NLE Climate Change Mitigation: Projected footprint of the NLE

<u>Construction</u>	Construction emissions are those arising during the construction of the NLE. These include emissions from embodied carbon in the extraction and processing of raw materials, as well as emissions from energy use in construction processes such as vehicles delivering building materials to the site. Two construction design options presented in Chapter 4: Description of the NLE; have been modelled to compare emissions. Construction Option A and B are mostly the same, with alternative tunnelling methods being applied for Option B. Description Rational for calculation and assumptions tCO2 - Option A tCO2 - Option B tCO2 - Option B tCO3 - Option B										
	Description	Rational for calculation and assumptions	tCO2 - Option A	tCO2 - Option B							
	Embodied carbon from the extraction and processing of raw	Embodied carbon emissions are based multiplying the quantities of materials by									
Embodied carbon in construction	materials	published emissions factors from The Inventory of Carbon and Energy (ICE)									
materials		(January 2011).	161,835.35	161,969.88							
	Vehicles removing extracted materials from the site	Assumed distances are used for the vehicle movements based on average									
Transportation of extracted materials		distances for delivery vehicles.	2,576.79	2,730.32							
	Vehicles delivering building materials to the site	Assumed distances are used for the vehicle movements based on average									
Transportation of materials to site		distances for delivery vehicles.	270.41	284.49							
	The operation of vehicles and plant equipment in the	Emissions from construction vehicles and plant are based on the fuel									
	construction of the site. On-site accommodation, lighting and any	requirements of typical construction vehicles over the length of the project.									
	other use of fossil fuels for the construction of the project.										
Construction site energy			25,978.99	25,978.99							
TOTAL CONSTRUCTION		·	190,661.54	190,963.69							

<u>Baseline</u>	The baseline accounts for emissions from indirect sources assun	The purpose of the baseline is to act as a reference to compare the impact of any new project against. The baseline accounts for emissions from indirect sources assuming no NLE is built, based on 2031 projected development. Operation of existing stations has been excluded from the baseline, as it is assumed that the energy use at existing stations will not change significantly as a result of the NLE.									
	Description	Rational for calculation and assumptions	tCO2								
Transport - indirect	Indirect transport by people in the NLE area, including public transport and private vehicle use.	Based on the scenario for 'without NLE' as detailed in Chapter 2	12,883,637.24								
TOTAL BASELINE	12,883,637.24										

Operational emissions	associated with the maintenance and operation of the line. Indire operation.	The operational emissions calculation is based on emissions during 2031.								
	Description	Rational for calculation and assumptions	tCO2							
Scope 1										
Transport - direct	Company leased vehicles emissions (from London Underground 2008 carbon footprint data)	Total company leased vehicle emissions, for support road fleet - assumed proportional to 2008 LU carbon footprint.	4							
Scope 2										
Operation - Non Trackside Operation - Trackside	Non-trackside emissions (from Energy Strategy calculations) Trackside emissions (from London Underground 2008 carbon	Heating & Domestic hot water (DHW) Cooling Lighting Auxiliary Small Power & Escalators & Lifts	NB. Not included here as this would be double-counting tube travel emissions which are built into the transport emissions.							
	footprint data)	Traction - assumed proportional to 2008 LU carbon footprint. Groundwater Pumps - assumed proportional to 2008 LU carbon footprint. Ventilation fans - assumed proportional to 2008 LU carbon footprint.								
Scope 3	Indicate acceptional amissions /from Landon Underground 2000	Total indivest an austional emissions, assumed avanaging to 2000 III south an	935							
Operation - indirect	Indirect operational emissions (from London Underground 2008 carbon footprint)	Total indirect operational emissions - assumed proportional to 2008 LU carbon footprint.	935							
Transport - indirect	Indirect transport by people in the NLE area, including public transport and private vehicle use.	Based on the scenario for 'with NLE' as detailed in Chapter 2	12,880,843.17							
TOTAL OPERATION			12,881,781.98							

Two construction design options have been modelled to com									
J ,	pare emissions. Const	ruction Option A and B are mos	tly the same, with alternative	tunnelling methods	being applied for Option	В.		1	
Embodied Energy of Construction Materials									
Design Option A									
Source: Table 1-3 Clean Excavated Material Generated by the N		- Material Management Strate	gy - Draft 3)						
Source: The Inventory of Carbon and Energy (ICE) (January 201	1								
Location	Material	Components	Total Quantity	Unit	Density (kg/m3)	Material weight (kg)	Emissions Factor Description	Emissions Factor (kg CO2e/kg tco2e	
Running Tunnels and Cross Passages (including Battersea work			99,625.00		2,400.00	239,100,000.00		0.17	41,603.4
Running Tunnels and Cross Passages (including Battersea work			2,365.00		2,400.00		RC 40/50 Mpa (suitable for high strength a	0.17	987.6
Running Tunnels and Cross Passages (including Battersea work		t platform deck units	1,695.00		2,400.00		Precast RC 40/50 MPa	0.18	732.2
<u> </u>	Reinforcement		21,740.00		2.462.00		Steel. Bar and rod - UK (EU) Average Recyc	1.40	30,436.0
Running Tunnels and Cross Passages (including Battersea work	Grout Tunnel Linings	PCC Segments	14,690.00 84,962.50		2,162.00		Cement mortar (Grout) Precast RC 40/50 MPa	0.22	7,018.9 15,293.2
Running Tunnels and Cross Passages (including Battersea work Running Tunnels and Cross Passages (including Battersea work	Tunnel Linings	SGI lining rings (Spheroidal	310.00	tonnes		310,000.00	Iron	2.03	629.30
Nine Elms Station	Concrete	3di ililing rings (aprieroldar	74,172.00	m3	2,400.00	178,012,800.00		0.17	30,974.2
Nine Elms Station	Reinforcement		16,445.00	tonnes	2,400.00	16,445,000.00		1.40	23,023.0
Kennington Green Ventilation Shaft	Concrete		2,595.00		2,400.00		RC 40/50 Mpa (suitable for high strength a	0.17	1,083.6
Kennington Green Ventilation Shaft	Grout		370.00		2,162.00		Cement mortar (Grout)	0.22	176.79
Kennington Green Ventilation Shaft	Reinforcement		455.00		2,102.00	455,000.00	` '	1.40	637.00
Kennington Green Ventilation Shaft	Tunnel Linings	PCC lining rings	1,037.50			1,037,500.00	` ' " "	0.18	186.75
Kennington Park Ventilation Shaft	Concrete	j j	4,838.00		2,400.00	, ,	RC 40/50 Mpa (suitable for high strength a	0.17	2,020.35
Kennington Park Ventilation Shaft	Grout		370.00		2,162.00		Cement mortar (Grout)	0.22	176.79
Kennington Park Ventilation Shaft	Reinforcement		1,025.00	tonnes		1,025,000.00	Steel. Bar and rod - UK (EU) Average Recyc	1.40	1,435.00
Kennington Park Ventilation Shaft	Tunnel Linings	PCC lining rings	1,037.50	tonnes		1,037,500.00	Precast RC 40/50 MPa	0.18	186.75
Radcot Street and Harmsworth Street Temporary Shafts	Concrete		221.00		2,400.00	*	RC 40/50 Mpa (suitable for high strength a	0.17	92.29
Radcot Street and Harmsworth Street Temporary Shafts	Grout		484.00	m3	2,162.00	1,046,408.00		0.22	231.26
Radcot Street and Harmsworth Street Temporary Shafts	Reinforcement		28.00	tonnes		28,000.00	` ' " "	1.40	39.20
Radcot Street and Harmsworth Street Temporary Shafts	Tunnel Linings	PCC lining rings	142.50			142,500.00		0.18	25.65
Radcot Street and Harmsworth Street Temporary Shafts	Tunnel Linings	SGI lining rings (Spheroidal	102.40			102,400.00	Iron	2.03	207.87
Step Plate junctions	Concrete		2,140.00		2,400.00	5,136,000.00	, , , , ,	0.17	893.66
Step Plate junctions	Grout		1,534.00		2,162.00	3,316,508.00	` ′	0.22	732.95
Step Plate junctions	Reinforcement	PCC lining rings	169.00 1,535.00	tonnes		1,535,000.00	Steel. Bar and rod - UK (EU) Average Recyc Precast RC 40/50 MPa	1.40 0.18	236.60 276.30
Step Plate junctions Step Plate junctions	Tunnel Linings Tunnel Linings	SGI lining rings (Spheroidal	1,230.80			1,230,800.00		2.03	2,498.52
TOTAL	Tullilei Lillings	3di ililing rings (aprieroldar	1,230.60	tornes		618,305,176.00	ITOTI	2.03	161,835.35
TOTAL						013,303,170.00			101,033.33
Design Option B									
Source: Table 1-3 Clean Excavated Material Generated by the N	NI E (from Annendiy R1	NA.1. 2.1.NA							
(· · · · · · · · · · · · · · · · · · ·	NLL (IIIOIII Appelluix bi	Materiai Management Strate	gy - Draft 3)						
Source: Email from Simon Lewis (ch2m) 27.03.13	NEE (ITOIII Appendix B)	L - Material Management Strate	gy - Draft 3)						
Source: Email from Simon Lewis (ch2m) 27.03.13 Source: The Inventory of Carbon and Energy (ICE) (January 201		Material Management Strate	gy - Draft 3)						
, ,	11)			rary Shafts data, as tl	nese not expected to be in	Design Option 2. Have also include	d gallery tunnels.		
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum Location	11) ned same as Option A, o		nd Harmsworth Street Tempo Total Quantity	Unit	Density (kg/m3)	Material weight (kg)	Emissions Factor Description	Emissions Factor (kg CO2e/kg tco2e	
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum- Location Running Tunnels and Cross Passages (including Battersea work	11) ned same as Option A, o Material Concrete	except removed Radcot Street a	nd Harmsworth Street Tempor Total Quantity 99,625.00	Unit m3	Density (kg/m3) 2,400.00	Material weight (kg) 239,100,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a	0.17	41,603.40
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum- Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels and Cross Passages (including Battersea work	ned same as Option A, of Material Concrete Tunnel Linings (spray	except removed Radcot Street a Components //ed concrete)	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00	Unit m3 m3	Density (kg/m3) 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a	0.17 0.17	987.62
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assumble Location Running Tunnels and Cross Passages (including Battersea work	ned same as Option A, of Material Concrete Tunnel Linings (spray 230mm thick precas)	except removed Radcot Street a Components //ed concrete)	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00	Unit m3 m3 m3	Density (kg/m3) 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa	0.17 0.17 0.18	987.62 732.24
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assumble Location Running Tunnels and Cross Passages (including Battersea work	ned same as Option A, of Material Concrete Tunnel Linings (spray 230mm thick precast Reinforcement	except removed Radcot Street a Components //ed concrete)	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00	Unit m3 m3 m3 tonnes	Density (kg/m3) 2,400.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo	0.17 0.17 0.18 1.40	987.62 732.24 30,436.00
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assumble Location Running Tunnels and Cross Passages (including Battersea work	ned same as Option A, of Material Concrete Tunnel Linings (spray 230mm thick precast Reinforcement Grout	except removed Radcot Street a Components red concrete) t platform deck units	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00	Unit m3 m3 m3 tonnes m3	Density (kg/m3) 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout)	0.17 0.17 0.18 1.40 0.22	987.62 732.24 30,436.00 7,018.91
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assumble Location Running Tunnels and Cross Passages (including Battersea work	ned same as Option A, of Material Concrete Tunnel Linings (spray 230mm thick precase Reinforcement Grout Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50	Unit m3 m3 m3 tonnes m3 tonnes	Density (kg/m3) 2,400.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa	0.17 0.17 0.18 1.40 0.22 0.18	987.62 732.24 30,436.00 7,018.91 15,293.25
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assumble Location Running Tunnels and Cross Passages (including Battersea work	Material Concrete Tunnel Linings (spray Reinforcement Grout Tunnel Linings Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes	Density (kg/m3) 2,400.00 2,400.00 2,400.00 2,162.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron	0.17 0.17 0.18 1.40 0.22 0.18 2.03	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Station	Material Concrete Tunnel Linings Ground Ground Tunnel Linings Tunnel Linings Tunnel Linings Concrete	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes tonnes m3	Density (kg/m3) 2,400.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Station	Material Concrete Tunnel Linings (spray Selection and the concrete Tunnel Linings (spray Concrete and the concrete Tunnel Linings Tunnel Linings Tunnel Linings Concrete Reinforcement	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes tonnes tonnes	Density (kg/m3) 2,400.00 2,400.00 2,400.00 2,162.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00 16,445,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement mortar (Steel	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels and	Material Concrete Tunnel Linings (spray Beinforcement Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Concrete Reinforcement Concrete Reinforcement	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes tonnes tonnes m3 tonnes m3	Density (kg/m3) 2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00 16,445,000.00 6,228,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recyclement Mpa (suitable for high strength a Steel Bar and rod - UK (EU) Average Recycl	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Station	Material Concrete Tunnel Linings (spray Selection and the concrete Tunnel Linings (spray Concrete and the concrete Tunnel Linings Tunnel Linings Tunnel Linings Concrete Reinforcement	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00	Unit m3 m3 m3 tonnes m3 tonnes m3 tonnes m3 tonnes m3 m3	Density (kg/m3) 2,400.00 2,400.00 2,400.00 2,162.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement mortar (Steel	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels and	Material Concrete Tunnel Linings (spray Signal Signar Concrete Tunnel Linings Control Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Concrete Reinforcement Concrete Reinforcement Concrete Grout	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes tonnes tonnes m3 tonnes tonnes m3 tonnes m3 tonnes	Density (kg/m3) 2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength; Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength; Cement mortar (Grout)	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Nine Elms Station Nine Elms Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft	Material Concrete Tunnel Linings (spray Consequence) Reinforcement Tunnel Linings Concrete Tunnel Linings Tunnel Linings Concrete Reinforcement Concrete Reinforcement Concrete Grout Reinforcement	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes tonnes tonnes m3 tonnes tonnes m3 tonnes tonnes tonnes	Density (kg/m3) 2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength; Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength; Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength; Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyo	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum: Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels and	ned same as Option A, of Material Concrete Cannel Linings (spray 230mm thick precase Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Grout Reinforcement Concrete Grout Reinforcement Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50	Unit m3 m3 m3 tonnes m3 tonnes tonnes m3 tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 m3 tonnes m3	Density (kg/m3)	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength; RC 40/50 MPa	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40 0.18	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum-Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Battersea work Running Tunnels and Cross Passages (including Battersea work Running Tunnels	ned same as Option A, of Material Concrete Caronel Linings (spray 230mm thick precase Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Grout Reinforcement Concrete Grout Reinforcement Tunnel Linings Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes m3 m3 tonnes m3	Density (kg/m3)	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyo Precast RC 40/50 MPa RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40 0.18 0.17	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.75 637.00 186.75 436.39
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum-Location Running Tunnels and Cross Passages (including Battersea work Nine Elms Station Kenning Tunnels and Cross Passages (including Battersea work Nine Elms Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Gallery Tunnel Kennington Park Ventilation Shaft	Material Concrete Tunnel Linings Concrete Tunnel Linings Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Grout Reinforcement Concrete Grout Reinforcement Tunnel Linings Tunnel Linings Tunnel Linings Reinforcement	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00 4,838.00 370.00 1,025.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes tonnes	Density (kg/m3)	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 178,012,800.00 16,445,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 10,25,000.00 11,025,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement RC 40/50 MPa RC 40/50 Mpa (suitable for high strength a RC 40/50	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40 0.18 0.17 0.17 0.17 0.17 0.17 0.17	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.79 436.39 2,020.35 176.79
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnel Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Park Ventilation Shaft	Material Concrete Tunnel Linings Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 4,838.00 4,838.00 370.00 1,025.00 1,025.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes tonnes tonnes tonnes tonnes	2,400.00 2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,037,500.00 1,037,500.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyology Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyology RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyology RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyology Precast RC 40/50 MPa RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyology Precast RC 40/50 MPa	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40 0.18 0.17 0.17 0.19 0.19 0.19 0.19 0.19	987.62 732.24 30,436.00 7,018.91 15,293.25 629.33 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.33 2,020.35 1,76.79
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum Location Running Tunnels and Cross Passages (including Battersea work Running Tunnel Station Shaft Kennington Green Ventilation Shaft Kennington Park Ventilation Shaft	Material Concrete Tunnel Linings (spray Tunnel Linings (spray Tunnel Linings (spray Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Concrete Reinforcement Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal PCC lining rings	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 4,938.00 370.00 1,025.00 1,037.50 1,037.50	Unit m3 m3 m3 tonnes m3 tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes tonnes tonnes tonnes tonnes tonnes tonnes m3 m3 tonnes tonnes m3 m3 m3	2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,400.00 2,400.00 2,400.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 310,000.00 178,012,800.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,025,000.00 1,037,500.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyologore RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyologore RC 40/50 Mpa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyologore RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyologore RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyologore RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for hi	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40 0.18 0.17 0.17 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.35 2,020.35 1,76.79
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Station Nine Elms Station Nine Elms Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Gallery Tunnel Kennington Park Ventilation Shaft Kennington Park Gallery Tunnel Step Plate junctions	Interest of the second of the	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal PCC lining rings	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00 1,037.50 1,025.00 1,037.50 1,037.50 2,140.00	Unit m3 m3 m3 tonnes m3 tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes tonnes m3 tonnes tonnes tonnes tonnes tonnes tonnes m3 m3 m3 tonnes m3 m3 m3 m3 tonnes	2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 31,759,780.00 310,000.00 178,012,800.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,037,500.00 1,037,500.00 1,037,500.00 5,136,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyo Precast RC 40/50 MPa RC 40/50 Mpa (suitable for high strength a RC 40/	0.17 0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40 0.18 0.17 0.17 0.22 1.40 0.18 0.17 0.17 0.21 1.40 0.18 0.17 0.17 0.17 0.17	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.39 2,020.35 176.79 1,435.00 186.75 294.41
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Station Nine Elms Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Gallery Tunnel Kennington Park Ventilation Shaft Kennington Park Ventilation Shaft Kennington Park Ventilation Shaft Kennington Park Ventilation Shaft Kennington Park Gallery Tunnel Step Plate junctions Step Plate junctions	Material Concrete Tunnel Linings Concrete Tunnel Linings Concrete Tunnel Linings Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal PCC lining rings	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00 4,838.00 370.00 1,025.00 1,037.50 1,037.50 1,037.50 1,045.00 1,037.50 1,037.50 1,045.00 1,037.50 1,045.00 1,037.50 1,045.00 1,037.50	Unit m3 m3 m3 tonnes m3 tonnes tonnes m3 tonnes tonnes m3 tonnes m3 tonnes m3 tonnes tonnes tonnes tonnes tonnes tonnes tonnes m3	2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,400.00 2,400.00 2,400.00 2,400.00 2,400.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 310,000.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00 11,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,692,000.00 5,136,000.00 3,316,508.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength a Steel. Bar and rod - UK (EU) Average Recyo RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyo Precast RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyo Precast RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyo Precast RC 40/50 Mpa (suitable for high strength a Cement mortar (Grout)	0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 0.22 1.40 0.18 0.17 0.17 0.17 0.17 0.22 1.40 0.18 0.17 0.17 0.21 1.40 0.17 0.22 1.40 0.18 0.17 0.22 1.40 0.18 0.17	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.36 2,020.35 176.79 1,435.00 186.75 294.41
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Station Nine Elms Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Park Gallery Tunnel Step Plate junctions Step Plate junctions	Material Concrete Tunnel Linings Concrete Tunnel Linings Concrete Tunnel Linings Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal PCC lining rings PCC lining rings	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00 4,838.00 370.00 1,025.00 1,037.50 1,037.50 1,045.00 1,037.50 1,050.00 2,140.00 1,534.00 1,534.00	Unit m3 m3 m3 m3 tonnes m3 tonnes tonnes tonnes m3 tonnes m3 tonnes m3 tonnes tonnes tonnes tonnes tonnes tonnes tonnes tonnes tonnes m3 m3 m3 m3 tonnes tonnes tonnes	2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,037,500.00 1,037,500.00 1,628,000.00 1,638,000.00 1,638,000.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength; Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout) Steel. Bar and rod - UK (EU) Average Recyclement mortar (Grout)	0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 1.40 0.17 0.22 1.40 0.18 0.17 0.17 0.17 0.17 0.17 0.22 1.40 0.18 0.17 0.22 1.40 0.18 0.17 0.22 1.40 0.18	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.39 2,020.35 176.79 1,435.00 186.75 294.41 893.66
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Nine Elms Station Nine Elms Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Park Gallery Tunnel Step Plate junctions Step Plate junctions Step Plate junctions Step Plate junctions	ned same as Option A, of Material Concrete Councete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Grout Reinforcement Tunnel Linings Concrete Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal PCC lining rings PCC lining rings	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00 4,838.00 370.00 1,025.00 1,037.50 705.00 2,140.00 1,534.00 169.00 1,535.00	Unit m3 m3 m3 m3 tonnes m3 tonnes tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes tonnes tonnes tonnes tonnes tonnes tonnes tonnes m3 m3 tonnes	2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,025,000.00 1,037,500.00 2,518,000.00 1,025,000.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength; RC 40/50 Mp	0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 1.40 0.17 0.18 0.17 0.22 1.40 0.18 0.17 0.17 0.17 0.17 0.17 0.22 1.40 0.18 0.17 0.22 1.40 0.18	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.39 2,020.35 176.79 1,435.00 186.75 294.41 893.66 732.95 236.60
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Nine Elms Station Nine Elms Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Park Gallery Tunnel Step Plate junctions	Material Concrete Tunnel Linings Concrete Tunnel Linings Concrete Tunnel Linings Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal PCC lining rings PCC lining rings	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00 4,838.00 370.00 1,025.00 1,037.50 1,037.50 1,045.00 1,037.50 1,050.00 2,140.00 1,534.00 1,534.00	Unit m3 m3 m3 m3 tonnes m3 tonnes tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes tonnes tonnes tonnes tonnes tonnes tonnes tonnes m3 m3 tonnes	2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,037,500.00 2,508,000.00 11,611,200.00 3,316,508.00 169,000.00 1,535,000.00 1,535,000.00 1,535,000.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength; RC 40/50 Mp	0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 1.40 0.17 0.22 1.40 0.18 0.17 0.17 0.17 0.17 0.17 0.22 1.40 0.18 0.17 0.22 1.40 0.18 0.17 0.22 1.40 0.18	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.39 2,020.35 176.79 1,435.00 186.75 294.41 893.66 732.95 236.60 276.30 2,498.52
Source: The Inventory of Carbon and Energy (ICE) (January 201 NB. There is no materials data for Option B and so have assum. Location Running Tunnels and Cross Passages (including Battersea work Running Tunnels Anterials and Cross Passages (including Battersea work Running Tunnels Station Kennington Green Ventilation Shaft Kennington Green Ventilation Shaft Kennington Park Gallery Tunnel Step Plate junctions Step Plate junctions Step Plate junctions Step Plate junctions	ned same as Option A, of Material Concrete Councete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Reinforcement Concrete Grout Reinforcement Tunnel Linings Concrete Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Tunnel Linings Tunnel Linings Tunnel Linings Concrete Grout Reinforcement Tunnel Linings Concrete Grout Reinforcement Tunnel Linings	except removed Radcot Street a Components red concrete) t platform deck units PCC Segments SGI lining rings (Spheroidal PCC lining rings PCC lining rings	nd Harmsworth Street Tempor Total Quantity 99,625.00 2,365.00 1,695.00 21,740.00 14,690.00 84,962.50 310.00 74,172.00 16,445.00 2,595.00 370.00 455.00 1,037.50 1,045.00 4,838.00 370.00 1,025.00 1,037.50 705.00 2,140.00 1,534.00 169.00 1,535.00	Unit m3 m3 m3 m3 tonnes m3 tonnes tonnes tonnes m3 tonnes m3 tonnes m3 tonnes m3 tonnes tonnes tonnes tonnes tonnes tonnes tonnes tonnes m3 m3 tonnes	2,400.00 2,400.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,162.00 2,400.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00 2,100.00	Material weight (kg) 239,100,000.00 5,676,000.00 4,068,000.00 21,740,000.00 31,759,780.00 84,962,500.00 178,012,800.00 16,445,000.00 6,228,000.00 799,940.00 455,000.00 1,037,500.00 2,508,000.00 11,611,200.00 799,940.00 1,025,000.00 1,037,500.00 2,518,000.00 1,025,000.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00 1,037,500.00	Emissions Factor Description RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; RC 40/50 Mpa (suitable for high strength; Precast RC 40/50 MPa Steel. Bar and rod - UK (EU) Average Recyo Cement mortar (Grout) Precast RC 40/50 MPa Iron RC 40/50 Mpa (suitable for high strength; RC 40/50 Mp	0.17 0.18 1.40 0.22 0.18 2.03 0.17 1.40 0.17 1.40 0.17 0.18 0.17 0.22 1.40 0.18 0.17 0.17 0.17 0.17 0.17 0.22 1.40 0.18 0.17 0.22 1.40 0.18	987.62 732.24 30,436.00 7,018.91 15,293.25 629.30 30,974.23 23,023.00 1,083.67 176.79 637.00 186.75 436.39 2,020.35 176.79 1,435.00 186.75 294.41 893.66 732.95 236.60

Transport of Excavated Materials (Clean)									
Source: Material Volumes: Table 1-4 Clean Excavated Mater	ial Generated by the NLE (fr	om Appendix B1 - Material N	Management Strategy - Draft 3)						
Source: Transport Data: Battersea to Northfleet by road from	n Google maps direction se	arch. Barge from Battersea Je	etty to Wallasea Island see "Cor	nstruction Vehicle move	ments for excavated r	naterials" table below			
Source: Emission Factors: Defra 2012: "Defra-ghg-conversion	nfactors2012" J:\Wimbledo	n-Jobs\Transport for London	(TfL)\46368016 Northern Line	Ext Climate & Ad\Techr	ical\Carbon Footprint	Data Sources			
Source: Distances travelled: GRNLEB-HGL-00-XX-TNT-MDR-0	00018-01REV_01Activ	ity_7Technical_Note_for_	removal_of_Excavated_Mater	rial_at_Battersea					
NB. Assumed sea-going boat has same capacity as barge for	transport from Northfleet t	o Wallasea Island							
NB. Journey distances account for return journey. Emissions			HGVs are 44% loaded both wa	lys.					
Design Option A							Emission Factors		
							Road	Barge	Sea-going boat
Works	Volume of Excavated Materials (m3)	Density Factor from m3 to Tonnes	Road (km travelled)	Barge (km travelled)	Sea-going boat (km travelled)	Conversion Factor to km	Artic Truck, 3.5-33t (kgCO2e/tonne.km)	General Cargo, 0-4999 dwt (kgCO2e/tonne.km)	General Cargo, 0-4999 dwt (kgCO2e/tonne.km)
Nine Elms Station Box	110,310.00	2.00	77.25	77.25	21.60	1	.61 0.20	0.02	0.02
Battersea Station Box	76,340.00	2.00	77.25	77.25	21.60		.61 0.20		
		2.00	77.25	77.25	21.60		.61 0.20		0.02
Overrun Tunnels at Battersea	12,170.00	2.00							
Crossover at Battersea	71,200.00		77.25	77.25	21.60				0.02
Running Tunnels	141,730.00 9,030.00	2.00	77.25 77.25	77.25 77.25	21.60 21.60		61 0.20 61 0.20		
Step Plate Junctions									0.02
Kennington Park (Permanent Shaft) and Substation	12,500.00	2.00	77.25	77.25	21.60		61 0.20		
Kennington Gardens (Permanent Shaft)	6,730.00	2.00	77.25	77.25	21.60		61 0.20		0.02
Cross Passages	2,160.00	2.00	77.25 77.25	77.25 77.25	21.60 21.60		61 0.20 61 0.20		0.02
Temporary Shafts	1,300.00								
Gallery Tunnels		2.00	77.25	77.25	21.60		.61 0.20		
TOTAL Excavated Material	443,470.00	2.00	77.25	77.25	21.60	1	.61 0.20	0.02	0.02
Purity Bully B							F. Marie France		
Design Option B							Emission Factors	Tallin	I construction to the construction of the construction to the construction of the cons
w. I.	W.1 (5	D	Decide the state of the the	5		10	Road	Barge	Sea-going boat
Works	Volume of Excavated	Density Factor from m3 to	Road (km travelled)	Barge (km travelled)	Sea-going boat (km	Conversion Factor to km	Artic Truck, 3.5-33t (kgCO2e/tonne.km)	General Cargo, 0-4999 dwt	General Cargo, 0-4999 dwt
	Materials (m3)	Tonnes			travelled)			(kgCO2e/tonne.km)	(kgCO2e/tonne.km)
All of the Cost of D	440 240 00	2.00	77.25	77.25	24.6		64	0.02	0.02
Nine Elms Station Box	110,310.00	2.00	77.25	77.25	21.60		.61 0.20		
Battersea Station Box	76,340.00	2.00	77.25	77.25	21.60		.61 0.20		0.02
Overrun Tunnels at Battersea	12,170.00	2.00	77.25	77.25	21.60		.61 0.20		
Crossover at Battersea	71,200.00	2.00	77.25	77.25	21.60		.61 0.20		0.02
Running Tunnels	141,730.00	2.00	77.25 77.25	77.25 77.25	21.60 21.60		61 0.20 61 0.20		
Step Plate Junctions	9,030.00						.61 0.20		0.02
Kennington Park (Permanent Shaft) and Substation	12,500.00	2.00	77.25 77.25	77.25 77.25	21.60 21.60		.61 0.20		0.02
Kennington Gardens (Permanent Shaft)	6,730.00	2.00	77.25	77.25			.61 0.20		0.02
Cross Passages	2,160.00				21.60				
Temporary Shafts		2.00	77.25	77.25	21.60		61 0.20 61 0.20		0.02
Gallery Tunnels	6,290.00	2.00	77.25	77.25	21.60				0.02
TOTAL	448,460.00	2.00	77.25	77.25	21.60	1	.61 0.20	0.02	0.02
T									
Transport of Excavated Materials (Contaminated)		45 /00 /0040 5 II 00 00	10 (1)						
Source: "Draft Strategy for Excavated Material 2 TW" Extract	ted from source document	on 15/02/2013 + Email 28.02 -	13 (Howard Waples)						
Design Option A			15 10 1 11 11			1			
Works	Volume of Excavated	Volume of Disposal Truck	'	Emission Factors:	Number of Journeys	Total distance	Carbon Emissions (tCO2e)		
	Materials (m3)	(m3)		Artic Truck, 3.5-33t					
				(kgCO2e/vehicle km)					
Contaminated Materials	4,650.00	10.00	20.00	1.11	465.00				
Contaminated Dredged Materials	4,500.00	10.00	20.00	1.11	450.00	9,000	00 9.98		
Design Option B									
Works	Volume of Excavated	Density Factor from m3 to		Emission Factors:	Number of Journeys	Total distance	Carbon Emissions (tCO2e)		
	Materials (m3)	Tonnes		Artic Truck, 3.5-33t					
				(kgCO2e/vehicle km)					
Contaminated Materials	4,650.00	10.00		1.11	465.00				
Contaminated Dredged Materials	4,500.00	10.00	20.00	1.11	450.00	9,000	00 9.98		
		•	·		·	·		·	

	1			T	T		
Transport of Construction Materials	1				l		,
Design Option A							
Source: GRNLEB-HGL-00-XX-SCH-MDR-00002 - 03-01 - VEHICLE							
Backfill Materials - location	Number of lorries	Road (km travelled) - assumed 5km	Emissions factor description	Emission Factors (kgCo2e/km)	Total km travelled	Carbon Emissions (tCO2e)	
Temporary Shafts at Radcot Street (shaft 1) and Harmsworth S	77.00	5.00	Artic Truck, 3.5-33t (kgCO2e/	1.33	385.00	0.51	
Radcot Street Shaft 1: connection to chamber	5.00	5.00	Artic Truck, 3.5-33t (kgCO2e/	1.33	25.00	0.03	
Radcot Street Shaft 1: Access tunnel	26.00	5.00	Artic Truck, 3.5-33t (kgCO2e/	1.33	130.00	0.17	
Harmsworth Street Shaft 2: connection chamber	5.00	5.00	. , , ,	1.33	25.00	0.03	
Ventilation shafts at Kennington Green (Shaft 3) and Kenningto	20.00	5.00	Artic Truck, 3.5-33t (kgCO2e/	1.33	100.00	0.13	
Sub-surface tunnel	51.00	5.00	Artic Truck, 3.5-33t (kgCO2e/	1.33	255.00	0.34	
Shaft 4	31.00	5.00	Artic Truck, 3.5-33t (kgCO2e/	1.33	155.00	0.21	
Sub-surface Traction power Substation and Head house	108.00	5.00	. , , ,	1.33	540.00	0.72	
TOTAL	100.00	5.00		1.55	5-0.00	2.14	
1						2.17	
Construction Materials - location	Materials	Number of lorries	Road (km travelled) -	Emissions factor	Emission Factors	Total km travelled	Carbon Emissions (tCO2e)
			assumed 5km	description	(kgCo2e/km)		
Temporary Shafts at Radcot Street (shaft 1) and Harmsworth S	Concrete	38		Concrete wagon (6m3	1.33	190.00	0.25
Temporary Shafts at Radcot Street (shaft 1) and Harmsworth S		39		Artic wagon (40t): Arti	1.42	195.00	0.28
Temporary Shafts at Radcot Street (shaft 1) and Harmsworth S	<u> </u>	81		Grout wagon (6m3): A	1.33	405.00	0.54
Ventilation shafts at Kennington Green (Shaft 3) and Kenningto		1250		Concrete wagon (6m3	1.33	6,250.00	8.30
Ventilation shafts at Kennington Green (Shaft 3) and Kenningto		87		Artic wagon (40t): Arti	1.42	435.00	0.62
Ventilation shafts at Kennington Green (Shaft 3) and Kennington		124		Grout wagon (6m3): A	1.33	620.00	0.02
Step-plate junction 1 Northbound	Concrete	181.00		Concrete wagon (6m3	1.33	905.00	1.20
Step-plate junction 1 Northbound	PCC segment, SGI segment	79.00		Artic wagon (40t): Arti	1.42	395.00	0.56
Step-plate junction 1 Northbound	Grout	133.00		Grout wagon (6m3): A	1.33	665.00	0.30
Step-plate junction 1 Northbound Step-plate junction 2 Southbound	Concrete	181.00		Concrete wagon (6m3): A	1.33	905.00	1.20
	PCC segment, SGI segme	78.00		Artic wagon (40t): Arti	1.33	390.00	0.56
Step-plate junction 2 Southbound		130.00		• • •	1.42	650.00	0.56
Step-plate junction 2 Southbound	Grout	130.00		Grout wagon (6m3): A	1.33	560.00	0.86
From Kennington shaft to Kennington Loop - Running tunnel tr				Concrete wagon (6m3			
From Kennington shaft to Kennington Loop - Running tunnel tr		2.00		Artic wagon (40t): Arti	1.42	10.00	0.01
From Kennington shaft to Kennington Loop - Running tunnel tr		2 262 00		Grout wagon (6m3): A	1.33	46.245.00	- 21.66
From Battersea to Kennington shafts Both tunnels - Running tu		3,263.00		Concrete wagon (6m3	1.33	16,315.00	21.66
From Battersea to Kennington shafts Both tunnels - Running tu		59.00		Artic wagon (40t): Arti	1.42	295.00	0.42
From Battersea to Kennington shafts Both tunnels - Running tu		- 240.00		Grout wagon (6m3): A	1.33	-	- 1.20
Crossover tunnels - Running tunnel track bed	Concrete	210.00		Concrete wagon (6m3	1.33	1,050.00	1.39
Crossover tunnels - Running tunnel track bed	PCC segment, SGI segme	4.00		Artic wagon (40t): Arti	1.42	20.00	0.03
Crossover tunnels - Running tunnel track bed	Grout	-		Grout wagon (6m3): A	1.33		-
Nine Elms Station	Concrete	11,999.00		Concrete wagon (6m3	1.33	59,995.00	79.67
Nine Elms Station	PCC segment, SGI segme	410.00		Artic wagon (40t): Arti	1.42	2,050.00	2.92
Nine Elms Station	Grout	-		Grout wagon (6m3): A	1.33	-	-
Battersea Station	Concrete	15,786.00		Concrete wagon (6m3	1.33	78,930.00	104.81
Battersea Station	PCC segment, SGI segme	3,407.00		Artic wagon (40t): Arti	1.42	17,035.00	24.27
Battersea Station	Grout	2,447.00	5.00	Concrete wagon (6m3	1.33	12,235.00	16.25
TOTAL							268.26

Desire Oution B				1		T	T	T
Design Option B	THICLE MACVEMENT SCHED	HILL ACL ALT DDC						
Source: GRNLEB-HGL-00-XX-SCH-MDR-00006 - REV 02-01 - VE Backfill Materials - location	Number of lorries		Emissians fastar description	Emission Footons	Total km travelled	Carbon Emissions (tCO2e)		
Backilli Materials - location	Number of fornes	Road (km travelled) - assumed 5km	Emissions factor description	(kgCo2e/km)	Total km travelled	Carbon Emissions (tCO2e)		
Temporary Shafts at Radcot Street (shaft 1) and Harmsworth	S 77.00		Artic Truck, 3.5-33t (kgCO2e/	1.33	385.00	0.51		
Radcot Street Shaft 1: connection to chamber	5.00		Artic Truck, 3.5-33t (kgCO2e/	1.33	25.00	0.03		
Radcot Street Shaft 1: Access tunnel	26.00		Artic Truck, 3.5-33t (kgCO2e/	1.33	130.00	0.17		
Harmsworth Street Shaft 2: connection chamber	5.00		Artic Truck, 3.5-33t (kgCO2e/	1.33	25.00	0.03		
Ventilation shafts at Kennington Green (Shaft 3) and Kenning			Artic Truck, 3.5-33t (kgCO2e/	1.33	100.00	0.13		
Sub-surface tunnel	51.00		Artic Truck, 3.5-33t (kgCO2e/	1.33	255.00	0.34		
Shaft 4	31.00		Artic Truck, 3.5-33t (kgCO2e/	1.33	155.00	0.21		
Sub-surface Traction power Substation and Head house	108.00		Artic Truck, 3.5-33t (kgCO2e/	1.33	540.00	0.72		
SCL Gallery Tunnels: Kennington Green SCL Tunnel	440.00		Artic Truck, 3.5-33t (kgCO2e/	2.33	2,200.00	5.12		
SCL Gallery Tunnels: Kennington Park SCL Tunnel	297.00	5.00	Artic Truck, 3.5-33t (kgCO2e/	3.33	1,485.00	4.94		
TOTAL					·	12.21		
Construction Materials - location	Materials	Number of lorries	Road (km travelled) - assumed 5km	Emissions factor description	Emission Factors (kgCo2e/km)	Total km travelled	Carbon Emissions (tCO2e)	
Ventilation shafts at Kennington Green (Shaft 3) and Kenning	to Concrete	1250		Concrete wagon (6m3	1.33	6,250.00	8.30	
Ventilation shafts at Kennington Green (Shaft 3) and Kenning Ventilation shafts at Kennington Green (Shaft 3) and Kenning		87		Artic wagon (40t): Art	1.42	435.00	0.62	
Ventilation shafts at Kennington Green (Shaft 3) and Kenning Ventilation shafts at Kennington Green (Shaft 3) and Kenning		124		Grout wagon (40t): Art	1.42	620.00	0.82	
Step-plate junction 1 Northbound	Concrete	181		Concrete wagon (6m3	1.33	905.00	1.20	
Step-plate junction 1 Northbound Step-plate junction 1 Northbound	PCC segment, SGI segm	79		Artic wagon (40t): Art	1.42	395.00	0.56	
Step-plate junction 1 Northbound	Grout	133		Grout wagon (6m3): A	1.33	665.00	0.88	
Step-plate junction 1 Northbound	Concrete	181	5.00	0 1 7	1.33	905.00	1.20	
Step-plate junction 2 Southbound	PCC segment, SGI segm	76		Artic wagon (40t): Art	1.42	380.00	0.54	
Step-plate junction 2 Southbound	Grout	130		Grout wagon (6m3): A	1.33	650.00	0.86	
From Kennington shaft to Kennington Loop - Running tunnel		112		Concrete wagon (6m3	1.33	560.00	0.74	
From Kennington shaft to Kennington Loop - Running tunnel to		2		Artic wagon (40t): Art	1.42	10.00	0.01	
From Kennington shaft to Kennington Loop - Running tunnel	<u> </u>	0		Grout wagon (6m3): A	1.33	-		
From Battersea to Kennington shafts Both tunnels - Running t		3263		Concrete wagon (6m3	1.33	16,315.00	21.66	
From Battersea to Kennington shafts Both tunnels - Running t		49		Artic wagon (40t): Art	1.42	245.00	0.35	
From Battersea to Kennington shafts Both tunnels - Running t				Grout wagon (6m3): A	1.33	-	-	
Crossover tunnels - Running tunnel track bed	Concrete	210		Concrete wagon (6m3	1.33	1,050.00	1.39	
Crossover tunnels - Running tunnel track bed	PCC segment, SGI segm	4		Artic wagon (40t): Art	1.42	20.00	0.03	
Crossover tunnels - Running tunnel track bed	Grout	0		Grout wagon (6m3): A	1.33		-	
Nine Elms Station	Concrete	11999		Concrete wagon (6m3	1.33	59,995.00	79.67	
Nine Elms Station	PCC segment, SGI segm	410	5.00	Artic wagon (40t): Art	1.42	2,050.00	2.92	
Nine Elms Station	Grout	0		Grout wagon (6m3): A	1.33	-	-	
Battersea Station	Concrete	16565		Concrete wagon (6m3	1.33		109.98	
Battersea Station	PCC segment, SGI segm	3407	5.00	Artic wagon (40t): Art	1.42	17,035.00	24.27	
Battersea Station	Grout	2447	5.00	Concrete wagon (6m3	1.33	12,235.00	16.25	
TOTAL							272.28	
Construction site energy		<u> </u>		1				
Source: Power requirements for construction activities -MDR		ned 75% of peak load is used	for whole construction period	& powered by grid elec	ricity. Hours of operation	on from CoCP (13-02-01_NLE_docu	ment_CoCP_edited draft_3).	
NB. Assumed Design Option A and Option B are the same for		16				1		
NB. No information on specific plant use such as TBMs etc. so			'			'		
Specific Equipment & max power use		Hours of construction per	Years of construction	Total construction	Fuel use (kWh)	Emissions factor description	Emissions Factor (kg CO2e per kWh)	Carbon Emissions (tCO2e)
Conveyors - 1820kW	equipment 1,365.00	year 2,780.00	6.50	hours 18,070.00	24 665 550 00	UK Grid Electricity for 2010	0.59	14,548.23
Lighting - 140kW	1,365.00	2,780.00	6.50	18,070.00		UK Grid Electricity for 2010	0.59	1,119.09
General Power - 300kW	225.00	2,780.00	6.50	18,070.00		UK Grid Electricity for 2010 UK Grid Electricity for 2010	0.59	2,398.06
Pumps - 20kW	15.00	2,780.00	6.50	18,070.00		UK Grid Electricity for 2010	0.59	159.87
Compressors - 10kW	7.50	2,780.00	6.50	18,070.00	,	UK Grid Electricity for 2010	0.59	79.94
Ventilation - 560kW	420.00	2,780.00	6.50	18,070.00		UK Grid Electricity for 2010	0.59	4,476.38
Accommodation (offices, canteens, toilet/shower blocks) - 40		2,780.00	6.50	·		UK Grid Electricity for 2010	0.59	3,197.41
TOTAL	300.00	2,700.00	0.50	16,070.00	3,421,000.00	ON GITA Electricity IOI 2010	0.59	25,978.99
TOTAL	l	1		I	l		l .	23,310.33

		•										
				+								
										0.1	(1000.)	
Road	Transport Capacity	Con mains hand	Road	Number of Journeys	Con police hoot	Road	I tonne km per Journey	Can antina bank		Carbon Emission Construction C		
Road	Barge	Sea-going boat	Road	Barge	Sea-going boat	Road	Barge	Sea-going boat		Construction	ption 1	TOTAL (both
			!	1	Number of Journeys -							methods
Lorry Capacity per journey	Barge Capacity per Journey	Boat capacity per journey	Number of Journeys -		assumed 100% of trips use							transport) to
(tonnes)	(tonnes)	(tonnes)	-		·	tonne km	tonne km	tonne km	Road	Barge	Sea-going boa	
20					110.31	1,544.97	77,248.51	21,602.90	502.05		39.65	640.96
20	0 1000	1000	1145.10	53.44	76.34	1,544.97	77,248.51	21,602.90	347.44	68.69	27.44	443.57
20					12.17	1,544.97	77,248.51	21,602.90	55.39		4.37	70.71
20					71.20	1,544.97	77,248.51	21,602.90	324.05		25.59	413.71
20					141.73	1,544.97	77,248.51	21,602.90	645.05		50.95	823.52
20					9.03	-	77,248.51	21,602.90	41.10		3.25	52.47
20					12.50	1,544.97	77,248.51	21,602.90	56.89		4.49	72.63
20					6.73	1,544.97	77,248.51	21,602.90	30.63		2.42	39.10
20					2.16 1.30	1,544.97 1,544.97	77,248.51 77,248.51	21,602.90 21,602.90	9.83 5.92		0.78 0.47	12.55 7.55
20					0.00	1,544.97	77,248.51	21,602.90	5.92	- 1.17	0.47	7.55
20				310.43	443.47	1,544.97	77,248.51	21,602.90	2,018.34		159.42	2,576.79
			5,25			,	,	,				
	Transport Capacity			Number of journeys		Tota	l tonne km per Journey			Carbon Emission	s (tCO2e)	•
Road	Barge	Sea-going boat	Road	Barge	Sea-going boat	Road	Barge	Sea-going boat		Construction C	ption 2	
												TOTAL (both
			!		Number of Journeys -							methods
Lorry Capacity per journey	Barge Capacity per Journey	Boat capacity per journey	· ·		assumed 100% of trips use					_	L	transport) to
(tonnes)	(tonnes)	(tonnes)						tonne km	Road		Sea-going boa	
20					110.31 76.34	1,544.97 1,544.97	77,248.51 77,248.51	21,602.90 21,602.90	535.52 370.61		39.65 27.44	671.59 464.77
20					12.17	1,544.97	77,248.51	21,602.90	59.08		4.37	74.09
20					71.20	1,544.97	77,248.51	21,602.90	345.65		25.59	
20					141.73	1,544.97	77,248.51	21,602.90			50.95	862.88
20	0 1000				9.03	·		21,002.30	688.05	123.88	50.95	
20	0 1000		200.00	0.50		1,544.97	77,248.51	21,602.90	43.84		3.25	54.98
20					12.50	1,544.97 1,544.97	77,248.51 77,248.51			7.89		54.98 76.10
20	1000		107.68	4.58	6.73	1,544.97 1,544.97	77,248.51 77,248.51	21,602.90 21,602.90 21,602.90	43.84 60.68 32.67	7.89 10.93 5.88	3.25 4.49 2.42	54.98 76.10 40.97
20		1000	107.68 34.56	4.58 1.47	6.73 2.16	1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68	7.89 10.93 5.88	3.25 4.49	54.98 76.10
	0 1000	1000	107.68 34.56 0.00	4.58 1.47 0.00	6.73 2.16 0.00	1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78	54.98 76.10 40.97 13.15
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00	6.73 2.16 0.00	1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78	54.98 76.10 40.97 13.15
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29
20	0 1000 0 1000	1000 1000 1000	107.68 34.56 0.00 100.64	4.58 1.47 0.00 4.28	6.73 2.16 0.00 6.29	1,544.97 1,544.97 1,544.97 1,544.97 1,544.97	77,248.51 77,248.51 77,248.51 77,248.51 77,248.51	21,602.90 21,602.90 21,602.90 21,602.90 21,602.90 21,602.90	43.84 60.68 32.67 10.49 - 30.54	7.89 10.93 5.88 1.89	3.25 4.49 2.42 0.78 - 2.26	54.98 76.10 40.97 13.15 - 38.29

Baseline Footprint

Scope 1

No scope 1 emissions associated with the baseline

Scope 2

No scope 2 emissions associated with the baseline

Scope 3 Transport - indirect

no NLE is built, includes central London area

without NLE scenario	Source	Unit	Car	Taxi	LGV	OGV Bu	ıs	Tube	Rail	TOTAL tonnes CO2e
Total distance	tfl (motorcycle = estimation, walk/cycle from LTS)	km/yr	20,827,716,826.00	796,345,379.00	4,200,214,701.00	3,556,160,934.00	9,030,058,979.00	16,932,243,621.00	26,256,522,722.00	
Total person trips	tfl (motorcycle = estimation, walk/cycle from LTS)	people trips/yr	n/a	n/a	n/a	n/a	2,573,971,137.00	2,474,320,522.00	1,185,965,557.00	
Total vehicle trips	tfl (motorcycle = estimation, walk/cycle from LTS)	vehicle trips/yr	2,757,241,223.00	47,655,885.00	380,043,837.00	284,331,018.00 n	/a	n/a	n/a	
Average trip length	tfl (motorcycle = estimation, walk/cycle from LTS)	km/trip	7.55	16.71	11.05	12.51	3.50	6.80	22.10	
Emissions factor description	Defra, all scopes grand total GHG	kg CO2e per km	Average car unknown fuel	Taxi (black cab)	Van/Light Commercial Ve	n Diesel HGV Road Freight (Lo	cal London bus	London Underground	National rail	
Emissions factor value	Defra	kg CO2e per km	0.23394	0.188446667	0.2996	0.718520392	0.10005	0.08154	0.06715	
Total tonnes CO2e			4,872,436.07	150,068.63	1,258,720.34	2,555,174.15	903,457.40	1,380,655.14	1,763,125.50	12,883,637.24

Operation - indirect
Currently assuming that the energy use at existing stations will not change significantly as a result of the NLE

Operation Footprint

Scope 1 Transport - direct

LU company leased vehicles (support road fleet)

	Source	Unit	Vehicles
Total CO2e from LU footprint	London Underground 2008 leased vehicles footprintf	tco2e	461
Total km LU	http://www.tfl.gov.uk/corporate/mo desoftransport/londonunderground/ 1608.aspx	km	402
Total km NLE		km	3
Total CO2e		tco2e	4

Do not include in Operation totals as this will double count the impacts of tube emissions accounted for in Scope 3.

Operation -	- Nor	Trackside	
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Operation - Non-Hackside]	CO2 emissions (tonnes CO2/year)								
Space	Space Source		Space Heating	DHW	Cooling	Lighting	Auxiliary	Small Power & Escalators & Lifts	Total			
		Battersea Station	108	5	73	656	391	464	1,697			
Bereller Celevis	- 0/ / /	Nine Elms Station	108	5	73	786	472	441	1,884			
Baseline Scheme	'compliance with building regulations' scenario	Kennington Park	1	-	16	67	627	18	729			
		Kenngington Green	-	-	16	49	606	13	683			
TOTAL		NLE	217	10	178	1,558	2,096	936	4,993			

	Source	Unit	Traction	Groundwater Pumps	Ventilation fans	Total
Total CO2e from LU footprint	London Underground 2008 footprint	tco2e	473,491	36,339	9,027	
Total km LU	http://www.tfl.gov.uk/corporate/mo desoftransport/londonunderground/	km	402	402	402	
Total km NLE	1608.aspx	km	3	3	3	
Total CO2e		tco2e	3,651	280.23	70	4,00

Scope 3
Operation - indirect

	Source	Unit	Water consumption	Wastewater discharge	Waste produce	d	Employee commuting	Business travel	Rail replacement buses	Contracted maintenance vehicles	Purchased materials	Contracted activities	End Use products
Total CO2e from LU footprint	London Underground 2008 footprint	tco2e		216	38	34,872	497		718 1,5	21 2,567	1,775	76,670	2,407
Total km LU	http://www.tfl.gov.uk/corporate/mo desoftransport/londonunderground/ 1608.aspx			402	402	402	402		402 4	02 402	402	402	402
Total km NLE		km		3	3	3	3		3	3 3	3	3	3
Total CO2e		tco2e		2	0	269	4		6	20	14	591	19

Transport - indirect

Public transport in the NLE area (assuming NLE is built)

with NLE scenario	Source	Unit	Car	Taxi	LGV	OGV B	Bus	Tube	Rail	TOTAL tonnes CO2e
Total distance	tfl (motorcycle = estimation, walk/cycle from LTS)	km/yr	20,806,524,950.00	796,521,494.00	4,197,665,475.00	3,553,259,608.00	9,006,700,031.00	17,017,974,628.00	26,261,370,604.00	
Total person trips	tfl (walk/cycle from LTS)	people trips/yr	n/a	n/a	n/a	n/a	2,570,192,878.00	2,489,233,136.00	1,184,313,433.00	
Total vehicle trips	tfl (motorcycle = estimation, walk/cycle from LTS)	vehicle trips/yr	2,750,860,693.00	47,655,885.00	380,512,032.00	284,625,785.00 n	ı/a	n/a	n/a	
Average trip length	tfl (motorcycle = estimation, walk/cycle from LTS)	km/trip	7.56	16.71	11.03	12.48	3.50	6.80	22.20	
Defra, all scopes grand total GHG	kg CO2e per km	Average petrol mo	to Average car unknown fuel	Taxi (black cab)	Van/Light Commercial Ve	Diesel HGV Road Freigh Lo	ocal London bus	London Underground	National rail	
Defra	kg CO2e per km	0.1423	8 0.23394	0.188446667	0.29968	0.718520392	0.10005	0.08154	0.06715	5
Total tonnes CO2e			4,867,478.45	150,101.82	1,257,956.39	2,553,089.49	901,120.34	1,387,645.65	1,763,451.04	12,880,843

nb/ emissions for travel on the NLE are accounted for in
0.81 trackside energy use

Baseline Vs Operation LGV OGV without NLE scenario Source Unit Car Taxi Bus Tube Rail **TOTAL tonnes CO2e** 20,827,716,826.00 796,345,379.00 4,200,214,701.00 3,556,160,934.00 16,932,243,621.00 26,256,522,722.00 tfl (motorcy km/yr 9,030,058,979.00 Total distance Total person trips tfl (motorcy people tri n/a n/a 2,573,971,137.00 2,474,320,522.00 1,185,965,557.00 n/a n/a Total vehicle trips tfl (motorcy vehicle tri 2,757,241,223.00 47,655,885.00 380,043,837.00 284,331,018.00 n/a n/a n/a 11.05 3.50

12.51

0.718520392

2,555,174.15

Van/Light Commerc Diesel HGV Road Fre Local London bus

6.80

London Underground National rail

0.08154

1,380,655.14

0.10005

903,457.40

22.10

0.06715

12,883,637.24

1,763,125.50

16.71

Taxi (black cab)

0.188446667

150,068.63

7.55

0.23394

4,872,436.07

with NLE scenario	Source	Unit	Car	Taxi	LGV	OGV	Bus	Tube	Rail	TOTAL tonnes CO2e
Total distance	tfl (motorc	km/yr	20,806,524,950.00	796,521,494.00	4,197,665,475.00	3,553,259,608.00	9,006,700,031.00	17,017,974,628.00	26,261,370,604.00	
Total person trips	tfl (walk/cy	people tr	n/a	n/a	n/a	n/a	2,570,192,878.00	2,489,233,136.00	1,184,313,433.00	
Total vehicle trips	tfl (motorc	vehicle tr	2,750,860,693.00	47,655,885.00	380,512,032.00	284,625,785.00	n/a	n/a	n/a	
Average trip length	tfl (motorc	km/trip	7.56	16.71	11.03	12.48	3.50	6.80	22.20	
Defra, all scopes grand total GHG	kg CO2e pe	Average p	Average car unknown fuel	Taxi (black cab)	Van/Light Commerc	Diesel HGV Road Fre	Local London bus	London Underground	National rail	
Defra	kg CO2e pe	0.14238	0.23394	0.188446667	0.29968	0.718520392	0.10005	0.08154	0.06715	
Total tonnes CO2e			4,867,478.45	150,101.82	1,257,956.39	2,553,089.49	901,120.34	1,387,645.65	1,763,451.04	12,880,843.17

1,258,720.34

0.29968

Difference

Average trip length

Total tonnes CO2e

Emissions factor description Emissions factor value

tfl (motorcy km/trip

Defra

Defra, all so kg CO2e p Average car unknown fuel

kg CO2e p

Operation vs Baseline	Source	Unit	Car	Taxi	LGV	OGV	Bus	Tube	Rail	TOTAL tonnes CO2e
Total distance	tfl (motorc	km/yr	- 21,191,876.00	176,115.00	- 2,549,226.00	- 2,901,326.00	- 23,358,948.00	85,731,007.00	4,847,882.00	1
Total person trips	tfl (walk/c)	people tr	n/a	n/a	n/a	n/a	- 3,778,259.00	14,912,614.00	- 1,652,124.00	1
Total vehicle trips	tfl (motorc	vehicle tr	- 6,380,530.00	-	468,195.00	294,767.00	n/a	n/a	n/a]
Average trip length	tfl (motorc	km/trip	0.01	-	- 0.02	- 0.03	-	-	0.10]
Defra, all scopes grand total GHG	kg CO2e pe	Average p	Average car unknown fuel	Taxi (black cab)	Van/Light Commerc	Diesel HGV Road Fre	Local London bus	London Underground	National rail	
Defra	kg CO2e pe	0.14238	0.23394	0.188446667	0.29968	0.718520392	0.10005	0.08154	0.06715	
Total tonnes CO2e			- 4,957.63	33.19	- 763.95	- 2,084.66	- 2,337.06	6,990.51	325.54	- 2,794.07