



CLIENT: LONDON UNDERGROUND LIMITED

CONTRACT REF: TLL 7917

NORTHERN LINE EXTENSION

MAIN WORKS CONTRACT

RESOURCE EFFICIENCY MANAGEMENT PLAN



Issue and Revision Control

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1.0 Introduction

This Resource Efficiency Plan sets out the Ferrovial Agroman Laing O'Rourke Joint Venture (FLO) holistic approach to managing materials, including wastes, in an environmentally responsible way. This plan covers the requirements of a Site Waste Management Plan but also looks to minimise the use of resources, and optimise the reuse of material both on and off-site.

2.0 Objectives and targets

FLO will implement the following waste hierarchy throughout the project:

1. Prevent the generation of excavated materials and other wastes through efficient design
2. Reduce the generation of excavated materials and other wastes through efficient materials resource management
3. Re-use excavated materials and other waste within the NLE
4. Re-use excavated materials and other waste through environmentally beneficial use out-side of the NLE worksites
5. Re-use excavated materials and other wastes
6. Recover value e.g. energy generation or beneficial land use from waste materials
7. Dispose of surplus excavated materials and other waste at permitted landfill sites.

FLO aims to meet the following targets:

- Recover a minimum of 96% of construction materials, with an aim to exceed this figure;
- Recover a minimum of 96% of demolition and strip out materials, with an aim to exceed this figure;
- Recover 100% of clean excavated material;
- Ensure that at least 20% of total material value comes from reused and recycled content.

3.0 Description of the sites

The Northern Line Extension (NLE) will create a new underground line as an extension to the existing Charing Cross branch of the Northern line between Kennington and a terminus station to the south of Battersea Power Station. The extension will consist of new twin bore running tunnels of 5.2m internal diameter and covering a distance of approximately 3.3 km with new stations at Battersea and Nine Elms.

The worksites associated with the construction of the NLE are located at Battersea, Nine Elms, Kennington Park, and Kennington Green, as described below:

Battersea Station worksite is located within the south western section of Battersea Power Station (BPS) development, within London Borough of Wandsworth. Where the worksite abuts Battersea Park Road, Battersea Park Road is at a higher level than the site. The site is

bounded to the west by Network Rail, to the north by Battersea Power Station and to the east by Battersea Power Station Development Company:

Nine Elms Station worksite, including part of the Covent Garden Market Authority (CGMA), is located on the land to the west of A3036 Wandsworth Road and north of its junction with Pascal Street, within London Borough of Lambeth. The worksite includes the north footway of Pascal Street. The worksite is bounded to the north by a Sainsbury's worksite and to the west by land owned by Covent Garden Market within London Borough of Wandsworth. The demolition of the Banham securities building on the west end of the worksite, the CGMA office, boiler house, including the chimney and underground fuel tanks and the relocation of two substations are necessary to release the full area of the worksite.

Kennington Green worksite is located at Kennington Green within the London Borough of Lambeth. The triangular site is bounded on all three sides by Kennington Road, the eastern boundary being the main route of the road. The worksite includes footways and parking bays. It is necessary to carry out some demolition to release the full worksite. There is a local satellite worksite (hereafter referred to as Montford Place) to the west of Kennington Green adjacent to the Beefeater Gin Distillery and this is accessed via a narrow road from an access way to the west of Kennington Green. The area, although not containing any permanent works for the NLE, is very close to the Kennington Green shaft. FLO have taken early occupation of the area and developed it for 'satellite' temporary offices and storage.

Kennington Park worksite is located in the north east corner of Kennington Park, south of Kennington Park Place west of its junction with St Agnes Place, within London Borough of Lambeth. It is necessary to demolish Kennington Park Lodge to release the full worksite.

Two shafts of approx. 25m deep will be sunk at Kennington Green and Kennington Park respectively. These shafts will be used to remove the Tunnel Boring Machine's (TBM), service the Sprayed Concrete Lining (SCL) running tunnels up to the step plate junction, build the step plate junction and build the four cross passages at Kennington Station. The current proposal to build the step plate junction includes for two SCL gallery tunnels but this method is currently being reviewed.

4.0 Resource Efficient Construction

FLO will proactively look to use the CL:AIRE Code of Practice, WRAP Quality Protocol and the ICE Demolition Protocol [these are industry standards] to optimise the reuse of any contaminated soils, recycled aggregates, demolition materials and excavated material from the tunnelling, within the four worksites. FLO will also ensure that waste is managed in accordance with Policy 5.3 Sustainable Design and Construction of the London Plan 2011 and the Mayor's Business Waste Strategy as well as all relevant legislation and best practice guidance. The waste hierarchy will be applied to the management of materials wherever practicable, as below:

1. Prevent the generation of excavated materials and other wastes through efficient design
2. Reduce the generation of excavated materials and other wastes through efficient materials resource management
3. Re-use excavated materials and other waste within the NLE
4. Re-use excavated materials and other waste through environmentally beneficial use out-side of the NLE worksites
5. Re-use excavated materials and other wastes
6. Recover value e.g. energy generation or beneficial land use from waste materials
7. Dispose of surplus excavated materials and other waste at permitted landfill sites.

5.0 Site Waste Management Plan

A separate Site Waste Management Plan (SWMP) in BRE Smart waste format shall be developed and maintained for each worksite prior to construction works starting. However a draft SWMP for the whole project is in Appendix 1.

Prior to the start of works, opportunities to adopt the Waste Hierarchy will be reviewed with the construction team to assist in meeting and where possible exceeding the contractual KPIs listed in section 2. Opportunities for waste minimisation will be explored as described in section 8.

During design stage the following will be identified and detailed within the SWMP:

- Opportunities to re-use existing materials on site and provide justification for non-reuse materials;
- Opportunities to design out waste and implement these opportunities during construction;
- Explore the use of off-site manufactured components where this would reduce waste;
- Other opportunities to reduce waste.

In addition the SWMP will include:

- Names of personnel responsible for implementation of this plan on site;
- A forecast of expected waste streams;
- Waste minimization decisions taken throughout the project;
- A record of the production and disposal routes of waste;
- Waste carriers and destinations of the waste (including licence/permit details);
- Details of the implementation of the waste hierarchy i.e. whether waste has been reused, recycled, recovered or landfilled etc.
- Details of the training that has been carried out onsite
- A comparison of the forecasted versus actual waste produced; and
- A review record to identify areas of improvement.

This plan shall have precedence with regards to waste management activities and will be produced and updated a minimum of every 6 months by the Environment Manager in conjunction with the construction teams.

Specific site measures to reduce waste will be outlined within the Environmental Aspects and Impact Register for each site.

6.0 Construction Waste Management

During construction, waste shall be managed using the BRE SMARTwaste system as the tool of choice. All the site worksites including Montford Place will be registered under the Hazardous waste regulations.

6.1 Waste storage on site

The following waste will be segregated on site:

- Surplus materials, plant and equipment suitable for reuse;
- Hazardous (any waste which contains or is suspected to contain high levels of chemicals);
- General uncontaminated construction and demolition waste;
- Canteen waste; and
- Electrical waste.

Where practicable other waste types shall be segregated such as metals, clean timber, plastics and office paper. Where space does not facilitate onsite segregation, general uncontaminated construction and demolition waste will be sent to a waste transfer facility for segregation.

7.0 Contaminated Land

Contaminated land issues will be addressed in the site specific Contaminated Land Management Plan(s) which are produced once all the ground investigation data has been assessed for each worksite.

The steps detailed below sets out the management process to reduce the risks associated with any contaminated material identified at any of the worksites, and how to deal with any previously unidentified contaminants:

- FLO will monitor excavation works to check for unexpected or unusual materials with a contaminative potential. This material may consist of, but not be limited to soil, groundwater or liquids with an unusual colour or odour, or other evidence of contamination;
- If this type of material is encountered work will be halted and the affected area made safe. The Environment Team is immediately informed of the suspected contamination.
- The Environmental Advisor/Manager in conjunction with the Land Contamination Specialist (where necessary) will inspect the suspect area, and carry out an assessment of the risk and collect samples as required. No further work will be

undertaken in the affected area until the exact nature and extent of the material has been identified and a mitigation proposal agreed.

- In the event that unexpected contamination is identified, there may be need for additional investigation works. This could be in the form of additional exploratory holes or be limited to additional sampling.
- Site specific training in the form of Tool Box Talks will be carried out to highlight likely contamination risks.

All encounters of unexpected contaminated material will be logged as an environmental incident.

7.1 Contaminated Land Remediation

Where site investigation reveals risks from contamination, FLO will develop and implement an appropriate remedial strategy for dealing with the presence of contamination. This will be submitted to the Project Manager for acceptance prior to implementation.

Any remedial strategy produced will include:

- Assessment of the composition of waste soil using appropriate techniques, which could include sampling and laboratory analysis to determine if the waste is classifiable as hazardous as defined in the European Waste Catalogue;
- Consideration of alternatives to landfill disposal which may include the use of remedial technologies (in-situ or ex-situ) or treatment of soils to a standard such that they can be reused at a site or be disposed of as non-hazardous waste;
- Designation of an area within the worksite to separate contaminated materials from clean ones and store contaminated materials in an appropriate environment to control any migration of contamination;
- Separation of contaminated material from other material to send to treatment facilities or licensed landfill sites;
- Identification of remediation measures that are compatible with the construction programme and where possible does not increase cost; and
- Methodologies that include an evaluation of impacts and identification of necessary controls.

8.0 Waste Minimisation

The following measures are taken to minimise the production of and avoid disposal of waste:

- 'Just-in-time' procurement to minimise the chance of damage to materials;
- Storage in appropriately dedicated areas to prevent spoilage, damage and contamination;
- Training of construction teams on the importance of correct ordering of materials;
- Try to use standard materials that can be used elsewhere if necessary;
- Ensure deliveries are correct before accepting them on site;
- Review packaging requirements where possible to avoid, reduce and reuse;
- Utilise offsite manufacturing;
- Modularisation of components;

- Upon completion of the project the materials inventory will be completed and handed to London Underground (LU) to facilitate recycling during deconstruction.

During the procurement stage, a pre-contract questionnaire is distributed to potential contractors which questions their waste management practices to ensure that they fulfil the requirements of the SWMP. Waste management performance alongside wider environmental indicators are utilised to govern decision making when awarding contracts.

Excavated material, in particular, is reused on site where possible and where not possible opportunities for reuse shall be investigated on the other NLE sites. Where this is not possible, waste will be used for beneficial re-use offsite wherever practicable. For example for landscaping and restoration use.

9.0 Waste Reporting

Waste transfer notes are kept on site and entered onto the SMARTwaste system allowing the site to record and track the amount of waste produced, as well as the destination and disposal/recovery operation that is performed.

The following waste data will be submitted within a waste report for each 4 week period:

- Tonnes of waste produced (including waste in total);
- Tonnes of hazardous waste produced (including hazardous waste in total);
- Tonnes of waste reused and recycled;
- Tonnes of hazardous waste reused and recycled;
- Tonnes of waste diverted from landfill;
- Tonnes of material reused on Site and in the Working Areas

The waste data will include subcontractor waste data within the total reported figures and will provide evidence of meeting the objectives detailed within section 2.

10.0 Duty of Care

FLO will comply with all its Duty of Care responsibilities to protect the interests and safety of others from the potential effects of handling, storing, transporting and depositing of all waste material.

11.0 Site Monitoring

FLO project staff monitor site activities by undertaking inspections on a weekly basis as a minimum. Inspections are undertaken by the Environmental Advisor to determine whether there is compliance with the environmental requirements as set out in the method statements and environmental procedures. In addition, the Environmental Manager will undertake monthly environmental inspections to ensure overall compliance and to address any key issues.

The Environmental Manager will ensure that the routine inspections and quarterly audits are completed and closed out to ensure that the Project Team and Contractors are engaged in the development and implementation of the SWMP to ensure its implications are embedded in sub-contracts and method statements.

Waste performance will be discussed in meetings with subcontractors and the site team(s) and will be a topic of focus on site inspections/walk rounds. The Environmental Manager will make sure the SWMP is appropriately policed and waste actions on site are recorded and monitored for compliance on a monthly basis.

12.0 Responsibilities

The key responsibilities of managing waste generated by construction of the NLE are as follows:

Worksite Project Manager

It is the responsibility of the Project Manager to lead and champion all areas of waste management and to ensure that a Site Waste Management Plan with allocation of local responsibilities and identification of waste streams is completed.

FLO Logistics Team

It is the responsibility of an appointed person to:

- Manage and maintain site waste facilities including wheelie bins at the workforce and waste storage and segregation area on the site.
- Collect waste from designated areas on a daily basis
- Record waste arising's
- Provide feedback and training on adequate segregation of waste
- Liaise with waste management contractors and site wide contractors
- Responsibility for meeting the waste targets

FLO Environmental Team

It is the responsibility of the Environmental Team to:

- Ensure that the appropriate staff receive Waste Management Training
- Ensure that staff Training records are maintained
- Monitor delivery of waste orientated Toolbox Talks by the required sub-contractors on a frequent basis.
- Update the SWMP document
- Work with the Site Team to identify areas for improvements in waste minimisation
- Delivery of Waste Management and Duty of Care Training
- Other waste management related duties include: General environmental audits to manage environmental compliance and KPI monitoring and reporting.

Site Staff

All site staff have a responsibility to:

- Maintain site waste facilities

- Comply with this Resource Efficiency Plan through direction given in the Site Induction
- Proactively approach waste minimisation and management whilst on site, this may include understanding of Tool Box Talks, Sustainability briefings and training sessions.

Subcontractor

All subcontractors have a responsibility to:

- Ensure that they are completing all works in accordance with the principle of Waste Hierarchy: Prevention, Minimisation, Re-use, Recycling, Recovery and then Disposal.
- Follow requirements to adhere to the Resource Efficiency objectives.
- Ensure that all staff/personnel are provided with the appropriate waste management induction, training, briefings in order to carry out their required roles and training records are maintained.
- Provide updates to FLO site management on waste issues, progress, and information on their own targets.
- Provide monthly waste data in the agreed template formats.

13.0 Environmental Incident

The following situations are examples of an Environmental Incidents with regards to waste and resource management and as such will be subject to the relevant controls and procedures set out within the incident plan:

- A complaint received from a member of the public or the Local Authority;
- An incident or activity which results in a breach of legislation e.g. non-compliance with waste duty of care;
- Encounters of unexpected contaminated materials.

14.0 Training

All personnel are briefed on this plan during site induction. Toolbox talks are given to all site personnel throughout the project, as a regular reminder to follow the waste hierarchy, store waste on site appropriately, and dispose of it following the duty of care requirements.

Training is given to all staff members as scheduled within the FLO environmental training requirements. Specific waste management training is delivered to include a briefing on:

- Identification
- Classification
- Storage
- Segregation
- Waste Disposal

Method statements and risk assessments are written and briefed to all site personnel before any works are carried out on site. Integrated into these documents are specific control and risk mitigation methods relating to the waste issues detailed in this document.

15.0 Review

This document will be reviewed and updated to ensure that it remains current and reflects the status of the Works. The reviews will be carried out:

1. Following any material changes to the works or site that has an impact on compliance;
2. As instructed by the Project Manager; and
3. At least every 6 months.

Prior to each construction stage commencing works and during the Resource Efficiency Plan next update period, the Environment Team will discuss likely resource efficiencies with the construction teams, and investigate options for minimisation, reuse, recycle and recovery. These will be integrated into the site activities where possible. During each revision of this plan the same process will be implemented, ensuring that the waste hierarchy is integrated throughout the project.

Appendix 1 – Draft Site Waste Management Plan for the NLE project.

BRE SMARTWaste Plan: SWMP template - this template is suitable for projects over £500,000

Project information

Project name	Northern Line Extension			
Project Location	Four worksites – Battersea, Nine Elms, Kennington Green, Kennington Park			
Project cost (estimated)*	£500,000,000			
Floor area (m ²)				
Project start date	Date	Month	Year	
	<input type="text"/>	October	<input type="text"/>	2014
Project end date	Date	Month	Year	
	<input type="text"/>	December	<input type="text"/>	2020
Site location description	<p>The Northern Line Extension (NLE) is made up of four work sites and areas affected by the NLE works. The NLE will create a new underground line as an extension to the existing Charing Cross branch of the Northern line between Kennington and a terminus station to the south of Battersea Power Station. The extension will consist of new twin bore running tunnels of 5.2m internal diameter and covering a distance of approximately 3.3km with two permanent ventilation shafts at Kennington Park and Kennington Green and new stations at Battersea and Nine Elms.</p>			
Client	London Underground (LU)			
Principal Contractor	Ferrovial Agroman Laing O'Rourke Joint Venture (FLO)			
Version Number and Date	DRAFT v1 – 22.01.15			

** The cost should be the price of the accepted tender, if there is no tender then it should be the estimated cost of labour, plant, materials, overhead and profit but exclude VAT.*



Preparing your plan

1. Responsibilities

	Name	Company	Company Type (e.g. Client, Designer, Principal Contractor)	Contact details
Who is responsible for drafting the SWMP?	Rebecca Flint	FLO	Principal Contractor	07738 707 748
Who is responsible for implementing the SWMP?	Rob McCarthy	FLO	Principal Contractor	07909 804 851
Who is the waste champion?	Environment Team	FLO	Principal Contractor	
Who is the person in charge of the project?	David Darcy	FLO	Project Director	

Where will this SWMP be kept? (a copy should be on site)

Electronic based document

The SWMP will be kept as an online version on the BRE SMARTWaste platform.

Paper based document

Declaration statement: We agree that the 'Client' and the 'Principal contractor' will take reasonable steps to ensure waste duty of care is complied with, materials are handled efficiently and waste is managed appropriately.

Signature

Print name

Date



Preparing your plan

2. Waste minimisation

Use the table below to record decisions taken before the plan was drafted on the nature of the project, design, construction methods and materials to plan waste minimisation i.e. reducing the amount of waste produced

Type	Waste Minimisation decision taken	By whom	Intended results
Clean excavated waste	The clean tunnel arising's will be beneficially reused	FLO	Beneficial re-use of all clean excavated material.
Concrete obstructions at Battersea	Concrete obstructions removed during the initial works will be crushed and reused within the piling mats.	FLO	Maximisation of onsite reuse
Demolition of brick structures at Kennington Green	Brick demolition material used onsite e.g. within piling mats.	FLO	Maximisation of onsite reuse
Demolition material from Kennington Park Lodge	Demolition of the Kennington Park Lodge, if uncontaminated, will be sent offsite for beneficial reuse.	FLO	Maximisation of reuse instead of disposal.
Demolition at Nine Elms	Onsite crushing of clean demolition material reused within the temporary haul roads and/or piling mats.	FLO	Maximisation of onsite reuse
Aerosols	Buy an aerosol degasser to allow aerosol cans to be recycled.	FLO	Maximise recycling opportunities.
Reuse of Bentonite	Bentonite recycling plant at Battersea & Nine Elms	FLO	Maximisation of onsite reuse



Preparing your plan

3. Forecast

Estimate the types and amounts of waste you expect to generate on this project.

Work Package (if known)	Subcontractor (if known)	Type of waste (as a minimum this should be inert, non-hazardous)	Estimate amount (m ³ or tonnes)
Battersea			
Excavated		Inert	150,000 m ³ 335,000 t
Nine Elms			
Excavated		Inert	120,000 m ³ 267,000 t
Demolition		Non-Hazardous	4,000 m ³ 9,000 t
Kennington Park			
Excavated		Inert	12,800 m ³ 30,600 t
Demolition		Non-Hazardous	350 m ³ 850 t
Kennington Green			
Excavated		Inert	9,300 m ³ 22,500 t
Demolition		Non-Hazardous	50 m ³ 110 t
Tunnels			
Tunnel Arising's		Inert tunnelled excavated material	174,363 m ³ 348,726 t
General			
Total Construction waste		Mixed construction waste	48,692 t



If you do not know then you can use benchmarks to predict you waste; which are available on <http://www.smartwaste.co.uk/page.jsp?id=37>



Preparing your plan

4. Waste Management options

For each waste type identify what waste management action is proposed and if you have set any targets.

- As a minimum this information should be split into inert, hazardous and non-hazardous waste (to comply with the SWMP Regulations) as appropriate
- For SMARTWaste Plan waste needs to be recorded in the following categories Bricks, Tiles and Ceramics Concrete, Inert, Insulation, Metals, Packaging, Gypsum, Binders, Plastics, Timber, Floor coverings (soft), Electrical and electronic equipment, Furniture, Canteen/office/adhoc, Liquids, Oils, Soils, Asphalt and tar, Mixed, Hazardous & Other
- Reduction = reducing the quantity of the waste; reuse = reuse of materials/products for same process; recycle = processing of material ; recover =composting, energy recovery, remedial treatment of soil, physical sorting of waste (when one or more components of the waste is recovered)

Waste type	Reduce (%)	Reuse (%)	Recover (%)	Recycle (%)	Dispose (%)	Container/ Equipment required	Waste Management contractor	Any relevant exemptions/ licenses
Construction waste			96%					
Demolition & Strip out material			96%					
Clean Excavated material			100%					
Overall target								

Sections 1 -4 should be completed before construction work commences onsite; the client is responsible for the SWMP before construction work commences



Implementing your plan

5. Duty of care

It is mandatory to include Duty of Care in your SWMP. The client and principal contractor must take reasonable steps to ensure waste duty of care and materials are handled efficiently, and waste is managed appropriately.

Please use the table to log relevant details:

Waste Management Contractor Name	Waste Management Contractor Address	Waste carrier license number; date of issue and expiry	Waste management license number, date of issue and expiry	Waste Transfer notes storage location

Have you registered with the Environment Agency as a hazardous waste producer?

Yes

No

If yes, please provide your hazardous waste registration number; date of issue and expiry

*If further assistance is needed to find local waste management contractors use BRE's free online tool at www.bremap.co.uk
For more information on Duty of Care and Hazardous Waste go to: www.netregs.gov.uk*



Implementing your plan

8. Training / communication

Training

Everyone on site should receive relevant training which should include:

- The SWMP
- Roles and responsibilities
- Waste procedures on site
- Hazardous waste
- Duty of care / responsibilities
- Materials storage
- Roles and responsibilities

What forms of training are you using on site? *(please tick all that apply)*

Induction
Tool box talks
Work shops
Other (please state)

Do you have a training log? Yes No If no, please use the attached table to create a training log

If yes where is it kept?

Communication

How are you communicating the SWMP on site? *(Please tick all that apply)*

Meetings
Posters
Feedback from staff
Other (Please state)



Reviewing your plan

11. Completion review

This section must be filled in within 3 months of the work being completed on this project (i.e. project finish) :

We confirm that the plan has been monitored on a regular basis to ensure that work was progressing to the plan and the plan was updated

Signature	<input type="text"/>
Print name	<input type="text"/>
Date	<input type="text"/>

This stage is designed to help you evaluate the success of your SWMP, and to identify key 'lessons learnt' to use on your future projects, it is helping you strive for continual improvement.

Please explain any deviation from the original plan:



Reviewing your plan

11. Completion review continued

Please review how successful you believe the implementation of the SWMP was:

If project value in excess of £500,000 estimate of cost savings achieved:

£

Actions planned for next project:

Sections 10 – 11 should be completed within 3 months of the project finishing, this is the responsibility of the principal contractor
This plan should be kept at either the principal contractor's place of business or at the site of the project for 2 years

