

19. Carbon Dioxide Emissions

19.1 Introduction

- 19.1.1 This Chapter, which has been prepared by Waterman, provides further information with regards to the potential carbon dioxide (CO₂) emission impacts arising from the Scheme with Phase 1B (North) in place (and having regard also to the detailed design previously approved in relation to Phase 1A (North)). This further information is provided pursuant to the s73 ES and other EIA Documentation (as defined in **Chapter 4: Approach to the ES Further Information Report**) in light of the further design information now available in respect of Phase 1B (North), and confirms whether the findings of the s73 ES and other EIA Documentation with respect to the likely significant effects, mitigation and residual impacts in relation to CO₂ emissions, remain valid.
- 19.1.2 A review of relevant policy, legislation and guidance published since preparation of the s73 ES and other EIA Documentation has been carried out. A review of the detailed design for Phase 1B (North), as defined in **Chapter 2: Description of Phase 1B (North) RMA**, has then been undertaken, to identify elements of the Phase 1B (North) RMA of relevance to the CO₂ emissions assessment.
- 19.1.3 The approach to the further information is set out and a summary of relevant consultation is provided. A review of the baseline information presented in the s73 ES and other EIA Documentation has been undertaken and updates are presented where relevant. Commentary is then provided which confirms whether any new or different potential significant CO₂ impacts arising from the Development (comprising the Scheme with the detailed design for both Phase 1A (North) and Phase 1B (North) in place) from those identified in the s73 ES and other EIA Documentation are likely. Likewise, any new or different mitigation measures from those identified in the s73 ES and other EIA Documentation are presented where considered necessary, and residual impacts following the application of mitigation are described.
- 19.1.4 The chapter is supported by **Appendix 19.1: Energy Strategy Compliance Phase 1B (North) (March 2017)** and **Appendix 19.2: Traffic CO₂ Emissions, Updated Methodology (March 2017)**.

19.2 Policy, Legislation and Guidance

- 19.2.1 There have been no significant changes to policy, legislation or guidance since the s73 ES and other EIA Documentation were prepared which have a material effect on the approach to or findings of the assessment. There have been some minor changes to relevant planning policy which are set out below, for completeness.

Minor Alterations to the London Plan, 2016

- 19.2.2 Minor alterations to the London Plan were adopted in March 2016ⁱ. Part of the evidence base included a study titled 'Non-Domestic Carbon Dioxide Emissions Target: Feasibility and Viability Study'ⁱⁱ. This study looked at potential changes to the carbon reduction targets within the London Plan for non-domestic buildings. However, no changes were made to the London Plan at that time, and therefore this does not materially change the assessment.

Barnet Local Plan: Supplementary Planning Document: Sustainable Design and Construction, 2016

- 19.2.3 London Borough of Barnet (LBB) published their updated ‘Supplementary Planning Document: Sustainable Design and Construction’ as part of their Local Plan in October 2016ⁱⁱⁱ. The SPD includes details on reducing energy consumption and improving efficient energy supply such as decentralised energy and using renewable energy sources. This relates directly to Policy 5.2 ‘Minimising Carbon Dioxide Emissions’ within the London Plan and reflects the updates to the London Plan since 2013. The SPD updated the previous version (April 2014) and it does not materially change the assessment.

19.3 Relevant Phase 1B (North) RMA Details

- 19.3.1 Key Phase 1B (North) elements of relevance to CO₂ emissions relate to transport infrastructure and buildings works, as follows:
- **Transport Interchange T2:** Replacement Brent Cross Bus Station;
 - **Plot 113:** Residential development will be located on Plot 113; and
 - **Brent Cross East Development Zone:** comprises a series of development plots to the south, west and east of the existing Brent Cross Shopping Centre, around High Street North and Brent Cross Main Square. The plots will contain a mix of uses including retail, leisure, food and beverage, hotel, and community floorspace, in addition to an **energy centre (Plot 101)**. The Development will be supported by multi-storey car parks, in addition to a riverside walkway adjacent to the realigned River Brent. Refurbishment works are also proposed within the existing Brent Cross Shopping Centre, such as reconfiguring existing retail units, removal of the existing mall roof lights and replacement with new features, renewal and replacement of mall floor finishes, increasing the height of existing shopfronts and external alterations to the exterior of the shopping centre where it meets the new plots.
- 19.3.2 These elements were previously considered as part of the assessment of the Scheme in outline in the s73 ES and other EIA Documentation, however further consideration is given within this Chapter to the detailed design proposals brought forward via the Phase 1B (North) RMA and whether these affect the conclusions of the s73 ES and other EIA Documentation.
- 19.3.3 As set out in the Revised Energy Strategy submitted with the Phase 1A (North) FIR, the main energy centre is proposed on the Southern site (Phase 1 (South)), with a Phase 1 energy centre provided within Phase 1B (North) (on Plot 101) and the potential to connect the energy centres provided. The details of the energy centre within Plot 101 in Phase 1B (North) are now available and have therefore have been considered in this Chapter and in the ‘Energy Strategy Compliance for Phase 1B North’ report (**Appendix 19.1**).

19.4 Assessment Methodology

- 19.4.1 The s73 ES chapter assessed whether the change in CO₂ emissions as a result of the transport or energy use resulting from the Scheme was in accordance with the relevant policy requirements. The Climate Change Act 2008^{iv} target for the UK is a target of 80% by 2050 and reductions in CO₂ emissions of at least 34% by 2020, against a 1990 baseline. The Revised

Energy Strategy referenced above, which sets out how the Scheme meets the London Plan (in relation to building emissions).

- 19.4.2 Issues and / or impacts were reported in the s73 ES where reductions in CO₂ emissions were deemed insufficient, such that Government objectives could not be met (i.e. negative impact), or where reductions in CO₂ emissions would be possible, however would not be economically unviable.
- 19.4.3 There have been no significant changes to planning policy, legislation or guidance which materially affect the approach to the CO₂ emissions assessment presented in the s73 ES and other EIA Documentation and therefore it remains valid.
- 19.4.4 The Construction Impact Assessment (CIA) Addendum of the s73 Application (Appendix 2.2 of the s73 ES) has been updated to take account of the change in the construction commencement date and revised sequencing in the Indicative Construction Programme (ICP) for Phase 1 (North). Consideration has been given to any likely changes in the predicted CO₂ emissions in the s73 ES and EIA Documentation as a result of these revisions.
- 19.4.5 The s73 ES determined the changes in CO₂ emissions from transport and energy use for:
- the change in steady-state CO₂ for the 2031 scenario (end state) with and without the Scheme in operation; and
 - the change in CO₂ emissions associated with the interim stages of the Scheme accounting for both construction and operation.
- 19.4.6 The CO₂ emissions assessment for the s73 ES and other EIA Documentation was based on the strategic BXC-TM traffic data. However, there is more recent traffic information data available as per the BXC-DDM traffic model (as described in **Chapter 7: Traffic and Transport**). In response to consultee comments (TfL and LBB), the CO₂ emissions have been recalculated based on the most up-to-date BXC-DDM traffic data.
- 19.4.7 The CO₂ calculations have been updated based on the BXC-DDM and using the Emissions Factors Toolkit (EfT) developed by Defra. In addition, the transport CO₂ emissions have been updated to match the assessment years used in the BXC-DDM transport model. Further details on the methodology are provided in **Appendix 19.2**.
- 19.4.8 As outlined in **Chapter 2: Description of Phase 1B (North) RMA**, ongoing detailed design works have resulted in some amendments to the design and layout of the Brent Cross East (BXE) Development Zone, in particular the New Town Centre. These works resulted in an increase of c.4,000m² in the Phase 1B (North) retail floorspace, as outlined in **Chapter 2: Description of Phase 1B (North) RMA**. This uplift in retail floorspace has been taken into account in this Chapter. A sensitivity test was run in March 2017 using the Transport Matrix (TM) tool as set out in the consented S106 agreement. The TM sensitivity test conclusions were that the increased floorspace proposals are non-material in terms of the additional trips which are forecast to be generated. Further information can be found in **Chapter 7: Traffic and Transport**. Therefore, there would be no material change in carbon emissions from traffic as reported in the s73 ES and the other EIA Documentation due to the increases in floorspace.

- 19.4.9 In relation to energy, the s73 ES Chapter relied upon the s73 Energy Strategy for the buildings of the Scheme. The Strategy proposed a Scheme-wide CHP, with the energy centre located in Phase 1B (South) and district heating infrastructure to serve the whole Site. When the detailed designs were developed for Phase 1A (North), feasibility studies and reports were completed to discharge and satisfy Pre-RMA Planning Condition 35.6 (attached to the 2014 Permission), which altered the Energy Strategy which formed the basis of the s73 ES. The Revised Energy Strategy, as submitted with the Phase 1A (North) FIR, confirms that the Development will be served by a heat network primarily supplied via gas fired CHP and that the main energy centre is proposed on the Southern site (Phase 1 (South)), with a Phase 1 (North) energy centre provided on the Northern Site. This would enable independence of the Northern Site in energy terms, and the earlier delivery of an energy centre to supply Phase 1B (North).
- 19.4.10 For the Phase 1B (North) RMA, an Energy Statement Compliance report (March 2017) has been prepared by Hilson Moran. This confirms that the Phase 1B (North) carbon reductions commitments are in accordance with the above Revised Energy Strategy.

Limitations and Constraints

- 19.4.11 No limitations or constraints have been identified in respect of this Chapter. Refer to **Appendix 19.2** for further information on methodology and interpretation of results.

19.5 Consultation

- 19.5.1 The approach to the CO₂ emissions assessment based on a 'Statement of Conformity' was set out in the EIA Scoping Report (**Appendix 4.1**). However, based on information now available, and in response to comments received from LBB and consultees, the approach has now been amended to a 'Further Information' Chapter.

19.6 Baseline Conditions

- 19.6.1 Following a review of the baseline conditions section of the s73 ES and the EIA Documentation, it is considered that the baseline for the existing buildings remains valid.
- 19.6.2 In relation to traffic emissions, the baseline CO₂ emissions have been updated (refer to **Table 19.2**) in accordance with the BXC-DDM traffic model, and as described in the Assessment Methodology section of this Chapter. The updated baseline CO₂ figures are less than predicted in the s73 ES. However, it should be noted that the updated figures are for a base year of 2012 and the s73 ES is based on a 2007 base year, and therefore the figures are not directly comparable. Furthermore, the BXC-TM model 2007 data used link flows, which includes every trip that begins, terminates or passes through the study area. The data used in the updated CO₂ emissions assessment is based on trip ends, i.e. demand data for trips that either start or end in the study area and therefore reflects the CO₂ emissions generated from the Development. Further details are provided in **Appendix 19.2**.
- 19.6.3 Baseline energy demand and carbon emissions were estimated by Buro Happold for the s73 ES in relation to the new buildings. An Energy Strategy Compliance report for Phase 1B (North) (March 2017) has been prepared by Hilson Moran in relation to the Phase 1B (North) RMA proposals (refer to **Appendix 19.1**). It should be noted that 'baseline' in this context refers to the

worst case demand and emissions, i.e. prior to implementation of the Mayor of London's energy hierarchy measures of 'Lean, Clean and Green'.

19.7 Assessment and Mitigation

Construction

Potential Impacts

- 19.7.1 As outlined earlier in this Chapter, the ICP for the Scheme has been updated to reflect changes to the sequence and timing of the construction activities for Phase 1 (North). However, the construction activities provided within the s73 (and as assessed in the s73 ES and other EIA Documentation) are not anticipated to change and therefore remain applicable to the CO₂ assessment.
- 19.7.2 In the s73 ES, traffic flows for the 'base case', 'do minimum' and 'do something' scenarios for construction were taken from the transport model BXC-TM as reported in the Consolidated Transport Assessment (TA). From these flow volumes, CO₂ emissions were calculated using the Design Manual for Roads and Bridges (DMRB)' spreadsheet tool. The overall flow volumes from the BXC-TM and the BXC-DDM have been compared and considered to have a high level of agreement, therefore it is deemed that the CO₂ emissions calculated in the s73 ES remain valid for the purposes of this Chapter.
- 19.7.3 The revisions to the ICP show that the construction works for Phase 1B (North) would commence in 2018 and largely be completed over a 5-year period. However, the overall carbon emissions during construction would be unlikely to change as a result of the revised ICP. The peak emissions during the construction phase are anticipated to be 2019 and 2020, as reflected in the revised traffic Construction Vehicle Movements presented in the updated CIA, which is consistent with the s73 ES and other EIA Documentation.
- 19.7.4 Further information on construction traffic or logistics for the Phase 1B (North) RMA would come forward as part of the Construction Traffic Management Plan (CTMP) required to satisfy planning condition 12.1 attached to the 2014 Permission and to inform the procurement of construction contractors, but is not considered (based on current information) to give rise to new or different likely significant impacts or mitigation.
- 19.7.5 In relation to emissions from site energy consumption for construction activities, there is no change to the overall construction activities proposed for Phase 1B (North). The Phase 1B (North) proposals include an increase floorspace and therefore amount of building work. However, this is a small increase in floorspace in the context of the 2014 Permission and the overall Scheme, and it is therefore considered that there would be no significant change to the CO₂ emissions previously estimated.

Mitigation

- 19.7.6 No new or different construction related mitigation measures beyond those identified in the s73 ES and other EIA Documentation have been identified as being necessary as a result of the detailed design development for Phase 1B (North). Many of the mitigation measures included in

Chapter 7: Traffic and Transport of this Report and the s73 ES and other EIA Documentation contribute towards reducing CO₂ emissions during the construction period.

- 19.7.7 The Code of Construction Practice (CoCP) and Construction Environment Management Plan (CEMP) will help to reduce construction emissions by measures such as switching off engines whilst on site (i.e. no idling) and selection of low emission vehicles.

Residual Impacts

- 19.7.8 The residual impacts of the construction phase of the Development remain as identified in the s73 ES and the other EIA Documentation.

Operation

Potential Impacts

- 19.7.9 Following a review of legislation, policy and guidance, baseline information and the Phase 1B (North) RMA detailed design, it is confirmed that the assessment of potential operational impacts presented in the s73 ES and other EIA Documentation remains valid. Additional information is provided below in relation to the CO₂ emissions related to traffic, and the Energy Strategy Compliance Phase 1B (North) report (March 2017) (**Appendix 19.1**).

Energy Use in Buildings

- 19.7.10 The 2014 Permission includes commitments for residential elements to achieve a 40% reduction in regulated CO₂ emissions compared to a Building Regulations Part L 2010 compliant scheme and for non-domestic elements to achieve a 25% CO₂ reduction compared to a Part L 2010 compliant scheme. The 2014 Permission also includes commitments to develop a heat network to connect residential building typologies only, with all other building typologies able to connect to the heat network. The Revised Energy Statement sets out how the BXC Scheme will achieve the aforementioned reductions. A further Energy Strategy Compliance Phase 1B (North) report (March 2017) has been prepared in support of the Phase 1B (North) RMA (**Appendix 19.1**).
- 19.7.11 The CO₂ emissions calculated by Hilson Moran for Phase 1B (North) are set out in **Table 19.1**.

Table 19.1: Phase 1B (North) Building CO₂ Calculations (Part L)

	Retail, Leisure, Hotel, Malls / BOH		Plot 113 (residential)	
	Tonnes CO ₂ / year	% Improvement	Tonnes CO ₂ / year	% Improvement
Baseline	7,147	-	63	-
Be LEAN	5,985	16.2%	58	7.2%
Be CLEAN	5,287	26.0%	43	33.0%
Be GREEN	5,287	26.0%	37	40.7%

- 19.7.12 **Table 19.1** demonstrates that the Phase 1B (North) proposals will achieve the energy targets set out in the Revised Energy Strategy. Therefore, these commitments remain unchanged from those set out in the s73 ES and other EIA Documentation.

- 19.7.13 The s73 ES contained an estimate of energy consumption and therefore CO₂ emissions from the new buildings of the Development, assessed by evaluating the respective floor areas and benchmarking their energy performance based upon best practice performance that meets current regulations.
- 19.7.14 The overall performance of the built elements of the Development as a whole was estimated in the Revised Energy Statement (included at Appendix 19.1 of the s73 ES), as set out below:
- Baseline: 31,210 tCO₂/year
 - Energy Efficiency ('Lean'): 26,490 tCO₂/year
 - Heat Network ('Clean'): 21,000 tCO₂/year
 - Renewable Energy ('Green'): 20,450 tCO₂/year
- 19.7.15 The floorspace areas for the Phase 1B (North) RMA have increased marginally (refer to **Chapter 2**). However, these proposals represent a small increase in floorspace in the context of the 2014 Permission, with an overall floorspace increase of 5.4% proposed within BXE, and 3.8% proposed across the BXC Site. Therefore, it is considered that the overall change in carbon emissions for the Development would not be significant.

On-Site CHP

- 19.7.16 An energy centre is proposed within Plot 101 which would serve Phase 1 North. This allows self-sufficiency within Phase 1, in line with objectives in the London Plan, whilst provision is maintained for the future option of joining a Site-wide energy and heating system. The emissions from this system have been considered within the dispersion modelling as undertaken in **Chapter 14: Air Quality and Dust**. The modelling results (as set out in **Appendix 14.3: Air Quality Modelling Results**) are consistent with the results as presented in the s73 ES and other EIA Documentation (specifically the Phase 1A (North) FIR). The main contribution at the modelled receptors is from traffic emissions from surrounding infrastructure (which was previously considered in the Phase 1A (North) FIR) rather than from additional emissions arising from the operation of Phase 1B (North) (i.e. from the replacement bus station, the bus station ventilation ducts and the energy centre).

Transport

- 19.7.17 Whilst the overall volume of traffic likely to be generated by the Development would remain as reported in the s73 ES, the CO₂ calculations have been updated using the latest traffic model (BXC-DDM) and assessment years used in the DDM.
- 19.7.18 The results of the updated assessment and respective contribution of cars, Light Goods Vehicles (LGVs) and Heavy Good Vehicles (HGVs) are set out in **Table 19.2** below.

Table 19.2 Updated Traffic CO₂ Emissions

Source Name	Traffic CO ₂ emissions (kilo-Tonnes/annum)		
	All LDVs	All HDVs / Buses	All Vehicles
2012 Base	68.68107813	5.656451294	74.33752881
2031 Do Minimum	53.33216797	6.32356543	59.65573291
2031 Do Something	80.18885938	8.643641357	88.83250171

- 19.7.19 The updated CO₂ figures are less than predicted in the s73 ES and therefore confirms that the s73 ES was a conservative assessment. However, it should be noted that the updated figures are for a base year of 2012 and the s73 ES is based on 2007 base year and therefore the figures are not directly comparable. Further, the BXC-TM model 2007 data used link flows, which includes every trip that begins, terminates or passes through the study area. The data used in the updated CO₂ emissions is based on trip ends, i.e. demand data for trips that either start or end in the study area, and therefore reflects the CO₂ emissions generated from the Development. The main difference is in the HGV CO₂ emissions. Further details are provided in **Appendix 19.2**.
- 19.7.20 Whilst the CO₂ figures have altered, the overall CO₂ emission impacts reported in the s73 ES remain unchanged. That is, that the reduction in transport CO₂ emissions do not meet the overall target of the Climate Change Act 2008¹ and the Carbon Budgets of the Committee on Climate Change (CCC)² and therefore this would be a negative impact. Therefore, the impacts set out in the s73 ES and other EIA Documentation therefore remain valid.

Mitigation

- 19.7.21 No new or different mitigation has been identified as being required from that identified in the s73 ES and other EIA Documentation. As set out in the s73 ES, the Applicants are committed to a wide range of provision and measures that will limit the transport emissions.

Residual Impacts

- 19.7.22 Following a review of the detailed Phase 1B (North) RMA, residual CO₂ emissions would have a negative impact, as identified in the s73 ES.
- 19.7.23 A summary of the residual impacts associated with carbon dioxide emissions is included within **Chapter 22: Summary of Residuals Impacts and Mitigation**.

¹ Legally binding target for GHG reductions in the UK of 80% by 2050 and reductions in CO₂ emissions of at least 34% by 2020, against a 1990 baseline.

² The CCC fifth carbon budget, covering the period 2028 to 2032, was set at 1,725 MtCO₂e (equivalent to 57% by 2030 based on 1990 levels).

References

- i Greater London Authority (2015), Minor Alterations to the London Plan (MALP)
- ii Greater London Authority (2015), Non-Domestic Carbon Dioxide Emissions Target: Feasibility and Viability Study' (by Hoare Lea with David Lock Associates and Gardiner & Theobald)
- iii Barnet Local Plan, October 2016, Supplementary Planning Document: Sustainable Design and Construction
- iv HMSO, Climate Change Act 2008
- v The Highways Agency (July, 2007), Design Manual for Roads and Bridges (DMRB) Screening Model accessed <http://www.standardsforhighways.co.uk/ha/standards/guidance/air-quality.htm>