Table 5.1: Verification Factor

Monitor	Monitored NO <sub>2</sub> µg/m <sup>3</sup>	Measured Road NO <sub>x</sub> µg/m <sup>3</sup>	Modelled Roadside NO <sub>x</sub> µg/m <sup>3</sup>	Ratio Measured NO <sub>x</sub> / Modelled road NO <sub>x</sub>	Total NO <sub>2</sub> after adjustment µg/m <sup>3</sup>	% Difference in NO <sub>2</sub> after adjustment
DT51	41.5	33.61	21.1	1.59	37.51	-9.7
DT52	33.0	14.66	17.3	0.85	35.46	7.5
DT53	34.8	18.47	19.2	0.96	36.53	5.0

The results imply that overall, the model was under-predicting the road-NO<sub>x</sub> contribution. This is a common experience with this and most other models. The final NO<sub>2</sub> adjustment is minor.

Figure 6.3 compares final adjusted modelled total NO<sub>2</sub> at each of the monitoring sites, to measured total NO<sub>2</sub>, and shows the 1:1 relationship, as well as ±10% and ±25% of the 1:1 line.

The following primary and secondary adjustment factors have been applied to all modelled nitrogen dioxide data:

Primary Adjustment Factor	1.1843
Secondary adjustment factor	0.9939

Model uncertainty has been estimated by calculating the root mean square error (RMSE). The calculated RMSE was 2.9 µg/m<sup>3</sup> (7%) after adjustment which is within the suggested value (10% of the objective being assessed) in LAQM.TG(16). The model has therefore performed sufficiently well for use within this assessment.

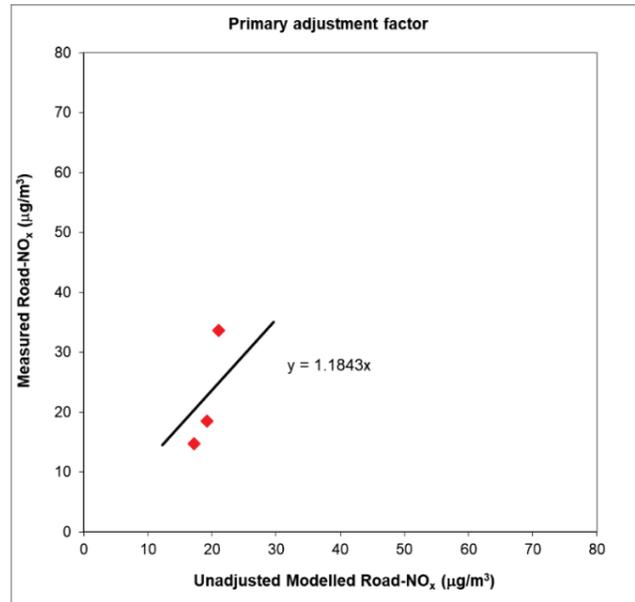


Figure 5.1: Comparison of Measured NO<sub>2</sub> with Primary Adjusted Modelled NO<sub>2</sub>

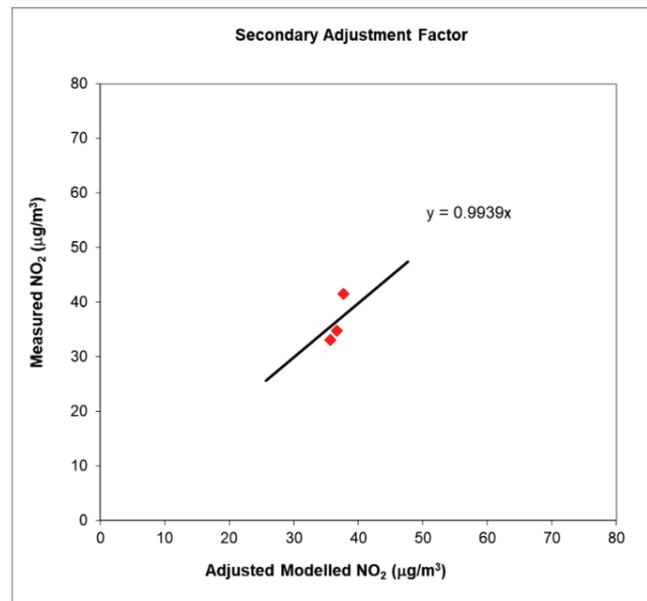


Figure 5.2: Comparison of Measured NO<sub>2</sub> with Primary Adjusted Modelled NO<sub>2</sub> Concentrations

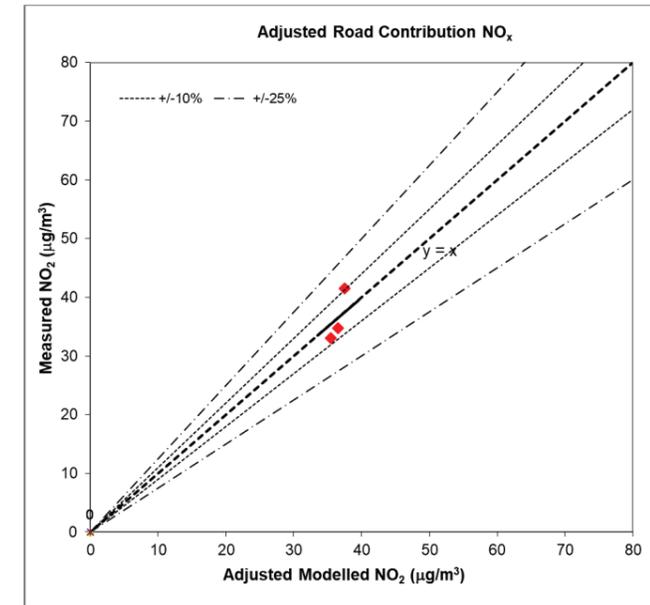


Figure 5.3: Comparison of Measured NO<sub>2</sub> with Fully Adjusted Modelled NO<sub>2</sub> Concentrations

5.1.1 Particulates (PM<sub>10</sub> and PM<sub>2.5</sub>)

With the exception of the urban background monitoring site, there is no PM<sub>10</sub> or PM<sub>2.5</sub> monitoring in close proximity to the proposed development site. Therefore, the primary adjustment factor calculated for NO<sub>2</sub> concentrations has been applied to the modelled road-particulates concentrations.

## 6. BACKGROUND CONCENTRATIONS

Defra publish details of estimated background concentrations of pollutants for each 1 km grid square across the country. The RBC operates a continuous background automatic at Reading Old Cemetery between London Road and Wokingham Road, which is also part of the AURN network. In order to more accurately reflect background concentrations across the study area, Defra mapped background concentrations have been compared against concentrations measured at the site in 2018 to produce a calibration factor which is applied to background concentrations across the study area. The background factors are presented in Table 7.1.

<b>Station</b>	<b>Defra Modelled Background (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Measured Concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Factor</b>
NO <sub>2</sub>	23.5	26.0	1.1
PM <sub>10</sub>	16.6	13.0	0.8
PM <sub>2.5</sub>	11.6	7.0	0.6

The factors have been applied to the mapped background for both baseline and future year scenarios across the study area.

# Technical Appendix 8.1: Legislation and Guidance



## TECHNICAL APPENDIX 8.1: NOISE AND VIBRATION LEGISLATION AND GUIDANCE

### 1. National Legislation

#### 1.1 Control of Pollution Act, 1974, Part III - Noise

The Control of Pollution Act, 1974<sup>1</sup> (CPA) is a combination and refinement of earlier Acts including: The Public Health Act, 1936<sup>2</sup> (replaced by the Public Health Act 1990, Part III) and the Noise Abatement Act 1960<sup>3</sup>.

Section 60 enables a Local Authority to serve a notice on a person (this includes a company) who is carrying out, or who is planning to carry out, works of construction, demolition, road-works, railway maintenance etc. in order to control the noise from those operations.

Section 61 also enables such a person to apply to the Local Authority for consent in respect of such works. The Act introduces the concept of using 'Best Practicable Means' (BPM) to control the impact of noise, where significant impacts are likely to occur. BPM refers to the selection of plant, techniques and equipment to reduce noise whilst considering local conditions, current state of technical knowledge and the financial implications. Factors such as timing, duration, location and opportunities for acoustic screening or separation are employed; in order to ensure that impacts are controlled in so far as is reasonably practicable. The demonstrable use of BPM can also be used as a defence to enforcement action under nuisance legislation.

#### 1.2 The Environmental Protection Act, 1990 (as amended)

Section 79 of the Environmental Protection Act 1990<sup>4</sup> (EPA) declares that a number of matters, including noise, are to be statutory nuisances. Under the provisions of the Environmental Protection Act, the Local Authority is required to inspect its area periodically to detect any nuisance and, where a complaint of a statutory nuisance is made by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint.

#### 1.3 National Planning Policy Framework, 2019

The National Planning Policy Framework (NPPF)<sup>5</sup> adopted in 2019 in England outlines the Government's planning policies and requirements for the planning system. The NPPF forms a material consideration in planning decisions and hence must be complied with for planning permission to be granted.

Paragraph 180 of the NPPF states that the planning system should seek to:

- *"Mitigation and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*

<sup>1</sup> Secretary of State, 1974, Control of Pollution Act, HMSO. Available: <http://www.legislation.gov.uk/ukpga/1974/40/contents>

<sup>2</sup> Secretary of State, 1960, Noise Abatement Act, HMSO.

<sup>3</sup> Secretary of State, 1960, Noise Abatement Act, HMSO. Available: <http://www.legislation.gov.uk/ukpga/1960/68/section/1/enacted>

<sup>4</sup> Secretary of State, 1990. Environmental Protection Act 1990, The Stationary Office. Available: <http://www.legislation.gov.uk/ukpga/1990/43/contents>

<sup>5</sup> Ministry of Housing, Communities & Local Government, 2019. The National Planning Policy Framework. HMSO.

- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".*

To achieve these aims the NPPF refers to the Noise Policy Statement for England 2010.

#### 1.4 Noise Policy Statement for England, 2010

The Noise Policy Statement<sup>6</sup> for England sets out the long-term vision of Government noise policy: to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

The NPSE outlines the following three aims for the effective management and control of environmental, neighbour and neighbourhood noise:

- *"Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life."*

The guidance defines two concepts applied to noise impacts. These are:

- NOEL is defined as: *"This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise."*;
- LOAEL which is defined as: *"This is the level above which adverse effects on health and quality of life can be detected."*; and
- SOAEL which is defined as the level above which significant adverse effects on health and quality of life occur.

The three aims can therefore be interpreted as follows:

- The first aim is to avoid noise levels above the SOAEL;
- The second aim considers situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur; and
- The third aim considers situations where noise levels are between the LOAEL and NOEL. In these circumstances, where possible, reductions in noise levels should be sought through the pro-active management of noise.

The NPSE recognises that it is not possible to have single objective noise-based measures that define the SOAEL, LOAEL and NOEL that are applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, receptors and at different times of the day.

#### 1.5 Planning Practice Guidance

In March 2014, the Department for Communities and Local Government (DCLG) (now the Ministry for Housing, Communities and Local Government) released its PPG web-based resource to support the NPPF. The guidance advises that local planning authorities should consider:

- *"Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*

<sup>6</sup> Ministry of Housing, Communities and Local Government, 2017. Planning practice guidance. HMSO. London.

- *Whether or not a good standard of amenity can be achieved.*"

The PPG qualifies the effect of noise based on whether a source is noticeable and/or intrusive and/or causes a change in behaviour or attitude.

The Lowest Observed Adverse Effect Level (LOAEL) is described as noise that can be heard and can cause small changes to behaviour and/or attitudes, for example turning up the volume on the television. The LOAEL affects the acoustic character of the area such that there is a perceived change in the quality of life.

The Significant Observed Adverse Effect Level (SOAEL) is defined as the level at which noise causes a change in behaviour and/or attitude, such as avoiding certain activities during periods of intrusion or, where there is no alternative to ventilation, having to keep windows closed most of the time because of the noise.

The latest version of PPG introduced the concepts of NOEL (No Observed Effect Level), and UAEL (Unacceptable Adverse Effect Level). Full details of the PPG on effects are provided in Table 1.

Table 1: PPG Guidance			
Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life	Significant Observed Adverse Effect	Avoid

Table 1: PPG Guidance			
Perception	Examples of Outcomes	Increasing Effect Level	Action
	diminished due to change in acoustic character of the area.		
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Factors to be considered in determining if noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

## 2. Local Policy

### 2.1 Reading Local Plan

The Reading Borough Local Plan<sup>7</sup> adopted 2019 has several general requirements in relation to noise; primarily associated with reducing stress caused by traffic noise, safeguarding amenity and not damaging the environment including sensitive receptors. This applies to all developments and must be balanced with other factors where 'employment land' is proposed.

Specifically, EN16 states that "proposals for development that are sensitive to the effects of noise...will only be permitted in areas where they will not be subject to high level of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution". This is reiterated for residential areas in Central Reading in CR6 which reads "ii) Proposals for new residential developments within the central area will be required to demonstrate how the issue of potential noise disturbance from neighbouring land uses and other sources, and air quality implications of residential development, have been considered and if necessary, mitigated. New residential development should not be located next to existing town centre uses where those uses would give rise to unacceptable level of noise and disturbance to the occupiers of the new scheme, unless this can be mitigated."

With reference to plant noise, EN17 requires that "Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor." The Local Plan also impresses the importance of assessing cumulative impacts and not changing behaviours or attitudes of people as a result of noise.

Noise guidance in the Local Plan relating to advertising and drinking establishments is not considered relevant to the proposed development.

<sup>7</sup> Reading Borough Council, 2019. Reading Local Plan, Reading Borough Council. Available: [http://www.reading.gov.uk/media/10410/Reading-Borough-Council-Local-Plan/pdf/Local\\_Plan\\_Adopted\\_November\\_2019.pdf](http://www.reading.gov.uk/media/10410/Reading-Borough-Council-Local-Plan/pdf/Local_Plan_Adopted_November_2019.pdf)

## 2.2 Reading Core Strategy

The Reading Core Strategy adopted in 2008 and altered in 2015 highlights that inappropriate building design has resulted in noise disturbance from late-night commercial activity upon residential activity.

Implementation of the Core Strategy is via a set of strategic policies, with more detail given in the Reading Borough Local Development Framework. The following policy contain reference to noise

- Policy CS34 – *“development will only be permitted where it would not be damaging to the environment through air, land, noise or light pollution ... proposals for development that are sensitive to the effect of air, noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.”*

## 2.3 Reading Station Area Framework

The Reading Station Area Framework<sup>8</sup> states that tall buildings must avoid significant negative noise impacts on existing residential properties and the public realm. It outlines the importance of having a transition zone from high-rise to low-rise residential areas so that pollution (including noise) is managed and minimised.

New development must, through good design, minimise external environmental noise.

## 2.4 Sustainable Design and Construction: Adopted Supplementary Planning Document July 2011

This document supplements the Local Plan and highlights the need to mitigate noise from infrastructure to residential development via sound insulation, bunds and noise barriers. In addition, it states that noise pollution should be kept to a minimum in areas near protected species in both the design and during construction phase. An updated version was consulted upon in late 2019 but has not yet been published.

## 3. Guidance

### 3.1 BS5228:2009+A1:2014 - 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'

BS 5228:2009+A1:2014 (British Standards Institute (a), 2009) gives recommendations for basic methods of noise and vibration control relating to construction work. It also provides guidance concerning methods of predicting and measuring noise and vibration and assessing its impact on those exposed to it. The prediction method considers the noise emissions level of proposed plant, the separation distance between the source and the receiver and the effect of the intervening topography and structures.

<sup>8</sup> Doyle Town Planning and Urban Design with Peter Brett Associates, 2010. Reading Station Area Framework, Reading Borough Council. Available: <http://www.reading.gov.uk/media/1674/Reading-Station-Area-Framework/pdf/Reading-Station-Area-Framework.pdf>

### 3.2 BS4142:2014 - 'Methods for Rating and Assessing Industrial and Commercial Sound'

BS4142:2014 – Method for rating and assessing industrial and commercial sound provides a method for assessing the significance of noise emissions from industrial and/or commercial sound source.

The significance of industrial and commercial sound is assessed based on the difference between the rating level resulting from plant operation measured or predicted at the nearest noise sensitive premises, and the existing background noise level in the area, as determined by a noise survey. BS 4142 states:

- 'a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.'
- e) A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value.'

BS4142 also sets out the following rating penalties based on the characteristics of the noise source:

- **Tonality:** up to 6 dB rating penalty applicable depending on its perception;
- **Impulsivity:** up to 9 dB rating penalty applicable depending on its perception;
- **Other sound characteristics:** a 3 dB penalty applicable for readily distinctive sound feature characteristics that are neither tonal or impulsive;
- **Intermittency:** a 3 dB penalty applicable for specific sound that has identifiable on/off conditions.

### 3.3 BS8233:2014– 'Guidance on sound insulation and noise reduction for buildings'

Guidance on the acceptable noise levels within residential buildings is given in British Standard BS8233:2014. The internal noise levels depend on the use of each room and the sensitivity to noise of the activities expected to be conducted in the rooms. An extract of the indoor ambient noise levels for dwellings is reproduced in Table 2.

Activity	Location	Daytime	Night-time
Resting	Living room	35 dB LAeq,16hour	-
Dining	Dining room / area	40 dB LAeq,16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16hour	30 dB LAeq,8hour

Note 7 referring to Table 5 in BS8233 states that where development is considered necessary or desirable, despite external noise levels above World Health Organisation guidelines (detailed in section 3.8), the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For external amenity areas such as gardens, courtyards and terraces, BS8233 specifies that it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$ , with an upper guideline value of 55 dB  $L_{Aeq,T}$  acceptable in noisier environments. However, it is also recognised that these guidelines values are sometimes not achievable in all circumstances where the development might be desirable.

### 3.4 World Health Organisation Guidelines

The World Health Organisation (WHO) published their 'Guidelines for Community Noise' in 1999. The 'Guidelines for Community Noise' set out guidance on appropriate noise levels for different scenarios to ensure that communities are not subjected to unacceptable levels of noise. These are presented in Table 3. It should be noted that the WHO guidelines, although widely referenced in UK, have no legal status.

Table 3: World Health Organisation Guidelines for Noise				
Specific Environment	Critical Health Effect(s)	$L_{Aeq}$ /dB	Time Base [hours]	$LAF_{max}$ / dB
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, Indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

# Technical Appendix 8.2: Baseline Noise Survey



## TECHNICAL APPENDIX 8.2: BASELINE NOISE SURVEY

### 1. Methodology

A baseline noise survey was carried out by Ramboll to establish the existing conditions around the application site and at nearby noise-sensitive receptors. The baseline noise survey comprised attended daytime measurements at two locations undertaken on 26 and 27 June 2019.

The dominant noise source observed during the attended measurements on Caversham Road was the road traffic along Caversham Road itself (A329). The dominant noise source observed during attended measurements at the location along Vastern Road was road traffic along Vastern Road. There was also noise from operational plant at a substation along Caversham Road. The monitoring locations are given in Figure 1.

Attended noise measurements were taken at an approximate height of 1.5 m from the ground and a minimum of 3 m from the façade of any surrounding buildings. These measurements are, therefore, considered representative of free field measurements and taken in accordance with BS7445-1:2003. The calibration of the sound level meter was checked before and after measurements were taken. No significant drift was observed.

Reading Station Park

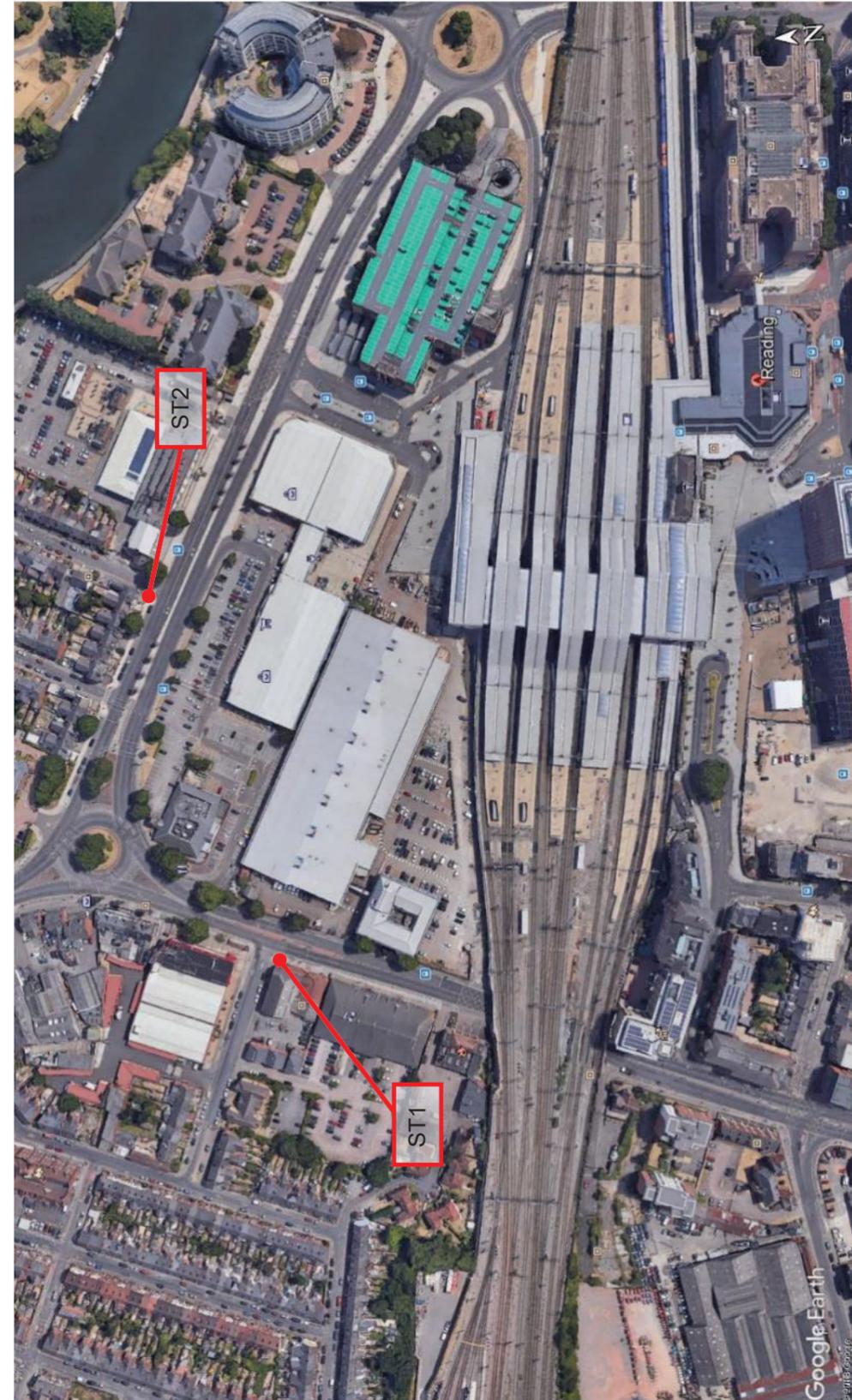


Figure 1: Noise Baseline Survey Measurement Locations

### 1.1 Equipment

The unattended noise survey was carried out using the following equipment:

- Bruel and Kjaer 2250 sound level meter. Serial number: 3002075; and
- Bruel and Kjaer 4231 sound calibrator. Serial number: 2642788.

All measurement equipment owned or hired and operated by Ramboll has regular calibration checks carried out by external companies traceable to UKAS or national standards.

### 1.2 Results

The key results of the daytime attended noise measurements are presented in Table 1. Night-time measurements are given in Table 2.

Table 1: Summary of Daytime Attended Measurements				
Location	Start Time	Ambient noise levels / dB L <sub>Aeq,15mins</sub>	Background noise levels / dB L <sub>A90,15mins</sub>	Maximum noise levels / dB L <sub>AFmax,15mins</sub>
ST1	11:14	74	66	90
	12:31	74	65	94
	13:14	73	63	96
ST2	11:38	69	62	82
	12:53	69	60	91
	13:38	70	60	82

Table 2: Summary of Night-time Attended Measurements				
Location	Start Time	Ambient noise levels / dB L <sub>Aeq,15mins</sub>	Background noise levels / dB L <sub>A90,15mins</sub>	Maximum noise levels / dB L <sub>AFmax,15mins</sub>
ST1	23:11	68	55	81
	23:56	67	50	84
	02:09	62	44	78
	02:50	64	44	81
	03:32	66	44	89
ST2	23:34	64	45	79
	00:17	66	47	92
	02:29	64	42	85
	03:11	61	42	81
	03:51	61	43	79

## **Technical Appendix 8.3: Construction Plant**



**TECHNICAL APPENDIX 8.3: CONSTRUCTION PLANT****1. Proposed Plant**

Table 1 outlines the construction noise plant proposed for each activity during construction, percentage on-time and the data used from BS5228-1.

<b>Table 1: Construction Plant and Percentage On-Time</b>			
<b>Activity</b>	<b>Plant</b>	<b>Percentage on-time</b>	<b>BS5228 reference</b>
<b>Enabling and Demolition</b>	Concrete Crusher	50	Table C.2 no. 3
	360 Excavators large	100	Table C.1 no. 12
	360 Excavators small	80	Table C.2 no.7
	Concrete Breaker	80	Table C.1 nos. 1&2
	Compactors	50	Table C.2 no. 42
	Mobile Cranes	20	Table C.4 no. 39
	Tower Cranes	40	Table C.4 no. 48
	MEWPS	40	Table C.4 no. 59
	Scaffolding	80	Table D.7 no. 1
	Fork Lifts	50	Table D.7 94
Small Tools (drills/cutters)	100	Table D.6 no. 53 (petrol disc cutter)	
<b>Substructure</b>	360 Excavators large	100	Table C.1 no. 12
	360 Excavators small	50	Table C.2 no.7
	Concrete Breaker	20	Table C.1 nos. 1&2
	Compactors	100	Table C.2 no. 42
	Piling rigs	50	Table C.3 no. 14
	Mobile Cranes	20	Table C.4 no. 39
	Tower Cranes	100	Table C.4 no. 48
	Concrete Pumps	70	Table C.5 no. 25
	Scaffolding	20	Table D.7 no. 1
	Fork Lifts	50	Table D.7 94
Small Tools (drills/cutters)	100	Table D.6 no. 53	
<b>Superstructure</b>	Tower Cranes	100	Table C.4 no. 48
	Concrete Pumps	70	Table C.5 no. 25
	MEWPS	100	Table C.4 no. 59
	Goods/passenger hoists	100	Table C.4 no. 61
	Cantilever decks	100	Table C.4 no. 55 (telescopic handler as no data available)
	Scaffolding	20	Table D.7 no. 1
	Fork Lifts	60	Table D.7 94
Small Tools (drills/cutters)	100	Table D.6 no. 53 (petrol disc cutter)	
<b>Envelope</b>	Mobile Cranes	10	Table C.4 no. 39
	Tower Cranes	100	Table C.4 no. 48

**Table 1: Construction Plant and Percentage On-Time**

	Concrete Pumps	10	Table C.5 no. 25
	MEWPS	100	Table C.4 no. 59
	Goods/passenger hoists	100	Table C.4 no. 61
	Small Tools (drills/cutters)	100	Table D.6 no. 53 (petrol disc cutter)
<b>Fit-out</b>	MEWPS	50	Table C.4 no. 59
	Goods/passenger hoists	50	Table C.4 no. 61
	Fork Lifts	80	Table D.7 94
	Small Tools (drills/cutters)	50	Table D.6 no. 53 (petrol disc cutter)

## **Technical Appendix 8.4: Site Suitability**



**TECHNICAL APPENDIX 8.4: SITE SUITABILITY FOR RESIDENTIAL USE**

**1. Introduction**

This technical appendix outlines the site suitability for its intended purpose from a noise perspective. It is, therefore, an outline assessment of possible design solutions.

The effect of noise sources on the proposed residential development (as the most noise-sensitive of the proposed uses) have been assessed in line with BS8233:2014 and Professional Practice Guidance (ProPG) on Planning & Noise developed by the Institute of Acoustics (IOA).

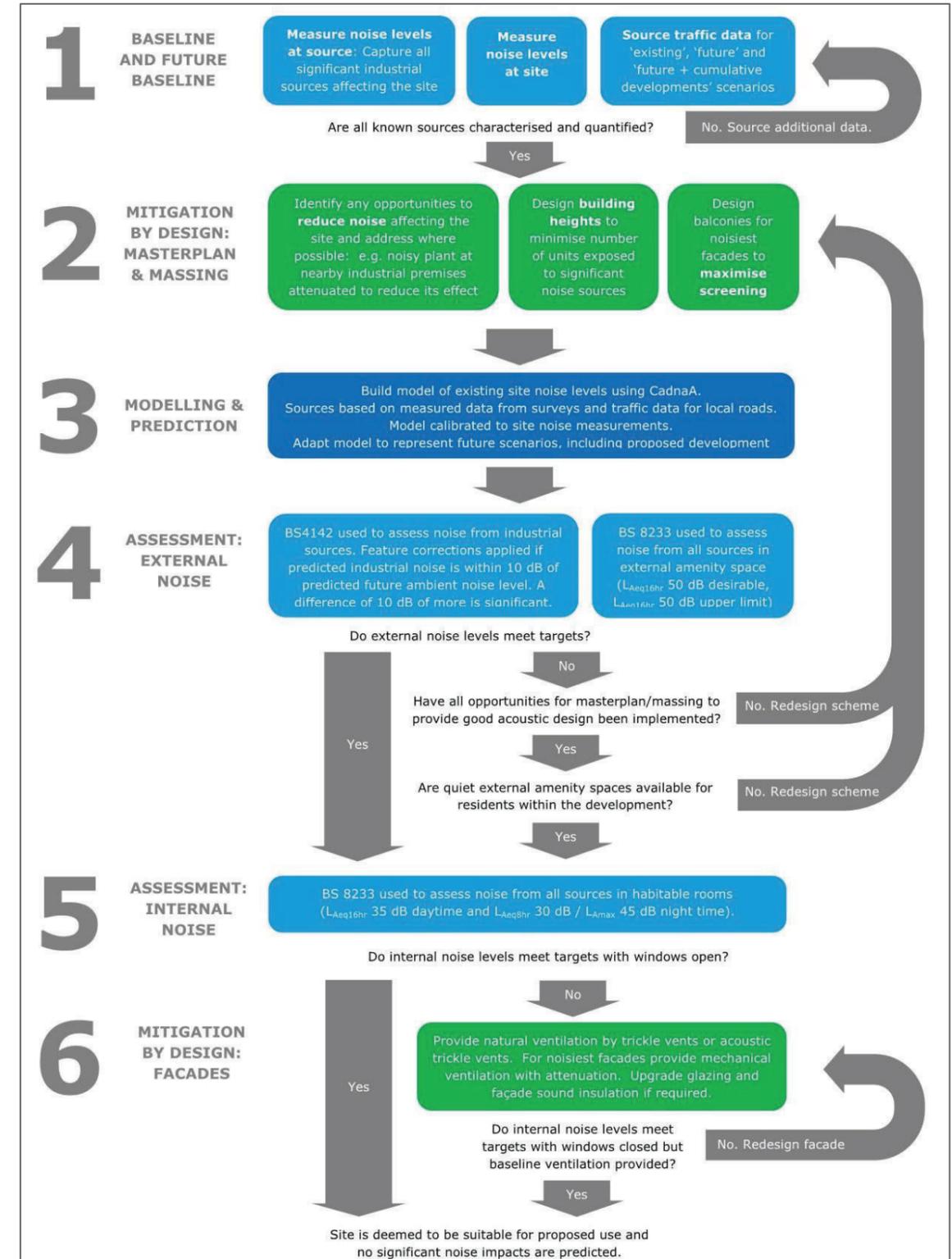
ProPG considers new residential that will primarily be exposed to transportation noise. The preparation of this guidance was overseen by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), IOA and Chartered Institute of Environmental Health (CIEH), together with practitioners from a planning and local authority background.

This guidance has been produced to provide practitioners with advice on a recommended approach to the management of noise within the planning system in England. It takes into account the guidance on the control and mitigation of noise detailed in the National Planning Policy Framework (NPPF) and the Noise Policy Statement for England (NPSE) and presents them in one overall document. It also provides further clarification and guidance for appropriate noise levels and suitable design, such as proposing suitable maximum noise levels in bedrooms at night.

In addition, the London Plan sets out how to assess risk of overheating (detailed in Energy Assessment Guidance), which will be the dominant criteria in this instance.

**2. Methodology**

Figure 1 below summarises the overarching assessment methodology which has been used to assess site suitability. Namely, determine the criteria; establish the baseline; modelling and prediction methodology; assessment; and mitigation by design.



**Figure 1: Site Suitability Assessment Methodology Flowchart**

### 3. Criteria

#### 3.1 Internal Ambient Noise Level

The internal ambient noise levels have been assessed in line with BS8233:2014 and RBC's pre-application response, which recommends that for resting/sleeping conditions in living rooms and bedrooms, the internal noise levels should not exceed 35 dB LAeq,16hour (daytime) and 30 dB LAeq,8hour (night time).

Consideration has also been given to the individual noise events, which should not regularly exceed 45 dB LAmax during night time hours. The highest measured night-time maximum noise event was 92 dB LAFmax, with events typically up to 89 dB LAFmax. For the purpose of this assessment, 89 dB LAFmax has been used.

#### 3.2 External Amenity Noise Levels

The noise levels in external amenity areas have been assessed in line with BS 8233:2014, which recommends that noise in external amenity spaces should not exceed 55 dB LAeq,T in busy urban areas.

In addition, ProPG states the following:

- "Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:
- a relatively quiet façade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance)."

### 4. Baseline

Noise measurements were undertaken to quantify the baseline noise climate at the application site as described in Technical Appendix 8.2: Baseline Noise Survey.

The noise measurements were used to calibrate the baseline noise model (undertaken with commercially available noise mapping software – CadnaA) and the noise levels incident on the façade were predicted using the predicted future traffic flows.

### 5. Modelling and Prediction

Noise levels at the application site have been predicted using the CadnaA suite of noise modelling software. This software utilises standard acoustic principles in conjunction with approved prediction methodologies (ISO 9613-2) and is an industry-standard method for predicting and assessing the impact of noise from a variety of sources.

The following noise sources were incorporated into the model:

- Traffic links surrounding the application site; and
- Existing plant noise audible at the north-west corner of the Former Royal Mail site.

The application site was assumed to comprise acoustically reflecting '100% hard ground' as it predominantly tarmacked or paved. All buildings were assumed as acoustically reflecting. The model was set to consider three-orders of reflection. This is considered to represent a typical 'worst case' in terms of noise propagation from the roads within the study area.

### 6. Assessment

#### 6.1 Internal Ambient Noise Level

Figure 2 shows the predicted noise levels at the façade of the proposed development during daytime. This shows that the daytime noise levels on the north-western façade are up to 72 dB LAeq, whilst some of the south-eastern façade noise levels are as low as 52 dB LAeq.

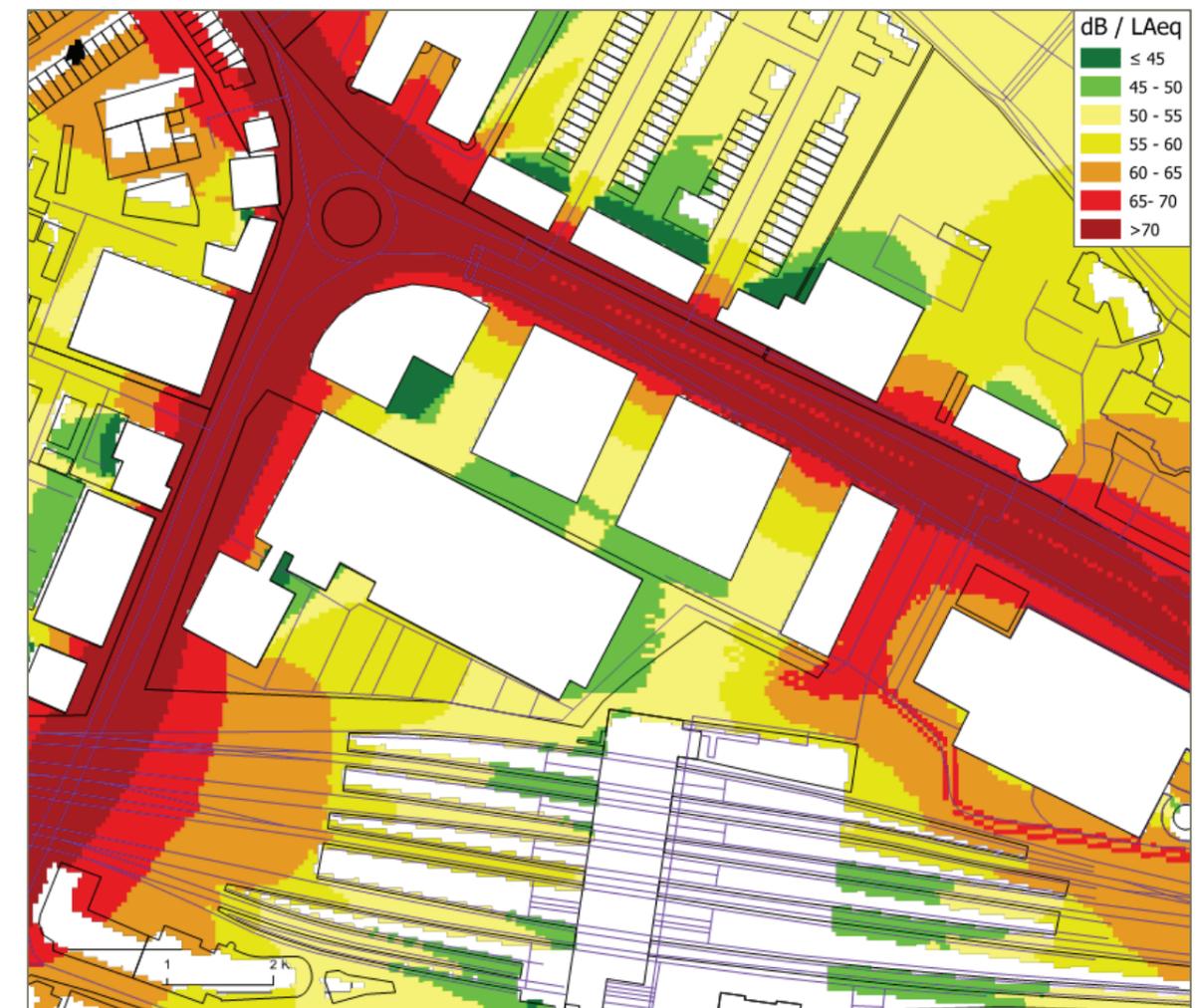


Figure 2: Daytime noise levels incident on the proposed development

For the purpose of this assessment, the maximum night-time noise levels have been used as the governing criterion. This is because the measured maximum night-time noise levels are typically >20 dB higher than the ambient noise levels (the criteria for maximum levels is 15 dB higher than the ambient) meaning the maximum targets are more onerous. Similarly, achieving the night-time criteria is more onerous than achieving the daytime criterion. Any mitigation required to achieve the night-time noise criteria will, by default, also achieve the daytime noise criterion.

Table 2 outlines a potential ventilation strategy and outline glazing performance standards which would be suitable to achieve the required level of attenuation. These are minimum performance requirements and assume the non-glazed element of the façade has a sound insulation performance of at least  $R_w$  67 dB. This is a high level of sound insulation performance and could comprise cavity brickwork with resilient ties with an independent internal lining. This would need to be developed during detailed design.

Daytime external ambient noise levels / dB LAeq	Night-time external maximum noise events / dB LA <sub>Fmax</sub>	Typical glazing sound insulation performance ( $R_w + C_{tr}$ ), dB	Potential ventilation strategy
52 - 72	89	40 (not exceeding 10% of the façade area)	Mechanical whole-house ventilation

The exact build-ups and products to meet the acoustic criteria would be developed during the detailed design. To value engineer this design, further noise measurements would be undertaken around the site, along with more detailed modelling of the massing of the proposed development at the Former Royal Mail site.

With the application of a façade strategy similar to that given in Table 1, the internal ambient noise levels are predicted to fall below the target level. On this basis Negligible effects are predicted in terms of internal noise levels within the proposed hotel rooms and serviced apartments.

## 6.2 External Amenity Noise Levels

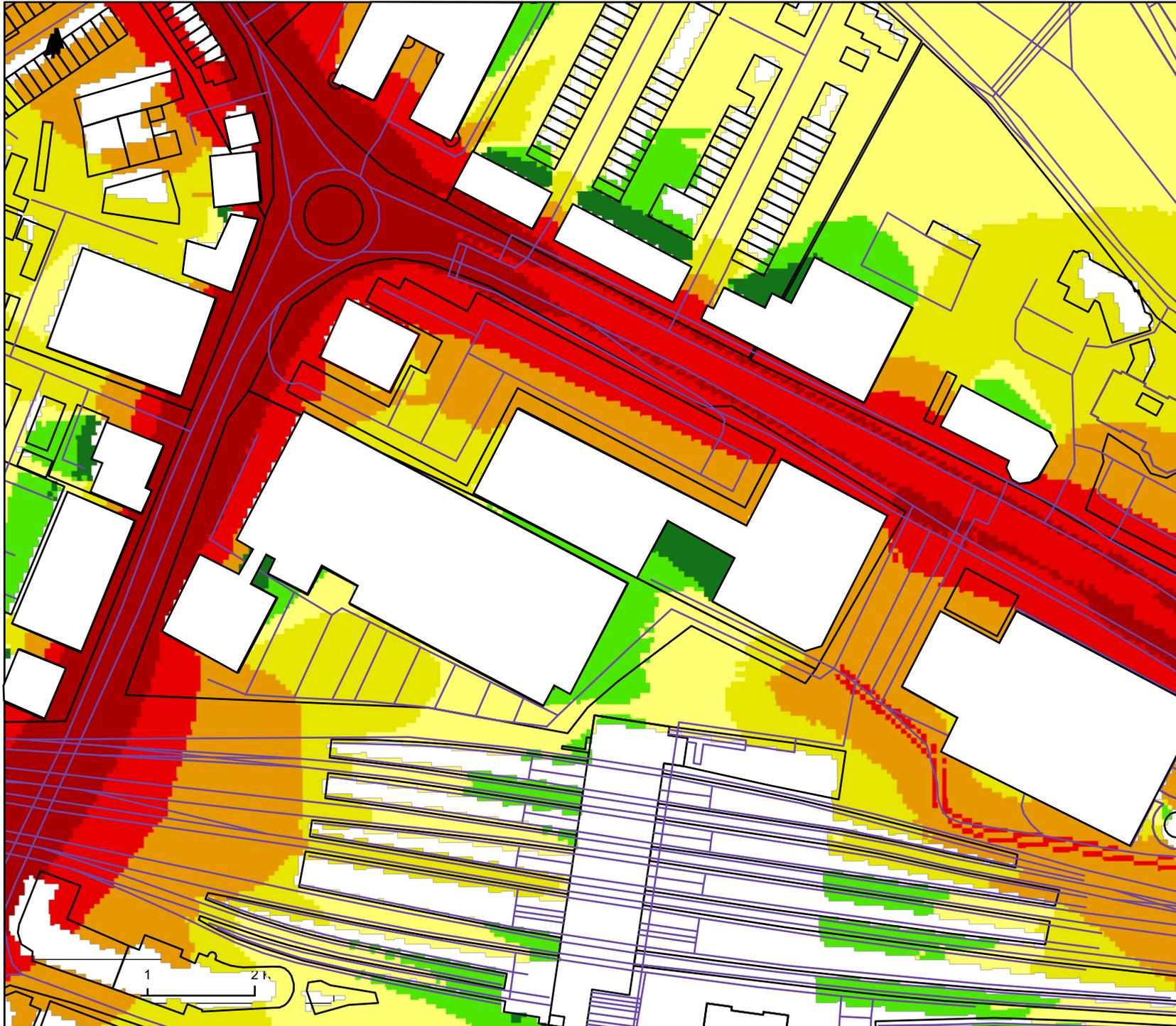
The proposed amenity spaces are located in the thoroughfares between the plots and the amenity space to the rear of the site.

The noise levels on the thoroughfare nearest to Vastern Road would be up to 68dB LAeq. However, at the rear of the site both on the thoroughfares and amenity space the noise levels are predicted to be 49-52 dB LAeq. Therefore, all residents would have access to amenity spaces with noise levels less than the 55 dB LAeq threshold.

As noise levels in some areas would be below the threshold for external amenity noise, **Negligible** effect is predicted.

## **Technical Appendix 8.5: Daytime Ambient Noise Levels**





**Legend**  
**Baseline**

dB / LAeq

- ≤ 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65- 70
- >70

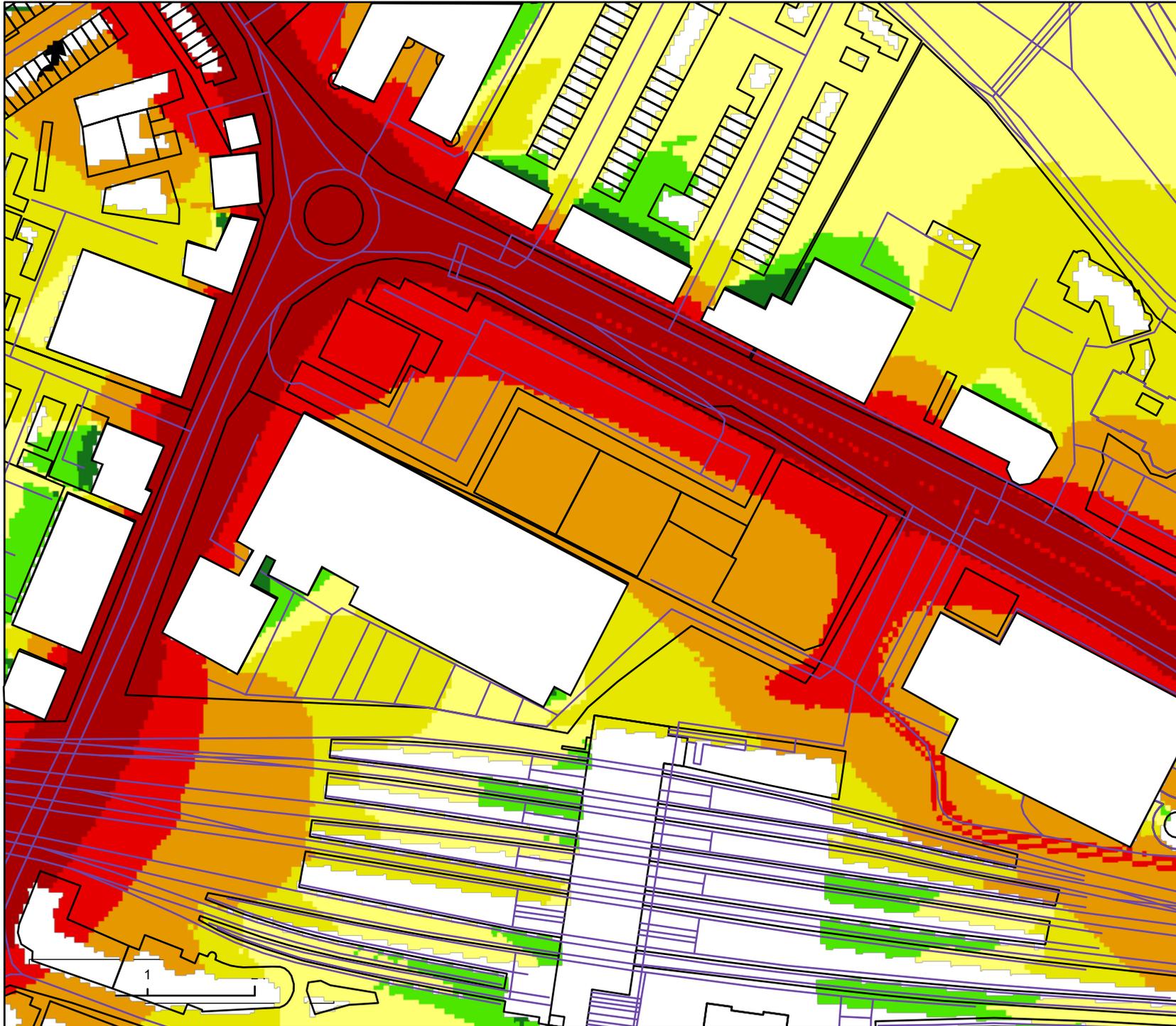
Figure Title  
Appendix 8.5A: Baseline ambient noise level

Project Name  
Reading Station Park

Project Number 1700003910	Figure No. A
Date January 2020	Prepared By CF
Scale NTS @A4	Issue 1

Client  
Aviva Life & Pensions UK Limited





**Legend**  
**Future baseline**

**dB / LAeq**

- ≤ 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65- 70
- >70

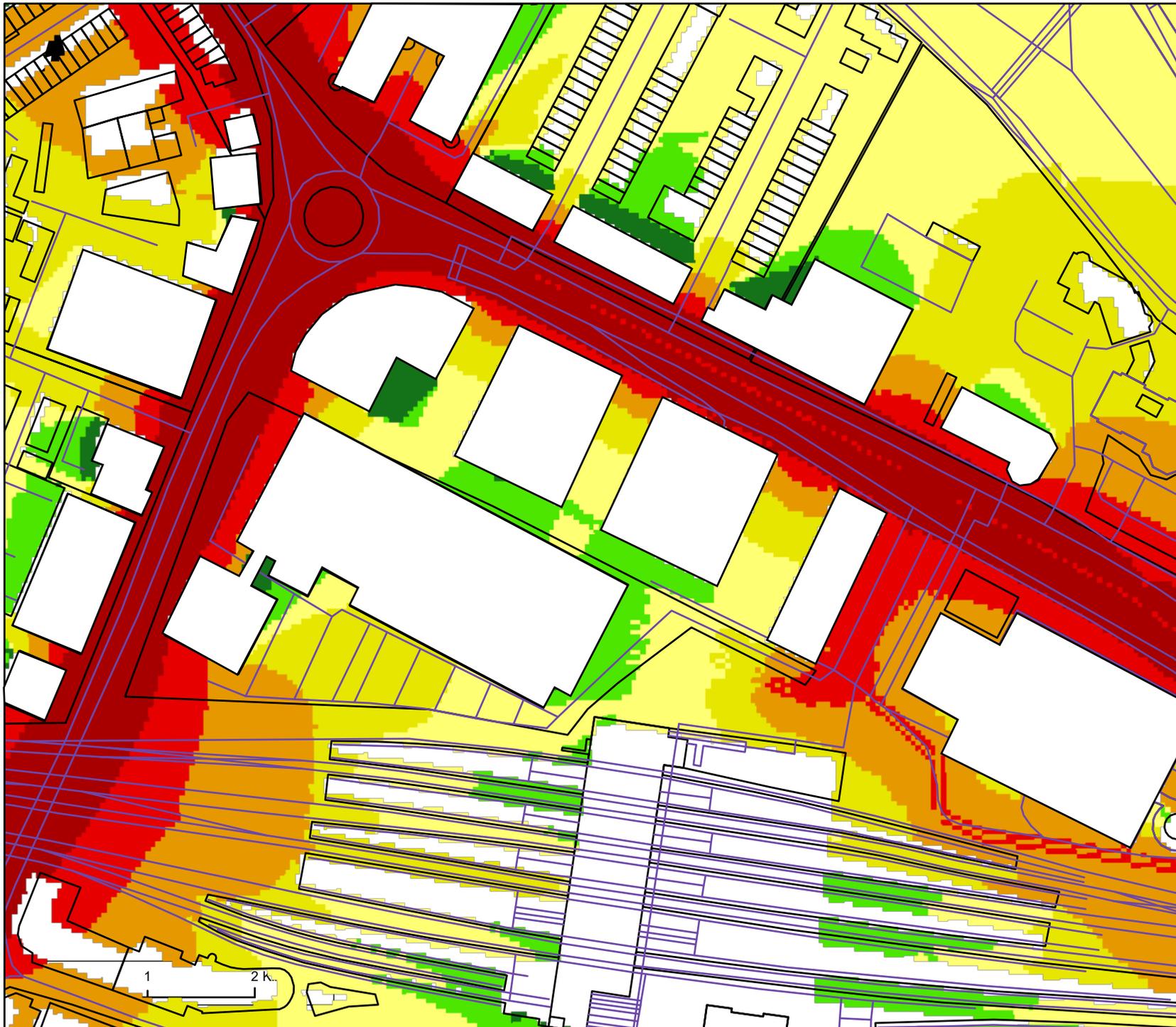
Figure Title  
 Appendix 8.5B: Future baseline  
 ambient noise level

Project Name  
 Reading Station Park

Project Number 1700003910	Figure No. B
Date January 2020	Prepared By CF
Scale NTS @A4	Issue 1

Client  
 Aviva Life & Pensions UK Limited





### Legend

### Future

dB / LAeq

- ≤ 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65- 70
- >70

Figure Title  
Appendix 8.5C: Future ambient noise level

Project Name  
Reading Station Park

Project Number 1700003910	Figure No. C
Date January 2020	Prepared By CF
Scale NTS @A4	Issue 1

Client  
Aviva Life & Pensions UK Limited

