9 Daylight, Sunlight and Overshadowing

9.1 INTRODUCTION

9.1.1 This chapter assesses the impact of the Proposed Development on its surroundings with regards to daylight and sunlight availability to habitable rooms and open spaces.

9.1.2 The BRE's '*Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice*' also known as the BRE Guide was used to establish the extent to which the Proposed Development meets current best practice guidelines. In cases where the Proposed Development is likely to block light to key windows the study has compared results against the BRE criteria.

9.1.3 This chapter (and its associated figures and appendices) is not intended to be read as a stand alone assessment and reference should be made to the Front End of this ES (**Chapters 1 – 5**), as well as **Chapter 15 - Cumulative Effects**.

LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

9.1.4 There is no specific national legislation for the assessment of the impact on sunlight, daylight and overshadowing.

Planning Policy

9.1.5 Planning policy at the national, regional, county and local level is discussed in **Chapter 5 – Planning Policy Context** and corresponding **Appendix 5.1**. However, none of the documents within **Appendix 5.1** refer to specific planning policies with respect to sunlight, daylight and overshadowing.

9.1.6 However, most Local Authorities recognise the guidelines set out in the Building Research Establishment Guide as the most appropriate method for daylight sunlight and overshadowing assessments. These guidelines were published in 1991 (Ref. 9.1) and superseded the 1971 Department of the Environment document 'Sunlight and Daylight'.

Guidance

9.1.7 The BRE Guide gives criteria and methods that are explained below for calculating daylight and sunlight impact on existing surrounding properties caused by a development.

9.1.8 Whilst the BRE Guide provides numerical guidelines for daylight, sunlight and overshadowing, these criteria should not be seen as absolute targets since, as the document states, the intention of the Guide is to help rather than constrain the designer. The Guide is not an instrument of planning policy, therefore whilst the methods given are technically robust, some level of flexibility should be applied where appropriate.

9.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

9.2.1 Natural light refers to both daylight and sunlight. However, a distinction between these two concepts is required for the purpose of analysis and quantification of natural light in buildings. In this assessment, the term '*Daylight*' is used for natural light where the source is the sky in overcast conditions, whilst '*Sunlight*' refers specifically to the light coming directly from the sun.

The BRE Guidelines

9.2.2 The methodology adopted for this chapter follows that set out in BRE Guide which gives criteria and methods for calculating daylight and sunlight.

9.2.3 The BRE Guide uses a set of criteria to quantify the potential effect on light levels: the Vertical Sky Component (VSC) and the Probable Sunlight Hours (PSH) for windows. The Guide uses the hours of constant overshadowing (HCO) to quantify the sunlight levels in open spaces.

9.2.4 The BRE Guide states that the guidance '*is intended to be used in conjunction with the interior daylight recommendations in the British Standard BS 8206: Part 2*'. The BS8206-02 (Ref. 9.2) suggests the use of Average Daylight Factor (ADF) as a measure of the general illumination from the sky light actually entering a room.

9.2.5 These criteria (discussed below in more detail) are used to assess the Site in the 'with development' and 'without development' scenarios.

Vertical Sky Component (VSC)

9.2.6 The VSC calculation is the ratio of the direct sky illuminance falling on the outside of a window, to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE (Commission Internationale d'Éclairage) Overcast Sky (Ref. 9.1) is used and the ratio is expressed as a percentage[1]. The maximum VSC value is close to 40% for a completely unobstructed vertical wall.

9.2.7 The BRE Guide also sets out two guidelines for the VSC:

- If the VSC at the centre of the existing window exceeds 27% with the new development in place, then enough sky light should still be reaching the existing window; and
- If the VSC with the new development in place is both less than 27% and less than 0.8 times its former value, then the reduction in light to the window is likely to be noticeable. This means that a reduction in the VSC value of up to 20% its former value would be acceptable and thus the impact would be considered negligible.

9.2.8 It is important to note that the VSC is a simple geometrical calculation which provides an early indication of the potential for daylight entering the space. However, it does not assess or quantify the actual daylight levels inside the rooms. If the VSC standard is not met on any window, a more detailed assessment based on the Average Daylight Factor should be undertaken.

Average Daylight Factor (ADF)

9.2.9 Should windows fail to comply with the VSC values, further detailed studies are performed using the ADF calculations to assess if compliance with the minimum values recommended in the BS8206 are achieved and mitigation measures are still required.

9.2.10 The CIBSE Guide LG10 (Ref 9.3) defines the average daylight factor as:

> *"…the measure of the amount of skylight in a room. If the room is not too deep or obstructed, an average daylight factor of 5% or more will ensure that an interior looks substantially daylit, except early in the morning, late in the afternoon or on exceptionally dull days. An average daylight factor below 2% generally makes a room look dull; electric lighting is likely to be in frequent use".*

9.2.11 The BRE Guide sets out the following guidelines for the ADF:

- If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided; and
- In dwellings, the following minimum average daylight factors should be achieved: 1% in bedrooms, 1.5% in living rooms and 2% in kitchens.

Sunlight Calculations (Probable Sunlight Hours [PSH])

9.2.12 Access to sunlight is measured on the windows to habitable rooms, facing within 90° of due south. The PSH calculation method measures the proportion of the window assessed that is sunlit for a period of time. The BRE Guide and the BS8206-02 recommend that the PSH is calculated for the whole year, and for the winter months (21 September to 21 March).

[1] **Standard CIE Overcast Sky**: The Standard CIE Overcast Sky distribution model is based on a completely clouded sky where the Sun and its position are not apparent. This type of sky is used for these assessments because the distribution of luminance in such a sky is symmetrical about the zenith and is lower at the horizon than overhead, thus representing a totally diffuse sky light.

9.2.13 If the window reference point can receive more than 25% of annual PSH, including at least 5% of annual probable sunlight hours during winter months between 21 September and 21 March, then the room should still receive enough sunlight and the impact will therefore be negligible.

9.2.14 However, if the available sunlight hours are both less than the amount given above and less than 0.8 times their former value, either over the whole year or during the winter months (21 September to 21 March), then the occupants of the existing building will notice the loss of sunlight.

Overshadowing of Open Areas

9.2.15 For open areas including those proposed, the BRE Guide suggests that no more than 40%, and preferable no more than 25%, of any the open spaces identified should be prevented from receiving any sunlight at all on the equinox (21 March) by the Proposed Development (sunlight at an altitude of 10% or less is excluded).

9.2.16 If as a result of the new development, an existing area which can receive direct sunlight on the 21 March is reduced to less than 0.8 times its former value, then this further loss of sunlight is significant.

Scope of the Assessment

9.2.17 A formal Environmental Scoping Letter was issued to WMBC (October 2009) (**Appendix 2.2**). This document identified the impacts that the development will potentially have on daylight and sunlight and overshadowing during the site preparation, earthworks and construction and operational stages of the Proposed Development.

9.2.18 The following lists the relevant potential impacts highlighted within the Environmental Scoping Letter (particularly in Appendix A of the letter) which are relevant to the operational phase:

Operational Phase

- Change in daylight falling on existing and future elevations where residential windows are likely to be; and
- Change in sunlight falling on existing and future elevations where residential windows are likely to be.
- Extent of overshadowing to public open spaces within the Proposed Development.

9.2.19 There is only one deviation since the submission of the Environmental Scoping Letter. The change in daylight and sunlight falling on existing and future elevations where residential windows are likely to be (including consideration of public open space) during the Site Preparation, Earthworks and Construction Phase has not been considered as the modelling used within the assessment (see below) is based upon the completed development (as operational). The future elevations referenced above relate to Northbank East.

Extent of the Study Area

9.2.20 The study area modelled for this analysis includes the Site and surrounding properties. The model includes all of the Quarters within the parameter plans and the immediate adjoining properties facing the Site which are likely to be affected by the Proposed Development.

Method of Baseline Data Collation

9.2.21 The Baseline data was collected via 3D model information provided by the architect's team and by a site visit conducted by the team. Supporting and reference information was also obtained through aerial photographs and navigation through the Site via IGIS satellite mapping system.

Assessment Methodology and Modelling

9.2.22 The calculations have been undertaken using the computer program Ecotect (version 5.50) in which a three dimensional model was created by WSP compromising the Proposed Development and adjoining existing buildings. The 3D model was provided by SOM architects. This modelling looks at the scenarios described below.

- 'Without Development' Scenario: The baseline conditions of the Site were modelled including all existing buildings on the Site and the existing adjoining properties; and

- 'With Development' Scenario: The Proposed Development was modelled assuming all existing buildings would be demolished and replaced by the Proposed Development. The model includes the existing adjoining properties. This enabled the establishment of changes in daylight and sunlight on its surroundings.

Significance Criteria

Key Sensitive Receptors

9.2.23 In order to undertake the assessment, first the key sensitive receptors around the Site need to be identified. According to the BRE Guide, sensitive receptors are described as:

- Windows to habitable rooms facing the site where the occupants have a reasonable expectation of daylight. As the BRE Guide states, '*this would normally include schools, hospitals, hotels and hostels, small workshops and most offices and dwellings*'. It continues, '*windows to bathrooms, toilets, store rooms, circulation areas and garages need not be analysed*'; and
- Other sensitive receptors are open spaces such as public gardens but excluding public footpaths and car parks.

9.2.24 In accordance with the BRE Guide, windows are selected as sensitive receptors on the basis of being a habitable room facing the Proposed Development. Similarly, amenities and open spaces are selected on the basis of being in the immediate vicinity of the Proposed Development.

9.2.25 In the case of windows, receptors such as residential and offices are considered highly sensitive and hotels may be considered to be of low sensitivity.

9.2.26 Therefore, in the eventuality of a receptor failing to comply with the BRE Guidelines, the sensitivity is taken into account before reaching a final conclusion on the significance of the Proposed Development on that receptor.

9.2.27 In the absence of Guidance, a window sensitivity rating has been developed using professional judgement, which is described below and categorised into high and low based on the space function. This rating is illustrative and there will be occasions where the sensitivity may be interpreted differently.

- Residential, offices, schools and hospital ward spaces generally require good levels of daylight and sunlight to render them more enjoyable and adequate to their function. Windows to such spaces are classified as high sensitivity to daylight and sunlight; and
- Hotel rooms are mostly used during evenings and night time where the type of activities does not require high daylight levels (such as sleeping and resting). Sunlight is also considered a nuisance in most hotel rooms as they usually rely on mechanical climate control to achieve comfort and reduce the effect of outside air and noise pollution, particularly in urban areas. Thus windows to such spaces can be classified as low sensitivity to daylight and sunlight.

9.2.28 The sensitive receptors identified above are windows of the habitable rooms facing the Site where the occupants have a reasonable expectation of daylight.

9.2.29 The results of the modelling quantify the likely daylight and sunlight availability to the receptors identified and derives the resulting ratio of impact. The potential effects of new developments on the daylight and sunlight of existing buildings include:

- noticeable reductions in daylight that are likely to make the rooms identified to appear gloomier, and electric lighting will be needed more often;
- noticeable reductions in sunlight to the windows identified that will make the room behind appear colder and less pleasant; and
- noticeable increase in sunlight to the windows identified that will make the rooms behind benefit from direct solar gains for longer, thus making the room appear warmer and more pleasant.

Compliance Criteria

9.2.30 Compliance with the BRE Guide is achieved if the levels of daylight/sunlight with the proposals are equal or over the values established for each criteria. Compliance is also achieved if the ratio between the 'with development' and 'without development' scenarios is 0.80 or higher, i.e. the reduction in daylight or sunlight hours is 20% or less. **Table 9.1** below illustrates the different scenarios of compliance and the generic reasons for each outcome.

Table 9.1: Compliance with the BRE Criteria

Existing only	With Proposed Development	Ratio of impact	Compliance with BRE criteria	Generic comments
Fail	Fail	Fail	Fail	Fails both criteria
Fail	Pass	Pass	Pass	Passes because the Proposed Development has a beneficial impact on the receptor
Fail	Fail	Pass	Pass	Passes because there is compliance with the BRE criterion on 'ratio of impact'
Pass	Fail	Fail	Fail	Fails both criteria
Pass	Fail	Pass	Pass	Passes because there is compliance with the BRE criterion on 'ratio of impact'
Pass	Pass	Fail	Pass	Passes because complies with the BRE criterion on VSC/PSH
Pass	Pass	Pass	Pass	Complies with both BRE criteria

Impact Significance

9.2.31 Compliance with the BRE criteria for the daylight and sunlight is either achieved or not. The BRE Guide does not provide guidance on the nature or scale of significance of impacts. In the absence of guidance, a rating to assess the significance of impact has been developed using professional judgement. The notes below illustrate the following rating situations:

- The nature of the impact on a receptor will be rated as positive when the levels of daylight/sunlight with the Proposed Development in place are equal or over the BRE minimum values, and the ratio of impact is 1.00 or higher, i.e. there is a net increase of daylight/sunlight available to the receptor;
- The nature of the impact on a receptor will be rated as negligible when the levels of daylight/sunlight with the Proposed Development in place are equal or over the BRE minimum values or the ratio of impact is between 0.80 and 1.00; and
- The nature of the impact on a receptor will be rated as negative when the levels of daylight/sunlight with the Proposed Development in place are lower than the BRE minimum values, and the ratio of impact is lower than 0.80.

9.2.32 Finally, the significance of the impact on a receptor will be rated as *minor, moderate, major* or *negligible* depending on the values obtained from the assessment and the sensitivity of the receptor.

9.3 BASELINE CONDITIONS

9.3.1 The computer model of the 'without development' scenario was based on Ordnance Survey (OS) maps and an architectural 3D model. Dimensions for existing buildings and surrounding buildings on the Site were based on the architect's information.

9.3.2 The buildings and open spaces around the Site that were identified for the purpose of this chapter are detailed below.

Buildings

*Buildings West of the Site (**A**)*

These are the buildings located immediately to the west of the Site adjacent to the Northbank West and Victoria Studios plots. The receptors identified are seven windows labelled as A01 – A07 (**Figure 9.1**).

*Buildings on Dock Road (**B**)*

Buildings B are those receptors located to the north and east (Grain Warehouses) of the Site immediately adjacent to Northbank West. The receptors identified are 38 windows labelled as B01 – B38 and are illustrated in **Figure 9.1**.

*Northbank East (Committed development) (**C**)*

The Northbank East development has been identified as one of the receptors with 285 windows labelled C01 – C285 (**Figure 9.1**).

*Buildings to the east of the Site (**D**)*

Buildings D are located to the east of the Site with receptor windows labelled as D01 – D22 (**Figure 9.1**).

*Buildings on Corporation Road (**E**)*

Buildings E are located on the south side of the Site on Corporation Road with 42 windows labelled E02 – E42 (**Figure 9.1**).

9.3.3 The receptors identified and their levels of sensitivity (for daylight) are as detailed in **Table 9.2**.

Table 9.2: Receptors Sensitivity Rating

Windows			
Location	**Window No.**	**Sensitivity**	**Function**
A	A01-A07	High	Offices
B	B01-B38	High	Offices/ Residential
C	C01-C285	High	Residential/Offices
D	D01-D22	High	Offices
E	E01-E42	High	Offices

Open Spaces

9.3.4 Following the BRE guidelines there were no sensitive open spaces identified adjacent to the Site due to the industrial nature of most of the immediate surrounding areas. The larger public spaces and parks such as Birkenhead Park to the south and Central Park to the north of the Site have been considered to be too far from the Site to be affected by the Proposed Development. In addition, the areas to the south of the Site are not affected by the Proposed Development from the sunlight, as the shadows are mainly cast to the north.

Daylight Calculations (VSC) for the Site

9.3.5 The results of the VSC calculations to establish the 'without development' scenario are summarised below and presented in **Appendix 9.1**.

9.3.6 The results of the daylight calculations (VSC) show that all of the 394 receptors identified meet the minimum requirement set in BRE Guide for daylight of 27% VSC. This means that the level of daylight potentially accessible to these receptors are sufficient to satisfy the internal daylight requirement of the buildings.

Sunlight Calculations (PSH) for Site

9.3.7 The results of the PSH calculations conducted on the windows for the 'without development' scenario are summarised below and presented in **Appendix 9.2** and **Appendix 9.3** for the whole year and winter respectively.

9.3.8 The results show that all 285 receptors assessed meet the minimum requirements set in the BRE Guide for sunlight for the whole year and winter of 25% and 5% PSH, respectively. This means that the level of exposure to sunlight of these receptors throughout the year is in line with the recommended criteria.

9.4 ASSESSMENT OF IMPACTS, MITIGATION AND RESIDUAL EFFECTS

Operational Phase

Change in daylight falling on existing and future elevations where residential windows are likely to be

9.4.1 The results of the VSC calculations conducted on the windows identified in the 'with development scenario' are summarised in **Table 9.3** and tabulated for each window in **Appendix 9.1**. The Proposed Development has an overall **minor** impact.

Table 9.3: Summary of Vertical Sky Component Results

SUMMARY for Vertical Sky Component						
VSC ≥ 27%						
Compliance VSC Calculations (above/below)						
Total Assessed	'without development scenario'		'with development scenario'		Overall Compliance	
394	394	Above	183	Above	183	Above
	0	Below	211	Below	211	Below

Notes to Table: Pass criteria; VSC ≥ 27% and ratio of impact ≥ 0.80

9.4.2 The VSC calculations showed that 211 of the receptors assessed in the 'with development' scenario fail the overall compliance criteria. Therefore, detailed calculations based on the ADF were carried out for the failed receptors.

ADF Calculation

9.4.3 Detailed daylight calculations to determine the ADF were performed for the habitable rooms surrounding the Proposed Development following the methodology described in BS 8206-02. Following assumptions were made in the assessment:

- Glazing type: Double clear glazing with a light transmittance of 0.8;
- Frame factor: 0.8; and
- Room and window dimensions: in absence of internal room layouts of the surrounding properties a standard 3 m by 3 m room has been assumed per receptor.

9.4.4 The results of the ADF calculations conducted on the 211 habitable rooms in the buildings identified show that 199 met the minimum requirements set for daylight in the BRE Guide, on the basis that the required ADF is higher than 1% for bedrooms, 1.5% for living rooms, 2% for kitchen and 5% for offices with supplementary electrical lighting. Twelve habitable rooms, representing approximately 3% of all those identified, marginally failed to meet these required criteria. The results are summarised below and shown in **Appendix 9.1**, Table 9.1B indicated by green highlighting.

9.4.5 The sensitivity of receptors identified is high and the magnitude of change is low to negligible, given the limited (~3%) of rooms likely to be marginally subjected to change. Therefore, there is likely to be a direct, permanent, long term effect on receptors identified of **minor negative to negligible** significance.

Mitigation

9.4.6 The daylight studies demonstrate that out of 394 sensitive receptors, 211 fell below the overall compliance criteria. The subsequent results of the ADF calculations for these 211 receptors indicate that 199 rooms tested comply with the recommended ADF. The receptors failing to comply were only marginally below the standard no mitigation measures are therefore considered necessary.

Residual Effect

9.4.7 The sensitivity of receptors identified is high and as no mitigation measures have been identified, the magnitude of change remains as low to negligible. Therefore, there is likely to be a direct, permanent, long term effect on receptors identified of **minor negative** to **negligible** significance.

Change in sunlight falling on existing and future elevations where residential windows are likely to be

9.4.8 PSH calculations were conducted on the identified receptors. The results are summarised in **Table 9.4**. Details are shown in **Table 9.2 of Appendix 9.2** and **Table 9.3 of Appendix 9.3** for the whole year and winter, respectively.

Annual Probable Sunlight Hours (APSH) for Impact from Proposed Development

9.4.9 The Proposed Development has a negligible impact on all the 285 receptors assessed on the basis that the sunlight levels for the whole year are 25% or higher with the Proposed Development and/or the ratio of impact is between 0.80 and 1.00.

Table 9.4: Summary of Annual Probable Sunlight Hours

Summary for Annual Probable Sunlight Hours						
PSH ≥ 25% all year and ratio of impact ≥ 0.80						
Compliance Annual PSH Calculations (above/below)						
Total Assessed	Without Proposed development		With Proposed development		Overall Compliance	
285	285	Above	285	Above	285	Above
	0	Below	0	Below	0	Below

Notes to Table. Pass criteria: PSH ≥ 25% all year And ratio of impact ≥ 0.80

Probable Sunlight Hours for Winter (21 September to 21 March) (WPSH)

9.4.10 The Proposed Development has a negligible impact on 281 receptors assessed on the basis that the sunlight levels for the whole year are 25% or higher with the Proposed Development and/or the ratio of impact is between 0.80 and 1.00. It has an adverse impact on 4 of the receptors which represents less than 2% of the those identified and also marginally fail the compliance criteria.

Table 9.5: Summary Winter Probable Sunlight Hours

Summary for Winter Probable Sunlight Hours						
including ≥ 5% between 21 September and 21 March (winter) And ratio of impact ≥ 0.80						
Compliance winter PSH Calculations (above/below)						
Total Assessed	Without Proposed development		With Proposed development		Overall Compliance	
285	285	Above	281	Above	281	Above
	0	Below	4	Below	4	Below

Notes to Table Pass criteria: ≥ 5% between 21 September and 21 March (winter) And ratio of impact ≥ 0.80

9.4.11 The sensitivity of receptors identified is high and the magnitude of change is low to negligible given the limited (<2%) of rooms likely to be marginally subjected to change. Therefore, there is likely to be a direct, permanent, long term effect on receptors identified of **minor negative** to **negligible** significance.

Mitigation

9.4.12 The sunlight studies indicate that the impact from the Proposed Development meets the recommended standards for sunlight for all receptors assessed for the whole year and winter, with the exception of four receptors which fall slightly below the standards for winter probable sunlight hours. These represent a very small percentage of the total receptors therefore mitigation measures are not considered necessary.

Residual Effects

9.4.13 The sensitivity of receptors identified is high and as no mitigation measures have been identified, the magnitude of change remains low to negligible. Therefore, there is likely to be a direct, permanent, long term effect on receptors identified of **minor negative** to **negligible** significance.

Sunlight and overshadowing falling on proposed public open space

9.4.14 WSP's microclimate team were employed to provide strategic guidance on the optimal location and massing of the built environment during the development of the parameter plans and principles. The illustrative masterplan detailed within the architect's model incorporates a larger open space running east-west between the two rows of building blocks within SkyCity. This allowed more solar penetration than in previous iterations of illustrative masterplans. Furthermore, a potential improvement is observed in sunlight accessibility to the main public open space in SkyCity. By locating the tallest buildings on the northern end of the Quarter, solar access is optimised when compared to earlier iterations where the tallest buildings on the south of the Site may have caused overshadowing to the southern facades of the buildings on the north.

A qualitative overshadowing assessment of open spaces for the shadow projection at the Equinox is illustrated in **Figure 9.2**. The results of the qualitative assessment suggest that it is likely that in excess of 50% of the significant areas of connected public open spaces, namely within SkyCity and Victoria Dock have adequate solar penetration on the equinox. However, towards the western end of the Proposed Development, some of the courtyards of Victoria Studios are likely to experience excessive overshadowing particularly in the mid seasons and winter. This results in moderate negative impact in these limited areas.

9.4.15 Overall, the sensitivity of the receptors are high (for the significant areas of public open space) with the magnitude of change being low prior to mitigation measures. Therefore there is likely to be a direct, permanent, long term effect on identified receptors of **minor** to **moderate negative** significance given the limited extent of impact within the wider available public open spaces.

Mitigation

9.4.16 The sunlight studies identified that the central open areas of Victoria Studios and Northbank West are likely to fall below the recommended criteria for sunlight to open spaces. The most effective mitigation is to reduce the height of the southern element of the courtyard buildings to improve the exposure of the open space to incident sunlight on the south whilst maintaining the overall quantum of development.

Residual Effects

9.4.17 Overall, the sensitivity of the receptors are high (for the significant areas of public open space) with the magnitude of change, following the above mitigation measures reducing to low to negligible. Therefore, there is likely to be a direct, permanent, long term effect on identified receptors of **minor negative** to **negligible** significance.

Cumulative Impacts

9.4.18 The consented Northbank East development has been included in the modelling associated with the above assessment. The Proposed Development will have an effect on the level of daylight and sunlight to these receptors, however, these are considered to be of negligible significance.

9.5 SUMMARY

9.5.1 This chapter assesses the impact of the Proposed Development on its surroundings with regards to daylight and sunlight to surrounding receptors.

9.5.2 The results of the Average Daylight Factor (ADT) calculations conducted on the 211 habitable rooms in the buildings identified show that 199 met the minimum requirements set for daylight in the BRE Guide, on the basis that the required ADF is higher than 1% for bedrooms, 1.5% for living rooms, 2% for kitchen and 5% for offices with supplementary electrical lighting. The assessment concludes that the Proposed Development will have a minor to negligible effect on the daylight availability of the surrounding sensitive receptors, given the limited number of rooms (3%) that will be marginally impacted.

9.5.3 In terms of the annual sunlight assessment, the results show that the Proposed Development has negligible effect on all the 285 receptors assessed on the basis that the sunlight levels for the whole year are 25% or higher with the Proposed Development and/or the ratio of impact is between 0.80 and 1.00.

9.5.4 With regards to the winter sunlight assessment, the results show that the Proposed Development has a **negligible** effect on 281 receptors assessed on the basis that the sunlight levels for the whole year are 25% or higher with the Proposed Development and/or the ratio of impact is between 0.80 and 1.00.It has adverse impact on four of the receptors, however, less than 2% of those identified are marginally below the compliance criteria.

9.5.5 The sunlight studies for the proposed open spaces identified that the significant areas of connected public open spaces, namely along SkyCity and within Victoria Docks will have adequate solar penetration on the equinox. However, it is noted that toward the western end of the proposed Development within the courtyards of Victoria Studios, excessive overshadowing is likely to be experienced, particularly in the mid seasons and winter. However, this should be considered in the wider context of the availability of public open spaces and the limited extent of the overshadowing across the Site.

9.5.6 The sunlight studies for open spaces also identified that the main central open area at SkyCity will benefit from the current building arrangement, improving solar penetration not only to the facades of the buildings to the north of the Site but also to the open amenity spaces which is also considered positive.

Table 9.6: Summary of Effects Table for Daylight, Sunlight and Overshadowing

Description of Likely Significant Effects	Significance of Impacts					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Operational													
Change in daylight falling on existing and future elevations where residential windows are likely to be	Minor to Negligible	Negative	P	D	LT	▪ None Required	Minor to Negligible	Negative	P	D	LT	N/A	N/A
Change in sunlight falling on existing and future elevations where residential windows are likely to be	Minor to Negligible	Negative	P	D	LT	▪ None Required	Minor to Negligible	Negative	P	D	LT	N/A	N/A
Sunlight and Overshadowing falling on proposed public open space.	Minor to Moderate	Negative	P	D	LT	▪ Optimise massing in the western end of the development	Minor to Negligible	Negative	P	D	LT	N/A	

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

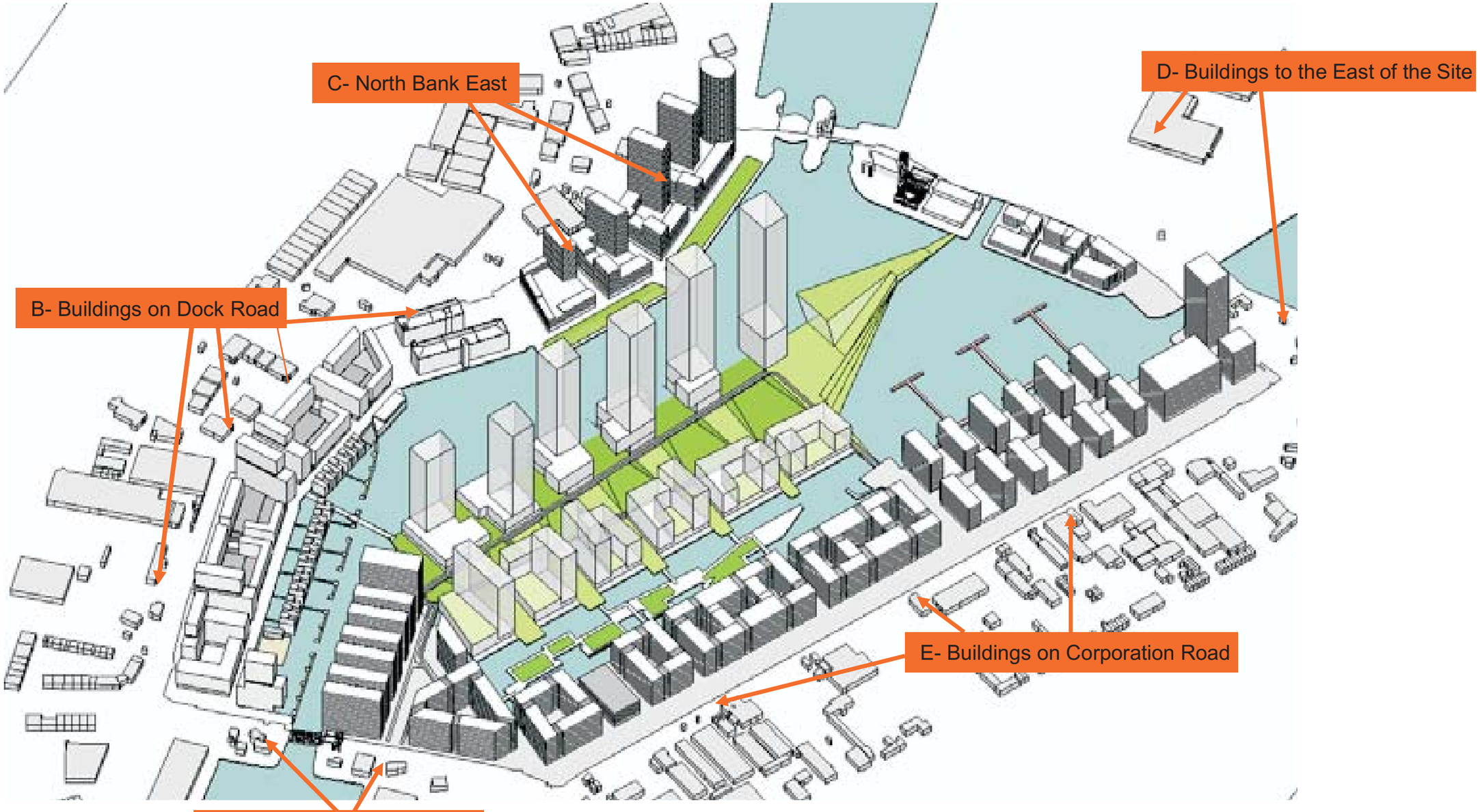
N/A = Not Applicable

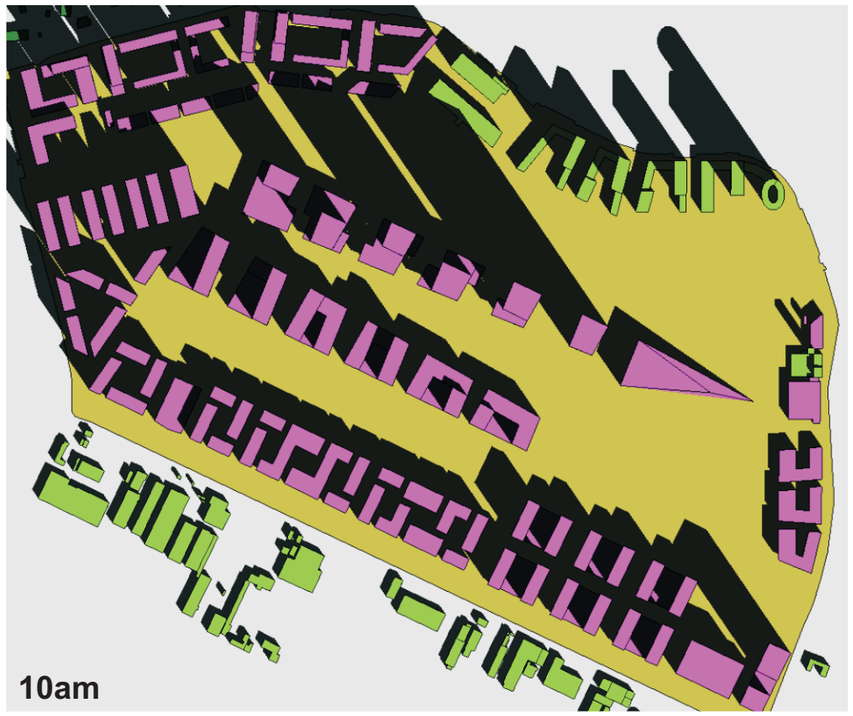
9.6 REFERENCES

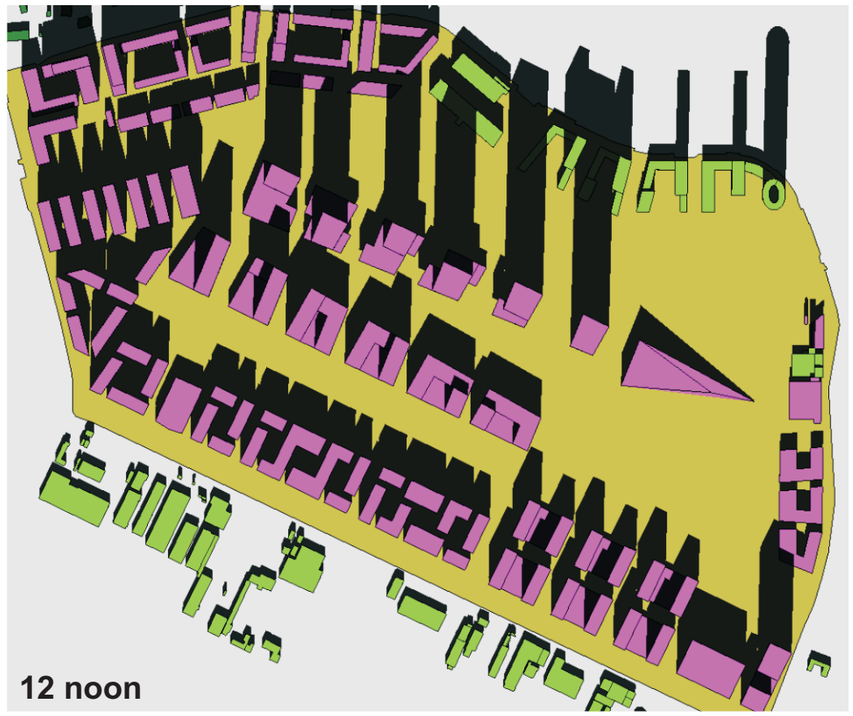
Ref 9.1 BRE (1995) Site Layout and Planning for Daylight and Sunlight: a guide to good practice. P. J. Littlefair.

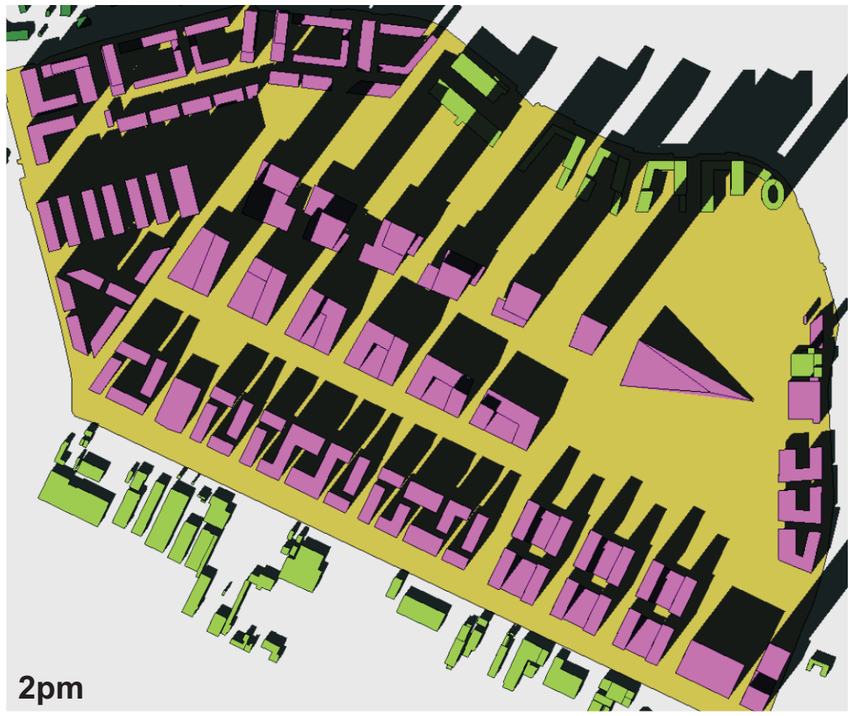
Ref 9.2 BSI (1992) British Standard 8206-02 of 1992 'Lighting for Buildings'.

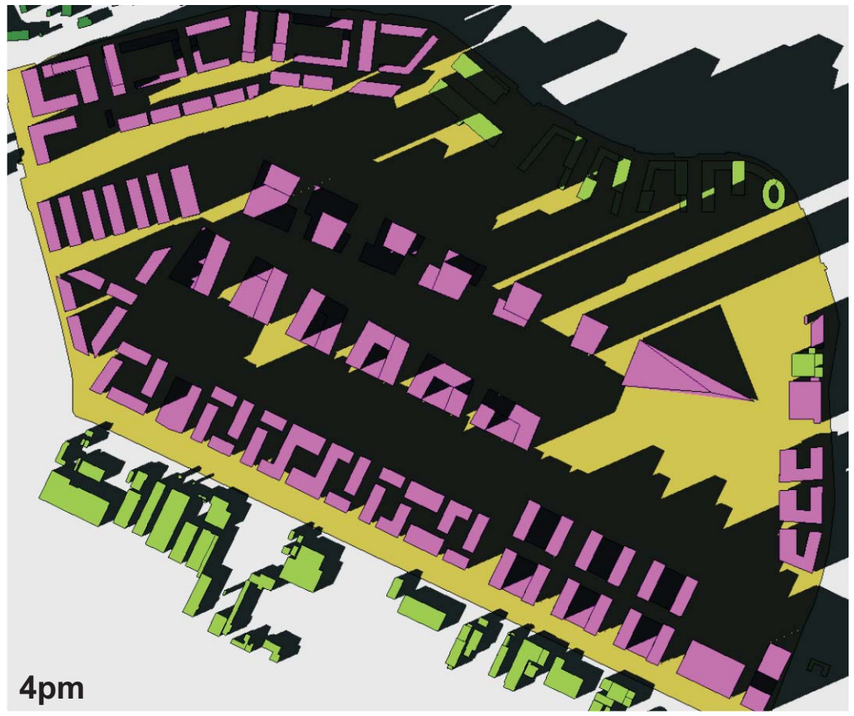
Ref 9.3 Chartered Institution of Building Services Engineers (CIBSE) (1999) Lighting Guide LG10: Daylighting and Window Design.


C- North Bank East
D- Buildings to the East of the Site
B- Buildings on Dock Road
E- Buildings on Corporation Road
A- Buildings West of the Site









PROJECT: East Float, Wirral Waters
PROJECT No: 12261552-001
CLIENT: Peel Land and Property (Ports) Limited

DRAWN: GH
CHECKED: AR
APPROVED: AR
REVISION: A
DATE: December 2009