**Phase two consultation documentation**

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- Your guide to phase two consultation
- Why does London need the Thames Tunnel?
- Feedback form
- Equalities form
- Customer overview leaflet

### Project information papers
- Build
- Changes
- Consultation
- Design
- Environment
- Funding
- Managing construction
- Odour
- Options
- Overflow
- Regulatory framework
- Route and tunnel alignment
- Route to consent
- Settlement
- Site selection
- Timing
- Transport

### Technical documents
- Air management plan
- Book of plans
- Code of construction practice Part A: General requirements
- Consultation strategy and statement of community consultation
- Design development report
- **Draft waste strategy**
- Interim engagement report
- Needs Report
- Phase two scheme development report
- Preliminary environmental information report
- Report on phase one consultation
- Site selection background technical paper
- Site selection methodology

### Site information papers
- Abbey Mills Pumping Station
- Acton Storm Tanks
- Albert Embankment Foreshore
- Barn Elms
- Beckton Sewage Treatment Works
- Bekesbourne Street
- Blackfriars Bridge Foreshore
- Carnworth Road Riverside
- Chambers Wharf
- Chelsea Embankment Foreshore
- Cremorne Wharf Depot
- Deptford Church Street
- Dormay Street
- Earl Pumping Station
- Falconbrook Pumping Station
- Greenwich Pumping Station
- Hammersmith Pumping Station
- Heathwall Pumping Station
- Jews Row
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List of abbreviations

BPEO Best practicable environmental option
C&D Construction and demolition
C&I Commercial and industrial waste
CDE Construction, demolition and excavation
CE&D Construction, excavation and demolition
CL:AIRE Contaminated Land: Applications in Real Environments
CoCP Code of construction practice
CSO Combined sewer overflow
EMOA Excavated material options assessment
KPI Key performance indicator
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1 Executive summary

1.1.1 This draft waste strategy has been developed to provide a framework for the management of materials and waste that would be produced throughout the construction and operational phases of the Thames Tunnel project.

1.1.2 This document is a consultation draft waste strategy. It is produced alongside the Preliminary environmental information report (PEIR) and, like the PEIR forms, it is part of the material available for the phase two public consultation in autumn 2011.

1.1.3 The main tunnel of the Thames Tunnel project would be 7.2m in diameter and up to 75m deep, and the preferred route is approximately 25km long. In general, the main tunnel needs to follow the route of the River Thames so that it can be connected to the combined sewer overflows (CSOs) that are located along the riverbanks. The construction of the tunnel would require the excavation of a large volume of material from 22 sites. There are four proposed tunnel drive sites and associated shafts which would be producing over 70% of the excavated materials: these are Carnwath Road Riverside, Kirtling Street, Chambers Wharf and Greenwich Pumping Station.

1.1.4 This waste strategy demonstrates Thames Water’s commitment to its overarching aim of pursuing a zero waste solution for the Thames Tunnel project. That is making the most efficient use of resources by minimising demand for primary resources and maximising the reuse, recycling and recovery of resources, instead of treating them as ‘waste’ with no innate value.

1.1.5 The waste strategy provides a strategic direction and framework for the management of waste and excavated materials, while ensuring that legislative, policy, environmental, financial and corporate drivers are all addressed and met. The majority of the material to be removed from Thames Tunnel project sites would be excavated material, which would generally be categorised as a non-waste. It is included in this waste strategy for completeness.

1.1.6 This waste strategy sets out the following objectives:
   a. To pursue a zero waste solution for the Thames Tunnel project
   b. To maximise reuse and recovery of excavated material arising from tunnel construction.

1.1.7 A percentage-based target will be set against these objectives, and these targets will be developed in the next phase of works.

1.1.8 This waste strategy considers, and is underpinned by, the relevant legislative and local/regional policy requirements for waste management. These encompass the following:
   a. The revised Waste Framework Directive (Waste FD), which clarifies the definition of waste and puts a greater emphasis on the use of the waste hierarchy in waste management decision-making.
b. National policy which provides the framework for strategic waste management decision-making, involving sustainable development, the waste hierarchy, self-sufficiency and the proximity principle, all of which form key elements to the national waste management plan for the UK, and are incorporated in the *Waste Review 2011* and *Planning Policy Statement 10*.

c. At regional level, the *London Plan*, the *South East Plan* and the *East of England Plan* all establish relevant regional waste policies that are considered.

1.1.9 An estimated 4.6 million tonnes of excavated material would be generated over the construction lifespan of the Thames Tunnel project. The proposed length of the tunnel means that the in situ geology varies along its length and the excavated materials would vary as construction progresses from clays, through sands and gravels to chalk, as the tunnel progresses from east to west.

1.1.10 A detailed options assessment is being undertaken to identify the preferred options for the management of the excavated material. The assessment provides a systematic and transparent approach for assessing the management options for reuse, treatment and/or disposal of the excavated materials arising from the project during its construction phase.

1.1.11 In addition to excavated material being produced during the construction phase, waste would also be generated. This includes:

a. construction related waste
b. demolition waste
c. hazardous waste (from demolition and construction equipment maintenance)
d. waste generated through vegetation site clearance
e. welfare waste
f. waste electrical and electronic equipment (WEEE).

1.1.12 Estimates have been made for the quantities of construction related waste that would be produced. This includes waste such as imported fill, concrete, grout and concrete tunnel linings. It has been estimated that around 51,000 tonnes of waste would be produced during the construction of the tunnel.

1.1.13 Work is currently being carried out to estimate the amount of waste that would be generated through the demolition of buildings and structures. Where possible, this waste would be reused and recycled. An assessment has been carried out to ascertain the likely amount of vegetation and tree related waste that would be produced. Contractors would be expected to ensure that no organic waste is sent to landfill; organic waste would be composted and/or chipped by an appropriate contractor. Welfare waste would also be generated by staff on site. Contractors would be encouraged to put in place systems to ensure this waste is recycled where possible.
1.1.14 It is anticipated that there would be small levels of hazardous waste produced. This waste would be managed appropriately, and collected and disposed of by specialist contractors.

1.1.15 All waste and excavated material produced on site would be managed in accordance with the Code of construction practice (CoCP), which sets out a series of measures to protect the environment and limit disturbance from construction activities as far as is reasonably practicable.

1.1.16 A waste management plan (WMP) would be developed by the Thames Tunnel project to provide an overarching framework and a consistent approach to managing the excavated materials and waste at individual construction sites. The WMP would provide a central location for all Thames Tunnel project waste information. The WMP would:
   a. record Thames Water’s (or another client entity) responsible person, as well as the responsible person for each site
   b. record the waste types generated by the entire project
   c. provide details of all waste minimisation actions
   d. provide project-wide waste forecasts for each waste type
   e. provide a complete register of all approved waste carriers and receptor sites for the project
   f. summarise the information relating to waste transactions from each site
   g. report against project key performance indicators (KPIs).

1.1.17 Under the Site Waste Management Plans Regulations 2008, a site waste management plan (SWMP) is required for each site. The SWMPs would be based on good practice and will comprise a live reporting tool rather than a static document. These SWMPs would report into the WMP and provide a framework to facilitate best practice on construction sites, as well as recording and monitoring environmental performance, meeting regulatory control requirements and reducing waste disposal costs.

1.1.18 Waste would also be produced during the operational phase of the Thames Tunnel project. This would comprise waste arising from the maintenance of the main tunnel and that associated with storm flows intercepted by the tunnel. It is anticipated that there would be a small amount of waste produced during routine maintenance (the main tunnel sites would require a maintenance visit every ten years, and surface equipment would require routine inspection and maintenance every three to six months). Maintenance waste includes oils and lubricants from equipment, granular carbon from odour control units, and general debris and other articles that enter the existing sewer system. Operational procedures for management of this waste would be developed from those established for the Lee Tunnel and would be in accordance with relevant regulations and the waste hierarchy.

1.1.19 It is anticipated that sewage-derived litter in the Thames would reduce from approximately 10,000 tonnes per annum at present to approximately 600 tonnes per annum, once the treatment works extensions and tunnels
are operational. The great majority of the sewage flows from CSOs, including solid waste, would be diverted from the Thames by the tunnel network and would be treated at Beckton Sewage Treatment Works (STW). Once operational, the sewage from the tunnels would be treated at the STW along with other flows, and would comprise approximately three per cent of the flows treated at the works.

1.1.20 The waste strategy would be reviewed regularly during the construction phase and when the tunnel is operational.
2 Aims of the waste strategy

2.1 Introduction

2.1.1 This document is a consultation draft waste strategy. It has been produced alongside the PEIR and, like the PEIR, forms part of the material available for the phase two public consultation in autumn 2011.

2.1.2 This waste strategy identifies the overall approach and objectives for managing materials generated as a result of the construction and operation of the Thames Tunnel project, and sets out appropriate waste management routes.

2.1.3 The waste strategy contains the following sections:

a. **Section 2 – Aims of the strategy**, summarises the key drivers behind the strategy and sets out the objectives of the strategy.

b. **Section 3 – Legislation and policy context**, summarises the key legislative and policy at a national, regional and local level influencing Thames Tunnel project waste management.

c. **Section 4 – Construction phase: Excavated material arisings**, details expected material arisings, provides the results of the *Excavated materials options assessment* (to date) and summarises the control mechanisms which would be put in place.

d. **Section 5 – Construction phase: Non-excavated material arisings**, estimates the waste arisings and summarises the control mechanisms which would be put in place.

e. **Section 6 – Construction phase: Site waste management**, provides information relating to the control of waste management during the construction phase through the use of a WMP.

f. **Section 7 – Impacts on regional construction, demolition and excavation (CDE) infrastructure**, assesses the impacts of Thames Tunnel project waste arisings on regional waste infrastructure.

g. **Section 8 – Operational phase**, estimates the waste arisings during the operational phase and summarises the control mechanisms which would be used.

h. **Section 9 – Roles and responsibilities**, outline of the Thames Tunnel project roles and responsibilities for waste management.

i. **Section 10 – Monitoring and review**, sets out the mechanisms for monitoring and review of the waste strategy.

2.1.4 This waste strategy sets out the approach to waste management, provides estimates of likely waste arisings and gives the results to date of the Excavated Materials Options Assessment, based on the Thames Tunnel project as defined in May 2011. For clarity, this document is referred to as ‘the waste strategy’ although it would be subject to amendments in advance of the development consent order application. The revised waste strategy will be produced in 2012, following the incorporation of consultation feedback and inclusion of any amendments which are required as a result of any changes to the project.
2 Aims of the waste strategy

2.2 Thames Tunnel project overview

2.2.1 At present, when the capacity of London’s sewers is exceeded during periods of heavy rainfall, the mixture of sewage and rainwater (‘storm sewage’) overflows into the tidal River Thames, generally through CSOs. The Thames Tunnel project would control, store and divert these CSO discharges for treatment at Beckton STW, which would reduce the frequency of CSO discharges and would greatly reduce the incidence of sewage-derived litter in the River Thames. The Thames Tunnel project would benefit London as a whole and those living and working in London by providing a cleaner River Thames.

2.2.2 The main tunnel is proposed to be 7.2m in diameter and up to 75m deep, and the preferred route is approximately 25km long. In general, the tunnel needs to follow the route of the River Thames so that it can be connected to the CSOs that are located along the riverbanks. The construction of the tunnel would require the excavation of a large volume of material from 22 sites. In the preferred scheme, there are four tunnel drive sites and associated shafts which would be producing over 70% of the excavated materials: these are Carnwath Road Riverside, Kirtling Street, Chambers Wharf and Greenwich Pumping Station.

2.2.3 It is estimated that approximately 4.6 million tonnes of excavated material would be produced from the construction of the tunnel and around 51,000 tonnes of construction related waste would be generated from the construction sites.

2.3 Purpose of this Thames Tunnel project waste strategy

2.3.1 The waste strategy provides a strategic direction for waste management to ensure that the legislative, policy, financial and corporate drivers are met. This would help demonstrate Thames Water’s1 commitment to pursing a zero waste solution for the Thames Tunnel project.

2.3.2 The aim of the waste strategy is to pursue a zero waste solution for the Thames Tunnel project by making the most efficient use of resources, by minimising demand for primary resources and maximising the reuse, recycling and recovery of resources instead of treating them as ‘waste’ with no innate value.

2.3.3 This waste strategy provides a framework for the management of materials and waste that would be produced throughout the construction and operational phases of the project. This includes waste that would arise through:

a. site demolition and clearance activities prior to excavation
b. shaft excavation and construction
c. tunnel excavation and construction
d. CSO interception works

1 This waste strategy assumes that Thames Water would be the client delivering the scheme. It may be that the delivery of the Thames Tunnel project is not undertaken by Thames Water and another client body would be responsible for the delivery and operation of the project.
2 Aims of the waste strategy

- operation of the tunnel and resultant waste associated with the tunnel arising at Beckton STW.

2.3.4 Figure 2.1 shows where information relating to waste management and waste effects can be found in the PEIR documents, including the waste strategy.

**Figure 2.1 Inclusion of waste related matters in the PEIR**

2.3.5 The waste strategy establishes the framework for the management and control of waste and materials generated through the construction and operational phases of the Thames Tunnel project which is depicted in Figure 2.2.

2.3.6 Figure 2.2 shows how the waste strategy would work with the WMP, SWMPs, CoCP and contract specifications to control the management of waste arising during the construction phase.
2.4 Consultation

2.4.1 This is a consultation draft waste strategy. Any issues raised during consultation and addressed in the waste strategy submitted with the DCO application will be summarised here.

2.5 Thames Water policy

2.5.1 The approach to waste management taken by this waste strategy reflects Thames Water’s corporate policies with respect to the environment and waste. Thames Water’s key environmental policy documents are summarised below.

**Thames Water Corporate Responsibility Report**

2.5.2 The Thames Water *Corporate Responsibility Report 2009/2010* states that Thames Water will continue to focus on how to become the water sector leader on environmental protection and sustainability. To do this, Thames Water:

“will work to eliminate waste, reduce the use of natural resources, operate more efficiently, continually improve performance, build employee pride, meet the expectations of stakeholders.”
The report also states that Thames Water’s:
“approach is likely to include a focus on core issues related to people (health, safety, wellbeing, skills, ethics and employee engagement), the planet (environmental protection, natural resource management, climate change and zero waste), and the strength and reliability of performance now and into the future.”

**Thames Water Environmental Policy**

Thames Water’s *Environmental Policy*, Thames Water Utilities Ltd (Oct 2010) sets out the company’s approach to environmental responsibility as part of a wider commitment to sustainability and good corporate citizenship.

The key Thames Water sustainability principles, which include environmental management, also include:

a. protecting and enhancing the natural and built environments, whether they are directly or indirectly impacted by Thames Water’s activities
b. making effective and efficient use of natural resources, including water, land and raw materials
c. minimising Thames Water’s impact on climate change through energy avoidance, efficiency, renewables, emissions reduction and good carbon management, while ensuring Thames Water adapts to the inevitable impacts of climate change on the organisation’s assets and operations
d. minimising the generation of waste and making effective and efficient use of unavoidable waste.

The Thames Water *Environmental Policy* states that the company will use the sustainability principles to help plan and operate in a sustainable way. When implementing environmental responsibilities with respect to waste, the environmental policy commits to:

a. reducing the volume of waste Thames Water produces and maximising avoidance, reuse and recycling of waste through proactive waste management
b. ensuring the beneficial reuse of sewage sludge.

Thames Water *Corporate Responsibility Report 2009/2010* and the Thames Water *Environment Policy* commitments are reflected within this waste strategy as they relate to waste management and protection of the environment.

**Drivers**

There are a number of key drivers for sustainable waste management that have guided the development of the waste strategy. The key drivers include:

a. fit with national, regional, local policy and corporate policy
b. need for a project of national significance to demonstrate good practice
2 Aims of the waste strategy

c. minimising the environmental effects of the project (during construction and operational phases)
d. compliance with legislative requirements
e. economic construction and operation of the project. The cost of managing waste is rising year-on-year and this is a strong driver for waste minimisation and diversion of material from landfill.

More detail relating to the legislative and policy context is provided in Section 3.

2.7 Thames Tunnel project objectives, commitments and targets

2.7.1 A sustainability strategy is being developed for the Thames Tunnel project with the vision: “To deliver a world class infrastructure project fit for the low carbon economy, which benefits the community, supports a healthier, cleaner River Thames and demonstrates exemplary performance in sustainability across the project lifecycle.” Draft Sustainability Strategy, Sustainability team (2011).

2.7.2 In order to set a clear vision and provide simple high-level direction for the Thames Tunnel project, a number of high-level waste related objectives have been developed. Thames Water policy, the legislative and policy context and the overall sustainability objectives of the Thames Tunnel project form the basis of these objectives.

2.7.3 The waste strategy objectives are:

a. Objective W1: To pursue a zero waste solution for the Thames Tunnel project

b. Objective W2: Maximise reuse and recovery of excavated material arising from tunnel construction.

2.7.4 Objectives W1 and W2 form part of the sustainability strategy for the Thames Tunnel project.

2.7.5 These objectives are supported by a number of commitments, and achievement against these objectives will be measured against specific targets. These are set out below.

2.7.6 During the operational phase, waste generated in relation to the Thames Tunnel project would become part of Thames Water’s operations and would be dealt with under Thames Water’s objectives and KPIs.

2 This Waste Strategy assumes that once operational, the Thames Tunnel will be operated and controlled by Thames Water and that Thames Water’s corporate policies and procedures will be used to manage waste arising from the Thames Tunnel project.
Objective W1: To pursue a zero waste solution for the Thames Tunnel project

Commitments
a. The waste hierarchy will be implemented throughout the project lifecycle.
b. Waste will be designed out through innovative practice.
c. The project will give consideration for neighbours and engage with stakeholders to minimise disruption.
d. Effective management practices on site will be implemented to optimise logistics and ensure timely removal of material.
e. The project WMP will provide appropriate control throughout the project lifecycle.
f. SWMPs will be used to ensure suppliers can manage areas of significant waste generation.

Targets
a. A percentage based target will be set against this objective. The actual targets will be developed in the next phase of works.

Objective W2: Maximise reuse and recovery of excavated material arising from tunnel construction

Commitments
a. The project will deliver a sustainable solution for management of excavated material.
b. Excavated material will be delivered to locations which meet or exceed the performance of the preferred options identified in the excavated material options assessment (EMOA).

Targets
a. A percentage based target will be set against this objective. The actual targets will be developed in the next phase of works.

2.7.7 The targets detailed above need to be agreed and will be included when this information is available. The appropriateness of these targets will be assessed in line with increasing knowledge of the Thames Tunnel project sites.
3 Legislative and policy context

3.1 Introduction

3.1.1 This waste strategy is underpinned by the legislative and policy requirements for waste management. These are described in this section (further detail is provided in Appendix A). Compliance with these would ensure protection of the environment and human health. The EMOA for identifying the preferred waste management option(s) for excavated material arising through the Thames Tunnel project is also informed by these legislative and policy requirements.

3.2 Waste definition

3.2.1 Waste is defined in Article 1 (a) of the European Union Waste FD as: “Any substance or object…..which the holder discards or intends or is required to discard.” (Revised Waste Framework Directive 2008/98/EC. European Union. December 2008.) The main aims of the Waste FD are the protection of human health and the environment (further information on the Waste FD and waste definition is provided in Appendix A).

3.2.2 It is anticipated that the Thames Tunnel project would generate the following wastes:

- a. Excavated materials
- b. Construction related wastes
- c. Demolition waste
- d. Hazardous waste
- e. WEEE
- f. Welfare waste
- g. Waste generated through vegetation site clearance
- h. Operational waste associated with maintenance of the tunnel
- i. Residues from the Beckton STW
- j. A reduced volume of litter associated with discharges from the CSOs.

3.2.3 Excavation material derived from the tunnel construction would fall into two categories:

- a. Waste – material which poses an unacceptable risk to human health/environment and/or material which is geotechnically unsuitable for any use and/or material which is surplus to requirements, and/or needs treatment to be reused.

- b. Non-waste – material which is suitable for reuse (in terms of human health/environmental risk and geotechnical suitability) and there is certainty of use (there is an outlet which requires the material and there is a contract/agreement in place, and reuse is allowed under the planning permission).

3.2.4 It is anticipated that the majority of the excavated material would be classified as non-waste under this definition. With regards to the
management of excavated material, there are two protocols that provide regulatory approved frameworks:


b. The Waste & Resources Action Programme (WRAP) aggregates protocols.

3.2.5 Both protocols provide a framework to demonstrate that waste can become material after some form of treatment, provided materials are treated in accordance with the protocol. If these protocols are followed, the final material can be removed from waste management controls. Further information on both of these protocols is provided in Appendix A.

3.3 Legislation

3.3.1 The Waste (England and Wales) Regulations 2011 transpose the revised Waste FD into UK legislation. It affects anyone who is responsible for producing, keeping, transporting, recycling, recovering or disposing of waste.

3.3.2 The revised Waste FD places greater emphasis on the waste hierarchy to ensure that waste is dealt with in the priority order of prevention, preparing for reuse, recycling, other recovery (for example, energy recovery) and disposal, as depicted in Figure 3.1 (Revised Waste Framework Directive 2008/98/EC. European Union. December 2008). In the Waste and Recycling Regulations (2011), the waste hierarchy is for the first time directly enshrined in English law. In these regulations, waste operators, carriers and producers must apply the waste management hierarchy in order to move waste as far up the hierarchy as possible.

![Figure 3.1 Waste Hierarchy](image)

3.3.3 The new regulations also revoke the Environmental Protection (Duty of Care) Regulations 1991, which means that a new waste carrier and broker regime has been introduced. This would impact on anyone who moves or
arranges the movement of waste. Further information on the regulations is provided in Appendix A.

3.3.4 The requirement to prepare, update and implement a SWMP is set out in the Site Waste Management Plan Regulations 2008, which came into effect on 6 April 2008. In accordance with these regulations, any client (in this case, Thames Water) intending to carry out a construction or demolition project on a site, with an estimated cost greater than £300,000 must, before work begins, prepare a SWMP. A greater level of detail is required for projects that cost more than £500,000. SWMPs apply to all aspects of construction work, including preparatory work such as demolition and excavation. Further details relating to SWMPs are provided in Section 6.

3.4 National policy

3.4.1 Planning policy guidance with respect to waste is provided by national plans and these have been examined to provide a policy context for the development.

Waste Review 2011

3.4.2 Defra carried out a review of waste policies in England which was published in June 2011. The review looks at all aspects of waste policy and delivery in England. Its main aim is to ensure that the right steps towards creating a ‘zero waste’ economy are taken, where resources are fully valued and nothing of value gets thrown away.

3.4.3 The review details how working towards a ‘zero waste economy’ will be achieved and how the amount of waste created can be drastically reduced, and considers waste as a valuable resource, looking at the entire process from source to end of life.

3.4.4 The review has been guided by the waste hierarchy, which is both a guide to sustainable waste management and a legal requirement. In driving waste up the waste hierarchy, it must be ensured that the UK meets its EU obligations and targets on waste management.

3.4.5 Progress would be assessed against a number of EU targets which are focussing on specific areas. For construction and demolition waste, the Waste FD target to recover at least 70% of construction and demolition waste by 2020 needs to be achieved.

Planning Policy Statement 10

3.4.6 Planning Policy Statement 10 (PPS10) sets out the Government’s policy to be taken into account by waste planning authorities (WPAs) and forms part of the national waste management plan for the UK, along with the Waste Review 2011.

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3 This Waste Strategy assumes that Thames Water will have oversight and control of the construction operations. It is acknowledged that a special purpose vehicle may be set up to manage the Thames Tunnel project.

4 It is the Government’s intention to replace PPS/Gs with a single National Planning Policy Framework. However, this will not include specific policies with respect to waste since national waste planning policy will be published alongside the National Waste Management Plan for England. The Waste Planning Policy Statement (PPS10) will remain in place until the National Waste Management Plan is published. Publication is expected in spring 2012.
3.4.7 PPS10 includes the following planning objectives for planning authorities, with respect to the preparation of planning strategies:

a. Sustainable development and waste hierarchy

“...help deliver **sustainable development** through driving waste management up the **waste hierarchy**, addressing waste as a resource and looking to disposal as the last option, but one which must be adequately catered for”

b. Self sufficiency

“...provide a framework in which **communities take more responsibility for their own waste**, and enable sufficient and timely provision of waste management facilities to meet the needs of their communities”

c. Proximity principle

“...help secure the recovery or disposal of waste without endangering human health and without harming the environment, and enable waste to be disposed of in one of the nearest appropriate installations”.

3.4.8 PPS10 requires regional spatial strategies (RSSs) to apportion tonnages to WPAs or subregions to ensure that sufficient waste management capacity is available over the plan period. The RSS should take into consideration waste arisings across the region and from constituent waste planning authority areas; any particular waste management needs arising from the regional economy, including for hazardous wastes and for recycling construction and demolition waste; and likely demand for waste management capacity arising from neighbouring regions.

3.5 Regional planning policy

3.5.1 Regional planning policy is dictated through RSSs which split the country into nine administrative areas. These RSSs translate national policy into regional specific policies and are also designed to steer the local planning policy. The RSS, with the exception of the **London Plan**, are currently in a state of flux because the government had concluded that the RSSs would not form part of the development plan, in anticipation of the adoption of a ‘localism bill’. A summary of the **Localism Bill** is provided in Appendix A. However, the government’s decision to abolish the RSS without consultation has resulted in a judicial review. Until the judicial review has been resolved, the RSSs have been reinstated and are still of material consideration in the planning system.

3.5.2 There are three RSSs that have been reviewed for the Thames Tunnel project:

a. The **London Plan** (Spatial Development Strategy for Greater London, July 2011)

b. The **South East Plan 2009**

c. The **East of England Plan 2008**.
3.5.3 The *South East Plan* and the *East of England Plan* are expected to be abolished once the judicial review has been resolved and the correct consultation exercises have been undertaken.

3.5.4 *The London Plan* aims to make London more self-sufficient in terms of waste management as the capital has a history of exporting a large quantity of waste to the surrounding counties. The key policies to this effect are:

a. 5.16 *Waste Self-Sufficiency:*
   
i. Manage as much of London’s waste within London as practicable, working towards managing the equivalent of 100 per cent of London’s waste within London by 2031
   
ii. Exceeding recycling and reuse levels in construction, excavation and demolition (CE&D) waste of 95 per cent by 2020.

b. 5.20 *Aggregates*
   
i. Achieve recycling and reuse levels of CDE of 95% by 2020.

3.5.5 The key policies in the *London Plan* relating to this project are detailed in Appendix B.1.

3.5.6 *The South East Plan* adopts a resource management approach to waste management reflecting the waste hierarchy and the concept of ‘zero waste’. The plan contains policies relating to waste reduction, sustainable construction and demolition, regional self sufficiency and diversion from landfill. The plan also contains policies relating to recycling of primary and secondary aggregates and safeguarding minerals infrastructure, including wharfs and rail infrastructure.

3.5.7 The key policies in the *South East Plan* relating to this project are detailed in Appendix B.2.

3.5.8 *The East of England Plan* seeks to make waste management more sustainable, while making adequate provision for the region’s waste arisings and apportionment of London’s waste. The plan specifically contains policies relating to waste management targets, including imported waste from London, and the provision of sufficient waste management facilities within the region.

3.5.9 The East of England Regional Assembly is in the process of reviewing the waste policies within the plan. The aim of this review is to bring the policies within the plan into closer alignment with the *London Plan* and the *South East Plan*.

3.5.10 The key policies in the *East of England Plan* relating to this project are detailed in Appendix B.3.

3.6 *Local planning policy*

3.6.1 Local planning policies have been considered to provide policy context for the Thames Tunnel project.

3.6.2 The local planning authorities potentially directly affected by the Thames Tunnel project are the London boroughs of Hammersmith and Fulham,
3 Legislative and policy context

Tower Hamlets, Lambeth, Lewisham, Newham, Southwark, Ealing, Hounslow, Richmond upon Thames, Wandsworth, and Greenwich, the Royal Borough of Kensington and Chelsea, the City of Westminster and the City of London.

3.6.3 The main waste related policy areas in the local planning framework of the local planning authorities are summarised in Appendix B.4.

3.6.4 In summary, the main policy objectives are consistent with national and regional policy, and comprise the following:

a. Sustainable development – addresses the appropriate siting of developments in relation to the surrounding land uses and services.

b. Sustainable waste management – ensuring that developments have sustainable facilities for managing waste in place, minimising waste generation in their jurisdiction and using more sustainable modes of transport for moving waste.

c. Waste management facilities – waste developments must comply with PPS10 and National Waste Strategy (proximity principle, the waste hierarchy and self sufficiency).

d. Environmental nuisance – all developments should ensure that they do not cause a nuisance to neighbouring land uses and users. This mainly covers dust, noise and vibration that will arise from the construction phase, transport to site and operation.

e. Demolition waste – the local authorities encourage the reuse of demolition and construction waste and on-site segregation to maximise recovery.

f. Controlling potential polluting uses – there are a number of criteria that potentially polluting developments must meet before they are permitted. The criteria relate to operating procedures and design measures that have been put in place to prevent pollution. Pollution is determined as anything that has a negative impact on its environs.

3.6.5 In many cases, where a local or regional authority does not have a specific policy relating to one of the objectives listed above, they do have policies that reflect the principle in question and/or they reflect the issues as part of more generic policies.

3.7 Key policy principles

3.7.1 The main policy principles which need to be considered in the management of wastes and materials arising from the Thames Tunnel project are:

a. compliance with relevant legislative requirements

b. follow good practice in the preparation and implementation of SWMPs

c. alignment with local/regional policy requirements for waste management:
   i. Pursue zero waste as an overall objective
3 Legislative and policy context

ii Ensure that all efforts are made to move the management of waste up the waste hierarchy

iii Have regard to the proximity principle when identifying end uses for excavated material

iv Reduce the amount of waste generated in London that is exported to the surrounding waste authorities

v Minimise the environmental impact of storing, transporting, processing and the end uses associated with managing waste.
4 Construction phase: Excavated material arisings

4.1 Introduction

4.1.1 This section details the types of excavation material and estimated quantities that would arise during the construction phase of the Thames Tunnel project.

4.1.2 It also details the management measures that would be put in place to ensure that the excavated material would be managed appropriately during the construction phase on all sites.

4.1.3 This waste strategy currently assumes that the excavated material is not altered in anyway by the presence of additives required for construction. Additives may include soil conditioners such as foams, and incidental additives such as tunnel boring machine (TBM) oils and greases. This will be addressed when information is available.

4.2 Arisings

4.2.1 Figure 4.1 provides an estimate of the excavated material that would be generated during the construction phase of the project for each site.

4.2.2 Figure 4.1 clearly demonstrates that the drive sites Carnwath Road Riverside, Kirtling Street, Chambers Wharf and Greenwich Pumping Station would produce the largest quantities of excavated materials. The quantities from these drive sites account for over 70% of the excavated material generated during the construction of the project.
### Figure 4.1 Estimated excavated material arisings by site and material type

<table>
<thead>
<tr>
<th>Site</th>
<th>Excavation Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acton Storm Tanks</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Hammersmith Pumping Station</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Barn Elms</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Putney Bridge Foreshore</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Carnwath Road Riverside</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Dormay Street</td>
<td>Site Strip</td>
</tr>
<tr>
<td>King Georges Park</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Falconbrook Pumping Station</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Lots Road Re-Cycling Centre</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Chelsea Embankment Foreshore</td>
<td>Site Strip, Made Ground</td>
</tr>
<tr>
<td>Kirtling Street</td>
<td>Site Strip, Made Ground</td>
</tr>
<tr>
<td>Heathwall Pumping Station</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Albert Embankment Foreshore</td>
<td>Site Strip, London Clay</td>
</tr>
<tr>
<td>Victoria Embankment Foreshore</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Blackfriars Bridge Foreshore</td>
<td>Site Strip</td>
</tr>
<tr>
<td>Chambers Wharf</td>
<td>Site Strip, Chalk - Tunnel</td>
</tr>
<tr>
<td>King Edward Memorial Park Foreshore</td>
<td>Site Strip, Chalk - Shafts</td>
</tr>
<tr>
<td>Earl Pumping Station</td>
<td>Site Strip, Chalk - Shafts</td>
</tr>
<tr>
<td>Deptford Church Street</td>
<td>Site Strip, Chalk - Shafts</td>
</tr>
<tr>
<td>Greenwich Pumping Station</td>
<td>Site Strip, Chalk - Shafts</td>
</tr>
<tr>
<td>Abbey Mills</td>
<td>Site Strip, Chalk - Shafts</td>
</tr>
</tbody>
</table>
4  Construction phase: Excavated material arisings

4.2.3 Table 4.1 provides a summary of the excavated material estimated to be generated during the construction phase of the project. Table C.2 in Appendix C provides a further breakdown of the volumes of excavated material generated by site.

**Table 4.1  Summary of excavated material arisings**

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
<th>Volume in situ '000 (m³)</th>
<th>Volume excavated '000 (m³)</th>
<th>Weight '000 (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>London Clay</td>
<td>Fine sandy silty clay to silty clay predominantly excavated by TBM.</td>
<td>873</td>
<td>1,484</td>
<td>1,746</td>
</tr>
<tr>
<td>Sands from the Thanet groups</td>
<td>Materials from the Thanet geological group predominantly excavated by TBM. Thanet Group comprises fine-grained sands with higher clay/silt content in the lower sequence.</td>
<td>61</td>
<td>85</td>
<td>110</td>
</tr>
<tr>
<td>Clays and sands from the Lambeth group</td>
<td>Materials from the Lambeth geological group predominantly excavated by TBM. Lambeth Group comprises variable sediments of clay, including sands, pebble and shelly beds.</td>
<td>496</td>
<td>843</td>
<td>1,041</td>
</tr>
<tr>
<td>Chalk – tunnel</td>
<td>Chalk excavated by TBM (likely to have high moisture content).</td>
<td>490</td>
<td>784</td>
<td>980</td>
</tr>
<tr>
<td>Chalk – shafts</td>
<td>Chalk excavated by mechanical excavation (likely to have high moisture content).</td>
<td>56</td>
<td>78</td>
<td>112</td>
</tr>
<tr>
<td>Made ground/ superficial deposits</td>
<td>No typical description for this material. Site investigation at each site would determine the nature of the material.</td>
<td>70</td>
<td>83</td>
<td>118</td>
</tr>
<tr>
<td>Site strip</td>
<td>Generally soft material, eg, topsoil and vegetation, but can include materials such as concrete hardstandings. Removed from site to provide a sound surface.</td>
<td>34</td>
<td>40</td>
<td>56</td>
</tr>
<tr>
<td>Imported fill</td>
<td>Generally imported crushed angular fill. Could be inert demolition arisings, 6N, 6P, Type 1, Type 2, or similar, which is later re-excavated. This may include crushed aggregate from site demolition. But to assume the worst case, it is expected that this is additional material</td>
<td>223</td>
<td>267</td>
<td>379</td>
</tr>
</tbody>
</table>
## 4 Construction phase: Excavated material arisings

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
<th>Volume in situ ‘000 (m³)</th>
<th>Volume excavated ‘000 (m³)</th>
<th>Weight ‘000 (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diaphragm wall/pile spoil</td>
<td>This material would constitute the undisturbed materials and processed materials, Hydrofraise mills and pumps to a separation plant, along with bentonite.</td>
<td>58</td>
<td>70</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td><strong>Total excavated materials</strong></td>
<td><strong>2,361</strong></td>
<td><strong>3,734</strong></td>
<td><strong>4,641</strong></td>
</tr>
</tbody>
</table>

### 4.2.4 A more detailed description of the materials anticipated and the assumed bulking factors and density are provided in Appendix C.

### 4.3 Management of excavated material

#### 4.3.1 Control of waste management on site would be the responsibility of the appointed contractor and would be managed through compliance with this waste strategy, the CoCP, the WMP and the SWMPs.

**Thames Tunnel project code of construction practice**

#### 4.3.2 All works would be undertaken in accordance with the Thames Tunnel project CoCP.

#### 4.3.3 The CoCP sets out measures to protect the environment and limit disturbance from construction activities, including waste and excavated material management, as far as is reasonably practicable. The objectives of the code are:

- **a.** to set out the standards and procedures for managing the impact of site activities during the construction of the Thames Tunnel project
- **b.** to identify the main responsibilities of the Client and contractors employed during the implementation of the scheme
- **c.** to assure all stakeholders that the project aims to ensure that all construction impacts will be managed appropriately.

#### 4.3.4 The CoCP would contain two parts: Part A and Part B. Part A would include information on general principles and general site operations, and Part B would detail site specific principles and individual requirements for each site.

**Waste management plan**

#### 4.3.5 A WMP would be developed by the project as an overarching document which sets out a consistent approach to the management of materials and wastes on the construction sites.

#### 4.3.6 Further information on the WMP is provided in Section 6.
Site waste management plans

4.3.7 A site waste management plan would be produced by the contractor for each of the construction sites. These would be developed in accordance with the *Site Waste Management Plan Regulations 2008*.

4.3.8 Further information on SWMPs is provided in Section 6.

Storage of excavated material on the construction sites

4.3.9 The storage and management of the excavated material would be the responsibility of the contractor.

4.3.10 It is envisaged that the excavated material would be stored on the construction sites for a maximum of three days before the material is transported off site to the appropriate end use.

4.3.11 There would be a designated area on the construction sites for the handling and storage of excavated material. The construction site layout and design in terms of handling and storing excavated material would be dependent on the type and quantity of material that is being removed.

4.3.12 The size of the handling and storage areas on the construction sites have been calculated based on assumptions concerning tunnelling rates (production rates), working hours, excavated material processing requirements, excavated material storage time and concrete segment storage time.

4.3.13 The tunnel drive sites would require increased excavated material-handling facilities, especially where the tunnel is driven through chalk (this requires the use of slurry TBMs). Where a slurry TBM is required, the excavated material would be removed by a pump and then transported out of the tunnel in a pipeline. The site layout and design for slurry TBMs would include a processing plant to convert the slurry into a manageable material to move off site.

Logistics: Removal of excavated material from site

4.3.14 A logistics study to ascertain the most practical and suitable methods to transport material to site and material and waste off site has been undertaken.

4.3.15 The current logistics approach suggests that excavated material would be removed from site by barge from three of the drive sites (Chambers Wharf, Carnwath Road and Kirtling Street). In addition, it is likely that cofferdam infill would be imported and later removed by barge from eight additional CSO sites on the foreshore. The excavated material from these CSO foreshore sites would be removed by river, unless the contractor has identified a suitable beneficial reuse location that is accessible by road.

Receptor sites: Excavated material options assessment

4.3.16 To identify the preferred options for the management of the excavated material, a detailed options assessment is being undertaken. The methodology has been designed to provide a systematic and transparent approach for assessing the most suitable management options for reuse,
4 Construction phase: Excavated material arisings

treatment and/or disposal of the excavated materials arising from the project during its construction phase.

4.3.17 Figure 4.2 illustrates the phased approach to EMOA. It can be seen that, as the project progresses, the least preferred options are eliminated from the assessment until final options are selected and operators procured for delivering their assessed solutions.

![Diagram of Options assessment methodology and Thames Tunnel project](image)

**Figure 4.2 Options assessment methodology and Thames Tunnel project**

4.3.18 The evaluation process has been designed so that it can be applied throughout both the planning and procurement phases. This is achieved through the consistent assessment of options against agreed evaluation objectives at all stages of the process.

4.3.19 The same evaluation objectives will be used throughout the assessment from scoping through to procurement. It is anticipated that these evaluation objectives would be used as part of the procurement evaluation for the excavated material end use contracts. In this way, the Thames Tunnel project commitment to ensuring that excavated material would be delivered to locations which meet or exceed the performance of the preferred options identified in the EMOA can be met.

4.3.20 The methodology systematically assesses the options against evaluation objectives which set out the key characteristics of the most appropriate options. The objectives reflect Thames Water’s aspirations for management of material, as well as reflecting the regional and national policy context, and are closely linked to the overall waste objectives detailed in Section 3.5.
The options assessment evaluation objectives (Table 4.2) address environmental issues, socio-economic issues, operational issues (including costs and reliability of delivery) and policy issues.

### Table 4.2 Summary of the EMOA objectives

<table>
<thead>
<tr>
<th>Objectives</th>
<th>1. To ensure prudent use of land and other resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental objectives</td>
<td>2. To reduce climate change impacts</td>
</tr>
<tr>
<td></td>
<td>3. To minimise adverse air quality and odour impacts on surrounding receptors</td>
</tr>
<tr>
<td></td>
<td>4. To conserve landscapes and townsapes</td>
</tr>
<tr>
<td></td>
<td>5. To protect local amenity</td>
</tr>
<tr>
<td></td>
<td>6. To protect water quality</td>
</tr>
<tr>
<td></td>
<td>7. To protect biodiversity</td>
</tr>
<tr>
<td></td>
<td>8. To protect cultural heritage</td>
</tr>
<tr>
<td>Socio-economic objectives</td>
<td>9. To provide employment opportunities</td>
</tr>
<tr>
<td>Operational objectives</td>
<td>10. To minimise the costs of waste management</td>
</tr>
<tr>
<td></td>
<td>11. To ensure delivery</td>
</tr>
<tr>
<td>Waste management policy objectives</td>
<td>12. To conform to waste hierarchy</td>
</tr>
<tr>
<td></td>
<td>13. To conform to proximity principle</td>
</tr>
<tr>
<td></td>
<td>14. To conform to sustainable transport policy</td>
</tr>
<tr>
<td></td>
<td>15. To conform to health and safety good practice</td>
</tr>
</tbody>
</table>

The shortlisted receptor sites for utilisation of the excavated materials will be included in the waste strategy once they have been finalised.

This list of sites will be further refined to a preferred list. This will be included in this waste strategy once they have been finalised.

The shortlist and preferred list provided in this waste strategy demonstrate that facilities can be identified which meet the Thames Tunnel project’s requirements with respect to delivery and environmental protection. The Thames Tunnel project does not guarantee to use these sites, as this would prejudice any future procurement activities, and would potentially rule out any alternative options which perform at least as well as those on the preferred list and may become available prior to the Thames Tunnel project construction work commencing. However, the Thames Tunnel
project commits to ensuring that the final location(s) and end use(s) for the material would perform as well as those sites identified on the preferred list.

4.3.25 A summary of the methodology and results from the assessment to date can be found in Appendix D. The preferred list of options for the utilisation of excavated material will be included here in the waste strategy, which will be produced to accompany the Environmental Statement.

**Hazardous waste**

4.3.26 Overall, it is anticipated that hazardous waste would be found on some of the sites. This would mostly be confined to the made ground, at each of the previously developed sites, and very little or no hazardous waste within the foreshore sites and parkland sites.

4.3.27 An assessment has been carried out using Hazwaste online, which is a waste soils assessment tool, to determine the levels of hazardous waste present at the sites. A total of 209 samples from the dataset were assessed and of these, approximately 11% were identified as hazardous waste, 33% as potentially hazardous waste and 55% as nonhazardous waste.

4.3.28 Soils identified as hazardous by the assessment tool within the current scheme are as follows:
   a. Cremorne Wharf
   b. Dormay Street
   c. Kirtling Street
   d. Heathwall
   e. Putney Embankment (off site)
   f. Abbey Mills.

4.3.29 This assessment is based on work undertaken by the ground investigation and land quality teams. The waste strategy issued with the Environmental Statement will include any additional information relating to likely arisings which have been identified by the ongoing land quality assessments.

4.3.30 It is worth noting that the default parameters are currently mostly set to ‘worst case’ scenario. Further analysis of the results will be carried out.

4.3.31 Based on the test results, a decision would be made on the most suitable management procedures. Hazardous material would be kept separate from other materials. The waste would be removed from site and treated in accordance with legislative requirements.

4.3.32 Asbestos could be present in made ground material on the construction sites. If it is suspected that asbestos material is present, it would be dealt with appropriately, in full accordance with the relevant regulations, as detailed in Section 5.4.20.
5 Construction phase: Non-excavated material arisings

5.1 Introduction

5.1.1 This section details the non-excavated material that would be generated during the construction phase of the project. This is waste associated with the construction of the tunnels, interception chambers and above-ground structures. This includes:

a. construction related waste
b. demolition waste
c. hazardous waste
d. WEEE
e. welfare waste
f. waste generated through vegetation site clearance.

5.1.2 Further information on the types and quantities of waste anticipated is given in sections 5.2 and 5.3. Information relating to the management of this waste is provided in Section 5.4.

5.2 Arisings

Construction waste

5.2.1 During the construction phase, the following waste is likely to be generated:

a. Excess concrete in concrete mixers, pumping lines and general spillage
b. Damaged concrete tunnel linings, and temporary linings at junctions and shaft connections
c. Sprayed concrete lining materials
d. Excess and rebound materials
e. Imported fill
f. Tunnel grout in the batching plant, grout pipes and general spillage.

5.2.2 Based on civil engineering estimates from WRAP, a percentage of the materials used on site is assumed to be wasted. These percentages have been applied to construction materials to produce a wastage tonnage. These are for general civil engineering works and considered an upper band.

5.2.3 The Thames Tunnel project would involve the factory production of precast concrete tunnel linings and, as it would be a large-scale construction project, it has been assumed that best practice would be achieved with respect to waste minimisation.

5.2.4 It is estimated that approximately 48,000 tonnes of non-excavated construction related waste would be generated throughout the construction phase of the project. Further details relating to this estimate can be found in Appendix E.1, Table E.1.
5.2.5 Information relating to the management of this waste is provided in Section 5.4.

**Demolition waste**

5.2.6 Demolition of buildings and structures would be required at a number of sites to enable the tunnel and shaft construction. Demolition waste would include:

a. brick  
b. glass  
c. made ground/asphalt  
d. plasterboard  
e. ceramics  
f. concrete/hardstanding  
g. metal  
h. plastics  
i. asbestos.

5.2.7 Work is currently being carried out to estimate the amount of waste that would be generated through the demolition programme. Appendix E.2, Table E.2 provides a summary of the sites where demolition activities are anticipated.

5.2.8 Information relating to the management of these wastes is provided in Section 5.4.

**Hazardous waste**

5.2.9 It is anticipated that there would be small levels of hazardous waste, such as oil and grease and associated maintenance waste from generators, produced during the project.

5.2.10 Asbestos may be present in any of the buildings identified for demolition.

5.2.11 Information relating to the management of this waste is provided in sections 5.4.17 to 5.4.22.

**Waste electrical and electronic equipment**

5.2.12 It is likely that there would be a small amount of WEEE produced at the sites from broken equipment.

5.2.13 Information relating to the management of this waste is provided in Section 5.4.

**Welfare waste**

5.2.14 Waste would be produced at the construction sites from the site offices and mess rooms. This waste would, in general, be domestic in nature and include paper, packaging and food waste.

5.2.15 Appendix E.4, Table E.6, provides estimates of the tonnage of welfare waste generated by the Thames Tunnel project, based on an estimate of
the number of staff that would be working at each of the construction sites (based on the Candidate Scheme).

5.2.16 The estimated figures have been calculated using the assumption that an average office worker produces approximately 200kg of waste per staff member per year. (Envirowise: GG256: Green Officency October 2002.)

5.2.17 The total estimated waste generated over a year from all construction sites would be between 400-450 tonnes, resulting in a total of 2,400-2,700 tonnes over the life of the project.

5.2.18 Information relating to the management of this waste is provided in Section 5.4.

**Waste generated through clearance of vegetation**

5.2.19 The demolition and site clearance plans for all proposed sites have been assessed to determine the likely volume of tree related waste which may be generated. Based on these plans, it is estimated that between 300 and 500 tonnes of organic waste would be generated during site preparation. This estimate will be revised once the full tree surveys have been completed. Further details relating to the method used to estimate these waste arisings is given in Appendix E.3.

5.2.20 Information relating to the management of this waste is provided in Section 5.4.

**5.3 Total arisings**

5.3.1 Figure 5.1 summarises the estimated quantities of non-excavated material generated during the construction of the tunnels, shafts, interception chambers and above-ground structures, as detailed above.

5.3.2 The waste generated through the construction phase also includes waste produced during the clearance of the sites and any demolition that is required.

5.3.3 Work is currently being carried out to produce estimates for those waste arisings for which there are data gaps.
Figure 5.1 A summary of the estimated non-excavated material generated (tonnes) during the construction phase of the tunnel

<table>
<thead>
<tr>
<th>Waste Types</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition waste</td>
<td>23,800</td>
</tr>
<tr>
<td>Concrete</td>
<td>19,000</td>
</tr>
<tr>
<td>Imported fill</td>
<td>4,500</td>
</tr>
<tr>
<td>Grout</td>
<td>600</td>
</tr>
<tr>
<td>Rings</td>
<td>2,700</td>
</tr>
<tr>
<td>Steel</td>
<td>19,000</td>
</tr>
<tr>
<td>Equipment</td>
<td>4,500</td>
</tr>
<tr>
<td>Granite facing blocks</td>
<td>600</td>
</tr>
<tr>
<td>Reinstatement works</td>
<td>2,700</td>
</tr>
<tr>
<td>WEEE</td>
<td>19,000</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td>4,500</td>
</tr>
<tr>
<td>Welfare waste</td>
<td>600</td>
</tr>
<tr>
<td>Vegetation clearance</td>
<td>500</td>
</tr>
<tr>
<td>Vegetation clearance waste</td>
<td>2,700</td>
</tr>
<tr>
<td>Welfare waste</td>
<td>500</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td>2,700</td>
</tr>
<tr>
<td>WEEE</td>
<td>500</td>
</tr>
<tr>
<td>Reinstatement works</td>
<td>2,700</td>
</tr>
<tr>
<td>Granite facing blocks</td>
<td>500</td>
</tr>
<tr>
<td>Equipment</td>
<td>2,700</td>
</tr>
<tr>
<td>Steel</td>
<td>2,700</td>
</tr>
<tr>
<td>Rings</td>
<td>2,700</td>
</tr>
<tr>
<td>Grout</td>
<td>2,700</td>
</tr>
<tr>
<td>Imported fill</td>
<td>2,700</td>
</tr>
<tr>
<td>Concrete</td>
<td>2,700</td>
</tr>
<tr>
<td>Demolition waste</td>
<td>2,700</td>
</tr>
</tbody>
</table>
5.4 **Management**

**Waste management on site**

5.4.1 Management of all waste on site would be the responsibility of the appointed contractor. The appointed contractor(s) would responsible for delivering best practice on site. As described in Section 4.3, for excavated materials, all works would be undertaken in accordance with the Thames Tunnel project CoCP.

5.4.2 The implementation of SWMPs on all construction sites would assist with the management of waste. Section 6 provides further detail regarding the role of the WMP and SWMPs in the management of waste on site.

5.4.3 The waste would be removed from site and treated in accordance with legislative requirements.

5.4.4 Contractors would be encouraged to take account of the *London Plan* self-sufficiency policies when selecting waste management routes.

**Waste hierarchy**

5.4.5 Contractors would be required to manage the construction waste in accordance with the waste hierarchy.

5.4.6 The minimisation of waste from the construction activities associated with the Thames Tunnel project would be essential. Contractors would be encouraged to identify actions with respect to waste minimisation at all sites.

5.4.7 Contractors would be encouraged to recycle wastes wherever possible. The contractor would provide site workers with appropriate training in recycling procedures.

5.4.8 The greatest possibility for recycling organic wastes from the clearance of vegetation would be the recycling of green waste into compost. Where possible, trees could also chipped and used as mulch. The contractor would be expected to divert no vegetative waste from landfill and that it would be taken off site by an appointed contractor to an appropriate licensed or exempt from licensing site.

5.4.9 All WEEE waste generated would be recycled through either take-back or other electrical recycling schemes.

**Waste segregation**

5.4.10 It will be the contractor’s responsibility to maintain a clean and tidy work area, with the prompt removal of waste and other debris. All waste containers should be stored in designated areas. Where this is not possible, appropriate containment methods would be used.

5.4.11 As a minimum, the following waste types would be kept separate:

a. Construction and demolition waste
b. Hazardous waste
c. WEEE waste
d. Waste created from the clearance of vegetation

e. Welfare waste.

5.4.12 Contractors would be encouraged to improve segregation of different waste types on each site. If possible, given the constraints on space at many of the Thames Tunnel project sites, contractors would establish a waste management compound, or ‘zone’, with sufficient space for the siting of a number of recycling/recovery skips for different waste types. This zone would be separate from the excavated material area. However, where there is a lack of space on site to achieve segregation, the Thames Tunnel project would work closely with the waste management contractor(s) to encourage procedures allowing mixed waste containers to be sorted for recycling once taken off site.

5.4.13 The contractor would also be required to provide recycling systems in the site offices and canteen areas on all sites.

**Construction and demolition wastes**

5.4.14 The immediate reuse of construction and demolition related materials at the sites where they would be generated is unlikely to be a viable option. However, the contractor would be encouraged to give every consideration to reusing material on site where possible.

5.4.15 It is envisaged that the WRAPs aggregate quality protocols would be used on some of the construction and demolition material. This protocol provides a control process for which the producer of the construction and demolition material can reasonably state and demonstrate that the product has been fully recovered and is no longer a waste. It also ensures that recovered material has met the quality and standards, thus ceasing to be a waste. Once the material has been through the protocol and met the standards, it can then be used as a product.

5.4.16 There are a number of both permitted and exempt sites that accept, process and recycle construction materials in and around London. Contractors would be encouraged to make use of these local facilities.

**Hazardous waste**

5.4.17 All hazardous materials generated would be kept safe and secure in dedicated storage receptacles of an appropriate design.

5.4.18 The waste would be removed from site and treated in accordance with legislative requirements.

5.4.19 Managing the risk from release of asbestos during alteration and demolition works and excavation work would be carried out and comply with the regulations and codes of practice.

5.4.20 All hazardous materials generated would be kept safe and secure in dedicated storage receptacles of an appropriate design.

5.4.21 The waste would be removed from site and treated in accordance with legislative requirements.
5.4.22 Managing the risk from release of asbestos during alteration and demolition works and excavation work would be carried out and comply with the regulations and codes of practice.

5.4.23 The Control of Asbestos Regulations 2006 (SI 2006/2739) and associated approved codes of practice would be complied with, and asbestos inspection, survey sampling and analysis would be carried out in accordance with Asbestos: The Survey Guide, Health and Safety Executive guidance HSG264 (2010).

5.4.24 Measures for managing asbestos in alteration, demolition and excavation works would include:

a. employing competent specialist contractors to carry out alteration and demolition works
b. contractors implementing a procedure for dealing with potentially suspect materials exposed requiring sampling and analysis by an independent specialist consultant
c. all locations of asbestos containing materials would be clearly labelled
d. formal exchange of information before start of work, including relevant information from the Asbestos Register to clearly identify location of asbestos-containing materials
e. method statements for any works in the vicinity of asbestos-containing materials to avoid any disturbance to such materials.

5.4.25 Measures for managing work involving asbestos-containing materials encountered in construction would include:

a. appointment of a specialist consultant independent of the asbestos treatment contractor
b. all locations of asbestos-containing materials would be clearly labelled
c. ensuring any work with asbestos-containing materials is notified to the Health and Safety Executive
d. ensuring any work with asbestos-containing materials is carried out by licensed specialist asbestos treatment contractors in accordance with the Control of Asbestos Regulations 2006 (SI 2006/2739)
e. method statements defining detailed control measures to be produced by the specialist asbestos treatment contractor and approved by the Client/independent specialist consultant
f. air sample monitoring of work to ensure required air quality standards are achieved.

5.4.26 Transport of asbestos-containing materials would be undertaken in accordance with the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (SI 2009/1348). Disposal of asbestos-containing materials to licensed waste sites will be in accordance with the Hazardous Waste (England and Wales) Regulations 2005 (as amended) (SI 2005/894).
6 Construction phase: Site waste management

6.1 Waste management plan and site waste management plans

6.1.1 Excavation and construction works would be taking place on all 22 CSO interception sites and drive sites. To comply with the Site Waste Management Plans Regulations, all of the Thames Tunnel project construction sites would require an SWMP to be prepared and implemented.

6.1.2 SWMPs set a framework to facilitate best practice on construction sites and are an important tool for improving environmental performance, meeting regulatory control and reducing waste disposal costs.

6.1.3 The SWMPs for the Thames Tunnel project would set out the roles and responsibilities with respect to waste management at each site. At the preconstruction phase, the SWMP would set out actions which have been taken to minimise waste and would provide a forecast of waste arisings. The SWMPs would also detail the waste carriers that would be used to remove waste from each site, and the anticipated destinations for those materials. Once the construction phase commences, the SWMPs are required by the regulations to record all waste transactions. The SWMP should specify exactly which types of waste were removed from site, by whom, and where they were taken to. The SWMPs would regularly assess (at least quarterly) performance against the forecast arisings and KPIs. It is anticipated that the KPIs would reflect the targets and objectives of this waste strategy and, as such, would include total waste arisings and percentage of construction, demolition and excavated material recovered, as well as overall diversion from landfill.

6.1.4 In order to ensure all the construction sites achieve the same standards, template SWMPs would be provided for each site. The templates would be based on good practice and would be a live reporting tool rather than a static document. The templates would be prefilled with project-wide requirements, such as information relating to waste minimisation actions undertaken at the design stage, waste types to be recorded, and any centrally contracted or recommended waste carriers or receptor sites.

6.1.5 In order to monitor the SWMPs and to ensure compliance with the Thames Tunnel project waste targets, Thames Water would maintain an overarching WMP. This would provide a central location for all Thames Tunnel project waste information. The WMP would:

a. record Thames Water’s responsible person, as well as the responsible person for each site
b. record the waste types generated by the entire project
c. provide details of all waste minimisation actions
d. provide project-wide waste forecasts for each waste type
e. provide a complete register of all approved waste carriers and receptors sites for the project
6 Construction phase: Site waste management

f. summarise the information relating to waste transactions from each site
g. report against project KPIs.

6.1.6 Figure 6.1 provides further detail about the information held in the WMP and the SWMPs, and the relationships between the documents.

6.1.7 Waste management services would be procured as appropriate and all centrally procured services would be recorded in the WMP and set out in the SWMP templates.

6.1.8 Where it is deemed appropriate for waste management services to be procured as subcontractors or on a site specific basis, this information would be included in the SWMPs and reported to the WMP. The WMP would set out the evaluation objectives which should be considered when procuring waste management services. These would be based on the waste strategy objectives and the evaluation objectives used in the excavated material option assessment.

6.1.9 The Client and the appointed Principal Contractor would take all reasonable steps to ensure that all waste from the site is dealt with in accordance with the duty of care, and materials would be handled efficiently and that waste would be managed appropriately.

6.1.10 A template WMP and SWMP will be included in the waste strategy, produced alongside the environmental statement.
### 6 Construction phase: Site waste management

**Figure 6.1 Information included in the waste management plan and site waste management plans**

<table>
<thead>
<tr>
<th>Waste Management Plan</th>
<th>Provides all project waste information in one location, monitors performance against KPIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Specified Information</td>
<td>Thames Water; Person who drafted plan</td>
</tr>
<tr>
<td>Summary of site locations</td>
<td>Actions undertaken at design stage to minimise waste; Actions to be taken by all sites to minimise waste</td>
</tr>
<tr>
<td>Waste types to be reported</td>
<td>Carriers contracted at project level; or project recommendations</td>
</tr>
<tr>
<td>Receptor sites contracted at project level; or project recommendations</td>
<td>Project-wide KPIs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information from SWMPs</th>
<th>Provides all waste information relating to an individual site, allows site specific performance to be monitored</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of responsible person for each site</td>
<td>Actions undertaken at design stage to minimise waste at this site; Actions to be taken by all sites</td>
</tr>
<tr>
<td>Summary of site costs</td>
<td>Waste types specified by project to enable collection of data</td>
</tr>
<tr>
<td>Summary of site specific actions</td>
<td>Carriers contracted at project level</td>
</tr>
<tr>
<td>All carriers identified for the project</td>
<td>Receptor sites contracted at project level</td>
</tr>
<tr>
<td>Overall project performance against KPIs and forecasts</td>
<td>KPIs will be specified at a project level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site Waste Management Plan</th>
<th>Provides all waste information relating to an individual site, allows site specific performance to be monitored</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Specified Information</td>
<td>Client: Thames Water</td>
</tr>
<tr>
<td>Principal Contractor; Person who drafted plan</td>
<td>Site location; Site layout; Site costs</td>
</tr>
<tr>
<td>Site specific actions</td>
<td>Forecast arisings for each waste type</td>
</tr>
<tr>
<td>All receptor sites identified for wastes arising from site</td>
<td>KPIs will be specified at a project level</td>
</tr>
</tbody>
</table>
| Performance against project and site specific KPIs and forecasts |}
6.2 **Review of site waste management plans**

6.2.1 For each site, the Principal Contractor would complete the SWMP template with site specific information. The completed SWMP would be reviewed and agreed by the Client prior to any works commencing on the construction site.

6.2.2 Once the SWMP has been agreed, the site specific information would be included in the relevant sections of the overall WMP.

6.2.3 The SWMPs would be produced by the Principal Contractor for review by Thames Water at agreed gateways, in line with existing Thames Water procedures. These gateways are set out in Figure 6.2.

<table>
<thead>
<tr>
<th>Gateway</th>
<th>Thames Tunnel project stage</th>
<th>Level of information required for SWMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway 1</td>
<td>Preliminary design</td>
<td>Preliminary estimates</td>
</tr>
<tr>
<td>Gateway 2</td>
<td>Principal contractor tendering process</td>
<td>Development of proposals</td>
</tr>
<tr>
<td>Gateway 3</td>
<td>Commencement of contract</td>
<td>Actual strategy detailed</td>
</tr>
<tr>
<td>Gateway 4</td>
<td>Sign off of SWMP</td>
<td>Monitoring and sign-off of SWMP</td>
</tr>
</tbody>
</table>
Once approved, the Principal Contractor would be responsible for making sure that all operators and contractors in connection with the construction site adopt and comply with the approved SWMP.

The SWMPs would be continually updated by the Principal Contractor and would be kept in a location and state such that they can be referenced when required.

The SWMPs would provide a current picture of how work is progressing against the waste estimates contained in the SWMP. The update of the SWMP shall include a record of the types and quantities of waste that are:

- reused (and whether on or off site)
- recycled (and whether on or off site)
- recovered (and whether on or off site). The type of recovery may include physical sorting, chemical or biological treatment, composting, incineration with energy recovery, remedial treatment of soil, etc
- sent to landfill
- otherwise disposed off (including burning without recovery and where it is not possible to record known quantities of mixed waste that are destined for the other points covered above).

The SWMPs would be issued to the Client at least quarterly following commencement of the works for review, acceptance and inclusion in the WMP. An agreed and approved SWMP requires signatures by both the Principal Contractor and the Client.

The regulations require that, within three months of the end of works on the construction site, the final SWMP must be produced (following updating the information and review by Thames Water). The final SWMP would include:

- confirmation that the SWMP has been monitored on a regular basis
- all waste tonnages input and updated
- an explanation of any differences between the first draft of the plan and the actual performance
- an estimate of the cost savings that have been achieved by completing and implementing the plan.

The final construction site SWMPs would then be combined within the WMP and a final WMP would be produced.
7 Impacts on regional construction, demolition and excavation infrastructure

7.1 Regional CDE arisings

7.1.1 In addition to the Thames Tunnel project, there are other ongoing and proposed developments in and around London that might give rise to large amounts of waste. This could increase the pressure on possible waste management options for the Thames Tunnel project and also on waste management facilities in the area.

7.1.2 An estimate of the CDE arisings anticipated in and around London for the period 2014–2020 is summarised Table 7.1. Further details are provided in Appendix F. Any additional information obtained during ongoing assessment work relating to proposed developments will be included in the waste strategy produced alongside the environmental statement.

<table>
<thead>
<tr>
<th>Source of CDE material</th>
<th>Recover/Reuse (million m³)</th>
<th>Landfill (million m³)</th>
<th>Total (million m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames Tunnel project</td>
<td>3.15</td>
<td>0.35</td>
<td>3.5</td>
</tr>
<tr>
<td>Other major projects London</td>
<td>17</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Other smaller projects London</td>
<td>28.7</td>
<td>6.3</td>
<td>35</td>
</tr>
<tr>
<td>Subtotal London</td>
<td>46.05</td>
<td>12.45</td>
<td>58.5</td>
</tr>
<tr>
<td>Major projects SE and E regions</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Other CDE arisings SE and E region</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

7.2 Regional CDE capacity

7.2.1 The regional waste capacity in and around London has been reviewed. The Environment Agency’s State of Environment Reports and Waste Data Tables 2009 (Environment Agency, www.environment-agency.gov.uk/research/library/data/123744.aspx) provide an overview of the regional CDE waste capacity which is detailed in Table 7.2. Further information on figures and remaining capacity is provided in Appendix B.6.

<table>
<thead>
<tr>
<th>Region</th>
<th>London (million m³)</th>
<th>South East England (million m³)</th>
<th>East of England (million m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inert landfill capacity (void space): 2009</td>
<td>2.9</td>
<td>29</td>
<td>8</td>
</tr>
</tbody>
</table>
7.2.2 It is anticipated that a waste infrastructure survey will be issued by Defra and the Environment Agency. This will be reviewed and any relevant information included in this section once it is available. A review of recycling infrastructure will also be undertaken once more accurate estimates of construction phase waste arisings are available.

7.2.3 Planning authorities are required to consider capacity for inert waste disposal and recycling capacity but not reuse or restoration capacity. Therefore, there are no reliable estimates for capacity for reuse and/or restoration of clean excavated soils and other materials. Work undertaken for the options assessment has identified that the region has capacity in excess of 75 million m$^3$. Site operators were asked for the capacity that their sites could potentially supply for recovery operations. This figure is the sum of the estimates received from nine operators.

7.3 Impact of Thames Tunnel project on regional capacity

7.3.1 Table 7.1 estimates that London will require 12.45 million m$^3$ of landfill capacity for the period 2014-2020. Table 7.2 estimates that in 2009 there was approximately 40 million m$^3$ of landfill capacity available in London, the South East and East of England. On this basis, there is landfill capacity within the region for anticipated CDE arisings, including arisings from the Thames Tunnel project and other known large-scale infrastructure projects. However, it should be noted that the volume required by the South East and East of England is currently unknown.

7.3.2 It is considered unlikely that the material from the Thames Tunnel project would be disposed of in permitted landfills. Whether the project meets or exceeds the 90% recovery target, it would require capacity for the reuse or recovery of the excavated material. There is strong evidence based on research undertaken for the EMOA that there is sufficient capacity for reuse and restoration of clean excavated material arising from the reuse and restoration sites within London and the South East.

7.3.3 The impact of Thames Tunnel project waste arisings on regional apportionment is discussed in Appendix F.
8 Operational phase

8.1 Thames Tunnel project – proposed waste management strategy

8.1.1 Once the Thames Tunnel project is operating, it would be necessary to carry out routine maintenance at six-monthly intervals at all sites. Maintenance is considered as minor works and would generate waste arisings. A maintenance programme would be developed.

8.1.2 It is anticipated that the tunnel system itself would be self-flushing and that it would not require cleaning activities which would lead to solid residues being removed from the tunnel other than at Beckton STW. A ten-year maintenance schedule for the main tunnel is envisaged, which may involve removal of accumulated debris by Thames Water. (System Master Plan Volume 5: Operation of the Proposed Project, 100-RG-DES-00000-001005-AC-SMP-Vol-5.doc. Thames Water.)

Waste

8.1.3 It is anticipated that there would be a small amount of waste produced when routine maintenance is carried out. This waste might include:

a. pump grease
b. residual tunnel sediment
c. oils
d. lubricants
e. wastes from odour control units, eg, granular carbon
f. WEEE.

Management

8.1.4 Operational procedures for the maintenance of the tunnel system would be developed and followed. It is anticipated that these procedures would be developed from those established for the Lee Tunnel. The procedures would be in accordance with relevant regulations. The waste hierarchy would also be applied.

8.2 Beckton Sewage Treatment Works

Waste

8.2.1 The operation of the tunnel system would increase the volume of solid waste arisings at Beckton STW. Waste produced at Beckton STW comprises the residues remaining after treatment of the sewage by the works. The waste includes:

a. grit (which is predominantly recycled)
b. fats, oils and greases (currently used in a biodiesel plant)
c. rags and other solids (oversize screenings) (these are recycled where possible but some are sent to landfill)
d. sewage sludge which is currently used to produce energy in the sludge-powered generator. The residual waste from this treatment comprises ash.

Based on a comparison in treated volumes, the solid waste arisings at Beckton STW are estimated to increase by approximately three per cent as a result of the operation of the Thames Tunnel project. These arisings would be dealt with by the existing (and proposed) STW processes as part of the normal STW waste stream (and would be indistinguishable from it – see below).

A more robust estimate for waste arisings at Beckton STW will be made once composition data and detail regarding management processes have been obtained. This will be included in subsequent versions of the waste strategy.

**Sludge strategy**

8.2.2 Sewage sludge is the main solid waste left behind after the sewage treatment process. At present, all sewage sludge treated by Thames Water is put to beneficial use, with 72 per cent treated and recycled to agricultural land as a nutrient-rich fertiliser (known as biosolids). The remainder is used to generate renewable energy to help power Thames Water sites, or used in land restoration.

8.2.3 Thames Water has produced a 25-year Sludge Strategy, which is based on an assessment of a range of treatment options which have helped identify a preferred list for each sludge area in the Thames Water region.

8.2.4 The Sludge Strategy states that:

"In the medium term, from 2010 to 2015, Thames Water will:

a. Work to ensure they can maintain the recycling to agricultural land outlet where suitable land is available.

b. Maximise energy recovery and reduce the quantity of sewage sludge recycled by reducing the amount of solids within the product." (25-year Sludge Strategy. Thames Water. December 2008.)

8.2.5 In the long term, from 2015 to 2035, the strategy states that:

8.2.6 “Thames Water will:

a. Continue to implement a sustainable sludge strategy, maximising beneficial use and considering issues of acceptability, energy, transport, odour, nutrients and local constraints.”

**Management**

8.2.7 The solid waste arisings from the tunnel pump-out would form part of the overall waste stream for Beckton STW. It is envisaged by the time the Thames Tunnel project is operational, the following management arrangements would be used for the solid waste produced at Beckton STWs:

a. Grit arisings would continue to be washed and recycled back into aggregate wherever possible or disposed of accordingly.
b. As part of the preliminary and primary treatment at Beckton STW, a fat, oil and grease removal plant would treat materials.

c. It is envisaged that raw sewage solids would be sent to the proposed anaerobic digestion plants at Beckton STW and Riverside STW.

d. Any other organic matter not treated at the anaerobic digestion plants would be dried into sludge cakes. These cakes would continue to be incinerated to generate electricity.

e. Screening arisings would be managed to try to avoid disposal to landfill where possible.

8.3 **River Thames following Thames Tunnel project implementation**

8.3.1 Overflows from the combined sewers cause solid sewage and related material to be deposited on the foreshore of the River Thames. The construction of the Thames Tunnel project means that there would be a substantial reduction in the deposits on the foreshore in comparison to baseline conditions.

8.3.2 The *Thames Tideway Strategic Study* estimated that overflows from the combined sewers deposit approximately 10,000 tonnes of sewage-derived solid material into the Thames annually. Due to the nature of the tidal system, water can take three months to travel to the sea. The upper and middle reaches of the Thames Tideway through London are therefore especially vulnerable to pollution because of long residence times. Sewage-derived litter creates offensive slicks of sewage in the water and deposits of solid material on the foreshore. (*Needs Report*, 100-RG-PNC-00000-900007. Thames Water. Summer 2010.)

8.3.3 It is estimated that the Thames Tunnel project would reduce by 94 per cent the volume of materials discharged to the river. This is equivalent to a reduction of litter discharged to the river from 10,000 tonnes per annum to 600 tonnes per annum. The waste no longer deposited in the river would be diverted to Beckton STW, as described in Section 8.2 above.
9 Roles and responsibilities

9.1.1 This section considers the roles and responsibilities of the Thames Tunnel project with regards to waste and material management.

9.2 Governance

9.2.1 This draft waste strategy assumes that the construction of the Thames Tunnel project would be undertaken on behalf of Thames Water (or another client entity) by a principal contractor. It is assumed that the Client would have oversight of the entire project.

9.2.2 It is assumed that the Principal Contractor would be responsible for the management of subcontractors, and that waste services would either be procured by the Principal Contractor or on a site-by-site basis as appropriate. Training of staff on site would be the responsibility of the contractor responsible for each site.

9.2.3 Performance of the contractors would be managed through contract specifications.

9.3 Thames Water/Client

9.3.1 Thames Water (or another client entity) main roles and responsibilities include:

a. complying with:
   i. duty of care and other legislative requirements
   ii. planning and permit conditions
   iii. CoCP
   iv. WMP and SWMP
   v. waste strategy

b. providing strategic objectives and corporate vision

c. making sure engagement with stakeholders and regulators is carried out

d. procuring the Principal Contractor

e. setting KPIs and performance standards

f. monitoring the contracts and KPIs.

9.4 Principal contractor

9.4.1 The Principal Contractor’s main roles and responsibilities should include, but not be limited to, the following:

a. Ensuring that duty of care requirements are complied with

b. Complying with the waste strategy, WMP, SWMPs, and the Thames Tunnel project’s CoCP

c. Procurement of subcontractors, including waste management companies and final excavated material option
9 Roles and responsibilities

d. Meeting KPIs and performance standards
e. Liaison with statutory bodies as required
f. Provision of an area for a secure waste compound where segregated materials for on-site reuse or off-site recycling can be safely stored
g. Monitoring the general site conditions in terms of waste management, ensuring the trade contractors keep their work areas safe and tidy
h. Where there have been large volumes of waste (from improper storage or damage) of any materials, investigate further and carry out a review.

9.5 Other contractors and subcontractors

9.5.1 The contractors’ main roles and responsibilities should include, but not be limited to, the following:

a. Ensuring that duty of care requirements are complied with
b. Liaising with the Principal Contactor
c. Providing training to site operatives
d. Reporting information to the Principal Contractor
e. Meeting KPIs and performance standards.

9.6 Site operatives

9.6.1 The site operatives’ main roles and responsibilities should include, but not be limited to, the following:

a. Ensuring that the duty of care requirements are complied with
b. Carrying out construction duties on site
c. Reporting information to the Contractor and Principal Contractor
d. Complying with site rules.
10 Monitoring and review of this waste strategy

10.1.1 The Draft waste strategy is a working document and would be reviewed continuously for the duration of the project. The next version of this document will be prepared for submission as part of the DCO application.

10.1.2 Progress on delivering the strategy will be assessed against:
   a. the WMP and SWMPs
   b. the objectives, commitments and targets set in the document.

10.1.3 If there is a significant change in estimates of waste or material arisings such that the overall approach would need reassessing, the Draft waste strategy will be reviewed and reissued.
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Combined sewer overflow (CSO)</td>
<td>A structure, or series of structures, designed to allow spillage of excess wastewater from a combined sewer under high rainfall conditions. Flows may discharge by gravity or by pumping.</td>
</tr>
<tr>
<td>Construction site</td>
<td>The area of site that would be used during the construction phase.</td>
</tr>
<tr>
<td>Diaphragm wall</td>
<td>A concrete or aluminium wall inserted in the ground and used to maintain an excavation open.</td>
</tr>
<tr>
<td>Environmental Impact Assessment</td>
<td>An Environmental Impact Assessment enables environmental factors to be given due weight, along with economic or social factors, when planning applications are being considered.</td>
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<tr>
<td>Excavated material</td>
<td>Material arising primarily from the construction of the main tunnel but also from the connections between the tunnel and the existing CSOs.</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td>Waste that is harmful to human health, or to the environment, either immediately or over an extended period of time.</td>
</tr>
<tr>
<td>Lee Tunnel</td>
<td>The Lee Tunnel comprises a storage and transfer tunnel from Abbey Mills Pumping Station to Beckton STW, and the interception of the Abbey Mills CSO.</td>
</tr>
<tr>
<td>Local development framework (LDF)</td>
<td>Collection of planning documents prepared by the local planning authority, outlining the management of development and land use in a borough.</td>
</tr>
<tr>
<td>Local plan</td>
<td>An area-specific plan to interpret and apply the strategy set out in the structure plan, to provide a detailed basis for the control of development, to provide a basis for co-ordinating new development and to bring planning issues before the public.</td>
</tr>
<tr>
<td>main tunnel drive site</td>
<td>Site that would be used to insert and then drive the TBM.</td>
</tr>
<tr>
<td>main tunnel reception site</td>
<td>Site that would be used to remove the TBM from the main tunnel at the end of the drive.</td>
</tr>
<tr>
<td>Preliminary environmental information report (PEIR)</td>
<td>A preliminary environmental information report is a document setting out initial environmental information. In accordance with the Planning Act 2008, it is a requirement that this is the subject of pre-application consultation.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
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<td>-----------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Preferred site</td>
<td>Sites assessed as most suitable following review of suitability of each shortlisted site by taking into account engineering, planning, environment, property and community considerations.</td>
</tr>
<tr>
<td>Receptor site</td>
<td>Site which will utilise the Thames Tunnel project’s excavated material.</td>
</tr>
<tr>
<td>Waste Electrical and Electronic Equipment Directive (WEEE)</td>
<td>The WEEE directive aims to reduce the amount of electrical and electronic equipment going to landfill and to encourage everyone to reuse, recycle and recover it.</td>
</tr>
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Appendix A: National legislation and policy

A.1 Waste Framework Directive

A.1.1 The original EU Waste FD, 75/442/EEC, established the general framework for the management of waste across the EU. It was updated and codified in 2006, and was replaced and repealed by the revised WasteFD (rWaste FD), 2008/98/EC, in December 2008. The revised framework directive also consolidated within its text the directives on waste oils and hazardous waste.

A.1.2 The overarching aim of the rWaste FD is given in Article 1:
“...This Directive lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use.” (Revised Waste Framework Directive 2008/98/EC. European Union. December 2008.)

A.1.3 The rWaste FD defines certain key terms which underpin all EU and UK environmental legislation, including the definitions of:
- waste and what properties of a waste make it a hazardous waste
- materials which are not waste and are therefore excluded from the Directive scope
- the terms ‘reuse’, ‘recycling’, ‘recovery’ and ‘disposal’
- the ‘waste hierarchy’.

A.1.4 To achieve its aim, it requires that member states:
- ensure proper recovery and disposal of waste without damage to human health or the environment
- ensure that the cost of disposal is borne by the waste holder in accordance with the polluter pays principle
- prepare and adhere to WMPs
- ensure that waste carriers are registered.

A.1.5 The new features of the rWaste FD are that it:
- sets new recycling targets to be achieved by the Member States by 2020, including recycling rates of 50% for household and similar waste, and 70% for construction and demolition waste.
- strengthens provisions on waste prevention through an obligation for Member States to develop national waste prevention programmes and a commitment from the EU Commission to report on prevention and set waste prevention objectives
- sets a clear, five-step ‘hierarchy’ of waste management options according to which prevention is the preferred option, followed by...
reuse, recycling, and other forms of recovery, and with safe disposal as the last recourse.

d. clarifies a number of important definitions, such as recycling, recovery and waste itself.

A.1.6 The Waste (England and Wales) Regulations 2011 address the requirements of the Waste FD and amend existing waste legislation through the following measures:

a. Enshrines the waste hierarchy within English legislation rather than guidance.

b. Sets out the scope for national WMPs, including their extent, which is now the seaward edge of territorial waters.

c. Requires businesses to confirm that they have applied the waste management hierarchy when transferring waste, and include a declaration on their waste transfer note or consignment note. If a business has an environmental permit for an operation which generates waste, it will have to apply the waste management hierarchy. This will be a condition of new environmental permits, and will be added to existing permits when they are reviewed.

d. Introduces a two-tier system for waste carrier and broker registration, including a new concept of a waste dealer.

e. Makes amendments to hazardous waste controls.

f. Excludes some categories of waste from waste controls.

A.2 Definition of waste

A.2.1 Waste is defined in Article 3 (1) of the revised (rWaste FD) as: “any substance or object which the holder discards or intends or is required to discard.” (Revised Waste Framework Directive 2008/98/EC. European Union. December 2008.)

A.2.2 However, within Article 2 of the rWaste FD there is a list of materials which are always excluded from the definition of waste and therefore are legally ‘non-wastes’. These materials include:

a. gaseous effluents

b. uncontaminated subsoil which is reused for construction purposes on the site of production

c. contaminated soils which remain in situ.

A.2.3 A number of materials are excluded from the scope of the directive, so far as they are covered by other EU directives, including:

a. wastewaters

b. mines and quarrying wastes.

A.2.4 Once a material has been classified as a ‘waste’, it must undergo some form of physic-chemical treatment to allow it to re-enter the chain of utility as a non-waste. To prevent abuses of this system, a number of Environment Agency approved protocols or codes of practice exist, each
one generally covering a single material type or process which, if followed, allows ‘waste’ to become ‘non-waste’. Once a material is non-waste, the legal requirements for the handling, storage, and use of that material change.

A.2.5 Non-waste is therefore material which the holder does not intend to be discarded and, when reused, would pose an acceptable or negligible risk to human health and the environment. As a non-waste, it must be suitable for use without any further treatment, there must be certainty of use and material should be used in the quantities necessary for that use and no more.

A.2.6 In summary, material derived from the Thames Tunnel project would fall into two categories:

a. Waste – material which poses an unacceptable risk to human health/environment and/or material which is geotechnically unsuitable for any use and/or material which is surplus to requirements.

b. Non-waste – material which is suitable for reuse (in terms of human health/environmental risk and geotechnical suitability) and there is certainty of use (there is an outlet which requires the material and there is a contract/agreement in place and reuse is allowed under the planning permission).

Soil

A.2.7 The voluntary CL:AIRE Definition of Waste Code of Practice (CoP) provides a regulator approved framework to demonstrate that soil and excavation arisings are either non-waste initially, or that they become non-waste after undergoing some form of physic-chemical treatment in accordance with the protocol. Non-waste, as defined within the rWaste FD, can be reused directly under the CoP, provided there is certainty of use of the material. Waste, as defined within the rWaste FD, can become non-waste following suitable physic-chemical treatment to reduce contamination loads to an acceptable level. Again, the CoP provides a robust legal framework to demonstrate that the material is no longer waste and can re-enter the chain of utility. Material which is surplus to outlet reuse requirements and/or remains unsuitable for use (poses an unacceptable risk to human health/environment and/or is geotechnically unsuitable) following treatment would remain waste and therefore be subject to waste legislation requirements. This is summarised in the flow diagram below.
Figure A.1 Material management options

Aggregates and demolition wastes

A.2.8 WRAP’s aggregate quality protocols also provide a framework to demonstrate that the production of aggregates from inert CDE waste can make those materials in to a non-waste after some form of physic-chemical treatment.

A.2.9 The purpose of the WRAP quality protocols is to provide a uniform control process for producers, from which they can reasonably state and demonstrate that their product has been fully recovered and is no longer a waste. It also provides purchasers with a quality-managed product to common standards, which increases confidence in performance. Also, the framework created by the protocol provides a clear audit trail for those responsible for ensuring compliance with waste management legislation.

A.3 National Waste Strategy

A.3.1 In 2007, Defra published the Waste Strategy for England. This document had the aim of increasing resource efficiency, while reducing levels of waste arisings and decoupling waste from economic growth. This is to be achieved through the application of the waste hierarchy at all stages of a product’s lifecycle, and the strategy has an emphasis on producer responsibility for the resources they use and the waste they generate.

A.3.2 The 2007 Waste Strategy has generally been replaced by the Waste Review 2011.
A.4 Waste Review 2011

A.4.1 Defra carried out a review of waste policies in England which was published in June 2011. The review looks at all aspects of waste policy and delivery in England. Its main aim is to ensure that the right steps towards creating a ‘zero waste’ economy are taken, where resources are fully valued, and nothing of value gets thrown away.

A.4.2 The review has been guided by the waste hierarchy, which is both a guide to sustainable waste management and a legal requirement. In driving waste up the waste hierarchy, it must be ensured that the UK meets its EU obligations and targets on waste management.

A.4.3 Progress would be assessed against a number of EU targets which are focussing on specific areas. For construction and demolition waste, the WastgeFD target to recover at least 70% of construction and demolition waste by 2020 needs to be achieved.

A.4.4 The waste review also acknowledges that there will be some types of waste for which landfill remains the best or least worse option, including some inert materials and waste to restore quarries and mineral workings.

A.5 Localism Bill

A.5.1 The Localism Bill was introduced to Parliament on 13 December 2010.

A.5.2 It sets out a series of proposals with the potential to achieve a substantial and lasting shift in power away from central Government and towards local people. They include:

c. new freedoms and flexibilities for local government

d. new rights and powers for communities and individuals

e. reform to make the planning system more democratic and more effective

f. reform to ensure that decisions about housing are taken locally.

A.5.3 This bill is, at the time of writing, still undergoing parliamentary scrutiny and, as such, while it is only in draft form, its impact cannot be fully determined.
## Appendix B: Regional and local waste policy

### B.1 Waste policy in London

#### B.1.1

The regional policies dealing with waste issues that are likely to affect the proposed development are described in the *London Plan*. (Greater London Authority. 2011.) The table below details the relevant waste policies in the *London Plan*.

<table>
<thead>
<tr>
<th>Policy Number</th>
<th>Policy Description</th>
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</table>
| Policy 5.16, *Waste Self Sufficiency* | **Strategic**  
A. The Mayor will work with London boroughs and waste authorities, the London Waste and Recycling Board (LWaRB), the Environment Agency, the private sector, voluntary and community sector groups, and neighbouring regions and authorities to:  
- manage as much of London’s waste within London as practicable, working towards managing the equivalent of 100 per cent of London’s waste within London by 2031  
- create positive environmental and economic impacts from waste processing  
- work towards zero biodegradable or recyclable waste to landfill by 2031.  
B. This will be achieved by:  
- minimising waste  
- encouraging the reuse of and reduction in the use of materials  
- exceeding recycling/composting levels in municipal solid waste (MSW) of 45 per cent by 2015, 50 per cent by 2020, and aspiring to achieve 60 per cent by 2031  
- exceeding recycling/composting levels in commercial and industrial waste of 70 per cent by 2020  
- exceeding recycling and reuse levels in CE&D waste of 95 per cent by 2020  
- improving London’s net self-sufficiency through reducing the proportion of waste exported from the capital over time  
- working with neighbouring regional and district authorities to co-ordinate strategic waste management across the greater South East of England. |
| Policy 5.17, *Waste Capacity* | **Strategic**  
A. The Mayor supports the need to increase waste processing capacity in London. He will work with London boroughs and waste authorities to identify opportunities for introducing new waste capacity, including strategically important sites for waste management and treatment, and |
<table>
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<tr>
<th>Policy</th>
<th>Description</th>
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</table>
|        | resource recovery parks/consolidation centres, where recycling, recovery and manufacturing activities can co-locate. **Planning decisions**
<p>|        | B. Proposals for waste management should be evaluated against the following criteria: |
|        | • Locational suitability (see LDF preparation F and G below) |
|        | • Proximity to the source of waste |
|        | • The nature of activity proposed and its scale |
|        | • A positive carbon outcome of waste treatment methods and technologies (including the transportation of waste, recyclates and waste-derived products) resulting in greenhouse gas savings, particularly from treatment of waste-derived products to generate energy |
|        | • The environmental impact on surrounding areas, particularly noise emissions, odour and visual impact and impact on water resources |
|        | • The full transport impact of all collection, transfer and disposal movements, particularly maximising the potential use of rail and water transport using the Blue Ribbon Network. |
|        | The following will be supported: |
|        | • Developments that include a range of complementary waste facilities on a single site |
|        | • Developments for manufacturing related to recycled waste |
|        | • Developments that contribute towards renewable energy generation, in particular the use of technologies that produce a renewable gas |
|        | • Developments for producing renewable energy from organic/biomass waste. |
|        | C. Wherever possible, opportunities should be taken to provide combined heat and power and combined cooling heat and power. |
|        | D. Developments adjacent to waste management sites should be designed to minimise the potential for disturbance and conflicts of use. |
|        | E. Suitable waste and recycling storage facilities are required in all new developments. <strong>LDF preparation</strong> |
|        | F. Boroughs must allocate sufficient land and identify waste management facilities to provide capacity to manage the tonnages of waste apportioned in this plan. Boroughs preparing joint waste LDFs may wish to collaborate by pooling their apportionment requirements. |</p>
<table>
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<th>Policy</th>
<th>Description</th>
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</table>
| G. Land to manage borough waste apportionments should be brought forward through: | - protecting and facilitating the maximum use of existing waste sites, particularly waste transfer facilities and landfill sites  
- identifying sites in strategic industrial locations (see Policy 2.17)  
- identifying sites in locally significant employment areas (see Policy 4.4)  
- safeguarding wharves (in accordance with Policy 7.25) with an existing or future potential for waste management. |
| H. If, for any reason, an existing waste management site is lost to non-waste use, an additional compensatory site provision will be required that normally meets the maximum throughput. |
| Policy 5.18, Construction, excavation and demolition | **Planning decisions**  
A. New CE&D waste management facilities should be encouraged at existing waste sites, including safeguarded wharves, and supported by:  
- using mineral extraction sites for CE&D recycling  
- ensuring that major development sites are required to recycle CE&D waste on site, wherever practicable, supported through planning conditions. |
|  | B. Waste should be removed from construction sites, and materials brought to the site by water or rail transport, wherever that is practicable. |
|  | **LDF preparation**  
C. LDFs should require developers to produce SWMPs to arrange for the efficient handling of CE&D waste and materials. |
| Policy 5.19, Hazardous Waste | **Strategic**  
A. The Mayor will prepare a hazardous waste strategy for London and will work in partnership with the boroughs, the Environment Agency, industry, and neighbouring authorities to identify the capacity gap for dealing with hazardous waste and to provide and maintain direction on the need for hazardous waste management capacity.  
**Planning decisions**  
B. Pending outcome of the work proposed in Paragraph A of this policy, development proposals that would result in the loss of existing sites for the treatment and/or disposal of hazardous waste should not be permitted unless compensatory site provision has been secured in accordance with Policy 5.17H. |
<table>
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<tr>
<th>Policy</th>
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</table>
| **LDF preparation** | C. LDFs should:  
- make provision for hazardous waste treatment plants to achieve, at regional level, the necessary waste management requirements  
- identify suitable sites for the storage, treatment and reprocessing of certain hazardous waste streams  
- identify sites for the temporary storage, treatment and remediation of contaminated soils and demolition waste during major developments. |

| Policy 5.20, Aggregates | **Strategic** | A. The Mayor will work with all relevant partners to ensure an adequate supply of aggregates to support construction in London. This will be achieved by:  
- encouraging reuse and recycling of CDE waste within London  
- extraction of land-won aggregates within London  
- importing aggregates to London by sustainable transport modes.  
B. The Mayor will work with strategic partners to achieve targets of:  
- 95 per cent recycling/reuse of CDE waste by 2020  
- 80 per cent recycling of that waste as aggregates by 2020.  
C. London should make provision for the maintenance of a landbank (ie, seven years’ supply) of at least 5 million tonnes of land-won aggregates throughout the plan period until 2031.  
**LDF preparation** | D. LDFs should make provision for the maintenance of a landbank (ie, seven years’ supply) of at least 5 million tonnes of land-won aggregates throughout the plan period to 2031 by a landbank apportionment of:  
- at least 1.75 million tonnes to LB Havering  
- at least 0.7 million tonnes to LB Redbridge  
- at least 1.75 million tonnes to LB Hillingdon  
- at least 0.7 million tonnes to LB Hounslow.  
E. Mineral planning authorities in London should:  
- identify and safeguard aggregate resources in LDFS  
- support the development of aggregate recycling facilities, subject to local amenity conditions. |
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<th>Policy</th>
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<tr>
<td>F. To reduce the environmental impact of aggregates, LDFs should:</td>
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<tr>
<td>• ensure that appropriate use is made of planning conditions dealing with aftercare, restoration and reuse of minerals sites following extraction</td>
<td></td>
</tr>
<tr>
<td>• safeguard wharves and/or railheads with existing or potential capacity for aggregate distribution</td>
<td></td>
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<tr>
<td>• minimise the movement of aggregates by road and maximise the movement of aggregates via the Blue Ribbon Network</td>
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<tr>
<td>• develop policies that support the protection and enhancement of aggregate recycling facilities.</td>
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Policy 5.21, *Contaminated Land*

**Strategic**

A. The Mayor supports the remediation of contaminated sites and will work with strategic partners to ensure that the development of brownfield land does not result in significant harm to human health or the environment, and to bring contaminated land to beneficial use.

**Planning decisions**

B. Appropriate measures should be taken to ensure that development on previously contaminated land does not activate or spread contamination.

**LDF preparation**

C. LDFs should encourage the remediation of contaminated sites and set out policy to deal with contamination.

Policy 5.22, *Hazardous Substances*

**Strategic**

A. The Mayor will work with all relevant partners to ensure that hazardous substances, installations and materials are managed in ways that limit risks to London’s people and environment.

**Planning decisions**

B. When assessing developments near hazardous installations:

- site specific circumstances and proposed mitigation measures should be taken into account when applying the Health and Safety Executive’s *Planning Advice Developments near Hazardous Installations* (PADHI) methodology
- the risks should be balanced with the benefits of development and should take account of existing patterns of development.
### Policy | Description
--- | ---
**LDF preparation** | C. In preparing LDFs, boroughs should:
- identify the locations of major hazards (including pipelines carrying hazardous substances)
- consult and give due weight to advice from the Health and Safety Executive to ensure that land use allocations take account of proximity to major hazards
- consult utilities to ensure that the timing of decommissioning and the implications for development are reflected in proposals
- ensure that land use allocations for hazardous installations take account of the need to incentivise and fund decommissioning.

### B.2 Waste policy in the South East

**B.2.1** The regional policies dealing with waste issues that are likely to affect the proposed development are described in the *South East Plan*. *(The South East Plan – Regional Spatial Strategy for the South East. Government Office for the South East. 2009.)*

**B.2.2** The relevant policies are detailed below.

**Policy W2: Sustainable design, construction and demolition**

**B.2.3** Development plan documents will require development design, construction and demolition which minimises waste production and associated impacts through:

a. the reuse of construction and demolition materials

b. the promotion of layouts and designs that provide adequate space to facilitate storage, reuse, recycling and composting.

**B.2.4** In particular, development in the region’s strategic Growth Areas, Growth Points and strategic development areas should demonstrate and employ best practice in design and construction for waste minimisation and recycling.

**Policy W3: Regional self-sufficiency**

**B.2.5** Waste authorities and waste management companies should provide management capacity equivalent to the amount of waste arising and requiring management within the regions boundaries, plus a declining amount of waste from London. Provision of capacity for rapidly increasing recycling, composting and recovery should be made, reflecting the targets and requirements set out in this section.

**B.2.6** Provision for London’s exports will usually be limited to landfill in line with the *Landfill Directive* targets and, by 2016, new permissions will only
provide for residues of waste that have been subject to recycling or other recovery process. WPAs should provide landfill capacity for the following apportionment of London’s exported waste.

Table B.2 Landfill provision to be made for London waste

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apportionment %</td>
<td>Million tonnes</td>
</tr>
<tr>
<td>Berkshire Unitaries</td>
<td>9.3</td>
<td>1.12</td>
</tr>
<tr>
<td>Buckinghamshire</td>
<td>17.6</td>
<td>2.12</td>
</tr>
<tr>
<td>East Sussex, Brighton and Hove</td>
<td>8.8</td>
<td>1.06</td>
</tr>
<tr>
<td>Hampshire, Portsmouth, Southampton and New Forest National Park</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kent &amp; Medway</td>
<td>13.1</td>
<td>1.58</td>
</tr>
<tr>
<td>Milton Keynes</td>
<td>10.8</td>
<td>1.30</td>
</tr>
<tr>
<td>Oxfordshire</td>
<td>18.7</td>
<td>2.26</td>
</tr>
<tr>
<td>Surrey</td>
<td>11.5</td>
<td>1.39</td>
</tr>
<tr>
<td>West Sussex</td>
<td>10.2</td>
<td>1.23</td>
</tr>
<tr>
<td>SE total</td>
<td>100</td>
<td>12.1⁶</td>
</tr>
</tbody>
</table>

B.2.7 Provision for recovery and processing capacity for London’s waste should only be made where there is a proven need, with demonstrable benefits to the region, including improving the viability of recovery and reprocessing activity within the region, and in the nearest appropriate location. A net balance in movements of materials for recovery and reprocessing between the region and London should be in place by 2016.

⁵ From Towards a Methodology for Apportionment of London’s Exported Waste, Alternative Apportionment Options: Revision for EiP, page 15, option 2f, Jacobs Babtie (January 2007). For 2006-2015, these have been amended based on advice from SEERA to reflect the Hampshire M&W Core Strategy.


⁷ Reduced to reflect Policy W5 MSW/C&I diversion targets.
B.2.8 The regional planning body will continue to work closely with all neighbouring regions to monitor and review waste movements and management requirements.

B.2.9 The figures in the above table should be used as a benchmark for the production and testing of development plan documents, but WPAs should use more recent data where this is available in order to assess and plan for capacity. Any major changes to the figures may dictate a need to reconsider the apportionment through a review of the RSS.

Policy W4: Subregional self-sufficiency

B.2.10 WPAs will plan for net self-sufficiency through provision for management capacity equivalent to the amount of waste arising and requiring management within their boundaries. A degree of flexibility should be used in applying the subregional self-sufficiency concept. Where appropriate, and consistent with Policy W3, capacity should also be provided for:

a. waste from London
b. waste from adjoining subregions (waste planning authority area within or adjoining the region).

B.2.11 WPAs should collaborate in the preparation of plans, including identifying and making provision for potential flows across the regional and subregional boundaries, and identifying possible sites that could be served by sustainable transport modes.

B.2.12 Co-operation will be encouraged between county councils and unitary authorities at the subregional level, particularly in respect of meeting the needs of the regions’ strategic growth areas.

Policy W13: Landfill requirements

B.2.13 Waste development documents should provide for continuing but declining landfill capacity. Non-inert landfill capacity should be husbanded to provide for disposal of residual non-inert waste. At regional level, there should be provision for at least the following landfill capacity.

Table B.3  Regional landfill requirements (million tonnes/year) 2008-20258

<table>
<thead>
<tr>
<th>Year</th>
<th>MSW landfill</th>
<th>C&amp;I landfill</th>
<th>C&amp;D landfill</th>
<th>Imports SE subtotal</th>
<th>Imports London</th>
<th>SE inc. London</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2.5</td>
<td>3.4</td>
<td>2.2</td>
<td>8.00</td>
<td>1.21</td>
<td>9.21</td>
</tr>
<tr>
<td>2010</td>
<td>2.3</td>
<td>3.1</td>
<td>2.1</td>
<td>7.48</td>
<td>1.03</td>
<td>8.51</td>
</tr>
<tr>
<td>2015</td>
<td>1.4</td>
<td>2.5</td>
<td>1.7</td>
<td>5.54</td>
<td>0.73</td>
<td>6.27</td>
</tr>
<tr>
<td>2020</td>
<td>1.0</td>
<td>2.0</td>
<td>1.5</td>
<td>4.44</td>
<td>0.55</td>
<td>4.99</td>
</tr>
<tr>
<td>2025</td>
<td>1.0</td>
<td>1.8</td>
<td>1.2</td>
<td>3.98</td>
<td>0.53</td>
<td>4.51</td>
</tr>
</tbody>
</table>

B.3 Waste policy in East of England

B.3.1 The regional policies dealing with waste issues that are likely to affect the proposed development are described in the *East of England Plan: 2008*. The relevant policies are detailed below.

**WM1: Waste Management Objectives**

B.3.2 In implementing the overall vision and objectives of the RSS, waste management policies should be based on the following objectives:

a. To ensure timely and adequate provision of the facilities required for the recovery and disposal of the region’s waste and for a reducing quantum of wastes imported into the region.

b. To minimise the impact of new development, particularly in the key centres of development and change, on regional waste management requirements.

c. To minimise the environmental impact of waste management, including impacts arising from the movement of waste, and help secure the recovery and disposal of waste without endangering human health.

d. To seek community support and participation in promoting responsible waste behaviour and approaches to management, viewing waste as a resource and maximising reuse, recycling, composting and energy recovery.

e. In determining proposals for planning permission to give weight to the particular locational needs of some types of waste management facility, together with the wider environmental and economic benefits of sustainable waste management.

**WM3: Imported Waste**

B.3.3 The East of England should plan for a progressive reduction in imported waste. After 2015, provision for the management of imported waste from London should be restricted to the landfill of residual waste that has been subject to the maximum practical level of recovery and treatment, for which landfill is the only practical option.

B.3.4 Through their waste development plan documents (WDPDs) and when considering proposals for waste management facilities, in addition to that arising within their area, local authorities should provide for an apportionment of waste imported from London for landfill. Allowance should only be made for new non-landfill waste facilities dealing primarily with waste from outside the region where there is a clear benefit, such as the provision of specialist processing or treatment facilities which would not be viable without a wider catchment, and which would enable recovery of more locally arising wastes.

**WM4: Regional Waste Apportionment**

B.3.5 In developing policies in their waste local development documents, and when considering proposals for waste management facilities, WPAs
should take responsibility for waste arising within their own administrative areas. They should plan for the following quantities of waste (rounded figures), including provision to be made for imported waste, in accordance with Policy WM3.

**Table B.4 Annual tonnages of waste (thousand tonnes) to be managed**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedfordshire &amp; Luton</td>
<td>1,450</td>
<td>1,460</td>
<td>1,620</td>
</tr>
<tr>
<td>Cambridgeshire &amp; Peterborough</td>
<td>2,140</td>
<td>2,190</td>
<td>2,460</td>
</tr>
<tr>
<td>Essex &amp; Southend</td>
<td>3,150</td>
<td>2,300</td>
<td>3,670</td>
</tr>
<tr>
<td>Hertfordshire</td>
<td>2,220</td>
<td>2,360</td>
<td>2,650</td>
</tr>
<tr>
<td>Norfolk</td>
<td>2,090</td>
<td>2,280</td>
<td>2,580</td>
</tr>
<tr>
<td>Suffolk</td>
<td>1,870</td>
<td>1,950</td>
<td>2,180</td>
</tr>
<tr>
<td>Thurrock</td>
<td>540</td>
<td>510</td>
<td>510</td>
</tr>
<tr>
<td>Region</td>
<td>12,680</td>
<td>13,790</td>
<td>15,170</td>
</tr>
</tbody>
</table>

**B.3.6** For waste arising in the region, no allowance has been made for waste residues from treatment processes. Waste development documents should assess the level of post treatment residues requiring further management, and plan to manage this waste. Collaboration with other areas, or between WPAs, should be pursued where it provides benefits in land use and sustainability terms.

**WM5: Planning for Waste Management**

**B.3.7** Local development documents should include policies which identify the additional capacity required to manage their apportioned wastes. They should identify sites and areas suitable to accommodate the required facilities, including for the collection, sorting and storage of waste and its treatment, recycling and disposal, and sufficient landfill capacity to meet the anticipated need across the region.

To minimise impacts on growth area objectives for Bedfordshire, the use of potential landfill capacity in the Marston Vale should reduce over time. New landfill development in the Marston Vale should not compromise proposals for environmental regeneration and housing development, and should only be permitted where the waste to be landfilled has been subjected to comprehensive pretreatment, such that the maximum practicable value has been recovered and provision is consistent with Bedfordshire’s waste apportionment in policies WM 3 and 4.
B.4 Local planning policy

B.4.1 The main waste related policy areas in the local planning framework of the local planning authorities (including the London boroughs of Hammersmith and Fulham, Tower Hamlets, Lambeth, Lewisham, Newham, Southwark, Ealing, Hounslow and Richmond upon Thames, the Royal Borough of Kensington and Chelsea, the City of Westminster and the City of London) that are potentially affected by the Thames Tunnel project are summarised in Table B.6 below.
Table B.5 Summary of the main topic areas relevant to this waste strategy

<table>
<thead>
<tr>
<th>Policy objective</th>
<th>Number of local authorities</th>
<th>Description of policy field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable development</td>
<td>10</td>
<td>The local authorities look to improve the sustainability of developments through measures such as cutting waste and reducing their impact on the environment, both on a local and the global scale. Sustainable development policies also address the sensible siting of developments in relation to the surrounding land uses and services. There are three main aspects to sustainable development: Environmental, social and economic. Many of the councils have set criteria for developments to meet before they will be considered for planning consent, either their own criteria or criteria determined by an external body, such as BREEAM.</td>
</tr>
<tr>
<td>Amenity</td>
<td>6</td>
<td>The local authorities wish to protect and improve the amenity of their jurisdiction through developments, bringing a net improvement to the local area in the terms of amenity. Amenity in these policies constitutes aspects of the natural, built and open environments. The developments should also have ‘design and access statements’, where appropriate. One of the main aspects to local amenity is the protection and improvement of the area in terms of recreational use, ie, any time people spend outside the workplace. All aspects of the development should be compared against amenity.</td>
</tr>
<tr>
<td>Environmental nuisance</td>
<td>4</td>
<td>All developments should ensure that they do not cause a nuisance to neighbouring land uses and users. This mainly covers dust, noise and vibration that will arise from the construction phase, transport to site and operation. Although this applies to impacts on all land uses and users, it is particularly relevant to sensitive receptors.</td>
</tr>
<tr>
<td>Sustainable waste management</td>
<td>10</td>
<td>The strategies set out by the local authorities in order to deal with their apportionment of London’s waste are centred on promoting sustainable behaviour during development. This ensures that developments have sustainable facilities for managing waste in place, minimising waste generation in their jurisdiction and using more sustainable modes of transport for moving waste. Local authorities also support the National Waste Strategy, eg, proximity principle, waste</td>
</tr>
</tbody>
</table>
Policy objective | Number of local authorities | Description of policy field
--- | --- | ---
Waste management facilities | 5 | Waste developments must comply with the criteria set out by the local authorities. These criteria ensure that waste developments comply with BPEO and the *National Waste Strategy* (proximity principle, waste hierarchy and self-sufficiency). There must be provision by the LA for waste facilities in their area that comply with these criteria. Any new waste development must comply with other planning policies and must be in keeping with the surrounding land uses, i.e., not near sensitive receptors.
Demolition waste | 2 | The local authorities will encourage the reuse of demolition and construction waste. It is also encouraged that waste should be segregated on site to ensure that as much of the waste materials can be recovered. This may be imposed through planning conditions.
Controlling of potential polluting uses | 4 | There are a number of criteria that are set down by local authorities that developments that have the potential to pollute must meet before they are permitted. The criteria relate to their operating procedure and design measures that have been put in place to prevent pollution. Pollution is determined as anything that has a negative impact on its environs. This can include, noise, light, dust, vibration, traffic liquid spills, soil pollution, odour and hazardous materials.
Flooding | 2 | Developments must demonstrate how they will minimise or reduce the impact of flooding on people, property and the environment. This also includes flood defence developments.
Use of water routes | 4 | Water routes can be used if they are essential to the movement of goods. Any infrastructure which is required in connection with the movements of goods by water must be in keeping with the local settings and should not have a detrimental impact on the...
### Policy objective | Number of local authorities | Description of policy field
--- | --- | ---
| | | environment. The riverside local authorities will actively encourage the uses of waterways for bulky materials and freight. This is part of the Blue Ribbon Network initiative, namely: 1) developments on the network should enhance the waterfront environment and amenity; 2) aquatic and riparian habitat will be protected and enhanced; 3) landscape character will be enhanced; 4) access to the river for ...freight will be protected and improved.
| Brownfield sites | 5 | Brownfield sites must be analysed for contamination and any contamination that is discovered must be mitigated prior to development. This may be subject to planning conditions. This is done in order to protect future users of the sites. The regeneration of brownfield sites will be encouraged and will be the preferred option over greenfield proposals. New developments on brownfield sites will have to compliment land uses that are already present.
| Environmental impacts | 5 | Developments must be efficient in the use of natural resources and must not compromise the natural environment. Sites meeting the local authority’s criteria (and EC directive 97/11/EC) will have to demonstrate their suitability through an environmental impact assessment. Waste sites must be environmentally acceptable. Developments must meet planning policies on a national and local scale.
| Safeguarded sites | 2 | Various sites in the boroughs have been safeguarded for other types of development (housing, employment, business use) and new developments cannot compromise these areas. Similarly, certain areas are safeguarded for waste facilities.
B.5 Subregional development plans

B.5.1 The West London Sub Regional Plan, the East London Sub Regional Development Framework and the South London Sub Regional Development Framework documents all contain the same waste and constructed related policies. The Central and North subregional plans have not been reviewed as the Thames Tunnel project is not located in these subregions.

B.5.2 The Mayor’s Supplementary Planning Guidance (SPG) on Sustainable Construction and Design will be important for a subregion in which more sustainable forms of development can make a major contribution to the sustainability of the projected growth.

B.5.3 Construction and demolition waste has been estimated for the regions of London and is highlighted in Table B.6 below

<table>
<thead>
<tr>
<th>Subregion</th>
<th>2013</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>1,686</td>
<td>1,710</td>
<td>1,557</td>
</tr>
<tr>
<td>West</td>
<td>1,210</td>
<td>1,227</td>
<td>1,117</td>
</tr>
<tr>
<td>North</td>
<td>599</td>
<td>607</td>
<td>553</td>
</tr>
<tr>
<td>South</td>
<td>911</td>
<td>924</td>
<td>841</td>
</tr>
<tr>
<td>Central</td>
<td>2,551</td>
<td>2,587</td>
<td>2,355</td>
</tr>
<tr>
<td><strong>London totals</strong></td>
<td><strong>6,957</strong></td>
<td><strong>7,055</strong></td>
<td><strong>6,423</strong></td>
</tr>
</tbody>
</table>

B.6 Regional waste capacity

B.6.1 The State of the Environment reports produced in 2010 for London, the South East and East of England provide information on the environment and, in particular, waste management treatment capacity.

B.6.2 Table B.8 summarises the main policy and objective areas of waste to landfill, the transport of waste and construction and demolition destinations that are relevant to the waste strategy.

---

## Table B.7  State of the Environment Report – Waste management treatment capacity

<table>
<thead>
<tr>
<th>Policy/Objective area</th>
<th>London(^{10})</th>
<th>South East England(^{11})</th>
<th>Anglian(^{12})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste to landfill</td>
<td>6.6 million tonnes of waste produced in the region were sent to landfill and 2.9 million tonnes were sent for reprocessing/recycling in 2008</td>
<td>In the South East in 2008, there were 106.3 million cubic metres of landfill still available for use. This has declined since 2001, when there were approximately 127.8 million cubic metres.</td>
<td>In 2009, the quantity of waste sent to landfill in the Anglian region decreased significantly. In 2008, almost 10.6 million tonnes of waste were sent to landfill in the region, whereas in 2009, this reduced to just over 8.8 million tonnes. Nonhazardous waste accounted for 5.9 million tonnes of this total.</td>
</tr>
<tr>
<td>Transport of waste</td>
<td>Of the 6.6 million tonnes of London’s waste that went to landfill in 2008, 5.6 million tonnes were transported to and disposed of in other regions; 3.1 million tonnes were buried in the South East and 2.2 million tonnes went to landfill in the East of England</td>
<td>38.3% of waste landfilled in the South East originates from the region, with London being the largest contributor of 25.8% in 2008. If the current levels of waste going to landfill persist then the existing available capacity is estimated to be sufficient for seven years.</td>
<td>In 2008, the Anglian region imported a total of 4.9 million tonnes of waste into the region and exported almost 1.0 million tonnes, with a net import of approximately 3.9 million tonnes into the region. The largest source of the imported waste was from London (1.9 million tonnes).</td>
</tr>
</tbody>
</table>

---


### C&D waste destinations

In 2008, approximately 3.3 million tonnes of construction and demolition waste went to landfill. In 2007, approximately 28 per cent of this waste was land-filled within London but in 2008, this had fallen to only 16 per cent, 530,000 tonnes. 766,000 tonnes went to landfill in the East of England and 1,582,000 tonnes to landfill in the South East.

In the South East, there is approximately 28 million cubic metres of inert landfill capacity, 76 million cubic metres of nonhazardous and 0.6 million cubic metres of hazardous. 5.3 million tonnes of the waste that was sent to landfill in 2008 was CDE waste.

The operators of landfill sites in the Anglian region reported at the end of 2009 that they had 144 million m³ of void space remaining. The landfill sites include those with stable nonreactive hazardous waste cells. With a current Anglian landfill rate of 8.8 million tonnes per year, this would equate to somewhere in the region of 16 years' remaining landfill capacity for the region.

### B.7 South East waste authorities’ policy towards importing construction, demolition and excavation waste from London

#### B.7.1

The Regional Spatial Strategy for the South East of England sets out details for the volumes of waste arisings from London that waste authorities within the region must make allowance for the disposal of within their area. These requirements are then included within the waste strategies of the relevant waste authorities, as laid out in Table B.9 below.

#### Table B.8 Relevant waste policies – South East waste authorities

<table>
<thead>
<tr>
<th>Waste authority planning document</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Waste Core Strategy will:</td>
</tr>
<tr>
<td></td>
<td>• facilitate the provision of waste management capacity equivalent to the amount of waste arising and requiring management within the collective areas of the six unitary authorities</td>
</tr>
<tr>
<td></td>
<td>• make an appropriate contribution to meeting the residual waste management needs of London</td>
</tr>
<tr>
<td>Waste authority planning document</td>
<td>Details</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>after 2016, in line with the apportionment defined in the RSS. Preferred Policy Approach W2 – <em>Waste Management Targets</em> The Waste Core Strategy policy approach is that waste management and disposal capacity will be provided in the Berkshire area sufficient to meet or exceed the targets set out in RPG9. The level of provision required will be reviewed annually against the available capacity in Berkshire.</td>
<td></td>
</tr>
<tr>
<td>Buckinghamshire Minerals and Waste Core Strategy Development Plan Documents – preferred options stage</td>
<td>Policy 1 Provision will be made for total waste management capacity in the county as follows: Landfill capacity • 2016 - 423,000t; • 2021 - 350,000t; • 2026 - 311,000t Policy 2 To meet the landfill requirements of Policy 1, there will be no provision for additional waste management capacity. Comment: The plan is required to provide landfill capacity for the disposal of a continuous but declining amount of imports of waste from London. The council must provide capacity for 270,000 tonnes a year until 2016, and 170,000 tonnes a year thereafter.</td>
</tr>
<tr>
<td>Milton Keynes Waste Development Plan Document – adopted</td>
<td>Milton Keynes currently does not take any of London’s waste. The draft SE Plan states that Milton Keynes should provide for landfill capacity for 10.1% (1 million tonnes in total between 2016-2025) of London’s exported waste into the South East.</td>
</tr>
<tr>
<td>Surrey Waste Plan Core Strategy – adopted</td>
<td>Surrey has made provision for the importation of 1.4 million tonnes from London between 2008-2015, after which only residual waste will be imported from London. This will amounts to 0.8 million tonnes between 2016-2025.</td>
</tr>
<tr>
<td>Kent Minerals and Waste Core Strategy – issues and options stage</td>
<td>South East Plan Policy (now revoked) W3 stated that WPAs should provide landfill capacity for proportions of London’s MSW and commercial and industrial waste (C&amp;I). However, Kent has handled less than 20,000 tonnes of London MSW and C&amp;I waste in recent years and, while other less costly destinations for London waste are available, it is</td>
</tr>
<tr>
<td>Waste authority planning document</td>
<td>Details</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>unlikely that there would be an increase to the 158,000 tonnes per annum envisaged by Policy W3 in the period to 2015. However, it is possible that when landfill sites to the east of London close, there will be market pressure for increased volumes of London waste to be sent to Kent. One outcome is that Kent could maintain approximately 20,000 tonnes per annum to 2017, but receive 158,000 tonnes after that date. This would mean an additional 917,000 or 2,226,000 tonnes per annum of MSW and C&amp;I waste sent from London to Kent for landfill. This quantity is not critical to whether or not the Kent Minerals and Waste Development Framework (MWDF) should provide for more nonhazardous landfill capacity.</td>
</tr>
<tr>
<td>Essex Gap Capacity Study</td>
<td>Currently there is insufficient additional capacity in Essex for future CDE materials. Essex predicts that by 2031, there will be a shortfall in the capacity for CDE of 0.31 million tonnes per annum.</td>
</tr>
<tr>
<td>Hertfordshire Waste Core Strategy – preferred options stage</td>
<td>Hertfordshire has taken into account the volume of waste that it will import from London (essentially residue waste that will reduce to 80,000 tonnes per annum by 2021) and it has determined that there will still be sufficient landfill capacity until 2019.</td>
</tr>
</tbody>
</table>
Appendices

Appendix C: Excavated materials

C.1 Definitions of excavated materials

Made ground

C.1.1 There is no typical description for this material. Site investigation is required at each site to determine the nature of the material.

London Clay

C.1.2 Stiff to very stiff, silty to locally sandy clay, with regular spaced nodular horizons (up to 500mm thick) of medium strong calcareous mudstone. Sand particle inclusions are fine to medium.

Thanet Sand

C.1.3 Dense to very dense silty fine sand, becoming locally clayey with depth. Contains a basal gravel bed, the Bullhead Bed, typically up to 0.5m thick, comprising a clayey, fine, medium and coarse, subangular to angular flint gravel.

Lambeth Beds

C.1.4 Stiff to hard, clay, with shell debris, occasional layers of strong limestone, local fine to medium sand inclusions and gravel. Gravel is rounded, weathered flint.

Chalk

C.1.5 Weak to moderately weak, low to medium density white chalk with nodular flint horizons (average 100mm thick) and marl seams (2mm to 20mm thick).

C.2 Assumed density and bulking factors

C.2.1 The following densities and bulking factors have been assessed and these figures have been used to estimate the excavated material. These figures are based on a review of estimates and actual data from previous similar projects, such as Crossrail and the Channel Tunnel.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Bulk density</th>
<th>Typical bulking factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/m$^3$</td>
<td>Shaft excavation</td>
</tr>
<tr>
<td>Made ground</td>
<td>1.7</td>
<td>1.2</td>
</tr>
<tr>
<td>London Clay</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Lambeth Group</td>
<td>2.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Thanet Sand</td>
<td>1.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Chalk (Seaford Member)</td>
<td>2</td>
<td>1.4</td>
</tr>
</tbody>
</table>
## C.3 Estimated excavation materials by construction site based on live candidate scheme

### Table C.2 Estimated m$^3$ (unbulked) excavated materials generated for each site during construction phase

<table>
<thead>
<tr>
<th>Excavated material</th>
<th>Acton Storm Tanks</th>
<th>Hammersmith Pumping Station</th>
<th>Barn Elms</th>
<th>Putney Bridge Foreshore</th>
<th>Carnwath Road Riverside</th>
<th>Dornay Street</th>
<th>King George’s Park</th>
<th>Falconbridge Pumping Station</th>
<th>Chelsea Embankment Foreshore</th>
<th>Kirtling Street</th>
<th>Heathrow Pumping Station</th>
<th>Albert Embankment Foreshore</th>
<th>Victoria Embankment Foreshore</th>
<th>Blackfriars Bridge Foreshore</th>
<th>Chambers Wharf</th>
<th>King Edward Memorial Park Foreshore</th>
<th>Earl Pumping Station</th>
<th>Deptford Church Street</th>
<th>Greenwich Pumping Station</th>
<th>Abbey Mills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site strip</td>
<td>0</td>
<td>476</td>
<td>200</td>
<td>1,785</td>
<td>855</td>
<td>1,191</td>
<td>304</td>
<td>175</td>
<td>120</td>
<td>1,543</td>
<td>49</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>22,400</td>
<td>161</td>
<td>2,871</td>
<td>234</td>
<td>192</td>
<td>800</td>
<td>33,431</td>
</tr>
<tr>
<td>Imported fill</td>
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<td>38,140</td>
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<td>0</td>
<td>0</td>
<td>37,280</td>
<td>0</td>
<td>1,106</td>
<td>38,380</td>
<td>13,342</td>
<td>30,440</td>
<td>2,803</td>
<td>59,276</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>222,767</td>
<td>58,120</td>
<td>69,447</td>
</tr>
<tr>
<td>Diaphragm wall/Pile spoil</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8,091</td>
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<td>6,986</td>
<td>9,891</td>
<td>8,365</td>
<td>5,397</td>
<td>5,068</td>
<td>4,871</td>
<td>9,451</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>222,767</td>
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<tr>
<td>Made ground</td>
<td>314</td>
<td>1,008</td>
<td>813</td>
<td>3,077</td>
<td>6,449</td>
<td>1,327</td>
<td>1,310</td>
<td>3,567</td>
<td>780</td>
<td>10,005</td>
<td>8,226</td>
<td>5,417</td>
<td>919</td>
<td>1,472</td>
<td>5,417</td>
<td>6,514</td>
<td>528</td>
<td>737</td>
<td>6,057</td>
<td>737</td>
<td>4,772</td>
</tr>
<tr>
<td>London Clay</td>
<td>634</td>
<td>16,446</td>
<td>2,956</td>
<td>1,835</td>
<td>380,212</td>
<td>15,387</td>
<td>6,205</td>
<td>8,776</td>
<td>7,035</td>
<td>336,312</td>
<td>4,981</td>
<td>7,889</td>
<td>38,319</td>
<td>15,555</td>
<td>2,606</td>
<td>0</td>
<td>12,413</td>
<td>2,293</td>
<td>8,847</td>
<td>2,875</td>
<td>873,168</td>
</tr>
<tr>
<td>Lambeth</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>270</td>
<td>192</td>
<td>442,535</td>
<td>1,963</td>
<td>6,860</td>
<td>3,557</td>
<td>10,171</td>
<td>8,171</td>
<td>13,029</td>
<td>10,171</td>
<td>0</td>
<td>1,207</td>
<td>1,207</td>
<td>0</td>
<td>496,101</td>
</tr>
<tr>
<td>Thanet</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>30,411</td>
<td>0</td>
<td>0</td>
<td>2,238</td>
<td>7,817</td>
<td>5,591</td>
<td>334,821</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>137,835</td>
<td>0</td>
<td>60,733</td>
<td>490,355</td>
<td></td>
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<tr>
<td>Chalk – tunnel</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17,699</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>334,821</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>137,835</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>490,355</td>
</tr>
<tr>
<td>Chalk – shafts</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11,250</td>
<td>8,511</td>
<td>10,237</td>
<td>7,021</td>
<td>7,054</td>
<td>12,338</td>
<td>56,412</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Draft waste strategy
Appendices

Appendix D: Excavated material options assessment report non-technical summary

D.1 Introduction
D.1.1 The Thames Tunnel project will require the excavation of significant volumes of material at several sites throughout London. This excavated material would come primarily from the construction of the main tunnel but also from the construction of connections between the tunnel and existing CSOs. To identify the preferred options for the management of the excavated material, a detailed assessment (options assessment) is being undertaken.

D.2 Method
D.2.1 The methodology for assessment of the excavated material options is based on the sustainability appraisal methodology\(^\text{13}\), and assumes that the excavated material is segregated at source (ie, clay and sands remain separated from excavation until final destination). While the objective would be to separate the materials (sands, clays, etc), the tunnel boring method would inevitably lead to a fair degree of mixing in a number of locations.

D.2.2 The options assessment has been undertaken prior to obtaining consent for the project and before construction contractors have been appointed. Therefore, the assessment methodology takes into account the uncertain nature of a number of parameters. The assessment needs to be robust while flexible as:

a. the exact volume and nature of material arisings are likely to change

b. specific options (especially specific sites) may cease to be viable over both the time until project approval and the construction period of the project

c. new options may become available throughout this period.

D.2.3 The assessment comprises a phased approach (Figure D1). As the assessment progresses, the least preferred options are eliminated until the final most viable and sustainable options remain. These remaining options demonstrate the capacity to manage the excavated material in a sustainable manner, which would aid operators procured for delivering the construction of the tunnel. The assessment is based on the consistent assessment of options against agreed evaluation objectives at all stages of the process.

D.2.4 The steps in the assessment process are as follows:

a. Development of a long list of potential options for the treatment, reuse, recycling or disposal of excavated materials.

b. Viability filter involving the assessment of the long list against the operational evaluation objective associated with viability of the options. This step prevents unnecessary time being used to fully assess options which are not practicable or deliverable.

c. Preliminary RAG assessment to develop a short list of options which perform sufficiently well against all the evaluation objectives (environmental, social, operational, policy and health and safety). The options on the viable list are given a red, amber or green (RAG) score for each evaluation objective, and the best are put onto the short list.

d. Detailed RAG assessment in which the short list is further scrutinised to produce a preferred list of options, which score best against the full suite of evaluation objectives.

D.2.5 At the present time, steps 1 to 3 have been undertaken, with a short list of options developed.

D.3 Interim results

D.3.1 The long list comprises 191 options across 17 business sectors. These options are primarily landfills and quarries in need of material for restoration (98 options) and recyclers (35 options).

D.3.2 The ability of the receptor site to accept the volumes and rates of excavated material, and that the site possessed the necessary planning consents and permits, determined that only 25 of the 191 long list options would pass through the assessment and onto a viable list.
D.3.3 The options on the viable list were next assessed against further evaluation objectives and awarded a red, amber, or green score. Only 15 options performed sufficiently well to progress onto the short list.

D.3.4 Based on information provided by the operators, all the options can accept at least 200,000 tonnes of excavated material over the project’s lifetime.

a. Five options can accept all of the excavated material types (i.e., clay, sands, gravels and chalk) and four of these options may be able to accept the entire volume of excavated material (based on current operator responses).

b. Eleven of the shortlisted sites are located to the east of London.

c. All of the options are located within 69km of the Thames Tunnel project drive sites.

d. Seven options have barge access (at least one of these requires seagoing vessels for access), with the remainder having road access. Two options may have the potential to accept material by rail with infrastructure improvements.

D.4 Next steps

D.4.1 This summary sets out the excavated material options appraisal method and results up to the end of July 2011, including the draft short list of options. As further information is brought forward, this short list may alter. The detailed RAG assessment to develop the preferred list commenced in July 2011 and preliminary results should be available in autumn 2011.
Appendices

Appendix E: Non-excavated material arisings

E.1 Construction wastes

E.1.1 During the construction phase, the following types of waste are likely to be generated:

a. Excess concrete in concrete mixers, pumping lines and general spillage
b. Damaged concrete tunnel linings and temporary linings at junctions and shaft connections. Sprayed concrete lining materials
c. Imported fill
d. Tunnel grout in the batching plant, grout pipes and general spillage.

E.1.2 Based on civil engineering estimates from WRAP, a percentage of the materials used on site is assumed to be wasted. These percentages have been applied to construction materials that would be used to produce a wastage tonnage. These are for general civil engineering works and considered an upper band.

E.1.3 The Thames Tunnel project is a large-scale construction project and would involve the factory production of precast concrete tunnel linings, therefore it has been assumed that best practice would be achieved with respect to waste minimisation.

E.1.4 Table E.1 details the estimated quantities of non-excavated construction related waste that would be generated throughout the construction phase of the project.

E.1.5 Table E.1 includes concrete from the following:

a. Diaphragm wall and pile construction
b. Tunnel and shaft secondary lining
c. Sprayed concrete linings
d. Interception chambers and culverts.

E.1.6 It also includes tunnel and shaft annulus grout which comprises cement, pulverised fuel ash, sand and bentonite.

E.1.7 The other construction related wastes, as outlined in Section E.1, have not been quantified.
### Table E.1 Estimated tonnages of construction waste arisings during tunnel construction (2014–2020) based on candidate scheme 13/06/2011

<table>
<thead>
<tr>
<th>Location</th>
<th>Rings</th>
<th>Imported fill</th>
<th>Grout</th>
<th>Concrete</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acton Storm Tanks</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>601</td>
<td>606</td>
</tr>
<tr>
<td>Hammersmith Pumping Station</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>339</td>
<td>357</td>
</tr>
<tr>
<td>Barn Elms</td>
<td>0</td>
<td>55</td>
<td>0</td>
<td>112</td>
<td>168</td>
</tr>
<tr>
<td>Putney Bridge Foreshore</td>
<td>0</td>
<td>1,143</td>
<td>0</td>
<td>128</td>
<td>1,271</td>
</tr>
<tr>
<td>Carnwath Road Riverside</td>
<td>135</td>
<td>0</td>
<td>513</td>
<td>1,434</td>
<td>2,082</td>
</tr>
<tr>
<td>Dormay Street</td>
<td>7</td>
<td>28</td>
<td>13</td>
<td>113</td>
<td>161</td>
</tr>
<tr>
<td>King George’s Park</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>78</td>
<td>79</td>
</tr>
<tr>
<td>Falconbrook Pumping Station</td>
<td>0</td>
<td>38</td>
<td>0</td>
<td>168</td>
<td>206</td>
</tr>
<tr>
<td>Cremorne Wharf Depot</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>262</td>
<td>267</td>
</tr>
<tr>
<td>Chelsea Embankment Foreshore</td>
<td>2</td>
<td>1,291</td>
<td>6</td>
<td>221</td>
<td>1,519</td>
</tr>
<tr>
<td>Kirtling Street</td>
<td>283</td>
<td>0</td>
<td>1,052</td>
<td>1,541</td>
<td>2,876</td>
</tr>
<tr>
<td>Heathwall Pumping Station</td>
<td>4</td>
<td>54</td>
<td>9</td>
<td>139</td>
<td>205</td>
</tr>
<tr>
<td>Albert Embankment Foreshore</td>
<td>6</td>
<td>1,446</td>
<td>11</td>
<td>96</td>
<td>1,559</td>
</tr>
<tr>
<td>Victoria Embankment Foreshore</td>
<td>5</td>
<td>1,130</td>
<td>8</td>
<td>191</td>
<td>1,334</td>
</tr>
<tr>
<td>Blackfriars Bridge Foreshore</td>
<td>0</td>
<td>1,475</td>
<td>3</td>
<td>372</td>
<td>1,850</td>
</tr>
<tr>
<td>Chambers Wharf</td>
<td>0</td>
<td>1,960</td>
<td>452</td>
<td>1,443</td>
<td>3,855</td>
</tr>
<tr>
<td>King Edward Memorial Park Foreshore</td>
<td>121</td>
<td>1,780</td>
<td>3</td>
<td>431</td>
<td>2,335</td>
</tr>
<tr>
<td>Earl Pumping Station</td>
<td>0</td>
<td>46</td>
<td>3</td>
<td>364</td>
<td>413</td>
</tr>
<tr>
<td>Deptford Church Street</td>
<td>0</td>
<td>50</td>
<td>3</td>
<td>343</td>
<td>395</td>
</tr>
<tr>
<td>Greenwich Pumping Station</td>
<td>49</td>
<td>43</td>
<td>177</td>
<td>516</td>
<td>785</td>
</tr>
<tr>
<td>Abbey Mills</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>1,031</td>
<td>1,034</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>610</strong></td>
<td><strong>19,020</strong></td>
<td><strong>4,518</strong></td>
<td><strong>23,814</strong></td>
<td><strong>47,962</strong></td>
</tr>
</tbody>
</table>

**E.1.8** Further work is currently being carried out to estimate the other types of waste that would be produced on the construction sites. These wastes include steel, equipment and granite facing blocks.

**E.1.9** There would be waste produced through the reinstatement works that would be carried out once the construction of the tunnel has been completed. It is anticipated that the waste produced from the reinstatement works would be similar in nature to the construction waste.


E.2 Demolition waste

E.2.1 Work is currently being carried out to estimate the amount of waste that would be generated through the demolition programme. Table E.1 provides a summary of the sites [based on the preferred current, live candidate scheme; confirmation of sites required] where demolition activities would take place.

Table E.2 Summary of demolition activities on each site (based on Live Candidate Scheme 13/6/11)

<table>
<thead>
<tr>
<th>Sites</th>
<th>Demolition activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acton Storm Tanks</td>
<td>Partial demolition of two existing storm tanks</td>
</tr>
<tr>
<td>Hammersmith Pumping Station</td>
<td>Demolition of the section of the existing site pumping station boundary wall would be required.</td>
</tr>
<tr>
<td>Carnwath Road Riverside</td>
<td>Demolition of existing above-ground structures, including existing business units on Carnwath Road Industrial Estate</td>
</tr>
<tr>
<td>Putney Bridge Foreshore</td>
<td>Partial demolition of sections of existing slipway and walls prior to permanent works</td>
</tr>
<tr>
<td>Falconbrook Pumping Station</td>
<td>Existing disused toilet block and a disused pumping station would be demolished. The below-ground structures will need to be removed.</td>
</tr>
<tr>
<td>Waste Transfer Facility (replaces Cremorne Wharf Foreshore)</td>
<td>The existing waste transfer facility would be demolished.</td>
</tr>
<tr>
<td>Kirtling Street</td>
<td>The existing building on the worksite would be demolished.</td>
</tr>
<tr>
<td>Dormay Street</td>
<td>Demolition of existing buildings on the worksite</td>
</tr>
<tr>
<td>Blackfriars Bridge Foreshore</td>
<td>The partial demolition of the westbound ramp structure would be required.</td>
</tr>
<tr>
<td>Chambers Wharf</td>
<td>The existing building on the worksite would be demolished.</td>
</tr>
<tr>
<td>King Edward Memorial Park Foreshore</td>
<td>There are no major demolition works anticipated at this site, although the park furniture would need to be temporarily removed.</td>
</tr>
<tr>
<td>Greenwich Pumping Station</td>
<td>Depending on the final configuration of the site, it is possible that the existing coal sheds may require removal. They</td>
</tr>
<tr>
<td>Sites</td>
<td>Demolition activity</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td>would be carefully dismantled and removed from site, following heritage recording. It is likely to need to be reassembled.</td>
</tr>
</tbody>
</table>

### E.3 Waste generated through clearance of vegetation

#### E.3.1
The demolition and site clearance plans for all proposed sites have been assessed to determine the likely volume of tree related waste which may be generated. At present, these are estimated figures and are subject to full tree surveys being completed. Table E.3 summarises the estimates for vegetation waste.

**Table E.3 A summary of the estimated number of trees that would be removed and trimmed across all of the sites**

<table>
<thead>
<tr>
<th>Tree treatment</th>
<th>Number of trees (with known heights)</th>
<th>Low estimate (tonnes)</th>
<th>High estimate (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal</td>
<td>90 (20)</td>
<td>220</td>
<td>420</td>
</tr>
<tr>
<td>Trimming</td>
<td>60</td>
<td>30</td>
<td>60</td>
</tr>
</tbody>
</table>

#### E.3.2
Some trees will be denser than others, depending on species. This information would be available following the tree surveys.

#### E.3.3
It should be noted that tree trimming waste volumes would be dependent on the time of year that works are undertaken and the level of foliage.

### E.4 Welfare waste

#### 10.1.5
Waste would be produced at the construction sites from the site offices and mess rooms. This waste would, in general, be domestic in nature and include paper, packaging and food waste.

#### 10.1.6
Appendix E.4, Table E.6, provides estimates of the tonnage of welfare waste generated by the Thames Tunnel project, based on an estimate of the number of staff that would be working at each of the construction sites (based on the Candidate Scheme).

#### 10.1.7
The estimated figures have been calculated using the assumption that an average office worker produces approximately 200kg of waste per staff member per year. (Envirowise: GG256: *Green Officency* October 2002.)

#### E.4.1
Table E.4 provides estimates of the tonnage of welfare waste generated by the Thames Tunnel project, based on the number of staff that would be working at each of the construction sites.

#### E.4.2
The estimated figures have been calculated using the assumption that an average office worker produces approximately 200kg of waste per staff member per year. (GG256 *Green Officency*. Envirowise. 2002.) The estimated staff numbers have been provided by the Thames Tunnel project team.
Table E.4 Estimated tonnages of welfare waste produced at each site per annum

<table>
<thead>
<tr>
<th>Sites</th>
<th>Total no of staff</th>
<th>Waste generation (tonnes per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action Storm Tanks</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hammersmith Pumping Station</td>
<td>60</td>
<td>12</td>
</tr>
<tr>
<td>Barn Elms</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Putney Bridge Foreshore</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Carnwath Road Riverside</td>
<td>289</td>
<td>58</td>
</tr>
<tr>
<td>Dormay Street</td>
<td>92</td>
<td>18</td>
</tr>
<tr>
<td>King George's Park</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Falconbrook Pumping Station</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Recycling Centre (replaces Cremorne Wharf Foreshore)</td>
<td>65</td>
<td>13</td>
</tr>
<tr>
<td>Chelsea Embankment Foreshore</td>
<td>65</td>
<td>13</td>
</tr>
<tr>
<td>Kirtling Street</td>
<td>319</td>
<td>64</td>
</tr>
<tr>
<td>Heathwall Pumping Station</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Albert Embankment Foreshore</td>
<td>65</td>
<td>13</td>
</tr>
<tr>
<td>Victoria Embankment Foreshore</td>
<td>65</td>
<td>13</td>
</tr>
<tr>
<td>Blackfriars Bridge Foreshore</td>
<td>70</td>
<td>14</td>
</tr>
<tr>
<td>Chambers Wharf</td>
<td>289</td>
<td>58</td>
</tr>
<tr>
<td>King Edward Memorial Park Foreshore</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Deptford Church Street</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Greenwich Pumping Station</td>
<td>289</td>
<td>58</td>
</tr>
<tr>
<td>Abbey Mills</td>
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<td>9</td>
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<tr>
<td>Beckton STW</td>
<td>65</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,068</strong></td>
<td><strong>414</strong></td>
</tr>
</tbody>
</table>
Appendices

Appendix F: Regional construction, demolition and excavation arisings and infrastructure

F.1 Regional CDE waste arisings

F.1.1 In addition to the Thames Tunnel project, there are other ongoing and proposed developments in the South East region that might give rise to large amounts of waste. This could increase the pressure on possible waste management options for the Thames Tunnel project and also on waste management facilities in the area. Known large projects are summarised in Table F.1.

Table F.1 A summary of large developments that are taking place in London until 2020

<table>
<thead>
<tr>
<th>Project name</th>
<th>Location</th>
<th>Construction period</th>
<th>Quantities</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossrail</td>
<td>Maidenhead in the west to Abbey Wood in the east</td>
<td>2008-2018</td>
<td>7,500,000m$^3$ CDE material</td>
<td>Rail link for London and the South East</td>
</tr>
<tr>
<td>Lee Tunnel</td>
<td>Abbey Mills Pumping Station near Stratford</td>
<td>2012-2014</td>
<td>1,200,000m$^3$ excavated material</td>
<td></td>
</tr>
<tr>
<td>Docklands Light</td>
<td>Borough of Newham</td>
<td>2012-2020</td>
<td>Unknown</td>
<td>Beckton to Royal Victoria in the West also extension into Barking and Dagenham</td>
</tr>
<tr>
<td>Blackfriars Station Project (Network Rail)</td>
<td>Blackfriars Bridge</td>
<td>2010-2012</td>
<td>4,000m$^3$ demolition waste</td>
<td></td>
</tr>
<tr>
<td>Olympic Park Legacy</td>
<td>Stratford</td>
<td>2013-2018</td>
<td>Unknown</td>
<td>Removal of temporary venues and completion of residential units</td>
</tr>
<tr>
<td>Three Mill Island</td>
<td>Bromley-by-Bow</td>
<td>Unknown</td>
<td>Peter Brett Associates (PBA) estimated 500,000m$^3$ – excavations and materials</td>
<td>Large scale redevelopment of land close to Abbey Mills</td>
</tr>
</tbody>
</table>

Blackfriars Bridge

Crossrail

Lee Tunnel

Docklands Light

Blackfriars Station Project

Olympic Park Legacy

Three Mill Island

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### F.1.2 The major projects in London listed in Table F.1 are expected to generate approximately 20 million m$^3$ of CDE material in the period 2014-2020. If it is assumed that these major construction projects will divert at least 82% of their CDE arisings from landfill based on current London performance, then of this 20 million m$^3$, no more than around 3 million m$^3$ will be taken to landfill. The remaining 17 million m$^3$ of CDE material will require reuse or recovery infrastructure.

### F.1.3 It is anticipated that the Thames Tunnel project would generate 3.5 million m$^3$ of CDE material over the same period. If a minimum of 90% of this material is diverted from landfill, 3.15 million m$^3$ would require reuse or recovery infrastructure and 0.35 million m$^3$ would be taken to landfill.

### F.1.4 The *London Plan* (*Spatial Development Strategy for Greater London, July 2011*) provides estimates for CDE arisings from 2010 to 2031. The plan estimates that 5 million m$^3$ per annum of CDE material will be produced within London. This amounts to 35 million m$^3$ over the period 2014-2020. Based on current (2008) disposal figures set out in the *London Plan*, 82% of this material is currently recycled and reused. This equates to 6.3 million m$^3$ being sent to landfill over the Thames Tunnel project’s timeframe (2014-2020). As it is known that this estimate does not include large projects such as Crossrail and the Olympics, they have been taken in addition to the projects identified in Table F.1.

### F.1.5 An estimate of the CDE arisings anticipated in and around London for the period 2014-2020 is summarised Table F.2.
Table F.2 CDE arisings anticipated 2014-2020

<table>
<thead>
<tr>
<th>Source of CDE material</th>
<th>Recover/Reuse (million m³)</th>
<th>Landfill (million m³)</th>
<th>Total (million m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames Tunnel project</td>
<td>0.35</td>
<td>3.15</td>
<td>3.5</td>
</tr>
<tr>
<td>Other major projects London</td>
<td>17</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Other smaller projects London</td>
<td>28.7</td>
<td>6.3</td>
<td>35</td>
</tr>
<tr>
<td>Subtotal London</td>
<td>46.05</td>
<td>12.45</td>
<td>58.5</td>
</tr>
<tr>
<td>Major projects SE &amp; E regions</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Other CDE arisings SE &amp; E region</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

F.1.6 In 2008, approximately 1.6 million m³ of construction and demolition waste was sent to landfill by London. This compares to the estimated 1.5 million m³ per year estimated in Table F.2 for the period 2014-2020.

F.1.7 In 2008, approximately 215,000 m³ of CDE waste arisings in London (16%) were taken to landfill within the city; the remainder was sent for landfill in the East and the South East of England.

F.2 Impact on regional self-sufficiency and apportionment

F.2.1 The London Plan has set a target to improve the net self-sufficiency for the capital’s waste management. In 2008, the amount of CDE material managed within London was 82% of generated CDE material. All remaining CDE material was to be exported out of London. The exported waste in 2008 was 1.9 million tonnes (18% of generated CDE material in London). The future targets (2020) for CDE self-sufficiency in the London Plan remain at only 5% of generated CDE material being exported to the surrounding region. (London Plan. Greater London Authority. 2011.)

F.2.2 The landfill capacity in the region is limited, with approximately seven years in the South East. (South East Plan. Government Office for the South East. 2009.) There is a large amount of CE&D waste that is disposed of to landfill, with a large amount of it being exported from London to other regions for disposal.

F.2.3 The South East Plan and the East of England Plan state in their respective Policy W3 (see Appendix B.2 and B.3 for a full list of relevant waste policies from the South East of England Plan and East of England Plan) that the waste authorities that surround London are expected to continue

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14 In terms of these two plans, these authorities are as follows: Berkshire Unitaries, Oxfordshire, Buckinghamshire, Milton Keynes, 'Bedfordshire and Luton', 'Cambridgeshire and Peterborough', Hertfordshire,
importing waste from London and, therefore, to make capacity allocation in their WDPDs. In line with the London Plan, these waste authorities have confirmed that the WDPDs take into account the volumes of waste that will be exported from London.

F.2.4 However, Policy W3 of the South East Plan only deals with MSW and C&I, and not CDE material. This means that the surrounding waste authorities have not made specific provision for the importation of CDE materials within their WDPDs. In the East of England Plan, W3 does not distinguish between the different waste streams.

F.2.5 The Thames Tunnel project has a target to divert a minimum of 90% of CDE materials from landfill. Therefore, the maximum tonnage anticipated to be landfilled by the Thames Tunnel project is 0.46 million tonnes over six years. It is anticipated that this material would be taken to landfills in or around London.

F.2.6 This can be compared to the total amount of CDE material to be generated in London. The London Plan anticipates approximately 10.4 million tonnes of CDE to be generated within London annually. Of this, a maximum of 5% (approximately 0.5 million tonnes per year) should be exported from London by 2020. The permitted landfill capacity in London and the surrounding area is 13 million tonnes over the project's timeframe. This shows that the proportion of Thames Tunnel project CDE material that would be sent to landfill accounts for about 3.5% (derived by dividing 0.46 million tonnes by 13 million tonnes) of available landfill capacity.
Appendices

Appendix G: Sewage-derived litter

G.1.1 Table G.1 shows the reduction in the discharge of materials to the River Thames from the current baseline (2010) to post Thames Tunnel project completion (2021).

Table G.1 Estimated sewage-derived solid material that would be deposited on the foreshore of the River Thames per annum

<table>
<thead>
<tr>
<th>Discharge to river (m³)</th>
<th>Baseline discharged to river (%)</th>
<th>Reduction of discharge to river (%)</th>
<th>Tonnes litter discharged (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current baseline</td>
<td>39,817,000</td>
<td>100.00</td>
<td>10,000</td>
</tr>
<tr>
<td>Post completion of the Lee Tunnel</td>
<td>17,871,000</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>Post completion of the Thames Tunnel project</td>
<td>2,335,000</td>
<td>6</td>
<td>94</td>
</tr>
</tbody>
</table>

G.1.2 The three scenarios displayed in Table G.1 are as follows:

a. The current baseline – takes into account the existing system and the existing STW (as of 2006).

b. Post Lee Tunnel – takes into account the planned STW improvements and the completion of the Lee Tunnel. Date for this scenario is 2021 and takes into account the increase in population.

c. Post Thames Tunnel project – takes into account the planned STW improvements, the completion of the Lee Tunnel and the completion of the Thames Tunnel project (based on the preliminary phase two consultation scheme). The date set for this scenario is 2021 and takes into account the increase in population.

G.1.3 The five datasets summarised in the table are as follows:

a. Discharge of all materials to the river – this is based on the capacity of the system described in the scenario. This also takes into account the predicted population increase.

b. The scenario’s discharge as a percentage of the baseline discharge to the river.

c. The reduction of the baseline discharge achieved by the scenario.

d. The tonnage of litter that is included in the discharged material. This is based on the assumption that the tonnage of litter per m³ of discharged material would substantially change between the scenario’s timeframes. Under this assumption, there are 260 tonnes of litter in 1 million m³ of discharge.
e. Number of spills from the system in a ‘typical year’ under each scenario. A typical (weather) year is taken as October 1979 to September 1980.
Phase two consultation (Autumn 2011)

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