

17B. Daylight, Sunlight and Overshadowing

17B.1 Introduction

- 17B.1.1 This Chapter has been prepared by Waterman and BMT Fluid Mechanics (BMT) and provides further information with regard to the potential daylight, sunlight and overshadowing microclimate 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 detailed 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 daylight, sunlight and overshadowing remain valid.
- 17B.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 daylight, sunlight and overshadowing assessment.
- 17B.1.3 The approach to the further information chapter 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 daylight, sunlight and overshadowing 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.
- 17B.1.4 This Chapter is supported by the following appendices:
- **Appendix 17B.1:** BXC Phase 1B North - Daylight and Sunlight Availability Study; and
 - **Appendix 17B.2:** BXC Phase 1B North - Internal Daylight Assessment.
- 17B.1.5 A shading study of the River Brent (conducted by BMT) was carried out as part of the assessment of the Phase 1A (North) RMAs and to support Condition 34.4, which is as follows:
- “Prior to beginning development in relation to any Bridge Structures River Brent Bridges or Plot Development on or around the Plots immediately adjacent to the Eastern River Brent Alteration and Diversion Works, the Central River Brent Alteration and Diversion Works and/or the Western River Brent Alteration and Diversion Works a shading study for that river section shall be carried out and approved in writing with the LPA. Any shading impacts on the River Brent shall be assessed and any appropriate mitigation measures shall be detailed as part of the survey and implemented as part of the relevant Bridge Structures Plot Development or ancillary works”.*
- 17B.1.6 The report was submitted as Appendix 17B.2 to the Phase 1A (North) FIR. This study has been reviewed in the context of the Phase 1B (North) development proposals. It has not been updated

since the Phase 1A (North) FIR was submitted, as the shading study assessed the maximum parameters for Phase 1B (North), i.e. shows a worst-case scenario for Phase 1B (North) in relation to potential shading effects on the river, and therefore remains valid.

17B.2 Policy, Legislation and Guidance

17B.2.1 There have been no significant changes to policy, legislation or guidance since the s73 ES and other EIA Documentation was prepared which have a material effect on the approach to or findings of the daylight, sunlight and overshadowing assessments previously presented.

17B.3 Relevant Phase 1B (North) RMA Details

17B.3.1 Key components of the Phase 1B (North) RMA of relevance to the daylight, sunlight and overshadowing assessment include the following:

Buildings:

- **Plot 113:** residential development comprising 52 units to be located on Plot 113; and
- **Brent Cross East Development Zone:** comprising a series of development plots to the south, west and east of the existing Brent Cross Shopping Centre, around High Street North, the Park and Brent Cross Main Square (known as the New Town Centre), supported by multi-storey car parks and an enhanced replacement bus station, in addition to a riverside walkway adjacent to the realigned River Brent. Refurbishment works are also proposed within existing Brent Cross Shopping Centre.

Amenity Areas:

- **New Areas of Public Realm and Open Space:** those of relevance to this assessment specifically include Brent Cross Main Square, High Street North, The Park and the Threshold Spaces, including Fenwick Place, Tempelhof Circus and Layfield Place;
 - **Sturgess Park improvements:** the existing Sturgess Park (located to the north west of the shopping centre) is to be retained and enhanced including new formal play facilities, seating areas, gardens, informal sports provision and nature areas; and
 - **Riverside Park (Reaches 1 and 3):** comprising the Eastern Brent Riverside Park and Western Brent Riverside Park to be provided adjacent to the realigned River Brent and the River Brent Nature Park to be provided alongside the River Brent.
- 17B.3.2 In addition, although it falls within Phase 1A (North), the Upper Riverside Walk continues along the northern bank of Reach 2 of the Riverside Park. Nature Park 5 is also located within Reach 2 (and within Phase 1A (North)). However, as these amenity areas are in close proximity to (and could be impacted by) Phase 1B (North), these have also been included as part of the overshadowing assessment for amenity areas.
- 17B.3.3 The above elements were assessed as part of the assessment of the Scheme in outline in the s73 ES, however further consideration is given within this Chapter to the detailed design brought forward via the Phase 1B (North) RMA and whether this affects the conclusions of the s73 ES and other EIA Documentation in terms of any new or different likely significant effects and mitigation.

17B.3.4 It should be noted that internal daylight and sunlight availability for the proposed residential units on Plot 113 has not been considered in this FIR, but has been assessed and the results presented as a standalone report which is submitted in support of the Phase 1B (North) RMA.

17B.4 Assessment Methodology

17B.4.1 At the outset, a review of the baseline conditions presented in the s73 ES and other EIA Documentation was undertaken by Waterman to confirm that the receptors used in the s73 ES and other EIA Documentation remain valid.

17B.4.2 Waterman and BMT then completed a review of the Phase 1B (North) detailed design in order to reassess any potential daylight, sunlight or overshadowing impacts which may arise which were not identified in the s73 ES and other EIA Documentation. In addition, assessment of the internal pedestrianised areas within the New Town Centre has been undertaken, for the purpose of addressing Condition 48.1, as follows:

“Pedestrianised areas within the Brent Cross East Zone including the High Street North and Brent Cross Main Square must be lit by natural light during the daytime. Any full or partial roof covering must allow sufficient natural daylight to permeate to the street spaces below and be constructed using suitable transparent materials.”

17B.4.3 The methodology for the assessments follows guidelines published by the Building Research Establishment (BRE) in 2011ⁱ for daylight, sunlight and overshadowing as detailed in the s73 ES and other EIA Documentation.

Basis of the Assessment

17B.4.4 The following Development configurations have been assessed:

- **Configuration 1: Existing Surrounds** - the current configuration of Brent Cross Shopping Centre with existing surrounds, i.e. in the absence of further development;
- **Configuration 2: Interim Surrounds** - Phase 1B (North) elements with the approved Phase 1A (North) elements in place, with existing surrounds for the remainder of the Site (i.e. in the absence of other development within the Site); and
- **Configuration 3: Maximum Height Parameters** - Phase 1B (North) elements with the approved Phase 1A (North) elements in place, with the remainder of the BXC Scheme modelled using the maximum parameters (worst case scenario).

17B.4.5 A configuration was not tested to determine the effects having regard to any identified cumulative schemes, as it was agreed with London Borough of Barnet (LBB) through the scoping process that all cumulative schemes are located at too great a distance from the Development for there to be any potential for interaction between the daylight, sunlight and overshadowing associated with these schemes and the Development.

Daylight and Sunlight Availability Assessment

- 17B.4.6 The detailed design of the buildings and structures within the Development have been subject to assessment by BMT to confirm the potential daylight and sunlight impacts at surrounding sensitive receptors based on the detailed design of Phase 1B (North).
- 17B.4.7 As per the BRE Guidance, the daylight and sunlight availability for buildings was assessed in terms of the Vertical Sky Component (VSC) and Annual Probable Sunlight Hours (APSH) (which was described in detail in Chapter 17B: Microclimate of the Phase 1A (North) FIR and for which more detail is included in **Appendix 17B.1** to this FIR). This methodology is consistent with the approach taken for the s73 ES and other EIA Documentation.
- 17B.4.8 BMT constructed a numerical model of the existing Site and of the Development. The model of the Development is based on the maximum building heights parameters of the 2014 Permission together with the detailed designs which form part of the proposed Phase 1B (North) RMA and approved Phase 1A (North) RMAs. The maximum building heights parameters of the 2014 Permission represent a worst-case scenario since it is not expected that the rest of the Development would be built out to maximum approved heights for all Development Plots.
- 17B.4.9 The assessment considers surrounding areas that may be affected by the now available detailed design for Phase 1B (North). 14 residential areas (comprising both individual buildings and blocks of buildings) were considered to have the potential to be affected by the Development and therefore these buildings were included in the assessment. The locations of these receptors are shown in **Figure 17B.1**.
- 17B.4.10 It is considered that all areas of the Scheme other than Phase 1B (North) would remain unchanged from the assessment carried out and reported within the s73 ES and other EIA Documentation, and therefore areas outside of Phase 1B (North) have not been considered further in this chapter.
- 17B.4.11 The results of the daylight and sunlight assessment are compared with the impact ratings as shown in Table 17B.1:

Table 17B.1 – Impact Rating for Daylight / Sunlight Indices

Impact Rating	Deviation of APSH or VSC from Existing Site Conditions
Strong Adverse	Reduction of more than 40%
Moderate Adverse	Reduction of between 30 – 40%
Marginal Adverse	Reduction of between 20 – 30%
Slight Adverse	Reduction of between 10 – 20%
Negligible Adverse	Reduction of between 0.1 – 10%
None	Deviation less than 0.1%
Negligible Beneficial	Improvement of between 0.1 – 10%
Slight Beneficial	Improvement of between 10 – 20%

Impact Rating	Deviation of APSH or VSC from Existing Site Conditions
Marginal Beneficial	Improvement of between 20 – 30%
Moderate Beneficial	Improvement of between 30 – 40%
Strong Beneficial	Improvement of more than 40%

Note: All Impacts in **Bold** – Best Practice Guidelines are adhered to

17B.4.12 The methodology and results are presented in full in **Appendix 17B.1**.

Overshadowing Assessment

17B.4.13 11 external amenity areas within the Site (as shown in **Figure 17B.2**) were included for the ‘sun-on-the-ground’ assessment, which assesses overshadowing. These are as follows:

- Hendon Way Access;
- Sturgess Park;
- Western Riverside Park;
- Eastern Riverside Park;
- Nature Park 4;
- Layfield Place;
- Tempelhof Circus;
- Fenwick Place;
- Living Bridge Approach North;
- Upper Riverside Walkway; and
- Nature Park 5.

17B.4.14 It should be noted that of these, Nature Park 5 and part of the Upper Riverside Walkway are located within Phase 1A (North) but have been included in this assessment as sensitive adjacent receptors. All the above are proposed receptors associated with the Development, except for the existing Sturgess Park and Hendon Way Access, which are due to be enhanced as part of Phase 1B (North).

17B.4.15 In addition, the gardens associated with the 14 surrounding residential receptors have been assessed. A ‘sun-on-the-ground’ analysis was also carried out to assess the impact of the proposed Development upon these amenity spaces. The method used Appendix G from the BRE guidelines for this analysis where a central point was used as a simple check for the 2 hour ‘sun-on-the-ground’ requirement.

17B.4.16 The BRE Guidelines recommend that at least half of any amenity area should receive at least 2 hours of sunlight on the 21st March.

Daylight Assessment for Internal Pedestrianised Areas

17B.4.17 Condition 48.1 attached to the 2014 Permission states that:

“... Pedestrianised areas within the Brent Cross East Zone including the High Street North and Brent Cross Main Square must be lit by natural light during the daytime. Any full or partial roof covering must allow sufficient natural daylight to permeate to the street spaces below and be constructed using suitable transparent materials...”.

17B.4.18 In order to satisfy the requirements of this condition, an assessment was carried out to assess the daylight availability from the skylights, roof lights and vertical facades for all internal pedestrianised elements of the Brent Cross East (BXE) Zone, at Lower Ground Level, Upper Ground Level and Level 01, including:

- The Park;
- High Street North; and
- Brent Cross Main Square.

17B.4.19 These areas are shown in **Figure 17B.3**. The assessment was carried out in accordance with the methodology set out in ‘Daylight Prediction in Atrium Buildings’ⁱⁱ. The minimum ADF levels recommended is 5% or more if there is no supplementary electric lighting, or 2% or more if there is supplementary electric lighting provided. As there will be supplementary electric lighting provided within all internal pedestrianised areas, the recommended level of 2% or more is the minimum ADF level used for this assessment.

17B.4.20 The assessment criteria and material properties, along with the results of the assessment are presented in **Appendix 17B.2**.

Limitations and Constraints

17B.4.21 No significant limitations or constraints to the assessment have been identified.

17B.5 Consultation

17B.5.1 The approach to the daylight, sunlight and overshadowing microclimate further information chapter was set out in the EIA Scoping Report (**Appendix 4.1**). Amenity areas to be included in the further information assessment were agreed with LBB as part of the consultation process.

17B.5.2 The EIA Scoping Opinion is presented in **Appendix 4.2**. The approach to the assessment was considered acceptable by LBB.

17B.6 Baseline Conditions

17B.6.1 The daylight, sunlight and overshadowing baseline information presented in the s73 ES Microclimate Chapter and other EIA Documentation has been reviewed. As part of the s73 ES, sunlight and daylight availability was assessed at 49 existing façade locations (receptors) surrounding the Site. Results indicated that the recommended level of daylight and sunlight was received at all receptor locations for baseline conditions. For the Phase 1A (North) FIR, only receptors at Brent Terrace, i.e. the existing residential units adjacent to Plots 53 and 54 of the

Phase 1A (North) RMAs, were considered to be relevant for the assessment of the Phase 1A (North) RMAs. The baseline conditions were not reassessed as they were considered to remain valid.

17B.6.2 For the Phase 1B (North) FIR, the baseline was tested at 14 existing receptor locations (**Figure 17B.1**) surrounding Phase 1B (North). These are as follows:

- Receptor 1 - Brent Park Road West;
- Receptor 2 - Brent Park Road East;
- Receptor 3 - Layfield Road;
- Receptor 4 - Layfield Close;
- Receptor 5 - Sturgess Avenue;
- Receptor 6 - Fairfield Avenue West;
- Receptor 7 - Fairfield Avenue East;
- Receptor 8 - Park Road;
- Receptor 9 - Hendon Way;
- Receptor 10 - Denehurst Gardens;
- Receptor 11 - Renters Avenue (Top);
- Receptor 12 - Renters Avenue (Middle);
- Receptor 13 - Renters Avenue (Lower); and
- Receptor 14 - Brent Cross Gardens.

17B.6.3 It should be noted that the 14 receptors assessed for Phase 1B (North) are not directly comparable with those assessed in the s73 ES or other EIA Documentation. The reason for this is that the receptor locations assessed for the s73 ES (as shown in Annex P of the s73 ES) are focused more on the southern part of the Site, with limited receptors located close to the Phase 1B (North) part of the Site. Receptors F14 to F22, as identified in the s73 ES, are approximately comparable, i.e. are in close proximity to, Receptors 1 to 5 and 13 of the current assessment for the Phase 1B (North) RMA. Receptors 6 to 12 and 14 of the current assessment do not have any comparable receptors from the s73 ES. Receptors re-assessed as part of the Phase 1A (North) FIR (Receptors F32-F42) do not overlap with those assessed for Phase 1B (North), and therefore are not considered further in this chapter.

17B.6.4 The baseline results showed that the recommended level of daylight and sunlight was received at all receptor locations for baseline conditions.

17B.6.5 The validity of the baseline information is confirmed as there have been no significant variations to the baseline conditions surrounding the Site in the vicinity of Phase 1B (North), and the 14 receptors assessed for the purposes of Phase 1B (North) showed that the recommended levels of daylight and sunlight are currently received in all cases.

17B.7 Assessment and Mitigation

Construction

Potential Impacts

- 17B.7.1 Construction impacts were not considered in the s73 and other EIA Documentation in terms of daylight, sunlight or overshadowing as they are not likely to be significant. The principal reason for this being that construction activities do not give rise to any significant overshadowing effects due to their short duration (temporary) and limited tall structures which are likely to impact daylight or sunlight availability. Partially completed structures would give rise to impacts considered fully within the operation assessment section. No significant construction impacts have therefore been identified following a review of the Phase 1B (North) RMA.
- 17B.7.2 The Interim Years Assessment within the s73 ES and other EIA Documentation considered the daylight and shading effects during interim stages of the Development. This has been reviewed and updated by Waterman and the findings presented in **Chapter 20: Intermediate Years Assessment** of this Phase 1B (North) FIR.

Mitigation Measures and Residual Impacts

- 17B.7.3 No mitigation measures or residual impacts relevant to construction were identified in the s73 ES and other EIA Documentation, or have been identified in relation to the Phase 1B (North) RMA.

Operation

Potential Impacts

Daylight and Sunlight Availability

- 17B.7.4 The proposed buildings and structures within Phase 1B (North) have the potential to give rise to daylight and sunlight effects on existing surrounding residential receptors. **Appendix 17B.1** presents the findings of the daylight and sunlight availability assessment.
- 17B.7.5 The assessment concludes that for Configuration 3, i.e. with the detailed design for Phase 1A (North) and 1B (North) in place with the maximum surrounds in place for the rest of the Scheme, Receptors 1, 2 and 14 (residential properties at Brent Cross Road West, Brent Park Road East and Brent Cross Gardens respectively) fail the BRE Guidance criteria. The remaining 11 receptors comply, i.e. they pass the required VSC criteria of 27%, and will therefore not be adversely affected by the Development. In line with the BRE guidelines, further detailed analysis is therefore not required for these properties.
- 17B.7.6 For the above three receptors, there is a 11.6% reduction in VSC from existing conditions for Receptor 1 (Brent Cross Road West), a 12% reduction for Receptor 2 (Brent Cross Road East) and a 4% reduction for Receptor 14 (Brent Cross Gardens). When compared to the impact ratings as presented in **Table 17B.1**, Receptors 1 and 14 show a **slight adverse** impact, and

Receptor 2 shows a **negligible adverse** impact. All of these are within best practice guidelines (as shown in **Table 17B.1**).

- 17B.7.7 It should also be noted that, of the receptors that did not comply, the results indicate that only Brent Cross Road East (Receptor 2) fails primarily because of Phase 1B (North), specifically the New Town Centre element. This is due to the fact the windows of Receptor 2 face directly onto the New Town Centre within Phase 1B (North). Therefore, results indicate that Receptors 1 and 14 fail due to the introduction of the maximum parameters for the remainder of the Scheme, i.e. the worst-case scenario, and not as a result of the Phase 1B (North) proposals.
- 17B.7.8 The APSH analysis carried out for the fourteen residential receptors areas showed that all locations (receptors) passed the criteria for annual and winter APSH (25%), however it is noted that there is a degradation of sunlight availability as a result of the introduction of Configuration 3. Only one window assessed failed the winter APSH criteria of 5% by 1%.
- 17B.7.9 Therefore, the potential impact of the Development on the surrounding receptors is negligible for 11 of the assessed receptors in terms of VSC, negligible adverse for two receptors and slight adverse for one receptor. Further testing for Receptors 1 and 14 is recommended as the later phases of the Scheme progress.
- 17B.7.10 The impact assessment within the s73 ES with the Scheme in place (illustrative scheme) showed that all receptors assessed surrounding Phase 1B (North) passed the BRE guidance criteria (only three receptors located close to the southern section of the Site failed the BRE criteria). Therefore, there was a negligible impact reported. In relation to the change in impacts as a result of the lower VSC results for Receptors 1, 2 and 14 reported above, this could be due to a number of reasons, including that the receptors are not directly comparable with those assessed previously, differences in which windows were previously assessed, and upgrades in software used for the analysis. In addition, the s73 ES assessed an illustrative scheme, whereas for this FIR, the maximum parameters were assessed for the Scheme (other than Phase 1A (North) and 1B (North) for which detailed design was available).

Overshadowing of Amenity Areas

- 17B.7.11 The assessment carried out for sunlight availability to the amenity spaces within the Site that have been assessed as part of the Phase 1B (North) FIR, was carried out for March 21st in line with BRE guidelines. The same assessment has also been undertaken for June 21st when the amenity areas are more likely to be used by the occupants.
- 17B.7.12 For the amenity areas in the context of Configuration 2, with Phase 1A (North) and Phase 1B (North) in place without the remainder of the Scheme in place, all amenity areas pass the BRE guideline of 50% 'sunlight on the ground'. For Configuration 3, with the maximum parameters for the remainder of the Scheme in place, two amenity areas, Tempelhof Circus and Fenwick Place, fail the BRE guidance criteria. However, it should be noted that it is unlikely that the maximum parameters for the Scheme will be built out in full. Further modelling will be carried out as the Scheme progresses.
- 17B.7.13 For the residential gardens of the receptor locations, it was found the 2 hour 'sun-on-the-ground' requirement, as per the BRE Guidance, was unaffected by the Development when testing Configuration 3 and thus passes the BRE guidelines for a worst-case scenario.

17B.7.14 The transient overshadowing drawings are included at Appendices 17B.1 and 17B.2, which show the assessment of overshadowing on the amenity spaces on March 21st in line with BRE guidelines.

Daylight Assessment for Internal Pedestrianised Areas

17B.7.15 The minimum ADF recommended is 2% (if supplementary lighting is provided). The results of the assessment of the internal pedestrianised areas showed that for Lower Ground Level, the averaged ADF levels are 5.5%, for the Upper Ground Level they are 3.9% and for Level 01 they are 9.7%. Within each floor, all areas also meet the minimum ADF criteria of 2%. Therefore, all assessed areas meet the recommended criteria. These assessment outcomes are considered to be acceptable and will enable the requirements of Condition 48.1 to be satisfied.

17B.7.16 The ADF levels for each area assessed are presented in Appendix 17B.2.

Mitigation

17B.7.17 No new or different mitigation has been identified from that reported in the s73 ES and other EIA Documentation.

Residual Impacts

17B.7.18 No new or different residual operational impacts have been identified from those in the s73 ES and other EIA Documentation for daylight, sunlight and overshadowing, other than the three receptors showing a reduction in VSC, which results in negligible adverse to minor adverse impacts for those three residential areas.

17B.7.19 With regard to the Internal Pedestrianised areas of the New Town Centre assessed, the minimum BRE guidance criteria for daylight will be met for these areas.

17B.7.20 A summary of the residual impacts associated with wind is included within **Chapter 22: Summary of Residuals Impacts and Mitigation**.

References

- ⁱ Building Research Establishment Report, “Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice”, P. Littlefair, Second Edition, 2011
- ⁱⁱ Solar Energy, “Daylight Prediction in Atrium Buildings”, P.Littlefair, August 2002.