

## 19. Carbon Dioxide Emissions

### 19.1 Introduction

- 19.1.1 This Chapter, which has been prepared by Waterman, provides a statement of conformity with regard to the potential carbon dioxide emission impacts arising from the Scheme with Phase 1A (North) in place (hereafter referred to as the 'Development'). This statement of conformity is provided pursuant to the s.73 ES to confirm that the overall findings of the s.73 ES with respect to carbon dioxide emissions remain valid.
- 19.1.2 The carbon dioxide emissions chapter of the s.73 ES aimed to describe and assess the likely significant effects and mitigation of the Scheme in the context of national, regional and local planning policy objectives in relation to the Site and any changes in the carbon dioxide emissions resulting from transport and energy generation and usage. The assessment within the s.73 ES provided an update from the RES 2009 to incorporate the Scheme updates and more importantly to capture updated emission targets and objectives.
- 19.1.3 The chapter is supported by **Appendix 19.1: Extract from Revised Energy Strategy (January 2015)**.

### 19.2 Policy, Legislation and Guidance

- 19.2.1 There have been no significant changes to policy, legislation or guidance since the s.73 ES was prepared which have a material effect on the approach to or findings of the assessment. A review of material published or amended since October 2013 is set out below for reference.

#### Further Alterations to the London Plan (FALP), 2014

- 19.2.2 Further Alterations to the London Plan (GLA)<sup>i</sup> were published in January 2014, however following a review it is deemed that it does not alter the existing carbon dioxide related policies within the London Plan. In summary and for ease of reference the following policies of the London Plan directly relate to carbon dioxide:
- *Policy 5.1 Climate Change Mitigation*
    - *A: The Mayor seeks to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025. It is expected that the GLA Group, London boroughs and other organisations will contribute to meeting this strategic reduction target, and the GLA will monitor progress towards its achievement annually.*
    - *B: Within LDFs boroughs should develop detailed policies and proposals that promote and are consistent with the achievement of the Mayor's strategic carbon dioxide emissions reduction target for London.*
  - **Policy 5.2: Minimising Carbon Dioxide Emissions**
    - *A: A Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy: 1 Be lean: use less energy 2 Be clean: supply energy efficiently 3 Be green: use renewable energy*

- *B: The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.*
- *C: Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.*
- Policy 5.3 Sustainable Design and Construction
  - *A: The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.*
- Policy 5.5 Decentralised Energy Networks
  - *A: The Mayor expects 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025. In order to achieve this target the Mayor prioritises the development of decentralised heating and cooling networks at the development and area wide levels, including larger scale heat transmission networks*
  - *Shifting 25 per cent of London's energy demand to be supplied through decentralised systems could save up to 2.57 million tonnes of carbon dioxide a year.*
- Policy 5.6 Decentralised Energy in Development Proposals
  - *A: Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.*

## Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy and the London Climate Change Adaption Strategy, October 2011

- 19.2.3 The Climate Change Mitigation and Energy Strategy (CCME) and London Climate Change Adaptation Strategy are strategic frameworks to enhance the quality of life in London and to protect the environment. These strategies form two of several from the Mayor of London which together aim to reduce carbon emissions and improve sustainability throughout the city. The three pillars of the Mayor's Strategy overall are: Retrofitting London, Greening London and Cleaner Air for London.
- 19.2.4 The main objectives of the CCME strategy include how to reduce carbon emissions to improve quality of life and to gain economic opportunities from a low carbon economy. The approach to achieve this aligns with the London Plan and therefore no additional information from this strategy is considered relevant to the methodology or outcome of this assessment.

## Barnet Local Plan: Supplementary Planning Document: Sustainable Design and Construction, April 2013

19.2.5 LBB published the “Supplementary Planning Document: Sustainable Design and Construction” as part of their Local Plan in April 2013<sup>ii</sup>. 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.

## Supplementary Planning Guidance: Sustainable Design and Construction, 2014

19.2.6 The Supplementary Planning Guidance (SPG): Sustainable Design and Construction<sup>iii</sup> was adopted in April 2014 to provide guidance on the implementation of London Plan policy 5.2 and 5.3 along with a range of policies within chapter 5 and 7 dealing with environmental sustainability.

19.2.7 The SPG includes guidance on the following key areas:

- Preparing energy demand assessments;
- Using less energy, including through both passive and active design measures;
- Planning for and installing an efficient energy supply and facilitating site-wide energy networks and district heating systems;
- Planning for and installing renewable energy
- Carbon dioxide off-setting; and
- Retrofitting energy and water saving measures.

## 19.3 Relevant Phase 1A (North) RMAs Details

19.3.1 Key Phase 1A (North) infrastructure elements of relevance to the assessment due to their potential to influence the future carbon dioxide emissions from vehicles (both private and public) within and surrounding the Site, comprise the following structures:

- Primary and secondary routes: new roads, junctions and routes to link the future Development to the existing infrastructure;
- Engineering works: alteration and diversion of the River Brent;
- Bridge structures: replacement of Templehof Bridge (A406) (B1), new River Brent bridges, the Living Bridge (B7) and new pedestrian and cycle bridge at the M1 junction (B6); and
- Temporary Bus Station and Bus Stops

19.3.2 The proposed public open spaces included in Phase 1A (North) RMA are listed below. These have the potential to act as carbon sinks (although not material to the assessment) within the Site whilst providing additional amenity and visual benefits:

- Claremont Park Improvements;
- Clitterhouse Playing Fields Improvements Part 1; and
- Central Brent Riverside Park including River Brent Nature Park.

- 19.3.3 The Gateway Junctions in Phase 1A (North) have full planning permission so do not require a RMA, but have along with the whole of the Development been taken into account in the assessment of this chapter.
- 19.3.4 The residential Plots 53 and 54 located on Brent Terrace will provide up to 47 units of replacement housing for existing residents of Whitefield Estate. A small CHP is to be provided within Plot 53 to service both plots and enable self-sufficiency for energy and heat from the rest of the Development. This is particularly important being the first residential plots within the Development which are proposed to be constructed prior to the site-wide energy centre(s).
- 19.3.5 The Plot 53/54 CHP and Temporary Bus Station and Bus Stations were not considered as part of the assessment of the Scheme in outline in the s.73 ES, although due to the presence of the existing bus station and the small scale of the Plot 53/54 CHP these are not considered to be material to the assessment on the basis that they do not give rise to any likely significant impacts for the purposes of this Chapter.
- 19.3.6 The Revised Energy Strategy (January 2015) which has been submitted to LBB in respect of Planning Condition 35.6 states that the Development will be served by a heat network primarily supplied via gas fired CHP. A 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 is required to reflect development phasing and brings benefits with regards to certainty of delivery, network resilience and with no loss of performance in terms of carbon reduction. The energy centres can be linked into one site wide heat network depending on agreement with the Southern developer and their development programme. Infrastructure and connections to enable this connection will be provided as part of Phase 1A (North), including sleeves and access points to allow district heat pipework to be inserted through the Tempelhof Bridge. The details of the energy centres are not available as part of the Phase 1A (North) RMAs and have therefore have not been considered in detail in this Chapter.

## 19.4 Assessment Methodology

- 19.4.1 There have been no significant changes to planning policy, legislation or guidance which materially affect the approach to the carbon dioxide emissions assessment presented in s.73 ES. The methodology and significance criteria presented in the s.73 ES chapter 19 therefore remain valid.
- 19.4.2 The s.73 ES chapter assessed whether or not the change in CO<sub>2</sub> emissions as a result of the transport or energy use resulting from the Scheme were in accordance with the policy requirements. Issues and / or impacts were reported where reductions in CO<sub>2</sub> emissions were deemed insufficient so that government objectives could not be met, or where reductions in CO<sub>2</sub> emissions were excessive which would exceed the trajectory but likely to cause significant economic impacts.
- 19.4.3 The s.73 ES determined the changes in CO<sub>2</sub> emissions from transport and energy use for:
- the change in steady-state CO<sub>2</sub> for the 2031 scenario (end state) with and without the Scheme in operation; and
  - the change in CO<sub>2</sub> emissions associated with the interim stages of the Scheme accounting for both construction and operation.

- 19.4.4 To note, the s.73 ES chapter relied upon the Energy Strategy for the buildings of the Scheme which included the Applicants intention to deliver the '*Preferred Option*' which included a Waste Handling Facility in Phase 1B (South), Energy from Waste (EfW) / Combined Heat and Power (CHP) plant using Refuse Derived Fuel (RDF) in Phase 1A (South) and district heating and cooling infrastructure to serve all significant new residential buildings. It was reported that further feasibility studies would determine the fuel source and alternatives if RDF were deemed to be unfeasible, with biofuel / biomass and natural gas then being considered. The Scheme-wide CHP would be provided in Phase 1B (South) and district heating infrastructure to serve the whole site. Any residential buildings developed prior to this phase were proposed to allow for connection to the district system at a later date, if appropriate.
- 19.4.5 Now that detailed design has been undertaken for Phase 1A (North) and Pre-RMA Planning Condition feasibility studies and reports have been completed and discharged, the following outcomes alter the '*Preferred Option*' which formed the basis of the s.73 ES. The Pre-RMA Condition studies and their outcomes are summarised below:
- **Condition 35.3: RDF Feasibility Study** – this study concluded that RDF is not a feasible fuel option at this time for the proposed Site-wide CHP / energy centre.
  - **Condition 35.4: Alternative Fuel Feasibility Study** – this condition was triggered by the outcome of the RDF study. Natural gas was found to be the favourable fuel option for the Site-wide CHP / energy centre.
  - **Condition 35.6: Revised Energy Strategy** – an updated Energy Strategy was completed to account for the outcome of the RDF study and the alternative fuel study above. The report confirms that the Development will be served by a heat network primarily supplied via gas fired CHP. A 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 earlier delivery of an energy centre to supply Phase 1B (North).
- 19.4.6 As the project moves into an implementation stage then a further transport model termed the Brent Cross Cricklewood Detailed Design Model (BXC-DDM) has been developed for detailed design purposes principally for obtaining the formal Technical Approvals for the highways designs. The BXC DDM has a significantly increased level of detail of both existing and forecast traffic movements on the local roads. In relation to the assessment of traffic and transport to determine CO<sub>2</sub> emissions from the Site in the end state year 2031, the detailed design of the highway network and associated bridges and junctions has been developed in line with the BXC-DDM transport model. The forecast traffic flows from the model have been used to determine the air quality impact assessment in Chapter 14 of this Report and for the purposes of noise modelling (**Chapter 9**).
- 19.4.7 A Reserved Matters Transport Report produced for Phase 1A (North) by URS can be found in **Appendix 7.1. Chapter 7: Traffic and Transport** of this Report confirms that the Consolidated Transport Assessment (TA) of the s.73 ES and the Construction Impact Assessment Addendum of the s.73 Application remain valid (**Appendix 7.2** and **2.2** respectively) in respect of traffic impacts. It is therefore reasonable to conclude that the traffic related CO<sub>2</sub> emissions presented in the s.73 ES also remain valid and have not been updated for the purposes of this Report.

## Limitations and Constraints

19.4.8 No particular limitations or constraints have been identified in respect of this chapter.

## 19.5 Consultation

19.5.1 Capita, as LBB's advisors, raised a query in respect of the CO<sub>2</sub> assessment in the December 2014 EIA Scoping Opinion as detailed in Table 4.1 of this Report. Capita recommended that the s.73 assessment is re-done using a more robust methodology using the ADMS Roads Dispersion Model (air quality model that should already be built) or EMIT Emission Inventory or Traffic emissions modelling (e.g. AIRE) should be conducted that employs with up to date CO<sub>2</sub> vehicle emissions rates supplied by Defra. It is acknowledged by Waterman that the Design Manual for Roads and Bridges (DMRB) tool used in the s.73 ES to calculate changes in CO<sub>2</sub> emissions from road traffic is based on outdated emission factors, although it does not follow that results would under-estimate CO<sub>2</sub> emissions. Following the completion of sensitivity tests for a number of typical road types and vehicles speeds (reported in **Chapter 14: Air Quality**) indications are that estimated CO<sub>2</sub> emissions using DMRB tend to be notably higher (>10%) than those calculated by the EFT for the same year, road type, and speed (for typical urban speeds within 20-50km/hr), and significantly higher (>25%) on typical motorways (considering a speed of 100km/hr), although DMRB provides slightly lower results than the EFT at very low speeds (10km/hr and less). This indicates that results presented in the s.73 ES are likely to be overly conservative, in addition to the DMRB only allowing calculation of emissions up to 2025, whilst the EFT goes up to 2030 (projected emissions in 2030 are lower than in 2025 - and our year of assessment is 2031). No further assessment has therefore been undertaken.

## 19.6 Baseline Conditions

- 19.6.1 Following a review of the baseline conditions section of the s.73 ES it is considered that this remains valid for the purposes of decision making, having been updated in 2013 for the s.73 ES with current and future carbon intensity for different transport modes. As such, no further baseline study has been undertaken.
- 19.6.2 Baseline energy demand and carbon emissions have been estimated by Buro Happold and are presented in the Revised Energy Strategy. An extract of these figures is included at **Appendix 19.1** for reference including: Baseline energy demands, baseline carbon emissions and baseline estimate of unregulated emissions. 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 The Indicative Construction Programme (ICP) and the Construction Impact Assessment (CIA) Addendum set out in the s.73 Application remain unchanged from that considered by the s.73 ES, with the exception of the delivery of the Plots 53 and 54 which were brought forward from Sub-Phase 1C to 1A (North) through an application that was made under Planning Condition 4.2 of the 2014 Permission (**Appendix 4.3**).
- 19.7.2 No further significant changes to the construction programme or phasing are proposed as part of the Phase 1A (North) RMAs. No further information is available on construction traffic or logistics as part of the Phase 1A (North) RMAs. This would come forward as part of the Construction Traffic Management Plan (CTMP) and to discharge planning conditions and to inform the procurement of construction contractors, , but is not considered on current information to give rise to new or different likely significant effects or mitigation.
- 19.7.3 As the construction transport routes, traffic volumes and timeframes remain as per the s.73 Application, it is considered that the CO<sub>2</sub> emissions from construction traffic will remain valid from the s.73 ES.
- 19.7.4 In the s.73 ES, traffic flows for the 'base case', 'do minimum' and 'do something' scenarios for construction and operation were taken from the transport model BXC-TM as reported in the Consolidated TA (**Appendix 7.2**). From these flow volumes, CO<sub>2</sub> emissions were calculated using the Design Manual for Roads and Bridges (DMRB)<sup>iv</sup> 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 CO<sub>2</sub> emissions calculated in the s.73 ES remain valid for the purposes of this Chapter.

#### Mitigation

- 19.7.5 No new or different construction related mitigation measures beyond those identified in the s.73 ES have been identified as necessary as a result of the detailed design development for Phase 1A (North). Many of the mitigation measures included in Chapter 7 of this Report and the s.73 ES contribute towards reducing CO<sub>2</sub> emissions during the construction period.

#### Residual Impacts

- 19.7.6 The residual impacts of construction of the Development with the Phase 1A (North) RMAs in place remain as identified in the s.73 ES.

## Operation

### Potential Impacts

19.7.7 Following a review of legislation, policy and guidance, baseline and the Phase 1A (North) RMAs detailed design, it can be confirmed that the assessment of potential operational impacts presented in the s.73 ES Carbon Dioxide Emissions Chapter remains valid. Additional information is provided below in relation to the buildings within Plots 53 and 54 and traffic emissions as part of the Phase 1A (North) RMAs and Revised Energy Strategy.

### Energy Use in Buildings

19.7.8 The 2014 Permission includes commitments for residential elements to achieve a 40% reduction in regulated CO<sub>2</sub> emissions compared to a Building Regulations Part L 2010 compliant scheme and for non-domestic elements to achieve a 25% CO<sub>2</sub> reduction compared to a Part L 2010 of compliant scheme. The consented scheme 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, should the developer elect to do so. The Revised Energy Strategy has been drafted in order to discharge Planning Condition 35.6, and sets out how the BXC Development will achieve reduction in carbon emissions of 40% below Building Regulations Part L 2010 for Residential and 25% below for Commercial buildings. These commitments remain unchanged from those set out in the s.73 ES.

19.7.9 The s.73 ES contained an estimate of energy consumption and therefore CO<sub>2</sub> emissions from the new buildings of the Development have been assessed by evaluating the respective floor areas and benchmarking their energy performance based upon best practice performance that meets current regulations. The floorspace areas remain as per the s.73 Application and therefore it is not considered that the operational energy use in buildings will have altered from the s.73.

19.7.10 The overall performance of the built elements of the Development as a whole is estimated in Table 8.1 of the Revised Energy Strategy (included at **Appendix 19.1**). **Appendix 19.1** provides an estimate of total tonnes of CO<sub>2</sub> emissions per year as follows:

- Baseline: 31,210 tCO<sub>2</sub>/year
- Energy Efficiency (Lean): 26,490 tCO<sub>2</sub>/year
- Heat Network (Clean): 21,000 tCO<sub>2</sub>/year
- Renewable Energy ('Green'): 20,450 tCO<sub>2</sub>/year

19.7.11 In relation to the 'Energy Strategy' the CO<sub>2</sub> emissions chapter of the s.73 ES reported that the 'Preferred Option' for RDF fuelled CHP on-site would fully comply with the London Plan requirement for at least 20% of the energy requirement for the Scheme to be provided by on-site renewable energy sources. It is also reported that in the 'alternative option', the CO<sub>2</sub> emission reductions would be delivered by a combination of energy efficiency initiatives including the efficiency savings from the use of gas-fired CHP plant alongside other renewable resources which are still being evaluated including PV biomass heating, solar or small-scale wind turbines.

19.7.12 In consideration of the Revised Energy Strategy (Condition 35.6) the CO<sub>2</sub> emission calculations and assessment within the s.73 ES is considered to remain valid as both the preferred and alternative option were deemed to meet the necessary CO<sub>2</sub> emission reductions for the Development through on-site energy sources. It should be noted however that in respect of renewables ('green') the Revised Energy Strategy indicates that where the developer elects that a building typology will not connect to the heat network, alternative means such as building based solutions and solar photovoltaic panels can still achieve the carbon emissions reduction targets set out by the 2014 Permission.

19.7.13 The s.73 ES included an estimate of 44 kilo-tonnes per annum for CO<sub>2</sub> emissions from the Development as a whole. Table 8.1 of the Revised Energy Strategy (included at **Appendix 19.1**) provided estimates of the overall performance of the Development as a whole in terms of total CO<sub>2</sub> emissions and reductions based on the energy hierarchy. The total estimated emissions even in the baseline case (i.e. worst case without any reductions) would be 31,210 t/CO<sub>2</sub>/yr from the buildings within the Development. This demonstrates that the s.73 ES presented a conservative estimate of predicted CO<sub>2</sub> emissions. The conclusion of the s.73 ES, which stated that the s.73 Scheme is expected to result in a negative impact in respect of CO<sub>2</sub> emissions" therefore remains valid.

#### On-Site CHP for Plots 53 and 54

19.7.14 A small-scale on-site gas-fired CHP would be provided in the car park of Plot 53 to service the residential units of both Plots 53 and 54 and to provide an independent energy resource. This reduces reliance on the existing energy and heating network and allows self-sufficiency within the plots, in line with objectives in the London Plan, whilst allowance is maintained for the future option of joining a Site-wide energy and heating system. The emissions from this system would be minor if at all notable within the Site-wide dispersion modelling as undertaken in **Chapter 14: Air Quality and Dust**. It is reported Site-wide and localised impacts from the CHP would not be significant for CO<sub>2</sub> emissions.

#### Transport

19.7.15 As per the construction impacts section of this Chapter, the traffic flows as per the s.73 ES remain valid in regards to carbon emission calculations using DMRB tools to determine the potential operational impacts of emissions from transport in the 'do minimum' and 'do something' scenarios. The BXC-DDM data has not been used to update the transport CO<sub>2</sub> emissions for the end state (2031) since the overall volume of traffic likely to be generated Development would remain as reported in the s.73 ES. The contribution of cars, LGVs and HGVs set out in Table 19.4 of the s.73 ES to CO<sub>2</sub> emissions is therefore also considered to remain valid.

#### Mitigation

19.7.16 No new or different mitigation has been identified as being required from that identified in the s.73 ES.

## Residual Impacts

19.7.17 Following a review of the detailed Phase 1A (North) RMAs no new or different residual CO<sub>2</sub> emission impacts have been identified. The impacts set out in the s.73 ES therefore remain valid.

### 19.8 Summary

19.8.1 No new or different potential impacts, mitigation or residual impacts arising from the Development have been identified in respect of Carbon Dioxide Emissions, therefore all of these remain as identified in the s.73 ES.

19.8.2 Overall the s.73 ES concluded that the Applicants are committed to delivering an energy strategy that minimises CO<sub>2</sub> emissions in residential buildings by at least 40% and in commercial buildings by at least 25% compared to a 2010 Part L Building regulations compliant scheme. The performance of the buildings in the 'preferred option' and the 'alternative option' would be identical, only the source of energy would differ.

19.8.3 The s.73 ES stated that total CO<sub>2</sub> emissions generally remain constant throughout construction until 2025 after which emissions increase due to the number of new residents and visitors occupying the Site alongside continued construction. During operational year's post 2031, the Scheme will increase overall CO<sub>2</sub> emissions by 75% compared to the 'do minimum' scenario. As a result, the Scheme was assessed in the s.73 ES as resulting in a 'negative impact in respect to CO<sub>2</sub> emissions'. The reported adverse impacts of CO<sub>2</sub> emission increases from the Scheme were also considered in the context of the floorspace provision provided and the fact that many of the future residents would be moving from less energy efficient residences to the new development therefore improving the overall energy efficiency and carbon emissions for London.

19.8.4 In consideration of the previous conclusions of the s.73 ES and the detailed design information for Phase 1A (North) it is deemed that the conclusions stated above from the s.73 ES remain valid. It is however noted that an update to the CO<sub>2</sub> emissions assessment may be appropriate for future phases containing the majority of Development Plots where further information can be provided on energy supply and use for the Development.

## References

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- i Greater London Authority (2014) Draft Further Alterations to the London Plan
- ii Barnet Local Plan, April 2013, 'Supplementary Planning Document: Sustainable Design and Construction' – Available online at [www.barnet.gov.uk/downloads/download/518/sustainable\\_design\\_and\\_construction\\_spd\\_documents](http://www.barnet.gov.uk/downloads/download/518/sustainable_design_and_construction_spd_documents)
- iii Greater London Authority (2014), Supplementary Planning Guidance: Sustainable Design and Construction
- iv 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>