Thames Tideway Tunnel
Thames Water Utilities Limited

Development Consent Order

Application Reference Number: WWO10001

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

Thames Tideway Tunnel

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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 assessment

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

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January 2013

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Thames Tideway Tunnel

Environmental Statement

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Volume 27: Minor work sites assessment

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Application for Development Consent

Application Reference Number: WWO10001

Environmental Statement

Doc Ref: **6.2.27**

Volume 27: Minor Works Sites assessment

Section 1: Introduction

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

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1 Introduction

1.1.1 This volume of the *Environmental Statement* of the Thames Tideway Tunnel project presents the results of the environmental impact assessment (EIA) of the proposed development at the Bekesbourne Street minor works site.

1.1.2 The proposal at this site is to control the existing Holloway Storm Relief combined sewer overflow (CSO), which currently discharges approximately eight times in a typical year. It would not be intercepted by the main tunnel but flows would be indirectly controlled by the works at this site. The total volume discharged is approximately 8,000m3 in a typical year.

1.1.1 The site and environmental context are described in Section 2. The proposed development, comprising both the construction and operational phases, is described in Section 3. Those elements of the proposal for which development consent is sought are described followed by a description of the assumptions applied to the assessment of construction and operational effects. Finally in Section 3.6, the main alternatives which have been considered for this site are presented.

1.1.2 Sections 4 to 15 present the environmental assessments for each topic, which are presented alphabetically. The order of these topics and the structure of each assessment remains the same across different sites.

1.1.3 Figures and appendices for this site are appended separately (Vol 27 Minor work sites figures and Vol 27 Minor work sites appendices). In addition, there is a separate glossary and abbreviations document which explains technical terms used within this assessment.

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2 Site context

2.1.1 The proposed development site is located in the London Borough (LB) of Tower Hamlets. It would comprise a section of Bekesbourne Street and its junction with Ratcliffe Lane. The site is defined by the limits of land to be acquired or used (LLAU) and covers an area of approximately 0.1 hectares. The site context and location is indicated in Vol 27 Figure 2.1.1 (see separate volume of figures).

2.1.2 The site is bounded to the north by Limehouse Docklands Light Railway (DLR) station, to the east and southeast by John Scurr House and community centre, and to the west and south by two to four storey housing. Vol 27 Plate 2.1.1 below provides an aerial view of the site.

Vol 27 Plate 2.1.1 Minor work sites – aerial photograph

2.1.3 The site is predominantly comprised of roadway with 2-6 storey residential dwellings and major roads surrounding the site. The general pattern of existing land uses within and around the site is shown in Vol 27 Figure 2.1.2 (see separate volume of figures).

2.1.4 Existing access to the site is via Ratcliffe Lane from the east and west. The closest railway station is Limehouse DLR Station, located immediately to the north of the site (see Vol 27 Plate 2.1.2).

Vol 27 Plate 2.1.2 Minor work sites − view from Bekesbourne Street

2.1.5 There are a number of receptors in close proximity to the site and these include residential, educational, commercial and recreational receptors as follows (approximate closest distance to the proposed main site hoarding is given):

a. residential:
   i John Scurr House 2m east (construction phase 2), 8m (phase 1)
   ii 8 Bekesbourne Street – adjacent to hoarding (phases 1 and 3), 5m (phase 2)

b. educational
   i Stephen Hawking School - 210m northeast

c. commercial
   i grocery station shop - 22m north

d. Recreational and other
   i St James's Gardens 32m south
   ii John Scurr Community Centre - 20m southwest (phase 1), 25m (phase 2).

2.1.6 Environmental designations for the site and immediate surrounds are shown in Vol 27 Figure 2.1.3 (see separate volume of figures).

2.1.7 The LB of Tower Hamlets has been designated an air quality management area (AQMA) declared for nitrogen dioxide (NO_2) and particulate matter (PM_{10}).

2.1.8 There are no designated sites for nature conservation and no Conservation Areas on or within 250m of the site.

2.1.9 The site does not contain any nationally designated (statutorily protected) heritage assets. The closest listed buildings to the site include a Grade II listed railway viaduct, located approximately 30m to the east of the site, and the grade II listed Royal Foundation of St. Katherine's Chapel located approximately 50m to the southwest of the site. Additionally, the northern end of the site, adjacent to Limehouse DLR Station, lies within the York Square Conservation Area. The site lies outside the LB of Tower Hamlets archaeological priority area.

2.1.10 There are no tree preservations orders (TPOs) in effect within or adjacent to the site and trees on the site are not protected indirectly by a Conservation Area designation.

2.1.11 The potential for ground contamination is considered to be low with the principal source of possible contamination being within the existing made ground. Local geology comprises Made Ground, Alluvium and River Terrace Deposits, overlaying London clay formation. Given the low potential for contamination and the limited extent of proposed excavations, land quality is not covered in detail within the assessment for this site.

2.1.12 The site lies within the low probability flood risk zone, Environment Agency's (EA) Flood Zone 1(less than 0.1% annual probability of fluvial/tidal flooding in any give year).

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Doc Ref: **6.2.27**

Volume 27: Minor Works Sites assessment

Section 3: Proposed development

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3 Proposed development

3.1 Overview

3.1.1 Bekesbourne Street is a minor works system modification site. The proposed development at Bekesbourne Street would seek to control the existing Holloway Storm Relief CSO but the CSO would not be intercepted by the main tunnel. A construction site on Bekesbourne Street would be used to construct a penstock and flap valve chamber to allow the introduction of a controlled gate within the sewer. Other than in exceptional circumstances when the residual flows would still spill to the river via the current outfall, the flows from the Holloway Storm Relief CSO would instead be diverted to the northern Low Level Sewer No.1 and transferred to Beckton STW for treatment

3.1.2 The geographic extent of the proposals for which development consent is sought, is defined by the LAU.

3.1.3 This section of the assessment provides a description of the proposed development. The defined project for which consent is sought is described in Section 3.2. In Section 3.3, assumptions are presented on how the development at this site is likely to be constructed and include the assumed programme and typical construction activities. Section 3.4 sets out operational assumptions in terms of operational structures and typical maintenance regime. These construction and operational assumptions underpin the assessment.

3.1.4 Other developments may become operational in advance of or during the Thames Tideway Tunnel project thereby changing the baseline conditions. In order to undertake an accurate assessment it is necessary to compare the predicted situation with the Thames Tideway Tunnel project in place with this future baseline conditions (‘base case’) (rather than comparing it with the current conditions). In addition, other developments may be under construction at the same time as construction or operation of the Thames Tideway Tunnel project and this could lead to cumulative effects. Information regarding schemes included in the base case and in the cumulative assessment is summarised in Section 3.5 with details included in an appendix. The methodology for identifying these schemes is explained in Volume 2 Section 3.8. Finally, Section 3.6 describes any on-site alternatives considered.

3.2 Defined project

3.2.1 This section identifies the proposals for which consent is sought and so those which can be regarded, subject to approval, as being ‘certain’ or nearly so (eg, indicative locations).

3.2.2 Vol 27 Table 3.2.1 below sets out documents and plans for which consent is sought and which have been assessed.

Vol 27 Table 3.2.1 Minor work sites − plans and documents defining the proposed development

Document /Plan Title	Status	Location
Proposed schedule of works	For approval	Schedule 1 of *The Draft Thames Water Utilities Limited (Thames Tideway Tunnel) Development Consent Order 201[ ] (Draft DCO)* (and extracts below)
Site works parameter plan	For approval	Vol 27 Minor work sites figures – Section 1
Demolition and site clearance plan	For approval	Vol 27 Minor work sites figures – Section 1
Access plan	For approval	Vol 27 Minor work sites figures – Section 1
Proposed landscape plan	Illustrative only – but scale of above ground structures indicative	Vol 27 Minor work sites figures – Section 1
Design Principles: Generic	For approval	*Design Principles* report Section 3 (see Vol 1 Appendix B)
Design Principles: Site Specific principles (Bekesbourne Street)	For approval	*Design Principles* report Section 4.24 (see Vol 1 Appendix B)
Code of Construction (CoCP) Practice Part A: General Requirements	For approval	*CoCP* Part A (see Vol 1 Appendix A)
Code of Construction Practice (CoCP) Part B: Site-specific Requirements (Bekesbourne Street)	For approval	*CoCP* Part B Bekesbourne Street (see Vol 1 Appendix A)

Description of the proposed works

3.2.3 Schedule 1 to the *Draft DCO* describes the proposed works for which development consent is sought. The schedule describes the main tunnel, connection tunnels and also the works which would be required at each of the proposed sites within the project. This includes the works comprising the nationally significant project (NSIP) and associated development (which are described in Part 1 of Schedule 1) and ancillary works (which are described in Part 2 of Schedule 1).

3.2.4 The following sections provide a description of the proposed works at this site under three headings: Nationally significant infrastructure project, Associated development and Ancillary works. The description of the proposed works has been taken from Schedule 1 to the *Draft DCO* and the codes given for the works are those given within that schedule.

3.2.5 In accordance with the *Draft DCO*, all distances, directions and lengths referred to are approximate. All distances for scheduled linear works referred to are measured along the centre line of the limit of deviation for that work. Internal diameters for tunnels and shafts are the approximate internal dimensions after the construction of a tunnel lining. Unless otherwise stated, depths are specified to invert level and are measured from the proposed final ground level.

Nationally significant infrastructure project

3.2.6 There are no NSIP elements at this site and all works would comprise either associated development or ancillary works.

Associated development

3.2.7 The proposed structures and works required at this site which comprise the associated development are as follows:

a. **Work No. 25:** Bekesbourne Street sewer modifications associated development – works to modify the existing sewer including a chamber with approximate internal dimensions of 4.6 metres by 5 metres and an approximate depth (to invert level) of 8 metres to allow introduction of hydraulic structures within the sewer, installation of an electrical and control kiosk and ventilation column including provision of ducts, including construction of pits, chambers, ducts and pipes for cables, hydraulic pipelines, utility connections, utility diversions and drainage, and temporary relocation of existing lamp posts and CCTV camera.

3.2.8 The maximum heights of above-ground structures, which are for approval, and shown on the Site works parameter plan (see separate volume of figures – Section 1) are as follows:

a. ventilation column(s) = 6m

b. electrical and control kiosk(s) = 2.5m

3.2.9 In addition, further works are required at this site that constitute associated development within the meaning of section 115(2) of the Act. These comprise:

a. establishment of temporary construction areas at each works site to include, as necessary, site hoardings/means of enclosure, demolition (including of existing walls, fences, planters, and other buildings and other above and below ground structures), provision of services, including telecommunications, water and power supplies (including substations) including means of enclosure, and ground preparation works including land remediation and groundwater de-watering

b. provision of welfare/office accommodation, workshops and stores, storage and handling areas, facilities for and equipment for processing of excavated materials, treatment enclosures and other temporary

facilities, plant, cranes, machinery, temporary bridges and accesses, and any other temporary works required

c. in connection with Work Nos. 5, 6, [8] , 11, 12, 13, 14, 15, 16, 17, 19, [23], 24 [and 26] the provision of temporary moorings (including dolphins) and other equipment and facilities for temporary use by barges, pontoons and other floating structures and apparatus (including as necessary piling for support of such structures) for use in construction of those works, and works for the strengthening of river walls and other flood protection defences

d. temporary removal of coach and car parking bays and creation of temporary replacement coach and car-parking as required and temporary footpath diversions

e. restoration of temporary construction areas, works to restore and make safe temporary work sites and work areas, including (as necessary) removal of hardstanding areas, temporary structures and other temporary works and works to re-establish original ground levels

f. works to trees

g. works to create temporary or permanent landscaping, including drainage and flood compensation, means of enclosure, and reinstatement / replacement of, or construction of, boundary walls and fences including gates

h. formation of construction vehicle accesses and provision of temporary gated or other site accesses and other works to streets

i. diversions (both temporary and permanent) of existing traffic and pedestrian access routes and subsequent reinstatement of existing routes, and works to create permissive rights of way

j. modifications of existing accesses, railings and pedestrian accesses

k. provision of construction traffic signage

l. relocation of existing bus stops and provision of temporary bus lay-bys

m. construction of new permanent moorings and piers, including access brows, bank seats, gangways and means of access

n. permanent and temporary works for the benefit or protection of land or structures affected by the authorised project (including protective works to buildings and other structures, and works for the monitoring of buildings and structures)

o. temporary landing places, moorings or other means of accommodating vessels in the construction and/or maintenance of the authorised project

p. provision of buoys, beacons, fenders and other navigational warning or ship impact protection works

q. such other works as may be necessary or expedient for the purposes of or in connection with the construction of the authorised project which do not give rise to any materially new or materially different

environmental effects from those assessed in the Environmental Statement.

3.2.10 The works defined by bullet c, k, l and m (in the list above) are not considered likely to be applicable to the works proposed at this site.

Ancillary Works

3.2.11 These works are not “development” as defined in section 32 of the Planning Act 2008, they do however form part of the Thames Tideway Tunnel project for which development consent will be sought and are included within Schedule 1 to the *Draft DCO*.

3.2.12 The following ancillary works, are set out in Schedule 1 to the *Draft DCO*:

a. works within the existing sewers, chambers and culverts and other structures that comprise the existing sewerage network for the purposes of enabling the authorised project, including reconfiguring, modifying, altering, repairing, strengthening or reinstating the existing network

b. works within existing pumping stations including structural alterations to the interior fabric of the pumping station(s), works to reconfigure existing pipework, provision of new pipework, new penstock valves and associated equipment, modification of existing electrical, mechanical and control equipment, and installation or provision of new electrical, mechanical and control equipment

c. installation of electrical, mechanical and control equipment in other buildings and kiosks and modification to existing electrical, mechanical and control equipment in such buildings and kiosks

d. installation of pumps in chambers and buildings

e. works to trees and landscaping works not comprising development

f. works associated with monitoring of buildings and structures

g. provision of construction traffic signage

h. the relocation of boats/vessels.

3.2.13 The works defined by bullets b and c are not considered likely to be applicable to the works proposed at this site.

Design principles

3.2.14 The design principles for the project have been developed with stakeholders and set the parameters that must be met in the final detailed design of the above-ground structures and spaces associated with the project. The principles apply only to the operational phase of the project (ie, the permanent structures)

3.2.15 The generic principles include principles for the integration of functional components and also principles for heritage, in-river structures, landscape, lighting and site drainage.

3.2.16 The design principles form an integral part of the project and are assumed to be implemented within the design of the operational development.

Where individual principles are relevant to a particular topic, this is indicated within the relevant assessments.

3.2.17 The *Design Principles* report is provided in Vol 1 Appendix B.

Site features and landscaping

3.2.18 The above-ground structures are shown at indicative scale on the Proposed site features plan (see separate volume of figures – Section 1) and the scales of these structures (in addition to the defined heights) have been considered within the assessments as appropriate. All other features on the plan, other than those which are otherwise captured in the design principles are illustrative only and have not been assessed. The possible locations of these above-ground structures are defined by the zones on the Site works parameter plan.

3.2.19 All other features on the Site features plan (see separate volume of figures – Section 1) are illustrative only and have not been assessed. There are no other landscaping proposals, other than those captured by the design principles, either for approval or indicative, for this site.

Code of Construction Practice

3.2.20 All works would be undertaken in accordance with the *Code of Construction Practice (CoCP).* The *CoCP* sets out a series of measures to protect the environment and limit disturbance from construction activities as far as reasonably practicable. These measures would be applied throughout the construction process at this site, and would be the responsibility of the contractor to implement. The *CoCP* is provided in Vol 1 Appendix A and comprises two parts, Part A and Part B. Part A presents measures which are applicable at all sites across the project and Part B defines measures which are only applicable at individual sites.

3.2.21 The *CoCP* forms an integral part of the project and all of the measures contained therein are assumed to be in place during the construction process described in Section 3.2 below. The measures are not described within the Section 3.2 although further details on the measures within the CoCP Part B Bekesbourne Street are given within the relevant assessments.

3.3 Construction assumptions

3.3.1 This section describes the approach to construction which has been assumed for the purposes of the EIA. The construction programme, layouts and working methods are illustrative and do not form part of the project for which consent is sought.

3.3.2 Although the programme, layouts and working methods described are illustrative, they represent what is considered to be the likely approach, given the existing site constraints, the adjacent land uses and the construction requirements. This section describes the main activities with the focus on those that are relevant for the assessment of environmental effects.

3.3.3 The assumed construction programme is described first, followed by a description of typical construction activities.

3.3.4 It is also assumed that, where the appropriate powers do not form part of the Development Consent Order, further consents may be required before certain construction activities are progressed.

Assumed construction programme and working hours

3.3.5 Construction at this site would be likely to commence in 2019 and continue into 2020 and would take approximately seven months. As the site would not be connected to the main tunnel the works could in theory be operational immediately but in reality this would depend on the available capacity in the northern Low Level Sewer No.1 and this in turn may depend on upstream interceptions of other flows by the Thames Tideway Tunnel project. For this reason, it is assumed that the works at this site would only become fully operational in 2023 when the Thames Tideway Tunnel project as a whole becomes operational.

3.3.6 This site would operate to the standard working hours for all phases and activities as set out in the *CoCP* Part A and B (Section 4).

Typical construction activities

3.3.7 Vol 27 Table 3.3.1 identifies the construction phasing plans used for the assessment of construction effects. These plans have been prepared to illustrate possible site layouts for the principal construction phases and relevant activities:

Vol 27 Table 3.3.1 Minor work sites − construction phase plans

Plan title	Activities	Status	Location
Construction phases – phase 1	Secant piling	Illustrative	Vol 27 Minor Works Sites figures – Section 1
Construction phases – phase 2	Secant piling and chamber construction	Illustrative	Vol 27 Minor Works Sites figures – Section 1
Construction phases – phase 3	Kiosk construction	Illustrative	Vol 27 Minor Works Sites figures – Section 1

3.3.8 The methods, order and timing of the construction work outlined herewith are illustrative, but representative of a practical method to construct the works and suitable upon which to base the assessment.

3.3.9 The following construction activities are described:

a. site setup

b. secant piling and chamber construction

c. electrical and control kiosk construction

d. completion of works and site restoration.

e. excavated materials and waste

f. access and movement.

Site setup

3.3.10 Eight trees along Bekesbourne Street would require removal in advance of the works. Also some existing CCTV installations and lampposts would need to be temporarily relocated for the period of the works.

3.3.11 Prior to any works commencing, the site boundary would be established and would consist of close boarded hoarding panels to the heights specified in the *CoCP* Part B Bekesbourne Street Section 4. Welfare and office facilities would also be set up with utility and power connections installed.

3.3.12 The extent of demolition and site clearance works are shown on the Demolition and site clearance plans (see separate volume of figures – Section 1). It is not anticipated that any land remediation would be required at this site.

3.3.13 Parking bays on both sides of Bekesbourne Street would be suspended for the duration of the works and bollards removed.

3.3.14 There are a large number of services within the carriageway of Bekesbourne Street that would require diversion prior to shaft construction. The bulk of the utilities including gas and water, together with an approximately 300mm diameter foul water sewer would be diverted as necessary. The diversion of the sewer would require approximately 5m deep excavations within sheet piled excavations and / or micro tunnelling techniques. Cable TV and LV power services would also be diverted.

3.3.15 On completion of the utility diversions the road would be realigned and traffic management instigated as shown on the construction phase plans.

3.3.16 Prior to piling works, internal strengthening would be undertaken to the existing sewer.

Secant piling and chamber construction

3.3.17 Once the site has been set up as described above, the main construction would commence.

3.3.18 It is assumed that the penstock and flap valve chamber would be constructed as an in situ concrete chamber within a secant piled excavation. This would allow the structure to be constructed in two phases with the carriageway being realigned halfway through the works.

3.3.19 The road surface would be broken out and the ground excavated for the guide walls to a depth of approximately 1.5m. The secant piles would then be excavated and installed in two phases.

3.3.20 When all the piled walls had been completed (under the second phase of traffic management) excavation would commence.

3.3.21 The material will be excavated and the material loaded direct to a road skip. Works would be undertaken using tracked excavator with a long reach arm.

3.3.22 A capping beam may be cast to tie the top of the secant piles or an internal waling would be installed. During the excavation phase additional internal temporary walings and struts would be installed ensuring that the toes of the piles above the sewer are restrained.

3.3.23 Excavation would proceed and the top of the sewer would be broken out as work proceeds. Temporary ground support would be provided to the exposed ground around the sewer. Works would be undertaken with a small excavator in the shaft or by hand, supported by an attendant crane at the surface.

3.3.24 Once fully excavated, the base concrete would be cast using a crane and a skip, followed by concreting of the chamber walls and internal structure.

3.3.25 The penstock and flap valves would be installed by crane followed by intermediate landings and ladder ways.

3.3.26 The top of the shaft would then be removed down to cover slab level and the reinforced concrete roof slab would be constructed in situ. Manholes would then be built up to ground level and the road reinstated.

3.3.27 During construction phase 2, those parts of the ventilation duct within the construction compound would be installed.

Electrical and control kiosk construction

3.3.28 Once the main underground structures have been completed, the main construction compound would be removed and Bekesbourne Street would be reopened to traffic.

3.3.29 The control kiosk and adjacent sections of ducts would then be constructed within a temporary open mesh fence compound in the area of parking spaces on the west side of Bekesbourne Street as part of a third construction phase.

3.3.30 A cast in situ concrete base would be prepared and then the kiosk components would be delivered by road and assembled on site using suitable lifting equipment.

3.3.31 The remaining sections of ventilation duct and ventilation column would be constructed within open mesh compounds in Bekesbourne Street and Ratcliffe Lane.

Completion of works and site restoration

3.3.32 On completion of the construction works the permanent works area would be finished in accordance with the landscaping requirements (see Section 3.2).

Excavated materials and waste

3.3.33 The construction activities described above would generate excavated material which would require removal. This is estimated at 700 tonnes, the main elements of which would comprise approximately 400 tonnes from the site strip, 150 tonnes of made ground and 150 tonnes of London Clay.

3.3.34 In addition, it is estimated that approximately 20 tonnes of construction waste would be generated over the seven month construction period.

3.3.35 Excavated materials and construction wastes would be exported from the site in accordance with the *Transport Strategy* which accompanies the application for development consent (the 'application') (see Access and movement below).

Access and movement

3.3.36 For the purposes of the assessment a single trip to or from the site is referred to as a 'movement', while two trips, one to and one from the site, are referred to as a 'lorry'.

3.3.37 Peak vehicle movements would be associated with specific site activities. The highest lorry movements at the site would occur during excavation for the underground chambers. The daily vehicle movements at this time, averaged over a one month period, would be five lorries, equivalent to ten movements per day. It is estimated that total vehicle numbers for this site would be in the order of 344 HGV lorries, equivalent to 688 movements over the construction period.

3.3.38 A Traffic management plan would be developed for the site, produced, coordinated and implemented by the contractor.

3.3.39 A *Draft Project Framework Travel Plan*, which accompanies the application, has been produced setting out the requirements and guidelines for the site-specific *Travel plans* to be developed by the contractor.

3.4 Operational assumptions

3.4.1 This section provides details of the assumptions which have been made for the operational phase for the purposes of the EIA. Unless otherwise also listed in Section 3.2, the details given are illustrative and do not form part of the project for which consent is sought.

3.4.2 The details given are considered to represent the likely approach, given the site constraints, the adjacent land uses and the operational requirements. This section describes only the main operational structures and activities with the focus on those that are relevant for the assessment of environmental effects.

3.4.3 The operational structures are described first, followed by the assumed maintenance regime.

3.4.4 Once developed the works would divert the combined sewage discharges from the Holloway Storm Relief Sewer into the northern Low Level Sewer

No.1 via an existing connection and then on to treatment at Beckton Sewage Treatment Works. The proposed chamber in Bekesbourne Street would house a weir, penstock and flap valve in order to divert flows from the Holloway Storm Relief Sewer and reduce spills to the river. The number of CSO discharges would be reduced from eight spill events to approximately two per typical year with an approximate total volume of 7,000m^3.

Operational structures

3.4.5 For the purposes of the application, each of the main operational structures is shown as being located within a defined zone, in which the structure would be located. The operational structures listed within the proposed schedule of work description in Section 3.2 along with the relevant plans, form part of the scheme for consent. The defined zones for the structures are shown on the Site works parameter plan (see separate volume of figures – Section 1).

3.4.6 The heights of the main ventilation columns are defined and also form part of the project for consent (see Section 3.2). The following text provides additional clarification on the assumed form, purpose, function and working of these structures where this is considered helpful to the reader.

3.4.7 The assessment for each of the environmental topics has been based on the most appropriate dimensions and siting of the structures to ensure the assessment is robust. For example, at some sites (although not this site), the lower height for the ventilation column would typically generate higher odour impacts than a higher height and so the lower height limit has been modelled in the assessment. For other topics such as townscape, the upper height may be more important and has been assessed. The approach that has been adopted in this regard is explained within each topic assessment section, where necessary.

3.4.8 The approximate dimensions provided for underground structures are internal dimensions which are determined by the hydraulic requirements at particular sites.

3.4.9 Once constructed and operational the structures listed in the following sections would remain on site.

Penstock and flap valve chamber

3.4.10 The penstock and flap valve chamber would be a below ground flow control chamber constructed on the line of the Holloway Storm Relief Sewer. The chamber would be approximately 5m by 4.6m by 8m deep and would house the weir, penstock and flap valve. There would be a number of access covers at ground level to allow access for inspection and maintenance. The larger covers would be used for the installation and removal of the penstock gates and flap valves.

Air management structures

3.4.11 The heights and locations of above ground air management structures, which comprise the ventilation column (or columns), are defined in Section 3.2. There would be no other additional small diameter vent columns at this site as there would be no interception chamber.

3.4.12 The ventilation column would be connected to the penstock and flap valve chamber via a ventilation duct.

Electrical and control kiosk

3.4.13 The height and location of the above ground electrical and control kiosk are defined in Section 3.2. The electrical and control kiosk would contain gas monitors, electrical and control panels and metering equipment.

Permanent restoration and landscaping

3.4.14 Once the works described above have been completed the site would be reinstated in accordance with the Proposed landscape plan (see separate volume of figures – Section 1).

Typical maintenance regime

3.4.15 A light commercial vehicle would undertake three to six monthly maintenance works. This would be carried out during normal working hours and would take approximately half a day. There would be no aerial lighting. Additionally, once every ten years, more significant maintenance work would be carried out. This would also be carried out in normal working hours. Vehicular requirements for these visits could include mobile cranes and associated support vehicles and equipment.

3.5 Base case and cumulative development

3.5.1 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, Greater London Authority and Transport for London 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 Appendix N 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.

3.5.2 The development projects which have been included under base case, cumulative or both for the assessment of the proposed development at Bekesbourne Street are listed below:

a. Former land bounded by Schoolhouse Lane, Cable Street and Glasshouse Fields

b. Ocean Estate

c. John Bell House, King David Lane.

3.6 On site alternatives

3.6.1 Project-wide and site selection alternatives are addressed in Volume 1 section 3. This section describes on-site alternatives that have been considered and provides the main reasons why these alternatives (to the proposed approach) have not been adopted.

3.6.2 Vol 27 Table 3.6.1 Minor work sites – on-site alternatives below identifies those items for which alternatives have been considered, the alternatives and provides the main reasons why the alternatives were not taken forward.

Vol 27 Table 3.6.1 Minor work sites – on-site alternatives

Item	Alternatives considered	Main reasons that the alternative (given left) was not progressed
Kiosk location	Land adjacent to the DLR	• To avoid conflict with an approved planning application in the vicinity. This change would result in a smaller site footprint.
Site layout	Two discrete construction sites	• A single site large enough to enable utilities to be diverted and to include the ventilation duct is preferable
Ventilation column	No ventilation column	• A ventilation column is required to meet technical requirements

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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 assessment

Section 4: Air quality and odour

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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

Section 4: Air quality and odour

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4 Air quality and odour

4.1 Introduction

4.1.1 This section presents the findings of the assessment of the likely significant air quality and odour effects of the proposed development at the Bekesbourne Street site. The project-wide air quality effects are described in Volume 3 Project-wide effects assessment.

4.1.2 The proposed development has the potential to affect air quality due to:

a. construction traffic on the roads leading to an increase in vehicle emissions (air quality)

b. emissions from construction plant (air quality)

c. construction-generated dust (air quality).

4.1.3 Each of these impacts is considered within the assessment. As a result the construction assessment for Bekesbourne Street site comprises three separate components: effects on local air quality from construction road traffic; effects on local air quality from construction plant; and effects from construction dust. The effects on local air quality from construction road traffic and construction plant are assessed together (within the same model) while construction dust is assessed separately. As set out in the *Scoping Report*, local air quality effects are not assessed during operation on the basis that the only relevant operational source of air pollutants would be from the infrequent visits of maintenance vehicles which would not result in a likely significant effect. For the Bekesbourne Street site, although a ventilation column is proposed it will not be connected to the main Thames Tideway Tunnel, so there would be no odour effects associated with the main tunnel during operation. Operational effects are not therefore assessed for this site given that the effects from the existing sewerage network will be minimal.

4.1.4 The assessment of air quality and odour presented in this section has considered the requirements of the National Policy Statement for Waste Water Sections 4.3 (odour), 4.11 (air quality and emissions) and 4.12 (dust). Further details of these requirements can be found in Volume 2 Environmental assessment methodology Section 4.3.

4.1.5 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume Minor work sites Figures). Appendices supporting this site assessment are contained in Vol 27 Appendix B.

4.2 Proposed development relevant to air quality

4.2.1 The proposed development is described in Section 3 of this volume. The elements of the proposed development relevant to air quality are set out below.

Construction

Construction road traffic

4.2.2 During the proposed construction period there would be construction traffic movements in and out of the site.

4.2.3 The highest number of lorry movements[i] in any one year at the Bekesbourne Street site would occur during preliminary site works (Site Year 1 of construction). The average daily number of vehicle movements during the peak month would be approximately ten movements per day.

4.2.4 The construction traffic routes, traffic management and access to the site are detailed in Section 12 Transport.

4.2.5 Construction traffic is likely to affect local air quality as a result of increasing traffic and therefore emissions on the road network.

Construction plant

4.2.6 Construction plant is likely to affect local air quality from direct exhaust emissions associated with the use and movement of the plant around the site.

4.2.7 There are a number of items of plant to be used on site that may produce emissions that could affect local air quality. Examples of such plant are excavators, generators and dumper trucks.

4.2.8 Typical construction plant which would to be used at the Bekesbourne Street site in the peak construction year and associated emissions data are presented in Vol 27 Appendix B.3.

Construction dust

4.2.9 Activities with the potential to give rise to dust emissions from the proposed development during construction are as follows:

a. site preparation and establishment

b. materials handling and earthworks

c. construction traffic – from moving over unpaved ground and then tracking out mud and dirt onto the public highway (termed 'trackout' hereafter).

4.2.10 At the Bekesbourne Street site there would be no demolition material generated while the amount of material moved during the earthworks would be approximately 680 tonnes. The volume of building material used during construction would be approximately 140m^3.

Code of construction practice

4.2.11 Appropriate dust and emission control measures are included in the *Code of Construction Practice* (*CoCP*)[ii] Part A (Section 7) in accordance with the

[i] A movement is a construction vehicle moving either to or from the site.

[ii] The Code of Construction Practice (*CoCP*) is provided in Vol 1 Appendix A. It contains general requirements (Part A), and site specific requirements for this site (Part B).

London Councils Best Practice Guidance (Greater London Authority and London Councils, 2006)[1]. Measures incorporated into the *CoCP* (Section 7) to reduce air quality impacts include measures in relation to vehicle and plant emissions, measures to reduce dust formation and re-suspension, measures to control dust present and measures to reduce particulate emissions. These would be observed across all construction activities at the Bekesbourne Street site.

4.2.12 The effective implementation of the *CoCP* Part A (Section 7) measures is assumed within the assessment.

4.3 Assessment methodology

Engagement

4.3.1 Vol 2 Section 4.2 documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. Specific comments relevant to this site for the assessment of air quality and odour are presented here (Vol 27 Table 4.3.1).

4.3.2 The *Scoping Report* was prepared before the Bekesbourne Street site had been identified as a preferred site. The scope for the assessment of air quality and odour at this site has therefore drawn on the scoping response from London Borough (LB) of Tower Hamlets and is based on professional judgement as well as experience of similar sites.

Vol 27 Table 4.3.1 Air quality – stakeholder engagement

Organisation	Comment	Response
LB of Tower Hamlets, May 2012	Agree air quality monitoring locations with LB of Tower Hamlets	Locations agreed with LB of Tower Hamlets Air Quality Officer

Baseline

4.3.3 The baseline methodology follows the methodology described in Vol 2 Section 4. There are no site specific variations for identifying baseline conditions for this site.

Construction

4.3.4 The assessment methodology for the construction phase follows that described in Vol 2 Section 4. There are no site specific variations for undertaking the construction assessment of this site.

4.3.5 Section 4.5 details the likely significant effects arising from the construction at the Bekesbourne Street site. There are no other Thames Tideway Tunnel project sites which could elevate construction dust nuisance effects within the assessment area (see para. 4.3.6 below). With regard to local air quality, the effect of all relevant traffic associated with Thames Tideway Tunnel project sites using the highway network in the vicinity of the site is taken into account in the assessment as traffic data used for the assessment includes traffic associated with all Thames Tideway Tunnel sites.

Construction assessment area

4.3.6 The assessment area for the local air quality assessment during construction covers a square area of 600m by 600m centred on the Bekesbourne Street site. This assessment area has been used for the assessment of road transport, construction plant and construction dust and has been selected on the basis of professional judgement to ensure that the effects of the Bekesbourne Street site are fully assessed. A distance of 200m is generally considered sufficient (Highways Agency, 2007)[2] to ensure that any significant effects are considered. The selected assessment area exceeds this considerably.

Construction assessment year

4.3.7 The peak construction year in terms of construction traffic movements (Site Year 1 of construction) has been used as the year of assessment for construction effects (effects from construction road transport, construction plant and construction dust) in which the development case (with the Thames Tideway Tunnel project) has been assessed against the base case (without the Thames Tideway Tunnel project) to identify likely significant effects for the Thames Tideway Tunnel project.

4.3.8 The assessment of construction effects also considers the extent to which the effects on local air quality would be likely to be materially different should the programme for the Thames Tideway Tunnel project be delayed by approximately one year.

Other developments

4.3.9 As indicated in the site development schedule (see Vol 27 Appendix N), there are no other new developments requiring consideration identified within the construction air quality assessment area for the Bekesbourne Street site.

Assumptions and limitations

Assumptions

4.3.10 The general assumptions associated with this assessment are presented in Vol 2 Section 4.

Construction

4.3.11 The site specific assumptions in terms of model inputs for the local air quality dispersion modelling are set out in Vol 27 Appendix B.1. There are no assumptions specific to the assessment of this site.

Limitations

4.3.12 The general limitations associated with this assessment are presented in Vol 2 Section 4.

Construction

4.3.13 As there are no roadside PM_{10} monitoring sites located within the vicinity of the Bekesbourne Street site, it has not been possible to verify PM_{10} modelling results using the monitoring from this site. The adjustment

factor derived for NO_X (from a comparison of modelled and monitored NO_X data) has therefore been applied to the PM_{10} modelling results.

4.4 Baseline conditions

4.4.1 The following section sets out the baseline conditions for air quality within and around the site. Future baseline conditions (base case) are also described.

Current baseline

Local air quality

4.4.2 The current conditions with regard to local air quality are best established through long-term air quality monitoring.

4.4.3 As part of their duties under Part IV of the Environment Act 1995 (UK Government, 1995)[3], local authorities, especially in urban areas where air quality is a significant issue, undertake long-term air quality monitoring within their administrative areas.

4.4.4 There is no continuous NO_2 or PM_{10} monitoring undertaken in the vicinity of the site. The closest continuous monitoring site (Poplar (TH1)) is an urban background site measuring both pollutants that is 1.4km from the site.

4.4.5 Five sites from the LB of Tower Hamlets NO_2 diffusion tube survey collect data pertinent to the Bekesbourne Street site and associated construction traffic routes. The location of these is shown in Vol 27 Figure 4.4.1 (see separate volume of figures). Monitoring data for these sites for the period 2007-2011 are contained in Vol 27 Table 4.4.1 (NO_2 concentrations) and Vol 27 Table 4.4.2 (PM_{10} concentrations).

Vol 27 Table 4.4.1 Air quality – measured NO_2 concentrations

Monitoring site	Site type	Annual mean (µg/m^3)					Number of exceedances of hourly standard				
		2011	2010	2009	2008	2007	2011	2010	2009	2008	2007
Continuous monitoring site											
Poplar (TH1)	Urban background	34*	37**	36	38	37	0	NM	0	0	8
Diffusion tube monitoring sites											
Narrow Street (TH35)	Roadside	NM	**150**	**168**	**144**	**163**	NM				
Brodlove Lane (TH23)	Roadside	NM	**49**	**64**	**49**	**60**	NM				
Pitsea Street (TH34)	Roadside	NM	NM	NM	**52**	**60**	NM				
Wapping Wall (TH22)	Roadside	NM	**42**	**51**	**41**	**49**	NM				
Dellow Street (TH20)	Roadside	NM	**70**	**98**	**78**	**81**	NM				

** Note: NM indicates not measured. * Data capture 80%. ** Data capture 66%. Emboldened figures indicate an exceedance of the objective / limit value which is 40µg/m^3 for the annual mean. Codes in brackets represent monitoring site identifiers used in Vol 27 Figure 4.4.1 (see separate volume of figures).*

Vol 27 Table 4.4.2 Air quality - measured PM_{10} concentrations

Monitoring site	Site type	Annual mean (µg/m^3)					Number of exceedances of daily standard				
		2011	2010	2009	2008	2007	2011	2010	2009	2008	2007
Poplar (TH1)	Urban background	23	22	22	23	23	18	6	7	15	19

Note: Codes in brackets represent monitoring site identifiers used in Vol 27 Figure 4.4.1 (see separate volume of figures).

4.4.6 The monitoring data at these sites show that the annual mean NO_2 objective / limit value (40µg/m^3) has been exceeded for all of the roadside sites during the years in which monitoring was undertaken. No exceedances of the annual mean or hourly objectives were measured at the urban background site at Poplar in the last five years.

4.4.7 The PM_{10} monitoring indicates that the annual mean objective / limit value (40µg/m^3) or the daily objective / limit value (more than 35 exceedances of the daily standard) was not exceeded at the urban background site in any of the years.

4.4.8 As a result of previous exceedances of air quality objectives, the LB of Tower Hamlets has declared the whole Borough an AQMA for both NO_2 and PM_{10}.

4.4.9 In addition to the local authority monitoring, diffusion tube monitoring has been undertaken as part of the environmental impact assessment (EIA) to monitor NO_2 concentrations in the vicinity of the King Edward Memorial Park Foreshore site which is close to the Bekesbourne Street site. This monitoring comprises six diffusion tubes based at the locations identified in Vol 27 Table 4.4.3. The table shows a 2010 annual mean concentration (baseline year), which has been calculated from the measurements made between April 2011 and April 2012 at each of the sites. To calculate the 2010 annual mean NO_2 concentrations, the 2011/12 measurements are adjusted for bias using the co-located diffusion tubes and are then seasonally adjusted. Annual mean NO_2 concentrations, for the period covered by the diffusion tubes, and for the year 2010 have been collated from four nearby background continuous monitoring sites measuring NO_2 and with data capture rates greater than 90%. The average of the ratios between the period and annual means has been used to calculate the seasonal adjustment factor. To enable any bias to be corrected a triplicate site (comprising three diffusion tubes) was established at a continuous monitoring site in Putney (site PEFM4 – see Vol 7); for additional precision, a triplicate site was established at one of the monitoring sites (KEMM2); otherwise all the monitoring locations have single tubes.

Vol 27 Table 4.4.3 Air quality – additional monitoring locations

Monitoring site	Grid reference	Site type	2010 NO_2 annual mean (µg/m^3)
A1203 The Highway (KEMM1)	535403, 180774	Roadside	**90.9**
A1203 The Highway (KEMM2)	535638, 180797	Kerbside	**105.6**
A1203 The Highway/Butcher Row (KEMM3)	535956, 180870	Roadside	**120.9**
A126 Butcher Row (KEMM4)	535957, 181018	Kerbside	**83.5**

Monitoring site	Grid reference	Site type	2010 NO_2 annual mean ($\mu g/m^3$)
A13 Commercial Road (KEMM5)	535923, 181158	Kerbside	**96.0**
A13 Commercial Road/Yorkshire Road (KEMM6)	536109, 181123	Roadside	**91.1**

Note: Emboldened figures indicate an exceedance of the objective / limit value which is 40µg/m³ for the annual mean.

4.4.10 All six sites recorded concentrations above the NO_2 annual mean standard of 40µg/m³. The concentrations recorded during the monitoring are similar to those recorded during local authority monitoring at roadside sites and are typical of the high levels in London.

4.4.11 This monitoring has been used in conjunction with existing LB of Tower Hamlets monitoring to define the baseline situation and also to provide input to model verification[iii].

4.4.12 In addition to monitoring data, an indication of baseline pollutant concentrations in the vicinity of the site has been obtained from the background data on the air quality section of the Defra website (Defra, 2012)[4]. Mapped background pollutant concentrations are available for each 1km by 1km grid square within every local authority's administrative area for the years 2008 to 2020. The background data relating to the Bekesbourne Street site are given in Vol 27 Table 4.4.4 for 2010 (baseline year).

Vol 27 Table 4.4.4 Air quality – 2010 background pollutant concentrations

Pollutant*	2010
NO_2 ($\mu g/m^3$)	42.9
PM_{10} ($\mu g/m^3$)	23.2

** Annual mean for 1km grid square centred on 536500, 181500.*

Receptors

4.4.13 As set out in Section 4.1 and Vol 2 Section 4, the air quality assessment involves the selection of appropriate receptors, which are shown in Vol 27 Figure 4.4.2 (see separate volume of figures) and the table below (Vol 27 Table 4.4.5) for the Bekesbourne Street site. All of these receptors are relevant, albeit with different levels of sensitivity to each of the elements of

[iii] Model verification refers to checks that are carried out on model performance at a local level. This basically involves the comparison of predicted (modelled) versus measured concentrations. Where there is a disparity between the predicted and the measured concentrations, the first step should always be to check the input data and model parameters in order to minimise the errors. If required, the second step would be to determine an appropriate adjustment factor that can be applied to the modelled traffic contribution.

the air quality assessment. The sensitivity of identified receptors has been determined using the criteria detailed in Vol 2 Section 4.

Vol 27 Table 4.4.5 Air quality – receptors

Receptors (relating to all identified emissions sources)	Approximate distance of modelled receptor from site boundary and direction from site	Receptor sensitivity	
		Air quality (construction traffic/plant)	Construction dust (on-site demolition and construction processes)
Residential - John Scurr House (OWSR3)	Adjacent	High (exposure relevant to annual mean, daily mean and hourly mean standards)	Medium
Residential - 8 Bekesbourne Street (OWSR5)	Adjacent	High (exposure relevant to annual mean, daily mean and hourly mean standards)	Medium
Residential - 1-11 Bekesbourne Street (OWSR6)	Adjacent	High (exposure relevant to annual mean, daily mean and hourly mean standards)	Medium
Residential - 10-14 Bekesbourne Street (OWSR7)	Adjacent	High (exposure relevant to annual mean, daily mean and hourly mean standards)	Medium
Residential - 12 Ratcliffe Lane (OWSR1)	5m west	High (exposure relevant to annual mean, daily mean and hourly mean standards).	Medium
Educational - Stephen Hawking School (building) (OWSR9)	210m northeast	High (exposure relevant to annual mean, daily mean and hourly mean standards)	Medium
Commercial - Grocery Shop (OWSR2)	22m north	Low (exposure relevant to hourly mean standards)	Medium
Community - John Scurr Community Centre (OWSR4)	20m southwest	Medium (exposure relevant to daily mean and hourly mean standards)	Medium
Recreational - St James's Gardens (OWSR8)	32m south	Medium (exposure relevant to hourly mean standards)	Medium

Construction base case

4.4.14 The base case conditions for the construction assessment year would be expected to change from the baseline conditions due to modifications to the sources of the air pollution in the intervening period.

4.4.15 For road vehicles, there would be an increase in the penetration of new Euro emissions standards (Defra, 2012)[5] to the London vehicle fleet between the current situation and Site Year 1 of construction. Euro standards define the acceptable exhaust emission limits for new vehicles sold in the EU. These standards are defined through a series of European Union directives staging the progressive introduction of increasingly stringent standards over time. The uptake of newer vehicles with improved emission controls should lead to a reduction in NO_2 and PM_{10} concentrations over time. These changes in fleet composition and the emissions are covered in this assessment.

4.4.16 Other emissions sources should also reduce due to local and national policies. Therefore, the non-road sources of the background concentrations used in the modelling will be reduced in line with Defra guidance LAQM.TG(09) (Defra, 2009)[6]. Background pollutant concentrations for Site Year 1 of construction (peak construction year) used in the modelling are shown in Vol 27 Table 4.4.6.

4.4.17 The background NO_2 and PM_{10} concentrations have been derived from the Defra mapped background data4 as there are no suitable monitors within the relevant assessment area.

Vol 27 Table 4.4.6 Air quality – annual mean background pollutant concentrations

Pollutant	Baseline (2010)	Peak construction year (Site Year 1 of construction)
NO_2 (µg/m^3)*	38.8	25.9
PM_{10} (µg/m^3)*	22.9	20.6

** Annual mean for 1km grid square centred on 536500, 181500. Adjusted to ensure local A roads are not double counted.*

4.5 Construction effects assessment

Local air quality assessment

4.5.1 Construction effects on local air quality (comprising emissions from construction road traffic and construction plant) have been assessed following the modelling methodology set out in Vol 2 Section 4. This involves predicting NO_2 and PM_{10} concentrations in the baseline year (2010), and in the peak construction year (Site Year 1 of construction) without the proposed development (base case) and with the proposed development (development case). Predicted pollutant concentrations for the base case and development case can then be compared to determine the air quality impacts associated with the project and considering these in

the context of statutory air quality objectives/limit values to determine the significance of effects at specified receptors (listed in Vol 27 Table 4.4.5).

4.5.2 The assessment has focussed on NO_2 and PM_{10} concentrations as these are the only pollutants whose air quality standards may be exceeded. From professional experience, emissions of other pollutants (eg, volatile organic compounds (VOCs)) are very unlikely to be significant and therefore do not need to be assessed.

4.5.3 A model verification exercise has been undertaken at the Bekesbourne Street site in line with the Defra guidance LAQM.TG(09)6. This checks the model performance against measured concentrations, using six monitoring sites established for this assessment (KEMM1–KEMM6– see Vol 27 Table 4.4.3 and TH20, TH23 and TH35 – see Vol 27 Table 4.4.1). Further details regarding the verification process are included in Vol 27 Appendix B.1. The model adjustment factor derived from the verification process was applied to all model results (for both NO_2 and PM_{10}).

4.5.4 The model inputs for the local air quality assessment for the Bekesbourne Street site are also detailed in Vol 27 Appendix B.2 and B.3. This includes road traffic data (comprising annual average daily traffic flows, heavy good vehicle proportions and speeds for each road link) and data pertaining to construction plant.

NO_2 concentrations

4.5.5 Predicted annual mean NO_2 concentrations for the modelled scenarios are shown in Vol 27 Table 4.5.1. This table details the forecast NO_2 concentrations at specific sensitive receptors. Annual mean results are shown for all of the sensitive receptors, but the receptors are divided into two groups depending on whether the annual mean objective/limit value applies or not. The annual mean criteria only apply at those receptors which could be occupied continually for a year (eg, residential properties). Exceedances of the hourly criteria are inferred from the annual mean concentration. Additionally, contour plots are provided (Vol 27 Figure 4.5.1to Vol 27 Figure 4.5.3, see separate volume of figures) showing modelled concentrations for the baseline, base case and development case scenarios over the construction assessment area. A plot showing the change in NO_2 annual mean concentrations between the base and development cases (in the peak construction year) is presented in Vol 27 Figure 4.5.4 (see separate volume of figures).

4.5.6 The modelled concentrations in Vol 27 Table 4.5.1 show that annual mean NO_2 levels are predicted to decrease between 2010 and the peak construction year with or without the Thames Tideway Tunnel project. This decrease is due to predicted reductions in background concentrations and improved vehicle engine technology. The results for the development case show increases over the base case at all modelled receptors due to the construction works at the Bekesbourne Street site.

Exceedances of the annual mean objective / limit value (40µg/m^3) are predicted for all receptors in all cases. In line with LAQM.TG(09)6, modelled concentrations above 60µg/m^3 indicate exceedances of the hourly NO_2 air quality objective. Therefore, exceedances are considered

likely at all receptors in the baseline case but at no receptors in the base and development cases.

Vol 27 Table 4.5.1 Air quality – predicted annual mean NO_2 concentrations

Receptor	Predicted annual mean NO_2 concentration ($\mu g/m^3$)			Change ($\mu g/m^3$)	Magnitude of impact
	2010 baseline	Peak construction year base case	Peak construction year dev case		
Receptors where the annual mean objective / limit value applies					
John Scurr House residential (OWSR3)	**61.9**	**42.0**	**43.1**	1.1	Small
8 Bekesbourne Street residential (OWSR5)	**61.2**	**41.4**	**44.3**	2.9	Medium
1-11 Bekesbourne Street residential (OWSR6)	**61.8**	**41.9**	**43.2**	1.3	Small
10-14 Bekesbourne Street residential (OWSR7)	**62.2**	**42.3**	**43.2**	0.9	Small
12 Ratcliffe Lane residential (OWSR1)	**62.7**	**42.5**	**43.0**	0.5	Small
Stephen Hawking School (building) (OWSR9)	**70.8**	**48.6**	**48.7**	0.0	Negligible
Receptors where the annual mean objective / limit value does not apply					
Grocery Shop (OWSR2)	**62.5**	**42.4**	**43.2**	0.8	Small
John Scurr Community Centre (OWSR4)	**61.8**	**41.6**	**42.1**	0.5	Small

Receptor	Predicted annual mean NO_2 concentration ($\mu g/m^3$)			Change ($\mu g/m^3$)	Magnitude of impact
	2010 baseline	Peak construction year base case	Peak construction year dev case		
St James's Gardens (OWSR8)	**67.2**	**45.9**	**46.0**	0.1	Negligible

Note: Emboldened figures indicate an exceedance of the criteria which is 40µg/m³ for the annual mean. Changes at each receptor have been rounded to one decimal place.

4.5.7 The highest predicted increase in annual mean concentration as a result of the construction works at the Bekesbourne Street site is 2.9µg/m³ which is predicted at 8 Bekesbourne Street (OWSR5). This increase is described as medium magnitude according to the criteria detailed in Vol 2 Section 4.

4.5.8 The significance of the effect at the residential property at 8 Bekesbourne Street (OWSR5), which has a high sensitivity to local air quality, is **moderate adverse** (according to the criteria detailed in Vol 2 Section 4). The significance of the effect at residential properties at John Scurr House (OWSR3), 1-11 Bekesbourne Street (OWSR6), 10-14 Bekesbourne Street (OWSR7) and 12 Ratcliffe Lane (OWSR1), which have a high sensitivity to local air quality, is **minor adverse** (according to the criteria detailed in Vol 2). The significance of the effect at the grocery shop (OWSR2) and John Scurr Community Centre (OWSR4), which have a low sensitivity to local air quality, is **negligible** (according to the criteria detailed in Vol 2 Section 4). All other sensitive receptors are predicted to experience a **negligible** effect from NO_2.

PM_{10} concentrations

4.5.9 Predicted annual mean PM_{10} concentrations for the modelled scenarios are shown in Vol 27 Table 4.5.2. This table details the forecast PM_{10} concentrations at specific sensitive receptors. Additionally, contour plots are provided (Vol 27 Figure 4.5.5 to Vol 27 Figure 4.5.7, see separate volume of figures) showing modelled concentrations for the baseline, base case and development case scenarios over the construction assessment area. A plot showing the change in annual mean PM_{10} concentrations between the base and development cases (in the peak construction year) is also presented at Vol 27 Figure 4.5.8 (see separate volume of figures).

4.5.10 The modelled concentrations in Vol 27 Table 4.5.2 show that annual mean concentrations of PM_{10} are predicted to achieve the annual mean criteria ($40\mu g/m^3$) and decrease between 2010 and the peak construction year with or without the Thames Tideway Tunnel project. This decrease is due to predicted reductions in background concentrations and improved vehicle engine technology. The predicted results for the development case show increases over the base case at seven modelled receptors due to construction activities at the Bekesbourne Street site.

Vol 27 Table 4.5.2 Air quality – predicted annual mean PM_{10} concentrations

Receptor	Predicted annual mean PM_{10} concentration ($\mu g/m^3$)			Change ($\mu g/m^3$) between base and dev cases	Magnitude of impact
	2010 baseline	Peak construction year base case	Peak construction year dev case		
Receptors where the annual mean objective / limit value applies					
John Scurr House residential (OWSR3)	27.0	23.5	23.7	0.2	Negligible
8 Bekesbourne Street residential (OWSR5)	26.9	23.5	24.0	0.5	Small
1-11 Bekesbourne Street residential (OWSR6)	27.0	23.6	23.8	0.2	Negligible
10-14 Bekesbourne Street residential (OWSR7)	27.1	23.7	23.8	0.2	Negligible
12 Ratcliffe Lane residential (OWSR1)	27.0	23.6	23.7	0.1	Negligible
Stephen Hawking School (building) (OWSR9)	29.2	25.5	25.5	0.0	Negligible
Receptors where the annual mean objective / limit value does not apply					
Grocery Shop (OWSR2)	27.0	23.6	23.7	0.1	Negligible
John Scurr Community Centre (OWSR4)	26.9	23.5	23.6	0.1	Negligible
St James's Gardens (OWSR8)	28.2	24.5	24.5	0.0	Negligible

** Note: Changes at each receptor have been rounded to one decimal place.*

4.5.11 The largest predicted increase in the annual mean concentration as a result of construction at the Bekesbourne Street site is 0.5µg/m^3 predicted at 8 Bekesbourne Street (OWSR5). This change is described as small according to the criteria detailed in Vol 2 Section 4.

4.5.12 With no exceedances of the annual mean PM_{10} standard, the significance of the effects is likely to be **negligible** at all receptors.

4.5.13 With regard to the daily mean PM_{10} concentrations, Vol 27 Table 4.5.3 shows the predicted number exceedances of the daily PM_{10} standard (50µg/m^3) for each modelled scenario. The objective / limit value allows no more than 35 exceedances in a year.

Vol 27 Table 4.5.3 Air quality – predicted exceedances of the daily PM_{10} standard

Receptor	Predicted number of exceedances of the daily PM_{10} standard			Change	Magnitude of impact
	2010 baseline	Peak construction year base case	Peak construction year dev case		
Receptors where the objective / limit value does apply					
John Scurr House residential (OWSR3)	18	9	10	0	Negligible
8 Bekesbourne Street residential (OWSR5)	17	9	10	1	Small
1-11 Bekesbourne Street residential (OWSR6)	18	9	10	0	Negligible
10-14 Bekesbourne Street residential (OWSR7)	18	9	10	0	Negligible
12 Ratcliffe Lane residential (OWSR1)	18	9	9	0	Negligible
Stephen Hawking School (building) (OWSR9)	25	14	14	0	Negligible
John Scurr Community Centre (OWSR4)	17	9	9	0	Negligible

Receptor	Predicted number of exceedances of the daily PM_{10} standard			Change	Magnitude of impact
	2010 baseline	Peak construction year base case	Peak construction year dev case		
Receptors where the objective / limit value does not apply					
Grocery Shop (OWSR2)	18	9	9	0	Negligible
St James's Gardens (OWSR8)	21	11	11	0	Negligible

** Note: Changes at each receptor have been rounded to the nearest whole number.*

4.5.14 The results in Vol 27 Table 4.5.3 show that the number of daily exceedances of PM_{10} is predicted to decrease between 2010 and the peak construction year with or without the Thames Tideway Tunnel project. This decrease is due to predicted reductions in background concentrations and improved vehicle engine technology. The predicted results for the development case show a maximum increase of one day per year with concentrations above 50µg/m^3 compared with the base case at the modelled receptors due to construction works at the Bekesbourne Street site.

4.5.15 With no exceedances of the daily PM_{10} criteria in the development case, the significance of the effects would be **negligible** at all sensitive receptors.

Sensitivity test for programme delay

4.5.16 For the assessment of local air quality effects during construction, a delay to the Thames Tideway Tunnel project of approximately one year would not be likely to materially change the assessment findings reported above for the existing receptors. Based on the development schedule (Vol 27 Appendix N), there would be no new receptors requiring assessment as a result of a one year delay.

Construction dust

4.5.17 Construction dust would be generated from both on-site activities and from road vehicles accessing and servicing the site.

4.5.18 Dust sensitive receptors have been identified in the vicinity of the Bekesbourne Street site in accordance with the criteria in Vol 2 Section 4, as described in Vol 27 Table 4.4.5. A summary of the approximate numbers of receptors in distance bands from the Bekesbourne Street site is listed in Vol 27 Table 4.5.4.

Vol 27 Table 4.5.4 Air quality – numbers of dust sensitive receptors

Buffer distance (m)	Number of receptors*	Receptor type

Buffer distance (m)	Number of receptors*	Receptor type
<20	10-100	Residential, commercial, open space
20-50	10-100	Residential, commercial, open space
50-100	100-500	Residential, open space, chapel
100-350	100-500	Residential, open space, shops, financial, restaurants, community facilities

** Buildings or locations that could be affected by nuisance dust*

4.5.19 In line with the Institute of Air Quality Management (IAQM) guidance (IAQM, 2012)[7], the site has been categorised using the criteria given in Vol 2 to assess the likely impacts from demolition, earthworks, construction and trackout activities during construction and the likely effects of these activities on sensitive receptors close to the development.

4.5.20 The demolition for the Bekesbourne Street site is classified as a 'negligible' dust emission class, as there is no demolition planned on site. The risk category for demolition activities is therefore negligible.

4.5.21 The earthworks have been assessed to be a 'small' dust emission class as the size of the construction site is less than 2,500m^2 and the total material to be moved is less than 10,000 tonnes. With the nearest receptor within 20m, the site is assessed to be medium risk for earthworks.

4.5.22 The construction proposed for the Bekesbourne Street site has a 'small' dust emission class. This classification is based on the quantity of concrete that would be used and batched on-site. The risk category for construction activities is therefore assessed to be of medium risk due to receptors being within 20m.

4.5.23 There would be 50-100m of unpaved haul roads on site and the number of construction lorries per day would be less than 25, so the trackout dust emission class is classified as 'medium'. The closest receptor is within 20m of the affected roads. The risk category from trackout is therefore assessed to be medium risk.

4.5.24 The risk categories for the four activities are summarised in Vol 27 Table 4.5.5. This summary of these risks of construction does not take into account the measures outlined in the *CoCP* (Parts A and B).

Vol 27 Table 4.5.5 Air quality – summary of construction dust risks

Source	Dust soiling / PM_{10} effects
Demolition	Negligible risk site
Earthworks	Medium risk site
Construction	Medium risk site
Trackout	Medium risk site

** Note: without CoCP (Section 7) measures*

4.5.25 On this basis, the development at the Bekesbourne Street site is classified as a medium risk site overall.

4.5.26 Although the receptor sensitivity (with respect to construction dust nuisance) is identified as medium for all receptors (as identified in Vol 27 Table 4.4.5), due to the high PM_{10} background concentrations in the locality, the sensitivity of the area has been defined as 'high'.

4.5.27 With regard to the significance of effects, a medium risk site with a high sensitivity of the area would result in a moderate adverse effect without mitigation. When the measures outlined in the *CoCP* (Section 7) are applied, the significance of the effect would be reduced to **negligible** at all dust sensitive receptors (in accordance with IAQM guidance).

4.6 Operational effects assessment

4.6.1 A ventilation column is planned for the Bekesbourne Street site as part of the modification works to the existing sewerage system. Operational effects for this would be minimal since the proposed ventilation column will not be connected to the main Thames Tideway Tunnel. Therefore, operational effects are not assessed for this site.

4.7 Cumulative effects assessment

Construction effects

4.7.1 As described in Section 4.3, there would not be any cumulative construction effects. Therefore, the effects on air quality would remain as described in Section 4.5 above. This would also be the case if the programme for the Thames Tideway Tunnel project was delayed by approximately one year.

4.8 Mitigation

Construction

4.8.1 Control measures of relevance to air quality are embedded in the *CoCP* (Section 7) as summarised in Section 4.2. As a significant effect is predicted at 8 Bekesbourne Street, mitigation measures could include the identification of lower NO_X emission plant for the construction. However, further modelling has been undertaken which indicates that a reduction in NO_X emissions of 15% is required over and above Stage IV emissions limits (see Vol 2 Section 4). At present, there is no clarity from manufacturers on potential improvements after 2014. Therefore, no further mitigation can be proposed at the current time.

Monitoring

4.8.2 It is envisaged that an appropriate particulate monitoring regime would be agreed with the LB of Tower Hamlets prior to commencement of construction at the Bekesbourne Street site.

4.9 Residual effects assessment

Construction effects

4.9.1 As no additional mitigation measures can be proposed at the current time (as detailed in para. 4.8.1), the residual construction effects remain as set out in Section 4.5.

4.10 Assessment summary

Vol 27 Table 4.10.1 Air quality – summary of construction assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Residential - John Scurr House (OWSR3)	Local air quality – effects from construction road traffic and plant emissions	Minor adverse	None	Minor adverse
	Effects from construction dust	Negligible	None	Negligible
Residential - 8 Bekesbourne Street (OWSR5)	Local air quality – effects from construction road traffic and plant emissions	Moderate adverse	None	Moderate adverse
	Effects from construction dust	Negligible	None	Negligible
Residential - 1-11 Bekesbourne Street (OWSR6)	Local air quality – effects from construction road traffic and plant emissions	Minor adverse	None	Minor adverse
	Effects from construction dust	Negligible	None	Negligible
Residential - 10-14 Bekesbourne Street (OWSR7)	Local air quality – effects from construction road traffic and plant emissions	Minor adverse	None	Minor adverse
	Effects from construction dust	Negligible	None	Negligible
Residential - 12 Ratcliffe Lane (OWSR1)	Local air quality – effects from construction road traffic and plant emissions	Minor adverse	None	Minor adverse
	Effects from construction dust	Negligible	None	Negligible
Educational - Stephen Hawking School (building) (OWSR9)	Local air quality – effects from construction road traffic and plant emissions	Negligible	None	Negligible
	Effects from construction dust	Negligible	None	Negligible
Commercial - Grocery Shop (OWSR2)	Local air quality – effects from construction road traffic and plant emissions	Negligible	None	Negligible

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
	Effects from construction dust	Negligible	None	Negligible
Community - John Scurr Community Centre (OWSR4)	Local air quality – effects from construction road traffic and plant emissions	Negligible	None	Negligible
	Effects from construction dust	Negligible	None	Negligible
Recreational - St James's Gardens (OWSR8)	Local air quality – effects from construction road traffic and plant emissions	Negligible	None	Negligible
	Effects from construction dust	Negligible	None	Negligible

References

[1] Greater London Authority and London Councils. *Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition* (November 2006).

[2] Highways Agency, Design Manual for Roads and Bridges, *Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques*, Part 1 pg D-1 HA207/07 Air Quality (May 2007).

[3] Environmental Protection UK. *Development Control: Planning For Air Quality* (2010 update).

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

[7] Institute of Air Quality Management. *Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance* (January 2012).

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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 assessment

Section 5: Ecology - aquatic

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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

Section 5: Ecology – aquatic

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5 Ecology – aquatic

5.1 Introduction

5.1.1 This section presents the findings of the assessment of the likely significant effects of the proposed development on aquatic ecology at the Bekesbourne Street site.

5.1.2 Construction effects for aquatic ecology for this site have not been assessed. This is on the basis that there would be no in-river construction works associated with this site. Therefore no significant construction effects are considered likely and for this reason only operational effects on aquatic ecology are assessed.

5.1.3 There would also be no in-river operational works, however during operation the interception of the combined sewer overflow (CSO) would result in reduced discharges of untreated sewage into the Tidal Thames at this location.

5.1.4 The presence of sewage in the aquatic environment has adverse effects on aquatic ecology receptors (habitats, mammals, fish, invertebrates and algae). In particular, discharges of untreated sewage effluent can result in low levels of dissolved oxygen (DO), which can cause mass fish mortalities known as hypoxia events. There are CSOs discharging at locations throughout the Tidal Thames including the reaches upstream and downstream of the Holloway Storm Relief CSO.

5.1.5 The Tidal Thames comprises a dynamic environment, in which tidal action leads to dispersal of discharges. Therefore the effects of the operational Thames Tideway Tunnel, which is designed to intercept the most problematic CSOs, would be most evident at a project-wide level. These effects are therefore reported in Volume 3 (Project-wide assessment). This section assesses the localised effects at a site-specific level for the Holloway Storm Relief CSO.

5.1.6 The assessment of the likely significant effects of the project on aquatic ecology has considered the requirements of the National Policy Statement (NPS) for Waste Water (Defra, 2012)[1]. In line with these requirements, designations, species and habitats relevant to aquatic ecology are identified and measures incorporated into the proposed development described. Based on assessment findings, measures to address likely significant adverse effects are identified. Vol 2 Section 5 provides further details on the methodology.

5.1.7 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

5.2 Proposed development relevant to aquatic ecology

5.2.1 The proposed development is described in Section 3 of this volume. The elements of the proposed development relevant to aquatic ecology are set out below.

Operation

5.2.2 Discharges from the Holloway Storm Relief CSO would be diverted at the Bekesbourne Street site as part of the project. Based on the base case (which includes permitted Tidal Thames sewage treatment works upgrades, and the Lee Tunnel scheme, as well as projected population increases) discharges, which have been modelled for 2021, during the Typical Year[i] from the Holloway Storm Relief CSO are anticipated to be 8,500m^3 per annum over a total of ten discharge events (or spills) by 2021. The discharge is predicted to reduce to 7,000m^3 per annum over two discharge events once the Thames Tideway Tunnel is operational. This represents an approximately 17% decrease in the volume of discharge as a result of the Thames Tideway Tunnel project.

5.3 Assessment methodology

Engagement

5.3.1 Volume 2 Environmental assessment methodology documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. There were no site specific comments from consultees for this particular site relating to aquatic ecology.

Baseline

5.3.2 The baseline methodology follows the methodology described in Vol 2. There are no site specific variations for identifying the baseline conditions for this site.

5.3.3 The assessment is based on survey and desk study data for habitats, fish, invertebrates and algae, and on background data for mammals. For habitats, mammals, fish, invertebrates, and algae desk study data has been obtained for the whole of the Tidal Thames. The data sets for fish, invertebrates and algae are based on fixed sampling locations at intervals through the Tidal Thames. Sites as close to Bekesbourne Street as possible have been selected. Details of the background and data sets are provided in Vol 2.

5.3.4 Surveys for fish and invertebrates were undertaken during October 2010, at King Edward Memorial Park Foreshore, approximately 0.6km upstream of the Holloway Storm Relief CSO. As part of the project wide assessment, surveys for juvenile fish were undertaken at five sampling

[i] The 'Typical Year' represents the most 'typical' 12 month period of rainfall observed between 1970 and 2011 and covers the period from October 1979 to September 1980.

locations six times between May and September 2011. The nearest sampling location to the site was at Bermondsey Wall East, approximately 2.3km upstream. Surveys for algae were undertaken eight locations in May 2012. The nearest sampling location to the site was at King Edward Memorial Park Foreshore. The survey comprised sampling of algae along a vertical transect of the river wall.

Operation

5.3.5 The assessment methodology for the operation phase follows that described in Vol 2. The assessment area is the zone which lies within a 100m radius of the existing CSO. There are two assessment years for operational effects; Year 1 and Year 6. Year 1 is the year that the Thames Tideway Tunnel project would be brought into operation. Year 6 provides sufficient time after operation commences to allow the longer term effects on aquatic ecology to be assessed. There are no site specific variations for undertaking the operational assessment of this site.

5.3.6 Section 5.6 details the likely significant effects arising from the operation at Bekesbourne Street. The effects of the interception of all of the CSOs within the Thames Tideway Tunnel project on aquatic ecology receptors at a river wide level are considered in Vol 3 Project wide assessment.

5.3.7 No schemes from the site development schedule (Vol 27 Appendix N) are considered relevant to the base case, as all developments are either in-land, do not comprise in-river development, development adjacent to the river or development discharging into the river and therefore would not affect the aquatic ecology baseline. Similarly there are no schemes in the site development schedule that could lead to a cumulative impact at Bekesbourne Street. Therefore no cumulative impact assessment has been undertaken.

5.3.8 The assessment of operational effects also considers the extent to which the assessment findings would be likely to be materially different, should the programme for the Thames Tideway Tunnel project be delayed by approximately one year

Assumptions and limitations

5.3.9 The assumptions and limitations associated with this assessment are presented in Vol 2. Assumptions and limitations specific to this site are outlined below.

Assumptions

5.3.1 The proposed development at the Bekesbourne Street site would control the Holloway Storm Relief CSO, by diverting discharges from it into the Low Level No. 1 Sewer. There is potential for the diversion of the Holloway Storm Relief CSO to take place before Thames Tideway Tunnel would be operational, which means that the CSO could be controlled before Year 1 of operation. However, for the purposes of this assessment it is assumed that control of the Holloway Storm Relief CSO would occur at Year 1 of operation, when the Thames Tideway Tunnel would be operational.

Limitations

5.3.2 There are no site specific limitations.

5.4 Baseline conditions

5.4.1 The following section sets out the baseline conditions for aquatic ecology within and around the site. Future baseline conditions (base case) are also described.

Current baseline

5.4.2 The following section sets out the existing baseline applicable to this site. The section begins with a discussion of any statutory (i.e., with a basis in law) or non-statutory (i.e., designated only through policy) sites designated for their nature conservation value. It then addresses habitats, followed by the species receptors associated with those habitats, namely mammals, fish, invertebrates and algae. This order is followed throughout the assessment sections.

Designations and habitats

5.4.3 This section sets out the effects on designations and habitats applicable at the site specific level. Effects on designations and habitats applicable at the project wide scale are assessed in Vol 3.

5.4.4 The Tidal Thames is part of the proposed South East Marine Conservation Zone (MCZ) that was submitted to Government in early 2012. If adopted, it will be designated as a national statutory site under the Marine and Coastal Access Act 2009. The purpose of MCZs is to protect the full range of nationally important biodiversity, as well as certain rare and threatened species and habitats. Species include smelt (*Osmerus eperlanus*), European eel (*Anguilla anguilla*) and tentacled lagoon worm (*Alkmaria romijnii*) (Balanced Seas, 2011)[2]. The Tidal Thames offers important spawning and migratory habitat for smelt, and migratory habitat for European eel.

5.4.5 There are no other international or national statutory sites (i.e., Sites of Special Scientific Interest or Local Nature Reserves) designated for aquatic ecology within the assessment area.

5.4.6 The Holloway Storm Relief CSO discharges directly into the non-statutory River Thames and Tidal Tributaries Site of Importance for Nature Conservation (Grade III of Metropolitan importance)[ii]. The SINC is designated by the Greater London Authority (GLA) and adopted by all boroughs which border the Thames. It recognises the range and quality of estuarine habitats including mudflat, shingle beach, reedbeds and the river channel itself. The SINC citation notes that over 120 species of fish have been recorded in the Tidal Thames, though many of these are only occasional visitors. The more common species include dace (*Leuciscus*

[ii] SINC (Grade M) = Site of Importance for Nature Conservation (Grade III of Metropolitan importance)

leuciscus), bream (*Abramis brama*) and roach (*Rutilus rutilus*) in the freshwater reaches (described in para. 5.4.8), and sand-smelt (*Atherina presbyter*), flounder (*Platichtyhys flesus*) and Dover sole (*Solea solea*) in the estuarine reaches. Important migratory species include Twaite shad (*Alosa fallax*), European eel, smelt, salmon (*Salmo salar*) and sea trout (*Salmo trutta*). A number of nationally rare snails occur, including the swollen spire snail *Mercuriaconfusa*, as well as an important assemblage of wetland and wading birds.

5.4.7 The Tidal Thames is the subject of a Habitat Action Plan (HAP) within the London Biodiversity Action Plan (BAP) (Thames Estuary Partnership Biodiversity Action Group, undated)[3]. The intertidal habitat represents the 'Rivers and Standing Water' habitat which forms part of the London Borough (LB) of Tower Hamlets local Biodiversity Action Plan (LB of Tower Hamlets, undated)[4].

5.4.8 The river is divided into three zones within the Tidal Thames *HAP*; freshwater, brackish and marine (Vol 3 Figure 3.4.1, see separate volume of figures). The brackish zone is equivalent to the transitional water definition of the Water Framework Directive (WFD). Further details of the WFD river zone classifications can be found in Vol 3.

5.4.9 Holloway Storm Relief CSO lies within the brackish zone of the river, which means that the fish and invertebrate communities which occur within the river at this location consist of freshwater tolerant marine species and salt-water tolerant freshwater species. Invertebrate diversity is generally lower than in the freshwater zone as species must be able to withstand some variations in salinity and a stressful environment. Stress is caused by the fluctuating tidal conditions, which means that flora and fauna have to be able to tolerate wide variations in their physical environment.

5.4.10 The Bekesbourne Street site lies within 150m of the London Canals SINC (Grade M)[iii] which is designated as supporting a wide range of aquatic flora, including a number of locally uncommon species.

Evaluation of designations and habitats for Bekesbourne Street

5.4.11 The value of the habitats for individual aquatic ecology receptors is described in the relevant baseline sections. Habitats are considered to be of medium-high (metropolitan) value as part of the River Thames and Tidal Tributaries SINC (Grade M).

Marine mammals

5.4.12 Records compiled by the Zoological Society of London for 2003-2011 indicate that harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*) and various seal species (grey seal (*Halichoerus grypus*) and common seal (*Phoca vitulina*)) migrate through the Tidal Thames. One record of seal (unidentified) has been observed near the Holloway Storm Relief CSO area of the Thames.

[iii] SINC (Grade M) = Site of Importance for Nature Conservation (Grade III of Metropolitan importance)

Evaluation of marine mammals for Bekesbourne Street

5.4.13 The CSO site is considered to be of low-medium (local) value for marine mammals given the small number of records. There is no evidence of use as a haul out site by seals.

Fish

5.4.14 In general, Tidal Thames fish populations are mobile and wide ranging. Although the abundance and diversity of fish at any one site may provide some indication of the habitat quality offered at that site it is important to consider the data within the context of sites throughout the Tidal Thames, since the factors influencing distribution are likely to be acting at this wider scale. To this end, the findings of the Thames Tideway Tunnel site specific survey, relevant juvenile fish surveys and Environment Agency (EA) background data are presented in this section and are used to inform the evaluation of the site. Effects at the project-wide scale are assessed in Vol 3.

Baseline surveys

5.4.15 A single day survey was undertaken at King Edward Memorial Park Foreshore, approximately 600m upstream of the Holloway Storm Relief CSO, during October 2010. Full details of the methodology and rationale for timing of surveys are presented in Vol 2.

5.4.16 Fish are routinely categorised into 'guilds' according to their tolerance to salinity and habitat preference (Elliott, M and Taylor,CJL, 1989[5]; Elliott, M and Hemingway, KL, 2002[6]) which can be defined as follows:

a. Freshwater – species which spend their complete lifecycle primarily in freshwater.

b. Estuarine resident – species which remain in the estuary for their complete lifecycle.

c. Diadromous – species which migrate through the estuary to spawn having spent most of their life at sea.

d. Marine juvenile – species which spawn at sea but spend part of their lifecycle in the estuary.

5.4.17 The survey recorded relatively low fish abundance in the area of King Edward Memorial Park Foreshore, with only 64 individuals captured in total. This was a relatively low number in terms of absolute abundance of fish, compared with a catch exceeding 200 fish at Barn Elms, Western Pumping Station and Cremorne Wharf Depot, which had the highest abundance of fish of all sites surveyed in relation to the Thames Tideway Tunnel project. The lowest catch (at Albert Embankment) was of 19 individuals. Although the absolute abundance of individual species based on a single survey visit is not a reliable basis for evaluation of the site, the presence of 50 smelt is notable in the context of the survey, making King Edward Memorial Park Foreshore one of the best Thames Tideway Tunnel survey sites for this species. The range of species recorded and the number of individuals is presented in Vol 27 Table 5.4.1

5.4.18 The low abundance of freshwater species relative to estuarine resident and diadromous species at King Edward Memorial Park Foreshore such as roach and bream is explained by the site location, which is towards the downstream end of the freshwater zone (Vol 3 Figure 3.4.1, see separate volume of figures), where salinity is relatively close to the tolerance threshold of freshwater species.

Vol 27 Table 5.4.1 Aquatic ecology – results of fish surveys at King Edward Memorial Park Foreshore

Common name	Scientific name	Number of individuals	Guild
Flounder	*Platichthys flesus*	4	Estuarine resident
Common goby	*Pomatoschistus microps*	3	Estuarine resident
Smelt	*Osmerus eperlanus*	50	Diadromous
Common bream	*Abramis brama*	4	Freshwater
Roach	*Rutilus rutilus*	2	Freshwater

5.4.19 Smelt is a species listed under Section 41 of the Natural Environment and Rural Communities Act 2006 and is a priority UK BAP species. Smelt migrate into freshwater to spawn on gravel banks. Colclough, SR *et al* (2002)[7] have identified smelt spawning sites on gravel shores in the upper Tidal Thames around Wandsworth and Battersea but not as far downstream as King Edward Memorial Park. The spawning period is March-April and thereafter smelt drift progressively downstream from spawning sites towards Greenwich. Catches may be expected anywhere along the Tidal Thames over the summer months.

Juvenile fish surveys

5.4.20 The shallow river margins, which shift across the intertidal foreshore with the ebb and flood of the tides, provide an important migration route for juvenile fish along the estuarine corridor. The young of species such as eel (known as glass eels or elvers), flounder, dace and smelt rely upon access to these areas of lower water velocity to avoid being washed out by tides and to avoid predation by the larger fish that occur in deeper water. Young fish also feed predominantly amongst the intertidal habitat. Adult migrants of larger fish tend to use faster mid-channel routes.

5.4.21 Surveys for juvenile fish were undertaken as part of a suite of five sites sampled six times between May and September 2011 as part of the project wide assessment. The site locations are presented in Vol 2 Figure 4.4.5 (see separate volume of figures). The data from the juvenile fish surveys at Bermondsey Wall East (the closest juvenile fish survey site to Holloway Storm Relief CSO) are presented in Vol 27 Table 5.4.2. The findings are relevant to this site because it gives context to the assemblage of fish that may be expected to be found in this reach of the

river. The aim of the surveys was to record juvenile fish migrations through the Tidal Thames to inform a study of the hydraulic effects of the temporary and permanent structures on fish migration. The extent of the surveys and details of the methodology are presented in Vol 2.

Vol 27 Table 5.4.2 Aquatic ecology – results of 2011 juvenile fish surveys at Bermondsey Wall East

Common name	Scientific name	Number of individuals					
		Survey					
		1 May	2 Late May	3 June	4 July	5 Aug	6 Sep
Flounder	*Platichthys flesus*	1	7	102	16	1	10
Smelt	*Osmerus eperlanus*	1	2	0	0	0	0
Eel	*Anguilla anguilla*	0	3	2	4	1	3
Common bream	*Abramis brama*	0	0	0	7	0	5
Dace	*Leuciscus leuciscus*	0	2	0	0	0	0
Roach	*Rutilus rutilus*	0	0	25	1	0	1
Perch	*Perca fluviatilis*	0	0	0	7	0	0
Goby	*Pomatoschistus spp.*	0	0	2	262	457	330
Sea bass	*Dicentrarchus labrax*	0	0	0	247	14	4
3-spined stickleback	*Gasterosteus aculeatus*	0	0	1	0	0	0
Zander	*Stizostedion lucioperca*	0	0	0	2	2	1
Sand smelt	*Atherina presbyter*	0	0	0	2	1	0

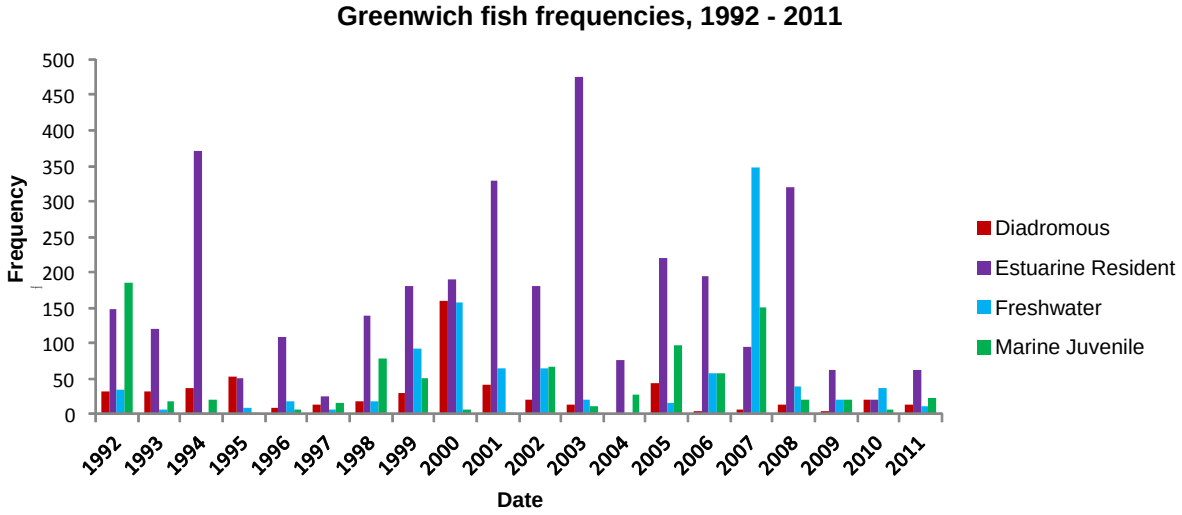
5.4.22 Post-larval flounders dominated the catch during survey three. Flounder were caught in the shallow littoral zone, indicating early springtime colonisation from marine spawning sites. In survey four, sea bass (*Dicentrarchus labrax*) and gobies were numerous, with numbers of gobies remaining high in surveys five and six. This indicates that Bermondsey Wall East is of importance for juvenile fish and that this broad stretch of the river is of value for juveniles, if not for adults.

Environment Agency background data

5.4.23 The surveys described in paras. 5.4.15 to 5.4.22 provide up-to-date baseline information relevant to fish community composition at Holloway Storm Relief CSO. EA records have also been used to provide a wider context for the fish community in the Tidal Thames. The EA carry out annual surveys of fish within the Tidal Thames, with data available from 1992-2011. Methodologies for the surveys are provided in Vol 2. There is an EA sampling site at Greenwich, located approximately 4km downstream of Holloway Storm Relief CSO, where EA surveys have been carried out every year from 1992 to 2011.

5.4.24 Results from Greenwich (see Vol 27 Plate 5.4.1) show fairly steady catches in trawls but some indication of increasing seine-net catches in recent years. Catches are dominated by estuarine resident fish such as common goby, flounder and sand smelt, freshwater species including dace, common bream, perch (*Perca fluviatilis*) and roach, and migratory species including eel and smelt. This includes all the species recorded in the 2011 surveys undertaken for this project at King Edward Memorial Park Foreshore. Other migratory species such as salmon and sea trout must pass through the area but are too infrequently present to be detected by only one or two surveys per year. The high frequency of freshwater species recorded in 2007 may be as a result of very high rainfall during that year. High flows may have led to a greater number of freshwater fish being washed into the Tidal Thames and lower salinity conditions which allowed them to survive.

Vol 27 Plate 5.4.1 Aquatic ecology – long-term EA total fish catches from Greenwich site



Water quality and current fish baseline

5.4.25 Prior to the 1960s, water quality in the Tidal Thames was heavily degraded by raw sewage inputs caused by under-capacity of sewage treatment works (STWs). With the construction of new works (Wheeler, AC, 1979)[8] there has been a progressive improvement of fish populations from the 1960s onwards was recorded. The ecology of the Tidal Thames

has undergone further improvement in recent decades, with some 125 fish species now recorded by the EA.

5.4.26 However, hypoxia events (see para. 5.1.4) arising from regular CSO spills and occasional discharges of untreated waste from STWs still occur. Discharges have the effect of depleting DO (measure in mg/l) by the biological breakdown of organic matter in the discharge. This is referred to as biochemical oxygen demand (BOD). Substantial fish mortalities begin to occur when DO levels drop beneath 4mg/l. An example of the effects of a hypoxia event occurred in June 2011, in which approximately 26,000 fish were killed across the Tidal Thames assessment area following a release of around 450,000 tonnes of untreated sewage. This incident is discussed in further detail in the project-wide assessment (Vol 3 Section 5).

5.4.27 The Tideway Fish Risk Model (TFRM) was developed to evaluate DO standards for the Tidal Thames (Turnpenny, AWH, *et al*, 2004)[9] as part of the Thames Tideway Strategic Study (TTSS). The DO standards for the Tidal Thames comprise four threshold levels expressed as concentrations of DO in mg/l over specified tidal durations. Frequencies are set on the number of times per year each of these thresholds can be exceeded. Further details of the standards are presented in Vol 2 Section 14 (Water resources – surface water). Details of the TFRM are presented in Vol 2 and Vol 2 Appendix C.3. The TFRM considers fish distribution and the effects of low DO conditions within defined 3km zones within the Tidal Thames. The zones are based on those used by the EA's automated water quality monitoring system (AQMS), for which DO data are collected continuously.

5.4.28 The model uses known hypoxia tolerance thresholds for seven species which are considered to represent the range of species which occur in the Tidal Thames. The model is based on the assumption that most species of fish populations would be sustainable provided hypoxia related mortality does not exceed 10% of the total population. The model considers both adult and juvenile fish (known as 'lifestage cases'), since juveniles generally have a lower tolerance to hypoxia.

5.4.29 It is not possible to isolate the contribution of individual CSO discharges on hypoxia related fish mortalities in the Tidal Thames. This is because the TFRM provides outputs at a population level. For example, DO conditions may be below a lethal threshold in one zone known to be used by a particular species of fish. However, provided conditions are above the threshold in other zones such that 90% of the population are unharmed then conditions are considered to be sustainable. The outputs are discussed in further detail in the project wide assessment (Vol 3 Section 5.6). However, TFRM results for the existing baseline suggest that a total of five of the seven species/lifestage cases are expected to suffer unsustainable hypoxia related mortality in the Tidal Thames each year. Given that the indicator species used in the model act as surrogates for a wider range of ecosystem components, other taxa are also likely to be unsustainable under this water quality regime.

Evaluation of fish community for Bekesbourne Street

5.4.30 The Holloway Storm Relief CSO site is considered to be of medium-high (metropolitan) importance for fish, since although relatively low numbers of fish were recorded during the survey ay King Edward Memorial Park Foreshore, this included relatively large numbers of smelt and the site forms part of the migratory habitat of a wide assemblage of estuarine fish species.

Invertebrates

5.4.31 Benthic invertebrates are used in the freshwater, estuarine and marine environments as biological indicators of water and sediment quality since their diversity, abundance and distribution reflects natural or man-made fluctuations in environmental conditions. Species diversity is influenced by factors such as substrate and salinity. However high species diversity (or numbers of species) at any given site generally indicates good water and/or sediment quality, whilst low diversity may indicate poor quality.

5.4.32 Invertebrate populations and particularly those which occur in the water column (pelagic) are influenced by conditions throughout the estuary. The strongest influences on invertebrate distribution and density tend to be physical factors such as salinity, and substrate type followed by water quality and local habitat conditions.

Baseline surveys

5.4.33 A single day survey was undertaken at King Edward Memorial Park Foreshore during October 2010. The area covered by the survey is the same as that described for the fish survey above (paras. 5.4.15 to 5.4.19) and illustrated in Vol. 21 Figure 5.4.1 (see separate volume of figures). Details of the sampling methods used can be found in Vol 2. Three intertidal and three subtidal samples were taken on each occasion.

5.4.34 The invertebrates collected during the October 2010 field surveys are presented in Vol 27 Table 5.4.3 below. The Community Conservation Index (CCI) score (Chadd, R and Extence, C, 2004)[10] has been used to identify species of nature conservation importance. CCI classifies many groups of invertebrates of inland waters according to their scarcity and conservation value in Great Britain and relates closely to the Red Data Book (RDB) (Bratton, JH, 1991)[11], Shirt, DB, 1987)[12] by attributing a score between 1 and 10. The higher the CCI score the more scarce the species and/or greater its conservation value.

Vol 27 Table 5.4.3 Aquatic ecology – invertebrate fauna sampled at King Edward Memorial Park October 2010

Taxa	CCI Score	No. of individuals - subtidal samples			No. of individuals - intertidal samples		
Sample numbers		Air lift 1	Air lift 2	Air lift 2	Kick sample	Sweep net 1	Sweep net 2
Radix balthica	1	0	18	0	0	0	0

Taxa	CCI Score	No. of individuals - subtidal samples			No. of individuals - intertidal samples		
Sample numbers		**Air lift 1**	**Air lift 2**	**Air lift 2**	**Kick sample**	**Sweep net 1**	**Sweep net 2**
Oligochaeta	-	12	30	80	0	8	150
Erpobdella sp.	-	0	1	0	0	0	0
Crangon crangon	-	0	0	16	0	0	1
Eriocheir sinensis	-	0	0	0	2	0	0
Apocorophium lacustre	8	11	0	0	0	0	1
Corophium volutator	3	0	0	1	0	0	0
Gammarus zaddachi	1	0	50	8	0	0	1
Diptera pupae	-	0	0	0	0	1	0
Number of taxa	**-**	**2**	**4**	**4**	**1**	**2**	**4**

5.4.35 Invertebrate diversity and abundance at King Edward Memorial Park were amongst the lowest within the Tidal Thames in both intertidal and subtidal samples.

5.4.36 There was little difference in diversity between subtidal and intertidal samples. The most pollution sensitive animals present were *Gammarus zaddachi,* brackish water amphipod shrimps. However, these were present in relatively low numbers and limited to the subtidal samples. As at other sites, despite the apparent low quality, pollution tolerant taxa such as Oligochaeta were only present in low numbers, and the taxa present are brackish species, with varying tolerance of different levels of salinity from estuarine to near freshwater.

5.4.37 The presence of three CSO discharges (North East Storm Relief, Bell Wharf and Cole Stairs) within close proximity of the samples is likely to be a contributing factor to the low biological quality of the site. The low invertebrate diversity and abundance in the intertidal area is however also likely to reflect the physical conditions at the site. There is a very narrow intertidal zone due to encroachment by the river defences and neighbouring development. Wave washing from the tide and passing river craft is therefore intense and affects the entire width of the intertidal habitat. The site also lies within the brackish zone of the river which means that invertebrates are subject to considerable variations in salinity.

5.4.38 The only species of high nature conservation importance was the mudshrimp *Apocorophium lacustre* (CCI 8), a RDB species, which was present in subtidal samples at the site. EA data (paras. 5.4.39 to 5.4.42) have however shown *A. lacustre* to be common in the Tidal Thames and therefore the relative value of the invertebrate community is not considered to be of higher value in this instance.

Environment Agency background data

5.4.39 Holloway Storm Relief CSO is located approximately 4km upstream of the EA site at Greenwich, which is the nearest sampling location with recent data (2006 -2007). The EA samples are taken using a number of techniques, including cores and kick sampling in the intertidal and day grab and core samples in the subtidal. Sampling at Greenwich was undertaken on an approximately monthly basis over the period 1989 and 1993 and 2006-2007.

5.4.40 A total of 35 taxa were recorded at Greenwich over the seven year period in which samples were collected. The taxa Oligochaeta, which thrives in organically polluted conditions, was most abundant, together with other pollution tolerant species such as the snail *Potamopyrgus antipodarum,* Polychaeta worms (mostly *Boccardiella ligerica*), gastropod snails (*P. antipodarum* and Cochliopidae) and *G. zaddachi*.

5.4.41 In addition to the native *G. zaddachi*, the amphipod *Gammarus tigrinus*, of North American origin, was also relatively abundant in samples taken at Greenwich. It is believed that this species arrived in English waters via ballast water from ships. It lives in fresh and brackish waters and can expand rapidly, outcompeting local amphipods. However, based on available data, it appears to be much less abundant than the native *G. zaddachi* within the Tidal Thames.

5.4.42 The majority of taxa present at Greenwich are brackish species, with varying tolerance of different levels of salinity from estuarine to near freshwater. However, the increasing saline influence compared to upstream sites is demonstrated by the abundance of *Lekanesphaera hookeri* (a water louse) and various Polychaete worms (notably *B. ligerica* and *Marenzelleria viridis*), which are exclusively associated with estuarine or marine conditions.

Water quality and current invertebrate baseline

5.4.43 The influence of water quality, and specifically CSO discharges was investigated through statistical analysis of the EA invertebrate background data, Thames Tideway Tunnel baseline data, and EA water quality data. Although it was not possible to isolate trends over time at a site specific level, a number of observations were made that helps to identify the factors influencing invertebrate abundance and diversity. For example, certain species of Oligochaete worm, present at King Edward Memorial Park Foreshore are indicative of polluted conditions because they are able to tolerate the low DO conditions and multiply rapidly in the enriched sediments.

5.4.44 The analysis is described in further detail in Vol 3 Section 9.4. The following summary is relevant to the brackish zone of the Tidal Thames in which the Holloway Storm Relief CSO site is located.

5.4.45 The varying level of salinity and saline fluctuations appear to be a dominant factor determining the diversity and structure of benthic invertebrate assemblages. The analysis showed that, in general, samples in the brackish zone were less diverse compared with samples taken in the freshwater zone. This concurs with previous research into the

invertebrate community of the River Thames and other estuaries, which show diversity decreasing downstream as the saline influence increases (Bailey-Brock, JH, *et al,* 2002)[13]. This is generally attributed to the fact that relatively few invertebrates are adapted to considerable fluctuations in salinity. Other factors such as poor water quality and lack of habitat diversity, particularly in central London, are also likely to contribute.

5.4.46 Redundancy analysis (RDA)[iv] was used to compare the invertebrate dataset with water quality data for the period between 1992 and 2010. The analysis demonstrated the importance of environmental variables in determining the invertebrate communities in the Thames. It appears that dominance of either Gammaridae (sensitive to hypoxia) or Oligochaeta (more tolerant to hypoxia) is influenced by the DO concentrations and DO sags in the Thames, although other factors such as habitat are also highly important. Other invertebrate taxa also appeared to be affected by poor water quality (low DO) and/or saline intrusion, notably the insect group (mayflies), while other groups (essentially Polychaete and Oligochaete worms) were shown to be tolerant of these conditions.

Evaluation of invertebrate community for Bekesbourne Street

5.4.47 The Holloway Storm Relief CSO discharge site is considered to be of medium (borough) importance due to the limited diversity and abundance of species recorded at King Edward Memorial Park Foreshore, and dominance of the invertebrate community by pollution tolerant species. Only a single species of conservation importance (*A. lacustre*) was recorded, and it is ubiquitous within the Tidal Thames.

Algae

5.4.48 Algae occurs in the Tidal Thames both in the water column and growing on the river wall and associated structures. The range of species which occur in the Tidal Thames reflect salinity, habitat and environmental conditions. As well as their intrinsic value algal communities provide valuable habitat for invertebrates and juvenile fish. Algae are often used as an indicator of water quality, since nutrients associated with sewage promote the growth of certain species of algae. This assessment focuses on the algal communities which grow on the river wall and associated structures.

Baseline surveys

5.4.49 A single day survey was undertaken in May 2012 at King Edward Memorial Park Foreshore. The survey only recorded six species of algae of which *Blidingia minima* was overwhelmingly dominant. These were all on the river wall and are shown in Vol 27 Table 5.4.4. All species are widespread and abundant in the Tidal Thames.

[iv] Redundancy analysis is a form of regression analysis which provides information on the influence of environmental variables on the composition/abundances of the invertebrates assemblages

Vol 27 Table 5.4.4 Aquatic ecology – marine algae sampled at King Edward Memorial Park during 2012

Species	Survey observations	Species presence within the Tidal Thames
Blidingia marginata	Occasionally present on the river wall.	Widespread and abundant.
Blidingia minima	This species is dominant at all but the lowest level of the river wall.	Widespread and abundant.
Cladophora glomerata	Frequently present at the lowest level of the river wall.	Widespread and abundant.
Rhizoclonium riparium	Occasionally present on the lowest level of the river wall only.	Common in the estuary.
Ulva compressa	Occasionally present on the river wall.	Widespread and abundant.
Vaucheria sp.	Occasionally present on the river wall.	The *Vaucheria sp* recorded is most probably *Vaucheria compacta*, which occurs on the upper littoral levels on sea walls. Widespread in the tidal Thames.

Natural History Museum background data

5.4.50 Data was obtained from the Natural History Museum, London (NHM) that identifies records of marine algae received for the period from the early 1970s to 1999. Algae were recorded from a sampling location at Wapping, located approximately 1.5km upstream of Holloway Storm Relief CSO with the records all shown in Vol 27 Table 5.4.5.

Vol 27 Table 5.4.5 Aquatic ecology – marine algae sampled at Wapping between early 1970s and 1999

Species	Observations
Blidingia marginata	Upper littoral and supra-littoral, and floating structure just above the water-line. Widespread and abundant.
Rhizoclonium riparium	Upper mid-littoral levels on sea walls and occasionally on floating structures above the water-line. Common in the estuary.
Rhodochorton purpureum	Mid to upper littoral levels in shaded situations on sea walls and other structures. Not uncommon in the Tidal Thames.

Water quality and algal communities

5.4.51 Algae depend on the nutrients nitrate and phosphate for growth. Although these nutrients occur naturally in water bodies, they are also present in sewage. Discharges of untreated sewage can result in elevated levels of nutrients which can lead to excessive growth of algae. As these algae die and decompose they use up oxygen in the water resulting in hypoxia (para. 5.1.4). This process is known as eutrophication. Excessive levels of algae can disrupt other elements of the ecosystem by smothering them.

5.4.52 Studies of the pelagic algae (para. 5.4.48) of the Tidal Thames to inform its classification for the WFD have concluded that the estuary is not eutrophic due to strong tidal flows (English Nature, 2001)[14]. However, historically poor water quality has had a considerable negative influence on the algal communities of the Tidal Thames and the loss of pollution sensitive species. Improvements in sewage treatment since the 1960s have led to a gradual process of recovery (Tittley, 2009)[15], although pollution tolerant species such as the green algal species still dominate the community.

Evaluation of algal community for Bekesbourne Street

5.4.53 None of the species recorded have protected status (e.g. RDB species or UK or local BAP species). The algal populations are therefore given low-medium (local) value as only limited records of widespread species occur from this location.

Aquatic ecology receptor values and sensitivities

5.4.54 Using the baseline set out in paras. 5.4.1 to 5.4.53 the value accorded to each receptor considered in this assessment is set out in Vol 27 Table 5.4.6. The definitions of the receptor values and sensitivities used in this evaluation are set out in Vol 2.

Vol 27 Table 5.4.6 Aquatic ecology – summary of receptors and their values/sensitivities at Bekesbourne Street

Receptor	Value/sensitivity
Foreshore habitat (intertidal and subtidal)	Medium-high (metropolitan)
Marine mammals	Low-medium (local)
Fish	Medium-high (metropolitan)
Invertebrates	Medium (borough)
Algae	Low-medium (local)

Operational base case

5.4.55 The base case in Year 1 and Year 6 of operation would include the improvements at the five main sewage treatment works that discharge into the Tidal Thames (Mogden, Beckton, Crossness, Long Reach and Riverside), and the Lee Tunnel project. TFRM modelling (Vol 3 Appendix C.3) shows that at a river-wide level there would be considerable reduction in the occurrence of mass or population level fish mortalities with these schemes (i.e. hypoxia events, which result in more than 10% mortality of

fish populations). However, predictions for the base case show that, even with these schemes, unsustainable mortalities of salmon, the most sensitive species can be expected. Salmon is considered as acting as a surrogate for the more sensitive aspects of ecology, and thus taxa other than salmon may also be harmed under this condition. Further catchment modelling of the base case (i.e. without the Thames Tideway Tunnel proposals) also shows that the frequency, duration and volume of spills from the Holloway Storm Relief CSO will continue to rise due to population growth (spill volume and frequency as stated in para. 5.2.2: further details of the projected spills are presented in Section 14 Water resources – surface water. Therefore recovery due to water quality improvements would be suppressed at the Holloway Storm Relief CSO discharge point. As a result there are unlikely to be substantial changes in habitat quality at the site level and pollution sensitive fish species such as salmon would continue to be suppressed. Indeed, conditions in the immediate vicinity of the outfall may be more unfavourable for fish than the current baseline given the increase in frequency, volume and duration of CSO spills.

5.4.56 The invertebrate analysis demonstrates that more pollution sensitive groups such as shrimps (Gammaridae) are subject to considerable fluctuations in abundances during low DO periods. With the improvements associated with the Lee Tunnel scheme and sewage treatment works upgrades, these fluctuations are likely to be reduced. Whilst there may be minor changes, increases in abundance and diversity will however be limited by the fact that even with the Lee Tunnel and STW improvements in place there are still predicted to be numerous failures of DO standards. Colonisation by DO sensitive taxa such as Corophiidae, Crangonidae and Gammaridae which would otherwise occur within the brackish zone, including the Holloway Storm Relief CSO discharge point, would continue to be suppressed, and may also be less favourable than current baseline conditions because of the increased frequency volume and duration of CSO spills.

5.4.57 The recovery in algal communities that has taken place since the 1960s is expected to continue under the base case; however the baseline conditions are not anticipated to change from that described in Section 5.4. No changes in marine mammals are anticipated as they are relatively insensitive to point source sewage discharges.

5.4.58 As detailed in para 5.3.7 there are no other known developments which would change the base case. Furthermore there is unlikely to be any further encroachment onto the River Thames foreshore for non-river dependent uses as this is restricted through *London Plan* (GLA, 2012)[16] Policy 7.28 Restoration of the Blue Ribbon Network which states that development should 'protect the value of the foreshore of the Thames and tidal rivers'. The EA's *National Encroachment Policy for Tidal Rivers and Estuaries* (Environment Agency, 2005) [17] also presumes against developments riverward of the existing flood defences where these would, individually or cumulatively, change flows so that fisheries were affected or cause loss or damage to habitat. Therefore no change to current baseline from other developments is considered likely.

5.5 Construction effects assessment

5.5.1 As stated in para. 5.1.2, there would be no construction activities 'in-river' at this site therefore no significant effects on aquatic ecology are likely.

5.6 Operational effects assessment

5.6.1 This section presents the findings of the operational phase assessment. It outlines the operational impacts arising from the proposed development and the likely significant effects on aquatic ecology receptors.

Operational impacts

Increases in dissolved oxygen concentrations in the vicinity of the CSO

5.6.2 In the projected Typical Year, 17% decrease in the volume of discharges compared against the base case (see para. 5.2.2) would result in improvements in DO concentrations at a local level and throughout the tidal Thames. The Thames Tideway Tunnel improvements would ensure compliance with the DO standards described in para. 5.4.27. These improvements are assessed at a river wide level in Vol 3. The impact is considered to be low positive due to the relatively small magnitude of the Holloway Storm Relief CSO, and impacts would be near certain and permanent.

Reduction in sediment nutrient levels

5.6.3 Elevated concentrations of nutrients (phosphate and nitrate) are likely to have accumulated in the sediments in proximity to the discharge point as a result of the faecal material and sewage derived litter discharged from the CSO. In addition to the directly toxic effects of elevated ammonia (particularly in low oxygen situations) increased nutrients in the sediment can reduce the natural limits on algal growth and enable more nitrogen/phosphate responsive species to out compete other species reducing diversity. Interception of the CSO would lead to a gradual reduction in sediment nutrient levels. The impact is considered to be low positive, probable and permanent.

Reduced levels of sewage derived litter

5.6.4 Sewage derived litter from the CSO would be expected to reduce from approximately 2t per annum, in the Typical Year to 1.8t. This is therefore considered to be a negligible impact and would be near certain and permanent.

Operational effects

5.6.5 The following section describes the effects of these impacts on aquatic ecology receptors based on the significance criteria set out in Vol 2 Section 2.3. Only those impacts which are considered relevant to each receptor are assessed, in accordance with the methodology presented in Vol 2.

5.6.6 Unless stated the effects described below apply to both Year 1 of operation and Year 6 of operation.

Designations and habitats

Improvements in habitat quality through changes in water quality

5.6.7 The predicted increases in DO concentrations and reductions in organic material and sewage derived litter would result in localised improvements in habitat quality. This may be characterised by increased levels of photosynthesis by microscopic algae within the water column, termed primary production. These algae form the basis of the estuarine food chain, providing a food source for fish and invertebrates. The gradual breakdown and removal of sewage derived litter associated with the sewage discharge would contribute to the recovery. The effects are considered to **negligible** at Year 1 increasing to **minor beneficial** by Year 6, given the medium-high (metropolitan) value of the receptor and the low positive magnitude of the impact.

Marine mammals

Increase in the number and/or change in the distribution of marine mammals

5.6.8 No changes are anticipated on marine mammals as a result of the water quality improvements associated with interception of a single CSO. This is because they are relatively insensitive to point source sewage discharges. Improvements in habitat quality due to the reduction in sewage derived litter may make the habitat more favourable, although the factor determining its use by seals relates predominantly to the lack of disturbance rather than water quality. Effects are considered **negligible**, given the low-medium (local) value of the receptor and the low positive magnitude of the impact.

Fish

Reduction in the occurrence of dissolved oxygen related fish mortalities

5.6.9 Control of the CSOs throughout the tidal Thames would result in far fewer hypoxia events. The TFRM has been used to predict the change in the number of hypoxia events, and the results are reported in Vol 3. In summary, all Tidal Thames fish populations would become sustainable (i.e., less than 10% mortality as a result of hypoxia (Turnpenny, *et al,* 2004)[18], compared with the current baseline in which there is a greater than 10% mortality due to hypoxia for four key species (smelt, dace, flounder and common goby).

5.6.10 Control of the Holloway Storm Relief CSO would contribute to Tidal Thames-wide improvement, but would also result in improvements in the local area. Given that the impact is considered to be low positive, and the value of the receptors is medium-high (metropolitan), the effect is thus considered to be **minor beneficial**.

Increase in the distribution of pollution sensitive fish species

5.6.11 The Tidal Thames currently supports a small number of rare fish species such as salmon, sea trout, twaite shad and river lamprey (*Lampetra fluviatilis*). A number of factors limit the colonisation of habitats by these species, including salinity, substrate type and current, but pollution is known to be a considerable factor in determining colonisation (Maitland, PS, and Hatton-Ellis, TW, 2003)[19]. Improving water and sediment quality would facilitate the spread of those pollution sensitive species which are currently being impeded by poor water and sediment quality.

5.6.12 EA data have indicated no records of rare fish species in the vicinity of the Holloway Storm Relief CSO discharge site and habitat quality at this site is limited by confinement of the river channel between vertical river walls, which limits the extent of intertidal habitat and leads to increased current velocities. Given that the impact is considered to be low positive, and the value of the receptors is medium-high (metropolitan), the effect is thus considered to be **negligible** in the short term (Year 1), and **minor beneficial** in the medium term (Year 6), since it would take time for fish species to colonise.

Improvement in the quality of foraging habitat

5.6.13 Intertidal habitat in the upper and middle Tidal Thames is used by juvenile fish for foraging. For example, juvenile flounder, bass and smelt migrate to the tidal limit in spring and early summer and then migrate downstream in search of suitable foraging habitat. As habitat quality improves as described in para. 5.6.7, and the invertebrate community becomes more diverse (paras. 5.6.14 to 5.6.19) foraging opportunities for fish may increase. Given that the impact is considered to be low positive, and the value of the receptors is medium-high (metropolitan), the effect is considered to be **negligible** in the short term (Year 1), increasing to **minor beneficial** in Year 6 of operation as it would take time for fish species to colonise.

Invertebrates

Localised improvements in invertebrate diversity and abundance

5.6.14 Improvements in DO concentrations are likely to lead to an increase in the distribution of a range of species that are currently being suppressed by poor water quality conditions. Some of these improvements will occur under the base case due to the Lee Tunnel and sewage treatment works upgrades. However, even with these improvements in place there are still predicted to be a number of occasions during an average year when DO standards would be breached. Colonisation by DO sensitive taxa such as Corophiidae, Crangonidae and Gammaridae which would otherwise occur within the brackish zone would continue to be suppressed.

5.6.15 Full compliance with the standards as a result of the Thames Tideway Tunnel is expected to enable colonisation by these DO sensitive taxa. In the localised areas around CSO discharges gradual reductions in organic material associated with sewage would also allow for a transition from invertebrate communities dominated by small numbers of species to a more diverse and balanced community. For example, pollution sensitive

estuarine taxa such as Corophiidae, Crangonidae, Gammaridae, Sphaeromatidae, Nuculidae, Anthuridae, and Palaemonidae may be expected to increase in abundance.

5.6.16 Improvements in water quality could theoretically selectively enhance colonisation by invasive, non-native species. However, studies on mitten crabs, for example, state that improvement of water quality does not necessarily lead to an increased distribution (Veilleux, E, and de Lafontaine, Y, 2007)[20].

5.6.17 Given that the impact is considered to be low positive, and the value of the receptors is medium (borough), the effect is considered to be **negligible**.

Increase in the distribution of pollution sensitive invertebrate species

5.6.18 The Tidal Thames currently supports a small number of rare invertebrate species, such as swollen spire snail and tentacled lagoon worm. A number of factors limit the colonisation of habitats by these species, including salinity, substrate type and current, but pollution is known to be an important factor in determining colonisation. Improving water and sediment quality would facilitate the spread of those pollution sensitive species which are currently being impeded by poor water and sediment quality.

5.6.19 EA data and bespoke project surveys have indicated no records of rare invertebrate species in the vicinity of Holloway Storm Relief CSO (other than *A. lacustre* which as discussed although uncommon nationally is common in the Tidal Thames). Given that the impact is considered to be low positive, and the value of the receptors is medium (borough), the effect is thus considered to be **negligible**.

Algae

Changes in algal communities

5.6.20 The reduction in nutrient levels, both in the water column and the sediments in the vicinity of the discharge may cause local changes to the algal communities of the river wall. Whilst it is not possible to predict these changes precisely it is likely that the reduction in nutrients would contribute to the recovery of algal flora, with pollution sensitive species becoming a more common component of the community at the expense of more pollution tolerant species.

5.6.21 However, habitat availability would remain a key factor determining the diversity and abundance of algal communities and so the effects associated with the Thames Tideway Tunnel are considered to be **negligible**, given the low-medium (local) value of the receptor and the low positive magnitude of impact.

Sensitivity test for programme delay

5.6.22 For the assessment of effects on aquatic ecology during construction, a delay to the Thames Tideway Tunnel project of approximately one year would not be likely to materially change the assessment findings reported above (paras. 5.6.1 to 5.6.21). This is because there are no developments in the site development schedule that would fall into the

base case as a result of this delay and therefore the base case would remain as described in paras. 5.4.55 to 5.4.58.

5.7 Cumulative effects assessment

5.7.1 As described in Section 5.3, during the operational phase there are no schemes within the site development schedule identified that would have an impact on aquatic ecology receptors, and so no cumulative impacts with the proposed development would arise. Therefore the effects on aquatic ecology would remain as described in Section 5.6.

Sensitivity test for programme delay

5.7.2 In the event that the programme for the Thames Tideway Tunnel project is delayed by approximately a year, the cumulative effects assessment would remain unchanged. As described above in para. 5.7.1, there are no schemes anticipated to generate cumulative effects on aquatic ecology and this would remain the case with a programme delay of approximately one year.

5.8 Mitigation

5.8.1 No mitigation is required at Bekesbourne Street since the effects on aquatic ecology receptors are associated only with the improvements in water quality arising from interception of the CSO.

5.8.2 A monitoring programme to measure the recovery of aquatic ecology receptors throughout the Tidal Thames following interception of the CSO network will be implemented.

5.9 Residual effects assessment

Operational effects

5.9.1 As no mitigation measures are proposed, the residual operational effects remain as described in Section 5.6. All residual effects are presented in Section 5.10.

5.10 Assessment summary

Vol 27 Table 5.10.1 Aquatic ecology –summary of operational assessment

Receptor	Effect	Significance of effect		Mitigation	Significance of residual effect
		Year 1	Year 6		
Designations and habitats	Improvements in habitat quality through changes in water quality	Negligible	Minor beneficial	None	Minor beneficial
Marine mammals	Increase in the number and/or change in the distribution of marine mammals.	Negligible	Negligible	None	Negligible
Fish	Reduction in the occurrence of low dissolved oxygen related fish mortalities	Minor beneficial	Minor beneficial	None	Minor beneficial
	Increase in the distribution of pollution sensitive fish species.	Negligible	Minor beneficial	None	Minor beneficial
	Improvement in the quality of foraging habitat	Negligible	Minor beneficial	None	Minor beneficial
Invertebrates	Localised improvements in invertebrate diversity and abundance.	Negligible	Negligible	None	Negligible

Receptor	Effect	Significance of effect		Mitigation	Significance of residual effect
		Year 1	Year 6		
	Increase in the distribution of pollution sensitive invertebrate species.	Negligible	Negligible	None	Negligible
Algae	Changes in algal communities	Negligible	Negligible	None	Negligible

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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 assessment

Section 6: Ecology - terrestrial

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Environmental Statement

Volume 27: Minor work sites

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6 Ecology – terrestrial

6.1 Introduction

6.1.1 Construction and operational effects for terrestrial ecology at the Bekesbourne Street site have not been assessed. This is on the basis that no significant adverse effects on terrestrial ecology are anticipated during either construction or operation, as there are no notable species or habitats known to be present, or the potential for them to be present, on or adjacent to the site.

6.1.2 This section nevertheless presents details of engagement, baseline information and an overview of the reasons why this topic has been scoped out.

6.1.3 Likely significant effects on aquatic ecology are reported in Section 5 of this volume.

6.1.4 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Vol 27 Minor work sites Figures).

6.2 Engagement

6.2.1 Volume 2 Environmental assessment methodology documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. No comments relevant to this site were received for this site.

6.3 Baseline

6.3.1 There are no designated sites relevant to terrestrial ecology within 250m of the site that could be affected by construction or operation at the Bekesbourne Street site (Vol 27 Figure 6.4.1, see separate volume of figures). The aquatic ecology assessment in Section 5 considers effects on designated sites relevant to aquatic ecology.

6.3.2 A Phase 1 Habitat Survey (Vol 27 Figure 6.4.2, see separate volume of figures) identified that habitat is limited to hardstanding and immature ornamental trees. Eight of these trees would be removed. The hardstanding has negligible biodiversity value. The immature trees have low intrinsic biodiversity value and are unlikely to support nesting bird species.

6.4 Overview

6.4.1 It is confirmed that there is no potential for likely significant effects on terrestrial ecology arising from the construction or operation of the proposed development at Bekesbourne Street as the site comprises habitats of limited ecological value and therefore the proposed

development is unlikely to result in significant adverse effects on notable species.

6.4.2 Replacement tree planting would be provided for the trees to be removed during works at Bekesbourne Street. In the unlikely event that sensitive receptors are found on site during construction, such as nesting birds, management measures in line with the *Code of Construction Practice* (*CoCP*) would be implemented in conjunction with the contractors' site specific Ecological and Landscape Management Plan. The *CoCP* is provided in Vol 1 Appendix A. It contains general requirements (*Part A*), and site-specific requirements for this site (*Part B*).

6.4.3 In the event that the programme for the Thames Tideway Tunnel project is delayed by approximately one year, it is not anticipated that the ecological value of the site described in Section 6.3 would change and therefore this site would remain scoped out.

Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Environmental Statement

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Volume 27: Minor Works Sites assessment

Section 7: Historic environment

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7 Historic environment

7.1 Introduction

7.1.1 This section presents the findings of the assessment of the likely significant effects of the proposed development on the historic environment at the Bekesbourne Street site. The historic environment is defined in para 4.10.2 of the NPS as including all aspects of the environment resulting from interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora. For the purposes of this assessment, heritage assets comprise below and above-ground archaeological remains, buildings, structures, monuments and heritage landscapes within and around the site. Effects during construction are assessed with effects on buried assets presented first, followed by above-ground assets.

7.1.2 Based on a review of the noise and vibration assessment (Section 9), it is concluded that there would be no significant noise or vibration effects requiring offsite mitigation to any listed building. Such effects are therefore not considered further in this assessment.

7.1.3 Operational effects for buried heritage assets for this site have not been assessed. This is on the basis that the operational phase would not involve any activities below-ground aside from maintenance within the below-ground Thames Tideway Tunnel project structures. Therefore no significant operational effects are considered likely.

7.1.4 There are no known buried or above-ground heritage assets of high significance in the assessment area, the setting of which would be a consideration, given the limited extent of the works at this site. Effects on setting have therefore not been assessed.

7.1.5 An assessment of effects from ground movement resulting from the Thames Tideway Tunnel itself is covered in Volume 3 Project-wide Effects. No effects are predicted on historic receptors in the vicinity of this site, therefore no assessment of ground movement effects is presented.

7.1.6 The assessment of the historic environment effects of the project has considered the requirements of the National Policy Statement for Waste Water (NPS). As such the assessment covers designated and non-designated assets, and a description of the significance of each heritage asset affected by the proposed development. The assessment covers both above and below ground assets. The effect of the proposed development on the significance of heritage assets is clearly detailed in line with the requirements of the NPS. The role of the design process in helping to minimise effects on the historic environment is explained, and where appropriate, mitigation is proposed. Vol 2 Section 7 provides further details on the methodology.

7.1.7 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work site Figures).

7.2 Proposed development relevant to the historic environment

7.2.1 The proposed development is described in Section 3 of this volume. The elements of the proposed development relevant to the historic environment are set out below.

Construction

7.2.2 All below-ground works during construction are relevant to the assessment because they would potentially truncate or entirely remove any archaeological assets within the footprint of the works. These are described below.

7.2.3 Existing parking bays, lamp posts and other street furniture, including CCTV poles and bollards to either side of Bekesbourne Street would be removed.

7.2.4 It is assumed for the purposes of this assessment that construction of the temporary works compounds at Bekesbourne Street and Ratcliffe Lane would entail preliminary stripping of the existing road/paving to reach a depth of approximately 0.5 m below-ground level (mbgl). A number of trees would be removed. Site fencing would be erected to create gated temporary work compounds, supported by posts in concrete foundations. Office, storage and welfare facilities (see Construction phases plan, separate volume of figures – Section 1) would be constructed on pad foundations with a depth of approximately 1.0mbgl, as assumed for the purposes of this assessment. Initial site set up would entail the diversion of existing services and the construction of new service trenches approximately 1.0–4.5m deep, as assumed for the purposes of this assessment.

7.2.5 Permanent below-ground works would include excavations for the construction of a penstock and flapvalve chamber over the line of the existing Holloway Storm Relief Sewer. A ventilation duct would be constructed, connecting this chamber to a ventilation column in the northern part of the site, opposite the existing entrance to Limehouse Docklands Light Railway (DLR) Station at Ratcliffe Lane. Excavation would also be required for control cables to be located between the electrical and control kiosk and the penstock and flapvalve chamber (see Site works parameter plan, separate volume of figures - Section 1).

7.2.6 Following the reinstatement of the road, a permanent above-ground electrical and control kiosk would be constructed adjacent to the western site boundary at Bekesbourne Street. This would be constructed on pad foundations with a depth of approximately 1.0mbgl, as assumed for the purposes of this assessment.

7.2.7 Following construction works, the road surface would be reinstated and trees planted to either side of Bekesbourne Street. Ground intrusion from tree planting and root action is assumed for the purposes of this assessment to reach a depth of approximately 1.5mbgl.

Code of Construction Practice

7.2.8 Measures incorporated into the *Code of Construction Practice* (*CoCP*) Part A (Section 12) to protect heritage assets include:

a. The requirement for the contractor to prepare a site-specific *Heritage Management Plan* (HMP), indicating how the historic environment is to be protected. This may take form of both physical protection and working practices.

b. Protective measures, such as temporary support, hoardings, barriers, screening and buffer zones around heritage assets, and archaeological mitigation areas within and adjacent to worksites.

c. Advance assessment to inform the types of plant and working methods for use where heritage assets are close to worksites, or attached to structures that form parts of worksites.

d. Security procedures to prevent unauthorised access to heritage assets and archaeological investigations, and damage to or theft from them, including by the use of metal detectors.

e. Procedures in the event of the discovery of human remains.

f. Procedures under the Treasure Act Code of Conduct 1997, to address the discovery of any artefacts defined in the Treasure Act 1996.

7.2.9 The *Code of Construction Practice (CoCP)* is provided in Vol 1 Appendix A. It contains general requirements (Part A), and site specific requirements for this site (Part B).

7.2.10 There are no site-specific measures in the *CoCP* Part B (Section 12).

7.2.11 All the measures detailed above form part of the proposed development subject to the assessment, and therefore impacts such as strike damage on heritage assets are considered unlikely to occur and are not assessed. However, site specific measures to mitigate effects on buried heritage, which would be detailed in *Site Specific Archaeological Written Scheme of Investigation [SSAWSI])*, in line with the *Overarching Archaeological Written Scheme of Investigation (OAWSI)* (Vol 2 Appendix E.2), would be subject to the findings of field evaluation, and are therefore reported as mitigation as detailed further in para 7.8.4.

7.3 Assessment methodology

Engagement

7.3.1 Volume 2 Environmental assessment methodology documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. Throughout the environmental impact assessment (EIA) there has been regular liaison with English Heritage and other stakeholders. There were no site-specific comments for this site.

Baseline

7.3.2 The baseline methodology follows the methodology described in Vol 2. It should be noted that whilst most topics within the ES use the term 'value' to define the sensitivity of environmental receptors within the baseline, the historic environment assessment uses 'asset significance' as per the terminology used within the NPS. Distinction is made between the significance of the resource, i.e. asset significance, and the significance of the environmental effect throughout the following assessment. There are no site-specific variations for undertaking the construction assessment of this site.

7.3.3 Baseline conditions for buried and above-ground heritage assets are described within a 150m-radius area around the centre point of the site, which is considered through professional judgement to be most appropriate to characterise the buried heritage potential of the site. There are occasional references to assets beyond the baseline area, for example, the chance find of a prehistoric flint blade at the junction of Cable Street and Butcher Row, 150m to the southwest of the site; the Roman city of *Londinium*, 2.5km to the west; Roman finds and features discovered in Shadwell 550m to the west; and the medieval settlement at Ratcliff Cross, 235m to the southwest, which contribute to current understanding of the site and its environs in the prehistoric, Roman and medieval periods.

7.3.4 A site visit was carried out in April 2011 to identify heritage assets on or adjacent to the site.

Construction

7.3.5 The assessment methodology for the construction phase follows that described in Vol 2.

7.3.6 In terms of physical effects on above-ground or buried assets, likely significant effects could arise throughout the construction phase. Effects arising from all stages of the construction period are therefore assessed. The construction assessment area for such effects is defined by the site boundary.

7.3.7 Section 7.5 details the likely significant effects arising from the construction at the Bekesbourne Street site. There are no other Thames Tideway Tunnel project sites which could give rise to additional effects on the historic environment within the assessment area for this site, therefore no other Thames Tideway Tunnel project sites are considered in this assessment.

7.3.8 Archaeological remains are a static resource, which have reached equilibrium with their environment and do not change (ie, decay or grow) unless their environment changes as a result of human or natural intervention. Furthermore, none of the schemes listed in the site development schedule (Vol 27 Appendix N) would affect heritage assets within the site.

7.3.9 Whilst the baseline within the baseline area beyond the site may change as a result of any archaeological excavation and recording carried out as

part of a standard programme of mitigation for other developments, such as those listed in the site development schedule (Vol 27 Appendix N), such information is unlikely to significantly change the current understanding of the historic environment of the site. Therefore any changes to the surrounding baseline would not affect the assessment and are not detailed further within the construction base case.

7.3.10 The site development schedule (Vol 27 Appendix N) identifies no schemes for consideration in terms of cumulative effects. Therefore no assessment of cumulative effects has been undertaken for the construction phase.

7.3.11 Should the programme for the Thames Tideway Tunnel project be delayed by approximately one year, this would lead to no change in the assessment findings, and is therefore not considered further in the assessment. As described above, whilst the baseline within the area beyond the site may change as a result of any archaeological excavation and recording carried out as part of a standard programme of mitigation for other developments, such information is unlikely to significantly change the current understanding of the historic environment of the site. Therefore a delay to the Thames Tideway Tunnel project, with a consequent change in other schemes which may have been developed by the time of Thames Tideway Tunnel project construction, would not lead to any change in the baseline and therefore no change in the assessment of effects on these assets.

Assumptions and limitations

7.3.12 The assumptions and limitations associated with this assessment are presented in Vol 2. Site-specific assumptions and limitations are detailed below.

Assumptions

7.3.13 The assessment of effects on buried heritage assets is based on below-ground structures being located anywhere within the limits of deviation identified on the permanent works plan for these structures. For this site the assessment is not sensitive to variations in location within these limits of deviation because the desk-based assessment has not located any buried heritage assets of high significance within the site, which would warrant preservation *in situ,* (see Site works parameter plan, separate volume of figures - Section 1).

7.3.14 A number of assumptions have been made regarding the likely depth of temporary construction works (eg, site strip, footings for plant and accommodation), based on professional knowledge of construction projects. Whilst the precise nature of construction effects on buried heritage would vary if the depths varied, the mitigation proposed to address any effects would remain as stated, as would the residual effects. These assumptions are detailed in Section 7.2.

Limitations

7.3.15 A limitation of the assessment is that no intrusive archaeological investigation has been carried out on the site in the past. Nevertheless

the assessment is considered to be robust and in accordance with best practice.

7.4 Baseline conditions

7.4.1 The following section sets out the baseline conditions for the historic environment within and around the site. Future baseline conditions (base case), which would remain as per the baseline, are also described. The section comprises seven sub-sections:

a. a description of historic environment features within the 150m-radius area

b. a description of statutorily designated assets within the site and baseline area. Locally designated assets and known burial grounds are included, where relevant, as described in Volume 2

c. a description of the site location, topography and geology

d. a summary of past archaeological investigation, providing an indication of how well the area is understood archaeologically

e. a chronological summary of the archaeological and historical background of the site and its environs

f. a statement of significance for buried heritage assets, taking account of factors affecting survival

g. a statement of significance for above-ground assets within and around the site, describing the features which contribute to their significance.

Current baseline

Historic environment features

7.4.2 The historic environment features map (see Vol 27 Figure 7.4.1, separate volume of figures) shows the location of known above-ground and buried historic environment features within the baseline area, compiled from the baseline sources set out in the methodology in Vol 2. These have been allocated a unique historic environment assessment reference number (HEA 1, 2, etc), which are listed in the gazetteer in Vol 27 Appendix E.1.

Designated assets

International and national statutory designations

7.4.3 The site does not contain any nationally or internationally designated (protected) heritage assets, such as scheduled monuments, listed buildings or registered parks and gardens. There are several listed buildings within the baseline area. Those closest to the site comprise a Grade II listed railway viaduct (HEA 15) 30m to the east of the site, and the Grade II listed Royal Foundation of St. Katherine's Chapel (HEA 7) lies approximately 55m to the southwest of the site. There are no above-ground assets of heritage significance within the site, as detailed in para. 7.4.34.

Local authority designations

7.4.4 The northern part of the site (which includes the northern half of Ratcliffe Lane and Limehouse Docklands Light Railway Station), is located within the York Square Conservation Area. The purpose of the designation is to protect the architectural integrity of the Mercer's Estate, and the diverse concentration of historic buildings around Commercial Road and along Butcher Row. The site does not lie within an archaeological priority area.

Known burial grounds

7.4.5 There are no known burial grounds within the site. The nearest recorded burial ground is that associated with the former 18th century Rose Lane Meeting House (HEA 2), approximately 20m to the northwest of the site. This was entirely removed by the construction of the East London Railway in 1836–1840. Approximately 50m to the southwest of the site is the early Victorian graveyard of St. James, Ratcliffe, which was cleared in 2002 (HEA 5). There is no historic map or documentary evidence to suggest that these burial grounds ever extended into the site.

Site location, topography and geology

7.4.6 The site boundary includes the southern section of Bekesbourne Street and a small section of Ratcliffe Lane, in the northern part of the site, at the junction of the two streets. Paved areas to either side of the road sections are also included within the site boundary. The site is bounded to the east by John Scurr House and to the west and south by residential properties. Limehouse DLR Station lies adjacent to the northeast.

7.4.7 The land on which the site is situated slopes down from north to south towards the Thames foreshore. Ground levels across the site lie at approximately 107.5–109.0m ATD (above Tunnel Datum).

7.4.8 The British Geological Survey (BGS) indicates that the site is located on an outcrop of Langley Silt complex (also known as brickearth), to the north of lower-lying alluvial deposits associated with the River Thames.

7.4.9 A north-south longitudinal section through Bekesbourne Street, produced in 1881 to illustrate the construction of the Mile End Road branch of the Holloway Storm Relief Sewer, (see Vol 27 Appendix E Plate E.5), includes a geological cross-section of the northern part of the site, at the junction of Ratcliffe Lane and Bekesbourne Street. The top of London Clay is located at a depth of approximately 6.3m below contemporary ground level. This is overlain by c. 4.5m-thick deposits of sands and gravels, although natural gravels and brickearth deposits have not been differentiated. These deposits are in turn overlain by approximately 1.6m of made ground.

7.4.10 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), approximately 100m to the west of the site. The results of the excavation revealed the top of brickearth at 106.1m ATD, overlying sand and gravel at approximately 105.4m ATD. A BGS borehole adjacent to John Scurr House revealed the top of brickearth at a depth of approximately 104.7m ATD.

7.4.11 The site topography and geology is discussed in more detail in Vol 27 Appendix E.2.

Past archaeological investigations

7.4.12 No archaeological investigations have been carried out in the site in the past. There have been four archaeological investigations within the baseline area (HEA 1, 3, 5 and 6) which have revealed remains dating mainly to the 17th to 19th centuries, reflecting the rapid residential and industrial growth of Ratcliff in this period. Further details of past archaeological investigations carried out within the site and baseline area are included in Vol 27 Appendix E.3.

Archaeological and historical background of the site

7.4.13 The following section presents a chronological summary of the archaeological and historical background of the site. Further detail is included in Vol 27 Appendix E.4.

7.4.14 There are no known finds or features dating to the prehistoric period (700,000 BC–AD 43) within the site. The well drained gravel terrace on which the site is located, close to the River Thames approximately 200m to the south, would have been a first choice for early settlement. The closest finds dating to this period were recovered during an archaeological investigation as part of the Limehouse Link Road development (HEA 3), approximately 100m to the southwest of the site, and comprised numerous Neolithic and Bronze Age flint artefacts.

7.4.15 In the Roman period (AD 43–410), the site lay approximately 0.5–1.0km to the east of the closest known Roman settlement at Shadwell. Only one previous investigation within the baseline area has revealed Roman material: this was residual (within the infill of post-medieval features) and included tile fragments. The site probably lay within open marginal land in this period.

7.4.16 There are no known finds or features dating to the early medieval period (AD 410–1066) within the site or baseline area. Early post-medieval maps, dating from the mid-17th century, show the site lying within open fields to the north of built up areas along the riverbank, and it is likely that the site was undeveloped until the later 17th or 18th century.

7.4.17 The later medieval (AD 1066–1485) settlement at Ratcliff clustered around Broad Street and Ratcliffe Cross, approximately 235m to the southwest of the site, although no evidence of settlement from this period has been identified within the baseline area. The population of the area gradually rose, but it is likely that the site, which lay to the north of the main areas of shipbuilding activity, remained open ground throughout this period.

7.4.18 The site did not begin to be built up until the turn of the 18th century, as illustrated by historic maps. By the mid 18th century Rose Lane (the current Ratcliffe Lane), and London Street (the current Bekesbourne Street) had both been constructed, and either side of London Street was lined with terraced houses. Both streets are shown on maps as narrower than their modern counterparts (which were widened to their current extent

following the Second World War) and the site boundary therefore partially includes the footprints of earlier buildings.

7.4.19 By the mid-19th century the landscape of Ratcliff was almost entirely dominated by buildings. London Street and Rose Lane remained largely residential, with industrial buildings and warehouses, including a sugar refinery (HEA 8) and timber yards, constructed to the east and west. Further development was prompted by the construction of the Regent's Canal Dock, to the east of the site, and the East London (London and Blackwall) Railway line, to the north, in the mid-19th century.

7.4.20 In 1881, part of the Mile End Road branch of the Holloway Storm Relief Sewer was constructed beneath London Street (through the centre of the site). This rain water overflow sewer ran along Rose Lane, before turning south down London Street, and continuing on to an outfall on the Thames foreshore, approximately 200m to the south of the site.

7.4.21 By the early 20th century, the terraced houses directly fronting either side of London Street had been demolished and replaced by a large saw mill to the east, and new, larger buildings to the west, probably residential blocks of flats. London Street was stopped-up to through traffic and remodelled as open access space in front of the flats. By the end of the 1940s, the timber yard to the east had been replaced by John Scurr House. The residential blocks to the west of the site were subsequently replaced by new housing: by the end of the 1990s, the Docklands Light Railway (DLR) had been constructed and part of the paved area adjacent to Limehouse DLR Station currently occupies the northeastern part of the site.

Statement of significance: buried heritage assets on the site

Introduction

7.4.22 The following section discusses past impacts on the site which are likely to have compromised asset survival (generally from late 19th and 20th century developments, eg, building foundations), identified primarily from historic maps, the site walkover survey, and information on the likely depth of deposits.

7.4.23 In accordance with the National Policy Statement for Waste Water (Defra, 2012)[1], National Planning Policy Framework (DCLG, 2012)[2] and PPS5 Planning Practice Guide (DCLG, 2010)[3], (which remains extant), this is followed by a statement on the likely potential for and significance of buried heritage assets within the site, derived from current understanding of the baseline conditions, past impacts, and professional judgement.

Factors affecting survival

7.4.24 Archaeological survival potential is likely to be high across the majority of the site, with localised superficial disturbance at the edges of the site from works for the widening of pavements adjacent to Bekesbourne Street carried out in the 1940s. These works are likely to have reached a maximum depth of approximately 0.5–1.0mbgl, and may have locally truncated the foundations of 18th–19th century buildings which originally directly fronted Bekesbourne Street. Other factors affecting survival include:

a. The development of land either side of the site, eg, the construction of the former Bekesbourne Buildings and John Scurr House, is likely to have caused localised ground disturbance, eg, for services and associated paving/landscaping, to a maximum depth of 1.0–1.5mbgl. This will have locally truncated or entirely removed any remains from within the footprints of these works.

b. The construction of the Holloway Storm Relief Sewer, achieved by excavating through natural clay, with access/ventilation shafts located outside the area of the proposed below-ground works, will not have affected archaeological remains.

7.4.25 The made ground/archaeological deposit sequence is likely to extend to a depth of approximately 3.0–4.0mbgl, with the upper 1.5–1.8m comprising made ground. The made ground may contain make-up layers related to the construction and re-surfacing of Bekesbourne Street and Ratcliffe Lane in the 17th–19th centuries. Brickearth deposits, if present, would be located beneath the made ground overlying natural gravels, and are predicted to be c. 0.5–1.0m thick.

7.4.26 The 20th century landscaping and services works described above are likely to have locally affected 18th–19th century footings of buildings at the eastern, western and northern edges of the site. Any medieval and earlier archaeological remains within the footprint of Bekesbourne Street and Ratcliffe Lane, if present, as well as within those areas not locally affected by the impacts above, are likely to remain intact.

Asset potential and significance

7.4.27 The following statement of asset significance takes into account the levels of natural geology and the level and nature of later disturbance and truncation.

Palaeoenvironmental

7.4.28 The site has a low potential to contain palaeoenvironmental remains. The site is situated on brickearth overlying river terrace gravels. A borehole immediately adjacent to the eastern site boundary did not reveal any alluvial deposits which would have the potential to preserve palaeoenvironmental remains. If present, such remains would be of low or medium significance depending on their nature and degree of preservation, as derived from their evidential value.

Prehistoric

7.4.29 The site has an uncertain, probably low to moderate potential to contain prehistoric remains. Although flint artefacts dating to the later prehistoric period have been discovered to the south of the site, it is uncertain whether these are evidence of activity or residual finds (ie, outside the context in which they were originally deposited). Redeposited finds (moderate probability) would be of low significance, whilst localised settlement evidence (low probability) would be of medium or high significance, as derived from the evidential value of such remains.

Roman

7.4.30 The site has an uncertain, probably low potential to contain Roman remains. Past archaeological investigation within the baseline area revealed residual Roman material, including tile, within the infill of later, post-medieval features, and, unlike nearby Shadwell, where the remains of burials and high status buildings have been discovered, there is no evidence to suggest the site or its immediate vicinity was settled in this period. Isolated artefacts would be of low significance, as derived from their evidential value.

Early medieval

7.4.31 The site has a low potential to contain early medieval remains. There are no known finds or features dated to this period within the site or baseline area, and the site probably lay within open land, to the south of the settlement concentrated around the parish church of St. Dunstan and All Saints. Isolated rural landscape features such as field drainage ditches, if present, would be of low significance.

Later medieval

7.4.32 The site has a low potential to contain later medieval remains. There are no finds or features dated to this period within the site or baseline area. It is likely that the open marshland to the south began to be reclaimed in this period, perhaps for pasture or agriculture. Pre-18th century maps show the site as lying in an area of open fields and it is unlikely that later medieval remains will be found on the site. Evidence of cultivation soils or agricultural features such as ditches would be of low significance. This would be derived from their evidential and historical value.

Post-medieval

7.4.33 The site has a high potential to contain post-medieval remains. The site and its immediate vicinity began to be developed into a mixed industrial and residential area from the beginning of the 18th century onwards. It is possible that the footings of 18th–19th century terraced houses which formerly fronted Bekesbourne Street and Ratcliffe Lane may survive at the edges of the site boundary, possibly with the bases of associated features such as cess pits or wells. Remains of the 17th–19th century road surfaces of Bekesbourne Street and Ratcliffe Lane may survive within and beneath the existing roads. Such remains, if present, would be of low significance. This would be derived from their evidential and historical value.

Statement of significance: above-ground heritage assets

7.4.34 There are no above-ground assets of heritage significance within the site.

Construction base case

7.4.35 As described in paras. 7.3.8 and 7.3.9, no developments identified within the site development schedule would lead to any loss of or change in the buried heritage assets within the site. The base case for assessing construction effects within the site would therefore be the same as the baseline.

7.5 Construction effects assessment

Buried heritage assets

7.5.1 Effects of construction works are described in the following section, with the individual impacts described. The effects on heritage assets are summarised in Section 7.10, by chronological period.

Site setup and construction of electrical and control kiosk

7.5.2 Works carried out as part of the initial site setup, including service diversion, site strip, and footings for office, storage and welfare facilities and fencing, and also the foundations of a permanent electrical control kiosk would potentially truncate archaeological remains. Given their localised nature, and the likely depth of made ground across the site, these works would comprise a low level of impact on any surviving 17th–19th century road and terraced houses remains of low asset significance, resulting in a **minor adverse** effect.

Construction of the penstock and flapvalve chamber, and ventilation duct

7.5.3 Deep ground disturbance for the penstock and valve chamber would entirely remove any archaeological remains present from within its footprint. Excavations for the construction of the ventilation duct would be deep enough to locally truncate, and possibly entirely remove, any archaeological remains present. These works would constitute a high magnitude of impact for any affected assets, reducing asset significance to negligible. The environmental effect would vary depending on the significance of the assets removed, as detailed below:

a. The site has a low potential for palaeoenvironmental remains, of low or medium asset significance. Removal of such remains would comprise a **minor adverse** effect.

b. The site has an uncertain, probably moderate potential for redeposited prehistoric artefacts, of low asset significance. Removal of such remains would constitute a **minor adverse** effect.

c. There is an uncertain, probably low potential for localised prehistoric activity and settlement remains, which are likely to be of medium or high asset significance, if present. Removal of such remains would constitute a **moderate or major adverse** effect.

d. There is an uncertain, probably low potential for redeposited Roman remains of low asset significance. The removal of such remains would constitute a **minor adverse** effect.

e. There is a low potential for early/later medieval land reclamation/ drainage ditches of low asset significance. The removal of such remains would constitute a **minor adverse** effect.

f. There is a high potential for 17th–19th century road and terraced house remains of low asset significance. The removal of such remains would constitute a **minor adverse** effect.

7.6 Operational effects assessment

7.6.1 As detailed in Section 7.1, operational effects on the historic environment have not been assessed for the Bekesbourne Street site.

7.7 Cumulative effects assessment

7.7.1 As detailed in the site development schedule (Vol 27 Appendix N) no schemes have been identified within 1km of the site which meet the criteria for inclusion in the cumulative assessment. Therefore no assessment of cumulative effects has been undertaken.

7.8 Mitigation

7.8.1 As per the NPS, (para 4.10.19), a documentary record of a heritage asset is not as valuable as retaining the heritage asset, and it should not be a factor in the decision as to whether or not development consent is given. Nevertheless, it is the most appropriate form of mitigation available and in EIA terms serves to reduce the significance of the adverse effect, as has been agreed with English Heritage.

Buried heritage assets

7.8.2 Based on this assessment, no heritage assets of high significance are anticipated that would merit a mitigation strategy of permanent preservation *in situ*. It is therefore considered that the minor to major environmental effects of the proposed development on buried heritage assets within the site during the construction phase could be successfully mitigated with the advancement of understanding of asset significance by a suitable programme of archaeological investigation before and/or during construction, to achieve preservation by record.

7.8.3 Subject to the detailed construction methodology employed by the contractor, mitigation of the adverse effects upon archaeological remains within the site would include an archaeological watching brief during site preparation and construction, as appropriate.

7.8.4 Both evaluation and mitigation would be carried out in accordance with a scope of works (*Site Specific Archaeological Written Scheme of Investigation [SSAWSI]*), based on the principles in the *Overarching Archaeological Written Scheme of Investigation (OAWSI)*, to ensure that the scope and method of fieldwork are appropriate. The *SSAWSI* would be submitted in accordance with the application for development consent (the 'application') requirement.

7.9 Residual effects assessment

7.9.1 With the mitigation described above in place, the residual construction effects on buried and above-ground heritage assets would be **negligible**. All residual effects are presented in Section 7.10.

7.10 Assessment summary

Vol 27 Table 7.10.1 Historic environment – summary of construction assessment

Asset (receptor)	Effect	Significance of effect	Mitigation	Significance of residual effect
Buried heritage assets				
Low potential for palaeoenvironmental remains (Low or medium asset significance)	Assets removed by excavation for the penstock and flapvalve chamber, and ventilation duct. Asset significance reduced to negligible.	Minor adverse	Archaeological watching brief prior to and during construction to achieve preservation by record.	Negligible
Uncertain, probably low to moderate potential for prehistoric residual artefacts (low asset significance); probably low potential for prehistoric settlement evidence (medium or high asset significance)	Assets removed by excavation for the penstock and flapvalve chamber, and ventilation duct. Asset significance reduced to negligible.	Minor adverse (artefacts) to moderate or major adverse (settlement evidence)	Archaeological watching brief prior to and during construction to achieve preservation by record.	Negligible
Low potential for residual Roman artefacts (Low asset significance)	Assets removed by excavation for the penstock and flapvalve chamber, and ventilation duct. Asset significance reduced to negligible.	Minor adverse	Archaeological watching brief prior to and during construction to achieve preservation by record.	Negligible
Low potential for evidence of early and	Assets removed by excavation for the penstock and flapvalve	Minor adverse	Archaeological watching brief prior to and during	Negligible

Asset (receptor)	Effect	Significance of effect	Mitigation	Significance of residual effect
later medieval land reclamation and drainage ditches (Low asset significance)	chamber, and ventilation duct. Asset significance reduced to negligible.		construction to achieve preservation by record.	
High potential for buried 18th–19th century footings of buildings (Low asset significance)	Assets removed by site set up and electrical and control kiosk. Asset significance reduced to negligible.	Minor adverse	Archaeological watching brief prior to and during construction to achieve preservation by record.	Negligible
	Assets removed by the construction of the penstock and flapvalve chamber, and ventilation duct. Asset significance reduced to negligible.	Minor adverse	Archaeological watching brief prior to and during construction to achieve preservation by record.	Negligible

References

[1] Department of Environment, Food and Rural Affairs. *National Policy Statement for Waste Water (*2012)

[2] Communities and Local Government. *National Planning Policy Framework* (March 2012)

[3] Department of Communities and Local Government, English Heritage & Department for Culture, Media and Sport. *PPS5 Planning for the Historic Environment: Historic Environment Planning Practice Guide* (March 2010)

Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Environmental Statement

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Volume 27: Minor Works Sites assessment

Section 8: Land quality

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Environmental Statement

Volume 27: Minor work sites

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8 Land quality

8.1 Introduction

8.1.1 Construction and operational effects for land quality for the 'Minor work site', Bekesbourne Street site, have not been assessed. This is on the basis that this site would require substantially less construction than at other Thames Tideway Tunnel project sites and would involve modifications to the existing sewer network rather than any connection to the main tunnel.

8.1.2 At this site, the scale of construction is considered too small to affect land quality receptors. At the Bekesbourne Street site, the construction would include a penstock and flapvalve chamber (4.6m by 5m and 8m deep); assuming that appropriate construction techniques are used, the overall effect associated with land quality would be negligible.

8.1.3 This section nevertheless presents details of engagement, baseline information (including preliminary assessment) and an overview of the reasons why this topic has been scoped out. A preliminary assessment for the Bekesbourne Street site is included within Section 8.3.

8.1.4 The proposed work at Bekesbourne Street would include an on-line penstock and flapvalve chamber to connect to the Holloway Storm Relief sewer

8.1.5 The small scale of construction is likely to mean no significant effects on land quality and on the related topic of groundwater, which is reported in Section 13 Water resources – groundwater.

8.1.6 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

8.2 Engagement

8.2.1 The phase two consultation has not highlighted any issues relating to land quality at these sites.

8.3 Baseline and preliminary assessment

8.3.1 The ground investigation (GI) undertaken for the Thames Tideway Tunnel project has involved drilling boreholes both on the banks and within the main river channel for the purposes of understanding the geology and hydrogeology within the assessment area.

8.3.2 At Bekesbourne Street site, there has been no boreholes drilled specifically for this site, however a number of other boreholes for nearby Thames Tideway Tunnel project sites are close enough and provide an indication of what conditions may be present at this site. The depths and thicknesses of geological layers at the Bekesbourne Street site have been

extrapolated from three ground investigation boreholes, SR1030 and SR1029 (both 50m to the south), and SA1038 (at 140m to the southeast).

8.3.3 The Bekesbourne site chamber would pass through Made Ground, Alluvium, and River Terrace Deposits, which have a combined depth of 5.2 metres below ground level (mbgl). The shaft would then extend down into the top of the London Clay Formation. The construction of the shaft would be within a sheet pile or secant pile wall driven in the underlying London Clay at around 10mbgl.

8.3.4 A historical map search has identified that the area was not developed until the turn of the 18th Century.

8.3.5 By the mid 18th century Rose Lane (the current Ratcliffe Lane), and London Street (the current Bekesbourne Street) had both been constructed, and either side of London Street was lined with terraced houses.

8.3.6 Both streets are shown on maps as narrower than their modern counterparts (which were widened to their current extent following the Second World War) and the site boundary therefore partially includes the footprints of earlier buildings.

8.3.7 By the mid-19th century London Street and Rose Lane remained largely residential, with industrial buildings and warehouses, including a sugar refinery and timber yards, constructed to the east and west.

8.3.8 In 1881, part of the Mile End Road branch of the Holloway Storm Relief Sewer was constructed beneath London Street (through the centre of the site). This combined sewage overflow sewer ran along Rose Lane, before turning south down London Street, and continuing on to an outfall on the Thames foreshore, c. 200m to the south of the site.

8.3.9 By the early 20th century, the terraced houses directly fronting either side of London Street had been demolished and replaced by a large saw mill to the east, and new, larger buildings to the west, ‘Bekesbourne Buildings’. London Street was stopped-up to through traffic and remodelled as open access space in front of the flats.

8.3.10 By the end of the 1940s, the timber yard to the east had been replaced by John Scurr House. The residential blocks to the west of the site were subsequently replaced by new housing: by the end of the 1990s, the Docklands Light Railway (DLR) had been constructed and part of the paved area adjacent to Limehouse DLR Station currently occupies the northeastern part of the site.

8.3.11 The site is located within an area with some previous industry but also with a significant residential component. The principal contamination source is likely to relate to the composition of made ground that may be present beneath the highway.

8.3.12 The preliminary assessment of the proposed construction activities at the Bekesbourne site is summarised in Vol 27 Table 8.3.1.

8.3.13 In order to keep the assessment succinct, where receptors have multiple sensitivities (eg, surrounding land users which may be high [residential] or

low [industrial sites]), the most sensitive has been shown as a worst case scenario.

Vol 27 Table 8.3.1 Land quality – summary of assessment

Receptor (maximum sensitivity)	Impact (magnitude, and justification)	Effect (prior to mitigation)	Potential mitigation
Construction workers	Negligible – measures to be adopted in Section 9 of the *Code of Construction Practice* (*CoCP*)[i] including toolbox talks and use of personal protective equipment.	Minor*	None
Adjacent land-users – residential	Negligible – potential for soil contamination is relatively low. Quantities of excavated materials are minor and soils would be removed from site. Additional measures to reduce dust emissions are included in the *CoCP* Section 7.	Minor*	None
Built environment	Negligible – damage to nearby listed buildings would only occur through detonation of unexploded ordnance (UXO). The advice of an UXO specialist would be sought during construction activities.	Minor*	None
Controlled waters - groundwater	See Section 13 Water resources – groundwater	See Section 13 Water resources - groundwater	See Section 13 Water resources – groundwater
Controlled waters - surface water	See Section 14 Water resources – surface water	See Section 14 Water resources – surface water	See Section 14 Water resources – surface water

** Minor adverse effect has arisen due to the generic project wide assessment matrix. However in reality the effect is unlikely to be realised.*

8.4 Overview

8.4.1 The ‘Minor work’ site requires substantially less construction than at other Thames Tideway Tunnel project sites and would involve modifications to the existing sewer network rather than any connection to the main tunnel.

[i] The *Code of Construction Practice* (*CoCP*) is provided in Vol 1 Appendix A. It contains general requirements (Part A), and site specific requirements for this site (Part B).

Given the small scale of construction it is considered that there would be no likely significant effects associated with land quality.

8.4.2 For the operational phase, no likely significant effects associated with land quality have been predicted at the ‘Minor works’ sites.

Thames Tideway Tunnel
Thames Water Utilities Limited

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Environmental Statement

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Section 9: Noise and vibration

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9 Noise and vibration

9.1 Introduction

9.1.1 This section presents the findings of the assessment of the likely significant effects on noise and vibration at the Bekesbourne Street site.

9.1.2 The proposed development has the potential to affect noise and vibration levels at receptors due to:

a. construction site activities (noise and vibration)

b. construction traffic on roads outside the site (noise)

c. operation of the proposed development (noise and vibration).

9.1.3 Each of these is considered within the assessment.

9.1.4 The tunnel drive for the main tunnel does not run beneath this location. Noise and vibration from the tunnelling activities associated with the main tunnel, long connection tunnels and certain short connection tunnels are considered in Volume 3 Project-wide effects assessment.

9.1.5 There are no river services in the vicinity of the site. It is therefore not proposed to use the river to transport materials at this site; therefore, effects as a result of river-based construction traffic are not considered at this site.

9.1.6 The assessment of noise and vibration presented in this section has considered the requirements of the National Policy Statement for Waste Water Section 4.9 (noise and vibration) (Defra, 2012)[1]. Further details of these requirements can be found in Volume 2 Environmental assessment methodology Section 9.3.

9.1.7 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor Work Sites Figures).

9.2 Proposed development relevant to noise and vibration

9.2.1 The proposed development is described in Section 3 of this volume. The elements of the proposed development relevant to noise and vibration are set out below.

Construction

Construction traffic

9.2.2 The delivery and removal of all materials would be by road. Estimated vehicle numbers are presented in Vol 27 Sections 3.3 and 12.2.

Construction activities

9.2.3 Vol 27 Section 3.3 sets out the assumed construction duration and programme for the Bekesbourne Street site.

9.2.4 The construction works at this location would involve the following activities that have the potential to affect noise and vibration levels in the vicinity of the site:

a. utility diversions
b. hoarding and site setup
c. demolition
d. shaft/chamber construction
e. road works
f. landscaping and reinstatement (including construction and fit-out of permanent facility).

9.2.5 Further detail on the plant used in these construction stages is given in Vol 27 Appendix G.

9.2.6 All of the activities would be carried out during standard (core) hours (08.00-18.00 weekdays and 08.00-13.00 Saturdays) as identified in the *Code of Construction Practice* (*CoCP)*[i].

Code of Construction Practice

9.2.7 The *CoCP* Part A (Sections 4.3 and 6.4) specifies the use of best practicable means (BPM) to reduce noise and vibration effects. Generic measures include:

a. careful selection of construction plant construction methods and programming
b. equipment would be suitably sited so as to minimise noise impact on sensitive receptors
c. use of site enclosures, and temporary stockpiles to provide acoustic screening
d. choice of routes and programming for the transportation of construction materials, excavated material and personnel to and from the site
e. careful programming so that activities which may generate significant noise would be planned with regard to local occupants and sensitive receptors.
f. hoarding would be of a height and extent to achieve appropriate noise attenuation.

9.2.8 Site specific measures incorporated into the *CoCP Part B* (Sections 4 and 6) to reduce noise and vibration effects include:

a. the hoarding is proposed to be a height of 3.6m.

[i] The *Code of Construction Practice (CoCP)* is provided in Vol 1 Appendix A. It contains general requirements (Part A), and site specific requirements for this site (Part B).

Operation

9.2.9 The ventilation plant has the potential to create noise impacts, and these are considered in the assessment.

Environmental design measures

9.2.10 The operational plant associated with the surface structures would incorporate environmental design measures to control noise emission to the nearest noise sensitive receptors to acceptable noise limits. These limits are as defined by the Local Authority in which the receptor lies. At Bekesbourne Street, receptors within London Borough (LB) of Tower Hamlets have been considered (see para. 9.3.13). The environmental design measures have considered the following noise sources:

a. hydraulic plant for penstock operation (pumps, motors)

b. un-interruptible power supply (UPS) plant.

c. In considering the noise from the above items, the sound insulation of the housing for the equipment has been taken into consideration.

9.3 Assessment methodology

Engagement

9.3.1 Vol 2 documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. Specific comments relevant to this site for the assessment of noise and vibration are presented here.

9.3.2 The survey methodology and monitoring locations were agreed with LB Tower Hamlets. Limits for plant noise due to the operation of the site were also provided by LB Tower Hamlets.

9.3.3 There were no site specific comments from stakeholders in relation to noise and vibration at this site.

Baseline

9.3.4 The baseline methodology follows the methodology provided in Vol 2. There are no site specific variations for this site.

Construction

9.3.5 The assessment methodology for the construction phase follows that described in Vol 2. There are no site specific variations for undertaking the construction assessment of this site.

9.3.6 Section 9.5 details the likely significant effects arising from the construction at the Bekesbourne Street site. There are no other Thames Tideway Tunnel sites which could give rise to additional effects on noise and vibration within the assessment area for this site, therefore no other Thames Tideway Tunnel project sites are considered in this assessment.

9.3.7 The construction noise and vibration assessment has considered the effects across the whole duration of the construction phase and the worst-case predicted exposure levels are reported. The development case (with

the Thames Tideway Tunnel project) has been assessed against the base case (without the Thames Tideway Tunnel project).

9.3.8 None of the schemes outlined in the site development schedule (Vol 27 Appendix N) are considered relevant to the construction assessment base case and cumulative assessment as they are located outside of the 300m assessment area.

9.3.9 Traffic flows on construction traffic routes have been examined to determine if there are any routes where there is the potential for traffic noise changes of 1dB(A) or more. This is according to the flow, speed or composition change criteria specified in Vol 2. The results show that there would be no traffic changes on the road network associated with this site which meet the relevant criteria. This is discussed further in the assessment section from para. 9.5.37.

9.3.10 The assessment of construction effects also considers the extent to which the effects on noise and vibration would be likely to be materially different should the programme for the Thames Tideway Tunnel project be delayed by approximately one year.

Construction assessment area

9.3.11 As described in Vol 2 the assessment area considers unscreened receptors up to a maximum of 300m from the site boundary based on professional judgement of the likelihood of significant effects. The assessment primarily concentrates on those receptors closest to the site which would generally be most affected, rather than those further away which would be well screened by intervening buildings. Effects at more distant receptors beyond those closest to the site have been considered where necessary by reference to the impacts determined at the primary (closest) receptors.

Operation

9.3.12 The operational phase assessment methodology follows the methodology provided in Vol 2. Site specific variations to this methodology are set out below.

9.3.13 LB Tower Hamlets requires that noise emissions from this type of source are designed to meet a rating level (as defined in BS4142[2]) which is 10dB(A) below the typical background noise level over the operational period of the plant at 1m from the facade.

9.3.14 The operational assessment year is taken to be Year 1 of operation.

9.3.15 Section 9.6 details the likely significant effects arising from the operation at Bekesbourne Street. There are no other Thames Tideway Tunnel project sites which could give rise to additional effects on noise and vibration within the assessment area for this site, therefore no other Thames Tideway Tunnel project sites are considered in this assessment.

9.3.16 None of the schemes outlined in the site development schedule (Vol 27 Appendix N) are considered relevant to the operational assessment base case and cumulative assessment as they are located outside of the 300m assessment area.

9.3.17 Based on the traffic flow, speed or composition change criteria specified in Vol 2, there are no routes where potential for operational traffic noise effects would occur.

9.3.18 The assessment of operational effects also considers the extent to which the effects on noise and vibration would be likely to be materially different should the programme for the Thames Tideway Tunnel project be delayed by approximately one year.

Operational assessment area

9.3.19 Operational effects are considered up to 300m from the site boundary, although the focus is on the closest receptors.

Assumptions and limitations

9.3.20 The generic assumptions and limitations associated with this assessment are presented in Vol 2. The site specific assumptions are presented in the following section. There are no site specific limitations.

9.3.21 The working hours assumed for the assessment are as described in para. 9.2.6.

9.4 Baseline conditions

9.4.1 The following section sets out the baseline conditions for noise and vibration within and around the site. Future baseline conditions (base case) are also described.

Current baseline

9.4.2 The current baseline noise conditions are as described in the baseline survey. The specific details of this survey, such as the measurement times, locations measured, results and local conditions are described in Vol 27 Appendix G. Vol 27 Table 9.4.1 below shows the measured ambient noise levels for the day, evening and night-time periods.

Receptors

9.4.3 This section describes the setting and receptor characteristics of the site for the purposes of this assessment.

9.4.4 The closest noise and vibration sensitive receptors selected for the noise and vibration assessment are identified in Vol 27 Table 9.4.1 below (and shown in plan view in Vol 27 Figure 9.4.1 – see separate volume of figures). These were selected as they are representative of the range of noise climates where sensitive receivers are situated around the site. The approximate number of residential properties affected at each location (where known) is indicated in Vol 27 Table 9.4.2.

9.4.5 The nearest residences to the site are John Scurr House (a six storey block of flats which runs the entire eastern boundary of the site) and 8 Bekesbourne Street to the west of the site. Other residential dwellings to the south of the site are also included in the assessment. The non-residential noise sensitive receptor selected for assessment is the John Scurr Community Centre.

9.4.6 Beyond these closest receptors there are other residential properties which are screened from the site by intervening buildings, or are located further from the site than the buildings included in the assessment and these have not been assessed.

Receptor sensitivity

9.4.7 The noise and vibration sensitive receptors have been assessed according to their sensitivity, using the methodology outlined in Vol 2 Section 9.4. The sensitivities of all assessed receptors are presented in Vol 27 Table 9.4.1 along with the measured average ambient noise levels at each corresponding survey location.

Vol 27 Table 9.4.1 Noise and vibration – sensitive receptors and noise levels

Ref	Receptor addresses	Sensitivity	Local authority	Measured average ambient noise level, day dBL_{Aeq}*	Noise survey location
BK1	12 Ratcliffe Lane	High	LB Tower Hamlets	66	OWS01
BK2	John Scurr House	High	LB Tower Hamlets	66	OWS01
BK3	10-14 Bekesbourne Street	High	LB Tower Hamlets	60	OWS02
BK4	1-11 Bekesbourne Street	High	LB Tower Hamlets	60	OWS02
BK5	8 Bekesbourne Street	High	LB Tower Hamlets	66	OWS01
BK6	John Scurr Community Centre	Medium	LB Tower Hamlets	61	OWS03

** Noise level includes correction for façade acoustic reflection*

9.4.8 The baseline noise level is considered representative of the relevant receptor. Consideration has been given to the distance of the measurement location to the receptor, the orientation of the primarily affected façade and location of the controlling noise source(s).

9.4.9 The criteria for determining the significance of noise effects at residences from construction sources are partly dependent upon the existing ambient noise levels. From the ambient noise levels measured during the baseline survey, the assessment category and assessment noise threshold levels for the residential receptors near the Bekesbourne Street site are as shown in Vol 27 Table 9.5.2.

9.4.10 The assessment of significance at non-residential receptors is made according to the construction noise level relative to the ambient noise level (see Vol 27 Table 9.5.2) using the impact criteria described in Vol 2 Section 9.5 (where appropriate) and other factors described in Vol 2.

Vol 27 Table 9.4.2 Noise – residential receptors and assessment categories

Ref	Noise sensitive receptor (No. of dwellings)	Ambient day noise level, rounded to nearest 5dBL_{Aeq}*	Assessment category* day	Significance criterion threshold level*, day, dBL_{Aeq} 10hour
BK1	12 Ratcliffe Lane	65	B	70
BK2	John Scurr House	65	B	70
BK3	10-14 Bekesbourne Street	60	A	65
BK4	1-11 Bekesbourne Street	60	A	65
BK5	8 Bekesbourne Street	60	A	65

** From 'ABC' method – BS5228:20093*

Construction base case

9.4.11 The base case in Site Year 1 of construction taking into account the schemes described in Section 9.3 would not change as there are no additional sensitive receptors indicated which fall within the assessment area.

9.4.12 The noise levels, as measured during the baseline noise survey in 2011, are assumed for the base case. However, there is the potential for variations to occur in the ambient noise levels between 2011 and the base case year. If the noise levels were to vary, it is likely that they would increase compared to the measured data from 2011 due to natural traffic growth and the potential for additional construction noise from adjacent developments. The estimated traffic increases for the construction base case in Site Year 1 are such that noise levels would be expected to increase by less than 1dB(A) from those measured in 2011. The assessment based on data from 2011 therefore presents a worst case assessment.

9.4.13 It is considered that there are no other circumstances at this location that would cause the baseline noise levels at the receptor locations to change significantly between 2011 and the first year of construction.

9.4.14 No existing or future major sources of vibration have been identified and therefore it is considered that vibration levels are unlikely to change between the present time and the base case.

Operational base case

9.4.15 The base case in Year 1 of operation taking into account the schemes described in Section 9.3 would not change and there are no additional sensitive receptors indicated which fall within the assessment area.

9.4.16 The operational base case has been estimated from traffic flow expectations for the Year 1 of the operational phase as result of natural growth and new development in the vicinity. The estimated traffic increases for the operational base case in Year 1 of operation are such that noise levels would be expected to increase by less than 1dB(A) from those measured in 2011.

9.5 Construction effects assessment

Noise

9.5.1 The results of the assessment of construction noise are presented in Vol 27 Table 9.5.1 and Vol 27 Table 9.5.2. The tables show the range of predicted construction noise levels during the entire period of the works and a typical monthly construction noise level. The typical monthly level is the most frequently occurring monthly noise level during the works. The tables also show the total number of months across all construction stages that the noise level would be likely to exceed the impact criterion threshold level indicating potential significance. The final columns in the tables show the worst-case excess above the impact criterion together with the duration of the worst-case noise level. In cases when the impact criterion is exceeded (as marked by an asterisk in Vol 27 Table 9.5.1), further assessment of the likely noise ingress to the interior of the building has been carried out to more precisely estimate the resulting noise impact on the occupants. The noise ingress would depend on the degree of façade noise insulation of the particular buildings which is considered in further detail in these cases.

9.5.2 To illustrate the predicted variation in construction noise levels at each receptor position across the duration of the construction phase, Vol 27 Appendix G.2, Vol 27 Plates G.4 to G.9 show the estimated noise levels plotted month-by-month over the duration of the works. The appendix also lists the construction plant and operations assumed for the calculations. The predicted impacts and assessed effects at each representative receptor location are described below.

9.5.3 The predicted impacts at each representative receptor location are described below, and Section 9.10 shows the assessed significance of effects resulting from all sources of noise and vibration based on the extent of the impacts identified and the particular use of the receptor.

Impacts at residential receptors

9.5.4 The results for residential receptors are shown below.

Vol 27 Table 9.5.1 Noise – impacts at residential receptors (high sensitivity)

Ref/ receptor[a] (No. of noise sensitive properties)	ABC impact criterion threshold level (potential significance for residential), dBL_{Aeq}[b]	Range of construction noise levels, dBL_{Aeq}[c,d]	Typical[e] monthly construction noise levels, dBL_{Aeq}	Magnitude		
				Total duration above criterion for <u>all</u> works, months	Worst-case excess above criterion, dBL_{Aeq}[f] (*further assessment undertaken for excess above criterion)	Duration of worst-case excess above criterion, months
BK1 / 12 Ratcliffe Lane (7)	70	64 -70 (day)	67	0	0	0
BK2 / John Scurr House (30)	70	74 – 78 (day)	77	6	+8*	1
BK3 / 10-14 Bekesbourne Street (4)	65	61 – 67 (day)	67	2	+2*	2
BK4 / 1-11 Bekesbourne Street (5)	65	61 – 67 (day)	67	2	+2*	2
BK5 / 8 Bekesbourne Street (3)	65	68 – 77 (day)	71	6	+12*	1

[a] *Floors subject to highest noise level assessed – not necessarily the highest floor level*
[b] *The potential significance threshold is based on the ambient noise level as defined in Vol 2*
[c] *Construction noise only, excludes ambient noise. Refer to Vol 2 Section 9.5*
[d] *Noise level includes correction for façade acoustic reflection*
[e] *Most frequently occurring monthly construction noise level during works*
[f] *Positive value indicates exceedance, negative value indicates noise below criterion*

12 Ratcliffe Lane (BK1)

9.5.5 The residential block on the corner of Bekesbourne Street and Ratcliffe Lane is a four storey building. The upper floors, from the third floor and above, would have at least a partial view of the works within the site, at a distance of 20m from the shaft and 8m from the site boundary.

9.5.6 The typical daytime noise levels (most frequently occurring monthly level) is 67dBL_{Aeq} for three months. During the daytime, site establishment and road demolition works are expected to cause the worst-case noise level of 70dBL_{Aeq}.

9.5.7 There are no construction activities planned during the evening and night-time periods at this site. The construction noise levels are not estimated to exceed the ABC potential significance criteria for a residential receptor. The effect is therefore **not significant**.

9.5.8 Other than those assessed there are no other residential properties in the vicinity of this receptor that are close enough to be subject to significant adverse effects.

John Scurr House (BK2)

9.5.9 John Scurr House is a residential block of flats whose western aspect overlooks Bekesbourne Street. The upper floors, from the second floor and above, would have at least a partial view of the works within the site, at a distance of 5m from the shaft and 3m from the site boundary.

9.5.10 The typical daytime noise levels (most frequently occurring monthly level) is 77dBL_{Aeq}. During the daytime, site establishment and road demolition works are expected to cause the worst-case noise level of 78dBL_{Aeq} for one month. The construction noise levels are estimated to exceed the ABC potential significance criteria for a residential receptor during the day for six months.

9.5.11 As potentially significant effects have been identified using the ABC criterion, noise levels within the rooms most exposed to the construction works have been estimated. This has been based on conservative assumptions regarding the noise transmission through the façade with the windows closed. The approach to estimating internal noise levels is described in the methodology in Vol 2. Thermal double glazing has been assumed for this receptor (based on the age of the property and external observations) and takes into account the glazed area of the façade and a typical reverberant characteristic for a domestic room.

9.5.12 The worst case internal noise level during the day is estimated to be 43dBL_{Aeq} for one month with windows closed or approximately 60dBL_{Aeq} if windows were opened on the most exposed facade. For the other five months during which the potential significance threshold is exceeded, the internal noise level is estimated to be 42dBL_{Aeq}. Although the worst-case noise level is expected for only a short proportion of the works (one month), this impact, together with the other periods over the BS 8233 internal guidance noise level[4] of 40dBL_{Aeq} is assessed as causing a **significant** effect given the number of affected residences.

9.5.13 Other than those assessed there are no other residential properties in the vicinity of this receptor that are close enough to be subject to significant adverse effects.

10-14 Bekesbourne Street (BK3)

9.5.14 The residential block on Bekesbourne Street is three storeys high. The upper floor would have at least a partial view of the works within the site, at a distance of 14m from the shaft and 10m from the site boundary.

9.5.15 The typical daytime noise levels (most frequently occurring monthly level) is 67dBL_{Aeq} for 6 months. During the daytime, road demolition works are expected to cause the worst-case noise level of 67dBL_{Aeq}..

9.5.16 The construction noise levels are estimated to exceed the ABC potential significance criteria for a residential receptor during the day for two months.

9.5.17 As potentially significant effects have been identified using the ABC criterion, noise levels within the rooms most exposed to the construction works have been estimated. This has been based on conservative assumptions regarding the noise transmission through the façade with the windows closed. The approach to estimating internal noise levels is described in the methodology in Vol 2. Thermal double glazing has been assumed for this receptor (based on the age of the property and external observations) and takes into account the glazed area of the façade and a typical reverberant characteristic for a domestic room.

9.5.18 The worst case internal noise level during the day is estimated to be 30dBL_{Aeq} for two months with windows closed or approximately 49dBL_{Aeq} if windows were opened on the most exposed facade. For the other month during which the potential significance threshold is exceeded, the internal noise level is again estimated to be 30dBL_{Aeq}. Given the short duration of the worst-case internal level being below the internal guidance noise level of 40dBL_{Aeq} with windows closed, and that the noise levels would not be excessive for speech communication if windows were partially open, this is assessed as **not significant**.

9.5.19 Other than those assessed there are no other residential properties in the vicinity of this receptor that are close enough to be subject to significant adverse effects.

1-11 Bekesbourne Street (BK4)

9.5.20 The residential block on Bekesbourne Street is three storeys high. The upper floor would have at least a partial view of the works within the site, at a distance of 14m from the shaft and 10m from the site boundary.

9.5.21 The typical daytime noise levels (most frequently occurring monthly level) is 67dBL_{Aeq} for 6 months. During the daytime, road demolition works are expected to cause the worst-case noise level of 67dBL_{Aeq}.

9.5.22 The construction noise levels are estimated to exceed the ABC potential significance criteria for a residential receptor during the day for two months.

9.5.23 As potentially significant effects have been identified using the ABC criterion, noise levels within the rooms most exposed to the construction works have been estimated. This has been based on conservative assumptions regarding the noise transmission through the façade with the windows closed. The approach to estimating internal noise levels is described in the methodology in Vol 2. Thermal double glazing has been assumed for this receptor (based on the age of the property and external observations) and takes into account the glazed area of the façade and a typical reverberant characteristic for a domestic room.

9.5.24 The worst case internal noise level during the day is estimated to be 30dBL_{Aeq} for two months with windows closed or approximately 49dBL_{Aeq} if windows were opened on the most exposed facade. For the other month during which the potential significance threshold is exceeded, the internal noise level is again estimated to be 30dBL_{Aeq}. Given the short duration of the worst-case internal level being below the internal guidance noise level of 40dBL_{Aeq} with windows closed, and that the noise levels would not be excessive for speech communication if windows were partially open, this is assessed as **not significant**.

9.5.25 Other than those assessed there are no other residential properties in the vicinity of this receptor that are close enough to be subject to significant adverse effects.

8 Bekesbourne Street (BK5)

9.5.26 The residential block at 8 Bekesbourne Street is two storeys high. The upper floor would have at least a partial view of the works within the site, at a distance of 5m from the shaft and 4m from the site boundary.

9.5.27 The typical daytime noise levels (most frequently occurring monthly level) is 71dBL_{Aeq} for 6 months. During the daytime, road demolition works are expected to cause the worst-case noise level of 77dBL_{Aeq} for one month.

9.5.28 The construction noise levels are estimated to exceed the potential significance criteria for a residential receptor during the day for six months.

9.5.29 As potentially significant effects have been identified using the ABC criterion, noise levels within the rooms most exposed to the construction works have been estimated. This has been based on conservative assumptions regarding the noise transmission through the façade with the windows closed. The approach to estimating internal noise levels is described in the methodology in Vol 2. Thermal double glazing has been assumed for this receptor (based on the age of the property and external observations) and takes into account the glazed area of the façade and a typical reverberant characteristic for a domestic room.

9.5.30 The worst case internal noise level during the day is estimated to be 40dBL_{Aeq} for one month with windows closed or approximately 59dBL_{Aeq} if windows were opened on the most exposed facade. For the other five months during which the potential significance threshold is exceeded, the internal noise level is estimated to be 38 and 31dBL_{Aeq}. Given the short duration of the worst-case internal level being equal to the internal guidance noise level of 40dBL_{Aeq} with windows closed, and that the noise

levels would not be excessive for speech communication if windows were partially open, this is assessed as **not significant**.

9.5.31 Other than those assessed there are no other residential properties in the vicinity of this receptor that are close enough to be subject to significant adverse effects.

Impacts at non-residential receptors

9.5.32 The results for non-residential receptors are shown below.

Vol 27 Table 9.5.2 Noise – impacts at non-residential receptors

Ref / receptor	Receptor sensitivity[a]	Range of construction noise levels, dBL_{Aeq}[b,c,d]	Ambient baseline noise level, dBL_{Aeq}[d]	Typical[e] monthly construction noise levels, dBL_{Aeq}	Magnitude	
					Total duration above ambient for <u>all</u> works, months	Worst-case excess above ambient, dBL_{Aeq}
BK6 John Scurr Community Centre	Medium	56 – 64 (day)	61	56	2	+3

[a] *Assumed typical façade transmission loss and appropriate internal noise guidelines*
[b] *Floors subject to highest level assessed – not necessarily the highest floor level*
[c] *Construction noise only, excludes ambient noise. Refer to Vol 2*
[d] *Noise level includes correction for façade acoustic reflection unless receptor position is an open outdoor space (eg park)*
[e] *Most frequently occurring monthly construction noise level during works*

John Scurr Community Centre (BK6)

9.5.33 The John Scurr community centre is located over 25m from the site boundary.

9.5.34 The typical daytime noise levels (most frequently occurring monthly level) is 56dBL_{Aeq}.The worst-case daytime noise level of 64dBL_{Aeq} shown in Vol 27 Table 9.5.2 would occur during the site establishment works.

9.5.35 The noise level would increase relative to the ambient noise level for two months (not consecutive) and this could be noticeable at times inside the building. However, the increase in average noise levels inside the building, based on typical noise insulation for a façade of this type, is not expected to exceed guideline noise levels for the types of activity in a community hall.

9.5.36 The exceedance of the ambient noise level for two months during the works (not consecutive) is assessed as **not significant**.

Road-based construction traffic

9.5.37 The location of the site in Bekesbourne Street provides access to the major road network through London via Ratcliffle Lane and Commercial Road. The construction programme would result in varying traffic generation over a period of eight months. During the peak construction period, the traffic generation on Bekesbourne Street, the link adjacent to the site, is forecast to average 5 heavy vehicles (HGV) per day (equivalent 10 movements per day).

9.5.38 Major road links adjacent to and leading to the site are Butcher Row, Branch Road, Commercial Road, The Highway and Limehouse Link. Vehicles would use Ratcliffe Road and/or Bekesbourne Street to access the site. Other local roads would not be used.

9.5.39 A flow change of about 25% is required to cause a change in noise level of 1dB and by 100% to cause a change of 3dB, which is considered to be the minimum change perceptible to the human ear. Additionally, a change in HGV proportion in total traffic flow of 5% is also considered to cause a change in noise level of 1dB.

9.5.40 The traffic modelling doesn't include any data for either Bekesbourne Street or Ratcliffe Lane, however given the low number of construction traffic movements less than two movements per hour during the period 0800 to 1800, the additional HGVs movements is not anticipated to result in a change to the traffic noise levels of 3dB or more and therefore the effects are assessed as **not significant**.

9.5.41 The nearest links to the site where there is traffic data available include Commercial Road, Butcher Row and Rotherhithe Tunnel.

9.5.42 In the immediate vicinity of the site, Commercial Road currently has the highest 18hr flow, with over 37,500 vpd and just under 3,000 HGVs. The 18hr flows on other links are varied, with the majority of flows ranging from approximately 18,000 to approximately 26,500 vpd. The 18hr flow on Cable Street is much lower, varying from 450 to 4,700 vpd. The

percentage of HGVs is also varied across the road links, with HGV percentages ranging from 1.0% to 9.6%.

9.5.43 The modelling of construction traffic on these links indicates that the highest percentage increase in total flow due to construction traffic would occur on Cable Street. No construction HGVs are expected to use this link during the peak month of construction, however the daily number of worker cars and office/operational light vehicles is 6, with the number of cars and light vehicles consistent across the construction period. The current total flow on the link is just under 450 vpd. Therefore, the construction traffic results in a percentage increase in flow of 1.4%.

9.5.44 The modelling of the construction traffic on the road links indicates that the highest increase in HGV proportion would be less than 0.05% across all links.

9.5.45 Therefore, the percentage flow change and change in HGV percentage do not meet the criteria for causing a 1dB change in noise level. The additional numbers of HGVs would cause only negligible change to the traffic noise levels and the effects are assessed as **not significant**.

Vibration

9.5.46 The assessment of construction vibration considers events which have the potential to cause human disturbance, or damage to buildings and structures. The assessments of human disturbance and effects on building structures are carried out separately using different parameters.

9.5.47 The assessment has been conducted using the methodology defined in Vol 2.

9.5.48 The assessment of human disturbance due to construction vibration impacts at neighbouring receptors has been assessed using the predicted estimated Vibration Dose Value (eVDV). The results from the assessment are presented in Vol 27 Table 9.5.3.

Vol 27 Table 9.5.3 Vibration – human vibration impacts

Ref	Receptor	Impact (highest predicted eVDV across all activities, $m/s^{1.75}$)*	Value/ sensitivity	Magnitude
BK1	12 Ratcliffe Lane	<0.4	High	Low probability of adverse comment- No impact
BK2	John Scurr House	<0.8	High	Adverse comment possible - Impact
BK3	10-14 Bekesbourne Street	<0.4	High	Low probability of adverse comment - No impact
BK4	1-11	<0.4	High	Low probability of

Ref	Receptor	Impact (highest predicted eVDV across all activities, $m/s^{1.75}$)*	Value/ sensitivity	Magnitude
	Bekesbourne Street			adverse comment - No impact
BK5	8 Bekesbourne Street	<0.8	High	Adverse comment possible - Impact
BK6	John Scurr Community Centre	<0.2	Medium	Below low probability of adverse comment - No impact

**Most affected floor*

9.5.49 The predicted eVDV levels at John Scurr House and 8 Bekesbourne Street fall into the 'Adverse comment possible' band, as described in Vol 2 and impacts are identified. These predicted levels are based upon the highest anticipated exposures during the most intense vibration activities within the site (vibro-piling). The duration of the impact at these receptors is likely to be less than two weeks and therefore given the short duration these impacts are considered to be **not significant**.

9.5.50 At the remaining receptors the predicted eVDV levels fall within or below the 'Low probability of adverse comment' band, as described in Vol 2 and therefore significant effects are not anticipated. These predicted levels are based upon the highest anticipated exposures during the most intense vibration activities within the site.

9.5.51 The assessment of potential construction vibration effects at adjacent buildings / structures has been assessed using the predicted Peak Particle Velocity (PPV), according to the criteria given in Vol 2. The results of the assessment of construction vibration are presented in Vol 27 Table 9.5.4.

Vol 27 Table 9.5.4 Vibration – building vibration impacts and their magnitudes

Ref	Receptor	Impact (highest predicted PPV across all activities, mm/s)	Value/ sensitivity	Magnitude
BK1	12 Ratcliffe Lane	<0.5	High	Below threshold of potential cosmetic damage – No impact
BK2	John Scurr House	<1.0	High	Below threshold of potential cosmetic damage – No impact

Ref	Receptor	Impact (highest predicted PPV across all activities, mm/s)	Value/ sensitivity	Magnitude
BK3	10-14 Bekesbourne Street	<0.5	High	Below threshold of potential cosmetic damage – No impact
BK4	1-11 Bekesbourne Street	<0.5	High	Below threshold of potential cosmetic damage – No impact
BK5	8 Bekesbourne Street	<1.0	High	Below threshold of potential cosmetic damage – No impact
BK6	John Scurr Community Centre	<0.5	Medium	Below threshold of potential cosmetic damage – No impact

9.5.52 The vibration levels reported here are well below the levels likely to cause cosmetic building damage according to the criteria described in Vol 2.

9.5.53 Vibration effects are **not significant** to any receptors.

Sensitivity test for programme delay

9.5.54 For the assessment of noise and vibration effects during construction, a delay to the Thames Tideway Tunnel project of approximately one year would not be likely to materially change the assessment findings reported above for the existing and proposed receptors. Based on the site development schedule (Vol 27 Appendix N), there would be no new receptors, within the assessment area, requiring assessment as a result of a one year delay.

9.6 Operational effects assessment

Impacts from potential noise and vibration sources

9.6.1 The following section describes the potential noise and vibration effects from various sources identified for assessment.

Noise from operational plant at above ground structure

9.6.2 A passive ventilation system is to be installed at Bekesbourne Street and therefore there is no requirement to install active equipment at this location.

9.6.3 The appropriate emission limits are shown below in Vol 27 Table 9.6.1, based on local authority requirements to ensure that no adverse effects would occur. If cooling fans for the kiosks are required this equipment would be controlled to meet the criteria in Vol 27 Table 9.6.1. However, it

should be noted that any such small fans would be expected to have a relatively low noise emission (approximately 45dB(A) at 3m).

9.6.4 There would be a pump to maintain hydraulic pressure in the hydraulic pipe-work and rams for the penstocks although the noise emission would be short and infrequent. It is expected that this would produce a whirring noise about once a week with a duration of approximately 30 seconds to two minutes depending on the size of the penstock and hydraulic system. It is assumed that the plant would be operated for testing purposes once every three months. The power pack, pump and motor would be located within the kiosk and would be shielded with an acoustic surround if necessary to meet the requirements in Vol 27 Table 9.6.1.

Vol 27 Table 9.6.1 Noise – operational airborne noise impacts

Ref	Receptor	Lowest baseline noise level	Impact	Value/ sensitivity	Magnitude
BK1	12 Ratcliffe Lane	Night-time baseline not measured at this location	Plant noise emission to be designed to a rating level at receptor 10dB below the typical background noise level	High	Plant noise level below night-time local authority limit*,– no adverse impact
BK2	John Scurr House	Night-time baseline not measured at this location	Plant noise emission to be designed to a rating level at receptor 10dB below the typical background noise level	High	Plant noise level below night-time local authority limit*,– no adverse impact
BK3	10-14 Bekesbourne Street	Night-time baseline not measured at this location	Plant noise emission to be designed to a rating level at receptor 10dB below the typical background noise level	High	Plant noise level below night-time local authority limit*,– no adverse impact
BK4	1-11	Night-time	Plant noise	High	Plant noise

Ref	Receptor	Lowest baseline noise level	Impact	Value/ sensitivity	Magnitude
	Bekesbourne Street	baseline not measured at this location	emission to be designed to a rating level at receptor 10dB below the typical background noise level		level below night-time local authority limit*,– no adverse impact
BK5	8 Bekesbourne Street	Night-time baseline not measured at this location	Plant noise emission to be designed to a rating level at receptor 10dB below the typical background noise level	High	Plant noise level below night-time local authority limit*,– no adverse impact
BK6	John Scurr Community Centre	Night-time baseline not measured at this location	Plant noise emission to be designed to a rating level at receptor 10dB below the typical background noise level	High	Plant noise level below night-time local authority limit*,– no adverse impact

* *Limit referred to is that identified for the Local Authority in which the receptor is located (see para. 9.3.13)*

9.6.5 The results given above in Vol 27 Table 9.6.1, show that there are no adverse impacts and the effects of plant noise at these emission levels is assessed as **not significant**. This assumes that design measures are taken to ensure compliance with the appropriate local authority requirements to prevent disturbance.

Noise and vibration from tunnel filling

9.6.6 The main tunnel is located a significant distance from Bekesbourne Street and there is no main tunnel drop shaft at this location. As such noise and vibration from tunnel filling events is not considered to be significant at this site.

Operational maintenance

9.6.7 As part of the operation of the chamber, there would need to be routine but infrequent maintenance carried out at the site. A small crane would be required for ten yearly inspections. This would be carried out during normal working hours, using equipment which is likely to increase ambient noise levels. Given the infrequency of this operation, it is considered that a significant noise effect would not occur.

9.6.8 Routine inspections including testing penstock operations, lasting approximately half a day, would occur every three to six months and would not require heavy plant. As this would be carried out during the daytime with minimal noisy equipment operating over short periods of time, it is considered that further assessment of noise generated by this activity is not required.

9.6.9 As no impacts have been identified from the operation of the site, no significant effects have been identified.

Noise from operational traffic

9.6.10 Additional traffic associated with operation of the site would be limited to vehicles used by maintenance and inspection workers. This is likely to be a light commercial vehicle used during inspection visits every one to three months.

9.6.11 As a proportion of the existing traffic on the road network these vehicles would not contribute to the traffic noise level and the noise effects of these movements are assessed as **not significant**.

Sensitivity test for programme delay

9.6.12 For the assessment of noise and vibration effects during operation, a delay to the Thames Tideway Tunnel project of approximately one year would not be likely to materially change the assessment findings reported above for the existing and proposed receptors as the operational effects of the Thames Tideway Tunnel project are considered to be not significant. Based on the site development schedule (Vol 27 Appendix N), there would be no new receptors, within the assessment area, requiring assessment as a result of a one year delay.

9.7 Cumulative effects assessment

Construction effects

9.7.1 None of the schemes described in Section 9.3, would give rise to cumulative construction effects with the proposed development at Bekesbourne Street because the developments identified are outside of the 300m assessment area. As such, no cumulative construction noise or vibration effects are identified. This would also be the case if the programme for the Thames Tideway Tunnel project was delayed by approximately one year.

Operational effects

9.7.2 None of the schemes described in Section 9.3, would give rise to cumulative operational effects with the proposed development at Bekesbourne Street because the developments identified are outside of the 300m assessment area. As such, no cumulative operational noise or vibration effects are identified. This would also be the case if the programme for the Thames Tideway Tunnel project was delayed by approximately one year.

9.8 Mitigation and compensation

Construction

9.8.1 The above assessment has concluded that there are significant adverse noise effects during the construction phase at John Scurr House (BK2). However, no further practicable on site noise mitigation can be adopted in addition to those measures identified in the *CoCP*.

9.8.2 A *Thames Tideway Tunnel noise insulation and temporary re-housing policy* has been established (see Schedule 2 of the *Statement of Reasons* which accompanies this application). The policy seeks to offset the potential adverse noise effects arising from construction and would be available to those residents where predicted or measured construction noise levels exceed trigger levels published in the policy. As there is no guarantee that the noise control measures would be accepted by the affected party, the two scenarios (with and without implementation of the policy) are presented in the residual effects section below.

9.8.3 The north and east facades of John Scurr House may be eligible for noise insulation as described in the policy. This is a commonly used measure to control construction noise ingress to residential properties.

9.8.4 The effect of noise insulation on noise exposure inside the properties has been assessed in Section 9.9.

Operation

9.8.5 The above assessment has concluded that there are n*ot likely to be any significant adverse effects during the operationa*l phase that would require mitigation.

Monitoring

9.8.6 Monitoring of construction noise would be carried out as described in the *CoCP Part A* (Section 6). It is not anticipated that there would be any need for monitoring of operational noise.

9.9 Residual effects assessment

Construction effects

John Scurr House (BK2)

9.9.1 The construction noise assessment set out above in Section 9.5 has identified significant effects at John Scurr House (BK2).

9.9.2 The significant noise effects assessed at John Scurr House could be addressed by noise insulation as set out in the *Thames Tideway Tunnel noise insulation and temporary re-housing policy* (see para. 9.8.2). It must be recognised, however, that the affected residents of John Scurr House may not wish to take up the offer of noise insulation and thus the residual construction noise effects remains as presented in Section 9.5.

9.9.3 If a noise insulation package as described in the *Thames Tideway Tunnel noise insulation and temporary re-housing policy* were installed, the internal daytime noise levels at John Scurr House are estimated to reduce during the short period of worst-case noise levels to below the guidance criteria for living rooms. At night, noise levels are also estimated to be below internal night-time guidance levels for bedrooms. The inclusion of mechanical ventilation as part of the insulation package would allow windows to be closed at night to realise the full benefit of the noise insulated glazing. With the inclusion of a noise insulation package the construction noise effects would be rated as **not significant**.

Operational effects

9.9.4 As no mitigation measures are proposed, the residual operational effects remain as presented in Section 9.6.

9.10 Assessment summary

Vol 27 Table 9.10.1 Noise – summary of construction assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Surface construction noise				
BK1 - 12 Ratcliffe Lane	Noise	Not significant	None	Not significant
BK2 - John Scurr House	Noise	Significant	No further on site mitigation practicable	Significant, however properties may be eligible for noise insulation, which if accepted, would reduce the effect to not significant. See para 9.9.3.
BK3 - 10-14 Bekesbourne Street	Noise	Not significant	None	Not significant
BK4 - 1-11 Bekesbourne Street	Noise	Not significant	None	Not significant
BK5 - 8 Bekesbourne Street	Noise	Not significant	None	Not significant
BK6 - John Scurr Community Centre	Noise	Not significant	None	Not significant
Road-based construction traffic				
Residential and non-residential properties adjacent to the proposed vehicle route	Noise	Not significant	None	Not significant

Vol 27 Table 9.10.2 Vibration – summary of construction assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
12 Ratcliffe Lane	Vibration	Not significant	None	Not significant
John Scurr House	Vibration	Not significant	None	Not significant
10-14 Bekesbourne Street	Vibration	Not significant	None	Not significant
1-11 Bekesbourne Street	Vibration	Not significant	None	Not significant
8 Bekesbourne Street	Vibration	Not significant	None	Not significant
John Scurr Community Centre	Vibration	Not significant	None	Not significant

Vol 27 Table 9.10.3 Noise – summary of operational assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
12 Ratcliffe Lane	Noise	Not significant	None	Not significant
John Scurr House	Noise	Not significant	None	Not significant
10-14 Bekesbourne Street	Noise	Not significant	None	Not significant
1-11 Bekesbourne Street	Noise	Not significant	None	Not significant
8 Bekesbourne Street	Noise	Not significant	None	Not significant
John Scurr Community Centre	Noise	Not significant	None	Not significant

Vol 27 Table 9.10.4 Vibration – summary of operational assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
12 Ratcliffe Lane	Vibration	Not significant	None	Not significant
John Scurr House	Vibration	Not significant	None	Not significant
10-14 Bekesbourne Street	Vibration	Not significant	None	Not significant
1-11 Bekesbourne Street	Vibration	Not significant	None	Not significant
8 Bekesbourne Street	Vibration	Not significant	None	Not significant
John Scurr Community Centre	Vibration	Not significant	None	Not significant

References

[1] Department of Environment, Food and Rural Affairs. *National Policy Statement for Waste Water* (2012). Available at: http://www.defra.gov.uk/publications/files/pb13709-waste-water-nps.pdf, Last accessed November 2012.

[2] British Standards Institution, BS 4142 *Method for rating industrial noise affecting mixed residential and industrial areas,* British Standards Institution (1997).

[3] British Standards Institution, BS 5228 Code of Practice for Noise and Vibration Control on Open Construction Sites, British Standards Institution (2009).

[4] British Standards Institution, BS 8233 Code of Practice for Sound insulation and noise reduction for buildings, British Standards Institution (1999).

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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 assessment

Section 10: Socio-economics

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

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Thames Tideway Tunnel

Environmental Statement

Volume 27: Minor work sites assessment

Section 10: Socio-economics

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10 Socio-economics

10.1 Introduction

10.1.1 Construction and operational effects for socio-economics for this site have not been assessed. This is on the basis that the proposed works are minor (the small construction site on Bekesbourne Street would be used to construct a chamber to allow the introduction of a controlled gate within the sewer).

10.1.2 This section nevertheless presents details of engagement, baseline information and an overview of the reasons why this topic has been scoped out.

10.1.3 Any potential effects associated with disruption to local residential amenity, or from increased operational noise are covered by the air quality (Section 4 of this volume) and noise and vibration (Section 9 of this volume) assessments.

10.1.4 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

10.2 Engagement

10.2.1 Socio-economic effects have not been assessed. No comments specific to Bekesbourne Street socio-economic effects have been received during the consultation process.

10.3 Baseline

10.3.1 The site is predominantly comprised of roadway with 2-6 storey residential dwellings and major roads surrounding the site. Given the minor nature of the proposed works it is judged that the site baseline has low sensitivity to change.

10.4 Overview

10.4.1 No potential exists for likely significant effects on socio-economics arising from the construction or operation of the proposed minor works site development at Bekesbourne Street. Given the minor scale of the works construction and operational assessments have not been undertaken.

10.4.2 None of the surrounding development schedule schemes are considered relevant to socio-economic effects assessment

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Thames Tideway Tunnel
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Section 11: Townscape and visual

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11 Townscape and visual

11.1 Introduction

11.1.1 This section presents the findings of the assessment of the likely significant effects of the proposed development on townscape and visual amenity at Bekesbourne Street. The assessment describes the current conditions found within and around the site – the nature and pattern of buildings, streets, open space and vegetation and their interrelationships within the built environment – and the changes that would be introduced as a result of the proposed development during construction.

11.1.2 The effects of these changes during construction are assessed. The assessment includes construction phase effects on townscape character areas, and visual effects during daytime. The assessment also identifies mitigation measures where appropriate.

11.1.3 An assessment of effects arising from lighting during the construction phase is not required because it is judged that there would not be any significant effects (this is further explained in para. 11.3.8).

11.1.4 Operational effects have not been assessed on the basis that there would not be any significant effects due to the low height and size of the above ground structures and the reinstatement of the construction site. Each section of the assessment is structured so that townscape aspects are described first, followed by visual.

11.1.5 The assessment of the likely significant townscape and visual effects of the project has considered the requirements of the *National Policy Statement (NPS) for Waste Water* (Defra, 2012)[1]. In line with these requirements, the townscape and visual assessment considers effects during construction and operation on townscape components, townscape character and visual receptors. The construction and design of the proposed development also takes account of townscape and visual considerations in line with the NPS recommendations. Vol 2 Section 11 provides further details on the methodology.

11.1.6 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

11.2 Proposed development relevant to townscape and visual

11.2.1 The proposed development is described in Section 3 of this volume. The elements of the proposed development relevant to the townscape and visual assessment are set out below.

Construction

11.2.2 The specific construction works which may give rise to effects on townscape character and visual receptors are listed as follows, with the

activities likely to give rise to the most substantial townscape and visual effects described first:

a. use of cranes during the construction of the penstock and flapvalve chamber

b. provision of welfare facilities, assumed to be a maximum of one storey in height

c. vehicular construction access to the site via Ratcliffe Lane

d. installation of 3.6m high hoardings around the boundary of the construction site.

Code of Construction Practice

11.2.3 Measures incorporated into the *Code of construction practice (CoCP)*[i] Part A (Sections 4 and 11) to reduce townscape and visual impacts include:

a. protection of existing trees in accordance with *BS5837 'Trees in Relation to Construction – Recommendations'*

b. installation of well-designed and visually attractive hoardings

c. the use of appropriate capped and directional lighting when required.

11.2.4 Measures incorporated into the *CoCP* Part B (Section 4) include the use of 3.6m high hoardings which incorporate translucent material for the top 1m along the eastern extent to allow light to windows of adjacent properties.

11.3 Assessment methodology

Engagement

11.3.1 Volume 2 Environmental assessment methodology documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. The London Borough (LB) of Tower Hamlets and English Heritage have been consulted on the detailed approach to the townscape and visual assessment, including the number and location of viewpoints. The stakeholders have not commented on the proposed viewpoints.

11.3.2 A description of how the on-site alternatives to the proposed approach have been considered and the main reasons why these alternatives have not been adopted is included in Section 3.6 of this volume.

Baseline

11.3.3 The baseline methodology follows the methodology described in Vol 2 Section 11.4. In summary, the following surveys have been undertaken to establish baseline data for this assessment:

[i] The *Code of Construction Practice (CoCP)* is provided in Vol 1 Appendix A. It contains general requirements (Part A), and site specific requirements for this site (Part B).

a. Preliminary site visit to check the zone of theoretical visibility (ZTV), establish the extents of townscape character areas and identify locations for visual assessment viewpoints (February 2012)

b. Photographic survey of townscape character areas (February 2012)

c. Winter photographic survey of the view from each visual assessment viewpoint (February 2012).

11.3.4 As agreed with the LB of Tower Hamlets and English Heritage, no photomontages have been produced for this site, on the basis that the effects during construction could be adequately assessed without them. Therefore, no verifiable photography or surveying has been undertaken for this site.

11.3.5 With specific reference to the Bekesbourne Street site, baseline information on townscape character and York Square Conservation Area has been gathered through a review of:

a. The Core Strategy for the LB of Tower Hamlets(LB of Tower Hamlets, 2010)[2]

b. York Square Conservation Area Appraisal, produced by the LB of Tower Hamlets (LB of Tower Hamlets, 2009)[3]

Construction

11.3.6 The assessment methodology for the construction phase follows that described in Vol 2 Section 11.5. Site-specific variations are described below.

11.3.7 With reference to the Bekesbourne Street site, the peak construction phase relevant to this topic would be during Site Year 1 of construction, when the shaft would be under construction. Cranes would be present at the site and material would be taken away by road. This has therefore been used as the assessment year for townscape and visual impacts.

11.3.8 No assessment of effects on night time character is made for this site during construction on the basis that:

a. the site would generally only be lit in the early evening during winter

b. all site lighting would have minimal spill into the wider area due to the measures set out in the *CoCP* Part A (Section 4)

c. the surrounding area is lit in the early evening by street lighting and by light spill from surrounding buildings

d. visual receptors have limited sensitivity to additional lighting in the early evening.

11.3.9 The assessment area, defined using the methodology provided in Vol 2 Section 11.5, is indicated in Vol 27 Figure 11.4.1 for townscape and Vol 27 Figure 11.4.2 for visual (see separate volume of figures). The scale of the townscape assessment area has been set by the maximum extents of all character areas located partially or entirely within the construction phase ZTV, except in those locations to the south, northwest, and northeast of the site where the construction works would be barely perceptible. The

scale of the visual assessment area has been set by the maximum extents of the construction phase ZTV, except in those locations to the south, northwest, and northeast of the site where the construction works would be barely perceptible. All visual assessment viewpoints are located within the ZTV.

11.3.10 Section 11.5 details the likely significant effects arising from the construction at Bekesbourne Street. There are no other Thames Tideway Tunnel project sites which could give rise to additional effects on townscape and visual receptors within the assessment area for this site, therefore no other Thames Tideway Tunnel project sites are included in this assessment.

11.3.11 For the construction base case for the assessment of effects arising from the proposed development at the Bekesbourne Street site, it is assumed that there would be no change in the townscape and visual baseline within the assessment area between 2012 and Site Year 1 of construction. This is on the basis that none of the schemes identified in the site development schedule (Vol 27 Appendix N) would fall within the townscape and visual assessment area.

11.3.12 As detailed in the site development schedule (Vol 27 Appendix N) no schemes have been identified within 1km of the site which meet the criteria for inclusion in the cumulative assessment. Therefore no assessment of cumulative effects has been undertaken for Bekesbourne Street in the construction phase.

11.3.13 The assessment of construction effects also considers the extent to which the assessment findings would be likely to be materially different, should the programme for the Thames Tideway Tunnel project be delayed by approximately one year.

Assumptions and limitations

11.3.14 The assumptions and limitations associated with this assessment are presented in Vol 2 Section 11.9. Site-specific assumptions and limitations are detailed below.

Assumptions

11.3.15 For the purposes of the construction phase assessment, it is assumed that the construction activities and plant, site hoardings, welfare facilities and access points would be in the location shown on the Construction phase plan (see separate volume of figures – Section 1). The assessment of effects would be no worse if these elements of the proposed development were in different locations within the maximum extent of working area (shown on the Construction phase plans in separate volume of figures – Section 1), with the permanent structures under construction located within the zones (shown on the Site works parameter plan in separate volume of figures – Section 1).

Limitations

11.3.16 There are no limitations specific to the assessment of this site.

11.4 Baseline conditions

11.4.1 The following section sets out the baseline conditions for the townscape and visual assessment within and around the site as follows:

a. Information on the physical elements that make up the overall townscape character of the assessment area (topography, land use, development patterns, vegetation, open space and transport routes), which inform the identification of townscape character areas. These form the receptors for the townscape assessment.

b. Information on the townscape character (including setting), condition, tranquillity, value and sensitivity of the site and each townscape character area.

c. Information on the nature of the existing views towards the site from all visual assessment viewpoints, during daytime. This is ordered beginning with the most sensitive receptors through to the least sensitive.

d. Future baseline conditions (base case) are also described.

Current baseline

Townscape baseline

Physical elements

11.4.2 The physical elements of the townscape in the assessment area are described below.

Topography

11.4.3 The assessment area is located on flat ground on the northern bank of the River Thames. To the south of the site, the Rotherhithe Tunnel emerges.

Land use

11.4.4 The assessment area is predominantly residential, with wider land uses dominated by infrastructure including a number of major roads and the elevated Docklands Light Railway.

Development patterns and scale

11.4.5 Within the assessment area the townscape is characterised by two to six storey residential apartments. There are strong east-west transport corridors including the Rotherhithe Tunnel & Limehouse Link to the south and the Docklands Light Railway (DLR) to the north of the site.

Vegetation patterns and extents

11.4.6 Semi-mature street trees are present within the immediate site boundary and provide a green appearance to the streetscape, particularly during summer. There are no known Tree Preservation Orders within the assessment area, although trees within York Square Conservation Area are indirectly protected by virtue of the conservation area designation.

11.4.7 St James's Gardens public open space is located to the south of the site and is characterised by a grand avenue of mature trees.

11.4.8 To the north of the site, Ratcliffe Lane, and Commercial Road are characterised by a notable absence of trees and other vegetation.

11.4.9 Trees and vegetation are present within vacant land alongside Butcher Row to the west of the site.

Open space distribution and type

11.4.10 The assessment area has several small areas of open space including St James's Gardens and John Scurr Community Gardens to the south.

Transport routes

11.4.11 The majority of streets within the assessment area are residential in character, with the exception of the major infrastructure routes. Limehouse DLR station is located to the north of the site. The Rotherhithe Tunnel and its approach road passes through the assessment area and is characterised by relatively high levels of traffic.

Site character assessment

11.4.12 The site is a residential road lined with street trees and on–street parking on both sides. The northern part of the site is located within the York Square Conservation Area. The character of the site is illustrated by Vol 27 Plate 11.4.1 and the components of the site are described in more detail in Vol 27 Table 11.4.1.

Vol 27 Plate 11.4.1 The character of the site

Date taken: 16 February 2012. 50mm lens

Vol 27 Table 11.4.1 Townscape – site components

ID	Component	Description	Condition
01	Street trees	Nine semi-mature trees located along	Good

ID	Component	Description	Condition
		the edge of Bekesbourne Street.	condition
02	Bollards	20 black painted bollards along both sides of Bekesbourne Street.	Good condition
03	Parking bays	15 marked parking bays	Good condition
04	Shrub border dividing parking bays	Mix of low shrubs and bare ground of moderate to low value	Poor condition
05	Lighting	Three lamp posts and four uplighters along the street	Good condition

11.4.13 The condition of the townscape within the site is good with the majority of townscape components well maintained.

11.4.14 The site is located in a cul-de-sac and has no HGVs passing near to the site. However, the site is located south of the elevated DLR, which, in conjunction with overlooking residential properties, means that the site has a moderate level of tranquillity.

11.4.15 While part of the site falls within the York Square Conservation Area, which may suggest a borough value, the site is likely to be locally valued by residents living in the area.

11.4.16 Due to the local value and moderate levels of tranquillity, the site has a medium sensitivity to change.

Townscape character assessment

11.4.17 The three townscape character areas surrounding the site are identified in Vol 27 Figure 11.4.1 (see separate volume of figures). They are ordered beginning with Bekesbourne Residential townscape character area (TCA) surrounding the site, followed by Limehouse Residential TCA to the north and Royal Foundation of St Katherine and St James' Gardens TCA to the south. Each area is described below.

Bekesbourne Residential TCA

11.4.18 This area comprises modern residential developments including two storey apartments with rear gardens and a large six storey residential apartment block. Properties are generally set back from the road behind small gardens or driveways. The area is divided by Bekesbourne Street, a cul-de-sac characterised by low levels of traffic. The streets are characterised by allocated parking spaces set back from the road and semi-mature street trees. The character of this area is illustrated by Vol 27 Plate 11.4.2.

Vol 27 Plate 11.4.2 Bekesbourne Residential TCA

Date taken: 21 February 2012. 18mm lens.

11.4.19 The area is likely to be locally valued by residents within the character area.

11.4.20 The buildings and public realm within the area are well maintained. The overall townscape condition is good.

11.4.21 Despite the presence of Limehouse Station to the north, the townscape has a moderate level of tranquillity due to the presence of street trees and the low levels of traffic.

11.4.22 Because of the local value attributed to the townscape and the moderate levels of tranquillity, this character area has a medium sensitivity to change.

Limehouse Residential TCA

11.4.23 This area comprises the stretch of Commercial Road near the intersection with Branch Road which is a heavily trafficked vehicular route. The area is partially located within York Square Conservation Area. The area is characterised by a large nine storey residential apartment on the northern side of the railway line, and smaller scale 3 storey residential terraces with small retail units to the northern side of Commercial Road. The character of this area is illustrated by Vol 27 Plate 11.4.3.

Vol 27 Plate 11.4.3 Limehouse Residential TCA

Date taken: 21 February 2012. 18mm lens.

11.4.24 The buildings within the public realm are well maintained. The overall townscape condition is good.

11.4.25 Due to the presence of the high volumes of vehicular traffic and HGVs the townscape has a low level of tranquillity.

11.4.26 The townscape is likely to be locally valued by the residents in the area.

11.4.27 Due to the local value attributed to the townscape, this character area has a medium sensitivity to change.

Royal Foundation of St Katherine and St James's Gardens TCA

11.4.28 This character area comprises The Royal Foundation of St Katherine, a Grade II* Listed building, and the green open space of St James's Gardens which provides a cycle and pedestrian link. The area also incorporates a disused green space to the north of the Royal Foundation. The area is located within York Square Conservation Area. The open space is characterised by an avenue of mature trees and an enclosed children's playground. The area is bounded by Rotherhithe Tunnel to the south. The character of this area is illustrated by Vol 27 Plate 11.4.4.

Vol 27 Plate 11.4.4 Royal Foundation of St Katherine and St James's Gardens TCA

Date taken: 21 February 2012. 18mm lens.

11.4.29 The townscape of the Royal Foundation and St James' Gardens is well managed, although the townscape in the north of the area is in a poor condition due to its disused state. Despite this, the overall townscape condition is considered to be good.

11.4.30 Despite the presence of mature trees, the area is affected by the presence of regular road traffic along the Rotherhithe Tunnel and therefore has a moderate level of tranquillity.

11.4.31 The townscape of the character area is valued at borough level, by virtue of the conservation area designation.

11.4.32 Due to the borough value and good condition of the townscape, this character area has a high sensitivity to change.

Visual baseline

11.4.33 Vol 27 Figure 11.4.2 (see separate volume of figures) indicates the location of viewpoints referenced below. All residential and recreational receptors have a high sensitivity to change, and transport receptors have a medium sensitivity to change.

Residential

11.4.34 Residential receptors have a high sensitivity to change, as attention is often focused on the townscape surrounding the property rather than on another focused activity (as would be the case in predominantly employment or industrial areas). The visual baseline for residential receptors (represented by a series of viewpoints, agreed with consultees) is described below.

Viewpoint 1.1: View east from residences on Bekesbourne Street

11.4.35 This viewpoint is representative of the oblique view from residential properties adjacent to the site on Bekesbourne Street.

Vol 27 Plate 11.4.5 Viewpoint 1.1: winter view

Date taken: 16 February 2012. 18mm lens.

11.4.36 The view (illustrated in Vol 27 Plate 11.4.5) is contained by residential properties along both sides of Bekesbourne Street. The southern end of the site forms the middle ground of the view, partially screened by semi mature street trees.

Viewpoint 1.2: View south from residences on Bekesbourne Street

11.4.37 This viewpoint is representative of the view from residents in the six storey residential apartment on the east of Bekesbourne Street.

Vol 27 Plate 11.4.6 Viewpoint 1.2: winter view

Date taken: 16 February 2012. 18mm lens.

11.4.38 From the ground level, views (illustrated in Vol 27 Plate 11.4.6) are characterised by the semi-mature street trees along Bekesbourne Street and on-street parking. Views of the site from upper storeys are unobstructed from this location.

Viewpoint 1.3: View north from residences on Bekesbourne Street

11.4.39 This viewpoint is representative of the oblique view from residential properties on the west of Bekesbourne Street.

Vol 27 Plate 11.4.7 Viewpoint 1.3: winter view

Date taken: 16 February 2012. 50mm lens.

11.4.40 The view (illustrated in Vol 27 Plate 11.4.7) is framed by residential properties and street trees to the west and St James Gardens play area to the east. The elevated Docklands Light Railway forms the background of the view. Views of the majority of the site are unobstructed from this location.

Recreational

11.4.41 Recreational receptors (apart from those engaged in active sports) generally have a high sensitivity to change, as attention is focused on enjoyment of the townscape. Tourists engaged in activities whereby attention is focused on the surrounding townscape also have a high sensitivity to change. The visual baseline in respect of recreational receptors, including tourists, is discussed below.

Viewpoint 2.1: View northeast from John Scurr Community Gardens

11.4.42 This viewpoint is representative of the view for recreational users of John Scurr Community Gardens on the footpath at the northern entrance to the open space.

Vol 27 Plate 11.4.8 Viewpoint 2.1: winter view

Date taken: 16 February 2012. 18mm lens.

11.4.43 The foreground of the view (illustrated in Vol 27 Plate 11.4.8) is characterised by a small green space including a vegetable garden. Views towards the site are largely obscured by three storey residential properties along Bekesbourne Street, and partially by semi-mature street trees. The six storey residential property on the east of Bekesbourne Street forms the background of the view.

Transport

11.4.44 Travel through an area is often the means by which the greatest numbers of people view the townscape. Such receptors generally have a medium sensitivity to change.

Viewpoint 3.1: View north from CS3 Cycle Superhighway entrance to footbridge over the Rotherhithe Tunnel

11.4.45 This viewpoint is representative of the typical view for pedestrians and cyclists crossing the footbridge over the Rotherhithe Tunnel.

Vol 27 Plate 11.4.9 Viewpoint 3.1: winter view

Date taken: 16 February 2012. 18mm lens.

11.4.46 This view (illustrated in Vol 27 Plate 11.4.9) is characterised by residential properties and mature trees along the southern boundary of St James Gardens which almost entirely obscure views towards the site.

Viewpoint 3.2: View east from the junction of Butcher Row leading to The Royal Foundation of St Katherine

11.4.47 This viewpoint is representative of the typical view for people travelling to The Royal Foundation of St Katherine.

Vol 27 Plate 11.4.10 Viewpoint 3.2: winter view

Date taken: 16 February 2012. 18mm lens.

11.4.48 The view (illustrated in Vol 27 Plate 11.4.10) is contained to the west by the elevated DLR (far left of the image). The foreground of the view is characterised by palisade fencing and a brick wall. The six storey residential properties adjacent to the site form the background of the view. The site is largely obscured by two storey residential properties on the west of Bekesbourne Street.

Viewpoint 3.3: View south from the western end of the Limehouse Rail Station platform

11.4.49 This viewpoint is representative of the oblique view for passengers and people using the eastbound platform at Limehouse Rail DLR station at the eastern end of the platform.

Vol 27 Plate 11.4.11 Viewpoint 3.3: winter view

Date taken: 16 February 2012. 18mm lens.

11.4.50 This oblique view (illustrated in Vol 27 Plate 11.4.11) along Bekesbourne Street is framed by four and six storey residential properties in the middle ground of the view. Views of the majority of the site are unobstructed from this location.

Construction base case

11.4.51 For the purposes of the construction phase assessment, it is assumed that there would be no substantial change in the townscape and visual baseline between 2012 and Site Year 1 of construction, as described in para. 11.3.11.

11.5 Construction effects assessment

11.5.1 The following section describes the likely significant effects arising from construction at Bekesbourne Street.

11.5.2 Due to the scale of the construction activities proposed across what are, in many cases, prominent locations in London, construction works would be highly visible. In policy terms, the NPS for waste water (Defra, 2012)[4] recognises that nationally significant infrastructure projects are likely to take place in mature urban environments, with adverse construction effects on townscape and visual receptors likely to arise. In addition, construction works are a commonplace feature across London, and therefore the following assessment should be viewed in this context. It should also be noted that construction effects are temporary in nature and relate to the peak construction year defined in Section 11.3. Effects during other phases of works are likely to be less due to fewer construction plant being required at the time and a reduced intensity of construction activity.

11.5.3 Illustrative plans of the possible layout of the site during construction are contained in a separate volume (see Construction phase plans in separate volume of figures – Section 1).

Site character assessment

11.5.4 Effects on the character of the site would arise from the temporary removal of street trees and parking bays, the installation of hoardings and welfare facilities, and the presence of construction activity and plant. However, the overall character of the site would not be substantially altered. The impacts on specific components of the site are described in Vol 27 Table 11.5.1.

Vol 27 Table 11.5.1 Townscape – impacts on existing site components during construction

ID	Component	Impacts
01	Street trees	Eight trees would be removed during construction and replaced on completion.
02	Bollards	Bollards would be carefully removed and stored during construction. They would be replaced on completion.
03	Parking bays	The parking bays would be removed during construction and reinstated on completion.
04	Shrub border dividing parking bays	Shrub borders would be removed during construction and reinstated on completion.
05	Lighting	Lamp standards would require removal and careful storage during construction. They would be reinstated on completion.

11.5.5 The site has a moderate level of tranquillity, which would be affected by the introduction of construction plant and activity.

11.5.6 Due to construction at the site, affecting both character and tranquillity without substantially altering the overall character of the site, the magnitude of change is considered to be medium.

11.5.7 The medium magnitude of change, assessed alongside the medium sensitivity of the site, would result in **moderate adverse** effects.

Townscape character areas assessment

Bekesbourne Residential TCA

11.5.8 The proposed site forms part of the immediate setting for this character area. The setting would be affected to a limited extent by the removal of trees and the presence of site hoardings, welfare facilities, construction plant and construction activity. The setting would be protected to an extent through the use of high quality 3.6m high hoardings surrounding the site. Therefore the majority of the setting of the area would be largely unaffected, apart from by the hoardings themselves.

11.5.9 The area has a moderate level of tranquillity, which would be affected by the introduction of construction plant and activity.

11.5.10 Due to changes to character, limited by the use of high quality hoardings, and changes to tranquillity, the magnitude of change is considered to be low.

11.5.11 The low magnitude of change, assessed alongside the medium sensitivity of this character area, would result in **minor adverse** effects.

Limehouse Residential TCA; and Royal Foundation of St Katherine and St James's Gardens TCA

11.5.12 The setting of these areas would be affected to a limited extent by the presence of tall construction plant and cranes, although they would be barely perceptible above the roofline of buildings surrounding the site.

11.5.13 The tranquillity of the areas would be largely unaffected by construction activity at the site.

11.5.14 Due to the barely perceptible changes to character and tranquillity, the magnitude of change is considered to be negligible.

11.5.15 The negligible magnitude of change, assessed alongside the medium to high sensitivity of these character areas, would result in a **negligible** effect.

Townscape – sensitivity test for programme delay

11.5.16 For the assessment of townscape effects during construction, a delay to the Thames Tideway Tunnel project of approximately one year would not be likely materially to change the assessment findings reported above (paras. 11.5.4 to 11.5.15). This is on the basis that there are no known schemes that would change the sensitivity to change of the townscape character areas already presented (paras. 11.4.2 to 11.4.32).

Visual assessment

11.5.17 The visual assessment for the construction phase has been undertaken during winter, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, would be in leaf.

Residential

Viewpoint 1.1: View east from residences on Bekesbourne Street

11.5.18 Oblique views from residences towards the site would be affected to a limited extent during construction by intermittent construction activity at the southern end of the site. The majority of construction activity and site hoardings would be screened by intervening buildings along Bekesbourne Street. Cranes would be intermittently visible above the roof line of the intervening buildings. Therefore the magnitude of change is considered to be low.

11.5.19 The low magnitude of change, assessed alongside the high sensitivity of the receptor would result in **minor adverse** effects.

Viewpoint 1.2: View south from residences on Bekesbourne Street

11.5.20 Views from residences towards the site would be affected during the construction period due to the foreground visibility of site hoardings, construction plant, cranes and construction traffic. The removal of trees along Bekesbourne Street would also be visible from this viewpoint. From the ground floor, views would be dominated by the site hoardings, while from upper storeys construction activity in the site would be directly visible. However, no key components of the overall view would be substantially altered or removed during construction. Therefore the magnitude of change is considered to be medium.

11.5.21 The medium magnitude of change, assessed alongside the high sensitivity of the receptor would result in **moderate adverse** effects.

Viewpoint 1.3: View north from residences on Bekesbourne Street

11.5.22 Oblique views from residences towards the site would be affected to a limited extent during construction due to the background visibility of site hoardings, construction plant, cranes and construction traffic. The foreground of the view would remain unaffected. Therefore the magnitude of change is considered to be low.

11.5.23 The low magnitude of change assessed alongside the high sensitivity of the receptor would result in **minor adverse** effects.

Recreational

Viewpoint 2.1: View northeast from John Scurr Community Gardens

11.5.24 Construction activity at the southern end of the site would be visible from this location, partially screened by intervening street trees. The foreground of the view would remain unaffected. Therefore, the magnitude of change is considered to be low.

11.5.25 The low magnitude of change, assessed alongside the high sensitivity of the receptor would result in **minor adverse** effects.

Transport

Viewpoint 3.1: View north from CS3 Cycle Superhighway entrance to footbridge over the Rotherhithe Tunnel; and Viewpoint 3.2: View east from the junction at Butcher Row leading to The Royal Foundation of St Katherine

11.5.26 Views from these locations would be affected to a limited extent by the background visibility of tall construction plant and cranes, although they would be largely obscured by intervening buildings and mature trees. Therefore, the magnitude of change is considered to be negligible.

11.5.27 The negligible magnitude of change, assessed alongside the medium sensitivity of these receptors would result in a **negligible** effect.

Viewpoint 3.3: View south from the western end of the Limehouse Rail Station platform

11.5.28 Views from this location would be affected by the background visibility of construction activities, site hoardings, cranes and construction traffic. Construction activity would be partially obscured by intervening buildings

along Bekesbourne Street, particularly towards the southern end of the site. Views of construction activity in the northern part of the site would be screened by existing street trees. Therefore the magnitude of change is considered to be low.

11.5.29 The low magnitude of change, assessed alongside the medium sensitivity of the receptor would result in **minor adverse** effects.

Visual effects – sensitivity test for programme delay

11.5.30 For the assessment of visual effects during construction, a delay to the Thames Tideway Tunnel project of approximately one year would not be likely materially to change the assessment findings reported above (paras. 11.5.18 to 11.5.29). This is on the basis that there are no known schemes within the assessment area that would introduce new visual receptors, or alter visibility of the proposed development from the viewpoints described in paras. 11.4.34 to 11.4.50.

11.6 Operational effects assessment

11.6.1 Operational effects have not been assessed on the basis that there would not be any significant effects due to the low height and size of the above ground structures and the reinstatement of the construction site.

11.7 Cumulative effects assessment

11.7.1 As detailed in the site development schedule (Vol 27 Appendix N) no schemes have been identified within 1km of the site which meet the criteria for inclusion in the cumulative assessment. Therefore no assessment of cumulative effects has been undertaken. This would also apply in the event of a programme delay to the Thames Tideway Tunnel project of approximately one year.

11.8 Mitigation

11.8.1 All measures embedded in the proposed scheme and *CoCP* Part A and Part B of relevance to the townscape and visual assessment are summarised in Section 11.2. No further mitigation during construction is possible due to the highly visible nature of the construction activities.

11.9 Residual effects assessment

Construction effects

11.9.1 As no mitigation measures are proposed, the residual construction effects remain as described in Section 11.5. All residual effects are presented in Section 11.10.

11.10 Assessment summary

Vol 27 Table 11.10.1 Townscape – summary of construction assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
The site	Change to character due to the removal of street trees and parking bays, installation of hoardings and welfare facilities and the presence of construction activity and plant.	Moderate adverse	No mitigation possible	Moderate adverse
Bekesbourne Street Residential TCA	Slight change to setting due to the removal of trees, and the presence of site hoardings, welfare facilities and construction activity.	Minor adverse	None	Minor adverse
Limehouse Residential TCA	Slight change to setting due to the presence of tall construction plant and cranes.	Negligible	None	Negligible
Royal Foundation of St Katherine & St James's Gardens TCA	Slight change to setting due to the presence of tall construction plant and cranes.	Negligible	None	Negligible

Vol 27 Table 11.10.2 Visual – summary of construction assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Residential				
Viewpoint 1.1: View east from residences on Bekesbourne Street	Oblique visibility of construction activity at the southern end of the site.	Minor adverse	None	Minor adverse
Viewpoint 1.2: View south from residences on Bekesbourne Street	Foreground visibility of site hoardings, construction plant and traffic.	Moderate adverse	No mitigation possible	Moderate adverse
Viewpoint 1.3: View north from residences on Bekesbourne Street	Background oblique visibility of site hoardings, construction plant and construction traffic.	Minor adverse	None	Minor adverse
Recreational				
Viewpoint 2.1: View northeast from John Scurr Community Gardens	Filtered visibility of construction activity at the southern end of the site.	Minor adverse	None	Minor adverse
Transport				
Viewpoint 3.1: View north from CS3 Cycle Superhighway entrance to footbridge over the Rotherhithe Tunnel	Background visibility of tall construction plant and cranes.	Negligible	None	Negligible
Viewpoint 3.2: View east from the junction of Butcher Row leading to The Royal Foundation of St Katherine	Background visibility of tall construction plant and cranes	Negligible	None	Negligible
Viewpoint 3.3: View south from the western end of the Limehouse Rail Station platform	Background visibility of site hoardings, construction activity and construction traffic.	Minor adverse	None	Minor adverse

References

[1] Department of Environment, Food and Rural Affairs (Defra). *National Policy Statement for Waste Water* (2012).

[2] LB of Tower Hamlets. *LDF Core Strategy* (September 2010)

[3] LB of Tower Hamlets. *York Square Conservation Area* (2009)

[4] Department of Environment, Food and Rural Affairs (2012). See citation above.

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 assessment

Section 12: Transport

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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 assessment

Section 12: Transport

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12 Transport

12.1 Introduction

12.1.1 This section presents the findings of the assessment of the likely significant transport effects of the proposed development at the Other Works site at Bekesbourne Street. The project-wide transport effects are described in Volume 3 Project-wide effects assessment.

12.1.2 Construction of the proposed development at the Bekesbourne Street site has the potential to affect the following transport elements:

a. pedestrian routes

b. cycle facilities and routes

c. bus routes and patronage

d. Docklands Light Railway (DLR) and National Rail

e. car parking

f. highway layout, operation and capacity.

12.1.3 The assessment considers the effects on each of these elements during construction, as well as effects on specific receptors including nearby residents and users of John Scurr Community Centre and St James's Gardens. There are no river services in the vicinity of the Bekesbourne Street site and it is not proposed to use the river to transport materials at this site. Therefore effects on river passenger services and river navigation are not considered.

12.1.4 The operation of the Bekesbourne Street site has the potential to affect pedestrians, car parking/servicing and highway layout and operation and therefore effects on these are considered within the operational assessment.

12.1.5 The assessment of transport presented in this section has considered the requirements of the National Policy Statement for Waste Water (Defra, 2012)[1] section 4.13. Further details of these requirements can be found in Vol 2 Section 12.3.

12.1.6 Additionally, a separate *Transport Assessment* has been produced which provides an assessment of the effects on the transport network as a result of the construction and operational phases at the Bekesbourne Street site. The *Transport Assessment* accompanies the application for development consent (the 'application').

12.1.7 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

12.1.8 The separate but related assessments of effects of transport on air quality and noise and vibration are contained in Sections 4 and 9 respectively.

12.2 Proposed development relevant to transport

12.2.1 The proposed development is described in Section 3 of this volume. The elements of the proposed development relevant to transport are set out below.

Construction

12.2.2 The proposed site is located over two areas; one on a private residential access and parking area along a stretch of Bekesbourne Street and another on the northern side of Ratcliffe Lane just to the east of the junction with Bekesbourne Street. These areas are located approximately 70m south of the junction with Commercial Road (A13) within the London Borough (LB) of Tower Hamlets which is part of the Transport for London Road Network (TLRN).

12.2.3 During construction it is anticipated that the elements listed under para 12.1.2 may be affected as a result of changes to the local pedestrian, cycle and highway environments and additional construction traffic associated with the Bekesbourne Street site and other Thames Tideway Tunnel project construction sites with construction routes along Commercial Road (A13).

12.2.4 Additionally, to accommodate the construction works at the Bekesbourne Street site, 15 parking spaces (13 private parking spaces and two visitor/authorised contractor spaces) would be temporarily restricted from the southern section of Bekesbourne Street adjacent to John Scurr House. Two of these spaces would be permanently removed due to the need to accommodate an electrical and control kiosk.

12.2.5 A number of different highway configurations would be implemented during the construction of the site. During phase 1 of the construction works, the existing private parking area off Bekesbourne Street just south of the junction with Ratcliffe Lane would be removed and the carriageway relocated to the eastern edge of the road adjacent to the existing footway. The temporary carriageway would accommodate traffic travelling in one direction at a time. This single lane would be controlled either by temporary traffic lights at the southern and northern ends of the temporary carriageway or by traffic marshals. Due to the removal of the existing parking area, pedestrians currently using this area as a route to residences to the south would be diverted onto the eastern footway between the car park and John Scurr House.

12.2.6 For phase 2 of the construction works, the main site compound would be moved to the east of the street adjacent to the John Scurr House footway. The temporary carriageway would be moved to the west of the construction site and would also only accommodate traffic in one direction at a time. Either temporary traffic lights or traffic marshals would be employed to control movements.

12.2.7 During phase 3 of construction the main site compound would return to the west side of the street during the construction of the electrical and control kiosk. During this phase the carriageway would be arranged to accommodate two-way traffic.

12.2.8 The 15 parking spaces located on Bekesbourne Street would be temporarily restricted during all three construction phases.

12.2.9 In addition to the three phases of works described above a further four sub-phases of works (phases 2a-2d) would be required to install the ventilation duct, during which the main compound would be set out as per phase 2. A second smaller site compound would be erected on the Ratcliffe Lane footway and part of the carriageway just east of the junction with Bekesbourne Street for the construction of the ventilation column.

12.2.10 In phase 2a the site compound would be set up as per phase 2 of the main works and the duct would be laid within the main works compound with traffic management in Bekesbourne Street as described for phase 2. The northern footway on Ratcliffe Lane at the junction with Bekesbourne Street would be closed to pedestrians and the parking at this location would be restricted to accommodate the site compound for the ventilation column. Pedestrians would be diverted around the compound into the Ratcliffe Lane carriageway along a route protected from vehicular traffic by a barrier. To maintain adequate carriageway width during this phase the kerb buildout on the south side of Ratcliffe Lane (east) at the junction with Bekesbourne Street would need to be removed and replaced with carriageway. The phase 2a works could be undertaken simultaneously with phase 2.

12.2.11 During phases 2b, 2c and 2d a third site compound would be required in a different location in each phase as described in the following paragraphs.

12.2.12 In phase 2b the duct would be laid in a narrow compound extending to the north of the main site compound with a 3.0m wide traffic lane maintained to the west of the compound. Traffic operation would be as per phase 2 with traffic travelling in one direction at a time along the length of the main site compound and the extended duct site compound and movement controlled either by temporary traffic lights at the southern and northern ends of the temporary carriageway or by traffic marshals. Pedestrians would be diverted onto the eastern footway of Bekesbourne Street between the car park and John Scurr House. As with phase 2a, pedestrians on the northern footway of Ratcliffe Lane at the junction with Bekesbourne Street would be diverted around the compound into the Ratcliffe Lane carriageway along a route protected from vehicular traffic by a barrier. The kerb buildout on the south side of Ratcliffe Lane (east) at the junction with Bekesbourne Street would need to be removed and replaced with carriageway and parking at this location would be restricted.

12.2.13 For phase 2c the duct would be laid in a narrow compound within the Bekesbourne Street junction with Ratcliffe Lane. The kerb buildout on the north side of Ratcliffe Lane (east) at the junction with Bekesbourne Street would need to be removed and replaced with carriageway to give a carriageway width of 4.5m. During this phase the left turn into Bekesbourne Street (south) from Ratcliffe Lane (east) would be prohibited. Pedestrians on the northern footway of Ratcliffe Lane at the junction with Bekesbourne Street would be diverted to the southern footway on Ratcliffe Lane.

12.2.14 In phase 2d the duct would be laid in a narrow compound in Ratcliffe Lane (east) at the junction with Bekesbourne Street. The right turn into Bekesbourne Street (north) from Ratcliffe Lane (east) would be prohibited. The kerb buildout on the southern side of Ratcliffe Lane at the junction with Bekesbourne Street would need to be removed and replaced with carriageway to give a carriageway width of 3.1m. Two parking bays on the south side of Ratcliffe Lane and three parking bays on the north side would need to be restricted during this phase of work. Pedestrians on the northern footway of Ratcliffe Lane at the junction with Bekesbourne Street would be diverted to the southern footway on Ratcliffe Lane. Parking on the northern side of Ratcliffe Lane at this location would be again be restricted. The buildout on the southern side of Ratcliffe Lane at the junction with Bekesbourne Street would be removed. A minimum footway width of 2.2m would be maintained.

12.2.15 Details of the peak year of construction, anticipated lorry movements and the activities which would generate these movements are provided in Vol 27 Table 12.2.1.

Vol 27 Table 12.2.1 Transport - construction details

Description	Assumption
Assumed peak period of construction lorry movements	Site Year 1 of construction
Assumed average peak daily construction lorry vehicle movements (in peak month of Site Year 1 of construction)	10 movements per day (5 vehicle trips)
Typical types of lorry requiring access (comprising rigid-bodied, flatbed and articulated vehicles)	Office delivery lorries Temporary construction material lorries (including pipe/track/oils/grease lorries) Plant and equipment lorries Readymix mixer lorries Steel reinforcement lorries Excavation lorries

Note: a movement is a construction vehicle moving either to or from the site. A Site Year is a 12 month period, one in a series of Site Years; Site Year 1 commences at the start of construction

12.2.16 All construction material at the Bekesbourne Street site would be transported by road.

12.2.17 Vehicle movements would take place during the standard day shift of ten hours on weekdays (08:00 to 18:00) and five hours on Saturdays (08:00 to 13:00).

Construction traffic routing

12.2.18 Vehicle access to and from the Bekesbourne Street site would be on the northern side of the site, close to the junction of Bekesbourne Street and Ratcliffe Lane.

12.2.19 The access plan and highway layout during construction plans (see separate volume of figures – Section 1) present the highway layout during construction.

12.2.20 Construction vehicles would route to the site along Commercial Road (A13), Branch Road (A101) and then Ratcliffe Lane. Vehicles would turn north into Bekesbourne Street then reverse back through the junction with Ratcliffe Lane and into the site access. Vehicles would exit the site in forward gear and turn left into Ratcliffe Lane then turn right into Butcher Row (B126) to route to Commercial Road (A13).

12.2.21 Vol 27 Figure 12.2.1 (see separate volume of figures – Section 2) shows the construction traffic routes for access to/from Bekesbourne Street. Construction routes have been discussed with both Transport for London (TfL) and the Local Highway Authority (LHA), the LB of Tower Hamlets, for the purposes of the assessment.

Construction workers

12.2.22 The construction site is expected to require a maximum workforce of 24 workers on site at any one time. The number and type of workers is shown in Vol 27 Table 12.2.2.

Vol 27 Table 12.2.2 Transport - maximum estimated construction worker numbers

Contractor		Client
Staff*	**Labour****	**Staff*****
08:00-18:00	**08:00-18:00**	**08:00-18:00**
7	13	4

** Contractor Staff– engineering and support staff to direct and project manage the engineering work and site.*
*** Contractor Labour – those working on site doing engineering, construction and manual work.*
**** Client Staff– engineering and support staff managing the project and supervising the Contractor.*

12.2.23 At the Bekesbourne Street site there would be no parking provided within the site boundary for workers. As parking on surrounding streets would also be restricted and measures to reduce car use would be incorporated into the *Workplace Travel Plan* (prepared by the contractor in accordance with the overall aims and objectives of the *Draft Project Framework Travel Plan*), it is highly unlikely that workers would travel by car. It is therefore assumed that construction workers would access the site by other modes of transport, further details of which are provided in Vol 27 Table 12.5.1.

Code of Construction Practice

12.2.24 Measures incorporated into the *Code of Construction Practice (CoCP) Part A* (Section 5) to reduce transport effects include:

a. site specific *Traffic Management Plans* (TMP): to set out how vehicular access to the site would be managed so as to minimise impact on the local area and communicate this with the local borough and other stakeholders. This includes any works on the highway, diversion or temporary closure of the highway or public right of way

b. HGV management and control: to ensure construction vehicles use appropriate routes to the sites and the vehicle fleet and/or drivers meet current safety and environmental standards.

12.2.25 In addition to the above general transport measures within the *CoCP Part A*, the following transport measures have been incorporated into the *CoCP Part B* (Section 5) relating to the Bekesbourne Street site:

a. the site access would be from Commercial Road (A13) turning into Branch Road (A101) and right into Ratcliffe Lane. Vehicles would reverse into the site along Bekesbourne Street under supervision of a traffic marshal.

b. vehicles would exit the site in forward gear into Bekesbourne Street and left into Ratcliffe Lane and right into Butcher Row (B126).

c. existing parking on Bekesbourne Street is to be suspended during construction

d. parking on the northern side of Ratcliffe Lane and the junction with Bekesbourne Street is to be suspended during construction

e. parking on the southern side of Ratcliffe Lane and the junction with Bekesbourne Street is to be suspended during phase 2d of construction

f. the access route to the properties on Bekesbourne Street south of the site would be maintained throughout the construction period unless agreed otherwise. The access route would be a single lane, but adequate for its use by residents and light goods vehicles. Appropriate signage would be provided to make road users aware of the width restriction and likely conflict with oncoming vehicles. A traffic light system or traffic marshals would be used to manage traffic flow

g. the realigned residential access route would be controlled either by signalised traffic control or by traffic marshals with ‘Stop, Go’ signs

h. the site is restricted and so the contractor would utilise small vehicles to reduce potential traffic conflicts and impacts

i. the pedestrian route along the eastern boundary adjacent to John Scurr House would be maintained throughout the construction period unless agreed otherwise and would be clearly and adequately signed and lit.

12.2.26 The effective implementation of the *CoCP Part A* and *Part B* measures is assumed within the assessment.

12.2.27 Based on current travel planning guidance including TfL's 'Travel planning for new development in London', this development lies within the threshold for producing a Strategic Framework Travel Plan. A *Draft Project Framework Travel Plan* has been prepared based on the TfL ATTrBuTE guidance (TfL, 2011)[2]; and accompanies the application. The *Draft Project Framework Travel Plan* addresses project-wide travel planning measures including the need for a project-wide Travel Plan Manager, initial travel surveys during construction and a monitoring framework. It also contains requirements and guidelines for the site-specific Travel Plans to be prepared by the site contractors. The site-specific travel planning requirements of relevance to the *Draft Project Framework Travel Plan* are as follows:

a. information on existing transport networks and travel initiatives for the Bekesbourne Street site

b. a mode split established for the Bekesbourne Street site construction workers to establish and monitor travel patterns

c. site-specific targets and interim targets based on the mode share which would link to objectives based on local, regional and national policy

d. a nominated person with responsibility for managing the Travel Plan monitoring and action plans specifically for this site.

Operation

12.2.28 During operation, maintenance vehicles would enter the site from Branch Road (A101) and Ratcliffe Lane and exit the site via Ratcliffe Lane and Butcher Row (A126). Access would be required for a light commercial vehicle on a three- to six-monthly maintenance schedule. Additionally there would be more substantive maintenance visits at approximately ten year intervals which may require temporary restriction of some on-street parking in the vicinity of the site as well as other temporary traffic management measures such as diversion around open access covers.

12.2.29 Two of the existing car parking spaces would be removed permanently due to the need to accommodate an electrical and control kiosk.

12.3 Assessment methodology

Engagement

12.3.1 Volume 2 documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. Specific comments relevant to this site for the assessment of traffic and transport are presented in Vol 27 Table 12.3.1.

12.3.2 The *Scoping Report* was prepared before Bekesbourne Street had been identified as a potential site. The scope for transport for the Bekesbourne Street site has therefore drawn on the scoping response from the LB of Tower Hamlets and is based on professional judgement as well as experience of similar sites.

12.3.3 It is noted that it was reported in the *Scoping Report* that operational traffic effects for the project as a whole were scoped out of the environmental impact assessment (EIA). However, while the environmental effects associated with transport for the operational phase are not expected to be significant or adverse, the assessment of transport effects in the *Environmental Statement* examines relevant aspects of the operational phase in order to satisfy the relevant stakeholders that technical issues have been addressed.

Vol 27 Table 12.3.1 Transport - stakeholder engagement

Organisation	Comment	Response
Transport for London, Transport assessment workshop, November 2012	ATC survey was undertaken in July, which is a school holiday. ATC to be resurveyed.	The ATC survey on Commercial Road was undertaken between 21 May and 10 June 2011, outside of the school holiday period.
LB of Tower Hamlets, phase two consultation, February 2012	The Council has no objection in principle to the proposals for this site.	Noted.
LB of Tower Hamlets, phase two consultation, February 2012	The Council would require a s278 Highways Act 1980 agreement or equivalent provision in any development consent order, and appropriate liaison with the Streetworks and C&G section over hoardings etc shortly prior to construction.	Any s278 agreements required for any Thames Tideway Tunnel project site would be developed in liaison with the relevant borough departments.
GLA, phase two consultation, February 2012	The Mayor sees the Bekesbourne Street site being acceptable provided that Thames Water ensure satisfactory highway management measures, particularly given that the street is narrow and shared between vehicles and pedestrians	Highway management measures would be implemented to ensure the safety of pedestrians, cyclists and highway users particularly in the vicinity of the construction site. These measures are set out in the *CoCP Part B*.
GLA, phase two consultation, February 2012	The Mayor sees the Bekesbourne Street site being acceptable provided that Thames Water ensure that construction impacts are minimised to an acceptable level.	The proposed design has minimised construction effects as far as is practicable. Residual construction effects are detailed in Section 12.5.

Baseline

12.3.4 The baseline methodology follows the methodology described in Volume 2 with the exception that local modelling has not been undertaken for this site. However, survey results have been used to understand the existing capacity and operation of the local highway network (as described in paras. 12.4.44 to 12.4.50). This site-specific variation to the methodology has been discussed with TfL.

Construction

12.3.5 The assessment methodology for the construction phase follows that described in Volume 2 with the exception that local modelling has not been undertaken for this site.

12.3.6 The effect of all other Thames Tideway Tunnel project sites on the area surrounding the Bekesbourne Street site has been taken into account within the assessment of the peak year of construction at this site.

12.3.7 As indicated in the Development Schedule (see Vol 27 Appendix N) three other developments (development on the former land bounded by Schoolhouse Lane, Cable Street and Glasshouse Fields, Ocean Estate development and John Bell House development) would be complete and operational by Site Year 1 of construction at the Bekesbourne Street site. These developments have therefore been included in the construction base case assessment.

12.3.8 As the TfL Highway Assignment Models (HAMs) which have been used in the transport assessment have been developed by TfL using GLA employment and population forecasts and are based on the employment and housing projections set out in the *London Plan 2011(*GLA, 2011)[3], the assessment inherently takes into account a level of future growth and development across London.

12.3.9 This means that the trips associated with the other developments outlined within the Development Schedule (see Vol 27 Appendix N) are already taken into consideration within the traffic modelling. There are no cumulative effects to assess.

Construction assessment area

12.3.10 The assessment area for the Bekesbourne Street site includes the site access directly on Bekesbourne Street, the junction of Bekesbourne Street and Ratcliffe Lane and Ratcliffe Lane east of this junction.

12.3.11 These roads and junctions have been assessed for highway, cycle and pedestrian impacts. Effects on local bus services within 640m of the site and rail services within 960m of the site have also been assessed[i].

12.3.12 The assessment area also extends to the wider highway network, including Commercial Road (A13), Branch Road (A101) and Butcher Row (A126), in terms of delay on road users. The junctions of Commercial Road (A13) / Belgrave Street, Commercial Road (A13) / Branch Road

[i] Distances derived from the Public Transport Accessibility Level (PTAL) methodology described in Volume 2.

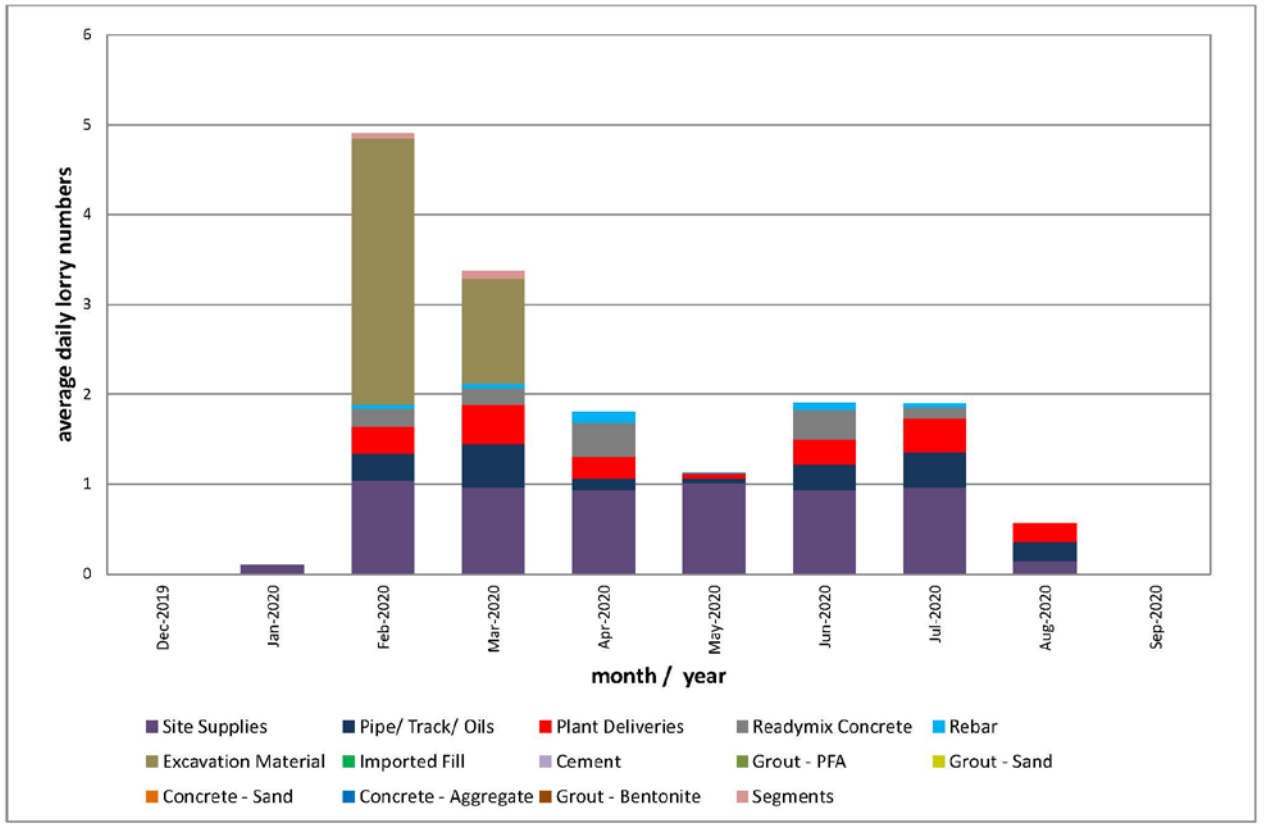
(A101) and The Highway (A1203) / Butcher Row (A126) have also been assessed for safety in relation to construction vehicle movements and the current accident history at these locations.

Construction assessment years

12.3.13 A site-specific peak construction assessment year has been identified. The histogram in Vol 27 Plate 12.3.1 shows that the peak site-specific activity at the Bekesbourne Street site would occur in Site Year 1 of construction.

12.3.14 The assessment of construction effects also considers the extent to which the assessment findings would be likely to be materially different should the programme for the Thames Tideway Tunnel project be delayed by approximately one year.

Vol 27 Plate 12.3.1 Transport – estimated construction lorry profile



Note: Plate shows approximate volumes and number of lorry trips based upon assumed timings for the works. It is not a programme and remains subject to change.

Operation

12.3.15 The assessment methodology for the operational phase follows that described in Volume 2. There are no site specific variations for undertaking the operational assessment of the Bekesbourne Street site.

12.3.16 Once the Thames Tideway Tunnel project is operational it is not expected that there would be any significant effects on the transport infrastructure and operation within the local area because maintenance trips to the Bekesbourne Street site would be infrequent and short-term. On this basis it is not necessary to assess the effects on all the elements listed at para. 12.1.2. The only elements considered are:

a. effects on pedestrians

b. effects on car parking and servicing

c. effects on highway layout and operation.

12.3.17 These elements are considered qualitatively (as described in Volume 2) because the minimal effect on the highway network means that a quantitative assessment is not required. The scope of this analysis has been agreed with the LB of Tower Hamlets and TfL.

12.3.18 Also, given the local impact of the transport activity associated with the Thames Tideway Tunnel project during the operational phase only the localised transport effects around the Bekesbourne Street site are assessed. Other Thames Tideway Tunnel project sites would not affect the area around the Bekesbourne Street site in the operational phase and therefore they are not considered in the assessment.

12.3.19 With regard to other developments in the vicinity of the site (as detailed in Vol 27 Appendix N) the three developments identified in the schedule would be complete and operational by Year 1 of operation. As a result these developments have been included within the operational base case which takes into consideration the effects on pedestrians, highway layout, operation and parking. There are no operational cumulative effects requiring assessment.

Operational assessment area

12.3.20 The assessment area for the operational assessment remains the same as for the construction assessment as set out in paras. 12.3.10 and 12.3.11.

Operational assessment year

12.3.21 As outlined in Volume 2 the operational assessment year has been taken as Year 1 of operation. As the number of vehicle movements associated with the operational phase is very low, there is no requirement to assess any other year beyond that date.

12.3.22 As with construction, the assessment of operational effects also considers the extent to which the assessment findings would be likely to be materially different should the programme for the Thames Tideway Tunnel project (and hence opening year) be delayed by approximately one year.

Assumptions and limitations

12.3.23 The general assumptions and limitations associated with this assessment are presented in Volume 2.

Assumptions

12.3.24 There would be deliveries of fuel for construction plant at this site and a number of construction products may be classified as hazardous. For the Bekesbourne Street site, it is assumed that there would be one hazardous load per fortnight generated by the site.

12.3.25 With regard to construction workers travelling to the site, it is assumed that no construction workers would drive to the site, as set out in para. 12.5.3.

Limitations

12.3.26 There are no site-specific limitations of the transport assessment undertaken for this site.

12.4 Baseline conditions

12.4.1 The following section sets out the baseline conditions for transport within and around the Bekesbourne Street site. Future baseline conditions (base case) are also described.

Current baseline

12.4.2 The Bekesbourne Street site is located on a private residential access and parking area along a stretch of Bekesbourne Street as shown in Vol 27 Figure 12.4.1 (see separate volume of figures – Section 2). It is located approximately 70m south of the junction with Commercial Road (A13). The A13 forms part of the TLRN.

Pedestrian routes

12.4.3 The existing pedestrian network and facilities in the vicinity of the Bekesbourne Street site are shown in Vol 27 Figure 12.4.2 (see separate volume of figures – Section 2).

12.4.4 The key pedestrian network to and from the site is directly related to local public transport services, primarily Limehouse DLR and National Rail Station and local bus stops. The key pedestrian network and facilities in the vicinity of the site comprise:

a. Bekesbourne Street – towards Limehouse DLR and National Rail Station

b. Bekesbourne Street and Commercial Road (A13) – towards bus stops on Commercial Road

c. Ratcliffe Lane west and Butchers Row (A126) – towards the bus stops on Butcher Row (A126).

12.4.5 Bekesbourne Street provides an access route to Limehouse Station, John Scurr House, John Scurr Community Centre and other residential properties. It routes north-south and is intersected by Ratcliffe Lane, an east-west link between Butcher Row (A126) and Branch Road (A101).

12.4.6 North of Ratcliffe Lane the footways on either side of Bekesbourne Street vary in width between 1.5m and 3.5m. This variation in footway width is due to parking and loading bays inset into the footways.

12.4.7 South of the junction with Ratcliffe Lane a pedestrian footway just less than 2m wide, and segregated from the carriageway by a line of bollards and trees, routes on the eastern side of Bekesbourne Street adjacent to John Scurr House to another crossroads providing pedestrian access to residential properties and parking, the John Scurr Community Centre and St James Gardens. The surface material of the carriageway on this section of Bekesbourne Street suggests shared operation between vehicles and pedestrians. South of this crossroads the definition between the footway and carriageway reduces further and there is a shared area for all users.

12.4.8 The footways on Ratcliffe Lane are between 1.5m and 5m wide with a short section of the footway to the west of Bekesbourne Street underneath a railway bridge segregated from the road on both sides.

12.4.9 The Bekesbourne Street / Ratcliffe Lane junction has a raised junction table treatment, providing a level surface to enable pedestrians to cross each arm of the junction. Additionally, dropped kerbs are provided at the junction of Bekesbourne Street / Commercial Road (A13), Ratcliffe Lane / Butcher Row (A126) and Ratcliffe Lane / Branch Road (A101).

12.4.10 A pedestrian crossing facility is located on Commercial Road (A13) at the junction with Butcher Row (A126) to aid north-south and east-west pedestrian movements.

12.4.11 The Thames Path routes along the riverside approximately 200m to the south of the Bekesbourne Street site. It can be accessed via Narrow Street and Spert Street to the south of the Limehouse Link (A1203).

Cycle facilities and routes

12.4.12 The existing cycle network and facilities in the vicinity of the Bekesbourne Street site are shown in Vol 27 Figure 12.4.2 (see separate volume of figures – Section 2).

12.4.13 The main cycle route within the area is Cycle Superhighway 3 (CS3) which routes between Barking and Tower Hamlets. The closest approach of CS3 to the site is along Cable Street, Narrow Road and Limehouse Causeway.

12.4.14 The Bekesbourne Street site is also located near to National Cycle Network (NCN) Route 1 (on road). NCN Route 1 routes through east London crossing the river at the Greenwich Foot Tunnel and continuing east along the southern bank of the River Thames. The closest approach of NCN Route 1 to the site is on Horseferry Road approximately 180m to the south.

12.4.15 An off-road cycle path is provided around Limehouse Basin and along the canal to the east and there are a number of quieter roads near to the Bekesbourne Street site recommended for use by cyclists. These are Caroline Street, Westport Street, Bromley Street, Belgrave Lane and Salmon Lane.

12.4.16 No advanced stop lines are provided for cyclists in the immediate vicinity of the site. There are also no public cycle stands in the area immediately around the site.

12.4.17 The closest cycle hire docking stations are located approximately 300m to the west of the Bekesbourne Street site on Flamborough Street under the railway bridge.

Public Transport Accessibility Level

12.4.18 The Public Transport Accessibility Level (PTAL) of the site has been calculated using TfL's approved PTAL methodology (TfL, 2010)[4] and assumes a walking speed of 4.8km/h and considers rail stations within a 12 minute walk (960m) of the site and bus stops within an eight minute walk (640m).

12.4.19 Using this methodology the site has a PTAL rating of 6b, rated as 'excellent' (with 1a being the lowest accessibility and 6b being the highest accessibility).

12.4.20 Vol 27 Figure 12.4.3 (see separate volume of figures – Section 2) shows the public transport network around the Bekesbourne Street site.

Bus routes

12.4.21 As shown in Vol 27 Figure 12.4.3 (see separate volume of figures – Section 2) a total of four daytime bus routes operate within a 640m walking distance of the Bekesbourne Street site serving local destinations. There are also a total of three night bus routes which operate within a 640m walking distance of the site.

12.4.22 These bus routes operate from the following stops:

a. Limehouse Station bus stop, 110m north on Commercial Road (A13) - eastbound and westbound

b. Cable Street bus stop, 245m west on Butcher Row (A126) – eastbound and westbound

c. Lowell Street bus stop, 420m northeast on Commercial Road (A13) – eastbound and westbound

d. Stepney Methodist Church bus stop 300m northwest on Commercial Road (A13) – eastbound and westbound

e. Marion Richardson School bus stop 480m northwest on Commercial Road (A13) – eastbound only

f. Free Trade Wharf bus stop 610m southwest on The Highway (A1203) – eastbound and westbound.

12.4.23 These routes also serve other stops further from the site as shown on Vol 27 Figure 12.4.3.

12.4.24 On average there are 54 bus services in total per hour in the AM peak and 51 bus services in total per hour in the PM peak within a 640m walking distance of the Bekesbourne Street site.

12.4.25 There are approximately 16 night-time bus services per hour Monday to Friday between 00:00 and 06:00 and a total of 18 bus services per hour on

Saturdays between 00:00 and 06:00 (two-way direction) within a 640m walking distance of the site.

London Underground and Docklands Light Railway

12.4.26 There are no London Underground stations located within a 960m walking distance of the Bekesbourne Street site. The nearest Underground station is Stepney Green on the District and Hammersmith and City lines, which is approximately 1.4km (18 minute walk) to the north of the site.

12.4.27 Limehouse DLR station is located approximately 35m walking distance to the north of the Bekesbourne Street site. The location of this station is shown in Vol 27 Figure 12.4.3 (see separate volume of figures – Section 2).

12.4.28 The DLR services at Limehouse provide connections to Beckton, Lewisham and Woolwich Arsenal in the east and Bank and Tower Gateway in the west. In the AM and PM peak hours the frequency of services is approximately 46 per hour in both the eastbound and westbound directions.

London Overground

12.4.29 There are no London Overground stations located within a 960m walking distance of the Bekesbourne Street site. The nearest station is at Shadwell approximately 1.4km (an 18 minute walk) to the west of the site. This provides Overground services to New Cross, Crystal Palace and West Croydon to the south and to Dalston Junction and Highbury and Islington to the northwest.

National Rail

12.4.30 The closest National Rail station to the Bekesbourne Street site is Limehouse located approximately 35m walking distance to the north.

12.4.31 Limehouse station provides c2c services between London Fenchurch Street and Shoeburyness via Grays and Southend Central. There are approximately five eastbound and 14 westbound services in the AM peak hour and 13 eastbound and five westbound services in the PM peak hour.

Parking

12.4.32 Vol 27 Figure 12.4.4 (see separate volume of figures – Section 2) shows the locations of the existing car parks and car club spaces within the vicinity of the Bekesbourne Street site.

Existing on-street car parking

12.4.33 There are five parking bays for business and permit holders along the northern section of Bekesbourne Street along with two station drop-off lay-bys. These restrictions operate between Monday and Friday 08:30 to 17:30.

12.4.34 Ten residential permit holder on-street parking bays are located on Ratcliffe Lane. These restrictions operate between Monday and Friday 08:30 to 17:30.

12.4.35 No stopping is permitted at any time along the length of Branch Road (A101). Butcher Row (A126) has a combination of no stopping at any time

at the northern and southern end of the road and no stopping between 07:00 and 19:00 in the middle section of the road.

Existing off-street/private car parking

12.4.36 The southern section of Bekesbourne Street has a total of 46 parking spaces. These are a mixture of spaces outside residential properties and numbered spaces for the residential flats. All these spaces are private resident spaces. There are a further four visitor/authorised contractor spaces and two spaces for use by the John Scurr Community Centre.

12.4.37 There are currently no council car parks within a 640m walking distance of the site.

Coach parking

12.4.38 There are currently no coach parking spaces within a 640m walking distance of the site.

Car clubs

12.4.39 There are a number of car club spaces located near to the Bekesbourne Street site. The closest space is provided by Zipcar and is located along Barnes Road approximately 80m walking distance to the north of the site.

12.4.40 Other spaces are located just off The Highway / Limehouse Link (A1203) on Heckford Street (one space), approximately 550m walking distance west of the site and Narrow Street (two spaces), approximately 600m walking distance southeast of the site.

Servicing and deliveries

12.4.41 Four 'authorised contractor' bays are located adjacent to John Scurr House. These are restricted to contractors for John Scurr House and the Bekesbourne Street residential dwellings. These spaces can also be used as visitor parking bays.

Taxis

12.4.42 There are no taxi ranks within a 640m walking distance of the Bekesbourne Street site.

12.4.43 Outside Limehouse Station, towards the northern end of Bekesbourne Street, there are two drop-off bays for the general public. 'No waiting' is permitted in these bays between Monday and Friday 08:30 to 17:30.

Highway network and operation

12.4.44 Bekesbourne Street is a north-south road, intersected by Ratcliffe Lane. It is approximately 150m in length and has a 30mph speed limit. At the intersection with Ratcliffe Lane there is a priority junction, with priority given to the east to north movement. North of Ratcliffe Lane, Bekesbourne Street is a one-way northbound only link and south of Ratcliffe Lane it is a two-way residential private access.

12.4.45 Bekesbourne Street provides an access route to Limehouse Station, John Scurr House, John Scurr Community Centre and other residential properties. It routes north-south and is intersected by Ratcliffe Lane, an east-west link between Butcher Row (A126) and Branch Road (A101).

12.4.46 Ratcliffe Lane is a 30mph road approximately 150m in length linking Branch Road (A101) and Butcher Row (A126). It is a one-way westbound only street between Branch Road (A101) and Bekesbourne Street, and two-way between Bekesbourne Street and Butcher Row (A126).

12.4.47 Butcher Row (A126) is a four lane carriageway with two lanes in each direction and a hatched central median which provides a link between Commercial Road (A13) and The Highway / Limehouse Link (A1203). The Limehouse Link is a tunnel which provides an underground connection to West India Quays and is subject to a 30mph speed limit.

12.4.48 Branch Road (A101) is a five lane carriageway with two lanes in the northbound direction and three lanes in the southbound direction. The road splits into two near to the Bekesbourne Street site and connects Commercial Road (A13) with the Rotherhithe Tunnel along one branch, and Horseferry Road along the other branch. Where the road splits, there is one lane in each direction for the Horseferry Road branch and two northbound and one southbound lane for the Rotherhithe Tunnel branch, both of which are subject to a 30mph speed limit.

12.4.49 There are signalised junctions between Butcher Row (A126) / Commercial Road (A13) and Branch Road (A101) / Commercial Road (A13) to the northwest and northeast of the site respectively.

12.4.50 Vehicular traffic on Bekesbourne Street and Ratcliffe Lane consists mainly of vehicles destined for or exiting from the residences on Bekesbourne Street. As a result Bekesbourne Street and Ratcliffe Lane are lightly trafficked and, although there is some queuing on Ratcliffe Lane at the junction with Butcher Row (A126) in the AM peak hour, the junctions all operate within capacity.

Data from third party sources

Description of data

12.4.51 Data in relation to accidents have been sourced from TfL.

Accident analysis

12.4.52 During the five year period of accident data analysed, a total of 107 accidents occurred within the assessment area. Of these accidents, 92 were categorised as slight and 15 were serious with the majority of accidents occurring at the junctions of Commercial Road (A13) / Belgrave Street, Commercial Road (A13) / Branch Road (A101) and The Highway (A1203) / Butcher Row (A126).

12.4.53 In general, the accidents largely involved cars and motorcyclists. Three of the accidents involved HGVs, of which two were rated as slight and one was serious, while MGVs were involved in four accidents, of which all were rated as slight.

12.4.54 Of the serious accidents, seven occurred each on Commercial Road (A13) and The Highway (A1203), while one occurred at the junction between Rotherhithe Tunnel Approach and East India Dock Road.

12.4.55 Of the total accidents along The Highway (A1203), seven were classified as serious. There is a cluster of five accidents at the junction with

Limehouse Link (A1203). Another of the serious accidents occurred at its junction with Butcher Row (A126).

12.4.56 The records show that there were 16 accidents involving pedestrians and cyclists in the assessment area. Inspection of the data showed that up to seven of these occurred at junctions with signalised control facilities, with the remaining accidents occurring at locations without signal control.

12.4.57 In the context of the temporary HGV movements associated with the Bekesbourne Street site, the accident risk to these modes of travel will be managed by providing pedestrian and cyclist awareness training for commercial drivers associated with the construction works.

12.4.58 In summary, none of the accident descriptions suggest that the cause of the accidents was due to the geometry and / or infrastructure of the highway network.

Survey data

Description of surveys

12.4.59 Baseline survey data were collected in May, July, and December 2011 to establish the existing transport conditions and parking usage in the area. Vol 27 Figure 12.4.5 (see separate volume of figures – Section 2) shows the survey locations in the vicinity of the Bekesbourne Street site.

12.4.60 As part of the surveys in the surrounding area in May and July 2011 manual and automated traffic surveys were undertaken to establish specific traffic and cycle movements including turning volumes, queue lengths, saturation flows, degree of saturation and traffic signal timings. Parking surveys were undertaken to establish the usage of the existing on-street and private parking in addition to visitor/loading bays.

12.4.61 Pedestrian, cycle and vehicle movement surveys along Bekesbourne Street were undertaken in December 2011.

Results of the surveys

12.4.62 The surveys inform the analysis of the baseline situation in the area surrounding the Bekesbourne Street site.

Pedestrians and cyclists

12.4.63 Pedestrian and cycle counts were conducted on Bekesbourne Street south of the junction with Ratcliffe Lane in order to determine the existing movements that occur around the Bekesbourne Street site.

12.4.64 The north-south flow of pedestrians is low in the AM peak (46 pedestrians per hour). Pedestrian flow increases during the afternoon to a peak of around 100 per hour at around 15:00. The flow is approximately equal in each direction throughout the day. Between 5% and 10% of these pedestrians were identified as having walked to or from cars parked in the section of parking on Bekesbourne Street adjacent to the west of John Scurr House. Between half and two thirds of pedestrians use the dedicated pedestrian footway adjacent to John Scurr House while the remainder route along the Bekesbourne Street carriageway/shared surface.

12.4.65 Six cycle movements were recorded routing along Bekesbourne Street during the survey period; three routing northbound in the AM peak hour and three routing southbound in the PM peak hour. All cyclists used the carriageway/shared surface.

12.4.66 The Cycle Superhighway (CS3) shows high usage with 330 cyclists routing eastbound and 239 westbound in the AM peak hour and 145 eastbound and 206 westbound in the PM peak hour.

Traffic flows

12.4.67 The ATC data has been analysed to identify the existing traffic flows along Commercial Road (A13). For westbound movement, the busiest hour is in the AM peak hour with a maximum of approximately 360 vehicles every 15 minutes. For eastbound movement, the busiest hour is in the PM peak hour, with a maximum of approximately 250 vehicles every 15 minutes.

12.4.68 The junction surveys have been analysed to identify existing traffic flows along Branch Road (A101) to the east of the Bekesbourne Street site. For southbound movement, the busiest hour is the PM peak hour with a maximum of approximately 177 vehicles every 15 minutes. For northbound movement, the busiest is in the AM peak hour, with approximately 97 vehicles every 15 minutes.

12.4.69 The junction surveys have also been analysed to identify existing traffic flows along Butcher Row (A126) to the west of the Bekesbourne Street site. For southbound movement, the busiest hour is the AM peak hour with a maximum of approximately 399 vehicles every 15 minutes. For northbound movement, the busiest is in the PM peak hour, with approximately 191 vehicles every 15 minutes.

12.4.70 Along Ratcliffe Lane to the west of the Bekesbourne Street site, the busiest hour for the eastbound movement is the PM peak hour with a maximum of approximately nine vehicles every 15 minutes. For westbound movement, the busiest is in the AM peak hour, with approximately 110 vehicles every 15 minutes.

12.4.71 On Bekesbourne Street the peak flow along the section through the John Scurr House private car park occurred in the PM peak hour when 36 vehicles routed northbound and four southbound.

Parking

12.4.72 The results of the parking surveys on Bekesbourne Street (north of Ratcliffe Lane) and Ratcliffe Lane show that utilisation of residential parking spaces is high during weekdays and at weekends.

Transport receptors and sensitivity

12.4.73 The receptors and their sensitivities in the vicinity of the Bekesbourne Street site are summarised in Vol 27 Table 12.4.1. The transport receptor sensitivity is defined as high, medium or low using the criteria detailed in Volume 2.

12.4.74 The transport effects identified in this assessment are directly related to changes to the operation of transport networks which may occur as a

result of physical changes to transport networks or of additional vessel or vehicle movements or additional public transport patronage. These changes in operation could lead to effects which would be experienced by people using those transport networks, whether as pedestrians, cyclists, public transport or private vehicle users. The assessment identifies several 'generic' groups of transport users in the list of transport receptors.

12.4.75 Receptors who are occupiers and users of or visitors to existing or committed developments in the vicinity of each of the project sites may experience transport effects on their journeys to and from those developments. In many cases those effects would be similar (or identical) to the effects identified for the 'generic' groups of transport users. However, the assessment specifically includes these receptors to ensure that any particular effects that they would be likely to experience (for instance because they make use of particular routes or transport facilities) have been identified.

Vol 27 Table 12.4.1 Transport – receptors and sensitivity

Receptors (relating to all identified transport effects)	Phase at which receptor is sensitive to identified impacts	Value/sensitivity and justification
Pedestrians (including sensitive pedestrians[ii]) and cyclists using Bekesbourne Street and Ratcliffe Lane.	Construction Operation	High sensitivity to increases in HGV traffic and changes in pedestrian and cycle routes.
Private vehicle users in the area using the local highways or on-street parking	Construction Operation	High sensitivity to reduction in parking, increases in HGV traffic and delays to journey time.
Emergency vehicles in the area using the local highways	Construction Operation	High sensitivity to network delays due to time constraints on journey purposes.
Bus users (passengers) travelling on routes along the A13 and Butcher Row (A126)	Construction	Low sensitivity due to distance from the site and low numbers of construction workers.
Public transport passengers using DLR	Construction	Low sensitivity due to distance from site and low

[ii] Sensitive pedestrians include those with mobility impairments, including wheelchair users.

Receptors (relating to all identified transport effects)	Phase at which receptor is sensitive to identified impacts	Value/sensitivity and justification
and National Rail services		numbers of construction workers.
Residents of John Scurr House, 2m to east of site, including users of resident permit parking on Bekesbourne Street	Construction Operation	High sensitivity to changes in pedestrian, cycle and access routes, and parking.
Users of John Scurr Community Centre, 25m southwest of the site	Construction	High sensitivity to changes in pedestrian, cycle and access routes, and parking.
Users of Grocery Station shop, 22m north of the site.	Construction	Medium sensitivity to changes in pedestrian routes, parking, and highway network operation.
Service vehicles using authorised contractor/loading bays adjacent to John Scurr House	Construction Operation	Medium sensitivity to increases in HGV traffic and delays to journey time.
Recreational users of St James's Gardens, 35m to south of site.	Construction	High sensitivity to changes in pedestrian, cycle and access routes; vulnerable pedestrian groups are likely to be present (children, mobility impaired users)
Pupils, parents and staff of Stephen Hawking School, 210m to northeast of site.	Construction	Low sensitivity to changes in pedestrian routes; sensitivity reflects distance from construction site.

Construction base case

12.4.76 As described in Section 12.3 the construction assessment year for transport effects in relation to the Bekesbourne Street site is Site Year 1 of construction.

12.4.77 There are no known proposals to change the cycle or pedestrian network by Site Year 1 of construction and the network will operate as indicated in the baseline situation.

12.4.78 In terms of the public transport network it is expected that as a result of the TfL *London Underground Upgrade Plan* (TfL, no date)[5] there will be a capacity increase compared to the current baseline for many of the London Underground lines. As part of the Upgrade Plan the Hammersmith and City line is expected to see a capacity increase of 65% and the District Line is expected to see a capacity increase of 24%. Given that the nearest underground station is Stepney Green, which is 1.4km from the Bekesbourne Street site, it is unlikely that a significant proportion of journeys to and from the site would be made using the London Underground.

12.4.79 The London Overground extension between Dalston Junction and Clapham junction (via Surrey Quays) opened in 2012 and will provide better connections between stations in southeast London[6]. However, considering the nearest London Overground station is Shadwell, approximately 1.4km from the Bekesbourne Street site, it is not expected that a significant proportion of journeys to and from the site would be made using the London Overground.

12.4.80 At the time of writing this assessment there were no committed proposals to enhance the DLR. It is envisaged that DLR and National Rail patronage will increase by Site Year 1 of construction. In order to ensure that the busiest case scenario is addressed in the assessment the capacity for DLR and National Rail in the base case has been assumed to remain the same as capacity in the baseline situation. This ensures a robust assessment as outlined in Volume 2.

12.4.81 The construction base case takes into account traffic growth and new developments within the local area by Site Year 1 of construction (see para. 12.3.7). However, none of these developments represent new receptors as none are located within 250m of the Bekesbourne Street site.

12.4.82 Professional judgement drawing on the traffic surveys undertaken and knowledge of the area suggests that the local network will continue to operate within capacity when taking into account the construction base case traffic flows.

Operational base case

12.4.83 The operational base case has been classified as Year 1 of operation.

12.4.84 The elements of the transport network that would be affected during operation are pedestrian routes, parking, servicing and highway layout and operation. For the purposes of the operational base case it is anticipated that the highway layout and operation will be as indicated in the construction base case.

12.4.85 The operational base case takes account of the developments described in the development schedules (Vol 27 Appendix N). Given the distance of the developments from the site it is not however necessary to consider

any of them as receptors in the transport assessment of operational effects.

12.5 Construction effects assessment

12.5.1 This section summarises the findings of the assessment undertaken for the peak year of construction at the Bekesbourne Street site (Site Year 1 of construction).

12.5.2 The anticipated mode split of worker trips for the Bekesbourne Street site is detailed in Vol 27 Table 12.5.1 and has been generated based on 2001 Census data for journeys to workplaces within the vicinity of Bekesbourne Street[iii]. The Census data indicates that the predominant mode of travel for journeys to work in this area would be the private car.

12.5.3 At this site there would be no parking provided within the site boundary for workers. Also, as parking on surrounding streets is restricted and measures to reduce car use would be incorporated into site-specific *Travel Plan* requirements, it is highly unlikely that workers would travel by car. The Census mode shares have therefore been adjusted in Vol 27 Table 12.5.1 to reflect increased levels of non-car use by workers at this site. This forms the basis of the assessment.

Vol 27 Table 12.5.1 Transport – mode split

Mode	Percentage of trips to site	Equivalent number of worker trips (based on 24 worker trips)	
		AM peak hour	PM peak hour
Bus	16.2%	4	4
National Rail	17.6%	4	4
Underground / DLR	32.7%	8	8
Car driver	<1%*	0	0
Car passenger	<1%*	0	0
Cycle	4.4%	1	1
Walk	24.0%	6	6
River	1.1%	0	0
Other (taxi/motorcycle)	4.0%	1	1
Total	**100%**	**24**	**24**

** Assumed to be zero for the purposes of the assessment*

[iii] Based on 2001 Census as this type of data had not been released from the 2011 Census at the time of the assessment.

Pedestrian routes

12.5.4 The Bekesbourne Street main site compound would be located along the private residential access section of Bekesbourne Street to the west of John Scurr House. The footway on the eastern side of Bekesbourne Street would remain open but any east-west movement across this section of Bekesbourne Street would be restricted, with pedestrians unable to walk through the existing car park.

12.5.5 The construction phasing plan (see separate volume of figures – Section 1) shows the layout of pedestrian footways during construction.

12.5.6 During the construction period, a minimum carriageway width of either 4m or 3.25m would be retained for traffic in each direction. Where necessary, carriageway widths of less than 3.25m would be agreed with the LB of Tower Hamlets prior to execution of any works.

12.5.7 To assess a busiest case scenario it has been anticipated that all worker trips would finish their journeys by foot. As a result the 24 worker trips generated by the site have been added to the construction base case pedestrian flows during the AM and PM peak hours.

12.5.8 During construction the location of the main site compound would prevent pedestrians from routing along Bekesbourne Street between the existing parking spaces and instead they would be diverted onto the eastern footway between the car park and John Scurr House.

12.5.9 During phases 2a to 2d of construction the footway on the northern side of Ratcliffe Lane (east) at the junction with Bekesbourne Street would be closed. During phase 2a and it would be possible to create a barrier-protected pedestrian route in the Ratcliffe Lane carriageway around the ventilation column site compound. During phases 2c and 2d this would not be possible due to the extension of the vent duct work compound into the carriageway at this location, therefore pedestrians would be able to use the southern side of Ratcliffe Lane (east).

12.5.10 In phases 2a to 2d of construction the footway on the southern side of Ratcliffe Lane (east) at the junction with Bekesbourne Street would be narrowed to provide adequate carriageway width. However, sufficient footway width would be maintained for pedestrians. Pedestrians wishing to route from Ratcliffe Lane (east) to Limehouse station during this phase would be required to route across Bekesbourne Street (south), Ratcliffe Lane (west) then Bekesbourne Street (north) in order to traverse around the site compound.

12.5.11 In determining the magnitude of impacts on pedestrian routes the relevant impact criteria are pedestrian delay, pedestrian amenity and accidents and safety (as set out in Volume 2).

12.5.12 It is anticipated that the minor nature of the pedestrian diversion routes around the construction site would present a negligible impact on pedestrian delay, ie, less than 30 seconds at a crossing point or less than 60 seconds per kilometre.

12.5.13 Based on the impact criteria in Volume 2, the restriction to movement relating to the works is considered to have a medium adverse impact on

pedestrian amenity during construction phases 1, 2 (including 2a and 2b) and 3 when pedestrians would be diverted from routing along Bekesbourne Street shared footway/carriageway and are also diverted from the northern footway of Ratcliffe Lane into a protected route on the carriageway (phases 2a to 2c only). There would be a high adverse impact on pedestrian amenity during phases 2c and 2d when pedestrians routing on the northern Ratcliffe Lane footway at the junction with Bekesbourne Street would experience a diversion that would require a road crossing. Over the construction period this would equate to a medium adverse impact on pedestrian amenity.

12.5.14 With regards to accidents and safety; the Bekesbourne Street site would generate fewer than four construction HGV vehicle movements per hour and the site access is not directly onto a strategic road. During phases 1, 2 (including 2a and 2b) and 3 of construction there would be a low adverse impact on accidents and safety. However, during phases 2c and 2d the proposals result in pedestrians having to make an additional road crossing. Based on the impact criteria set out in Volume 2 the magnitude for accidents and safety during the whole construction period has been classified as medium adverse.

Cycle facilities and routes

12.5.15 The relevant impact criteria for determining the magnitude of impacts on cycle facilities and routes are cycle delay and accidents and safety (as set out in Volume 2).

12.5.16 Cyclists could experience a delay to journey time as a result of the need to introduce alternate one-way working using temporary traffic lights or traffic marshals at the temporary access road on Bekesbourne Street. However, cyclists routing along this section of Bekesbourne Street would have the option to dismount and walk along the footway thus avoiding the temporary traffic control. This therefore represents a negligible impact on cycle delay.

12.5.17 Although cyclists would not be required to make any additional road crossings as a result of the carriageway adjustments they would be restricted to using the temporary carriageway and sharing this with vehicles accessing the residential properties and Community Centre. As a result there would be a low adverse impact but given that cyclists can dismount and wheel their cycles past this site the overall impact has been assessed as negligible on accidents and safety.

Bus routes and patronage

12.5.18 Given the low number of vehicle movements expected at the Bekesbourne Street site there would be no delay on nearby bus routes (no bus services run immediately past the site). In accordance with the criteria in Volume 2 this equates to a negligible impact on bus delay.

12.5.19 As a result of construction workers using bus services it is expected that there would be approximately four additional bus passenger journeys during both the AM and PM peak hours. Based on the impact criteria outlined in Volume 2 and the number of bus services within a 640m

walking distance of the site this small increase in bus passengers would have a negligible impact on bus patronage.

DLR and National Rail services and patronage

12.5.20 Limehouse National Rail and DLR station is the closest station, approximately 35m from the Bekesbourne Street site. It is anticipated that approximately 12 construction workers and labourers would use DLR and National Rail services to access the site daily.

12.5.21 The expected 12 additional two-way worker trips anticipated to be made by National Rail or DLR during the AM and PM peak hours would result in less than one worker trip per DLR / National Rail service (based on a service of 79 and 78 trains during the AM and PM peak hours respectively within a 960m walking distance).

12.5.22 This would result in a negligible impact on DLR and National Rail patronage.

Parking

12.5.23 To accommodate the construction works at the Bekesbourne Street site the 13 private residential parking spaces and two shared visitor/authorised contractor bays would be temporarily restricted from the section of Bekesbourne Street adjacent to John Scurr House. Two of these spaces would be permanently lost due to the need to accommodate the electrical and control kiosk.

12.5.24 During the ventilation duct works, a total of five parking spaces in Ratcliffe Lane would need to be restricted.

12.5.25 The highway layout during construction plans (see separate volume of figures – Section 1) show the proposed restriction and removal of parking bays associated with the construction works at the Bekesbourne Street site.

12.5.26 There is not anticipated to be any impacts on local parking from construction workers. This is on the basis that there would be no on-site parking for workers, parking on surrounding streets is restricted and site-specific *Travel Plan* measures would discourage workers from travelling by car to and from the site.

12.5.27 With regard to determining the magnitude of impacts the relevant criteria with respect to the assessment of parking is vehicle parking and loading changes (as set out in Volume 2).

12.5.28 Due to the removal of the parking bays for residents and visitors to the residents and the shared service bays for visitors/contractors this equates to a high adverse impact on vehicle parking and loading bays.

Highway network and operation

12.5.29 The highway layout during construction plans (see separate volume of figures – Section 1) show the highway layouts during construction of the proposed Bekesbourne Street site.

12.5.30 The highway layout during construction vehicle swept path analysis plan (see Bekesbourne Street Transport Assessment Figures) demonstrates that construction vehicles are able to safely enter and leave the site. Traffic marshal control would be used to supervise vehicles reversing into the site. The swept path analysis plans also show the swept path movements of other road users, eg, private vehicles accessing residential properties and refuse vehicles, showing that vehicles are able to safely access parking areas to the south of the site.

12.5.31 During the first phase of construction the existing parking area would be removed and the carriageway relocated to the eastern edge of the road adjacent to the existing footway. The temporary carriageway would have a minimum width of 3.8m and would only be capable of accommodating traffic travelling in one direction at a time. This single lane would be controlled either by temporary traffic lights at the southern and northern ends of the temporary carriageway or by traffic marshals.

12.5.32 Upon the completion of this phase of work the site would be moved to the east of the street adjacent to the John Scurr House footway. The temporary carriageway would be moved to the west of the construction site; it would have a minimum width of 3.8m and again would only accommodate traffic in one direction at a time. Temporary traffic lights or traffic marshals would be employed to control vehicle movements.

12.5.33 For phase 2 of work the site would be moved back to the west and the carriageway relocated to the east adjacent to the existing footway. The temporary carriageway would have a minimum width of 3.8m and would only be capable of accommodating traffic travelling in one direction at a time.

12.5.34 During the ventilation duct works the site would be located on the eastern side of Bekesbourne Street carriageway/car park with the carriageway located to the west of the site. The width of the carriageway on Bekesbourne Street would be 3.0m and flow would operate in one direction at a time.

12.5.35 It would be necessary to extend the site northwards into the junction with Ratcliffe Lane during phases 2b to 2d of the ventilation duct works. During phase 2c of construction the left turn into Bekesbourne Street (south) from Ratcliffe Lane (east) would be prohibited. During phase 2d of construction the right turn into Bekesbourne Street (north) from Ratcliffe Lane (east) would be prohibited. Vehicles wishing to access these sections of Bekesbourne Street during these periods would do so via Butcher Row (A126) and Ratcliffe Lane (west).

12.5.36 During phase 2c the buildout on the north side of Ratcliffe Lane (east) would need to be replaced with carriageway. The width of carriageway on Ratcliffe Lane (east) would be reduced to 4.5m during this period.

12.5.37 During phase 2d the build-out on Ratcliffe Lane at the junction with Bekesbourne Street would need to be removed to maintain a carriageway width of 3.1m.

12.5.38 Throughout the construction period there would be a gated access to the site with construction vehicles reversing into the site from Bekesbourne

Street south of the junction with Ratcliffe Lane under supervision as necessary. Vehicles would exit in forward gear and route westbound along Ratcliffe Lane to Butcher Row (A126).

12.5.39 With the highway layout changes described in paras. 12.2.5 to 12.2.12 access to the residential areas and Community Centre would be maintained throughout the construction phases.

12.5.40 Construction lorry movements would be limited to the day shift only (08:00 to 18:00 Monday to Friday and 08:00 to 13:00 Saturday). Table 12.5.2 shows the construction lorry movement assumptions for the local average daily traffic for the peak months. These are based on the peak months of construction activity at this site. It would only be in exceptional circumstances that HGV and abnormal load movements could occur up to 22:00 and later at night on agreement with the LB of Tower Hamlets.

12.5.41 The assessment is based on 10% of the daily number of lorry journeys occurring in the peak hours, which has been agreed with TfL as a reasonable approach. It is recognised that it may be desirable to reduce the number of construction lorry movements in peak hours and the mechanisms for addressing this would form part of the *Traffic Management Plans* which are required as part of the *CoCP*.

Vol 27 Table 12.5.2 Transport – construction works vehicle movements

Vehicle type	Vehicle movements per time period				
	Total daily	**07:00 to 08:00**	**08:00 to 09:00**	**17:00 to 18:00**	**18:00 to 19:00**
Construction lorry vehicle movements 10%*	10	0	1	1	0
Other construction vehicle movements**	36	4	4	4	4
Worker vehicle movements***	nominal	0	0	0	0
Total	**46**	**4**	**5**	**5**	**4**

** The assessment is based on 10% of the daily construction lorry movements associated with materials taking place in each of the peak hours.*
*** Other construction vehicle movements includes cars and light goods vehicles associated with site operations and contractor activity.*
**** Worker vehicle numbers based on less than 1% of workers driving on the basis that there would be no worker parking on site; on-street parking in the area is restricted; and Travel Plan measures would discourage workers from driving. In practical terms, this would be close to zero.*

12.5.42 With regard to determining the magnitude of impacts the relevant impact criteria with respect to the assessment of highway network and operation are accidents and safety, road network delay and hazardous loads (as set out in Volume 2).

12.5.43 It is anticipated that the changes to highway layout and temporary traffic controls would have a negligible impact on road network delay, given that traffic flows in Bekesbourne Street are very low and temporary traffic signals, if required, could operate on a short cycle time. Alternatively, control by traffic marshals would allow quick response to vehicles waiting to pass through Bekesbourne Street past the site.

12.5.44 The number of construction HGV movements at this site would be very low and the site would not be accessed from the strategic road network. There would therefore be a negligible impact on accidents and safety.

12.5.45 It is assessed that potentially there would be one vehicle every fortnight transporting hazardous loads to or from this site during construction and therefore the impact on the highway network in relation to hazardous loads would be low adverse.

Significance of effects

12.5.46 The significance of the effects has been determined by considering the transport impacts described above in the context of the sensitivity of the receptors identified in Vol 27 Table 12.4.1.

12.5.47 Vol 27 Table 12.5.3 sets out the effects on each receptor in the vicinity of the Bekesbourne Street site.

Vol 27 Table 12.5.3 Transport – significance of effects during construction

Receptors (relating to all identified transport effects)	Significance of effect	Justification (receptor sensitivity and impacts)
Pedestrians (including sensitive pedestrians) and cyclists using Bekesbourne Street and Ratcliffe Lane.	Moderate adverse effect on pedestrians Negligible effect on cyclists.	**Pedestrians:** • High sensitivity • Negligible impact on pedestrian delay • Medium adverse impact on pedestrian amenity and accidents and safety • Taking into account the negligible and medium adverse impacts, this equates to a moderate adverse effect. **Cyclists:** • High sensitivity • Negligible impact on accidents and safety and cyclist delay • Negligible impacts equate to negligible effect.
Private vehicle users in the area using the local highways and on-street parking	Minor adverse effect on highway users Major adverse	**Highway users:** • High sensitivity • Negligible impact on road network delay

Receptors (relating to all identified transport effects)	Significance of effect	Justification (receptor sensitivity and impacts)
	effect on parking users	and accidents and safety • Low adverse impact from hazardous loads • Negligible and low adverse impacts equate to minor adverse effect **Parking users:** • Medium sensitivity • High adverse impact on vehicle parking • Equates to a major adverse effect on parking users
Emergency vehicles in the area using the local highways	Minor adverse effect	• High sensitivity • Negligible impact on road network delay and accidents and safety • Low adverse impact from hazardous loads • Negligible and low adverse impacts equate to minor adverse effect
Bus users (passengers) travelling on routes along the A13 and Butcher Row (A126)	Negligible effect	• Low sensitivity • Negligible impact on road network delay and bus patronage • Negligible impacts equates to negligible effect
Public transport passengers using DLR and National Rail services	Negligible effect	• Medium sensitivity • Negligible impact on patronage • Negligible impact equates to negligible effect
Residents of John Scurr House Users of John Scurr Community Centre Users of Grocery Station shop Recreational users of	Moderate adverse effect on pedestrians Negligible effect on cyclists Minor adverse effect on highway users Major adverse	**Pedestrians:** • High sensitivity • Negligible impact on pedestrian delay • Medium adverse impact on pedestrian amenity and accidents and safety • Taking into account the negligible and medium adverse impacts, this equates to a moderate adverse effect.

Receptors (relating to all identified transport effects)	Significance of effect	Justification (receptor sensitivity and impacts)
St James's Gardens Pupils, parents and staff of Stephen Hawking School	effect on parking users	**Cyclists:** • Negligible impact on accidents and safety and cyclist delay • Negligible impacts equate to negligible effect. **Highway users:** • High sensitivity • Negligible impact on road network delay and accidents and safety • Low adverse impact from hazardous loads • Negligible and low adverse impacts equate to minor adverse effect **Parking users:** • Medium sensitivity • High adverse impact on vehicle parking • Equates to a major adverse effect on parking users
Service vehicles using authorised contractor/loading bays adjacent to John Scurr House	Major adverse effect	• Medium sensitivity • High adverse impact on loading bays • Equates to a major adverse effect on service vehicles.

Sensitivity test for programme delay

12.5.48 The assessment has been based on an estimated programme for the construction of the Thames Tideway Tunnel project. That programme has been used to derive construction vehicle numbers and to understand the relationships between the project and other developments in the vicinity of project sites, in order to allow appropriate receptors to be identified.

12.5.49 If the overall programme were to be delayed by approximately a year, the implications in relation to the transport effects would be as follows:

a. It is unlikely that the effects on pedestrians and cyclists would change. Over the course of one year, it is unlikely that pedestrian or cycle traffic in the vicinity of project sites would increase by a sufficient amount to change the magnitude of impacts or the significance of effects reported, nor that the arrangements for pedestrian route diversions would be any different to those currently proposed

b. Effects on public transport are unlikely to change as the rate of public transport patronage growth is relatively low and over the course of one year, any reduction in spare capacity on existing public transport networks would be small. Additionally, there is a general trend towards the enhancement of the public transport network through the provision of additional bus, rail and river services in order to meet future demand and accommodate future patronage growth. The transport assessment typically indicates that the additional public transport patronage arising from Thames Tideway Tunnel project sites would be small and not significant in the context of the capacity available on the wider networks

c. Effects on the operation of the highway network have been identified through qualitative assessment which is not year specific. A programme delay of approximately one year would not alter the outcomes of the highway network assessment reported

d. Based on the site development schedule (see Vol 27 Appendix N), there would be no new receptors requiring assessment as a result of a one year delay.

12.6 Operational effects assessment

12.6.1 This section summarises the findings of the assessment undertaken for Year 1 of operation at the Bekesbourne Street site.

12.6.2 The transport demands created by the development in the operational phase would be extremely low and limited to maintenance visits every three to six months.

12.6.3 The assessment of the operational phase is therefore limited to the physical issues associated with accessing the site from the highway network as outlined in Section 12.2. This has been discussed with LB of Tower Hamlets and TfL.

12.6.4 The operational assessment has taken into consideration those elements that would be affected, which comprise the short-term impacts on the pedestrian network, car parking and on the highway layout and operation when maintenance visits are made to the site.

12.6.5 The permanent highway layout plan (see separate volume of figures – Section 1) shows the access arrangements for the operational phase.

Pedestrians and cyclists

12.6.6 During routine inspections every three to six months a light commercial vehicle, typically a transit van, would be required to service the site.

12.6.7 During this period, the carriageway width on Bekesbourne Street is likely to be reduced and pedestrians would be encouraged to use the footway between the car park and John Scurr House instead of routing along Bekesbourne Street.

12.6.8 It is anticipated that the minor nature of the diversion would present a negligible impact on pedestrian delay.

12.6.9 Based on the impact criteria in Volume 2, the change to the pedestrian network arising from maintenance activities is considered to have a negligible impact on pedestrian amenity.

12.6.10 With regards to accidents and safety the Bekesbourne Street site would generate a very small number of maintenance vehicle journeys on a limited and infrequent number of occasions. In addition the site access is not directly onto a strategic road and the proposals would not result in pedestrians having to make any additional road crossings. Based on the impact criteria set out in Volume 2 the magnitude for accidents and safety is classified as negligible.

12.6.11 Based on these impacts, the overall effect on pedestrians would therefore be **negligible**.

Parking

12.6.12 Two parking spaces would be permanently removed to accommodate an electrical and control kiosk.

12.6.13 Routine inspections would be undertaken at the site every three to six months, for which a light commercial vehicle would be required to service the site. When larger vehicles are required to service the site (approximately once every ten years), a temporary parking restriction would be put in place along Bekesbourne Street. This temporary restriction would be on an infrequent basis.

12.6.14 Based on the impact magnitude criteria outlined in Volume 2 the permanent removal of two parking spaces and the temporary restriction of visitor/contractor parking bays would result in a medium adverse impact on parking within the local area.

12.6.15 Taking into consideration the infrequent arrival of vehicles and taking into consideration the sensitivity of the receptors (private vehicle users and emergency vehicles, residents of John Scurr House and service vehicles) and the permanent removal of two parking spaces, it is anticipated that there would be a high adverse effect on parking.

12.6.16 However, the frequency with which these parking restrictions would be required, the overall effect on parking would be **minor adverse**.

Highway layout and operation

12.6.17 For routine inspections vehicular access would be required for light commercial vehicles, typically a transit van. Access to the Bekesbourne Street site would be via Branch Road (A101) and Ratcliffe Lane then south into Bekesbourne Street. Egress would be via Ratcliffe Lane and Butcher Row (A126).

12.6.18 When larger vehicles are required to service the site during the ten-yearly inspections, there may be some temporary, short-term delay to other road users while manoeuvres are made into Bekesbourne Street. However it is anticipated that the arrival of vehicles would normally be scheduled to take place outside of the peak hours to minimise the effect on the local highway network.

12.6.19 Vehicle access to the residences and Community Centre to the south of the operational phase area would be maintained during routine inspections. If any works were to be carried out that required opening an access cover, then the access cover arrangement would be designed such that access is maintained.

12.6.20 The permanent highway layout vehicle swept path analysis plan (see Bekesbourne Street Transport Assessment Figures) demonstrates that operational vehicles would be able to safely enter and leave the site.

12.6.21 In accordance with the criteria outlined in Volume 2 during the routine inspections of the operational site there would be a negligible impact on highway layout and operation.

12.6.22 Taking into consideration the various sensitivities of the receptors affected during the operational phase (private vehicle users, emergency vehicles, residents of John Scurr House and service vehicles) this would result in a **negligible** effect on highway layout and operation.

Sensitivity test for programme delay

12.6.23 If the opening year of the Thames Tideway Tunnel were to be delayed by approximately one year, the results of the operational assessment would not be materially different to the assessment findings reported above.

12.7 Cumulative effects assessment

Construction effects

12.7.1 As indicated in the Development Schedule (see Vol 27 Appendix N) the three other developments within 1km of the Bekesbourne Street site would be complete and operational by Site Year 1 of construction. This means that there are no specific cumulative effects to assess.

12.7.2 Therefore, the effects on transport would remain as described in Section 12.5. This would also be the case if the programme for the Thames Tideway Tunnel project were delayed by approximately one year.

Operational effects

12.7.3 As indicated in the Development Schedule (see Vol 27 Appendix N) all three of the developments in the vicinity of the Bekesbourne Street site would be complete and operational by Year 1 of operation. Therefore there is no need for a cumulative assessment on transport and the effects would remain as described in Section 12.6. This would also be the case if the programme for the Thames Tideway Tunnel project were delayed by approximately one year.

12.8 Mitigation

12.8.1 The project has been designed to limit the effects on the transport networks as far as possible and many measures have been embedded directly in the design of the project.

Construction

12.8.2 During construction it is envisaged that the embedded measures set out in Section 12.2, including the *CoCP* and *Draft Project Framework Travel Plan*, would minimise the effects resulting from construction works at the Bekesbourne Street site. These are the most appropriate measures for this site and it is not possible to mitigate all significant effects.

Operation

12.8.3 No mitigation is required during the operational phase.

12.9 Residual effects assessment

Construction effects

12.9.1 As no mitigation measures are proposed the residual operational effects remain as described in Section 12.5. All residual effects are presented in Section 12.10.

Operational effects

12.9.2 As no mitigation measures are proposed the residual operational effects remain as described in Section 12.6. All residual effects are presented in Section 12.10.

12.10 Assessment summary

Vol 27 Table 12.10.1 Transport –summary of construction assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Pedestrians (including sensitive pedestrians) and cyclists using Bekesbourne Street and Ratcliffe Lane	• Reconfiguration of carriageway • Pedestrian route modifications • Temporary traffic lights or traffic marshals for traffic management • Movement of large construction vehicles	Moderate adverse effect on pedestrians. Negligible effect on cyclists.	None	Moderate adverse effect on pedestrians. Negligible effect on cyclists.
Private vehicle users in the area using the local highways or on-street parking	• Reconfiguration of carriageway • Removal of car parking spaces • Temporary traffic lights or traffic marshals for traffic management – delay to journey time • Movement of large construction vehicles	Minor adverse effect on highway users. Major adverse effect on parking users	None	Minor adverse effect on highway users. Major adverse effect on parking users
Emergency vehicles in the area using the local highways	• Temporary traffic lights or traffic marshals for traffic management – delay to journey time • Movement of large construction vehicles	Minor adverse effect	None	Minor adverse effect
Bus users (passengers) travelling on routes along the A13 and Butcher Row	• Movement of large construction vehicles • Some additional patronage from construction workers	Negligible effect	None	Negligible effect

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Public transport passengers using DLR and National Rail services	• Some additional patronage from construction workers	Negligible effect	None	Negligible effect
Residents of John Scurr House Users of John Scurr Community Centre Users of Grocery Station shop Recreational users of St James's Gardens Pupils, parents and staff of Stephen Hawking School	• Reconfiguration of carriageway • Removal of car parking area • Temporary traffic lights or traffic marshals for traffic management – delay to journey time • Movement of large construction vehicles	Moderate adverse effect on pedestrians Negligible effect on cyclists Minor adverse effect on highway users Major adverse effect on parking users	None	Moderate adverse effect on pedestrians Negligi ble effect on cyclists Minor effect on highway users Major adverse effect on parking users
Service vehicles using authorised contractor/loading bays adjacent to John Scurr House	• Removal of vehicle parking spaces	Major adverse effect	None	Major adverse effect

Vol 27 Table 12.10.2 Transport – summary of operational assessment

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Pedestrians (including sensitive pedestrians) and cyclists using Bekesbourne Street and Ratcliffe Lane.	• Occasional delay to pedestrians and cyclists on Bekesbourne Street	Negligible effect	None	Negligible effect
Private vehicle users in the area using the local highways or on-street parking	• Occasional maintenance trips by light commercial vehicle	Negligible effect	None	Negligible effect
Emergency vehicles in the area using the local highways	• Occasional maintenance trips by light commercial vehicle	Negligible effect	None	Negligible effect
Residents of John Scurr House Service vehicles using authorised contractor/loading bays adjacent to John Scurr House	• Occasional maintenance trips by light commercial vehicle • Occasional temporary restriction of visitor/contractor parking spaces	Negligible effect	None	Negligible effect
Residents of John Scurr House using residential parking bays	• Permanent loss of two parking spaces	Minor adverse effect	None	Minor adverse effect

References

[1] Defra, *National Policy Statement for Waste Water* (2012)

[2] Transport for London. *Assessment Tool for Travel plan Building Testing and Evaluation (ATTrBuTE)* (2011). Available at: http://www.attrbute.org.uk/.

[3] Greater London Authority, *London Plan*, July 2011.

[4] Transport for London. *Transport Assessment Best Practice Guidance* (2010).

[5] Transport for London. *London Underground Upgrade Plan,* 2011. Available at: http://www.tfl.gov.uk/assets/downloads/corporate/our-upgrade-plan-london-underground-february-2011.pdf

[6] Transport for London, *London Overground Clapham Junction to Surrey.* Available at: http://www.tfl.gov.uk/corporate/projectsandschemes/15401.aspx

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 assessment

Section 13: Water resources - groundwater

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Thames Tideway Tunnel

Environmental Statement

Volume 27: Minor work sites

Section 13: Water resources – groundwater

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13 Water resources – groundwater

13.1 Introduction

13.1.1 Construction and operational effects for groundwater for this site have not been assessed. This is on the basis that this site would require substantially less construction than other Thames Tideway Tunnel project sites and would involve modifications to the existing sewer network rather than any connection to the main tunnel. At this site, the scale of construction is considered too small to affect groundwater resources. At Bekesbourne Street, the construction would include a penstock and flapvalve chamber (approximately 5m by 4.6m and approximately 8m deep); assuming that appropriate construction techniques are used, the overall effect would be negligible on groundwater resources.

13.1.2 This section nevertheless presents details of engagement, baseline information and an overview of the reasons why this topic has been scoped out. A preliminary assessment[i] for the Bekesbourne Street site is included within Section 13.4.

13.1.3 A description of the proposed works at Bekesbourne Street is provided in Section 3.3 of this Volume. These include:

a. works to modify the existing sewer including a chamber with approximate internal dimensions of 4.6 metres by 5 metres and an approximate depth (to invert level) of 8 metres.

b. installation of an electrical and control kiosk and ventilation column including provision of ducts, including construction of pits, chambers, ducts and pipes for cables, hydraulic pipelines, utility connections, utility diversions and drainage.

13.1.4 The assessment of groundwater presented in this section has considered the requirements of the National Policy Statement for Waste Water (Defra, 2012)[1] Section 4.2. The physical characteristics of the groundwater environment including groundwater resources and quality are presented and the anticipated effects (including cumulative effects) on these resources addressed in the assessment that follows (further detail can be found in Vol. 2 Section 13.3).

13.1.5 Plans of the proposed development as well as figures included the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

[i] Preliminary assessment based on best judgement of sites with similar geologies and settings ie, western sites to those seen at Shad Thames Pumping Station.

13.2 Engagement

13.2.1 Volume 2 documents the overall engagement which has been undertaken in preparing the *Environmental Statement*.

13.2.2 Groundwater effects have not been assessed. No comment specific to this site has been received during the consultation process.

13.3 Baseline and preliminary assessment

13.3.1 The ground investigation (GI) undertaken for the Thames Tideway Tunnel project has involved drilling boreholes both on the banks and within the main river channel for the purposes of understanding the geology and hydrogeology within the assessment area.

13.3.2 At Bekesbourne Street, there has been no groundwater investigation boreholes drilled specifically for this site; however, a number of other boreholes for nearby Thames Tideway Tunnel project sites are close enough and provide an indication of what conditions may be present at this site. The depths and thicknesses of geological layers at Bekesbourne Street have been extrapolated from three ground investigation boreholes, SR1030 and SR1029 (both 50m to the south), and SA1038 (at 140m to the southeast).

13.3.3 The Bekesbourne Street chamber would pass through Made Ground, Alluvium, River Terrace Deposits, which have a combined depth of 5.2m. The chamber would extend down into the top of the London Clay Formation. The construction of the chamber would be within a sheet or secant pile wall driven in the underlying London Clay at approximately 10m. The water from within the sheet pile wall, driven in the underlying London Clay to approximately 10m below the ground surface, would be pumped out. The amounts of dewatering from within the sheet pile wall would be small.

13.3.4 There are no abstraction source (licence or unlicensed) from the River Terrace Deposits (upper aquifer) within 1km of the Bekesbourne Street works. Abstractions from the Chalk (lower aquifer) would be unaffected by the construction phase.

13.3.5 There is limited water quality data available locally for the area around Bekesbourne Street. The water quality data of nearby GI boreholes is summarised in Vol 27 Table 13.3.1. The data shows exceedances of Benzo(a)pyrene and Benzo(g,h,i)perylene within the River Terrace Deposits. There is also an exceedance for Sulphate in the River Terrace Deposits, which may indicate that brackish conditions are present at these locations close to the tidal reaches of the River Thames (tidal Thames).

Vol 27 Table 13.3.1 Groundwater resources – water quality exceedances near Bekesbourne Street

Ground investigation borehole ID	Geological strata	Water quality exceedance
SR1030	Made Ground*	-

Ground investigation borehole ID	Geological strata	Water quality exceedance
	River Terrace Deposits	Sulphate
SA1029A	Made Ground*	-
	River Terrace Deposits	Benzo(a)pyrene, Benzo(g,h,i)perylene
	London Clay*	-

**Several land quality exceedances are known from Made Ground and London Clay, see Volume 27 Section 8 Land Quality Assessment.*

13.3.6 As part of the environmental design measures for the Bekesbourne Street site, it is the case that any contamination encountered would be removed during excavation and disposed of appropriately. The *Code of Construction Practice (CoCP) Part A* (see Section 8 Water Resources) details the measures which would form part of the construction method. The CoCP is provided in Vol 1 Appendix A. It contains general requirements (Part A), and site specific requirements for this site (Part B).

13.4 Overview

13.4.1 The Thames Tideway Tunnel project has a substantial number of environmental design measures as described in Section 3.3 and various measures incorporated in the *CoCP* Part *A*.

13.4.2 This site requires substantially less construction works than other Thames Tideway Tunnel project sites and would involve modifications to the existing sewer network rather than any connection to the main tunnel. Given the small scale of construction it is considered unlikely that there would be any significant effects (moderate or major adverse) on groundwater resources.

13.4.3 At the Bekesbourne Street site, construction of a penstock and flapvalve chamber to 8m depth would be needed. Based on the available data, the preliminary assessment has indicated that there would be no significant effects. Confirmation of groundwater water quality in the upper aquifer at the site is required prior to construction; however, it is considered that the application of standard construction techniques (as set out in the CoCP Section 9) would ensure that no significant effects on groundwater would occur during the construction phase. For the operational phase, no significant effects on groundwater are anticipated at Bekesbourne Street.

13.4.4 In the unlikely event that an unknown receptor eg, unlicensed abstraction source is found close to the site during construction, management measures as outlined in the *CoCP* would be implemented as appropriate.

Reference

[1] Defra. *National Policy Statement for Waste Water* (2012)

Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

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Section 14: Water resources - surface water

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Environmental Statement

Volume 27: Minor work sites

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14 Water resources – surface water

14.1 Introduction

14.1.1 This section presents the findings of the assessment of the likely significant effects of the proposed development on surface water at the Bekesbourne Street site. The assessment of surface water presented in this section has considered the requirements of the N*ational Policy Statement for Waste Water* (NPS) (Defra, 2012)[1]. The physical characteristics of the surface water environment including surface water resources and quality are presented and the anticipated effects (including cumulative effects) on these resources addressed in the assessment that follows. Further details on how the NPS requirements relevant to surface water resources have been met can be found in Vol 2 Table 14.3.1.

14.1.2 The proposed development has the potential to affect surface water resources (ie, surface waterbodies including the tidal Thames) due to:

a. construction activities

b. operation of the works at the site.

14.1.3 The assessment of construction and operational effects on surface water includes the following:

a. identification of existing surface water resources baseline conditions

b. determining base case conditions against which the proposed development has been assessed

c. assessment of significant effects of the proposed development during construction and operation

d. identification of mitigation measures and the residual effects both during construction and operation.

14.1.4 The assessment of surface water partially overlaps with that for groundwater, land quality, aquatic ecology and flood risk. Effects on groundwater resources are assessed separately in Section 13 of this volume. Land quality is addressed in Section 8 of this volume. Effects on aquatic ecology are assessed in Section 5 of this volume. A Flood Risk Assessment (FRA), which assesses the effects of the proposed development on surface water run-off and considers the use of Sustainable Drainage Systems (SuDS), has been carried out separately and is included in Section 15 of this volume.

14.1.5 This assessment covers the effects of the proposed development at the Bekesbourne Street site and in particular in relation to the interception of the Holloway Storm Relief combined sewer overflow (CSO). It is however important to recognise that whilst the reduction in spills from the Holloway Storm Relief CSO would be important to water quality in the immediate area of the CSO outfall, the overall water quality benefits in any part of the tidal Thames, would accrue as a result of the project as a whole, rather than a single part of it. The catchment-wide effects on the Tidal Thames,

particularly the water quality improvements anticipated from the Thames Tideway Tunnel project are assessed separately and presented in Volume 3 Project-wide assessment.

14.1.6 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

14.2 Proposed development relevant to surface water

14.2.1 The proposed development is described in Section 3 of this volume. The elements of the proposed development relevant to surface water are set out below.

Construction

14.2.2 The site is located in Bekesbourne Street, approximately 200m north of the Tidal Thames. There is therefore no direct pathway to the Tidal Thames, but it is considered that an indirect pathway to the river is present via the surface water and combined drainage system.

14.2.3 Based on the geology at the site, minimal volumes of dewatering would be required. Disposal of dewatering effluent can have an effect on surface water resources. See Section 13 of this volume for further details on the dewatering requirements.

Code of construction practice

14.2.4 There is an indirect pathway for pollutants to be discharged to the Tidal Thames via surface water drains. The *Code of construction practice (CoCP)*[i] *Part A* includes a number of measures to minimise the potential for impacts to surface waters, including impacts such as discharge of pollutants via surface water drains, and these are summarised below.

14.2.5 Appropriate drainage, sediment and pollution control measures are included in the *CoCP Part A* (Section 4 and Section 8). These are in accordance with the relevant Pollution Prevention Guidelines (PPGs) issued by the Environment Agency (EA) and other Construction Industry Research and Information Association (CIRIA) documents.

14.2.6 All site drainage would be drained and discharged to mains foul or combined sewers. Where this is not practicable, the site would be drained such that accumulating surface water would be directed to holding or settling tanks, separators and other measures prior to discharge to the surface water drains. Foul drainage from the site welfare facilities would be connected to the mains foul or combined sewer.

14.2.7 Suitable spill kits would be provided and positioned in vulnerable areas and staff would be trained in their use and a record would be kept of all pollution incidents or near-misses, to ensure appropriate action is taken

[i] The *Code of Construction Practice (CoCP)* is provided in Vol 1 Appendix A. It contains general requirements (*Part A*), and site-specific requirements for this site (*Part B*).

and lessons are learned from incidents. Regular 'toolbox talks' would be held to raise staff awareness of pollution prevention and share lessons learned from any recorded incidents. There would be written procedures in place for dealing with spillages and pollution (*The Pollution Incident Control Plan or PICP).*

14.2.8 There are no site specific measures incorporated in the CoCP Part B relevant to the surface water assessment.

Operation

14.2.9 With the proposed modifications in place and operational, combined sewage generated during storms which would otherwise discharge to the Tidal Thames from the Holloway Storm Relief CSO, would be controlled. There would therefore be a reduction in the frequency, duration and volume of spills from this CSO.

14.3 Assessment methodology

14.3.1 The methodology used for the assessment of effects on surface water differs from the standard Website Transport Analysis Guidance (WebTAG) (DFT, 2003)[2] environmental impact assessment (EIA) methodology for water resources, in that the requirements of the Water Framework Directive (WFD) have also been taken into account. In the absence of an EIA specific assessment methodology for WFD compliance, an assessment methodology has been derived specifically for the project to assess significance of effects. The methodology also takes into consideration the requirements of the Urban Waste Water Treatment Directive (UWWTD)[2] and is outlined in Volume 2 Environmental assessment methodology. A WFD assessment for the project as a whole is presented in Volume 3 Project-wide.

Engagement

14.3.2 Vol 2 documents the overall engagement which has been undertaken in preparing the *Environmental Statement*. Vol 2 Section 14 summarises the engagement that has been undertaken for the surface water assessment and the consultation responses relevant surface water. The *Scoping Report* was prepared before the Bekesbourne Street site was identified as a potential site. The scope for the assessment of surface water for this site has therefore drawn on the scoping response from the LB of Tower Hamlets and is based on professional judgement as well as experience of similar sites.

14.3.3 There are no-site specific engagement comments relevant to the surface water assessment at Bekesbourne Street.

Baseline

14.3.4 The baseline methodology follows the methodology described in Vol 2. There are no site specific variations for identifying baseline conditions for this site.

Construction

14.3.5 The assessment methodology for the construction phase follows that described in Vol 2. There are no site specific variations for undertaking the construction of this site.

14.3.6 The assessment year for constriction effects is Site Year 1 (2017) when construction would commence. No modelled water quality conditions for the base case have therefore been derived from available modelled simulation data which uses population projections for 2021. This assumption is considered reasonable as substantial changes in water quality are considered unlikely between 2017 and 2021.

14.3.7 The Lee Tunnel and the sewage works upgrades at Mogden, Beckton, Crossness, Long Reach and Riverside sewage treatment works (STWs) would be operational by the time construction of the Thames Tideway Tunnel project commences, as described in Vol 2. Significant improvements in the water quality in the tidal Thames are anticipated as a result of these projects. Both the construction base case and the operational base case would be the water quality in the tidal Thames with the Lee Tunnel and sewage works upgrades in place.

14.3.8 The construction base case has considered the development that are scheduled to be complete and in operation by Site Year 1 (presented in the site development schedule, Vol 27 Appendix N). The developments in Vol 27 Appendix N would not result in additional surface water receptors (ie. Waterbodies) and are considered unlikely to result in changes in water quality as the majority of these developments are remote from the Tidal Thames. The base case would therefore not change from that outlined above.

14.3.9 No developments have been identified that would be under construction during Site Year 1, therefore a cumulative effects assessment has not been undertaken (Section 14.7).

14.3.10 The assessment area for the assessment of effects of construction activities at the Bekesbourne Street site, would be limited to the Thames Middle and the Regents Canal waterbodies, listed below in Vol 27 Table 14.4.1.

14.3.11 Section 14.5 details the likely significant effects arising from the construction at the Bekesbourne Street site. There are no other Thames Tideway Tunnel project sites which could give rise to additional effects on surface water within the assessment area for this site, therefore no other Thames Tideway Tunnel project sites are considered in this assessment.

Operation

14.3.12 The assessment methodology for the operation phase follows that described in Vol 2. There are no site-specific variations for undertaking the operational assessment of this site.

14.3.13 The assessment year for operation effects is Year 1 of operation. As with the construction assessment, the operational assessment also relies on modelled water quality data which uses population projections for 2021. In

addition, the influence of climate change in the proposed development has been assessed in 2080.

14.3.14 As noted above, the operational base case would be the water quality in the tidal Thames with the Lee Tunnel and sewage works upgrades in place. The operational base case has considered the developments that are scheduled to be complete and in operation by Year 1 of operation (presented in the site development schedule, Vol 27 Appendix N). These developments in Vol 27 Appendix N would not result in additional surface water receptors and are considered unlikely to result in changes in water quality as the majority of these developments are remote from the Tidal Thames. The base case would therefore not change from that outlined above.

14.3.15 No developments have been identified that would be under construction during Year 1 of operation, therefore a cumulative effects assessment has not been undertaken (Section 14.7). The operational assessment uses the same assessment area identified above for the construction assessment.

14.3.16 Section 14.6 details the likely significant effects arising from the operation at the Bekesbourne site.

Assumptions and limitations

14.3.17 The assumptions and limitations associated with this assessment are presented in Vol 2. Based on the geology at the site, it is assumed that only minimal dewatering and or ground treatment would be required. There are no other assumptions and limitations specific to the assessment of this site.

14.4 Baseline conditions

14.4.1 The following section sets out the baseline conditions for surface water within and around the site. Future baseline conditions (base case) are also described.

Current baseline

Water quality

14.4.2 A list of all surface water receptors and their WFD status given in the River Basin Management Plan (RBMP) (EA, 2009)[3], which are either adjacent to the site or downstream of the site and therefore have the potential to be affected by the proposed development, is included in Vol 27 Table 14.4.1 below.

14.4.3 The overall classification of status or potential under the WFD is a detailed process, which includes an assessment of water quality, physico-chemical and hydromorphological. Reference should be made to the United Kingdom Technical Advisory Group (UKTAG)[4] guidance, as given in the RBMP (EA, 2009)[5].

Vol 27 Table 14.4.1 Surface water – receptors

Waterbody name/ID	Hydro-morphological status	Current ecological quality	Current chemical quality	2015 Predicted ecological quality	2015 Predicted chemical quality	2027 Target status
Thames Middle GB530603911402	Heavily Modified	Moderate Potential	Fail	Moderate Potential	Fail	Good
Regents Canal (Lower Section) GB706105100	Artificial	Moderate Potential	Does Not Require Assess-ment	Moderate Potential	Does Not Require Assess-ment	Good

14.4.4 The River Thames and its Tidal Estuaries are designated as a Site of Metropolitan Importance (SMI). The Thames Middle waterbody stretches from Battersea Bridge to Mucking Flats. It is considered to be a high value waterbody, although the current and predicted status in 2015 (target date from RBMP [EA, 2009][6]) is moderate potential; a status objective of good by 2027 has been set. In addition, the Tidal Thames is a valuable water resource, habitat, and source of amenity, recreation, and transport route throughout London.

14.4.5 The Regents Canal lies downstream of the site and could therefore be affected by the proposed construction. However, lock gates in the Limehouse Basin at the confluence of the Regents Canal and the Tidal Thames prevent water movement for the majority of the time. They are only opened intermittently for the passage of individual boats for four hours either side of high tide. It is therefore considered that there is no pathway for impacts from the site to affect the Regents Canal and it is not considered further within this assessment.

14.4.6 Sediment levels within the Tidal Thames are estimated to currently reach a peak of 4,000kg/s in the lower tidal Thames estuary, or more than 40,000t of sediment a day during spring tides (HR Wallingford , 2006)[7].

14.4.7 There are no licensed surface water abstractions within 1km of the Bekesbourne Street site.

14.4.8 The Holloway Storm Relief CSO lies between the EA's spot sample sites at London Bridge and Greenwich, approximately 3km downstream of London Bridge and 3km upstream of Greenwich, as shown in Vol 27 Figure 14.4.1 (see separate volume of figures). Summary data from these monitoring points, which give 90 percentile values for Nitrogen (concentration that is exceeded 10% of the time) and 10% percentile values for dissolved oxygen (DO) (concentration exceeded 90% of the

time) for spot sample results collected between 2005 and 2009 are presented below in Vol 27 Table 14.4.2.

Vol 27 Table 14.4.2 Surface water – 2011 spot samples

EA spot sample site	Nitrogen (mg/l) as 90%ile	DO (mg/l) as 10%ile
London Bridge	10.92	4.81
Greenwich	10.22	3.59

14.4.9 The discharge from the Holloway Storm Relief CSO has the effect of depleting DO in the Tidal Thames as a result of the biological breakdown of organic matter in the discharges. This causes both a localised effect at the Holloway Storm Relief CSO and a more widespread effect along the Tidal Thames wide of rapidly dropping DO levels. Vol 3 details half-tide plots displaying the changes in DO levels along the Tidal Thames.

14.4.10 A search of historical mapping indicates that the site lies within a low risk area for sources of contaminated land. An assessment of potential on-site contamination is provided within Section 8 of this volume.

Current CSO operation

14.4.11 The current operation of the Holloway Storm Relief CSO has been characterised using the catchment model of the sewer system (See Vol 3 for further details of catchment modelling), and the annual average duration, frequency and volume of spills have been defined as follows:

a. the CSO spills on average 9 times in the Typical Year[ii]

b. the CSO spills for a duration of 21 hours in the Typical Year

c. the spill volume from the CSO is approximately 7,900m^3 in the Typical Year, representing 0.02% of the total volume discharged to the Tidal Thames from CSOs in the Typical Year from all spills.

14.4.12 Using the same catchment model the annual polluting loading of biochemical oxygen demand (BOD), ammonia and total Kjeldahl nitrogen (TKN) (the sum of organic nitrogen, ammonia (NH_3), and ammonium (NH_4^+)) of spills have defined as follows:

a. the CSO discharges 300kg of BOD in the Typical Year

b. the CSO discharges 10kg of ammonia in the Typical Year

c. the CSO discharges 50kg of TKN in the Typical Year.

14.4.13 Each discharge increases the risk of exposure to pathogens for river users who come into contact with the water. An assessment of health impacts upon recreational users of the River Thames was conducted and reported by the Health Protection Agency in 2007 (Lane, C, *et al.*, 2007)[8]. The

[ii] Typical Year: single year which is most representative of an observed typical year of rainfall with the dataset. The 1979-1980 'water year' defined as the 12 month period ending on the 30th September 1980

study concluded that risk of infection can remain for two to four days following a spill as the water containing the sewage moves back and forward with the tide[iii]. The same study also noted that analysis of the illness events reported against discharges on the Tidal Thames shows that 77% of cases related to rowing activities undertaken within three days of a CSO spill.

14.4.14 Assuming the average nine spills per annum occur from the Holloway Storm Relief CSO occur on separate days, there could be up to a maximum of 36 days per year where recreational users are at risk of exposure to pathogens in the vicinity of the outfall, as a result of the Holloway Storm Relief CSO spills alone (Lane, C, *et al*., 2007)[9].

14.4.15 The operation of Holloway Storm Relief CSO results in the discharge of sewage litter along with the discharge of effluent. It was estimated by the *Thames Tunnel Strategic Study* (TTSS) (Thames Water, 2005)[10] that overflows from all the CSOs along the Tidal Thames introduce approximately 10,000t of sewage derived solid material to the Tidal Thames annually. Catchment modelling of the current CSO operation has defined the average volume of discharge from Holloway Storm Relief CSO and assuming litter tonnages are proportional to discharge volumes, this would indicate that approximately 2t of sewage derived litter is discharged from the Holloway Storm Relief CSO in the Typical Year. An assessment of amenity effects of the sewage litter is given in Vol 3 Section 10 Socio-economics.

Construction base case

14.4.16 As explained in Section 14.3 both the construction base case and the operational base case would be the water quality in the Tidal Thames with the Lee Tunnel and sewage works upgrades in place.

14.4.17 The base case in Site Year 1 of construction taking into account the schemes described in Section 14.3 would not change since no new sensitive receptors would be introduced.

Operational base case

14.4.18 As noted above, the operational base case would be the same as the construction base case and would include water quality improvement achieved by the Lee Tunnel and the sewage works upgrades.

14.4.19 The base case in Year 1 of operation taking into account the schemes described in Section 14.3 would not change since no new sensitive receptors would be introduced.

14.4.20 Catchment modelling results of the base case have demonstrated that by Year 1 of operation (assessed using 2021 modelled assumptions) the frequency, duration and volume of spills from the Holloway Storm Relief

[iii] The EA has provided advice on CSO excursion areas, which states that CSOs below Tower Bridge will only impact the Thames Middle waterbody and those upriver of Tower Bridge will impact both the Thames Upper and Thames Middle waterbodies.

CSO would have increased (as a result of increased population) beyond the current baseline as follows:

a. the CSO would spill 10 times in the Typical Year (one more than the current baseline)

b. the CSO would spill for a total duration of 25 hours in the Typical Year (four hours more than the current baseline)

c. the spill volume from the CSO would be approximately 8,500m^3 in the Typical Year (600m^3 more than the current baseline).

14.4.21 The same catchment modelling has demonstrated that by the operational assessment year the annual polluting loading of BOD, ammonia and TKN would have increased (as a result of increased population) beyond the current baseline as follows:

a. the CSO would discharge 400kg of BOD in the Typical Year (100kg more than the current baseline)

b. the CSO would discharge 20kg of ammonia in the Typical Year (10kg more than the current baseline)

c. the CSO would discharge 60kg of TKN in the Typical Year (10kg more than the current baseline).

14.4.22 Following on from the interpretation of the current baseline as per para. 14.4.14 the number of risk days for river users being exposed to pathogens during the operational base case year (taking into account 2021 modelled assumptions) would be a maximum of 40 days in the Typical Year as a result of spills from the Holloway Storm Relief CSO alone.

14.4.23 Similarly, the tonnage of sewage derived litter discharges from the Holloway Storm Relief CSO can be expected to remain approximately 2t in the Typical Year.

14.5 Construction effects assessment

14.5.1 This section presents the construction impacts that could occur at the site and identifies where no further assessments of effects is required (eg, where the impact pathway has been removed). The second part of the section identifies any effects that may occur and the likely significance of these effects.

Construction impacts

Surface water drainage

14.5.2 There is an indirect pathway to the river for contaminated runoff, high suspended solids and other pollution from the site. However, appropriate site drainage would be used to control pollutants in the general site runoff, preventing the discharge of pollutants via combined or surface water drains as part of the surface water discharge from the construction site (see *CoCP Part A* Section 8). This would enable the pollution pathway to be removed and therefore there is considered to be no impact from this

source. Surface water drainage is therefore not considered further within this assessment.

Contamination and dewatering

14.5.3 A search of historical mapping indicates that the site lies within a low risk area for sources of contaminated land. There remains a possibility that the release of hazardous substances into the drainage system from the exposure of contamination could occur during construction at the Bekesbourne Street site. An assessment of potential on-site contamination is provided within Section 8 of this volume.

14.5.4 Based on the geology at the site and proposed construction techniques, only minimal dewatering would be required. See Section 13 of this volume for further details on the dewatering requirements. Depending on the quality of the groundwater that is pumped out, there could be an impact on water quality of the Tidal Thames. Settlement of suspended solids within the dewatering would minimise the levels of contaminants within the effluent, which tend to be associated with particulates. Additional treatment of the dewatering effluent, or remediation of groundwater, may also be carried out, if required and it is therefore considered that there is no pollution pathway and hence no impact from dewatering.

Construction effects

14.5.5 The assessment above has not identified any potential impacts as a result of the proposed development, therefore no significant construction effects are considered likely for the construction phase at this site.

14.6 Operational effects assessment

14.6.1 This section presents the operational impacts that could occur at the site. The second part of the section identifies any effects that may occur and the likely significance of these effects.

Operational impacts

Reduction in Holloway Storm Relief CSO spills

14.6.2 Catchment modelling of the operational development case (with the operational Thames Tideway Tunnel project) predicts that by Year 1 of operation, the frequency, duration and volume of spills from the Holloway Storm Relief CSO would decrease (as a result of modifications to the CSO) as follows:

a. the CSO would spill twice in a Typical Year (eight times less than the operational base case)

b. the CSO would spill for a duration of nine hours in the Typical Year (16 hours less than the operational base case)

c. the spill volume from the CSO would be approximately 7,000m^3 in the Typical Year (1,500m^3 less than the operational base case).

14.6.3 The frequency, duration and volume of spill at Holloway Storm Relief CSO would therefore be reduced by approximately 18% as a result of the Thames Tideway Tunnel project.

14.6.4 Given the reductions in spills, the number of days in which river users would be exposed to pathogens in Year 1 of operation as a result of spills from the Holloway Storm Relief CSO would be a maximum of eight days in the Typical Year (a reduction of up to 32 days of risk of exposure).

14.6.5 Similarly, the tonnage of sewage derived litter from the CSO can be expected to reduce by approximately 18% from approximately 2t to approximately 1.8t in the Typical Year.

14.6.6 The reduction in polluting load that would be discharged from the CSO with the project in place would be as follows:

a. the CSO would discharge 540kg of BOD in the Typical Year (140kg more than the operational base case)

b. the CSO would discharge 20kg of ammonia in the Typical Year (the same as the operational base case)

c. the CSO would discharge 80kg of TKN in the Typical Year (20kg more than the operational base case).

14.6.7 Catchment modelling of the 2080 development case (to account for the effects of climate change and predicted increases to population) has simulated that by 2080 with the project in place, the frequency, duration and volume of the Holloway Storm Relief CSO would be the following:

a. the CSO would spill on average once per year (one less than the Year 1 of operation development case)

b. the CSO would spill for an average duration of eight hours (one less than the Year 1 of operation development case)

c. the spill volume from the CSO would be approximately 7,200m^3 per year (200m^3 more than the Year 1 of operation development case).

14.6.8 In summary the model predicts that in the 2080 development case scenario the Holloway Storm Relief CSO would reduce in spill frequency and duration, but increase in total spill volume. These changes in spill frequency, duration and volume would be due to the impact of climate change, which is expected to lead to fewer, but more intense rainfall events during winter and drier summers.

14.6.9 Climate change is also predicted to increase average water temperatures, which combined with changes to rainfall patterns could affect water quality in the tidal Thames. As these water quality changes would be realised across the tidal Thames they have been assessed in Vol 3 project-wide and climate change is not considered further within this site assessment

Operational effects

14.6.10 The potential surface water impacts identified above as a result of operation at Bekesbourne Street have been assessed for their likely effects on WFD objective compliance, compliance with other legislation and effects on other users of the surface water.

14.6.11 The WFD objectives set out in Article 4 of the WFD are as follows:

a. WFD1 – Prevent deterioration of the status of all bodies of surface water.

b. WFD2 – Protect, enhance and restore all bodies of surface water, with the aim of achieving good surface water status by 2015.

c. WFD3 – Protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status by 2015.

d. WFD4 – Reduce pollution from priority substances and cease or phase out emissions, discharges and losses of priority hazardous substances.

14.6.12 The significance of the effects has then been assessed based on the approach described in Vol 2 Section 14.5.

Reduction in Holloway Storm Relief CSO spills

14.6.13 The reduction in spills from the Holloway Storm Relief CSO would represent an important contribution towards

a. meeting the requirements of the UWWTD[11] in relation to the Holloway Storm Relief CSO

b. meeting the required TTSS DO standards

c. moving the Tidal Thames towards its target status under the WFD (meeting WFD Objectives one and two), both locally and throughout the Tidal Thames.

14.6.14 Therefore, the reduction in spills would result in a **major beneficial** effect most notably in the context of the UWWTD. It should be noted that, as explained in Section 14.1, the water quality in the vicinity of the Holloway Storm Relief CSO outfall also depends on the project-wide improvements, as documented in Vol 3.

14.6.15 The associated reduction in exposure to pathogens would greatly improve the conditions for recreational users of the Tidal Thames around the Holloway Storm Relief CSO, allowing the Tidal Thames in this location to be used more frequently with a reduced risk of exposure. This is considered to be a **moderate beneficial** effect.

14.6.16 The reduction in sewage litter discharge would also improve the aesthetic quality of the Tidal Thames locally, improving conditions for recreational users. This is considered to be a **moderate beneficial** effect. As explained in Section 14.4, an assessment of the amenity effects of the sewage litter is given in Vol 3 Section 10 Socio-economics.

14.7 Cumulative effects assessment

14.7.1 Considerable improvements in the water quality of the tidal Thames will occur as a result of the works associated with the Lee Tunnel and sewage works upgrades. There already form part of the base case and so are not considered as part of the assessment of cumulative effects.

14.7.2 As explained in Section 14.3, no developments have been identified that would be under construction during Year 1 of construction or operation, therefore a cumulative effects assessment has not been undertaken. No significant cumulative effects have therefore been identified for the construction or operational phases at this site. The effects on surface water would therefore remain as described in Section 14.5 and Section 14.6 above.

14.8 Mitigation

14.8.1 No significant adverse effects have been identified and therefore no mitigation is required.

14.9 Residual effects assessment

Construction effects

14.9.1 As no mitigation measures are proposed the residual construction effects remain as described in Section 14.5. All residual effects are presented in Section 14.10.

Operational effects

14.9.2 As no mitigation measures are proposed, the residual operational effects remain as described in Section 14.6. All residual effects are presented in Section 14.10.

14.10 Assessment summary

Vol 27 Table 14.10.1 Surface water – construction assessment summary

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Thames Middle (including Regents Canal [Lower Section])	The assessment has not identified any likely significant effects.	N/A	N/A	N/A

Note: N/A – Not applicable

Vol 27 Table 14.10.2 Surface water – operational assessment summary

Receptor	Effect	Significance of effect	Mitigation	Significance of residual effect
Thames Middle (including Regents Canal [Lower Section])	Compliance with UWWTD and WFD. Improved water quality in the vicinity of the Holloway Storm Relief CSO by reduced pollutant loading and no reduction of DO levels due to reduced spill frequency, duration and volume from Holloway Storm Relief CSO.	Major beneficial	None	Major beneficial
Thames Middle (including Regents Canal [Lower Section])	Risk of exposure days to pathogens would be reduced to a maximum of 8 days in the Typical Year (a reduction of up to 32 days of risk of exposure).	Moderate beneficial	None	Moderate beneficial
Thames Middle (including Regents Canal [Lower Section])	Sewage derived litter discharge at Holloway Storm Relief CSO would be reduced by approximately 18% improving the aesthetic quality of the river locally.	Moderate beneficial	None	Moderate beneficial

References

[1] Defra. *National Policy Statement for Waste Water: A framework document for planning decisions on nationally significant waste water* (March, 2012). Available at: http://www.defra.gov.uk/publications/files/pb13709-waste-water-nps.pdf

[2] Department for Transport (DFT). *Transport Analysis Guidance* (WebTAG) (2003). Available at: http://www.dft.gov.uk/webtag/documents/overview/unit1.2.php

[3] Environment Agency. *River Basin Management Plan (RBMP), Thames River Basin District* (2009)

[4] The United Kingdom Technical Advisory Group (UKTAG) to the WFD. Available at: http://www.wfduk.org/

[5] Environment Agency (2009). See citation above

[6] Environment Agency (2009). See citation above.

[7] HR Wallingford (report prepared for the Environment Agency). *Thames Estuary 2100, Morphological changes in the Thames Estuary, Technical Note EP6.8, the development of an historical sediment budget* (2006).

[8] Lane, C, Surman-Lee, S, Sellwood, J and Lee, JV. *The Thames Recreational Users Study Final Report.* (2007).

[9] Lane, C, Surman-Lee, S, Sellwood, J and Lee, JV. (2007). See citation above.

[10] Thames Water. *Thames Tideway Strategic Study* (February 2005)

[11] *The Urban Waste Water Treatment Directive, Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment,* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0271:EN:NOT

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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 assessment

Section 15: Water resources - flood risk

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

Section 15: Water Resources – flood risk

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15 Water resources – flood risk

15.1 Introduction

15.1.1 Construction and operational effects for flood risk for this site have not been assessed. This is on the basis that the site is located within the Environment Agency's (EA) Flood Zone 1, where the chance of fluvial/tidal flooding is less than 0.1% in any given year. The site is less than 1 hectare in size and there are limited construction and permanent works proposed on the site that would impact on flood risk, therefore in accordance with the National Planning Policy Statement (NPS) for Waste Water (Defra, 2012)[1] and the National Planning Policy Framework (NPPF) (Communities and Local Government, 2012)[2] a Flood Risk Assessment (FRA) would not be required.

15.1.2 This section nevertheless presents details of baseline information and an overview of the reasons why this topic has been scoped out.

15.1.3 Likely significant effects on surface water are reported in Section 14 of this volume.

15.1.4 Plans of the proposed development as well as figures included in the assessment for this site are contained in a separate volume (Volume 27 Minor work sites Figures).

15.2 Assessment of flood risk

15.2.1 The Bekesbourne Street site is situated outside the floodplain associated with the River Thames. The EA Flood Map identifies the site and adjacent riverfront area as lying within Flood Zone 1.

15.2.2 The construction works proposed at the site relate to modifications to the existing sewer system. The proposed works include diverting flows from the Holloway Storm Relief combined sewer overflow (CSO) to the northern Low Level Sewer No.1.

15.2.3 The permanent works proposed at the site include a penstock and flapvalve chamber, ventilation column, an electrical and control kiosk and access covers.

15.2.4 The proposed construction and permanent works are not considered to have an implication on flood risk from all sources.

15.2.5 The surface water implications of the operational and construction effects have been assessed in Section14 of this volume.

15.2.6 As the site is located in Flood Zone 1, and is smaller than 1 hectare in size, a flood risk assessment is not required with respect to the Waste Water NPS and NPPF. Therefore a FRA for this site has not been completed.

15.3 Overview

15.3.1 It is confirmed that there is no potential for likely significant effects on flood risk arising from the construction or operation of the proposed development at Bekesbourne Street.

References

[1] Department of Environment, Food and Rural Affairs (Defra). *National Planning Policy for Waste Water* (February 2012).

[2] Communities and Local Government. *National Planning Policy Framework* (March 2012).

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