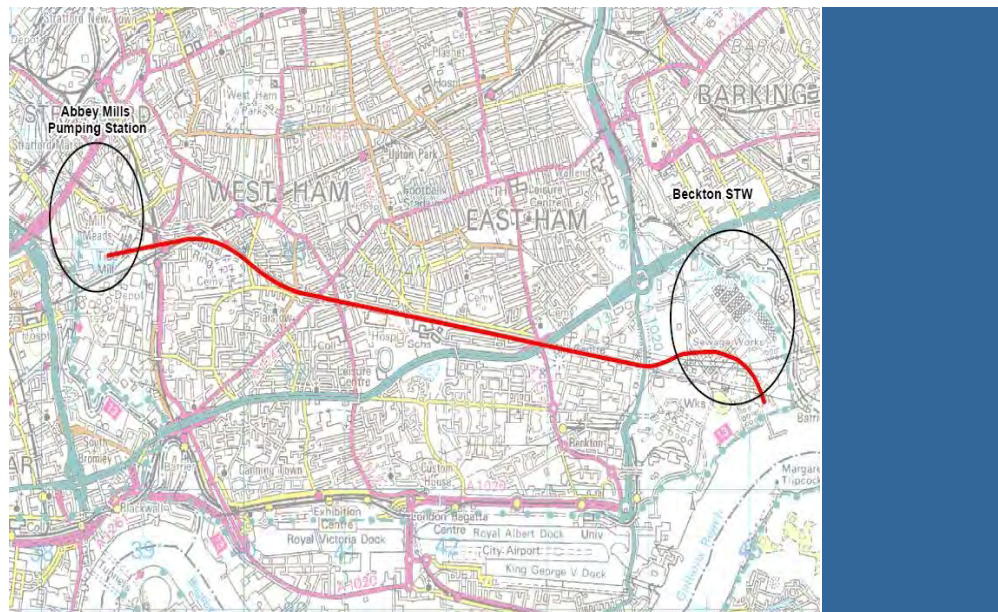


Thames Water Utilities Limited

Lee Tunnel and Beckton Sewage Treatment Works Extension

Environmental Statement Volume 1: Non Technical Summary

May 2008



Prepared for:



Revision Schedule

Lee Tunnel and Beckton Sewage Treatment Works Extension Environmental Statement: Volume 1 - Non Technical Summary May 2008

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1 Introduction

- 1.1.1 Thames Water Utilities Limited has submitted three planning applications for an engineering project to improve water quality in the River Thames and River Lee and provide additional sewage treatment capacity for London. Three planning applications have been submitted because the proposals traverse three areas for which different authorities have the responsibility for determining planning applications, namely the London Thames Gateway Development Corporation (LTGDC), the London Borough of Newham (LBN) and the Olympic Delivery Authority (ODA).
- 1.1.2 The proposal is to construct and operate a sewage storage and transfer tunnel (known as the Lee Tunnel) between Abbey Mills Pumping Station (PS) and Beckton Sewage Treatment Works (STW), as well as providing an extension to Beckton STW.
- 1.1.3 The proposals have been the subject of an independent Environmental Impact Assessment (EIA), the results of which are reported in the Environmental Statement submitted with the planning applications. This document is a non-technical summary of the main Environmental Statement (ES) and forms the first Volume of that document. It follows the structure of the main ES, including the use of the same numbering system, to enable the reader to quickly locate additional detail in the main volume as required.

1.2 The Need for the Project

Characteristics of the Existing System and Identifying the Problems

Combined Sewer Overflows

- 1.2.1 London's public sewerage system includes sewers that take both foul water (sewage) and surface water (rainwater) flows. Such sewers are referred to as combined sewers. Although modern standards require that surface water and foul water flows are separated, this is not possible for London's Victorian system.
- 1.2.2 The combined sewers take both sewage and surface water run-off to sewage treatment works for treatment prior to discharge to river. However, it is usual for a combined sewer to incorporate overflows in the system which, to prevent flooding during moderate or heavy rainfall, allow excess flows to discharge directly to river. Such excess flows are diverted along combined sewer overflows (CSOs), which discharge into the River Thames.
- 1.2.3 There are 57 CSOs which can discharge into the River Lee or the Thames between Teddington and Purfleet. CSO discharges currently occur approximately 60 times a year along this section and can be triggered by only moderate rainfall events. The largest CSO discharge is from Abbey Mills PS, which accounts for up to 50% of the total volume of all unsatisfactory discharges from CSOs in this area.
- 1.2.4 The CSO discharges cause pollution which affects fish and other aquatic wildlife, littering of the river, and can also heighten health risks by increasing levels of bacteria and viruses.

Beckton STW

- 1.2.5 Beckton STW treats the sewage from approximately 3.5 million Londoners and many businesses. It is one of the largest STWs in Europe.

- 1.2.6 There have not been any major expansions of the STW since the 1970s to deal with rises in population or to respond to any legal or regulatory-driven requirements for improvements. The STW is currently operating at its capacity for extended periods. Because of this there are occasions when sewage has to be discharged into the Thames having been subject only to very minimal treatment. Similarly the lack of additional treatment capacity means that there is insufficient infrastructure to deliver improved effluent quality during periods of more typical flow.

The Need to Improve Water Quality

- 1.2.7 It is generally acknowledged that it is unacceptable for London, as a leading World City, to release its untreated sewage into the Thames. Furthermore, European law, specifically the Urban Waste Water Treatment Directive (UWWTD), requires improved waste water treatment standards. Since both the Abbey Mills CSO and the Beckton STW sometimes release untreated sewage more often than is acceptable under European law, a solution to these releases (and others) is essential.

The Thames Tideway Strategic Study

- 1.2.8 The Thames Tideway Strategic Study (TTSS) was set up in 2000 to assess the environmental impact of storm sewage discharges to the tidal part of the Thames (the Thames Tideway) and to investigate potential solutions. Thames Water, the Environment Agency, Greater London Authority, Defra¹ and Ofwat² all contributed to the study.
- 1.2.9 The TTSS concluded, in February 2005, that the environmental objectives could only be met by addressing improvements to the five STWs serving London, including Beckton, and by reducing the instance of untreated storm sewage discharges to the Thames by building storage and transfer tunnels that would take storm sewage from the worst-performing Tideway CSOs (including Abbey Mills) to East London for treatment.

The Lee Tunnel and Improvements at Beckton STW

- 1.2.10 On 22nd March 2007, the Minister of State for Climate Change and Environment announced the Government's decision to support the development and implementation of a storage and transfer tunnel (the Thames Tunnel) from Hammersmith in West London, to Beckton STW in East London and a separate tunnel (the Lee Tunnel) from Abbey Mills PS to Beckton STW. The timely implementation of the full range of developments received the support of the (then) Mayor of London in the Draft Further Alterations to the London Plan document published in 2007.
- 1.2.11 The Lee Tunnel will intercept millions of litres of untreated storm flows from Abbey Mills, which would otherwise have been discharged untreated by the CSO to the River Lee (and hence to the Thames Tideway). This material will be stored in the tunnel and pumped out at Beckton STW for treatment, prior to discharge. In so doing, the tunnel will substantially reduce flows of untreated sewage into the River Lee and the Thames Tideway. There will still be a small number of residual spills, associated with exceptionally high rainfall or storm events, when the tunnel capacity is exceeded. These will occur to the Tideway at Beckton STW up to eight times per year.

¹ Department of Environment, Food and Rural Affairs.

² Water Services Regulation Authority.

- 1.2.12 The STW extension will also provide infrastructure to deliver the increased treatment capacity and higher consent standards required by the Environment Agency as well as providing for future population growth including the Olympic legacy.
- 1.2.13 The Lee Tunnel will have the capability of being linked to the proposed Thames Tunnel from Hammersmith in West London to Beckton STW. However separate delivery of the Lee Tunnel and Beckton STW extension in advance of the Thames Tunnel will:
- Result in significant water quality improvements in the River Lee (and the Thames Tideway) with a greater volume of sewage being fully treated at Beckton STW. Storm sewage overflow into the Thames Tideway will also be considerably reduced;
 - Deliver early improvements to the Olympic legacy by eliminating almost all overflow spills and substantially improving the water quality in the River Lee by 2014; and
 - Provide additional STW capacity to provide for population growth within the STW catchment up to 2021 and enable compliance with tighter consent standards.

2 The Approach to Assessment

2.1 Purpose

- 2.1.1 The EIA process provides the opportunity for likely significant environmental effects to be determined at an early stage in the formulation of development proposals, for the design to be developed to reduce or eliminate these undesirable environmental effects, and where elimination is not possible for measures to be incorporated to reduce undesirable environmental effects (known as 'mitigation measures'). The purposes of the EIA are fourfold:
- To identify the existing environmental conditions;
 - To predict the likely environmental effects of the development (which can be positive or negative) and their significance;
 - To identify means of reducing significant adverse effects, for example improving the design and / or introducing mitigation; and
 - To describe the residual environmental effects, after mitigation.

2.2 Legislation

- 2.2.1 The EIA has been undertaken in accordance with European³ and UK⁴ law.

³ EC Directive 85/337/EEC on the assessment of certain public and private projects on the environment, as amended by EC Directive 97/11/EC and Directive 2003/35/EC.

⁴ Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (SI No. 293) (as amended).

2.3 The Project Team

- 2.3.1 The planning applications have been submitted by Thames Water Utilities Limited.
- 2.3.2 The EIA has been undertaken primarily by Scott Wilson Limited, but with certain specialist inputs from Adams Hendry, Jacobs Aquatic, WRC, HR Wallingford, OdourNet, Faber Maunsell, and Thames Water Engineering.

2.4 Scope of Assessment

- 2.4.1 During the early stages of the EIA a scoping exercise was undertaken, the main purpose of which was to confirm the nature of the development, the breadth of the EIA, the range of key issues and the extent to which each environmental topic area was to be investigated.
- 2.4.2 A Scoping Report was prepared and submitted to the London Borough of Newham, Olympic Delivery Authority and London Thames Gateway Development Corporation in November 2007 for their formal consideration.
- 2.4.3 The Scoping Report was also sent to the following organisations and their opinions solicited on the scope of the EIA:
- Docklands Light Railway Ltd;
 - English Heritage;
 - Environment Agency;
 - Government Office for London;
 - Greater London Authority;
 - London Borough of Barking and Dagenham
 - London City Airport;
 - Natural England;
 - Port of London Authority; and
 - Transport for London.

3 The Site and Surroundings

- 3.1.1 The proposed development will comprise three main elements, all of which are located in the London Borough of Newham: the Abbey Mills PS site; the route of the Lee Tunnel; and the Beckton STW site. The sites at Abbey Mills PS and Beckton STW are located on land within Thames Water's ownership and the connecting Lee Tunnel follows the route of the Northern Outfall Sewer for much of its length. Maps showing the sites can be found overleaf (Figures 3.1, 3.2 and 3.3).

- 3.1.2 This area of East London has historically been associated with industry and trade. More recently it has been the focus for regeneration and re-development and over the next twenty years is anticipated to experience substantial new residential and infrastructure growth.

3.2 Abbey Mills PS

- 3.2.1 The Abbey Mills site is south of the A11 and east of the Blackwell Tunnel Northern Approach, the A1011 and West Ham Tube Station. The nearest residential settlements are a row of houses located off Abbey Lane approximately 100m to the north of the nearest development area. The site is bounded by the Prescott Channel to the west and Abbey Creek to the south.
- 3.2.2 Abbey Mills PS is set within a context of industrial, residential and amenity areas including the Lee Valley Park. The site itself is within the Mill Meads Conservation Area in recognition of the heritage value of the tidal mill buildings on an island between the River Lee and the Prescott Channel, but also due to the Joseph Bazalgette designed and Grade II* Listed pumping station. A number of the ancillary buildings are also Grade II* Listed. The entirety of the Abbey Mills site is designated as a Conservation Area and a Green Corridor.
- 3.2.3 The Mill Meads area is also designated as Site of Borough Importance (Grade 1) for nature conservation. In the surrounding area, Abbey Creek to the east is designated as a Site of Nature Conservation Importance, as is the Green Corridor 'Greenway' to the north of the site.

3.3 Lee Tunnel Alignment

- 3.3.1 The tunnel alignment follows the route of the Northern Outfall Sewer which leads east from Abbey Mills to Beckton STW. It also passes under or close to a number of properties including residential areas and a major cemetery. At depth the tunnel will predominantly be passing through deep chalk strata, much of which is an aquifer.

3.4 Beckton STW

- 3.4.1 Beckton STW is located on the north bank of the River Thames at the mouth of Barking Creek. The nearest residential properties are located approximately 350m to the north. The area is serviced by a number of transport arteries, including the A13(T), which provides access to the M25, the A406 (T) North Circular Road, the London Tributary and the Southend Railway Line. The Thames itself is also a principal transport artery.
- 3.4.2 A proportion of the area surrounding the Beckton STW is designated for its ecological value. Aside from the River Thames and Barking Creek being designated for their nature conservation value, a number of other sites in the area, including several within the STW boundary, are also subject to such designations.

4 Alternatives

- 4.1.1 Within the alternatives chapter, a variety are considered including :
- alternative strategies for the capture of CSO discharges;

- alternatives to the proposed Storage and Transfer Tunnel solution;
- alternatives to the proposed improvements at the five London STWs;
- alternatives to the Lee Tunnel and Beckton STW extension project as proposed including locations of various items of infrastructure at the sites and alternative STW technologies; and
- alternative renewable energy options.

4.1.2 The alternatives process, which leads to the development now proposed, can be summarised briefly as:

- Unacceptable CSO discharges are occurring and require a solution (see above);
- The only strategy capable of an appropriate solution is one which deals with the problem at the CSOs and the only option which enables capture and treatment of the effluent is for a Storage & Transfer Tunnel to be pumped to a STW for treatment. Other alternatives considered but discounted included Transfer only Tunnels and Screened Outlets or Storage Shafts at the CSOs;
- The only Storage Tunnel which delivers the required objectives and minimises construction risks is a tunnel of 7.2m internal diameter from Hammersmith to Beckton STW ("Thames Tunnel") and a separate tunnel from Abbey Mills to Beckton (the "Lee Tunnel");
- The Lee Tunnel is a stand-alone solution for the Abbey Mills CSO and deals with 50% of the volume of CSO discharges;
- Substantial growth is anticipated in STW catchments and furthermore they are to be subject to a requirement to increase capacity and to fully treat a greater proportion of existing flows and meet higher effluent standards;
- The only strategy identified to deliver the required additional capacity in each catchment is a programme of improvements at the existing STWs. Other alternatives considered but discounted included developing new STWs or transferring flows to other STWs;
- Beckton STW requires extension as part of this programme of improvements; it is also the most appropriate and sustainable location for extension in respect of treating flow from the tunnel pump-out ;
- No better alternatives exist in respect of the locations within the sites at Abbey Mills PS or Beckton STW and no better route for the Lee Tunnel than the direct route following the Northern Outfall Sewer. In general the choice of locations for new infrastructure is largely determined by operational requirements or available footprints and there are no better alternatives to the proposed locations;
- The choice of STW treatment technologies combines a robust technology with a reduced footprint and is widely used in the UK and worldwide (other secondary treatment technologies are untested at this scale); and

- The main choice of renewable energy solution (Anaerobic Digestion) makes best use of a process waste (sewage sludge) and will be supplemented by the use of a Wind Turbine (rated at up to 1.5MW); there are no better alternatives.

5 The Proposed Development

- 5.1.1 This summary provides a short overview of the development. Full details can be found within the Environmental Statement Main Volume, Chapter 5: The Proposed Development.

5.2 Abbey Mills PS

- 5.2.1 Works will be carried out entirely within Thames Water's existing Abbey Mills site and will include two vertical shafts and a 300m tunnel to connect them, to allow the transfer of waste water into the new Lee Tunnel. Figure 5.1 overleaf illustrates the works proposed at the Abbey Mills PS site.

5.3 Lee Tunnel

- 5.3.1 The 6.9km long tunnel will run approximately west to east across the London Borough of Newham, at a depth of approximately 55m to 75m below existing ground level, from the Abbey Mills PS to the Beckton STW. It will be double-lined to reduce the risk to the surrounding chalk aquifer. The wastes will flow under gravity to Beckton.

5.4 Beckton STW

- 5.4.1 At Beckton STW flows from the Lee Tunnel will be pumped out and treated before discharge to the Thames. The STW will be extended to allow treatment of more sewage to a higher standard. Figure 5.2 overleaf illustrates the works proposed at the Beckton STW site. The development will include:
- Drive Shaft for the tunnelling process (and to function as the Operational Overflow Shaft)
 - Pumping Shaft and Pumping House (to pump the wastes from the Lee Tunnel)
 - Connection Shaft including an Odour Control Unit (to link the Pumping Shaft to the Lee Tunnel)
 - Covered Fine Screens and Fat, Oil, Grease and Grit (FOGG) removal plant including an Odour Control Unit (to provide preliminary treatment of sewage)
 - Primary and secondary treatment tanks with odour control (to treat the sewage using both settlement and biological processes)
 - A new sludge thickening plant (to provide the first stage of treatment for the sewage sludge)
 - A new overflow shaft for the Lee Tunnel including an Odour Control Unit and outfall on the River Thames Foreshore (for spills when the wastes in the tunnel exceed the capacity)

- 5.4.2 A new jetty bridge will be constructed across the Thames Foreshore which will enable the export by barge of materials dug from the Lee Tunnel and the shafts at Beckton and will also give the contractor the opportunity to use river transport for the import of construction materials.
- 5.4.3 The Beckton STW extension and Lee Tunnel will require additional energy to power the new operational infrastructure. In order to do this, excess sludge from Beckton will be transferred via an existing underground pipeline to Riverside to generate renewable energy in a new anaerobic digestion plant (the subject of a separate planning application). In addition a new wind turbine is proposed at Beckton STW which would be up to 95m in height to the top of the blades.

5.5 Construction

- 5.5.1 It is expected that the construction of the entire development will take a total of some 55-60 months from mid 2009 until late 2013 / early 2014. The last few months in 2014 are likely to predominantly involve commissioning.
- 5.5.2 The general construction activities are outlined below:
- Clean-up of existing contamination from past activities, site clearance and surveys for potential undiscovered unexploded bombs;
 - Construction site set up;
 - Demolition of some buildings / structures;
 - Tunnelling;
 - Foundations and other below ground works;
 - Construction of primary treatment, secondary treatment, sludge treatment facilities and other equipment;
 - Landscape works and site completion; and
 - Commissioning of the new systems prior to operation.
- 5.5.3 The Lee Tunnel will be built from Beckton STW to Abbey Mills PS. A tunnel segment manufacturing facility and concrete batching plant will allow tunnel sections to be manufactured on site. The main shaft will be constructed and the Lee Tunnel excavated using specialist plant and equipment, including a "Tunnel Boring machine" for the Lee Tunnel itself.
- 5.5.4 Access to the Abbey Mills site will be via the existing access point on Gay Lane. Access to the Beckton site will generally be via the existing access point on Jenkins Lane or a new proposed access (also off Jenkins Lane).
- 5.5.5 Best practice environmental management will be employed to minimise environmental impacts from the construction, such as dust, noise, etc. A landscape and ecology masterplan has been developed to enhance ecology at Beckton in order to mitigate habitat loss.

6 Legislative & Planning Policy Context

- 6.1.1 The main ES volume (Volume 2) includes a review of relevant legislation and in particular the relevant planning policy applicable nationally, regionally (mainly in the London context) and locally (mainly in reference to the LBN Unitary Development Plan).

7 Water Resources

- 7.1.1 The potential impacts on the rivers adjacent to the sites as well as the underlying aquifers have been assessed. The main findings of the assessment are that the proposed development will significantly improve the water quality of the River Lee and Thames Tideway. The follow-on effects of this will be to:

- Improve conditions for aquatic ecology (see below);
- Improve the classification of these rivers under the Water Framework Directive;
- Reduce flood risk in the River Lee during times of heavy rain;
- Reduce the levels of bacteria in the River Lee and the Thames Tideway helping to reduce risks to human health; and
- Reduce litter in both the River Lee and Thames Tideway.

- 7.1.2 The Lee Tunnel will have a double lining which will greatly reduce the risk of contamination of the deeper chalk aquifer in the unlikely event that there is a breakage or fracture in the Lee Tunnel pipeline.

- 7.1.3 The construction of the development has the theoretical potential to cause a temporary reduction in river and groundwater quality through various means such as spillages / leaks of hazardous substances or fuels, run-off of contaminants from road surfaces and disturbance of contaminated land. However, with proposed mitigation including careful storage of hazardous materials in accordance with relevant legislation and guidance, use of oil interceptors as part of the drainage system and control of run-off from the sites, all of the potential effects are considered to be of negligible significance.

- 7.1.4 Flood risk assessments have been undertaken for both the Abbey Mills and Beckton sites and flood risk to the development at both sites is judged to be minimal. All new items of infrastructure have been designed to sit above appropriate flood levels. Flood risk at other locations, generated as a result of the development, is also considered to be negligible, as surface water will be collected and treated at Beckton. The collection of storm flows in the Lee Tunnel, which would otherwise have been released in to the River Lee, helps attenuate these flows and reduce flood risk in the catchment.

8 Aquatic Ecology

- 8.1.1 A wide range of freshwater and marine species of fish has been recorded in the Thames Tideway. With fewer storm sewage discharges and improvements in water quality the diversity of fish species in both the Tideway and the River Lee is likely to increase as is the presence of pollution-sensitive fish and invertebrate species. The improvements in water quality in the River Lee are also likely to lead to the development of more diverse communities of fish and invertebrates.
- 8.1.2 The construction works for the jetty bridge and outfall structure on the foreshore at Beckton STW will generate impacts although studies have shown that the impacts of scour are unlikely to be significant. Habitat creation measures are proposed to mitigate the impacts to the aquatic plant Sea Club Rush on the foreshore, some colonies of which will be lost as a result of construction.
- 8.1.3 During construction there is potential for a reduction in water quality resulting from leakage / run-off from construction sites. However, with the mitigation measures described under Water Resources, above, these impacts are considered unlikely.

9 Terrestrial Ecology

- 9.1.1 Detailed site surveys for invasive plants, reptiles, amphibians (Beckton), bats, breeding birds, wintering birds (Beckton foreshore), invertebrates and water voles (Beckton) have been carried out.
- 9.1.2 Surveys show that the Abbey Mills site is considered to be of negligible to low value for bats, breeding birds and reptiles and low to medium value for invertebrates. Habitats at Abbey Mills are considered to be of negligible or low value, apart from some areas of tall plants (ruderals - a type of plant that is first to colonise disturbed land) which are considered of low to medium importance. No significant effects which require mitigation have been identified at Abbey Mills.
- 9.1.3 The Beckton STW site is considered to be of negligible to low value for bats, amphibians and water voles, low to medium value for reptiles and breeding birds, and medium value for invertebrates. The foreshore is considered to be of low to medium value for wintering birds. Habitats at Beckton are considered to be of negligible to low value with the exception of tall ruderals, swamp and rough grassland habitats, which are considered to be of low to medium importance.
- 9.1.4 The proposals at Beckton STW will result in a loss of habitat for breeding birds, reptiles and invertebrates. The Northern Lagoon, a Site of Borough Importance for Nature Conservation, would be used for temporary spoil remediation during construction although wasteland habitats would be recreated on it once construction was completed.
- 9.1.5 The habitat loss effects will be partially offset through extensive habitat creation and enhancement measures developed as part of the landscape and ecology masterplan, which forms part of the application. These measures will include:

- Creation of and management of wasteland areas to encourage diversity;
- Creation of wetlands within the low-lying areas of Creekside (adjacent to the Barking Creek) and at the northern edge of the main development area; and
- Creation of new areas of Sea Club Rush and / or encouraging it to colonise on mudflats to the west of the existing jetty.

9.1.6 In addition, some trees will have appropriately situated bat boxes attached, habitats for reptiles and amphibians will be created, and a "Brown Roof" will be provided on the overflow shaft at Beckton to provide invertebrate habitat.



Photograph 1 Sea Club Rush

10 Landscape and Visual

- 10.1.1 The term 'landscape' refers to the combination of elements that contribute to landscape context, character and value including land form, land cover, vegetation and settlement pattern. A study has been undertaken to assess the effects of the proposed development on both the landscape in its own right and on views of that landscape, for example from public rights of way or groups of residential properties ("visual impact").
- 10.1.2 Both the Abbey Mills PS and Beckton STW sites lie within areas of industrial character with industrial estates, gas works and some tracts of undeveloped land. Substantial redevelopment is occurring in many places, particularly south-west of the STW site.

- 10.1.3 Construction activities will have some minor effects on the character of the landscape within the study area of the two sites, although activities will mostly be confined to the existing operational areas. Where work does occur outside the existing operational area, at Beckton STW, it is considered that there will be some disturbance to the structure and openness of these landscapes. During construction there will be adverse effects on views close to the boundaries of the two sites resulting from open views of construction works and/or movement of construction traffic. These effects will be temporary.
- 10.1.4 Once operational, the proposed development will generally become part of the existing Abbey Mills PS and Beckton STW sites, which are already characterised by operational facilities and plant. The developments are considered to have limited visual effects.
- 10.1.5 At Beckton the most prominent feature will be that of the wind turbine. It is considered that this will be appropriate to the context of the surrounding industrial landscape and viewed in the context of other vertical elements in the vicinity of the site, such as electricity pylons. There is a similar wind turbine by the A13 east of Beckton at Dagenham.
- 10.1.6 After fifteen years of operation, the proposed development will have a reduced effect on landscape character and views. At Beckton STW, proposed formal tree and shrub planting around the structures and at the entrance of the STW will have matured and the proposed wasteland habitat creation will have established, providing an appropriate setting for the development.

11 Cultural Heritage

11.1 Built Heritage

- 11.1.1 A desk study and site survey identified the following built heritage features within the study area at Abbey Mills, a setting with the potential to be impacted upon by the development:
- Nine Listed Buildings and a further eight additional Buildings of historic importance associated with the Listed Buildings; and
 - Three Mills Conservation Area.
- 11.1.2 The assessment showed that the proposed development at Abbey Mills would have a slight adverse temporary effect on the setting of seven buildings within the Three Mills Conservation Area during construction. Once the development is completed it will have a slight adverse effect on the setting of five of these. The photograph below shows the Abbey Mills Pumping Station (Grade II* Listed). Development will affect the setting of the pumping station, but the scale of the building will largely conceal the new works to the south from most viewpoints with the exception of views from the northwest.



Photograph 2: Abbey Mills Pumping Station

11.2 Archaeology

- 11.2.1 There is a potential for the development to have slight adverse effects on archaeology, notably on past human activity dating from early medieval periods back to the Neolithic / Bronze Age, and also on evidence of past environments ('palaeo-environmental').
- 11.2.2 A programme of archaeological mitigation to include palaeo-environmental sampling and scientific dating would be carried out in accordance with a method statement approved by English Heritage. The information obtained during this process would mitigate for the effects on archaeology such that the proposed development is considered to have a slight adverse effect.

12 Land Quality

- 12.1.1 Contamination from past land uses has been identified on both the Beckton STW and Abbey Mills PS sites. The most significant contamination has been recorded on the Beckton Rectangle area at Beckton STW. Clean up of contamination at Beckton STW will result in a significant overall beneficial effect of the development.
- 12.1.2 The potential effects of the disturbance of this contamination (caused by constructing the proposed development) on human health and the environment have been assessed. The impacts of potentially contaminated ground or groundwater on both the existing structures and the proposed extensions have also been assessed.

12.1.3 Contaminated land can only have an impact on people / the environment if there is a 'pathway' between them. Various ground engineering works such as excavations and piling would occur on the site which would involve the disturbance and / or removal of contaminated soils. This could potentially form a pathway between contaminated material and a person or environmental feature. The scheme has been designed to eliminate or minimise potential risks. However to do so, the following measures will be employed:

- Treatment or removal of contaminated soils (where possible, following treatment, soils will be re-used within areas of proposed landscaping);
- Use of personal protective equipment by construction workers to prevent the ingestion, inhalation or skin contact with contaminated soils;
- Double lining of the Lee Tunnel preventing any leakage of sewage into the chalk aquifer; and
- Suitable design of below ground concrete and water supply pipes to resist chemical attack.

12.1.4 Therefore there would not be any significant effects. As noted above the effects of remediation as proposed will be beneficial.

13 Waste Management

13.1.1 The types and amounts of demolition, excavation and construction waste have been considered. The assessment estimated the amounts of waste expected, as well as identifying the different types of waste and how they will be managed. The assessment also looked at the effects of the proposed waste management methods on London's waste management capacity in order to ensure that no significant pressure is added to the network.

13.1.2 Re-use and recycling options have been explored for all expected wastes, especially important for the substantial quantities of materials arising from the excavation of the Lee Tunnel and associated shafts at Beckton. Re-use and recycling of these materials will help to divert waste from scarce landfill capacity. The options for the management of the materials arising (mainly chalk) from excavation of the tunnel and the Beckton shafts include two schemes for restoration of land for nature conservation purposes, at Hoo Island and Wallasea Island. These options have a high probability of being delivered and would also provide opportunities for access by barge.

13.1.3 The implementation of a Site Waste Management Plan is proposed for the construction phase. This would seek the reduction, re-use and recycling of waste where possible, and promote the safe handling of waste.

13.1.4 As noted above, during operation, additional sludge which cannot be treated within the existing Sludge Powered Generator (SPG) at Beckton STW, will be pumped to Riverside STW and used to generate renewable energy using anaerobic digestion. The Riverside proposals are designed to treat sludge from the Riverside STW but the opportunity has been taken to export excess sludge from Beckton to Riverside to utilize spare capacity in the short to medium term.

- 13.1.5 Overall it is considered that the waste management options put forward will not have an adverse effect on London's waste management capacity and will accord with sustainable waste management principles.

14 Traffic and Transport

- 14.1.1 Construction traffic will occur throughout the majority of the main 55 month construction phase. The principal movements will be relatively evenly distributed throughout the period although the peak occurs for two months at the end of 2011.
- 14.1.2 The addition of daily construction traffic to a future baseline will lead to small percentage increases on major routes that will be insignificant, for example an increase of 0.4%-0.5% on the A13 at Beckton.
- 14.1.3 The number of construction traffic movements has already been reduced by ensuring excavated material is re-used on site wherever possible. Furthermore, export of tunnel and Beckton shaft arisings will be by river barge from Beckton. Measures to reduce construction workforce car numbers will be identified in a Green Travel Plan.
- 14.1.4 The additional transport movements resulting from the operation of the development will not be significant.

15 Noise and Vibration

- 15.1.1 Potential noise effects on sensitive locations such as residential properties have been assessed, both for the construction phase and once the development is operational. Vibration levels during tunnelling works and the STW extension at Beckton have also been assessed.
- 15.1.2 Background noise levels were measured at two locations at Abbey Mills and four locations at Beckton. The background noise levels were compared to predicted noise levels calculated using standard methods taking into account the likely construction activities and plant to be used.
- 15.1.3 Although noise levels will be higher during construction than at present including the contribution from road traffic, noise is assessed as having only a negligible to low adverse effect at Abbey Mills and a negligible effect at Beckton. This is mainly because most sensitive receptors including houses are some distance from most of the construction sites. Noise complaints are unlikely. Similarly vibration levels during construction are predicted to be insignificant.
- 15.1.4 Once the development is operational, noise (including that from the new wind turbine) and vibration will have a negligible effect at the nearest sensitive locations.

16 Air Quality

- 16.1.1 A study has been undertaken to assess the potential effects on air quality. In particular, the assessment considered the potential for impacts at sensitive locations in terms of:
- Dust and dirt, for example generated by construction activities;
 - Emissions from vehicles; and
 - Emissions of carbon dioxide (CO₂) associated with the energy use of the operational project.
- 16.1.2 Dust control measures would be used during construction works to ensure any effects of dust, which in any case would be temporary and would not be significant. Such measures would include the use of water sprays at the site of dusty activities to damp down dust, and the use of dust suppression equipment on machinery.
- 16.1.3 The potential impacts of the two main road traffic pollutants – nitrogen dioxide and fine particulate matter – have been assessed, both for the construction phase and once the development is operational. Predicted emissions are well below levels considered to signify a significant change in pollutant concentrations.
- 16.1.4 Renewable energy in the form of a wind turbine (to be sited at Beckton STW) and the anaerobic digestion facility supplied in part by sludge from Beckton STW (to be sited at the Riverside STW, see above) will reduce the overall carbon dioxide emissions associated with the operation of the development by about 72%..

17 Odour

- 17.1.1 A detailed assessment has been undertaken to assess whether the proposed development would result in any significant change (positive or negative) in the odour levels which will be experienced off site.
- 17.1.2 At Abbey Mills, installation of the Lee Tunnel will mean that storm water will not be discharged to the River Lee under normal operating conditions, helping to reduce odour generation. The operation of the tunnel will, however, introduce a potential new odour source to the site, particularly during tunnel filling when air is displaced as the tunnel fills and when ventilation of the partially full tunnel occurs. The strength of odour that will be generated by the tunnel is expected to be relatively low (since the sewage content is diluted by mixing with surface waters through combined drainage), and odour control measures have been designed and incorporated into the proposed development to minimise odour emissions. Furthermore the replacement and relocation of an existing penstock will further reduce odour sources.
- 17.1.3 The total odour emissions at Abbey Mills after completion of the Lee Tunnel are predicted to reduce by approximately 5% compared to the odour without the development (and also compared to the present situation).

- 17.1.4 At Beckton STW the assessment shows that a number of new elements of infrastructure might generate additional odour. However this would be dealt with by the inclusion within the development of a number of additional odour control measures. Many of the treatment processes take place within enclosed buildings, with any odorous air extracted to dedicated odour control systems prior to release.
- 17.1.5 At Beckton, a number of odour improvement schemes will take place before the proposed development is completed to reduce odour below current levels by 2010. With the Lee Tunnel and Beckton STW development in place there will then be a further reduction in overall site emissions of approximately 5% by 2014. With both sets of improvements in place, the total odour emissions are predicted to reduce by approximately 48% and a total of about 26,400 fewer dwellings will be exposed to odour levels of 1.5 odour units compared to the present situation.

18 Socio-economic and Community Effects

- 18.1.1 The development would have a number of beneficial effects for the community, including:
- Increased sewage treatment capacity at Beckton STW which will support the growing population of the STW catchment;
 - Reduction in sewage discharges to the River Lee and the Thames Tideway resulting in significant water quality improvements, reduced risk to human health and reduced litter on the foreshore;
 - Generation of approximately 350 temporary construction jobs; and
 - Creation of two new paths around the Beckton site.
- 18.1.2 The Thames Water Sailing Club buildings will be lost to the development at Beckton, as will the grazing land situated at the Beckton Rectangle. Since current usage of these facilities is low, they only involve a small number of people and alternative facilities are available in both cases, the effects are not considered to be significant.

19 Inter-relationships & Cumulative Effects

- 19.1.1 Improvement schemes at other STWs in London as well as the proposal for the future Thames Tunnel will also be carried out. Together, these projects are expected to lead to significant cumulative improvements in the water quality of the Thames Tideway and benefits to aquatic ecology.
- 19.1.2 Planning permission was recently granted for the Thames Gateway Water Treatment Plant (TGWTP, the "desalination plant") located on the Beckton STW site, adjacent to Barking Creek. The construction impacts of that project will have largely occurred by late 2009 and the TGWTP is likely to be largely complete by the time construction of the Lee Tunnel and Beckton STW project commences.
- 19.1.3 The West Ham Flood Alleviation Scheme Tunnel under construction at Abbey Mills PS, will, in combination with the Lee Tunnel reduce sewer flooding and therefore significant beneficial cumulative effects are likely in terms of flood risk to the catchment of the Lee Valley.

- 19.1.4 There are a large number of major schemes in the general vicinity of both Abbey Mills PS and Beckton STW although many, particularly in the Beckton area, such as Thames Gateway Bridge, DLR Extension and the further development of the National grid site, do not have planning permission. It is therefore difficult to predict the potential for cumulative effects given the uncertainties associated with programme overlaps. It is possible that cumulative effects will be generated if construction traffic for other developments were to use the same routes in the vicinity of the sites. Other cumulative effects are possible and are identified within main ES, Volume 2.

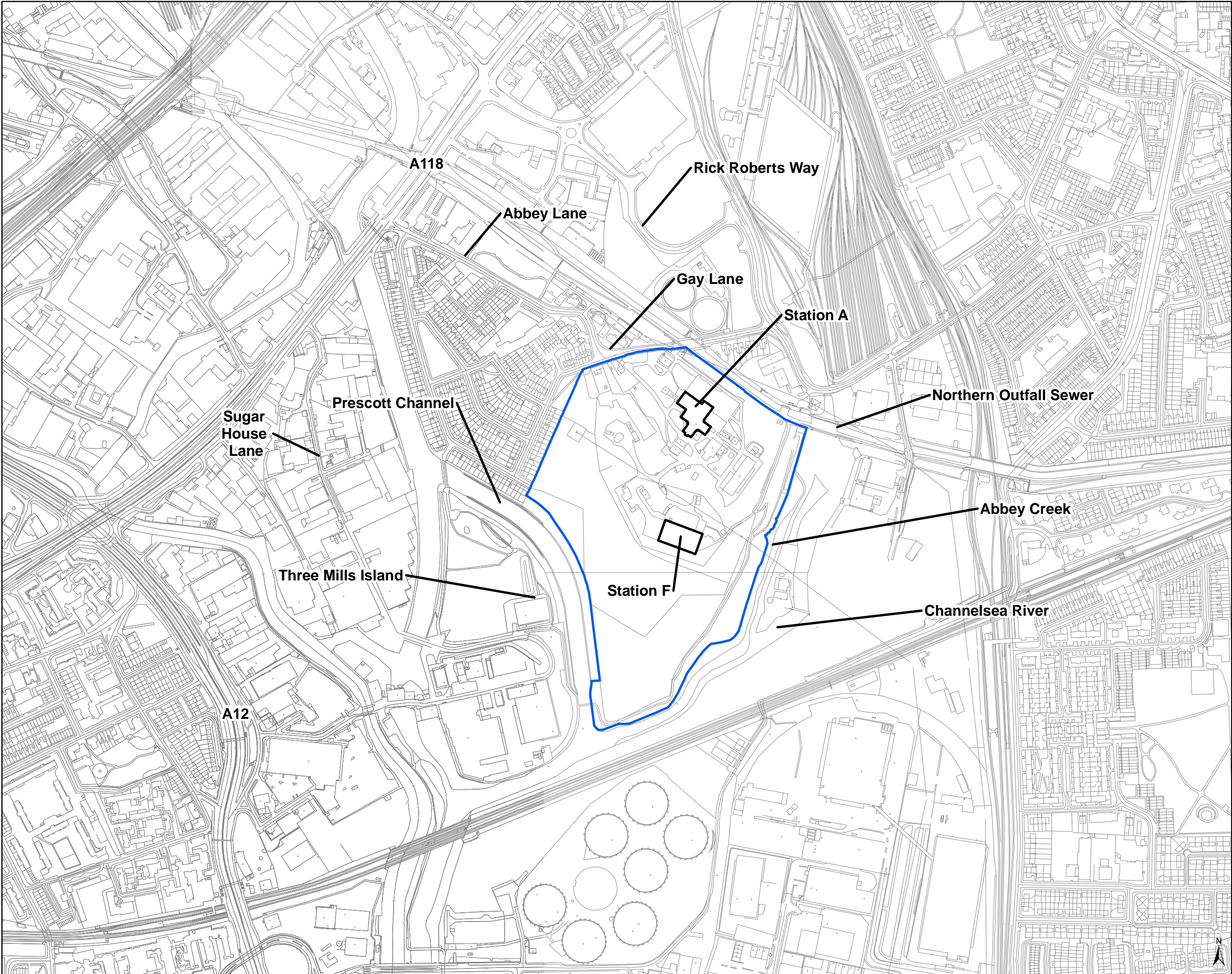
20 Mitigation

- 20.1.1 The Main ES (Volume 2) includes a summary table of all of the mitigation measures that are identified in each of the preceding chapters. These include measures that are integral to the project design and procedures associated with it which are designed to avoid adverse effects as well as mitigation measures that have been identified during the EIA process.

21 Conclusions

- 21.1.1 The need for the proposed development is driven by the statutory requirement to improve water quality within the Thames Tideway and by the need to support population growth within the STW catchment. The capture of the Abbey Mills CSO discharges within the Lee Tunnel and their treatment at an extended Beckton STW will substantially reduce the flows of untreated sewage into the River Lee and the Thames Tideway. The STW extension will also provide infrastructure to deliver the increased treatment capacity and higher consent standards required by the Environment Agency as well as providing for future population growth within the STW catchment.
- 21.1.2 A number of sensitive environmental features and locations are present both within and in proximity to the Abbey Mills PS and Beckton STW sites. There would be some localised residual adverse effects in respect of terrestrial ecology, landscape and views, archaeology and built heritage. These would be for the most part, minor adverse with a small number of moderate adverse effects.
- 21.1.3 Significant beneficial effects would result from the substantial reduction of untreated discharges to the River Lee and the Thames Tideway and improvements to effluent quality, the odour improvements at both Abbey Mills PS and Beckton STW and the remediation of contaminated land at Beckton STW.
- 21.1.4 As well as supporting the growing population of London, the proposals will provide significant improvements to the water quality of the River Lee and the Thames Tideway and so improve habitats for aquatic wildlife, help reduce the health risks to river users and reduce sewage derived litter. These improvements in the Thames Tideway will benefit both Londoners and visitors to London alike and can be regarded as benefits of at least regional significance.

Plot Date: 14/05/2008
Filepath: K:\D117693_Lee_Tunnel_EIA\MXDs\Figure 3.2 - Abbey Mills Site Context.mxd



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NOTES

- Site Boundary

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Revision Details	By	Date	Suffix
	Check		

Drawing Status

Job Title

LEE TUNNEL AND BECKTON STW

Drawing Title

ABBAY MILLS SITE CONTEXT

Scale at A3

1:5,000

Drawn	DH	Approved	AH
Stage 1 check	Stage 2 check	Originated	Date
			14.05.2008

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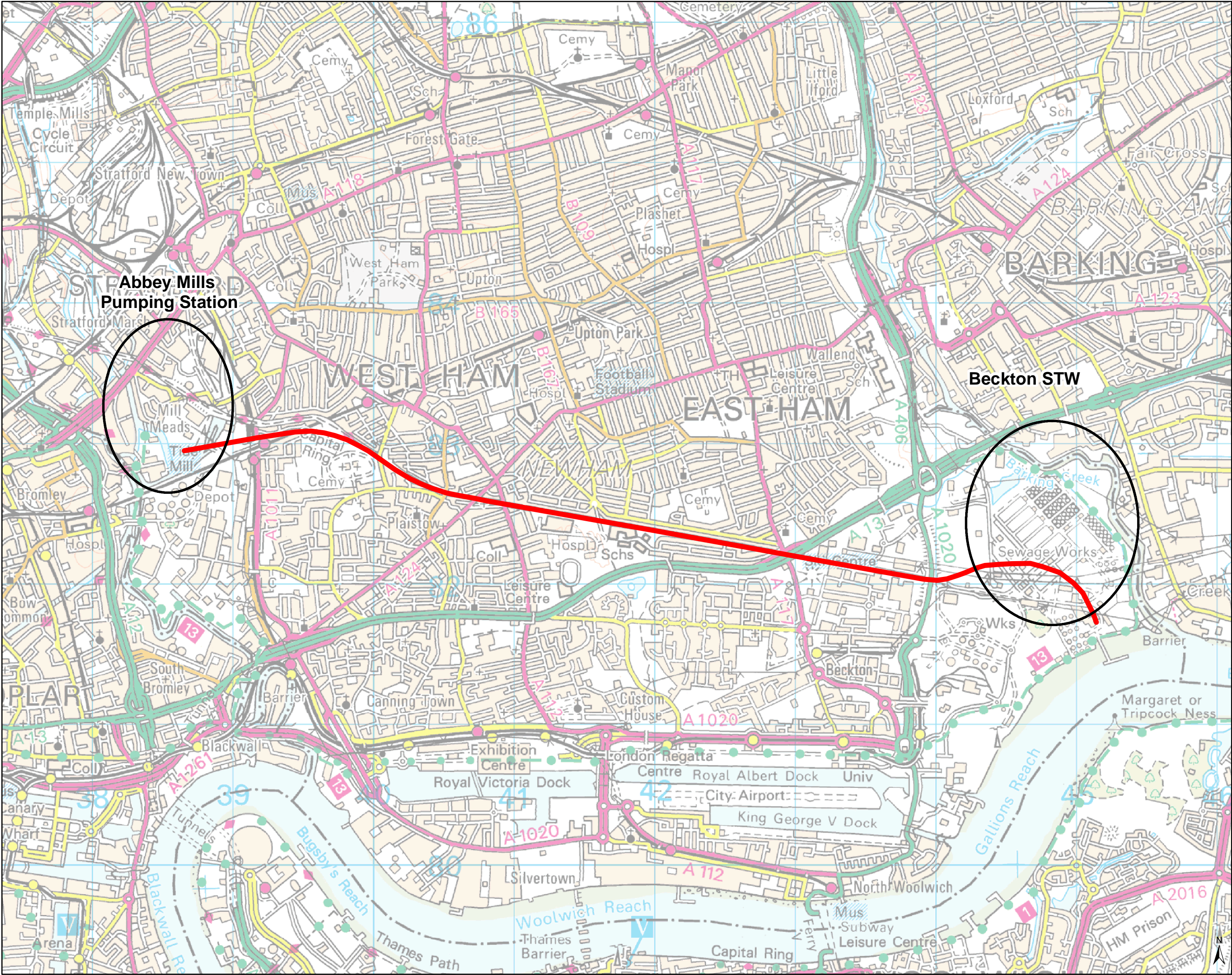
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Drawing Number

FIGURE 3.2

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NOTES

Proposed Lee Tunnel Alignment

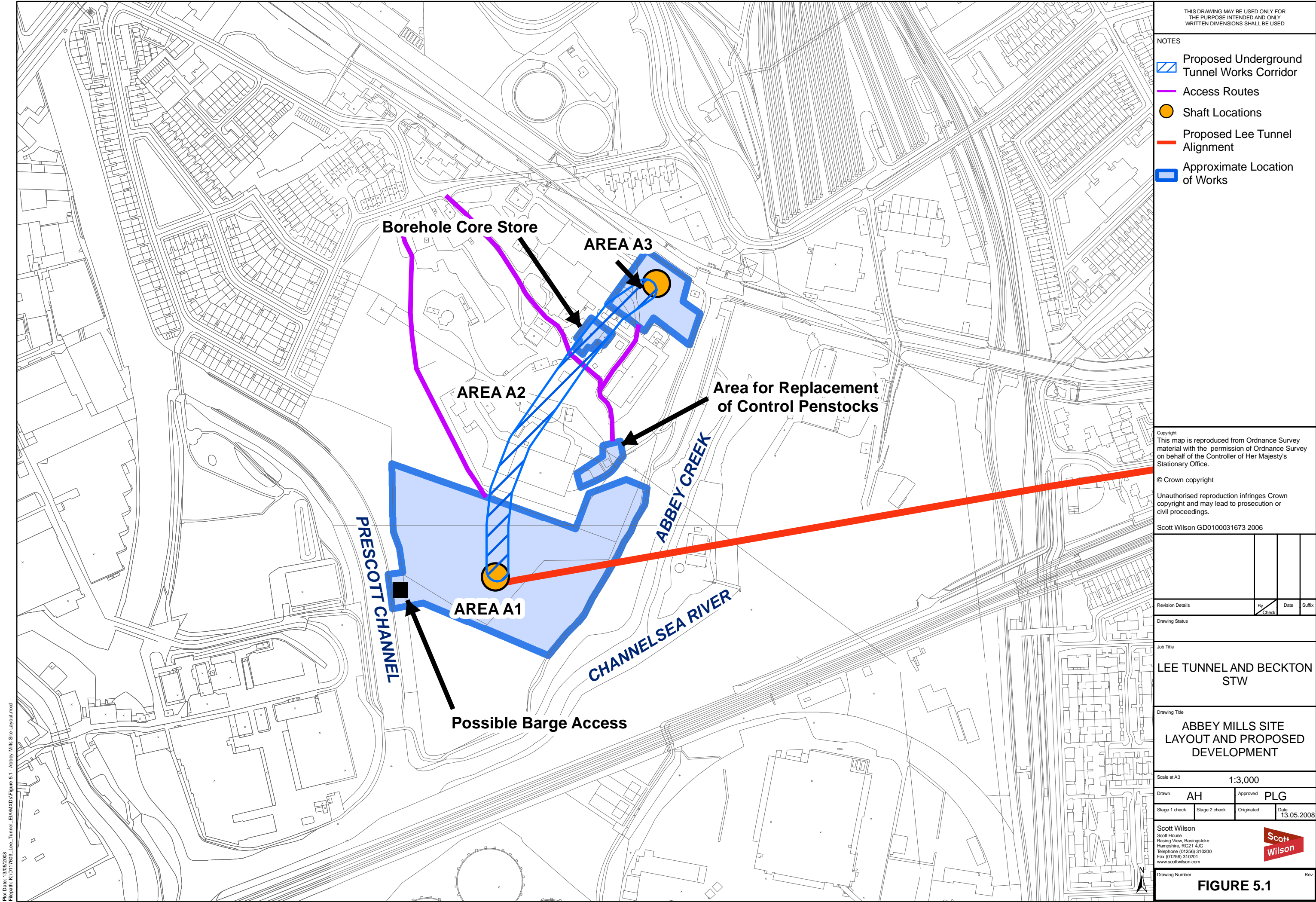
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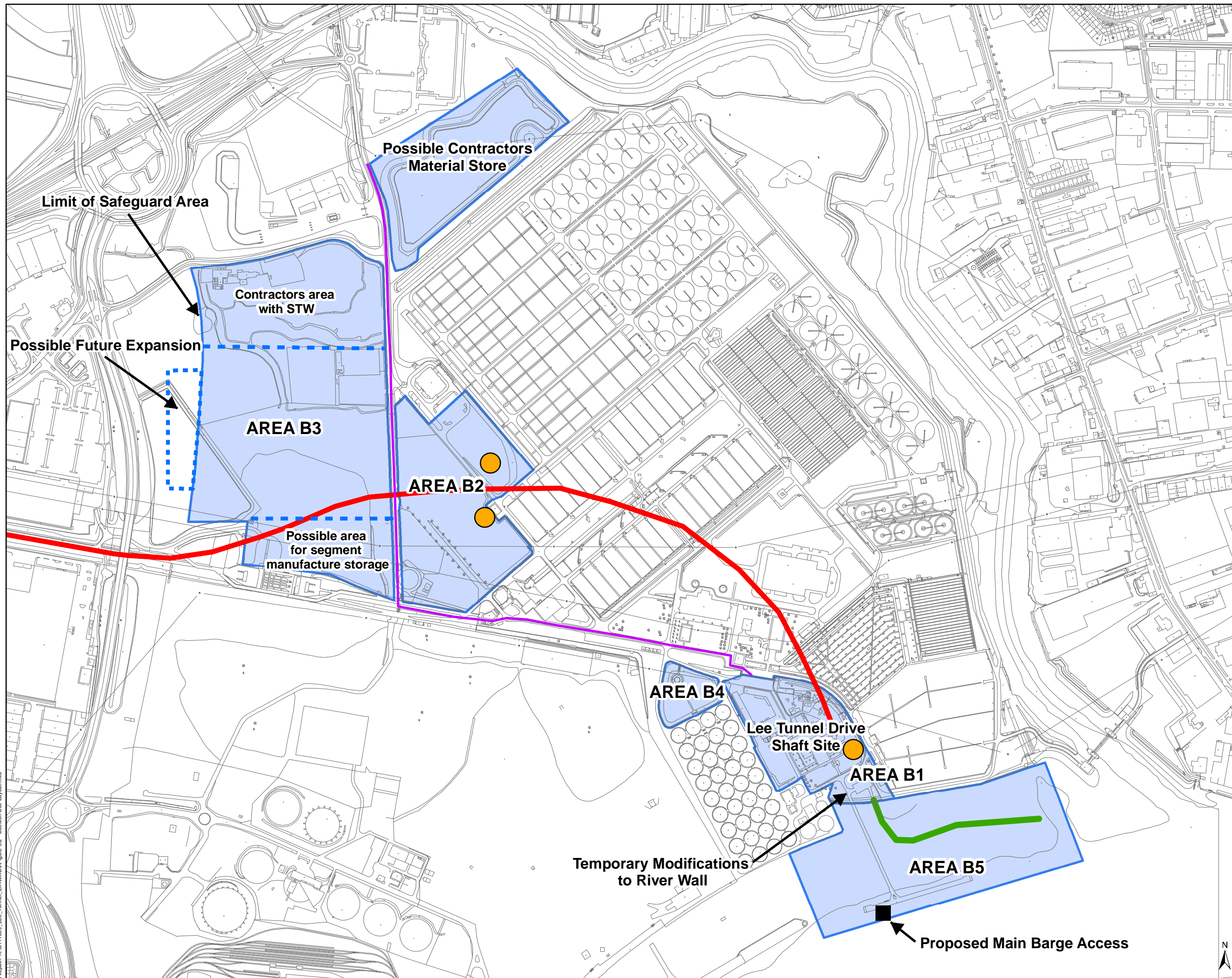
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Revision Details	By	Date	Suffix
Drawing Status	DRAFT		
Job Title	LEE TUNNEL AND BECKTON STW		
Drawing Title	SITE CONTEXT AND LOCATION MAP		
Scale at A3	1:25,000		
Drawn	AH	Approved	PLG
Stage 1 check	Stage 2 check	Originated	Date
			13.05.2008
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Drawing Number	FIGURE 3.1		








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NOTES

-  Shaft Locations
-  Proposed Lee Tunnel Alignment
-  Proposed Outfall Culvert
-  Approximate Location of Works
-  Access Routes

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Revision Details	By	Date	Suffix
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Drawing Status

Job Title

LEE TUNNEL AND BECKTON STW

Drawing Title

BECKTON SITE LAYOUT

Scale at A3 1:6,000

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AH	PLG
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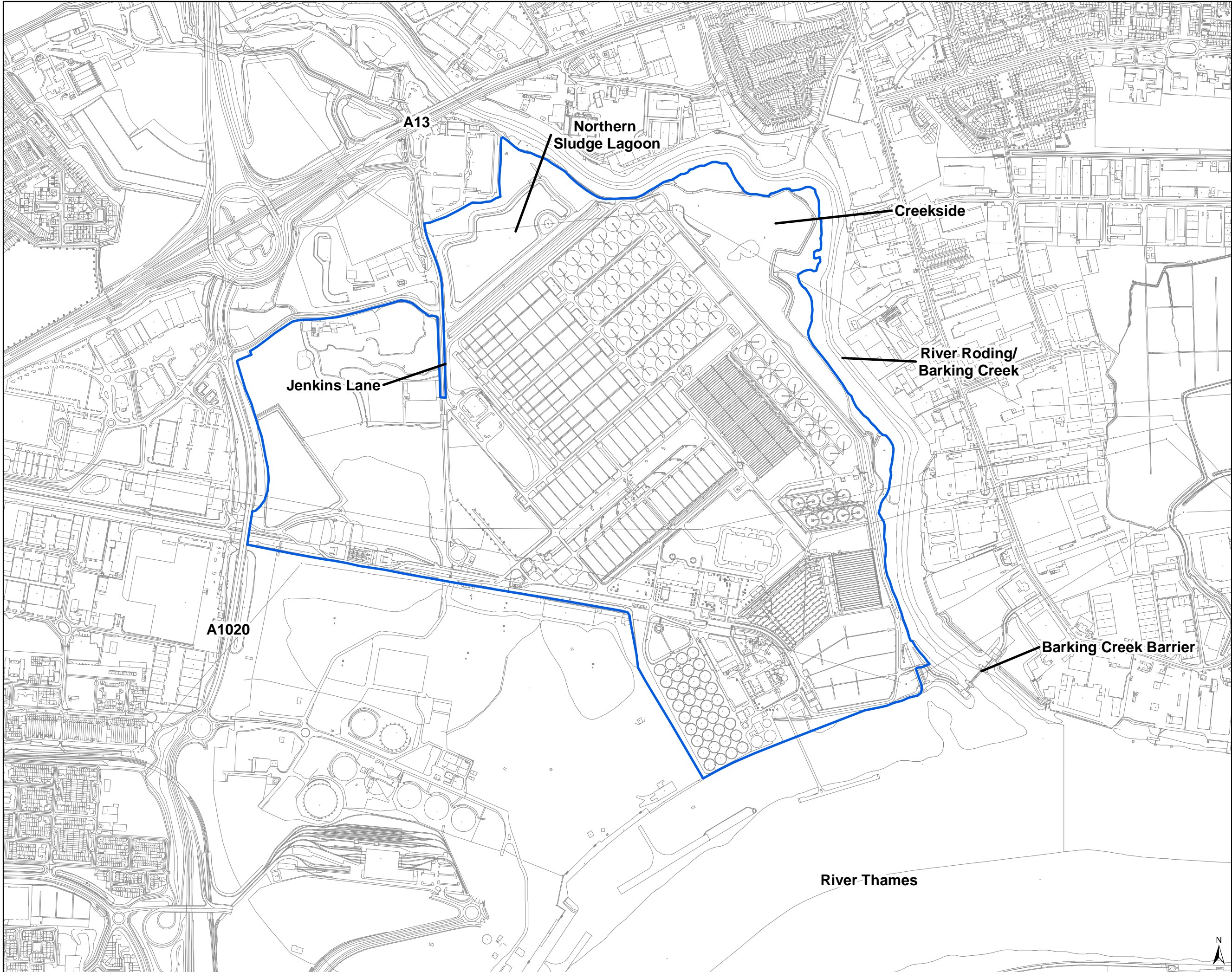


Drawing Number

FIGURE 5.2

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Drawing Status

Job Title

LEE TUNNEL AND BECKTON STW

Drawing Title

BECKTON STW - SITE CONTEXT

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FIGURE 3.3

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