



Development Consent Order

Application Reference Number: WW010001

Documents for Certification September 2014

We, Lindsay Speed and Sarah Fairbrother hereby certify that this is a true copy of the environmental statement referred to in Article 61 (1) (f) of the Thames Water Utilities Limited (Thames Tideway Tunnel) Order 2014.

Lindsay Speed

Sarah Fairbrother

September 2014

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Thames Water Utilities Limited



Application for Development Consent

Application Reference Number: WWO10001

Environmental Statement

Doc Ref: **6.2.27**

Volume 27: Minor Works Sites appendices

APFP Regulations 2009: Regulation **5(2)(a)**

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Environmental Statement

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Appendix A: Introduction

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Appendix A: Introduction

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Appendix A: Introduction

A.1 Summary

- A.1.1 This document presents the appendices that accompany the *Environmental Statement* Volume 27 Minor works sites assessment.
- A.1.2 Figures associated with the appendices are provided within a separate volume of figures.
- A.1.3 For consistency and ease of use Volumes 3 to 27 of the *Environmental Statement* all utilise the same appendices contents and labelling protocol. For these volumes the appendices are as follows:
- a. Appendix A: Introduction
 - b. Appendix B: Air quality and odour
 - c. Appendix C: Ecology – aquatic
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 - f. Appendix F: Land quality
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 - j. Appendix J: Transport
 - k. Appendix K: Water resources – groundwater
 - l. Appendix L: Water resources – surface water
 - m. Appendix M: Water resources – flood risk
 - n. Appendix N: Development schedule.
- A.1.4 Where a topic has not been assessed the associated appendix does not include any supporting information. Also, if a topic has been assessed but does not need to present any supporting information then the appendix is intentionally empty.

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Appendix B: Air quality and odour

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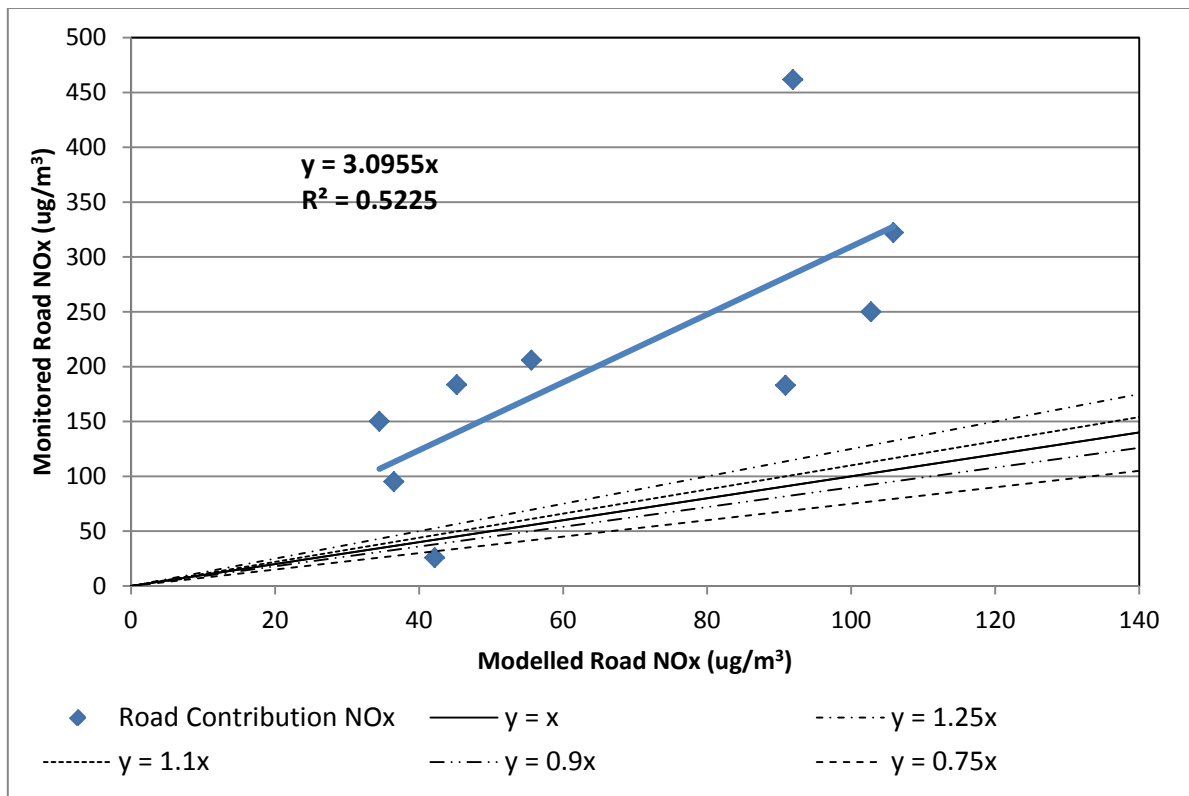
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Appendix B: Air quality and odour

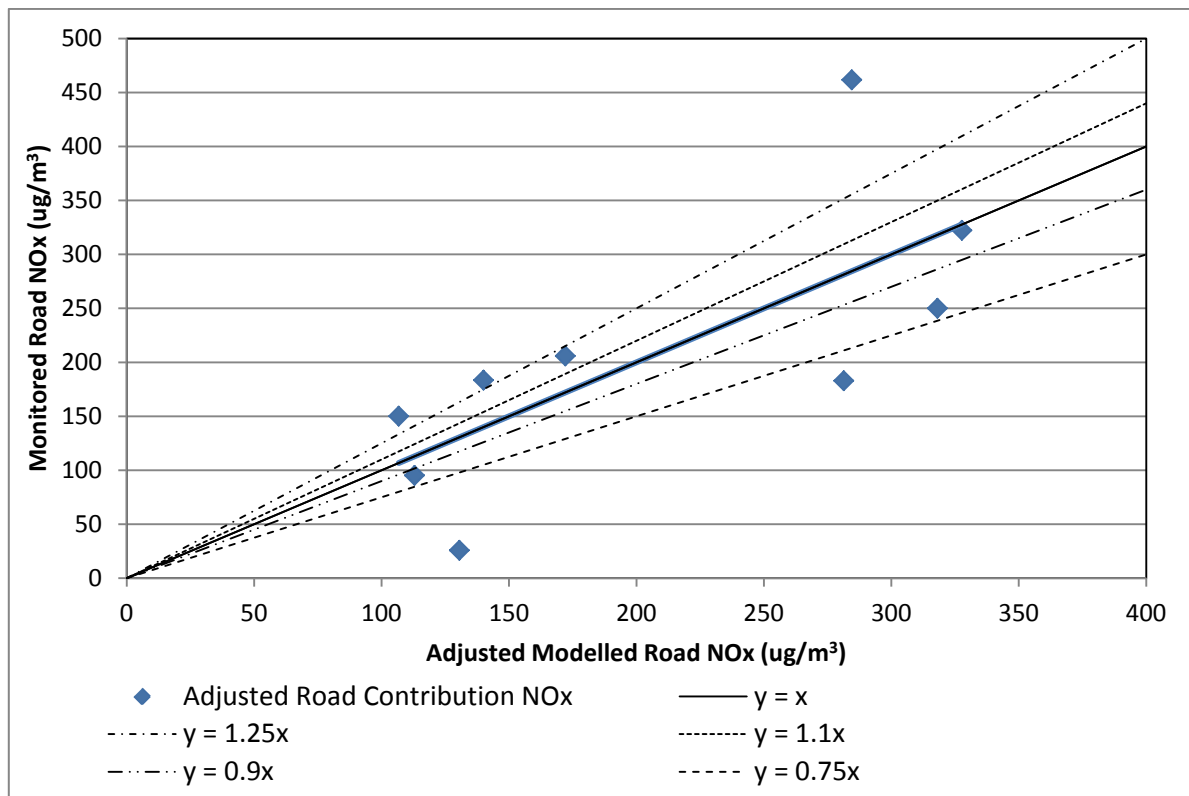
B.1 Model verification

- B.1.1 Modelled NO₂ concentrations have been plotted against monitored concentrations at the nine diffusion tube sites (KEMM1-KEMM6, TH20, TH23 and TH35) shown in Vol 27 Figure 4.4.1 (see separate volume of figures).
- B.1.2 This showed that the modelled results underestimated NO₂ concentrations by between -12% and 54%. As the model has been optimised and no further improvement of the model was considered feasible (such as reducing vehicle speeds or using different pollutant backgrounds, etc), a model adjustment factor was therefore deemed necessary.
- B.1.3 To derive the adjustment factor, modelled road NO_x concentrations were plotted against calculated monitored road NO_x concentrations - see Vol 27 Plate B.1 below. An adjustment factor of 3.10 was calculated to adjust modelled roadside NO_x concentrations, in accordance with LAQM.TG(09) (Defra, 2009)¹ and was subsequently applied – see Vol 27 Plate B.1. This factor was also applied to the PM₁₀ results as the PM₁₀ monitoring sites were more than 1km away from the site and traffic data were not available, so model verification could not be carried out.
- B.1.4 Applying the NO_x adjustment factor and then calculating NO₂ concentrations, as shown in Vol 27 Plate B.2, provides better overall agreement between actual and predicted data. The subsequent linear regression calculation for monitored versus modelled total NO₂, as shown in Vol 27 Plate B.3, indicated that three of the nine modelled concentrations were within 10% of the measured value and that seven of the nine were within 25% of the modelled value.

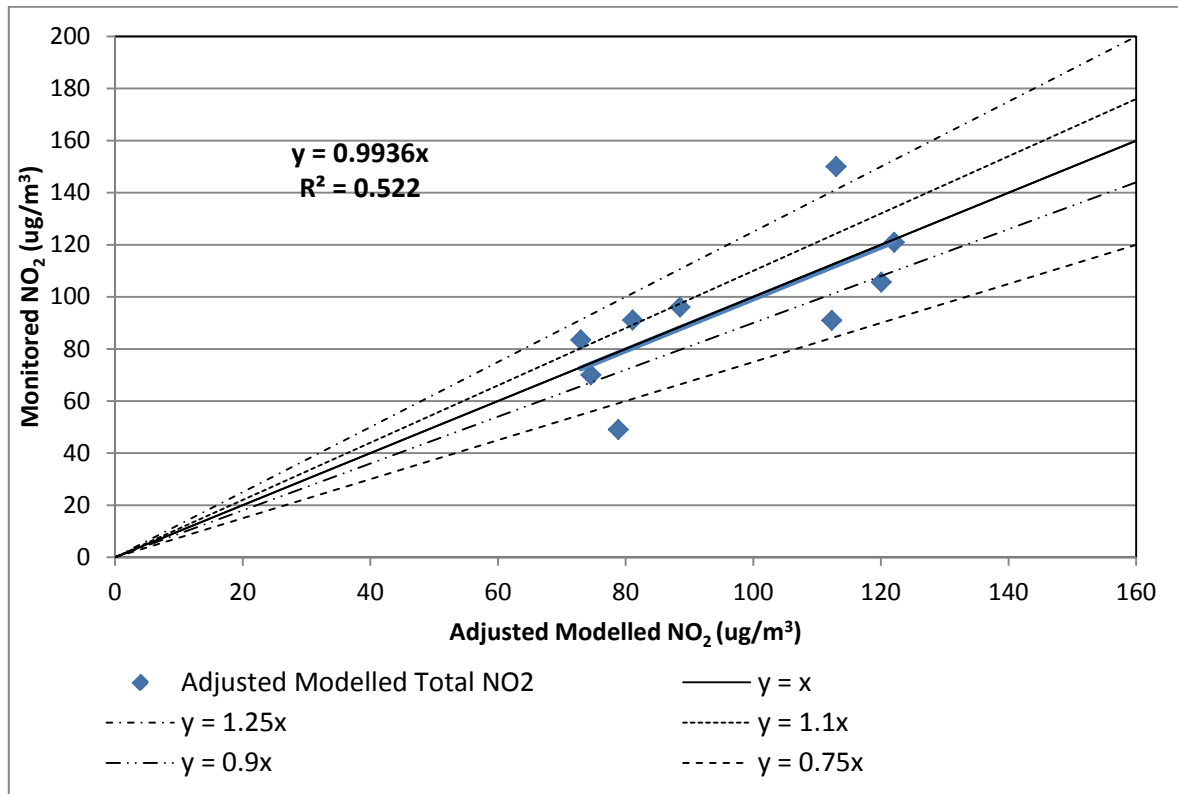
Vol 27 Plate B.1 Air quality - monitored road NO_x vs. modelled road NO_x



Vol 27 Plate B.2 Air quality – monitored road NO_x vs. adjusted modelled road NO_x



Vol 27 Plate B.3 Air quality – total monitored NO₂ vs. total adjusted modelled NO₂



B.2 Traffic data

B.2.1 The traffic data used in the air quality modelling for the Bekesbourne Street site are shown in Vol 27 Table B.1.

Vol 27 Table B.1 Air quality - traffic data model inputs

Source	Road link	2010 baseline AADT*	Baseline % HGV >3.5t	Speed limit (mph)	Model input speed (mph)	Growth factor % (2009 - 2018)	Peak construction year AADT	Peak construction year scheme construction HGV (HGV >3.5t)	Peak construction year development case (total AADT)	Peak construction year development case AADT % HGV (>3.5t)
ATC** 'direct'	Glamis Road	3610	11.9	20	20.4	12.4	4058	0	4058	11.9
TfL Model	A1203 The Highway	53237	9.5	30	21.4	12.4	59837	2	59865	9.5
ATC 'Indirect'	Glamis Road	1545	9.7	20	20.4	12.4	1736	0	1736	9.7
TfL Model	A1203 The Highway	57753	9.0	30	22.5	12.4	64912	2	64937	9.0
ATC 'Indirect'	Brodlove Lane	5102	3.5	20	20.4	12.4	5734	0	5734	3.5
TfL Model	A1203 The Highway	62762	8.6	30	22.5	12.4	70543	2	70568	8.6
TfL Model	A1203 The Highway	59913	9.8	30	13.3	12.4	67340	2	67388	9.8

Source	Road link	2010 baseline AADT*	Baseline % HGV >3.5t	Speed limit (mph)	Model input speed (mph)	Growth factor % (2009 - 2018)	Peak construction year AADT	Peak construction year scheme construction HGV (>3.5t)	Peak construction year development case (total AADT)	Peak construction year development case AADT % HGV (>3.5t)
TfL Model	Butcher Row	20961	7.2	30	6.7	12.4	23560	2	23588	7.2
TfL Model	Limehouse Link	72177	8.7	30	24.0	12.4	81124	0	81190	8.7
TfL Model	A101	26161	0.9	30	20.7	12.4	29404	0	29432	0.9
ATC 'Indirect'	Cable Street	4616	3.5	20	16.6	12.4	5188	0	5188	3.5
ATC 'direct'	Cable Street	437	8.2	20	16.6	12.4	491	0	497	8.1
ATC 'Indirect'	Cable Street	3374	2.4	20	16.6	12.4	3792	0	3798	2.4
TfL Model	Butcher Row	18040	7.1	30	22.5	12.4	20276	2	20308	7.1
TfL Model	A13 Commercial Road	30854	9.4	30	15.1	12.4	34679	4	34703	9.4
TfL Model	A13 Commercial	27017	8.8	30	8.5	12.4	30366	4	30374	8.8

Source	Road link	2010 baseline AADT*	Baseline % HGV >3.5t	Speed limit (mph)	Model input speed (mph)	Growth factor % (2009 - 2018)	Peak construction year AADT	Peak construction year scheme construction HGV (>3.5t)	Peak construction year development case (total AADT)	Peak construction year development case AADT % HGV (>3.5t)
	Road									
TfL Model	A13 Commercial Road	37422	6.5	30	12.7	12.4	42061	4	42086	6.5

* AADT – annual average daily traffic. ** ATC – automatic traffic counter.

B.3 Construction plant emission factors

B.3.1 For the purpose of the assessment, the following listed equipment (Vol 27 Table B.2) has been modelled for the peak construction year at the Bekesbourne Street site.

Vol 27 Table B.2 Air quality - construction plant assessment model inputs

Construction activity	Typical location	Typical plant	Unit No(s)	% on-time	Power (kW)	NO _x emission rate (g/s/m ²)	PM ₁₀ emission rate (g/s/m ²)
Site set up and general site	Ground level behind hoarding	Compressor 250cfm*	1	50	104	7.0 x 10 ⁻⁶	4.4 x 10 ⁻⁷
	Ground level behind hoarding	Generator - 200kVA	1	100	160	2.1 x 10 ⁻⁵	1.3 x 10 ⁻⁶
	Ground level behind hoarding	JCB with hydraulic breaker	1	50	67	4.5 x 10 ⁻⁶	2.8 x 10 ⁻⁷
	Ground level behind hoarding	Cutting equipment (diamond saw)	1	10	2.3	7.9 x 10 ⁻⁸	1.7 x 10 ⁻⁷
	Ground level behind hoarding	Telescopic handler / FLT**	1	30	60	2.4 x 10 ⁻⁶	1.5 x 10 ⁻⁷
Piling	Ground level behind hoarding	25t mobile crane	1	50	275	1.8 x 10 ⁻⁵	1.2 x 10 ⁻⁶
	Ground level behind hoarding	Piling rig	1	80	29	3.1 x 10 ⁻⁶	4.7 x 10 ⁻⁶
Shaft Construction	Ground level behind hoarding	Concrete deliveries (discharging)	1	20	223	6.0 x 10 ⁻⁶	3.7 x 10 ⁻⁷
	Ground level behind hoarding	25t mobile crane	1	50	275	1.8 x 10 ⁻⁵	1.2 x 10 ⁻⁶

Construction activity	Typical location	Typical plant	Unit No(s)	% on-time	Power (kW)	NO _x emission rate (g/s/m ²)	PM ₁₀ emission rate (g/s/m ²)
	Ground level behind hoarding	Long reach excavator	1	80	178	1.9 x 10 ⁻⁵	1.2 x 10 ⁻⁶
	Ground level behind hoarding	Dumper	1	50	81	5.4 x 10 ⁻⁶	3.4 x 10 ⁻⁷

** Note: For the purposes of this assessment, the above listed equipment has been modelled for the peak construction year. The data assumes a 10 hour working day. This schedule provides an illustration of typical plant that could be used in the construction of the Thames Tideway Tunnel at this site. The appointed Contractor must comply with section 6 of the CoCP but may vary the method and plant to be used. This schedule therefore represents the most reasonable assumption for the assessment that can be made at this stage. * cfm – cubic feet per minute. ** FLT – fork lift truck.*

References

¹ Defra. *Local Air Quality Management - Technical Guidance, LAQM.TG(09)* (2009).

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Appendix C: Ecology - aquatic

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Appendix C: Ecology - aquatic

C.1 Introduction

- C.1.1 Construction and operational effects assessments at this site for this topic do not require the provision of any supporting information, so this appendix is intentionally empty.

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Appendix D: Ecology - terrestrial

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Appendix D: Ecology - terrestrial

D.1 Introduction

- D.1.1 Construction and operational effects assessments at this site have not been undertaken so this appendix contains no supporting information.

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Appendix E: Historic environment

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Appendix E: Historic environment

E.1 Gazetteer of known heritage assets

- E.1.1 Details of known heritage assets within the assessment area are provided in Vol 27 Table E.1 below, with their location shown on the historic environment features map (Vol 27 Figure 7.4.1, see separate volume of figures).
- E.1.2 All known heritage assets within the assessment area are referred to by a historic environment assessment (HEA) number. Assets within the site are referred to (and labelled in the historic environment features map) with the prefix **1**, eg, **HEA 1A, 1B, 1C**. References to assets outside the site but within the assessment area begin with **2** and continue onwards, eg, **HEA 3, 4, 5**.

Vol 27 Table E.1 Historic environment – gazetteer of known heritage assets within the site and assessment area

HEA Ref no.	Description	Site code/ HER ref/ List Entry Number
1	Limehouse Docklands Light Railway (DLR) Station During pile probing on the east side of Branch Road, a large wall of 19th century date was exposed. Natural gravels had been cut by the cement foundations of this structure. Constructed in English bond pattern from dark red and purple/red bricks, it abutted the nearby Grade II listed viaduct structure (see HEA 11 below), and, while broadly contemporary with it, represented a different phase of construction. It may have functioned as a retaining wall while a corridor was being excavated for the construction of the viaduct itself.	LIA08
2	Site of the former Rose Lane Chapel Ground, Commercial Road The site of a former burial ground which is first shown on Horwood's map of 1799 and is labelled 'Meeting and Burial Ground'. It was cleared during the construction of the London and Blackwall Railway, which was opened in 1840. It is included in Appendix B of Holmes's London burial grounds survey (Holmes, Basil. (Mrs), 1896) ¹ amongst other burial grounds which had been 'entirely demolished' by development.	Basil Holmes Appendix B no. 99
3	Limehouse Link Road An archaeological excavation was undertaken in 1989 that recovered many prehistoric worked flints and located	LLK89

HEA Ref no.	Description	Site code/ HER ref/ List Entry Number
	remains of the 18th century manufactory that produced Limehouse porcelain. Several phases of industrial buildings in brick were recorded including premises for pickling and lime burning.	
4	Site of the former St. James's Churchyard, Butcher Row The location of a former burial ground. It was laid out as a public garden by the Metropolitan Public Gardens Association in 1891, as described in Holmes's survey of London's burial grounds. The burial ground was cleared as part of development in 2002 (see HEA 5 below).	Basil Holmes Appendix A no. 143
5	The Royal Foundation of St Katherine, 6–10 Butcher Row, Stepney, E14 An archaeological watching brief and evaluation were undertaken by MoLAS in 2002. The graveyard of the former St. James's Church was monitored while being cleared. An elaborate burial vault, a large polygonal brick structure of unknown function, and a deep water-filled shaft line and capped with bricks were recorded. During the evaluation natural brickearth was found overlaid by a series of 18th century ground raising dumps, followed by several brick walls of cellars, one of which appears to have been part of a large 18th century building that occupied the east side of the site. Several 19th century buildings remained in use until fairly recently.	BCR02 MLO75464
6	Butcher Row, E14 An excavation in 1975 revealed evidence for a medieval or post-medieval creek and flood deposits in the northern part of the site, running northeast to southwest, that had been filled in towards the end of the medieval period. Roman material was discovered within the fill of the creek, with residual tile discovered within a ditch or drain dating to the 17th century. Evidence of a post-medieval road was also discovered. Above the infill was a chalk and flint boundary wall on the same alignment and overlain by traces of three 17th century buildings with gravel yards. In the southern part of the site, only traces of Tudor garden soil and three 17th century pits survived beneath the 18th–19th century warehouses.	BTR75 081586 MLO36413 MLO36414 MLO18248 MLO30327 MLO35520 MLO35521 MLO8872 MLO8873
7	The Royal Foundation of St. Katherine's, Butcher Row. Grade II* listed.	1065284
8	Site of a former sugar refinery, Butcher Row, E14 The location of a post-medieval sugar refinery, one of	MLO11271

HEA Ref no.	Description	Site code/ HER ref/ List Entry Number
	several in Ratcliff. Part of the complex may have survived as a house until the late 18th century. The basement was still standing under the master's house of St. Katherine's Hospital, as revealed during previous archaeological investigation (see HEA 5 above).	
9	1–15 Barnes Street. Grade II listed.	1065303
10	2–10 Barnes Street. Grade II listed.	1065304
11	Railway Bridge, Commercial Road. Grade II listed.	1357806
12	582–588 Commercial Road. Grade II listed.	1240042
13	Pair of telephone kiosks at the entrance to the Rotherhithe Tunnel. Grade II listed.	1357549
14	Archway to Rotherhithe Tunnel approach, Branch Road. Grade II listed.	1242218
15	Railway viaduct to north of Regents Canal Dock between and including Branch Road Bridge and Limehouse Cut up to Three Colt Street. Grade II listed.	1242220

E.2 Site location, topography and geology

Site location

- E.2.1 The site comprises Bekesbourne Street and the central section of Ratcliffe Lane, at the junction of the two streets. Paved areas to either side of the road sections are also included within the site boundary. Bekesbourne Street, in which the majority of the site is situated, is a residential street lined with trees, parking bays and bollards. It is bounded to the east by John Scurr House (constructed as social housing post-1945) with further residential properties to the west and south. Immediately adjacent to the northeast of the site is modern Limehouse Docklands Light Railway (DLR) Station.

Topography

- E.2.2 The land on which the site is situated slopes down from north to south towards the Thames foreshore, c. 200m to the south of the site. Ground level slopes from c. 110.0m ATD (above Tunnel Datum; the equivalent to 10.0m Ordnance Datum), 45m to the north of the site at the junction of Bekesbourne Street and Commercial Road, down to c. 106.0m ATD, 120m to the south of the site, on Horseferry Road. Ground levels on the site lie at c. 108.5–109.0m ATD.

Geology

- E.2.3 The geology and topography of the area surrounding the site is reflected in the name Ratcliff (or Ratcliffe), which is recorded as being used in AD 1294 as 'la Rede clive'. This is thought to derive from 'the red slope or cliff', with the name being given to the slight rise up from the Thames bank².
- E.2.4 British Geological Survey (BGS) digital data shows the site is located on an outcrop of the Langley Silt complex (also known as brickearth), to the north of lower-lying alluvial deposits associated with the River Thames. Brickearth is a fine-grained deposit believed to have been deposited by a mixture of wind and colluvial processes at c. 17,000 BP.
- E.2.5 A longitudinal section from Commercial Road (to the northwest of the site), through Butcher Row (formerly White Horse Street) to the Thames foreshore, produced in 1881 to illustrate the construction of the Mile End Road branch of the Holloway Storm Relief Sewer, (Vol 27 Plate E.5), includes a geological cross-section of the northern part of the site, at the junction of Ratcliffe Lane (formerly Rose Lane) and Bekesbourne Street. The top of London Clay (through which the sewer runs) is located at a depth of c. 6.3m, overlain by deposits of sands and gravels c. 4.5m thick, although natural gravels and possible brickearth deposits were not differentiated. These deposits were in turn overlain by c. 1.6m of made ground.
- E.2.6 A BGS borehole adjacent to John Scurr House, (immediately to the east of the site), records a similar geological make-up to that illustrated in the 1881 section, recording the top of natural gravels at c. 5.5m below ground level (mbgl), or c. 101.0m ATD. This was overlain by c. 3.7m thick deposits of silty clays and sand up to 1.8mbgl (c. 104.7m ATD). Over these sediments was 1.8m of made ground³.
- E.2.7 The presence of brickearth in the vicinity of the site was also confirmed during an excavation of trial trenches in advance of the widening of Butcher Row in 1975 (**HEA 6**; BTR75), c. 100m to the west of the site. The results of the trial trench excavations revealed the top of brickearth at 106.1m ATD, overlying sand and gravel at c. 105.4m ATD (Schwab, I and Nurse, B, 1977)⁴.
- E.2.8 Geology and topography played an important part in the development of Ratcliff. It has been described as a natural landing place on the north bank of the Thames, between the marshes of Wapping and the Isle of Dogs (Weinreb, B, Hibbert, C, Keay, J and Keay, J, 2008)⁵. The relatively high and dry land at Ratcliff made the area one of the few places on the Thames that was suitable for landing before the surrounding marshes were embanked. Such a landing place would have been a likely site of early settlement (Baker, TFT, 1998)⁶.

E.3 Past archaeological investigations within the assessment area

- E.3.1 No archaeological investigations have been carried out in the site in the past. There have been four archaeological investigations within the assessment area, which have revealed remains dating mainly to the post-medieval period.
- E.3.2 The closest investigation to the site was undertaken in 2008 at the Limehouse DLR Station (**HEA 1**), 100m to the northeast of the site. A large wall of 19th century date was recorded, interpreted as a retaining wall for the railway viaduct to the north of the site. No other archaeological remains were noted.
- E.3.3 In 1975 an archaeological investigation was undertaken during the widening of Butcher Row (**HEA 6**), 75m to the west of the site. This found evidence of a creek running northeast to southwest, and 16th century garden soil and traces of 17th century buildings, pits and associated yards beneath 18th and 19th century warehouse foundations (Schwab, I and Nurse, B, 1977)⁷.
- E.3.4 An evaluation carried out at 6–10 Butcher Row in 2002, (**HEA 5**), 70m to the southwest of the site, revealed natural brickearth overlaid by a series of post-medieval ground-raising dumps and pits which were cut by several brick walls belonging to an 18th century building and 19th century cellars. Clearance of the graveyard of the 19th century church of St James revealed an elaborate post-medieval burial vault, a large post-medieval polygonal brick structure of unknown function, and a deep water-filled post-medieval shaft lined and capped with bricks.

E.4 Archaeological and historical background of the site

- E.4.1 The following section provides a detailed archaeological and historical background for the site. It should be read alongside the research framework presented in Appendix C to Vol 2 Appendix E2, which sets the overall Thames Tideway Tunnel project, and the individual site-specific assessments, within a broader historic environment context (ie, past landscapes and human activity within such landscapes). It identifies the main route-wide heritage themes, of which the built and buried heritage assets identified within this assessment form a part.

Prehistoric period (700,000 BC–AD 43)

- E.4.2 There are no known finds or features dating to the prehistoric period within the site. Numerous Neolithic and Bronze Age worked flint artefacts, including a hand axe, were recovered from prehistoric peat deposits as part of an archaeological investigation for the Limehouse Link Road Scheme (**HEA 3**), c. 100m southwest of the site.
- E.4.3 The chance recovery of a flint blade at the junction of Cable Street and Butcher Row, c. 150m to the southwest of the site (outside the

assessment area) also provides limited residual evidence of prehistoric activity within the vicinity of the assessment area, although the date of the blade was not established (Schwab, I and Nurse, B, 1977)⁸.

- E.4.4 The well drained gravel terrace on which the site is located, close to the River Thames c. 200m to the south, would have been a first choice for early settlement. The site probably lay to the north of a natural landing place on the northern Thames foreshore during the prehistoric period. The artefacts uncovered to the southwest of the site suggest that the marshy area adjacent to the Thames was utilised for hunting and fishing, possibly with the construction of timber trackways or platforms to facilitate access. The site may have been on drier ground, but there is no evidence to suggest extensive settlement in the area.

Roman period (AD 43–410)

- E.4.5 The site lay c. 2.5km to the east of the Roman city of *Londinium*. The line of an east-west Roman road is thought to have run from *Londinium*, towards Ratcliff and possibly further to the east, along the present line of The Highway, c. 180m to the southwest of the site. Two Roman roads are conjectured to have converged at Ratcliff Cross, c. 235m to the southwest of the site (outside the assessment area). It is thought that a small Roman settlement was present at Ratcliff, although evidence for such a settlement within the assessment area is scarce.
- E.4.6 Only one past investigation carried out within the assessment area has revealed evidence of Roman activity. During excavations at Butcher Row in 2002, (HEA 6), c. 105m to the west of the site, residual Roman material was recorded within a natural water channel. To the south of the water channel, a ditch at an upper level of 105.4m ATD, containing one fragment of Roman tile (also thought to be residual) was excavated (Schwab, I and Nurse, B, 1977)⁹.
- E.4.7 As in the prehistoric period, the site probably lay in marginal land during the Roman period, and, whilst the higher ground at Ratcliff provided an ideal landing point, it appears that Roman activity was mainly concentrated to the west of the site towards *Londinium*. The closest significant evidence of Roman activity, comprising ditches and isolated burials, was discovered at Glasshouse Fields, c. 550m to the west of the site, whilst the remains of high status buildings, a major burial area, and a probable settlement have been discovered as part of investigations further to the west and northwest of the site, at Shadwell.

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

- E.4.8 The site would have been situated within the manor (estate) of Stepney (*Stebenhythe*). It was probably part of the original foundation endowment of the Bishopric of London in AD 604 (McDonald, KGT, 1978)¹⁰.
- E.4.9 The name 'Ratcliff' is Saxon in origin, meaning 'red cliff'. The northern part of the medieval hamlet of Ratcliff contained the parish church of St. Dunstan and All Saints, c. 500m to the northwest of the site (outside the assessment area), described as a church 'of great antiquity' (Weinreb, B, Hibbert, C, Keay, J and Keay, J, 2008)¹¹ although its exact date of

construction is not known. The church was rebuilt in AD 952 by St. Dunstan, following Viking raids.

- E.4.10 There are no known finds or features dating to the early medieval period within the site or assessment area. Early post-medieval maps, dating from the mid-17th century, show the area of the site lying within open farmland, to the north of built up areas along the Thames bank, and it is likely that the site was continuously open land prior to this, probably until the 18th century.

Later medieval period (AD 1066–1485)

- E.4.11 At the time Domesday Book was compiled (1086), the manor (estate) of Stepney was still held by the Bishop of London, although it contained several sub-manors which were in the hands of tenants. After the Black Death in 1348 most of the land within the manor of Stepney was leased out. Throughout the later medieval period, the site was located within the immediate vicinity of the hamlet of Ratcliff. White Horse Road, part of which was renamed Butcher Row in the mid-1970s, runs c. 85m west of the site, and was the medieval route from Ratcliff to St. Dunstan and All Saints Church.
- E.4.12 The manors alongside the Thames began to reclaim the marshland in this period. Earthen banks to create a river wall were constructed along the riverside: the water levels on land behind these banks were eventually controlled by ditches and sluices in order to create meadow and pasture. The marshland immediately adjacent to the Thames bank, including the land to the south of the site, was probably used for fishing and fowling. The river wall banks needed constant maintenance during this period and a series of Royal Commissions to review and repair the banks ran from 1298 to 1481. Nevertheless, there was frequent flooding and a particularly disastrous breach in the river wall in 1448 resulted in the flooding of a thousand acres (Milne, G, 2001)¹².
- E.4.13 The settlement at Ratcliff clustered around Broad Street and Ratcliffe Cross, c. 235m to the southwest of the site, extending to Butcher Row in the 14th and 15th centuries although no evidence of settlement from this period has been identified within the assessment area. The earliest mention of wharves at Ratcliff occurs in 1349, and ships are known to have been constructed on the waterfront at Ratcliff for use in the French wars. Although the population of the area gradually rose, it is likely that the site, which lay to the north of the main areas of shipbuilding activity, remained open ground throughout this period (Kerrigan, C., 1982)¹³.

Post-medieval period (AD 1485–present)

- E.4.14 In the 16th century, many voyages of discovery set off from Ratcliff, including those of Sir Hugh Willoughby to the Arctic in 1553, and Martin Frobisher to the Americas in the 1570s. By the early 17th century, Ratcliff was the most populous of the hamlets of Stepney, with approximately 3,500 inhabitants (Weinreb, B, Hibbert, C, Keay, J and Keay, J, 2008)¹⁴. The development of the area in these centuries was concentrated to the south of the site, along the riverfront, which was lined with docks and wharves by the late 17th century. Cartographic sources indicate that it

was not until the turn of the 18th century that the area of the site began to be built up.

- E.4.15 Faithorne and Newcourt's map of 1658 (Vol 27 Plate E.1) shows terraced buildings located to the west of the site, along either side of Butcher Row, c. 90m to the west of the site. To the east of Butcher Row lay open land: the area of the site was open fields, possibly market gardens or pasture. An east-west aligned road leading from Whitechapel to Limehouse was shown on the line of present day Commercial Road, c. 45m to the north of the site. Bekesbourne Street and Ratcliff Lane did not exist at this time.
- E.4.16 An archaeological excavation carried out at Butcher Row in 1975, (**HEA 6**), c. 105m to the west of the site, revealed evidence of an infilled post-medieval creek and flood deposits in the northern part of the excavated area, as well as the remains of three 17th century buildings with gravel yards. In the southern part of the excavated area, only traces of 16th century soil and three 17th century pits survived beneath the footings of later 18th–19th century warehouses. These features indicate that the area to the west of the site was continually occupied by buildings possibly from as early as the 16th century.
- E.4.17 Morgan's map of 1682 (not reproduced due to insufficient coverage of the assessment area), shows considerable development within the immediate vicinity of the site. Rose Lane (now Ratcliffe Lane) and London Street (now Bekesbourne Street) had been constructed and were lined with buildings, probably terraced houses or warehouses/workshops. The site occupied the northern stretch of London Street, at its junction with Rose Lane, and included buildings directly fronting Rose Lane and London Street. Within the wider assessment area, the spread of buildings to the south and west of the site had become much denser, although the area to the east of London Street, and to the north of Rose Lane, remained predominately open land.
- E.4.18 Rocque's map of 1746 (Vol 27 Plate E.2) shows the northern stretch of London Street, at its junction with Rose Lane almost continuously build up on both sides, although both streets, particularly London Street, were probably narrower than their modern counterparts, and the site boundary therefore also includes parts of the buildings shown fronting both streets. The map shows increased development to the south of the site, along the waterfront, and to the west: there has been little additional development, however, to the north and east of the site which was mostly cultivated land or gardens. This map is the first to illustrate the sugar refinery (**HEA 8**) which lay c. 130m to the west of the site, partially within the footprint of the existing St. Katherine's Chapel, until the end of the 18th century.
- E.4.19 On Horwood's 1799 map (Vol 27 Plate E.3) London Street is shown lined with small terraced houses, with gardens to the rear. The southern side of Rose Lane, at its junction with London Street, has a mix of terraced houses and stables or workshops/warehouses, with open fields behind. On the northern side of the street, is the Rose Lane Meeting House and burial ground (**HEA 2**), c. 20m to the northwest of the site. This was a Baptist Meeting House and associated burial ground that is recorded as having contained 779 burials from 1786–1833¹⁵. The Rose Lane Chapel

- Ground was cleared and built over during construction of the East London (London and Blackwall) Railway in 1836–1840.
- E.4.20 The railway viaduct (**HEA 15**) is Grade II listed eastwards of the Branch Road Bridge (the bridge is included in the listing). It was built by engineers George Stephenson and GP Bidder and is an early stock brick arcaded viaduct with console corbelled string below parapet. The Branch Road Bridge is of two elliptical keystone arches. The railway is one of the earliest to serve the docks, before the great railway expansion of the 1840s. The railway was to revolutionise docking methods and buildings in the 1850s.
- E.4.21 The Ordnance Survey 1st edition 25" scale map of 1873 (Vol 27 Plate E.4) shows the area immediately to the north of the site occupied by the East London Railway line, which was opened in 1840, and Stepney Junction Station. London Street continues to be fronted on either side by terraced houses or shops. Rose Lane has been shortened to the east of the site by the construction of the Horseferry Branch Road, and much of the previously open land around the site had been infilled with houses and commercial buildings. Development within the assessment area and its vicinity included the construction of the Regent's Canal Dock and associated coal sheds in the area of former open fields, c. 70m to the east of the site. A number of timber yards now back onto the gardens of the houses fronting the eastern side of London Road and a cider stores and confectionary works lie to the west of the site. In comparison to Horwood's map of 74 years previously, the area of the site is largely industrial and densely populated.
- E.4.22 All four previous archaeological investigations within the assessment area (**HEA 1, 3, 5 and 6**) have revealed 18th–19th century remains attesting to the rapid development of the site area in this period. These include 18th century ground-raising dumps; 18th–19th century building and cellar footings and walls; and, at the Limehouse Link Road (**HEA 3**), c. 100m to the south of the site, the remains of a notable 18th century porcelain factory.
- E.4.23 In 1881, the Mile End Road branch of the Holloway Storm Relief Sewer was constructed. The final section of this rain water overflow sewer ran along the western side of Rose Lane, turning south down London Street (Bekesbourne Street) towards an outfall located on the Thames foreshore, c. 200m to the south of the site. A longitudinal section (Vol 27 Plate E.5) shows the 7 foot (c. 2.1m)-wide tunnel running from Rose Lane (Ratcliff Lane) beneath London Street. The site is located between Shaft 1, adjacent to the foreshore, and Shaft 2, at the junction of Bekesbourne Street and Ratcliff Lane. The top of the shaft is located at a depth of c. 8.5m below ground level (mbgl). The tunnel is shown running through natural 'blue clay', immediately above c. 4.5m of sand and gravel, described as 'brown sharp ballast', overlain by c. 1.6m of made ground.
- E.4.24 There were major changes around the site by the early 20th century. The Ordnance Survey 3rd edition 25" scale map of 1915 (Vol 27 Plate E.6) shows the former terraced houses directly fronting either side of London Street have been demolished and replaced by a large saw mill to the east,

and new, larger buildings to the west, possibly residential flats set back from London Street by c. 9.0m. London Street has been stopped-up to through traffic just to the south of Rose Lane and remodelled as open access space in front of the flats. To the west is a school and possible warehouses.

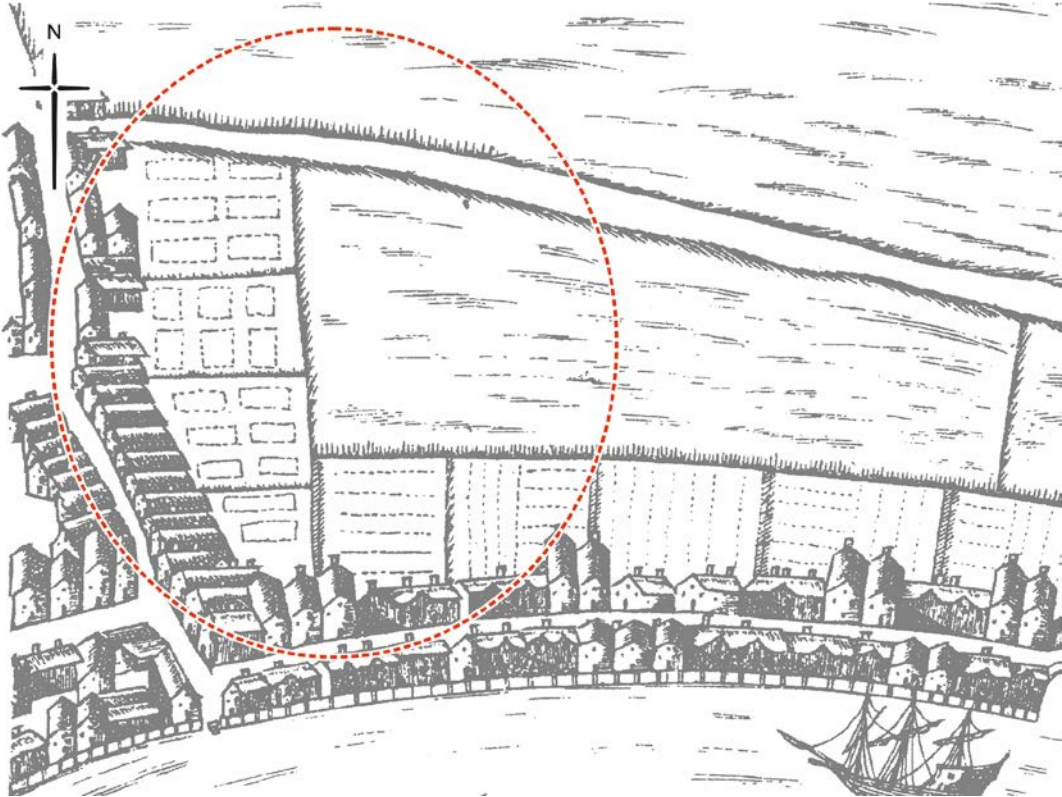
- E.4.25 The London County Council's Bomb Damage Maps 1939–1945¹⁶ (not reproduced) show no bomb damage within or immediately adjacent to the site.
- E.4.26 By 1947, as shown on the Ordnance Survey 25" scale map of 1947 (Vol 27 Plate E.7) Rose Lane had been renamed Ratcliffe Lane. The paved area to the east of London Street has been widened to the by c. 4.0m adjacent to the newly constructed John Scurr House (currently a block of residential flats).
- E.4.27 In 1951 the Royal Foundation of St. Katherine (**HEA 7**) (established in the 12th century by Queen Matilda) moved its original location on land adjoining the Tower of London, to the present location c. 50m to the southwest of the site. 14th century stalls belonging to the former chapel of The Foundation were moved to Ratcliff, where a small chapel was established on the site of the former Church of St. James (constructed in 1838), which had been destroyed by bombing.
- E.4.28 Post-1950 Ordnance Survey maps (not reproduced) show no major changes to the site. Immediately to the west, new housing was built on the site of the old flats. The former East London Railway was redeveloped as part of the construction of the Docklands Light Railway (DLR) and Limehouse DLR Station in the late 1990s.

The current site

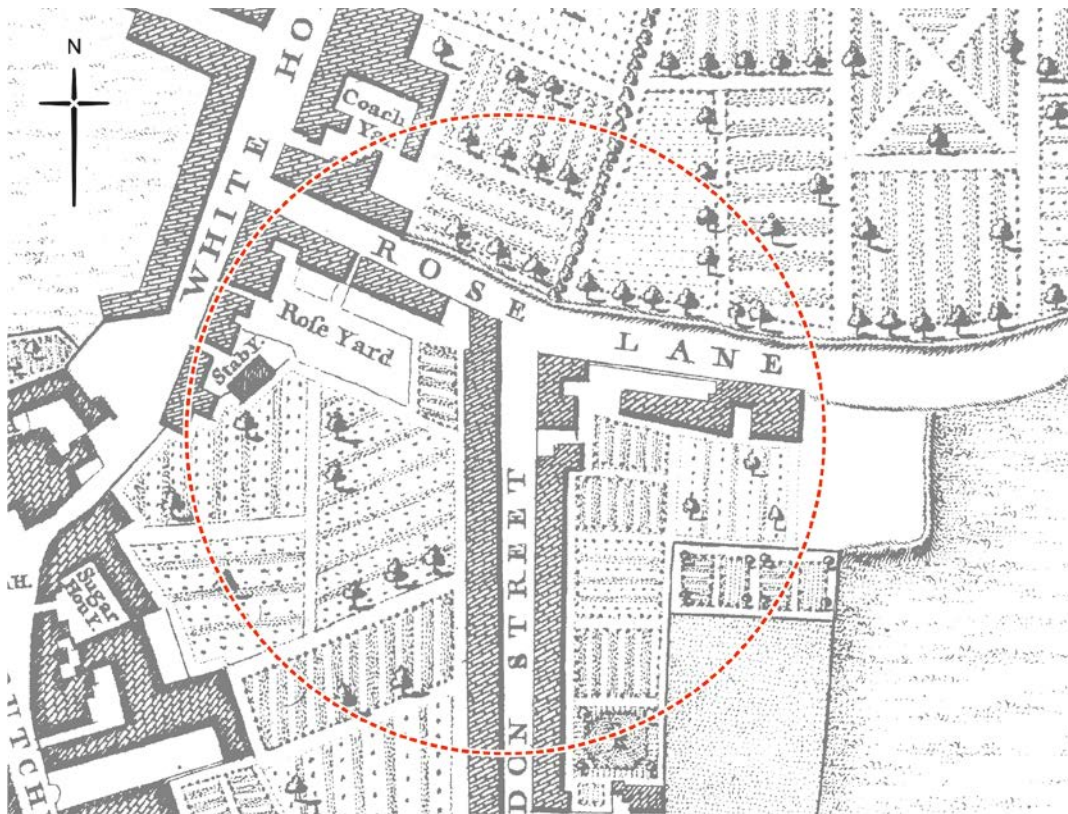
- E.4.29 The site comprises Bekesbourne Street (Vol 27 Plate E.8) and a small central section of Ratcliffe Lane, where the two roads meet. The northeastern part of the site also includes part of the paved area alongside Ratcliffe Lane, adjacent to the Limehouse DLR (Docklands Light Railway) Station (Vol 27 Plate E.9).

E.5 Plates

Vol 27 Plate E.1 Historic environment – Faithorne and Newcourt’s map of 1658



Vol 27 Plate E.2 Historic environment – Rocque's map of 1746



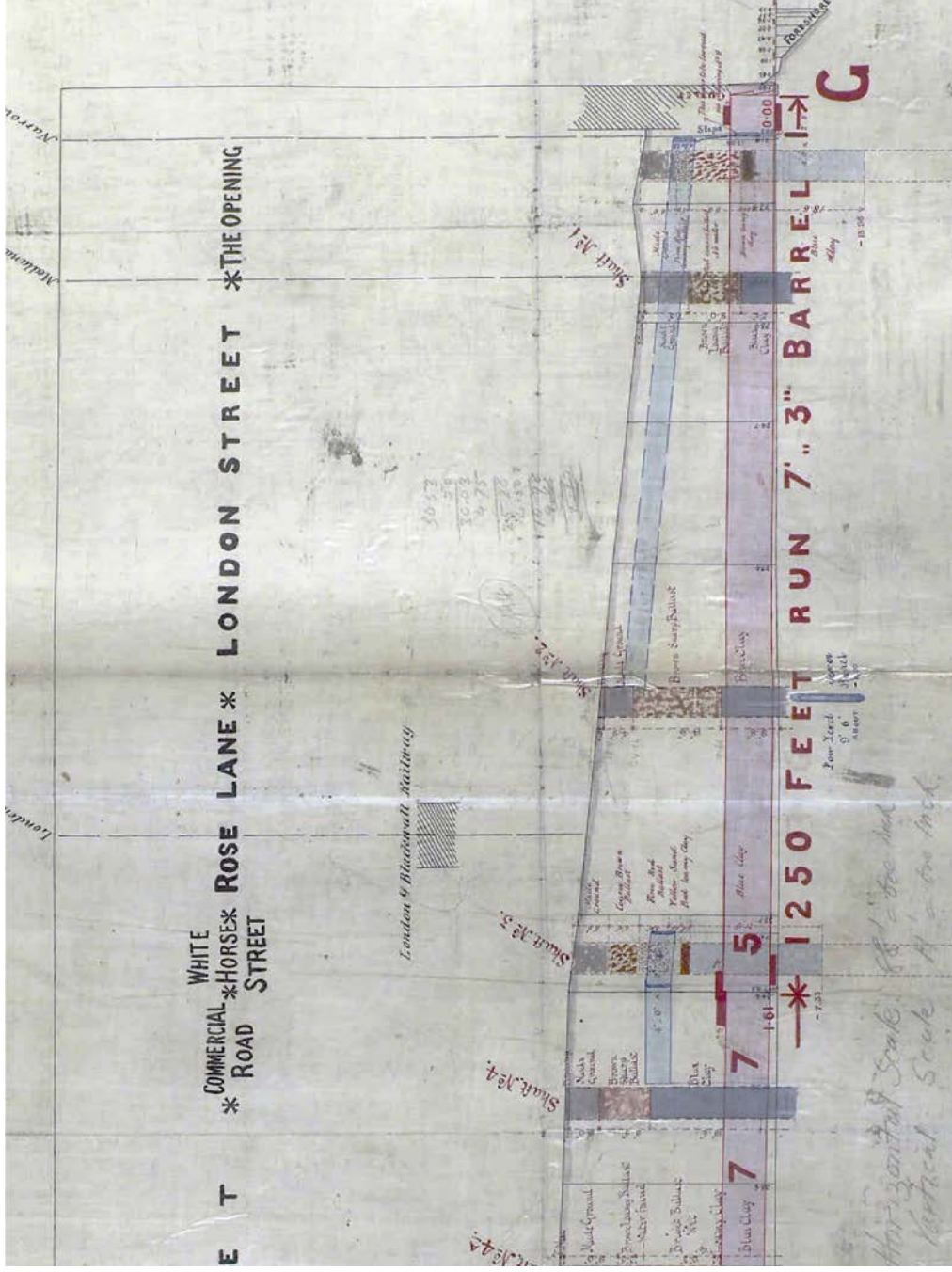
Vol 27 Plate E.3 Historic environment – Horwood's map of 1799



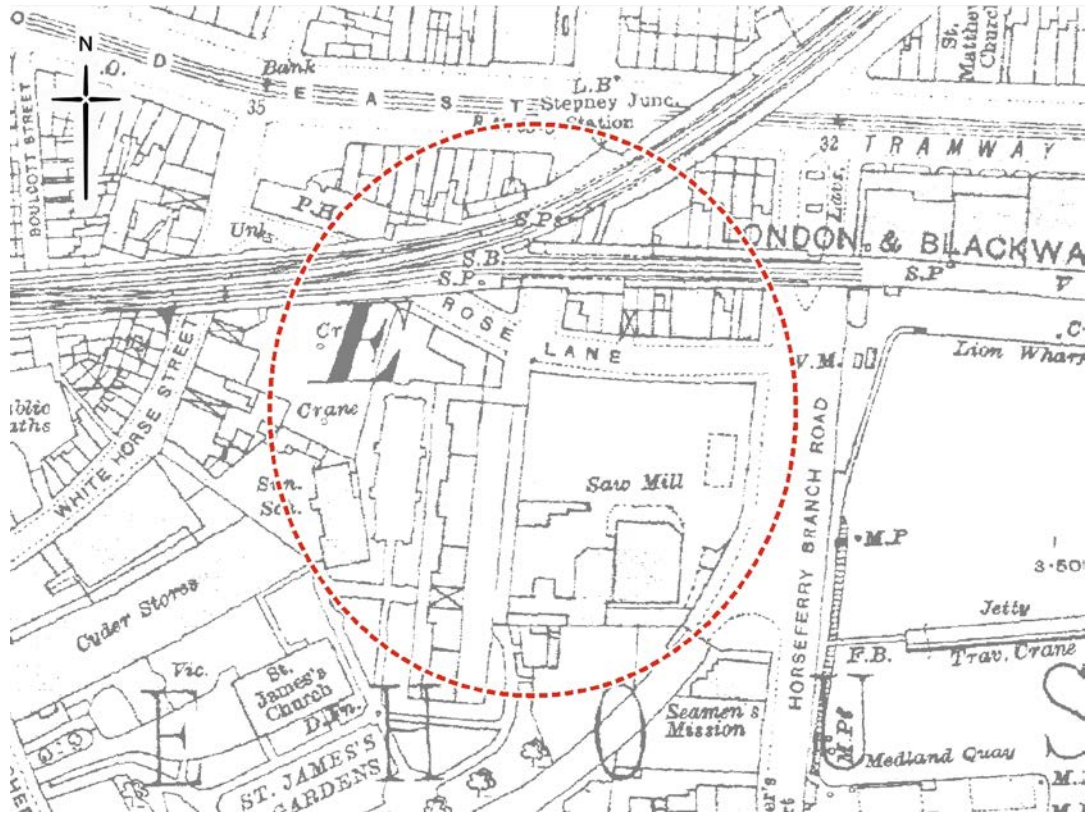
Vol 27 Plate E.4 Historic environment – Ordnance Survey 1st edition 25” scale map of 1873



Vol 27 Plate E.5 Historic environment – Longitudinal section of the Mile End Road branch of the Holloway Storm Relief Sewer (Thames Water Abbey Mills Books)



Vol 27 Plate E.6 Historic environment – Ordnance Survey 3rd edition 25” scale map of 1915



Vol 27 Plate E.7 Historic environment – Ordnance Survey 25” scale map of 1947



Vol 27 Plate E.8 Historic environment – Bekesbourne Street



Looking north; MOLA; 20th April 2011

Vol 27 Plate E.9 Historic environment – Bekesbourne Street and Ratcliffe Lane



Looking north with the entrance to Limehouse DLR Station shown to the east; MOLA; 20th April 2011

References

- ¹ Holmes, Basil. (Mrs). *The London Burial Grounds: Notes on their history from the earliest to the present day* New York: MacMillan & Co (1896).
- ² Gover, JEB, Stenton, A and Mawer FM. *The Place Names of Middlesex*. English Place Names Society, XVIII.
- ³ British Geological Survey borehole data.
- ⁴ Schwab, I and Nurse, B. 'Butcher Row, Ratcliffe, E14'. *Transactions of the London and Middlesex Archaeological Society*, 28 (1977), 216.
- ⁵ Weinreb, B, Hibbert, C, Keay, J and Keay, J. *The London Encyclopaedia*. Pan Macmillan (2008), 682.
- ⁶ Baker, TFT. *The Victoria History of the Counties of England. A History of Middlesex*, XI (1998), 13.
- ⁷ Schwab, I and Nurse, B. 'Butcher Row, Ratcliffe, E14'. *Transactions of the London and Middlesex Archaeological Society*, 28 (1977), 216.
- ⁸ Schwab, I and Nurse, B. See citation above.
- ⁹ Schwab, I and Nurse, B. See citation above.
- ¹⁰ McDonald, KGT. *Medieval London Suburbs*. London (1978), 17.
- ¹¹ Weinreb, B, Hibbert, C, Keay, J and Keay, J. *The London Encyclopaedia*. Pan Macmillan (2008), 754.
- ¹² Milne, G. 'Joining the Medieval Fleet', *British Archaeology*, 61 (2001).
- ¹³ Kerrigan, C. *A History of Tower Hamlets*. LB of Tower Hamlets (1982), 24
- ¹⁴ Weinreb, B, Hibbert, C, Keay, J and Keay, J. See citation above.
- ¹⁵ www.londonburials.co.uk; accessed 11/06/2012.
- ¹⁶ *London County Council Bomb Damage Maps 1939–45, reproduced by the London Topographical Society and London Metropolitan Archives*. LTS Publication No 164. 2005.

Thames Tideway Tunnel
Thames Water Utilities Limited



Application for Development Consent

Application Reference Number: WWO10001

Environmental Statement

Doc Ref: **6.2.27**

Volume 27: Minor Works Sites appendices

Appendix F: Land quality

APFP Regulations 2009: Regulation **5(2)(a)**

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**Thames
Tideway Tunnel**



Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel
Environmental Statement
Volume 27 Minor work sites appendices
Appendix F: Land quality

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Appendix F: Land quality

F.1 Introduction

F.1.1 Construction and operational effects assessments at this site have not been undertaken so this appendix contains no supporting information.

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Thames Tideway Tunnel
Thames Water Utilities Limited



Application for Development Consent

Application Reference Number: WWO10001

Environmental Statement

Doc Ref: **6.2.27**

Volume 27: Minor Works Sites appendices

Appendix G: Noise and vibration

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Thames Tideway Tunnel

Environmental Statement

Volume 27 Minor work sites appendices

Appendix G: Noise and vibration

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Appendix G: Noise and vibration

G.1 Baseline noise survey

Introduction

- G.1.1 As described in Volume 2 Environmental assessment methodology, the main purpose of the noise survey has been to determine representative ambient and background noise levels at a number of different types of noise sensitive receptor.
- G.1.2 The nearest identified receptors to Bekesbourne Street are the residential dwellings immediately surrounding the proposed work site and the community centre located to the west at the end of Bekesbourne Street.

Survey methodology

- G.1.3 A baseline noise survey was completed on 8th March 2012. The baseline survey comprised short term attended measurements taken during the daytime only.
- G.1.4 Short term attended noise monitoring was completed at all measurement positions. Measurements were undertaken during the interpeak periods of 10:00-12:00 and 14:00-16:00 on a typical weekday, so that the baseline data is representative of the quieter periods where any disturbance from construction would be most noticeable.
- G.1.5 The London Borough (LB) of Tower Hamlets has been consulted regarding the noise assessment and monitoring locations, prior to completing the surveys.
- G.1.6 Vol 27 Table G.1 describes the survey equipment that was used to collect the baseline data at the site.

Vol 27 Table G.1 Noise – survey equipment

Item	Type	Manufacturer	Serial number(s)	Laboratory calibration date*
Baseline Survey: 14th March 2012				
Hand-Held Analyzer(s)	2250	Brüel & Kjær	2626232	23/01/2012
½ " Microphone(s)	4189	Brüel & Kjær	2621211	20/01/2012
B&K Sound Calibrator(s)	4231	Brüel & Kjær	2619374	20/01/2012

**Hand-held analyser(s) and ½ inch microphone(s) valid for two years from the date listed, calibrator(s) valid for one year from the date listed*

- G.1.7 Prior to and on completion of the surveys, the sound level meters and microphone calibration was checked using a Brüel and Kjær sound level

meter calibrator. On-site calibration checks were performed before and after all measurements with no significant deviation being observed. The sound level meters and calibrators have valid laboratory calibration certificates.

G.1.8 The sound level meters were tripod-mounted with the microphone approximately 1.3m above ground level. A windshield was fitted over the microphone at all times during the survey period to minimise the effects of any wind induced noise.

G.1.9 The prevailing weather conditions observed for the baseline survey are described in Vol 27 Table G.2.

Vol 27 Table G.2 Noise – weather conditions during baseline noise survey

Wind speed (ms ⁻¹)	Wind direction	Temperature (°C)	Precipitation	Description
Baseline Survey – 8th March 2012 (daytime, 10:00-12:00)				
Maximum: 1.5-4.6 Average: 0.4-1.6	Westerly	9-13	No	Clear, sunny and breezy
Baseline Survey – 8th March 2012 (daytime, 14:00-16:00)				
Maximum: 2.0-5.7 Average: 0.4-2.2	Westerly	12-14	No	Sunny intervals, breezy and dry

Measurement locations

G.1.10 Vol 27 Table G.3 details the measurement locations which are also presented in Vol 27 Figure G.1 Noise – measurement locations (see separate volume of figures), and shown in Vol 27 Plate G.1 to Vol 27 Plate G.3.

Vol 27 Table G.3 Noise – measurement locations

Measurement location number	Description	Co-ordinates	
		X	Y
OWS01	On public footpath adjacent to Bekesbourne Street, near to junction with Ratcliffe Lane	536098	181059
OWS02	On public footpath adjacent to Bekesbourne Street	536095	181031
OWS03	On public footpath adjacent to Bekesbourne Street, opposite entrance to community centre	536058	181024

Results

G.1.11 The range of values for each of the parameters collected during the baseline surveys are summarised in Vol 27 Table G.4 to Vol 27 Table G.6.

Vol 27 Table G.4 Noise – sampled noise survey results – OWS01

Location Detail: OWS01, on public footpath adjacent to Bekesbourne Street, near to intersection with Ratcliffe Lane						
Measurement period	Noise level (dB(A) free-field)			Averaged ambient noise level, dBL _{Aeq,15min}		dBL _{Aeq,15min} (rounded to nearest 5dB)
	L _{AFmax}	L _{A90,15min}	L _{Aeq,15min}	Free field	Façade	Façade
Daytime (10.00-12.00, 14.00-16.00)	85	55	62-63	63	66*	65

** An approximation of the averaged ambient façade noise level has been obtained by adding 3dB to the calculated averaged ambient free-field level*

Vol 27 Table G.5 Noise – sampled noise survey results – OWS02

Location Detail: OWS02, on public footpath adjacent to Bekesbourne Street						
Measurement period	Noise level (dB(A) free-field)			Averaged ambient noise level, dBL _{Aeq,15min}		dBL _{Aeq,15min} (rounded to nearest 5dB)
	L _{AFmax}	L _{A90,15min}	L _{Aeq,15min}	Free field	Façade	Façade
Daytime (10.00-12.00, 14.00-16.00)	75	53	57-59	55*	58	60

** An approximation of the averaged ambient free-field level has been obtained by subtracting 3dB from the calculated averaged ambient façade noise level*

Vol 27 Table G.6 Noise – sampled noise survey results OWS03

Location Detail: OWS03, on public footpath adjacent to Bekesbourne Street, opposite entrance community centre						
Measurement period	Noise level (dB(A) free-field)			Averaged ambient noise level, dBL _{Aeq,15min}		dBL _{Aeq,15min} (rounded to nearest 5dB)
	L _{AFmax}	L _{A90, 15min}	L _{Aeq, 15min}	Free field	Façade	Façade
Daytime (10.00-12.00, 14.00-16.00)	74	53	57-59	58	61*	60

** An approximation of the averaged ambient façade noise level has been obtained by adding 3dB to the calculated averaged ambient free-field level*

Baseline condition photographs specific to topics

Vol 27 Plate G.1 Noise – measurement location OWS01



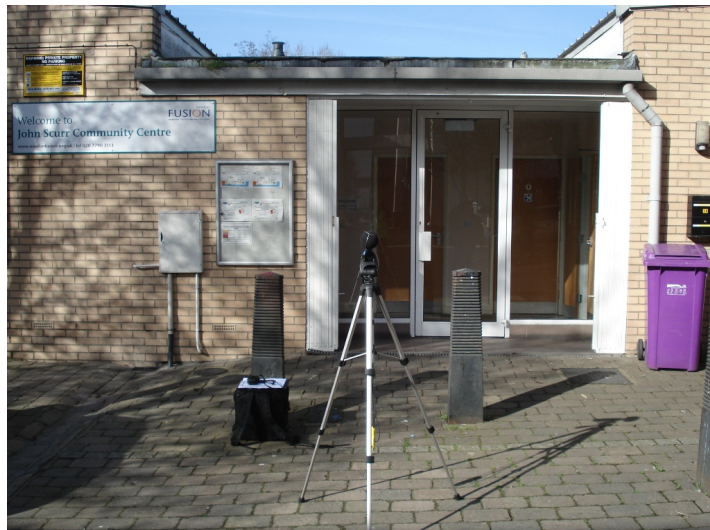
Note: On public footpath adjacent to Bekesbourne Street, looking south

Vol 27 Plate G.2 Noise – measurement location OWS02



Note: On public footpath adjacent to Bekesbourne Street, looking east towards John Scurr House (façade measurement)

Vol 27 Plate G.3 Noise – measurement location OWS03



Note: On public footpath adjacent to Bekesbourne Street, looking west towards community centre

G.2 Construction noise prediction results

- G.2.1 The construction noise prediction methodology follows the methodology provided in Vol 2 Section 9.
- G.2.2 The assessment has been carried out based on a typical construction programme which has been used to calculate the average monthly noise levels.
- G.2.3 Construction plant assumptions used in the assessment are presented in Vol 27 Table G.7.
- G.2.4 Time histories of the predicted daytime construction noise levels across the programme of construction works are shown in Vol 27 Plate G.4 to Vol 27 Plate G.9.

Vol 27 Table G.7 Noise – typical construction plant schedule

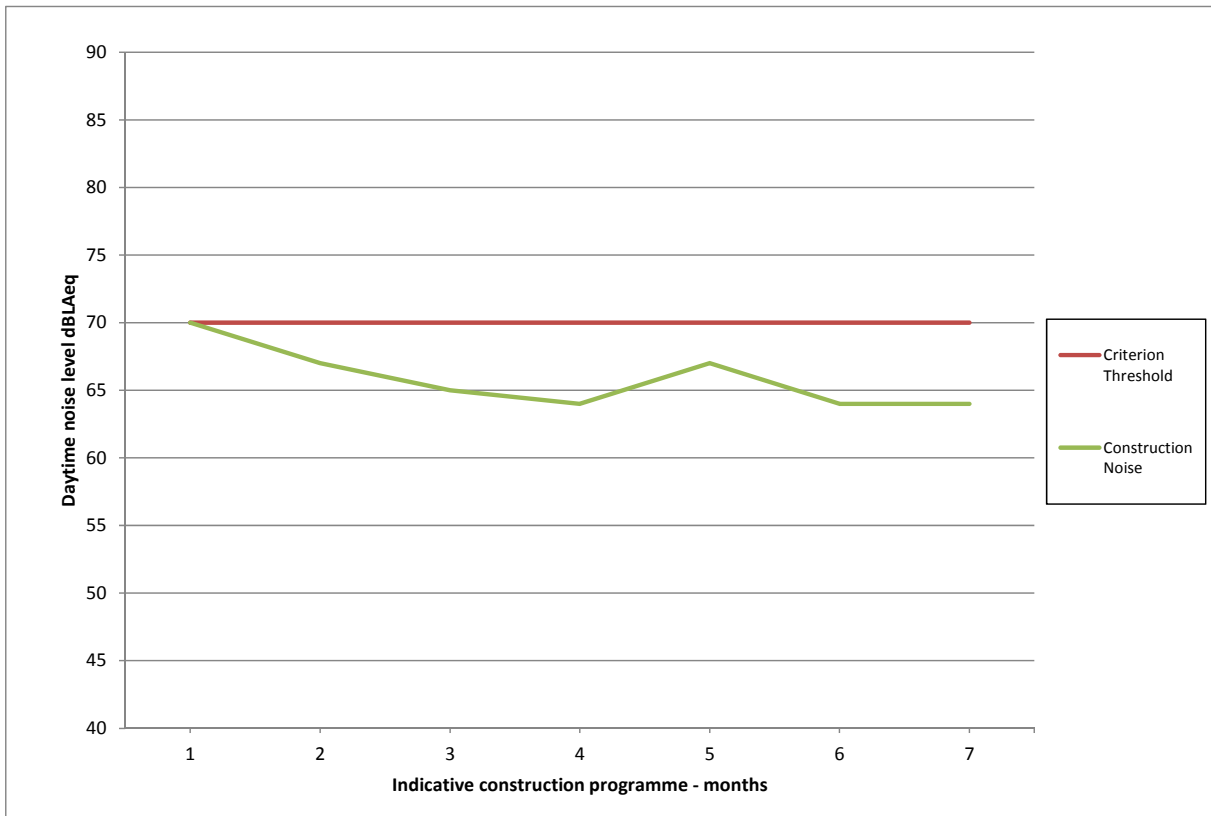
Construction activity	Plant	Unit No(s)	Activity LWA (dB)	% on-time	Data Source	Example equipment used in the assessment
Site set-up	Compressor 250cfm	1	93	50	BS5228-1: Table C.5, Item 5	Compressor for hand-held pneumatic breaker
	Generator 200 kVA	1	94	100	BS5228-1: Table C.4, Item 78	Diesel generator
	Hand Tools	1	100	15	Estimated	Hand tools
	Cutting equipment (diamond saw)	1	108	10	BS5228-1: Table C.4, Item 93	Angle grinder (grinding steel), 4.7 kg
	Telescopic Handler/FLT	1	99	30	BS5228-1: Table C.2, Item 35	Telescopic handler
Demolition (General site equipment also applicable during this phase)	JCB with hydraulic breaker	1	116	50	BS5228-1: Table C.5, Item 1	Backhoe mounted hydraulic breaker
	Service Crane 25T mobile Crane				BS5228-1: Table C.4, Item 43	Wheeled mobile crane, 35 t
Piling (General site equipment also applicable during this phase)	Small secant piling rig	1	104	80	BS5228-1: Table C.3, Item 17	Mini piling rig
	Concrete deliveries (discharging)	1	103	20	BS5228-1: Table C.4, Item 18	Cement mixer truck (discharging)

Construction activity	Plant	Unit No(s)	Activity LWA (dB)	% on-time	Data Source	Example equipment used in the assessment
Shaft construction (General site equipment also applicable during this phase)	Service Crane 25T mobile Crane	1	98	50	BS5228-1: Table C.4, Item 43	Wheeled mobile crane, 35 t
	Pump	1	96	50	BS5228-1: Table C.4, Item 88	Water Pump (Diesel)
	Long reach excavator	1	106	50	BS5228-1: Table C.7, Item 1	Long reach tracked excavator
	Dumper	1	104	50	BS5228-1: Table C.4, Item 3	Dumper, 7 t
General Site	Compressor 250cfm	1	115	50	BS5228-1: Table C.5, Item 5	Compressor for hand-held pneumatic breaker, 1 t
	Generator 200 kVA	1	116	50	BS5228-1: Table C.4, Item 78	Diesel generator
	Cutting equipment (diamond saw)	1	107	25	BS5228-1: Table C.4, Item 93	Angle grinder (grinding steel), 4.7 kg
	Telescopic Handler/FLT	1	97	50	BS5228-1: Table C.2, Item 35	Telescopic handler

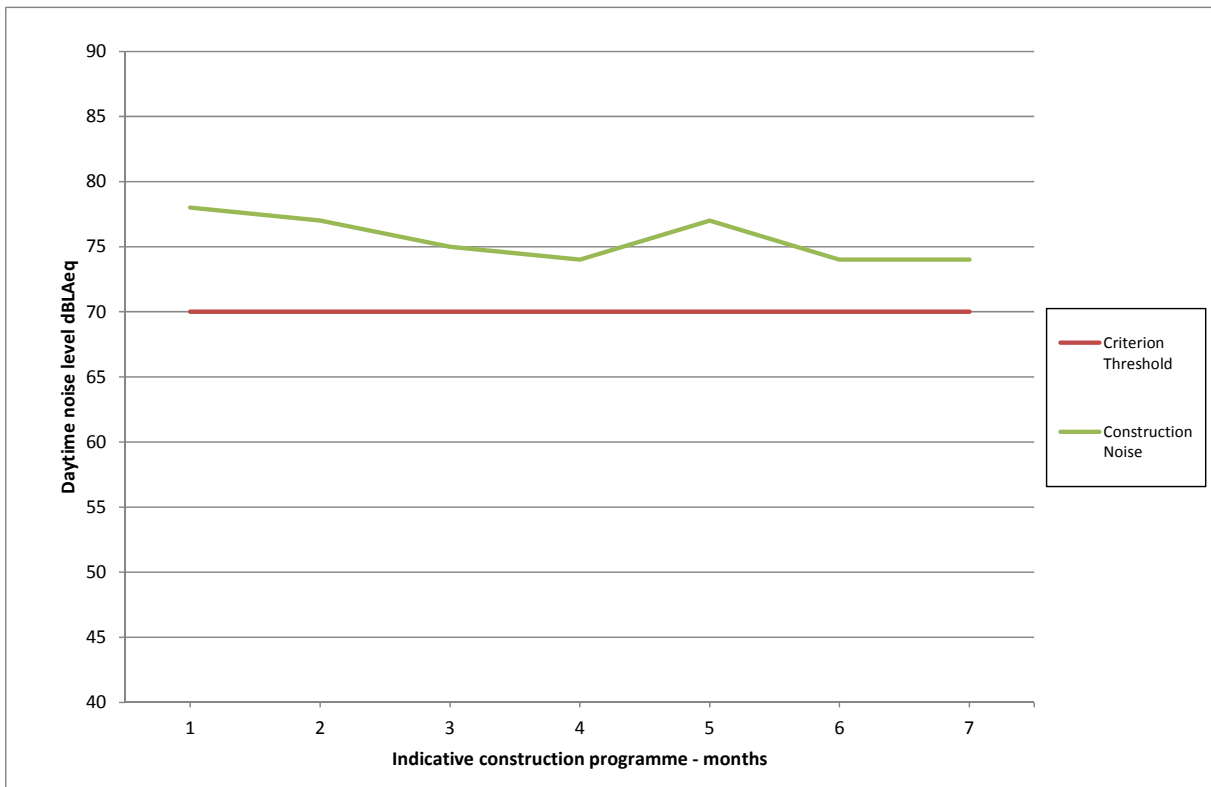
Note: This schedule provides an illustration of typical plant that could be used in the construction of the Thames Tideway Tunnel at this site. The appointed Contractor must comply with section 6 of the CoCP but may vary the method and plant to be used. This schedule therefore represents the most reasonable assumption for the assessment that can be made at this stage.

G.2.5 The predicted construction noise over time at each receptor is shown in the plates below. It should be noted that these representations are for the worst-case scenarios for noise exposure at the upper floors. For comparison with the construction noise, the plates also show either the potential significance criterion threshold for residential receptors, or the ambient noise level. This comparison is discussed in the main assessment text. The night-time noise levels have also been assessed for the short period of night-time works, these results are described in the main assessment text and not presented here.

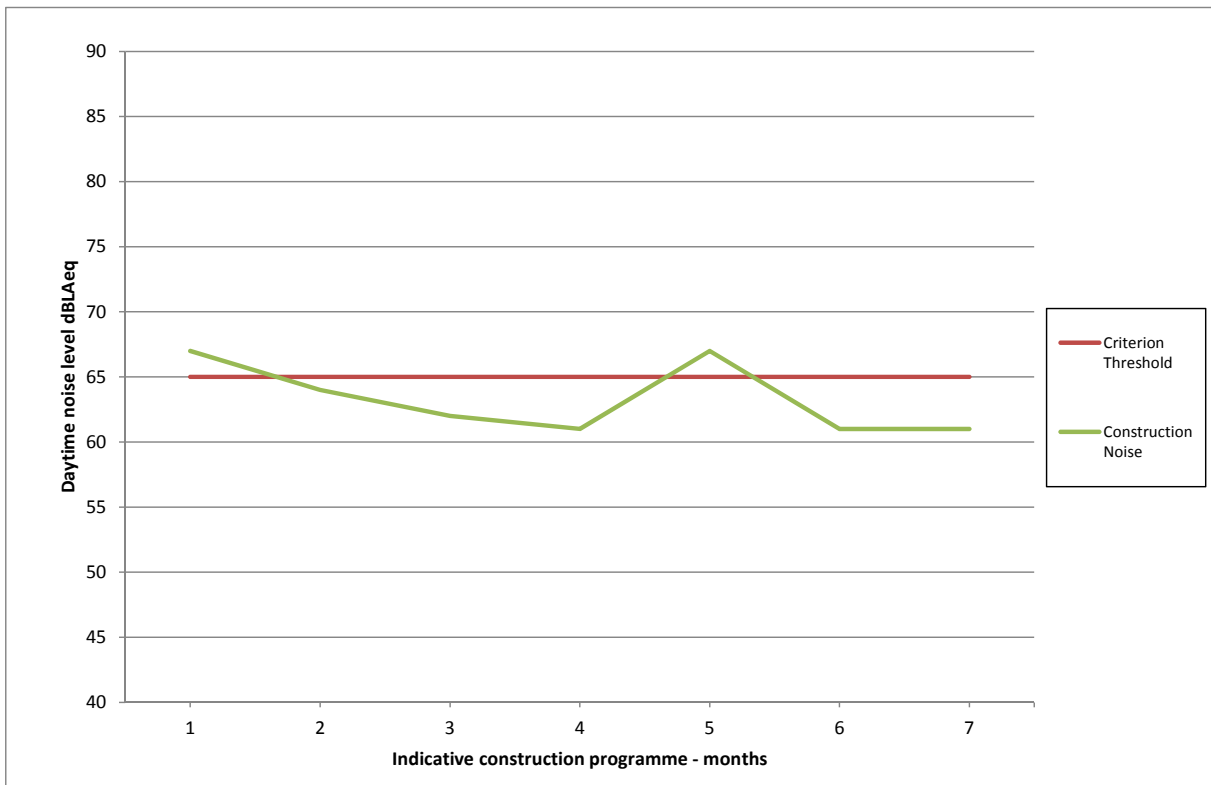
Vol 27 Plate G.4 Noise – Average monthly daytime noise level over duration of construction – 12 Ratcliffe Lane (BK1)



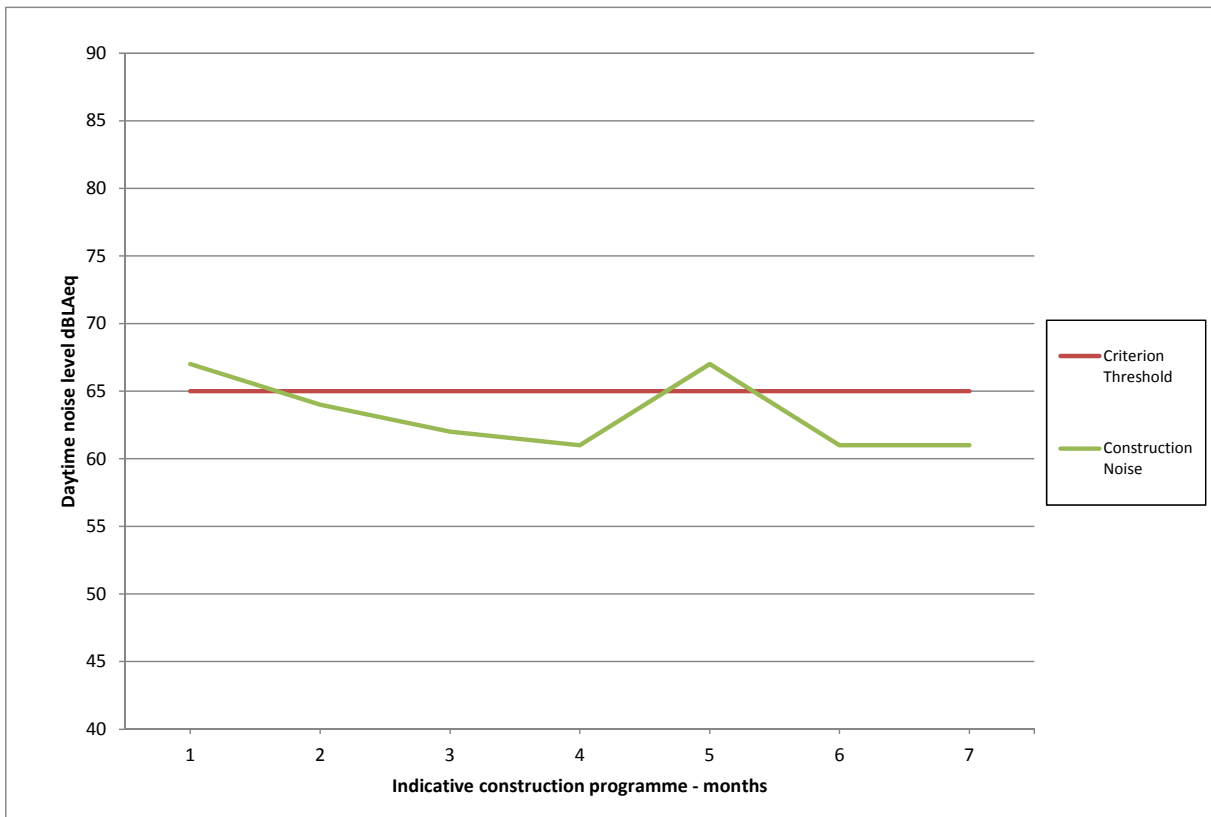
Vol 27 Plate G.5 Noise – Average monthly daytime noise level over duration of construction – John Scurr House (BK2)



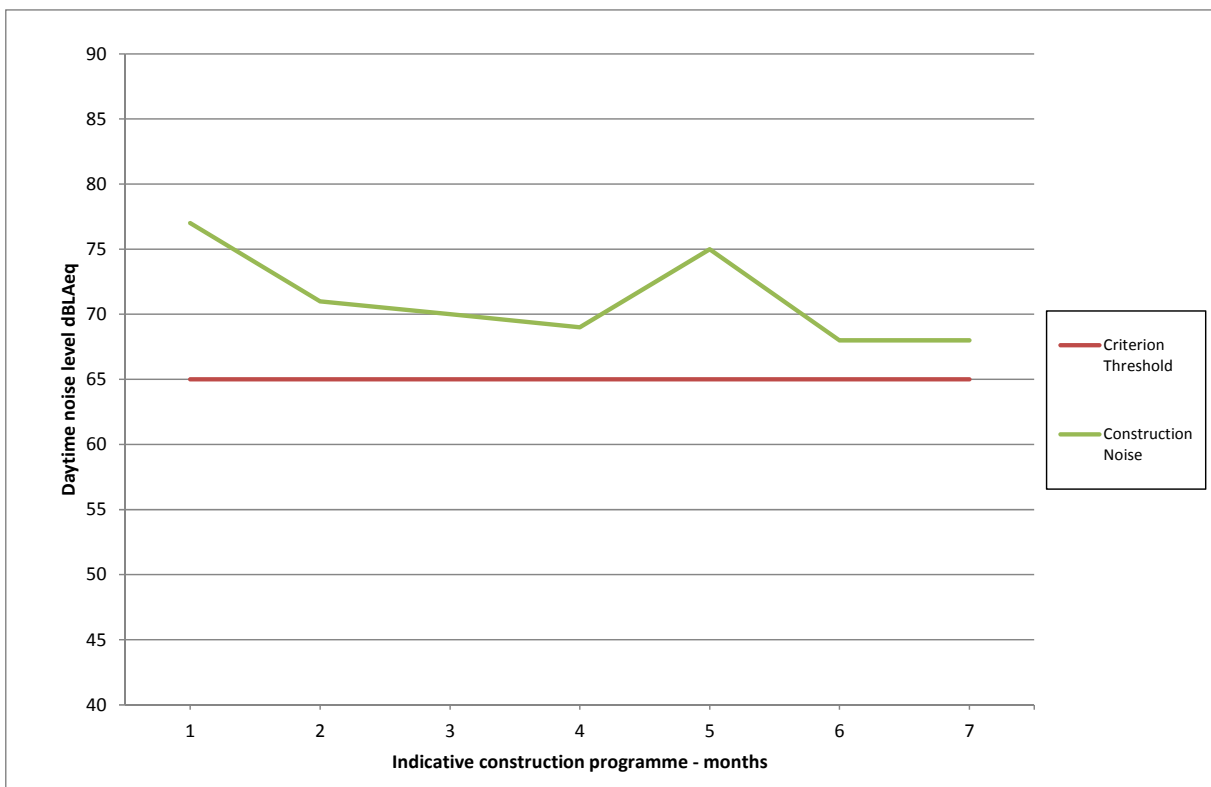
Vol 27 Plate G.6 Noise – Average monthly daytime noise level over duration of construction – 10-14 Bekesbourne Street (BK3)



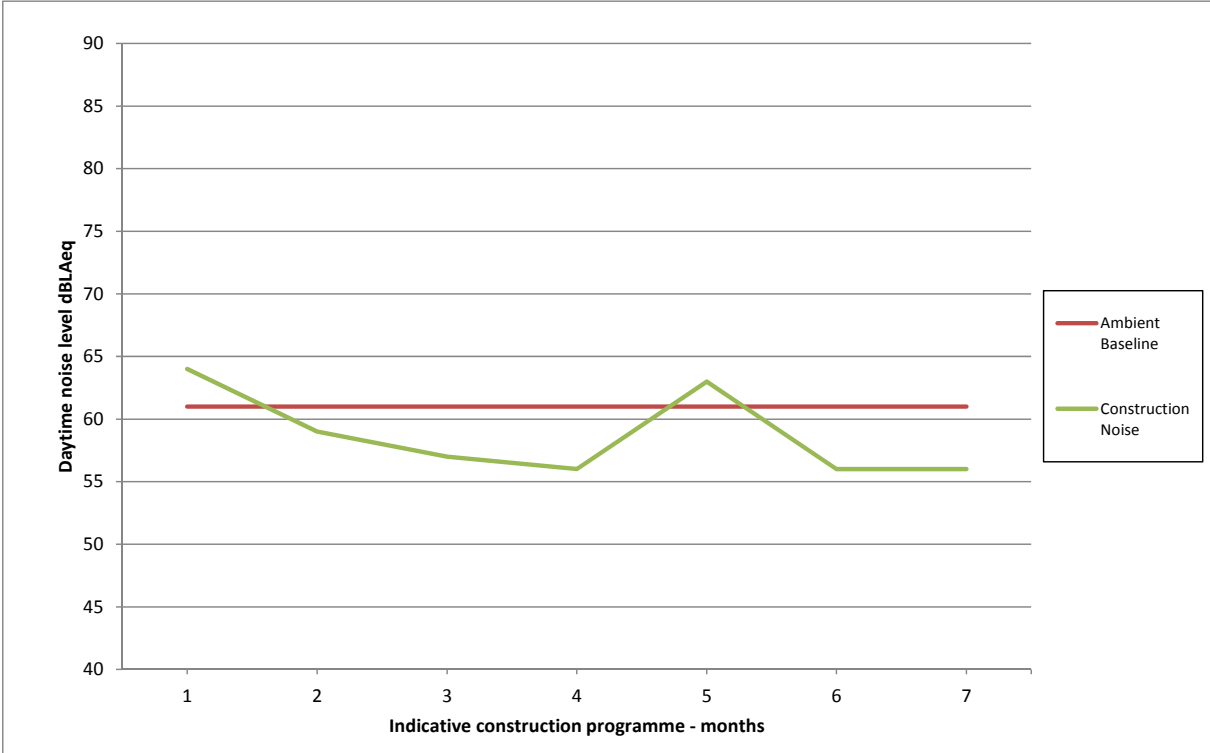
Vol 27 Plate G.7 Noise – Average monthly daytime noise level over duration of construction – 1-11 Bekesbourne Street (BK4)



Vol 27 Plate G.8 Noise – Average monthly daytime noise level over duration of construction – 8 Bekesbourne Street (BK5)



Vol 27 Plate G.9 Noise – Average monthly daytime noise level over duration of construction – John Scurr Community Centre (BK6)



References

¹ British Standards Institution, *BS 5228 Code of Practice for Noise and Vibration Control on Open Construction Sites*, British Standards Institution (2009)

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Appendix H: Socio-economics

APFP Regulations 2009: Regulation **5(2)(a)**

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Appendix H: Socio-economics

H.1 Introduction

H.1.1 Construction and operational effects assessments at this site have not been undertaken so this appendix contains no supporting information.

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Appendix I: Townscape and visual

APFP Regulations 2009: Regulation **5(2)(a)**

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Appendix I: Townscape and visual

I.1 Introduction

- I.1.1 Construction and operational effects assessments at this site for this topic do not require the provision of any supporting information, so this appendix is intentionally empty.

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Appendix J: Transport

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Appendix J: Transport

J.1 Introduction

- J.1.1 Construction and operational effects assessments at this site for this topic do not require the provision of any supporting information, so this appendix is intentionally empty.

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Appendix K: Water resources - groundwater

APFP Regulations 2009: Regulation **5(2)(a)**

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Appendix K: Water resources - groundwater

K.1 Introduction

K.1.1 Construction and operational effects assessments at this site have not been undertaken so this appendix contains no supporting information.

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Appendix L: Water resources - surface water

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Appendix L: Water resources – surface water

L.1 Introduction

- L.1.1 Construction and operational effects assessments at this site for this topic do not require the provision of any supporting information, so this appendix is intentionally empty.

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Appendix M: Water resources - flood risk

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Appendix M: Water resources – flood risk

M.1 Introduction

- M.1.1 Construction and operational effects assessments at this site have not been undertaken so this appendix contains no supporting information.

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Appendix N: Development schedule

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Appendix N: Development schedule

N.1 Summary

N.1.1 The assessments undertaken for this site take account of other relevant development projects within the vicinity of the site which are under construction, permitted but not yet implemented or submitted but not yet determined. In order to identify the relevant developments for consideration, the Planning Inspectorate, local planning authorities and the Greater London Authority have been consulted on the methodology (see Volume 2) and asked to assist in identifying and verifying the development projects included in the assessment. A schedule is provided in Vol 27 Table N.1 of the resulting development projects, a description of what is proposed and assumptions on phasing. Longer term development projects may be included under both base case, with construction preceding that of the Thames Tideway Tunnel site, and cumulative with construction or operation occurring at the same time as a given Thames Tideway Tunnel site.

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Vol 27 Table N.1 Development schedule for minor works sites – Bekesbourne Street

Category types:

- a. Under construction
- b. Permitted but not yet implemented
- c. Submitted but not yet determined

Development within 1km (IPC or Mayoral referral unless otherwise noted)	Dist from site (closest point)	Development description			Category type (based on 'current' status)	Year specific assumptions		Source of assumption information / Notes	Base case or cumulative dev?
		Appl. No.	Developer	Description		2020 (Site Year 1 of construction & peak construction traffic year)	2023 (Year 1 of operation)		
Former land bounded by Schoolhouse Lane, Cable Street and Glasshouse Fields	Approx 360m west	PA/06/01809	Kier London	Erection of a part four / part 7 storey building to provide 198 residential units; 1865 sq.m of B1 floorspace; 220 sq.m of A1 floorspace; 31 car parking spaces; 118 cycle parking spaces and associated landscaping.	A	100% complete & operational	100% complete & operational	Application documents	Base case (all years)
Ocean Estate	Approx 500m north	PA/09/02584	East Homes	Redevelopment to provide for up to 819 Class C3 residential dwellings, and up to 1300 square metres of built floorspace for non-residential uses (Use Classes A1, A2, A3, and D1) with associated car parking, alterations to existing highway and landscape works in connection with the regeneration of the Ocean Estate	A	100% complete and operational	100% complete and operational	Application documents	Base case (all years)
John Bell House, King David Lane	Approx 1km west	PA/06/01759	Unite Group	Redevelopment to provide a 6-11 storey building comprising 132 bedroom student accommodation and landscaping.	A	100% complete & operational	100% complete & operational	Application documents	Base case (all years)

Note: phasing and site layout information has been sourced from local authority planning portals unless otherwise indicated.

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