SILVERTOWN TUNNEL

Preliminary Environmental Information Report: Appendix 13.A

Preliminary Site Waste Management Plan

MAYOR OF LONDON

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

[BLANK PAGE]

Silvertown Tunnel

Preliminary Site Waste Management Plan

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Document Reference: *ST150030-PLN-ZZZ-ZZ-RP-PC-0008*

Author: *Transport for London*

Rev.	Date	Approved By	Signature	Description
1	02/10/2015	David Rowe (TfL Lead Sponsor)		For Consultation
		Richard De Cani (TfL MD Planning)		

Contents

FIGURES

TABLES

List of Abbreviations

The abbreviations, descriptions and project terminology used within this document can be found in the project dictionary.

Specific entries are listed below:

CoCP	Code of Construction Practice
DBFM	Design Build Finance Maintain
DCO	Development Consent Order
Defra	Department for Environment Food & Rural Affairs
DLR	Docklands Light Railway
EA	Environment Agency
EAL	Emirates Air Line
EMS	Environmental Management System (for the Scheme)
LOW	List of Waste
PEMP	Project Environmental Management Plan
SWMP	Site Waste Management Plan
TBM	Tunnel Boring Machine
TfL	Transport for London
WAC	Waste Acceptance Criteria

WEEE	Waste Electronic and Electrical Equipment
WRAP	Waste and Resources Action Programme

Glossary of Terms

Design, Build, Finance and Maintain (DBFM)	A DBFM company is typically a consortium of private sector companies, formed for the specific purpose of providing the services under the DBFM contract. This is also technically known as a Special Purpose Vehicle (SPV). The DBFM Company will obtain funding to design and build the new facilities and then undertake routine maintenance and capital replacement during the contract period, which is typically 25 to 30 years. The DBFM Company will repay funders from payments received from TfL during the lifespan of the contract. Receipt of payments from TfL will depend on the ability of the DBFM Company to deliver the services in accordance with the output specified in the contract and will be subject to deductions if performance is not satisfactory.
Development Consent Order (DCO)	A Development Consent Order is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP). This includes energy, transport, water and waste projects.
Contractor	Anyone who directly employs or engages construction workers or manages construction work. Contractors include sub-contractors, any individual self-employed worker or business that carries out, manages or controls construction work
Reference Design	Design proposals that the consultation and DCO application would refer to.

Soil Guideline Values (SGV)	Soil Guideline Values are scientifically based generic assessment criteria derived by the Environment Agency that can be used to simplify the assessment of human health risks arising from long-term and on-site exposure to chemical contamination in soil
Waste and Resources Action Programme (WRAP)	WRAP is a registered charity that works with businesses, individuals and communities to achieve a circular economy through helping them reduce waste, develop sustainable products and use resources in an efficient way.

[BLANK PAGE]

SUMMARY

This report describes the means by which waste generated by the Silvertown Tunnel project, hereinafter referred to as ‘the Scheme’, would be minimised and managed. It provides an indication of the types of waste expected to be generated on this Scheme and a forecast of the volume of waste arising from the temporary and permanent works. The nature of this Site Waste Management Plan is preliminary and serves as a guidance document for the purposes of the statutory consultation on the proposed application. It would be developed further by TfL prior to the submission of the DCO application and would subsequently be required to be finalised by the Design, Build, Finance and Maintain Contractor (DBFM) on award of contract.

[BLANK PAGE]

1 INTRODUCTION

1.1 Purpose of this document

1.1.1 This preliminary Site Waste Management Plan (SWMP) has been developed to reflect the Silvertown Tunnel Reference Design and the associated quantities for waste anticipated by the Scheme. The intention is to enable better control over materials and waste produced throughout the duration of the Scheme. The document has been prepared in accordance with The Site Waste Management Plan Regulations[1]. The Regulations were revoked in December 2013, it is however still considered good practice to complete a SWMP. This document summarises high level estimates of how much waste is anticipated to be generated and how much is estimated to be reused, recycled, recovered or disposed of based on information available at this stage.

1.2 Responsibilities

1.2.1 Transport for London (TfL), as the client and the appointed Contractor would take all reasonable steps to ensure that:

- All waste from the site would be dealt with in accordance with the waste Duty of Care in Section 34 of the Environmental Protection Act 1990[2] and the Environmental (Duty of Care) Regulations 1991[3];
- Greater emphasis is put on the waste hierarchy to ensure that waste is dealt with in the priority order of: prevention; preparing for re-use; recycling; other recovery (for example, energy recovery); disposal (Waste Regulations 2011[4]); and
- Materials would be handled efficiently and waste managed appropriately.

[1] The Site Waste Management Plans Regulations 2008 (SI 2008/314) revoked by SI 2013/2854.
[2] Environmental Protection Act 1990 (c. 43) Part II, section 34 as amended SI 2015/1360.
[3] Environmental (Duty of Care) Regulations 1991
[4] The Waste (England & Wales) Regulations 2011 (SI 2011/988) as amended SI 2012/1889, SI 2014/656, SI 2015/1360

1.2.2 This plan has been developed at this early stage to ensure a guidance document is in place. On award of contract, the appointed Contractor would be responsible for developing this plan and ensuring it relates specifically to the works associated with the solution adopted for the completion of the works.

1.2.3 The DBFM Contractor is responsible for instructing workers, overseeing and documenting results of the SWMP. The DBFM Contractor shall distribute copies of this plan to the design team, TfL Project Manager, Project Director and each Subcontractor involved in the Silvertown Tunnel Scheme. This would be undertaken every time the plan is updated, approximately every 6 months.

1.2.4 The DBFM Contractor is responsible for ensuring the waste is segregated and disposed in the appropriate waste bins. These works would be undertaken under the supervision of a project waste coordinator. Waste Management Guidance would be included in the Code of Construction Practice (CoCP).

1.2.5 The Environmental Manager would monitor the implementation of the mitigation measures included in the CoCP and the effectiveness and accuracy of the documentation during the routine site visits.

1.3 Purpose of the SWMP

1.3.1 This SWMP has been developed to record quantities of waste which could be reduced, reused, recycled and disposed of and any design decisions that demonstrate good and best practice in waste minimisation and management in construction. By recording these project details contractors are able to:

- Estimate waste and identify actions to reduce waste and cost;
- Record actual waste movements; and
- Review project performance.

1.3.2 At design stage, actions should be taken to design out waste and specify that materials and components with a recycled content should be used in the construction of the Scheme where possible. These considerations are in line with the principles of the Waste and Resources Action Programme (WRAP) of designing out waste principles and adopting best practice approaches.

1.3.3 The SWMP is designed to follow the key stage process of:

- Plan;
- Implementation;
- Measure; and
- Review.

1.3.4 Best practice suggests that the SWMP process is to be implemented at the earliest opportunity within the Scheme development to encourage the process of developing design and construction solutions that contribute towards the minimisation of waste.

1.3.5 The SWMP should outline the methods required to minimise waste, manage waste produced responsibly, measure the quantities and costs of waste produced effectively and on review provide lessons learned to advance to future schemes.

1.3.6 The SWMP WRAP spreadsheet is a live, working document that requires the relevant sections to be completed at different stages throughout the development of the Scheme. Final completion of the spreadsheet should not happen until the Scheme is finished. Therefore at any point during the scheme life, sections of the spreadsheet would be incomplete.

1.3.7 The DBFM Contractor is expected to take ownership of, and update the SWMP document, completing the various sections until it has reached the point of being finalised and signed off at the point of the overall Scheme completion. The SWMP would identify the types and quantities of waste that would be produced throughout the entire duration of the Scheme and would identify management options for each type of waste, paying attention to the waste hierarchy.

1.3.8 It shall also state stringent requirements for the control & disposal of hazardous wastes (see section 4.6).

1.3.9 The adoption of the SWMP would help to ensure the Scheme fulfils its legal obligations towards waste management and Duty of Care[3]. The SWMP shall be communicated to all staff and sub-contractors on the Scheme and it should be an agenda item at each progress meeting.

1.3.10 Adopting an extended duty of care i.e. ensuring that sub-contractors and facility operators with a good record of environmental performance and compliance are selected to treat and/or receive materials from the site, is also recommended.

1.3.11 The measurement and control of fly-tipping would not be included in the SWMP as this would be controlled by on-site measures.

1.4 Site Description

1.4.1 The Scheme involves the construction of a twin bore road tunnel providing a new connection between the A102 Blackwall Tunnel Approach on Greenwich Peninsula (Royal Borough of Greenwich) and the Tidal Basin Roundabout junction on the A1020 Lower Lea Crossing/Silvertown Way (London Borough of Newham). The Silvertown Tunnel would be approximately 1.4km long and would be able to accommodate large vehicles including double-deck buses.

1.4.2 On the north side, the tunnel approach road connects to the Tidal Basin Roundabout, which would be altered to create a new signal-controlled roundabout linking the Silvertown Way, Dock Road and the Lower Lea Crossing. Dock Road would be realigned to accommodate the new tunnel and approach road. On the south side, the A102 would be widened to create new slip-road links to the Silvertown Tunnel. A new flyover would be built to take southbound traffic exiting the Blackwall Tunnel over the northbound approach to the Silvertown Tunnel. The existing Boord Street footbridge over the A102 would be replaced with a pedestrian and cycle bridge

1.4.3 New portal buildings would be located close to each portal to house the plant and equipment necessary to operate the tunnel, including ventilation equipment.

1.4.4 The introduction of free-flow user charging on both the Blackwall and Silvertown Tunnels would play a fundamental part in managing traffic demand and support the financing of the construction and operation of the Silvertown Tunnel.

1.4.5 The design of the tunnel would include a dedicated bus/coach and HGV lane, which would provide opportunities for TfL to provide additional cross-river bus routes.

1.4.6 Main construction works would be likely to commence in 2018 and would last approximately 4 years with the new tunnel opening in 2022/23. A Tunnel Boring Machine (TBM) would be used to bore the main tunnel sections under the river with shorter sections of cut and cover tunnel at either end linking to the portals. The proposal is to erect and launch the TBM from specially-constructed chambers at Silvertown and Greenwich Peninsula where the bored and cut and cover sections connect. The main site construction compound would be located at Silvertown to utilise Thames Wharf to facilitate the removal of spoil and delivery of materials by river. A secondary site compound would be located adjacent to the alignment of the proposed cut and cover tunnel on the Greenwich Peninsula.

Figure 1-1: Location of Scheme

1.5 Existing and previous land uses

1.5.1 Presently, the land on the Silvertown side is of mixed residential and recreational use around the perimeter of Royal Victoria Docks and industrial use to the west of Silvertown Way and on both sides of the Docklands Light Railway (DLR) as well as around the Emirates Air Line (EAL) towers.

1.5.2 The industrial uses in the area include steel and metal suppliers, scrap metal dealers, concrete batching plants, waste recycling and management businesses and an aggregates supplier. It is understood that previous land uses included chemical works, gas and coke works, as well as railway sidings serving river wharves.

1.5.3 The proposed Scheme also cuts through the redundant Western Entrance Lock to the Royal Victoria Dock. The lock was infilled in two phases (1960's and 1980's) and is an Environment Agency Registered Landfill Site (1981).

1.5.4 On the Greenwich side, the present land-use consists mainly of surface car parks and access roads associated with The O2 and the North Greenwich Station. There is a non-operational gas holder (approximately 75m in diameter), lorry park, nightclub and office/commercial uses between Millennium Way and the A102 immediately south of the proposed southern tunnel portal. There are also former light industrial and commercial uses on the west side of the peninsula including an aggregates supplier and a chemical distribution company. The EAL Greenwich Peninsula station is also located adjacent to the tunnel alignment.

1.5.5 It is understood that a substantial part of the Greenwich Peninsula and therefore the site was previously dominated by a gasworks including a jetty. The area has undergone some remediation in the form of surface stripping and capping. Hence there is a heightened risk of contamination associated with gasworks at depth due to historic land use.

1.6 Regional geology

1.6.1 Ground investigation, as reported in the Atkins Ground Investigation Report (GIR), 2015 (document reference: STWTN-ATK-VGT-XXXX-RP-GE-0001), identified made ground at the location of the proposed Silvertown Tunnel, predominantly to the north and south of the River Thames. Made ground is associated with the historic land use of the site; a greater proportion is found at the location of the redundant Royal Victoria Dock Western Entrance. Made ground is also generally present at and around the tidal basin and docks; it was placed to raise the level of land above the level of the marshes which were prone to regular flooding. Additionally made ground is likely associated with demolition and redevelopment of sites.

1.6.2 Beneath the made ground, superficial deposits comprising Alluvium and River Terrace Deposits have been encountered. Superficial sediments overlie solid geology of the Thames Group (comprising London Clay Formation over the Harwich Formation) over the Lambeth Group, Thanet Sand Formation and White Chalk Subgroup. The Lambeth Group comprises the Woolwich Formation, Reading Formation and Upnor Formation. This has been represented on the geological long section in Appendix A. See Table 1-1 below for a summary of anticipated geology.

Table 1-1: Summary of anticipated geology

Period	Epoch	Group	Formation	BGS Lexicon description
Quaternary	Holocene		Made Ground	Variable composition. Man-made superficial deposit (generic).
			Alluvium	Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.
	Pleistocene		River Terrace Deposits	Sand and gravel, locally with lenses of silt, clay or peat.
Tertiary	Eocene	Thames Group	London Clay Formation	Mainly comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.
			Harwich Formation	Regionally variable. In the south of the London Basin, it typically comprises glauconitic silty or sandy clays, silts and fine- to coarse-grained glauconitic sands, some gravelly, varying to flint gravel beds. Thin beds of grey clay occur in some parts, as do shell-rich beds and thin beds of argillaceous limestone. The Harwich Formation commonly includes a shelly marine fauna but locally a brackish water fauna.

Period	Epoch	Group	Formation	BGS Lexicon description
	Palaeoecene	Lambeth Group	Laminated Beds of the Woolwich Formation	Typically consists of thinly to thickly laminated silts and clays, but can also include laminated fine- to medium-grained sand. Some shells can be present and the beds may contain lignite and pyritised plant material.
			Lower Shelly Clay of the Woolwich Formation	Almost entirely consists of a low-diversity fauna of fossil shells (of types indicating brackish water deposition) in dark grey, dark brown or black organic clay. The shell debris is concentrated into distinct beds or drifts (coquinas), which in some cases have been cemented to form limestones. The basal part is locally a shelly, clayey sand.
			Lower Mottled Clay of the Reading Formation	Purple, red, green, blue-grey and brown mottled or multi-coloured unbedded clays, some silty or sandy, and fine to medium-grained sands. Typically, sands in the Reading Formation are brown or grey in colour, and generally not silty. Glauconite is absent. Nodular calcrete, calcrete-cemented silt, or gravel to cobble sized calcareous nodules are widespread, which may coalesce to form a local limestone bed and which has been described in some borehole logs as 'chalk'.
			Upnor Formation	Typically composed of variably but commonly abundant glauconitic fine- to coarse-grained sand with variable clay and silt content, and with beds, lenses and stringers of well-rounded, black flint gravel, and minor thin clays, commonly interbedded with glauconitic sand laminae and lenses. When fresh, the sands are dark grey-brown to dark green depending on proportion of glauconite grains which may be more than 25%. In south-east London there is a persistent pebble bed at the top. The sands weather pale grey-brown to yellow-brown but the glauconite remains dark green.
			Thanet Formation	Silty fine grained sands that lie unconformably on the Upper Chalk. A basal bed of the Bullhead Beds may be present. This is formed of a thin (typically 0.5 – 1.0m thick) layer of elongate flint cobbles
Cretaceous	Upper Cretaceous	White Chalk Subgroup	Newhaven, Seaford and Lewes Nodular Chalk Formations	Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout. Typology of flints and incidence of marl seams is important for correlation.

1.7 Geological overview of the Greenwich Peninsula

1.7.1 Table 1.2 summaries the typical strata boundaries and minimum / maximum thicknesses of materials encountered at the Greenwich Peninsula during the 2015 Atkins ground investigation.

Table 1-2: Summary of typical strata boundaries on the Greenwich Peninsula

Formation	Top Highest Elevation (mAOD)	Top Lowest Elevation (mAOD)	Base Highest Elevation (mAOD)	Base Lowest Elevation (mAOD)	Minimum Proven Thickness (m)	Maximum Proven Thickness (m)
Made Ground	6.13	2.11	1.81	-1.26	1.5	4.5
Alluvium (including clay and peat)	1.81	-1.26	-1.22	-3.67	0.7	5.3
River Terrace Deposits	-1.13	-3.67	-7.22	-11.59	6.0	8.8
London Clay Formation	-7.22	-11.59	-12.50	-18.55	2.0	10.7
Harwich Formation	-12.50	-18.55	-14.79	-21.60	0.8	5.48
Laminated Beds and Channel Sand	-14.79	-21.60	-23.75	-24.22	2.15	>6.9 (unproven)
Lower Shelly Clay	-23.75	-24.22	-24.75	-26.22	1.0	2.08
Lower Mottled Beds	-24.75	-26.22	Not Proven		>4.61	

Source: Atkins GIR, 2015 (STWTN-ATK-VGT-XXXX-RP-GE-0001)

1.8 Geological overview of the Silvertown Area

1.8.1 Table 1.3 summaries the typical strata boundaries and minimum / maximum thicknesses of materials encountered at the Greenwich Peninsula during the 2015 Atkins ground investigation. Further details, including material descriptions, are provided in the Atkins Ground Investigation Report (GIR), 2015 (document reference: STWTN-ATK-VGT-XXXX-RP-GE-0001).

Table 1-3: Summary of typical strata boundaries at Silvertown

Formation	Top Highest Elevation (mAOD)	Top Lowest Elevation (mAOD)	Base Highest Elevation (mAOD)	Base Lowest Elevation (mAOD)	Minimum Proven Thickness (m)	Maximum Proven Thickness (m)
Made Ground	6.01	1.23	1.71	-4.98 (outside the Western Entrance) -9.75 (inside the Western Entrance)	1.1	8.5 (outside the Western Entrance) >15.05 (inside the Western Entrance)
Alluvium	1.71	-4.98 (outside of the Western Entrance) -9.75 (inside of the Western Entrance)	-2.40	-5.94	2.0	5.3
River Terrace Deposits	-2.40	-5.94	-6.11	-8.92	2.9	4.4
London Clay Formation	-6.11	-8.92	-19.66	-21.96	10.74	15.85
Harwich Formation	-19.66	-21.96	-20.69	-23.37	1.03	3.1
Laminated Beds and Channel Sand	-20.69	-23.31	-25.29	-26.51	3.2	4.6
Lower Shelly Clay	-25.29	-26.51	-28.12		2.83	
Lower Mottled Beds	-28.12		-31.44		3.32	
Upnor Formation	-31.44		-33.32		>1.88	

Source: Atkins GIR, 2015 (STWTN-ATK-VGT-XXXX-RP-GE-0001)

2 TYPES OF WASTE

2.1.1 Surplus or waste materials arise from either the materials imported to site or from those generated on site. Imported materials are those which are imported to site for inclusion into the temporary and permanent works (such as concrete, construction aggregates, asphalt and cabling etc.). Included within this waste stream is product packaging. This waste stream is produced from a range of potentially preventable activities. Such activities include damaged materials and the over ordering of materials. This waste stream is described as construction (C) waste within the SWMP. Site generated materials are those which exist within the Scheme footprint such as topsoil, sub-soil, trees and materials from demolition works etc. This waste stream is categorised as either excavation (E) or demolition (D) waste within the SWMP.

2.1.2 In order to assist the management and segregation of waste, estimations have been made of the types and quantities that would be generated during the scheme construction. For this the WRAP SWMP spreadsheet has been utilised (Section 3 & Appendix B).

2.1.3 For both groups of materials there are a number of considerations to waste management such as waste reduction, segregation of waste, disposal of waste, financial impacts of waste disposal and recording, monitoring, education and reviewing data (see section 4).

2.1.4 The following sections discuss the waste streams anticipated as a result of the scheme construction. This list is not exhaustive, however it forms a basis for the SWMP based on the current Reference Design. Any additional streams would be included in the plan as part of the updates.

2.2 Imported Material

2.2.1 Where possible, consideration should be given to the re-use of material back into the Scheme, however the proposed Scheme would require specific materials to be imported to the site.

2.2.2 Any waste produced through the importation of materials needs to be monitored and included in the SWMP under construction works. Where possible, consideration should be given to the use of recycled imported material such as concrete, which has a higher recycled content. However, due to the high level of specification expected of the material required for the tunnel structure, this may not be considered a viable option.

2.3 Fit Out Material

2.3.1 Imported materials for the final fit out of the tunnels and associated infrastructure should meet pre-designed specification, which would have taken into consideration designing out waste measures.

2.4 Construction and Demolition wastes (C & D)

2.4.1 Construction and demolition wastes typically include concrete (structural and pavement), bricks, glass, wood, plasterboard, metals and plastics.

2.4.2 Two large (approximately 1.4m diameter) rising mains, forming part of the Royal Victoria Dock drainage discharge into the River Thames, traverse the alignment of the tunnel in the vicinity of the DLR viaduct. It would be necessary to divert these mains, potentially producing waste from the diversion/replacement of pipes and with the reinstatement/relocation of the drainage system during the tunnel works.

2.5 Tunnel Materials

2.5.1 The bored tunnel section could be constructed using a segmental concrete lining, excavated through the use of a TBM, which would form the structural (or primary) lining. The type of TBM selected could be one of two options, using either a slurry shield or earth pressure balance configuration. These two machines are similar in many ways although they balance the pressure of the excavation differently, using pressurised slurry or controlling the rate of material excavation respectively. The condition of the excavated material is also vastly different with post processing required for the slurry shield TBM in order to separate the slurry and excavated material.

2.5.2 Final TBM selection would be determined by the contractor based on the assessment of the construction risk with consideration for tunnel alignment depth and associated ground pressure, ground cover, anticipated geology and depth of the water table. The Reference Design has therefore ensured that sufficient temporary land is available for a slurry separation plant if this option is chosen.

2.5.3 Due to the size of the tunnel bores the anticipated excavated spoil at any one time are likely to consist of more than one type of material (i.e. different stata). It is also expected that these materials would not be impacted by contamination.

2.5.4 If the water content of the excavated material is considered too high for transport by barge it may be necessary to dry it out prior to transportation.

2.5.5 The TBM would be maintained underground and by-products of this process would be typically, oils and greases, which are non-mineral and biodegradable.

2.6 Vegetation

2.6.1 In order for construction to take place, areas of vegetation, comprising mainly of grass and shrubs would require clearance in advance of general excavation works. If Japanese Knotweed, or any other invasive species, is located then special measures would be required to deal with this vegetation. For any vegetation removed consideration should be given to mulching and/or composting of vegetation materials. Reuse of such materials should be considered where possible. For example suitable vegetation could be turned into mulch or compost to be re-used back in the Scheme for landscaping purposes.

2.6.2 If any material deemed acceptable from the enabling works is produced e.g. good quality topsoil, this should be stored and re-laid, within the Scheme or if this is not possible should be sent for composting.

2.7 Excavated Materials (E)

2.7.1 Materials such as excavated soils should be segregated during the excavation process. Appropriately experienced staff, familiar with working on brownfield sites and the contaminant groups anticipated should supervise the excavation works to manage the segregation of soil materials. Site-derived materials of a similar nature should be stockpiled together and any changes in the physical and/or chemical properties should prompt further segregation.

2.7.2 Soils should be placed in clearly identified stockpiles and chemical testing undertaken to confirm the potential for re-use on site, or, if considered inappropriate for re-use (due to geotechnical or chemical properties or being surplus), to inform off site treatment and/or disposal routes. Where soil materials meet the geotechnical and chemical criteria for re-use given the proposed end use scenario, such materials may be re-used on site, if required. Any surplus materials should be removed from site for either direct beneficial use elsewhere (such as land remediation schemes) or for recycling or recovery at an appropriately permitted off-site facility. Where excavated materials are affected by contamination, such materials should be separated and sent for either treatment, where appropriate, or disposal at appropriately permitted facilities.

2.7.3 As part of the construction phase works, tunnelling activities, portal construction and general construction works, excess spoil would be produced. Excess material from tunnelling and other excavation activities would be removed from the construction sites at Greenwich Peninsula and Silvertown by road or river transport.

2.7.4 Where possible alternatives have been exhausted there would be a requirement to dispose of excavated material, by licensed carriers, to licensed landfill sites and handled in accordance with the Waste Management Regulations[1].

2.8 Contaminated Waste

2.8.1 As mentioned above given the nature of the works and site history there is the potential for works associated with the construction of the approach roads and cut and cover tunnel sections on both sides of the river to give rise to potentially contaminated material that would require remediation and/or appropriate disposal.

2.9 Hazardous Waste

2.9.1 Hazardous waste including any contaminated soil materials would be identified, removed and kept separate from other C&D waste materials in order to avoid further contamination and would be disposed of in accordance with the Hazardous Waste Regulations[5].

2.9.2 Asbestos based materials may arise during the excavation of the ground for tunnels and portals especially in areas of previously high industrial use and the historic gas works. Asbestos fragments in soil and low levels of loose fibres in soils have been identified within some of the samples taken during the ground investigation.

2.9.3 On Greenwich Peninsula the edge of one of the main historic gas works' buildings was located above the proposed alignment with the possibility of foundations or items of infrastructure (including asbestos sheeting) remaining underground. No records have been found detailing the demolition of these buildings.

2.9.4 Site wide remediation of the gasworks was undertaken during the late 1990s by British Gas and English Partnerships. It is understood that key sources of contamination, such as tar tanks and known contamination hot spots, were removed, groundwater remediation was undertaken and near surface soils were removed or cleaned prior to landscaping. However, it is understood that contaminated materials remain deeper beneath much of the site. Allowance would need to be made in the forecasted waste for the removal of these foundations and infrastructure.

2.9.5 Should asbestos be encountered, it must be managed by a qualified asbestos removal contractor and all asbestos must be removed off site in accordance with legislation and disposed of in a licensed tip by a licensed facility in accordance with all appropriate regulations.

[5] The Hazardous Waste (England and Wales) Regulations 2005 (SI 2005/894) as amended SI 2009/507, SI 2011/988, SI 2015/1360

3 WASTE FORECAST

3.1.1 One of the initial stages of completing the SWMP is to forecast anticipated waste arisings. Doing this allows for early stages of designing out waste and incorporating changes into design and on site management which could potentially lead to a reduction in waste.

3.1.2 The initial high level estimates produced are formulated from available scheme data including current design and cost estimates.

3.1.3 Appendix B contains the forecast waste tables from the WRAP spreadsheet produced for both the temporary and permanent works for the Silvertown Scheme. The waste forecast tables set out the current estimates of waste types and quantities that are anticipated from this Scheme. This list is not exhaustive and additional waste streams shall be added when they occur.

3.1.4 The forecast tables cover construction, demolition and excavation waste activities.

3.1.5 The forecast waste table provides important information such as identifying the waste activity (construction, demolition or excavation), waste stream, material type, LOW code and waste or re-use potential.

3.1.6 Demolition and excavation waste quantities are calculated as whole for an activity, i.e. assuming all of the material is classified as a waste and generally based on estimated volumes.

3.1.7 Construction waste quantities are calculated by using WRAP and industry standard wastage rates. The rates assume a certain percentage of the imported material would become a waste.

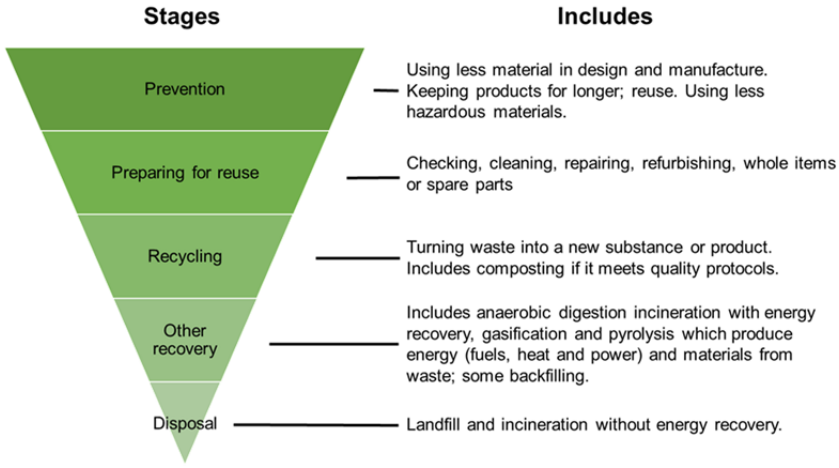
3.1.8 As well as determining where waste has been generated there are other considerations to waste management such as waste reduction, segregation of waste, disposal of waste, financial impacts of waste disposal.

[BLANK PAGE]

4 WASTE MANAGEMENT STRATEGY

4.1.1 The waste management strategy for the Scheme would follow the accepted waste hierarchy:

Figure 4-1: Waste management strategy hierarchy



4.1.2 Contractors, design teams and suppliers are encouraged to minimise the amount of waste produced at the work sites. Waste arisings have been considered in terms of their suitability for:

- reuse on site: as part of the development or future maintenance works;
- reuse off site: materials of reusable value but for which a need cannot be demonstrated on site; and
- recycling off site: were materials are suitable for recycling/ treatment at an appropriately permitted facility.

4.1.3 Where the reuse and recycling options above are not applicable it is assumed that the waste would need to be sent for disposal.

4.1.4 This SWMP helps to ensure best practice and sustainability are considered at the demolition, excavation and construction phases of the Scheme. The recovery for construction, demolition and excavation waste should be targeted at 95%, ensuring WRAP best practice guidelines are implemented. The following sections aim to highlight potential areas of waste minimisation and management that should be considered as part of this scheme's waste management strategy.

4.2 Reduction

4.2.1 By implementing a SWMP from design stage it is possible to reduce the amount of waste produced as part of the Scheme.

4.2.2 Construction waste, or waste arising from imported material may be reduced by adapting working methods.

4.2.3 Over-purchasing can lead to significant wastage and should be avoided in the first place. Ensuring materials are ordered for delivery shortly before they are used on the Scheme would also avoid possible damage and therefore wastage.

4.2.4 A continual review of the type of surplus materials being generated and change the site set up to maximise re-use or recycling and minimise the use of landfill.

4.2.5 Materials delivered to the Scheme would be received and controlled by the DBFM Contractor. Materials would be stored to minimise the potential of damage or wastage. Measures would include off-ground storage e.g. on pallets, remaining in original packaging, protection from rain damage or collision by plant or vehicles.

4.2.6 The materials storage area would be secured during out of hours to prevent unauthorised access.

4.3 Segregation of non-soil waste

4.3.1 It is essential that the construction and demolition work is carried out closely with the waste management contractors, in order to determine the best techniques for managing waste and ensure a high level of recovery of materials for recycling.

4.3.2 A specific area shall be laid out and labelled to facilitate the separation of materials, where possible, for potential recycling, salvage, reuse and return. Recycling and waste bins are to be kept clean and clearly marked in order to avoid contamination of materials. Potential skips for segregation of waste identified currently are:

- Mixed inert (e.g. concrete and rubble)
- Hazardous (e.g. asbestos, poly-chlorinated bi-phenols)
- Mixed non-hazardous (biodegradable waste, welfare waste, general waste)
- Metal (e.g. copper and iron)
- Wood (e.g. fencing/hoarding)
- Food (canteen waste)
- Paper and cardboard (office waste)
- Waste Electronic and Electrical Equipment (WEEE) (e.g. cables, disused electrical appliances and equipment)
- Oils and oily rags

4.3.3 Successful recycling relies upon early planning, clear responsibility and space within a compound for segregation and storage. Shelter may be needed to prevent some materials such as cardboard and paper from deteriorating while being sorted or awaiting collection.

4.3.4 Space requirements within the compound would need to be identified to accommodate skips and storage of reusable materials.

4.3.5 For all waste management options on the site compound, consideration would need to be given for identifying whether waste exemptions or permits are required to enable the storage and treatment of waste materials.

4.3.6 Waste management options would be supported by the identification of appropriately permitted waste management and recycling facilities in close proximity to the site compound.

4.4 Colour-coded skips

4.4.1 Different coloured skips (or sufficiently clear labelling) would be used to ensure that construction workers are clear about where to put each type of waste. This would reduce the levels of contamination in the skips and increases the likelihood that a load would not subsequently be rejected once the waste stream has been sent off-site for reprocessing. In cases where the load is rejected, the likely destination would be landfill (which would increase the costs of the Scheme).

4.4.2 Typical segregated skip categories and management methods include:

- Wood — Recycle
- Cable — Recycle
- Concrete — Recycle
- Plastic — Recycle
- Metal — Recycle
- Paper and cardboard (may be bagged up) — Recycle
- General domestic waste — Recycle/Dispose
- Spoil (only if contaminated) — Dispose

4.4.3 Skips would be monitored by the DBFM Contractor to ensure that contamination of segregated skips does not occur.

4.5 Soil waste

4.5.1 If applicable, surplus inert excavated materials with some engineering strength (e.g. stone, bricks, clay, rubble, rock) can be suitable for re-use in land reclamation schemes. The material could be re-used in other schemes in the surrounding area, if one were proceeding at the same time, to avoid disposal at landfill and its associated impacts and costs but would need to meet current legislative requirements. This would require compliance with the criteria and thresholds for an exemption (U1 or U11 may be applicable) or it may require a permit under the Environmental Permitting Regulations 2010[6] as amended.

4.6 Contaminated land and Hazardous waste

4.6.1 The cost of hazardous waste treatment and disposal is significantly higher than treatment or disposal of non-hazardous or inert waste. Through identifying areas of contamination early on, the scheme layout and construction methods to be adopted could be amended to minimise the handling of such materials, potentially reducing the scheme costs. Any soils removed from site during construction would be subject to a soil screening and Waste Acceptance Criteria (WAC) testing to determine their destination facility i.e. type of landfill etc.

4.6.2 The WAC as per the Landfill Directive[7] establishes the criteria and procedures for the acceptance of waste at landfills at the three classes of landfill – hazardous, non-hazardous or inert. The WAC for the three classes are:

- a list of wastes which may be accepted at a landfill for inert waste without testing;
- limits on the leachability of certain parameters; and
- limits on the organic content of the waste.

4.6.3 Hazardous waste cannot be re-used on site nor can it be mixed with non-hazardous wastes. There is a statutory requirement under the Landfill Directive[7] to pre-treat any waste (including hazardous waste) at the point of origin or at an alternative suitable site prior to disposal. Pre-treatment may reduce the cost of disposal by rendering the waste non-hazardous.

4.6.4 Where potentially contaminated materials are encountered, the following measures should be employed:

- Prepare a ‘quarantine’ receiver site with a bunded perimeter to a suitable size compared to the assumed quantity of materials (a maximum height to be agreed);

[6] The Environmental Permitting (England and Wales) Regulations 2010 (SI 2010/675) as amended SI 2010/676, SI 2010/2172, SI 2011/2043, SI 2011/2933, SI 2012/630, SI 2013/390, SI 2013/766, SI 2014/255, SI 2014/2852, SI 2015/324, SI 2015/918, SI 2015/1360
[7] Landfill Directive 99/31/EC and Council Decision 2003/33/EC

- The storage area would have an impermeable base to prevent leachate escape and would be protected against flood damage or inundation with any accumulated rainwater regularly emptied and managed appropriately. The area would be regularly checked and kept in a good condition, as well as being protected from vandalism. Appropriate spill kits would be available, located near to the hazardous waste storage area and checks carried out regularly to ensure they are adequately stocked;
- Take samples at a predetermined rate appropriate to the type and quantity;

4.6.5 Decide treatment and/or disposal of materials upon receipt of soil analysis results. Where this waste needs to be removed from site, a suitable disposal facility would be sourced. The facility would have the relevant licenses and permissions to receive the waste and waste transfer notes, with relevant waste codes, would be raised and the materials moved from site with a licensed waste carrier and a consignment note due consideration of the Duty of Care[3] requirements**.** Responsibility for the basic classification of waste rests with the producer and landfill operator.

4.6.6 All site staff would be made aware of their responsibilities and liabilities in terms of hazardous waste handling and management at site inductions and repeated during toolbox talks. Uncontaminated material would be reused where possible within the proposed improvement works for site levelling and fill. However it is still likely that there would be a requirement for importation of additional fill materials with specific properties such as structural backfill and topsoil.

4.6.7 When hazardous waste is generated all efforts would be made to ensure it is not stored on site any longer than is necessary.

4.7 Disposal and Treatment Options

4.7.1 Suitable treatment and recycling facilities within a reasonable proximity of the Silvertown Tunnel site should be identified by The Contractor. The Environment Agency may also be contacted to determine the most appropriate waste transfer station to handle the waste material being produced. The transfer station would then send it off for final disposal at an appropriate landfill site.

4.7.2 The Landfill Directive[7] requires that disposal sites are classified into one of three categories dependent on the chemical composition of the material; these are hazardous, non-hazardous and inert.

4.7.3 The ability for materials to be deposited at these sites would be dependent on the available space and the conditions imposed on the sites through the relevant licence/permit.

4.7.4 For excavated materials that are confirmed to be non-hazardous, by chemical screen e.g. using Soil Guideline Values (SGVs), there are a number of reuse and recycling opportunities.

4.7.5 The excavated materials could be used as infill, bunding and landscaping on the site. Further uses could be for construction or maintenance of pavements, footings for fencing etc. Material produced could also be used in the laying of roads around the site or stored for later use, providing there are adequate storage areas and the material is adequately managed to minimise dust and run off.

4.7.6 The majority of excavated material from the tunnel construction would be taken as “natural” material, the volume of which exceeds that for reuse on site. This material would be transported to a sustainable location such as a remediation scheme (e.g. Wallasea Island).

Table 4-1: General material resource efficiency measures to be considered for Silvertown Tunnel

Summary of Proposed and Recommended Minimisation Measures		
Excavation	Proposed	Excavation is likely to be for highways, tunnels and portals and foundations. It is anticipated that any waste produced through the construction of the tunnels would be cut and fill and be reused elsewhere on site if possible. Surplus excavated materials including soils, gravels and man-made fill can potentially generate the largest quantities of all the waste streams with significant implications on disposal costs if it cannot be reused on site a cut and fill balance produced during the design stage is recommended. Excavated material suitable for reuse, where appropriate, would be stored for reuse as landscaping material or infilling.
Minimisation of vegetation clearance at the design phase	Recommended	As the site is potentially grass with some shrubs, clearance of vegetation has the potential to be insignificant due to the nature of the area as former industrial/gasworks. Identify, during the design phase, ways to minimise the loss of vegetation on site. Where minimisation is not possible, composting or mulching the vegetation should be considered for reuse in landscaping within the Scheme.
Minimisation of contaminated land arisings	Recommended	Where possible contaminated land should be remediated and reused on site, or, if found to pose no risk to receptors (e.g. groundwater and human health) should be left undisturbed. The latter can minimise potential transport and disposal costs. This approach should be standard practice among designers and contractors.
Contractor targets	Recommended	The DBFM Contractor should consider setting off-cut/surplus targets for sub-contractors with a positive incentive scheme for on-site waste champions. Good practice suggests that 3% wastage rate based on the total amount of construction material handles on site is achievable. Setting targets at design stage that are incorporated into procurement is recommended

Summary of Proposed and Recommended Minimisation Measures		
Imported Material	Recommended	Enabling the purchase of materials in shape/dimension and form that minimises the creation of off-cuts/waste. Avoiding over-purchasing as this can lead to significant wastage and should be avoided in the first place. Ensuring materials are ordered for delivery shortly before they are used on the Scheme would also avoid possible damage and therefore wastage. Secure storage to minimise the generation of damaged materials/ theft. Keeping deliveries packaged until they are ready to be used and the inspection of deliveries on arrival helps to reduce damage and wastage.
Use of take back schemes	Recommended	Some suppliers offer a take back scheme, which should be utilised where practicable, particularly for packaging and pallets.
Monitoring and review	Recommended	The DBFM Contractor should use the waste data provided from the waste removed from the Scheme and the periodic review process (required as part of the SWMP) to their advantage to assess whether the waste objectives are being met, and if not to review procedures to steer the Scheme towards achieving them. This would require clear responsibilities to be identified, supported with authority and incentives to act on any deviations from the SWMP.
Education and awareness	Recommended	Waste minimisation must be underpinned by education and awareness throughout all levels of the project team, from the design team to site contractors who handle the construction materials via site inductions and monthly toolbox talks which all contractors and site workers would be expected to attend.
Consideration of End of Life materials	Recommended	Consideration should be given to what would happen to the materials specified when they reach the end of their useful life. Where possible, elements should be designed for repair, modular repair, recycling at the end of life or safe disposal. The use of hazardous materials, in particular, should be minimised.

5 TRAINING

5.1.1 The DBFM Contractor would provide on-site instruction and training of appropriate separation, handling, recycling, and reuse and return methods to be used by all parties, at all appropriate stages of the Scheme. This may include an initial toolbox talk that may form part of the site induction process that introduces and explains the requirements of the SWMP and the concept of the waste hierarchy, as well as regular toolbox talks that provide updates on wider environmental issues. Appropriate staff should be identified to attend these.

5.1.2 Where possible the Scheme would appoint a waste champion to act as a point of contact to deal with any waste queries from staff, provide staff with waste statistics on the Scheme for example good or bad recycling rates, resolve complaints regarding waste from the public and verify the waste transfer notes/consignment notes produced from the Scheme.

[BLANK PAGE]

6 MONITORING

6.1.1 Under the Duty of Care Regulations[3] the Contractor has a number of responsibilities which it would execute as follows:

- To ensure that suitable storage is made available, including correct signage;
- To check the waste carrier are correctly licensed; and
- To retain Waste Transfer Notes / Consignment Notes for 2/3 years as appropriate.

6.1.2 Responsibility for waste management lies with the Contractor unless a contractual agreement with sub-contractors to manage their own waste arisings exists – the contractor would still ensure the Duty of Care process when this situation occurs.

6.1.3 Duty of Care details are to be logged in the appropriate tabs within the SWMP. Details are to include the waste management licenses, waste carrier licenses and exempt site licenses for waste management contractors employed on the Scheme. All waste management contractors licences must be checked and verified before any waste movement occurs.

6.1.4 Table 6-1 below is an extract from the WRAP SWMP template which would be populated with such detail, including waste management facility information once the Scheme commences.

6.1.5 All Waste Transfer Notes would be safely stored for 2 years. Consignment notes for the transport of hazardous waste would be held for 3 years. The Scheme could also consider using electronic transfer notes rather than paper based. An example of such a system is Department for Environment Food & Rural Affair's Electronic Duty of Care (Defra Edoc).

6.1.6 In addition to monitoring and recording the performance of transport contractors and waste management facilities could be monitored periodically through the lifespan of the contract. This would ensure that high standards of compliance and environmental performance are maintained throughout the supply chain, including accurate recording of waste types and the origin/destinations of materials.

6.1.7 Waste monitoring would be included as an agenda item at construction progress meetings. In addition, this SWMP would be communicated to the whole project team (including the client) at regular management meetings.

Table 6-1: Specified Waste Carriers (Extract from WRAP SWMP)

I have :

Identified all persons removing the waste.	Yes
Identified all waste carriers and registration numbers.	Yes
A copy of, or reference to, the written description of the waste required by section 34 of the	Yes
Identified that the sites that the waste is being taken to and whether the operators of those sites hold a permit under the Environmental Permitting (England and Wales) Regulations 2007 or are	Yes

Specify Waste Carriers

Name	Contact Details	Date checked with Environment Agency (dd/mm/yyyy)	Registration Number	Expiry Date (dd/mm/yyyy)

Specify Waste Management Facilities

Name	Type of facility	% reused if known	% recycled if known	% energy recovery if known	% total all forms of recovery	Overall diverted from landfill / recovery	Date checked with Environment Agency (dd/mm/yyyy)	Licence / Exemption Number	Location of relevant documentation, e.g. WTN	C, D or E Activity (Leave blank if same facility & recovery rate are used for different waste streams)	Waste Stream
						0%					
						0%					
						0%					
						0%					
						0%					

7 ACTUAL QUANTITIES

7.1.1 In accordance with the SWMP Regulations1 it is mandatory to record the type and quantities of waste produced and what has happened to this waste.

7.1.2 Table 7-1is an extract from the Actual Waste Movements tab of the WRAP SWMP spreadsheet. The table provides an example of how the waste material movements should be logged, which ultimately feeds into actual waste figures for each waste activity (on subsequent WRAP template tabs).

7.1.3 Important information to be noted includes: waste activity, LOW code, off-site carrier and destination and waste totals (amongst others).

7.1.4 Maintaining these records would also help to identify which waste streams are not achieving their anticipated recycling potential so that alternative methods to handle that waste stream can be explored for the remainder of the Scheme.

7.1.5 The table within the template would be completed during construction.

Table 7-1: Actual Waste Movement Recording

Actual Waste Movements

Movement Number	C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	LOW Code used	On or off-site destination	Off-site carrier	Off- site destination	Overide facility recovery rate for individual skip	Overall diversion from landfill / recovery (further detail on Sheet 4)	Date of Movement(s) (dd/mm/yyyy)	Waste Totals (m^3)	(tonnes)	Actual Cost	£/m^3	£/t
1										100%						
2										100%						
3										100%						
4										100%						
5										100%						
6										100%						
7										100%						
8										100%						
9										100%						
10										100%						

*The WRAP spreadsheet includes a predetermined rate of 100% diversion from landfill, which is solely for illustrative purposes only in this example of the table. This rate will be updated after the project commences with actual individual facility diversion rates

8 REVIEW

8.1.1 The SWMP shall be reviewed on a six monthly basis – however further reviews shall take place where any significant changes occur. A log should be kept of when the plan has been reviewed and the outcomes.

8.1.2 An appropriate monitoring regime of the waste objective and targets shall be put in place.

8.1.3 Table 8-1 provides an example of a SWMP review checklist.

Table 8-1: Review Checklist

CHECKS – ENTER YES OR NO	YES	NO
Has a WM Contractor(s) been appointed with terms and conditions agreed?		
Have all WM Contractor(s) Carriers & Disposal Licences been checked & verified?		
Has a data reporting procedure been agreed with the WM Contractor(s)?		
Has a waste compound and segregation area been adequately set up & resourced?		
Has a SWMP implementation planning meeting been set up?		
Has the waste management document control process been set up?		
Have all necessary staff read & signed the SWMP?		
Have all site and sub-contractor staff been trained / briefed on SWMP requirements?		
Have waste management objective and targets been set?		
Has the SWMP received approval from the Project Lead?		
List comments and further actions if necessary		

[BLANK PAGE]

9 POST SCHEME COMPLETION

9.1.1 At the end of the Scheme, both TfL and the DBFM Contractor are responsible for reviewing, revising and refining the SWMP as necessary within three months of completion, in accordance with the SWMP Regulations[1], to ensure best practice and to identify if lessons could be learned for the next time a similar scheme is undertaken. This review must identify and conclude the following:

- Confirmation that the SWMP has been monitored and updated within the defined timescales;
- An explanation of any deviation from the original plan;
- A comparison of the estimated quantities of each waste type against the actual quantities generated; and
- An action plan to address the lessons that have been learnt from the Scheme that could be implemented for the next scheme.

9.1.2 An estimation of the cost savings (if any) that have been achieved through the measures undertaken to minimise, reuse, recycle or recover waste arisings rather than just sending it to landfill should be recorded.

9.1.3 The “reporting” tab of the SWMP summarises key performance indicators such as: diversion from landfill, cost of waste disposal and recovery of materials.

9.1.4 From this comparison reasons for any variance in quantities can be drawn and lessons learned shall be taken forward to future schemes.

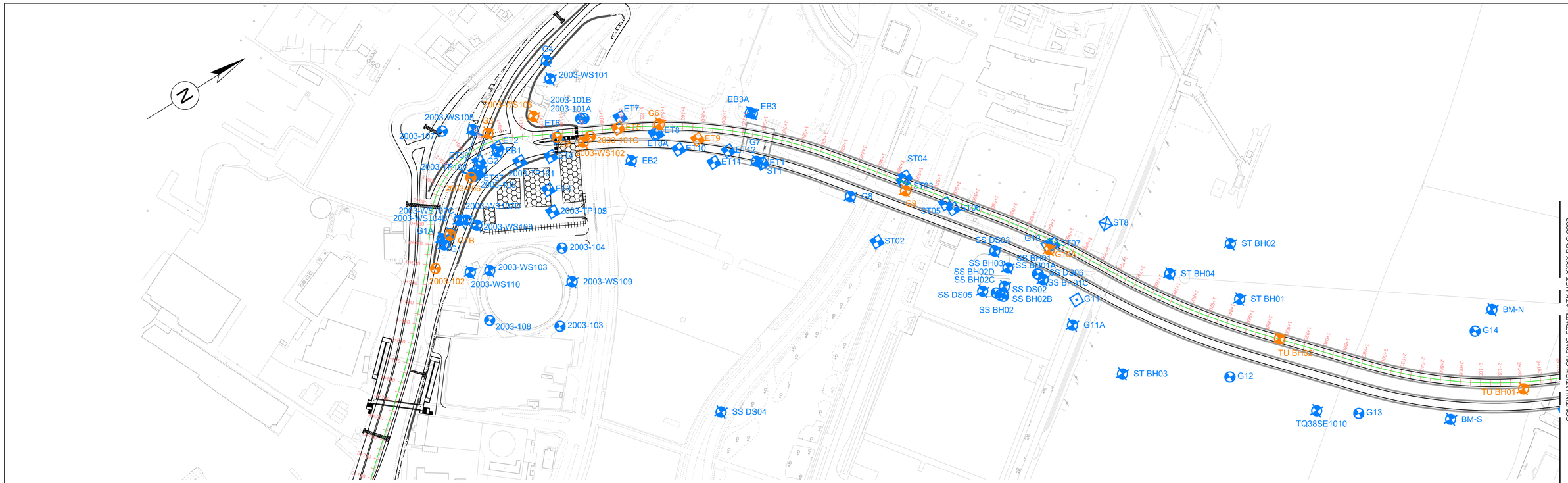
9.1.5 At this time any final estimated / quantified cost savings can be identified.

Appendix A – Geological Long Section and Location Plans

DO NOT SCALE

0 10 100

Millimetres



PLAN

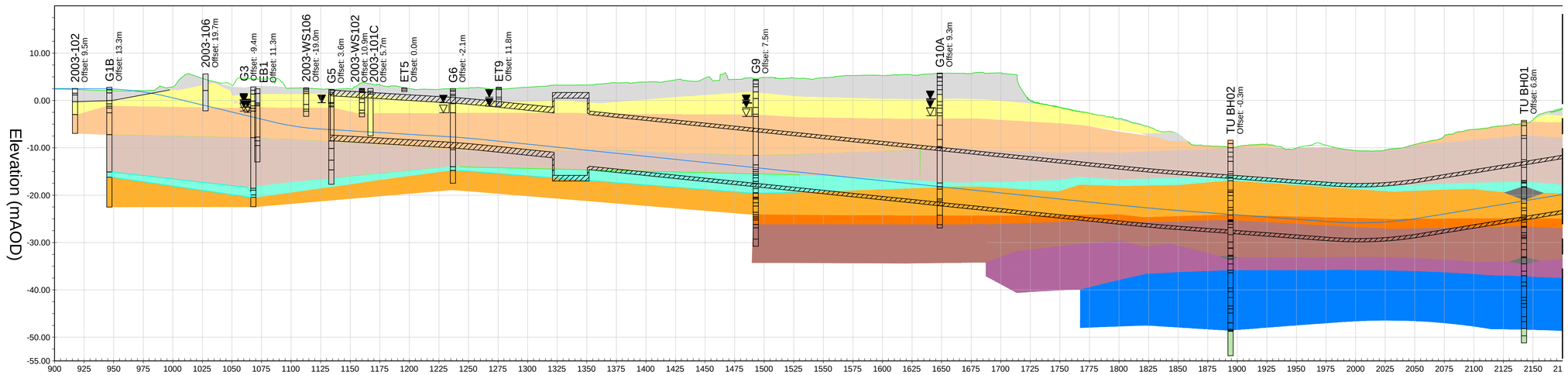
1:2000

KEY:

- HARDSTANDING
- MADE GROUND
- ALLUVIUM
- RIVER TERRACE DEPOSIT
- LONDON CLAY
- HARWICH FORMATION
- WOOLWICH FORMATION LAMINATED BEDS
- WOOLWICH FORMATION LOWER SHELLY CLAY
- READING FORMATION LOWER MOTTLED CLAY
- UPNOR FORMATION
- THANET SAND
- CHALK
- ZONE OF CORE LOSS
- EXISTING GROUND LEVEL
- ROAD ALIGNMENT
- TUNNEL OUTLINE

50m 0m 50m 100m

Scale 1:2000



LONG SECTION

1:2000H 1:500V

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
Groundwater is contiguous with the tidal River Thames throughout the geological sequence. High groundwater pressures may be expected at the tunnel face throughout the tunnel drive.

Maintenance / Cleaning
None

Use
None

Decommissioning / Demolition
None

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE GROUND INVESTIGATION REPORT (GIR) STWTN-ATK-VGT-XXXX-RP-GE-0001.
2. TOPOGRAPHY IS TAKEN FROM THE TOPOGRAPHICAL SURVEY STWTN-ATK-GEN-XXXX-M3-G-0001.
3. RIVER BED LEVEL IS TAKEN FROM THE BATHYMETRY SURVEY STWTN-ATK-VTO-XXXX-M3-G-0002.
4. GEOLOGICAL DATA USED IN THE THREE DIMENSIONAL (3-D) MODEL (STWTN-ATK-GEN-XXXX-M3-Z-0001) HAS BEEN SOURCED FROM A NUMBER OF GROUND INVESTIGATION REPORTS, INCLUDING
   a. ATKINS, DLR LCY EXTENSION, 1998
   b. ATKINS, GREENWICH PENINSULA, 2003
   c. BURO HAPPOLD, LONDON CABLE CAR, JULY 2011
   d. ATKINS, SILVERTOWN TUNNEL, JUNE 2015
5. THE GEOLOGICAL SECTION SHOWN IS A SLICE THROUGH THE 3-D GROUND MODEL, USING ALL OF THE AVAILABLE DATA, AS LISTED IN NOTE 4. THE BOREHOLES SHOWN ON THE SECTION ARE A SELECTION ALONG THE LINE OF SECTION, FOR ILLUSTRATIVE PURPOSES ONLY. THEY DO NOT REPRESENT THE TOTALITY OF DATA USED TO GENERATE THE SECTION.
6. THE GEOLOGICAL SECTION IS TAKEN ALONG THE CENTRE LINE OF THE NORTH TUNNEL.

Rev	Drawn / Des	Checked	Approved	Date
P01	JC	FR	SRM	19/06/15
Draft				
P02	SB	MK	MK	25/09/15
For TfL Review				

Description

Drawing Status: FOR REVIEW AND COMMENT
Suitability: S3

ATKINS
Woodcote Grove
Ashley Road
Epsom
Surrey
KT18 5BW
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Transport for London

Project Title: SILVERTOWN TUNNEL REFERENCE DESIGN

Drawing Title: GEOLOGICAL LONG SECTION AND LOCATION PLAN SHEET 1 OF 2

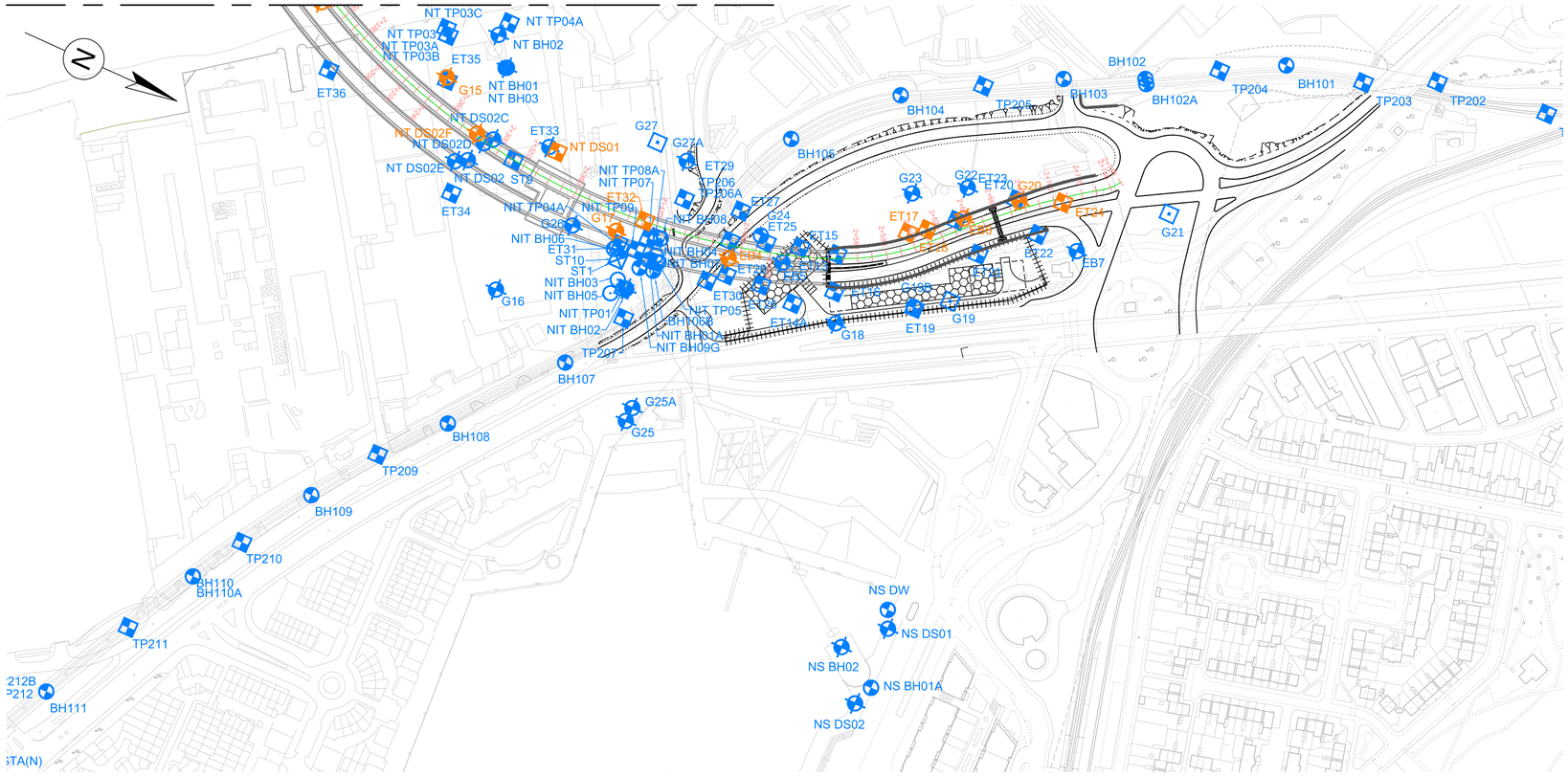
Scale	Designed / Drawn	Checked	Approved	Authorised
AS SHOWN	SB	MK	MK	MK
Original Size	Date	Date	Date	Date
A1	25/09/15	25/09/15	25/09/15	25/09/15

Drawing Number: STWTN-ATK-HGT-XXXX-DR-C-0001
Revision: P02

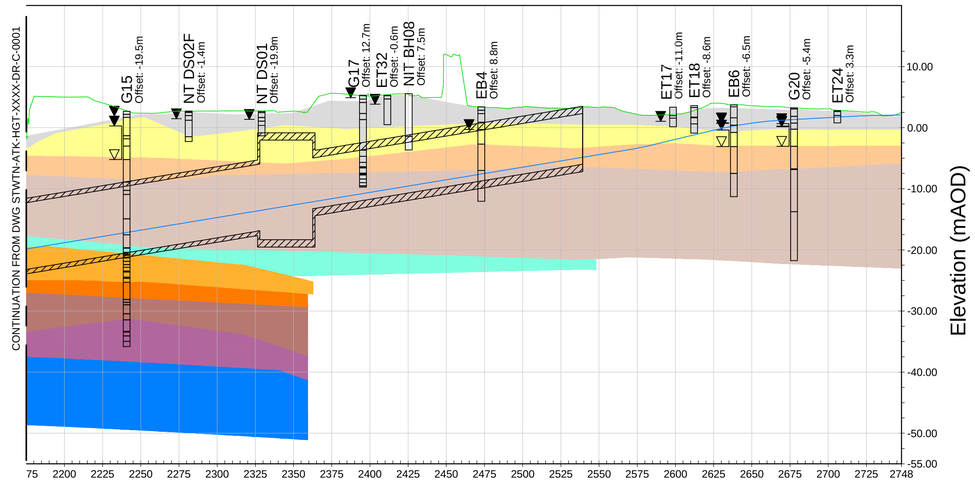
Plotted: Sep 25, 2015 - 2:02pm by: BROW3184

DO NOT SCALE 0 10 Millimetres 100

CONTINUATION FROM DWG STWTN-ATK-HGT-XXXX-DR-C-0001



PLAN
1:2000



LONG SECTION
1:2000H 1:500V

KEY:

- HARDSTANDING
- MADE GROUND
- ALLUVIUM
- RIVER TERRACE DEPOSIT
- LONDON CLAY
- HARWICH FORMATION
- WOOLWICH FORMATION LAMINATED BEDS
- WOOLWICH FORMATION LOWER SHELLY CLAY
- READING FORMATION LOWER MOTTLED CLAY
- UPNOR FORMATION
- THANET SAND
- CHALK
- ZONE OF CORE LOSS
- EXISTING GROUND LEVEL
- ROAD ALIGNMENT
- TUNNEL OUTLINE

50m 0m 50m 100m
Scale 1:2000

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
Groundwater is contiguous with the tidal River Thames throughout the geological sequence. High groundwater pressures may be expected at the tunnel face throughout the tunnel drive.

Maintenance / Cleaning
None

Use
None

Decommissioning / Demolition
None

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE GROUND INVESTIGATION REPORT (GIR) STWTN-ATK-VGT-XXXX-RP-GE-0001.
2. TOPOGRAPHY IS TAKEN FROM THE TOPOGRAPHICAL SURVEY STWTN-ATK-GEN-XXXX-M3-G-0001.
3. RIVER BED LEVEL IS TAKEN FROM THE BATHYMETRY SURVEY STWTN-ATK-VTO-XXXX-M3-G-0002.
4. GEOLOGICAL DATA USED IN THE THREE DIMENSIONAL (3-D) MODEL (STWTN-ATK-GEN-XXXX-M3-Z-0001) HAS BEEN SOURCED FROM A NUMBER OF GROUND INVESTIGATION REPORTS, INCLUDING
   a. ATKINS, DLR LCY EXTENSION, 1998
   b. ATKINS, GREENWICH PENINSULA, 2003
   c. BURO HAPPOLD, LONDON CABLE CAR, JULY 2011
   d. ATKINS, SILVERTOWN TUNNEL, JUNE 2015
5. THE GEOLOGICAL SECTION SHOWN IS A SLICE THROUGH THE 3-D GROUND MODEL, USING ALL OF THE AVAILABLE DATA, AS LISTED IN NOTE 4. THE BOREHOLES SHOWN ON THE SECTION ARE A SELECTION ALONG THE LINE OF SECTION, FOR ILLUSTRATIVE PURPOSES ONLY. THEY DO NOT REPRESENT THE TOTALITY OF DATA USED TO GENERATE THE SECTION.
6. THE GEOLOGICAL SECTION IS TAKEN ALONG THE CENTRE LINE OF THE NORTH TUNNEL.

Rev	Drawn / Des	Checked	Approved	Date
P01	JC	FR	SRM	19/06/15
Draft				
P02	SB	MK	MK	25/09/15
For TfL Review				

Description

Drawing Status: FOR REVIEW AND COMMENT
Suitability: S3

ATKINS
Woodcote Grove
Ashley Road
Epsom
Surrey
KT18 5BW
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Transport for London

Project Title: SILVERTOWN TUNNEL REFERENCE DESIGN

Drawing Title: GEOLOGICAL LONG SECTION AND LOCATION PLAN SHEET 2 OF 2

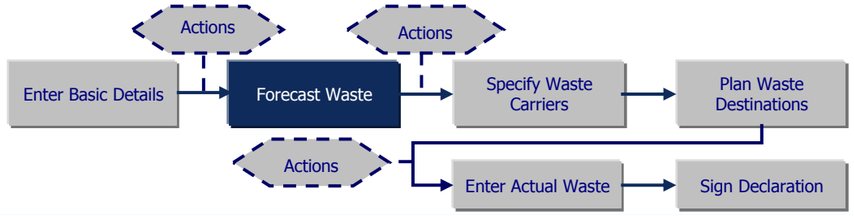
Scale	Designed / Drawn	Checked	Approved	Authorised
AS SHOWN	SB	MK	MK	MK
Original Size	Date	Date	Date	Date
A1	25/09/15	25/09/15	25/09/15	25/09/15

Drawing Number: STWTN-ATK-HGT-XXXX-DR-C-0002
Revision: P02

Plotted: Sep 25, 2015 - 2:03pm by: BROW3184

Appendix B – Temporary and permanent waste forecast tables (WRAP SWMP extract)

Material change for a better environment



?

Tell me about this sheet

TfL

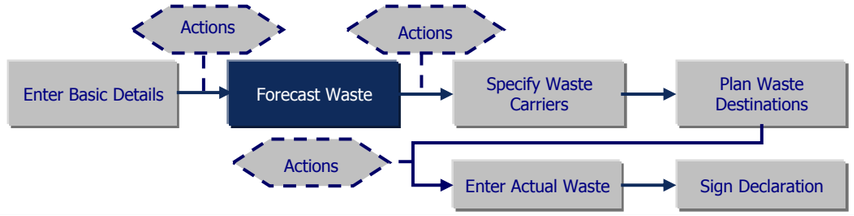
Silvertown- Temporary works

0

Forecast Waste

C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	Suggested LOW Code	Waste or Re-Use	Forecast Quantities (m^3)	Forecast Quantities (tonnes)	Calculated Quantities (Converting between m^3 and t) (m^3)	Calculated Quantities (tonnes)	Forecast provided by
Excavation	*Packaging*	*plastic packaging*	*plastic packaging*	*15 02 02*	*Off-site destination*	*###*	*###*	*###*	*###*	*A.N Other*
Excavation	Non Haz (Non Inert) - Dredgings	dredging spoil other than those mentioned in 17 05 05	Dredging and displaced material from piles.	17 05 06	Off-site segregated	46732		46732.00	23866.03	
Construction	Inert - mixture of concrete, bricks, tiles etc.	concrete	structural concrete-damage to components, miss pours and surplus concrete/screed/blinding - based on industry average waste rate of 2.5%. Values from Cost estimate July 2015 and Construction Method Statement for River Works July 2015.	17 01 01	Off-site segregated	23		23.00	29.21	
Construction	Metals	iron and steel	Reinforcement members/structural steel- off cuts and damaged components. Based on an industyr standard 7.55%. Values from Cost estimate July 2015 and Construction Method Statement for River Works July 2015.	17 04 05	Off-site segregated		2.55	6.22	2.55	
Construction	Packaging	mixed packaging	Packaging from all components delivered to the site for works- No data avalible so assumed 5% of total waste as a result of construction work.	15 01 06	Off-site mixed	1.3		1.30	0.27	
Demolition	Inert - mixture of concrete, bricks, tiles etc.	concrete	structural concrete-demolition of jetty at the end of the scheme. Values from Cost estimate July 2015 and Construction Method Statement for River Works July 2015	17 01 01	Off-site mixed	933		933.00	1184.91	

Material change for a better environment



?

Tell me about this sheet

TfL

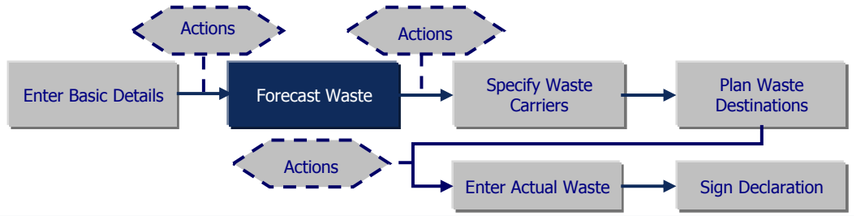
Silvertown- Temporary works

0

Forecast Waste

C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	Suggested LOW Code	Waste or Re-Use	Forecast Quantities (m^3)	Forecast Quantities (tonnes)	Calculated Quantities (Converting between m^3 and t) (m^3)	Calculated Quantities (tonnes)	Forecast provided by
Demolition	Metals	iron and steel	Reinforcement members/structural steel-removal of members during	17 04 05	Off-site segregated		34	82.93	34.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	
								0.00	0.00	

Material change for a better environment



?

Tell me about this sheet

Transport for London (TfL)

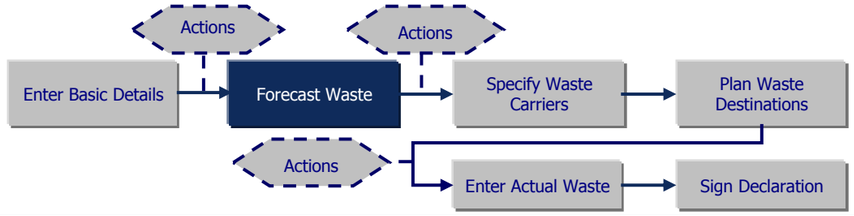
Silvertown Reference Design

0

Forecast Waste

C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	Suggested LOW Code	Waste or Re-Use	Forecast Quantities (m^3)	Forecast Quantities (tonnes)	Calculated Quantities (Converting between m^3 and t) (m^3)	Calculated Quantities (tonnes)	Forecast provided by
Excavation	*Packaging*	*plastic packaging*	*plastic packaging*	*15 02 02*	*Off-site destination*	*###*	*###*	*###*	*###*	*A.N Other*
Demolition	Inert - mixture of concrete, bricks, tiles etc.	bricks		17 01 02	Off-site segregated		44	36.67	44.00	
Demolition	Mixed C&D waste (17 09 04)	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03		17 09 04	Off-site mixed		290	333.33	290.00	
Demolition	Metals	iron and steel	light iron	17 04 05	Off-site segregated		54	131.71	54.00	
Demolition	Wood	wood		17 02 01	Off-site segregated		73	214.71	73.00	
Demolition	Gypsum (17 08 02)	gypsum-based construction materials other than those mentioned in 17 08 01		17 08 02	Off-site segregated		54	163.64	54.00	
Demolition	Metals	mixed metals	non ferrous	17 04 07	Off-site segregated		21	50.00	21.00	
Demolition	Metals	cables other than those mentioned in 17 04 10	cables	17 04 11	Off-site segregated		15	60.00	15.00	
Demolition	Inert - Glass	glass		17 02 02	Off-site segregated		21	34.43	21.00	
Demolition	Inert - mixture of concrete, bricks, tiles etc.	concrete		17 01 01	Off-site segregated		8978	7069.29	8978.00	
Demolition	Inert - mixture of concrete, bricks, tiles etc.	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06		17 01 07	Off-site segregated		1088	877.42	1088.00	
Demolition	Metals	iron and steel	ferrous	17 04 05	Off-site segregated		463	1129.27	463.00	
Demolition	Mixed C&D waste (17 09 04)	mixed construction and demolition wastes other than		17 09 04	Off-site segregated		31	35.63	31.00	
Demolition	Segregated Haz Waste	construction materials containing asbestos		17 06 05*	Off-site segregated		16	51.61	16.00	
Excavation	Inert - mixture of concrete, bricks, tiles etc.	concrete		17 01 01	Off-site segregated	9160		9160.00	11633.20	
Excavation	Inert - mixture of concrete, bricks, tiles etc.	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	asphalt	17 01 07	Off-site segregated	3851		3851.00	4775.24	
Excavation	Inert - Soil & stones	soil and stones (inert) other than those mentioned in 17 05 03		17 05 04	Off-site mixed	540490		540490.00	675612.50	
Excavation	Non Haz (Non Inert) - Soil & stones	Solid wastes from soil remediation other than those mentioned in 19 13 01		19 13 02	Off-site mixed	44240		44240.00	51760.80	

Material change for a better environment



?

Tell me about this sheet

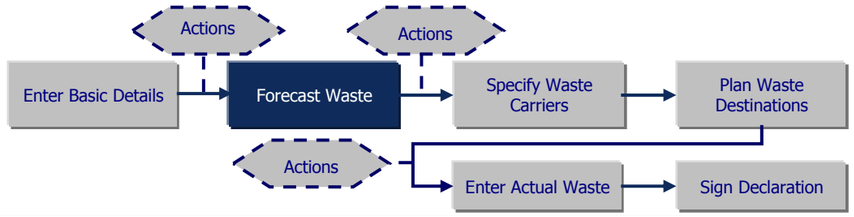
Transport for London (TfL)

Silvertown Reference Design

0

Forecast Waste

C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	Suggested LOW Code	Waste or Re-Use	Forecast Quantities (m^3)	Forecast Quantities (tonnes)	Calculated Quantities (Converting between m^3 and t) (m^3)	Calculated Quantities (tonnes)	Forecast provided by
Excavation	Segregated Haz - Soil & stones	soil and stones containing dangerous substances		17 05 03*	Off-site segregated	900		900.00	1125.00	
Construction	Inert - mixture of concrete, bricks, tiles etc.	concrete	Grout- damage to components, miss pours and surplus concrete/screed/blinding- industry standard 7.5%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015.	17 01 01	Off-site mixed	1003		1003.00	1273.81	
Construction	Inert - mixture of concrete, bricks, tiles etc.	concrete	STL insitu concrete- damage to components s, miss pours and surplus concrete, industry standard 2.5%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015	17 01 01	Off-site mixed	500		500.00	635.00	
Construction	Inert - mixture of concrete, bricks, tiles etc.	concrete	PTL- segmental concrete- damage to components, miss pours and surplus concrete/screed/blinding - based on industry average waste rate of 5%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015	17 01 01	Off-site mixed		1662	1308.66	1662.00	
Construction	Metals	iron and steel	structural steel- off cuts based on an industyr standard 7.55%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015.	17 04 05	Off-site segregated		79	192.68	79.00	



?

Tell me about this sheet

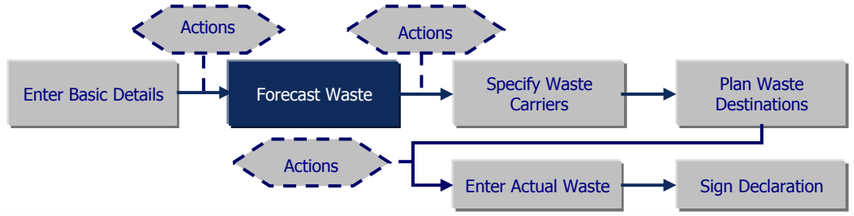
Transport for London (TfL)

Silvertown Reference Design

0

Forecast Waste

C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	Suggested LOW Code	Waste or Re-Use	Forecast Quantities (m^3)	Forecast Quantities (tonnes)	Calculated Quantities (Converting between m^3 and t) (m^3)	Calculated Quantities (tonnes)	Forecast provided by
Construction	Metals	iron and steel	structural steel- off cuts- based on an industyr standard 7.55%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015.	17 04 05	Off-site segregated	1779		1779.00	729.39	
Construction	Inert - mixture of concrete, bricks, tiles etc.	concrete	structural concrete-damage to components, miss pours and surplus concrete/screed/blinding - based on industry average waste rate of 2.5%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015.	17 01 01	Off-site mixed	3936		3936.00	4998.72	
Construction	Inert - mixture of concrete, bricks, tiles etc.	concrete	Mass concrete- damage to components, miss pours and surplus concrete/screed/blinding - based on industry average waste rate of 2.5%	17 01 01	Off-site mixed	564		564.00	716.28	
Construction	Inert - mixture of concrete, bricks, tiles etc.	concrete	Paving- damage to components, miss pours and surplus concrete/screed/blinding - based on industry average waste rate of 7.5%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015.	17 01 01	Off-site segregated	936		936.00	1188.72	



?

Tell me about this sheet

Transport for London (TfL)

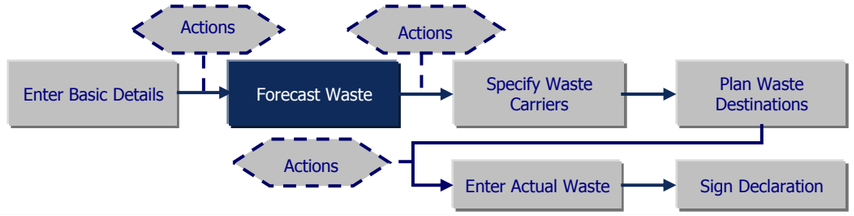
Silvertown Reference Design

0

Forecast Waste

C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	Suggested LOW Code	Waste or Re-Use	Forecast Quantities (m^3)	Forecast Quantities (tonnes)	Calculated Quantities (Converting between m^3 and t) (m^3)	Calculated Quantities (tonnes)	Forecast provided by
Construction	Mixed C&D waste (17 09 04)	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	Type 1 sub base-damage and surplus. Based on industry standard 13%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015.	17 09 04	Off-site mixed	6522		6522.00	5674.14	
Construction	Mixed C&D waste (17 09 04)	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	Imported fill-damage and surplus. Based on industry standard 13%. Values from Constructions Statement (STWTN-ATK-GEN-XXXX-RP-W-0005) and Cost Estiamte July 2015.	17 09 04	Off-site mixed	7545		7545.00	6564.15	
Construction	Packaging	mixed packaging	Packaging from all components delivered to the site for works- No data avalible so assumed 5% of total waste as a result of imported tunnel material.	15 01 06	Off-site mixed	1214		1214.00	254.94	
Construction	Metals	cables other than those mentioned in 17 04 10	Cables-off cuts- currently calculated at 1% of estimated total length (m). Values from Cost Estiamte July 2015.	17 04 11	Off-site mixed	28		28.00	7.00	
Construction	Other C&D segregated waste	bituminous mixtures other than those mentioned in 17 03 01	bitumen surfacing- including roads and tunnels-miss pours and surplus material. Waste at 4.9%. Values taken from cost estimate July 2015.	17 03 02	Off-site mixed	1950		1950.00	1599.00	
Construction	Metals	mixed metals	VRS-off cuts or surplus material. Based on 29kg per m. Value taken from cost estimate July 2015.	17 04 07	Off-site segregated		0.92	2.19	0.92	

Material change for a better environment



?

Tell me about this sheet

Transport for London (TfL)

Silvertown Reference Design

0

Forecast Waste

C, D or E Activity	Waste Stream	Material Type	Further description of waste - optional	Suggested LOW Code	Waste or Re-Use	Forecast Quantities (m^3)	Forecast Quantities (tonnes)	Calculated Quantities (Converting between m^3 and t) (m^3)	Calculated Quantities (tonnes)	Forecast provided by
Construction	Other C&D segregated waste	bituminous mixtures other than those mentioned in 17 03 01	Resin bonded tarmac- including roads and tunnels- miss pours and surplus material. Waste at 13%. Values taken from cost estimate July 2015/assumed thickness of 20mm.	17 03 02	Off-site mixed	183		183.00	150.06	
Construction	Other C&D segregated waste	baled plastic	Drainage-off cuts, damaged and surplus material. Based on 1% total m. Value taken from cost estimate July 2015.	17 02 03	Off-site segregated	87		87.00	20.01	
Construction	Mixed C&D waste (17 09 04)	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	Lighting-off cuts, damaged and surplus material. Based on 1% of total lenngth of tunnels in m. Values taken from cost estimate July 2015.	17 09 04	Off-site mixed	28		28.00	24.36	
Construction	Metals	iron and steel	structural steel/reinforcements- off cuts- based on an industyr standard 7.55%. Values from tunnel service building quantaties 2015.	17 04 05	Off-site segregated		746	1819.51	746.00	
Construction	Inert - mixture of concrete, bricks, tiles etc.	bricks	Bricks- off cuts, damaged and surplus material- based on an industyr standard 5%. Values from tunnel service building quantaties 2015.	17 01 02	Off-site segregated	104		104.00	124.80	