The British Museum
North West Development

Daylight Impact of North West Development on Existing Rooms

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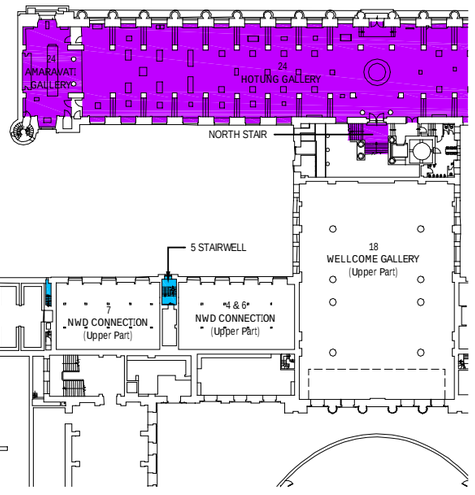

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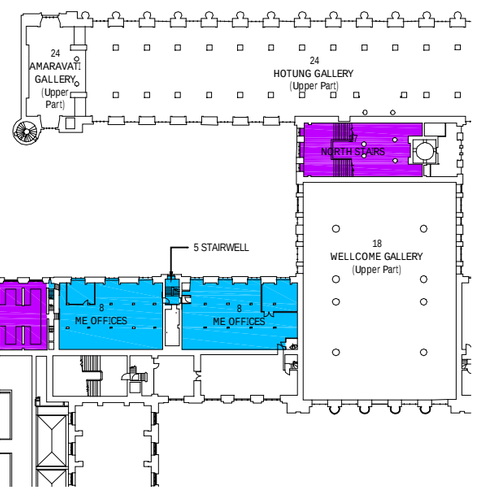

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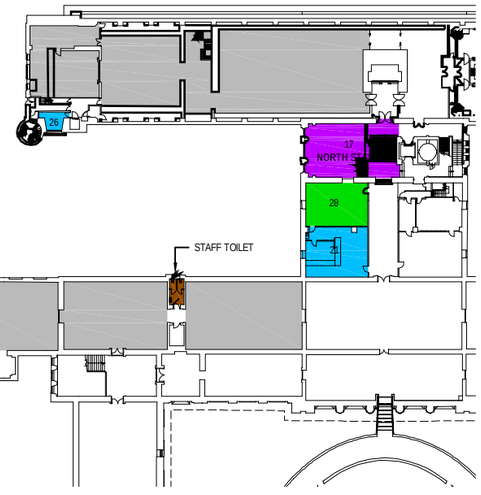

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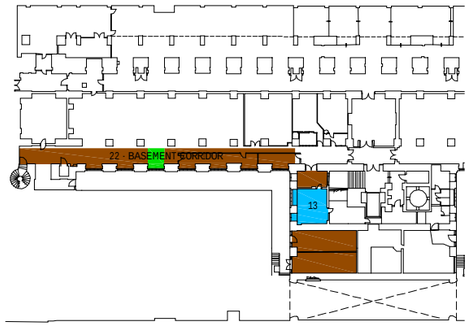

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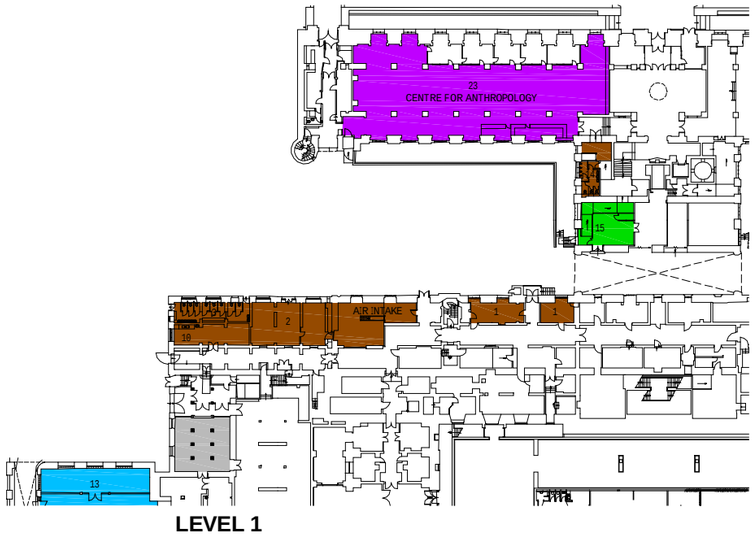

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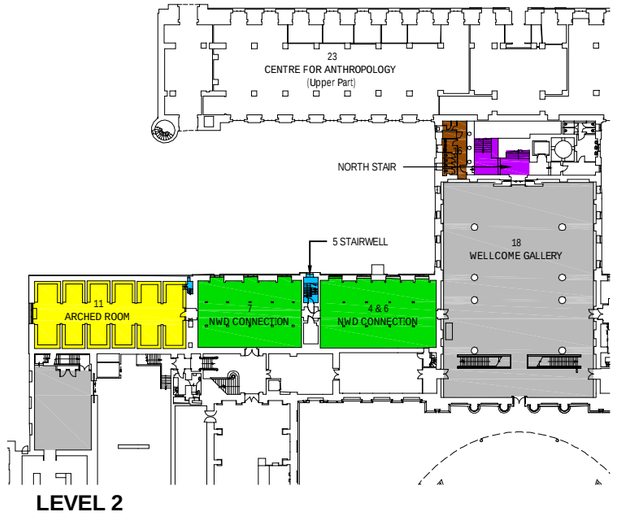

LEVEL 2

KEY

- DAYLIGHT IMPACT - PUBLIC
- DAYLIGHT AND VIEW IMPACT - PUBLIC
- DAYLIGHT AND VIEW IMPACT - STAFF
- BLACKED OUT
- NWD CONNECTION
- DAYLIGHT NOT CRUCIAL

ISSUED

REVISION	DATE	DRAWN	CHECKED	DESCRIPTION
A	04 Jun 2009	IW	IW	Key Colours amended - Daylight Impact Public and Daylight not crucial

CLIENT: British Museum		SCALE	DATE: 27 May 2009
PROJECT: British Museum North West Site		DRAWN: IW	CHECKED: IW
DRAWING TITLE: Daylight Impact Assessment	JOB NUMBER: 231267	DRAWING NO.: 014	REVISION: A

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1.0 INTRODUCTION

This paper considers the impact in daylight terms that the siting of the new North West Development will have on adjacent effected spaces. The surrounding spaces are a mixture of rooms some of which benefit from natural light, some of which seek to control the level of natural light and others where natural light is of no benefit. The paper considers each of the effected rooms in turn, and highlights where proposed mitigation measures are proposed.

1.1 The New North West Development

The proposed North West Development is to be inserted on the footprint of the former Bindery and other buildings in the space between and to the west of Sir Robert Smirke's North Wing and Sir J J Burnet's King Edward Building.

1.2 The North Wing Elevations

When the North Wing and the Arched Room were built in 1833-38 and 1839-41 respectively, there were high level windows lighting the Library Spaces (originally continuing eastwards the line of the existing Arched Room north windows) and windows at Level 6 which lit the original upper floor galleries (Figs.1 and 2). The land to the north and west was originally open, subdivided as private gardens relating to the Bedford Square and the Montague Place properties which had been built around 1800.

The basement windows beneath the Arched Room were designed originally to light a library store room, and in the years that followed more of the North Wing basements were converted to the same use. (The Facilities Management Store (Room 2) retains its original Smirke sash windows).

The southward wing which was built as part of the Arched Library development (Fig.3) originally had west facing windows lighting the basement, the "Insect Room" and the upper floor "Print Room". The upper and middle level west-facing windows were blocked when these rooms were converted to a top-lit gallery in 1869-87. The basement rooms with their cast iron windows were the only ones to survive but these too are now blocked internally.

The upper floor galleries along the North Wing were bricked up in 1912-14 when the rooflights were introduced, leaving only the window to the western-most bay which lit curators' studies.

In the 1930's the north windows of the Supplementary Rooms were both heightened and lowered in order to provide natural light to the mezzanine floors which replaced Smirke's original libraries. These housed offices for staff of the then "British Museum Library" and comprised deep low spaces.

1.3 The King Edward Link West Elevation

Projecting one bay to the north of the main North Elevation on the central axis of the Museum, Sir Robert Smirke built the north "aisle" of his "Large Room" library. In 1851 his brother Sydney added a new museum gallery over it at Level 6, which was lit from north-facing windows.

In 1904-14 J J Burnet gutted this bay (but retained the East and West walls) and added an additional bay to the north (Fig.4). This allowed him to expand the footprint of the original "Large Room" to form his new North Library, and to provide two new top-lit galleries. He provided tall triple windows in each bay lighting the North Library, and, above, the decorative "blind" windows at Level 6.

To the north of the North Library Burnet inserted his monumental North Stair which linked the main Museum with his new King Edward VII galleries fronting onto Montague

Place (Fig.5). The stair was originally designed to be on the east side of the main axis of the Museum, but was eventually built with its windows facing west. The principal windows light the middle and upper half landings, allowing light to percolate down to the depths of the principal landings. The ground floor (Level 2) windows do not contribute to the internal lighting of the staircase.

The windows to the two lower floors light toilets, circulation and service areas.

In the 1930's Burnet's impressive North Library was gutted and in its place was built a utilitarian library with a perimeter gallery, his former deeply odeled ceiling being adapted to create an additional mezzanine floor providing office accommodation. This meant adapting his former North Library windows to accommodate a new upper floor, and the addition of utilitarian sash windows at low level to light beneath the new gallery. The former "blind" windows at Level 6 were opened up to provide a view out of the newly formed studios either side of a central display corridor, now known as the Coptic Corridor.

When the North Library was converted in 2000 for use as a display gallery (the Wellcome Gallery) the side windows below the mezzanine offices were blocked internally.

1.4 The King Edward VII Galleries Elevations

Following the purchase and demolition of the houses fronting onto Montague Place, J J Burnet was commissioned in 1904-14 to design and build new galleries and other accommodation in a new North Wing which presented to the street a bold Beaux Arts façade of Portland Stone. The south (rear) and end facades, being away from the public gaze, were designed in a mannered style but using cheaper materials, with Portland Stone here reserved for dressings (Fig.6).

The principal gallery (now the Hotung Gallery) was lit from north and south by tall windows. A row of windows above this lit further gallery space, and two tiers of windows below (contained within the white glazed brick base storeys) lit former library and service areas. The very top storey had no side windows and, like the surviving Students' Reading Room at the east end, was top-lit, but with end windows.

It was Burnet's long term plan to extend the North Wing to east and west, and so these end windows would have opened only into light wells.

In its current use the North Wing utilises the south-facing windows to provide some light only to the Hotung Gallery and the Ethnography Department below it. The upper level windows of Gallery 67 are blanked off internally so that the displays are artificially lit, and the lower basement level windows light service and circulation areas. The west windows are blanked off internally.

2.0 ROOMS AFFECTED BY THE NORTH WEST DEVELOPMENT

The following descriptions comment on each daylit room in turn, giving an evaluation of its architectural and historical significance, its current and intended use, the effects that the North West Development will have on its daylight levels, and the mitigation steps which are proposed.

Arup Lighting have prepared a separate study on the impact of the North West Development on daylight to those rooms in the existing buildings with windows, and it should be read in conjunction with this report (Appendix A).

The Museum has carried out extensive internal consultations to establish the daylight requirements of each department, and the Matrix submitted as Appendix B has informed this study. It is the Museum's intention to improve the lighting where necessary in areas

or spaces affected by the new development whether they be public galleries or departmental or back-of-house spaces.

The Museum are fully appreciative of the fine buildings which are in their care, and it is their aim wherever possible to allow the buildings' best qualities to be fully expressed. However it is, and always has been, the Museum's function to protect and display the collections to their best advantage and consequently they have to strike a balance between these sometimes conflicting aims.

2.1 The North Wing

2.1.1 Plant Rooms, Stores and Service Area, Refs 1, 2 and 3

History

Built by Sir Robert Smirke 1833 – 8 as vaulted basement Rooms.

Daylight Requirements

These rooms are not dependent on daylight for their use, and so are not considered further.

2.1.2 East and West Supplementary Rooms, Refs 4, 6 and 7

History

Built by Sir Robert Smirke as Libraries.

Alterations

In the 1930's completely stripped out and subdivided horizontally with mezzanines, with altered windows to provide natural light along the south side. Designed as office accommodation for staff of the British Museum Library; low ceilings, deep spaces, and utilitarian in character. Would always have required supplementary internal lighting.

Effect of the North West Development

Level 3 mezzanine to be stripped out and the newly formed double height space to be used in association with the Special Exhibitions Galleries.

Daylight Requirement

The new rooms will have a view out to the exterior, but will be designed to be internally lit.

2.1.3 Staff Staircase, Ref 5

History

Built by Sir Robert Smirke in 1833-8 as a service stair giving access to the Library galleries and to storage rooms, lit by narrow windows.

Alterations

In the 1930's adapted above Level 2 with a new concrete stair serving the mezzanines at levels 3, 4 and 5. Windows adapted to new landings.

Daylight Requirement

Natural daylight not essential for staff use.

Significance of the Space

In their altered form these rooms are not considered to have any intrinsic significance.

Effects of the North West Development

Some reduction in light levels as a result of the close proximity of the new development.

Mitigation
Modify lighting as necessary to provide for lower natural light levels during daylight hours.

2.1.4 Middle East Department Mezzanines, Ref 8

History
Built by Sir Robert Smirke in 1833-8 and forming the upper part of libraries, lit by windows to the north.

Alterations
In the 1930's completely stripped out and subdivided horizontally with mezzanines, with altered windows to provide natural light to Levels 4 and 5. Designed as office accommodation for staff of the British Museum Library. Low, deep spaces, utilitarian in character. Would always have required supplementary internal lighting.

After the evacuation of the British Library, these two mezzanine floors were occupied by staff of the Middle East Department, as departmental offices.

Daylight Requirement
The mezzanines are partially lit from the north windows, but permanent supplementary electric lighting has to be used.

Significance of the Space
The 1930's alterations are not considered to have any intrinsic significance.

Effects of the North West Development
Some reduction in light levels as a result of the close proximity of the new development.

Mitigation
The reduction in light levels will be compensated (if necessary) by improvements to the internal lighting.

Fig.7 – The Arched Room viewed from the west

Fig.8 – A view towards one of the north windows

Fig.9 –The Upper Galleries

Fig.10 – A fluorescent light fitting

2.1.5 The Arched Room, Ref 11

The Arched Room has been the subject of a separate more detailed study "Arched Room Improvements" which should be read alongside this report.

History

The Arched Room was built in 1839-41 to the designs of Sir Robert Smirke. Its design was a response to the demands by the Department of Printed Books that the perceived waste of space at high level in the earlier libraries was here put to good use, hence the three tiers of book presses (Fig.9) and the subdivision of the room by cross-walls with arched openings (Fig.7). There were windows along the north side (Fig.8), at high level along part of the south side (Fig.12), and a large arched window facing west which, (a departure from Smirke's previous libraries) allowed a view out across to the backs of the Bedford Square houses (Fig.13).

Alterations

There have been only minor alterations to the form of the Arched Room, mostly at the east end where new openings and stairs had to be introduced in the 1930's to connect with the new mezzanines, the introduction of a Holland blind at the west window, and unsightly fluorescent strip lights at all levels.

Daylight Requirement

Daylight into the Arched Room has always been a problem. Light through the west window provides good illumination within the western most pair of bays (Fig.13), but in the afternoon, light intensity and sunlight (and in particular solar heat gain) can be overwhelming, hence the use of a Holland blind to reduce light levels. The north windows are intersected by the upper gallery floor (Fig.8), and consequently the useful light which penetrates the lower levels is limited. The high level south windows do not extend the full length and so have only limited effect. The result is that artificial lighting is required throughout in order to provide adequate light at the book presses and working areas.

Significance of the space

This room is highly significant both as a surviving library by Sir Robert Smirke, but also because of its unusual design. The use of perforated floor-plates for balconies to aid in the penetration of daylight was a precursor for his brother Sydney's Sanskrit and later Libraries. This was also the only instance where Sir Robert Smirke used a Roman arched form within the museum.

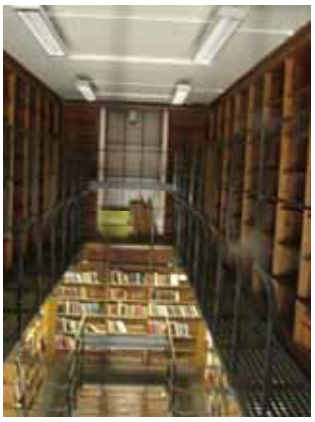

Fig.12 - The blocked high level north window

Fig.13 - Strong light at the west window, the blind drawn

Effects of the North West Development
The new North West Development will reduce further the light from the north windows, and will shade the west window. This will have the advantage of reducing the present imbalance at the western end of the room, and will allow the blind to be removed.

Mitigation
The separate study on the Arched Room considers the effects of the new North West Development on the interior, and proposes to mitigate the reduction in daylight by replacing the present strip fluorescents by a considered lighting scheme which will both enhance the architectural lighting and provide more targeted task lighting. The shielding of the west window will allow the blind to be permanently removed, and provision is being made to create an enhanced view from the Arched Room through the new building to the rear of the Bedford Square properties. The inappropriate Georgian wired glass will also be replaced by clear glass.

2.1.6 The Level 6 Study, Ref 10

History
This is one of two studies for Museum staff designed by Sir Robert Smirke as part of the Arched Room development of 1833-8. The north-facing window is original.

Alterations
Apart from the removal of the original fireplace surround, this room has to a large extent retained its original form. It has for many years served as a Conservation Studio in connection with the Egyptian galleries.

Daylight Requirement
This room receives the majority of its useful light through the north window and it benefits from a view to the north over the roof of the Bindery. It is supplemented by artificial light as task lighting.

Significance of the Space
The room is significant as a survival (largely in its original form) of a study designed by Smirke.

Effects of the North West Development
The new development will shield the window from light, but, being on the upper floor, it will be less affected than lower floors.

Mitigation
If daylight levels are inadequate, electric light is available, as at present.

2.1.7 North end of the West Wing

This wing no longer has west-facing functioning windows and so is not considered relevant to the Daylight Study.

2.1.8 Basement Duveen Gallery, Ref 12

History
The basement of the Duveen Gallery built 1936-8 to the designs of John Russell Pope. These basement rooms are plain and utilitarian in character, but have relatively high ceilings and large windows and are capable of being used for display.

Present Activity
The adjacent rooms house the Wolfson Galleries of Classical Sculpture and Inscriptions, but the north room is currently used only for storage.

Daylight Requirement
This room has large windows to north and west, but to the north the daylight has been (since 1985) shielded by the adjacent Locksmiths department, and to the west the overhang of the gallery above effectively removes any daylight. Whatever use this room is put to it will require supplementary artificial lighting.

Significance
This space is of secondary importance and is of low significance.

Effect of the North West Development
The north windows will continue to be shielded once the new development is built, making very little change to the current poor daylighting of this space.

Mitigation
Any new or the existing storage use will continue to be dependent on artificial lighting.

2.2 THE KING EDWARD BUILDING LINK

2.2.1 The Prints and Drawings Workshops, Ref 13

History
The Level O room beneath the main North Stair was built as part of Sir J J Burnet's King Edward Building development of 1904-14 as a service room.

Daylight Requirements
The present user, the Prints and Drawings Department, does benefit at present from natural light, but it is supplemented by artificial lighting.

Significance
The room is of low architectural significance.

Effects of the North West Development
The new development will shield the window, although the effect of this will be lessened by being north of the line of the new north elevation, that is, it will have a "slot" of uninterrupted west light.

Mitigation
To improve artificial lighting if required.

2.2.2 Staff Toilets, Ref 14 and 16

History
The lowest flight of Sir J J Burnet's great "North Stair" in constricted in width by a mahogany screen which passes behind a row of stout columns, thus shielding it from natural light (apart from a row of high level borrowed lights along the top). Between this screen and the windows of the west wall are staff toilets. On the floor below there are also staff toilets.

Daylight Requirements
The toilets do currently benefit from light from the west windows, but daylight is not necessary for their use.

Significance
The space west of the mahogany screen is utilitarian, and the black and white marble cladding of the staircase does not extend into this space, so it was not meant originally to be on view to visitors, and would always have been intended as a service area. The floor below has always functioned as a service area.

Effects of the North West Development
The shielding effect of the new development will reduce light levels.

Mitigation
Artificial lighting will be enhanced if necessary.

Fig.19 – The top windows and the gold ceiling

Fig.20 – The crowning glory – the top of the lift

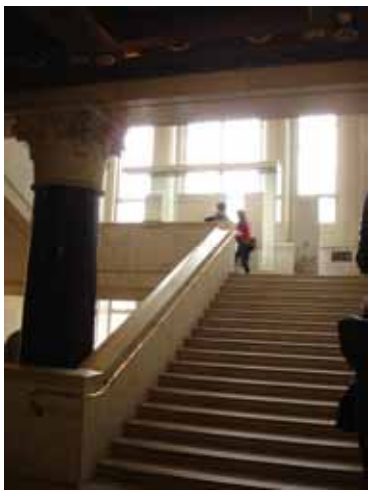

Fig.18 – Looking up to the second half landing

Fig.17 – Looking up to the main Level 4 landing

Fig.14 – The lowest flight of the North Stair

Fig.15 – The main floor landing showing light penetrating from the first landing windows

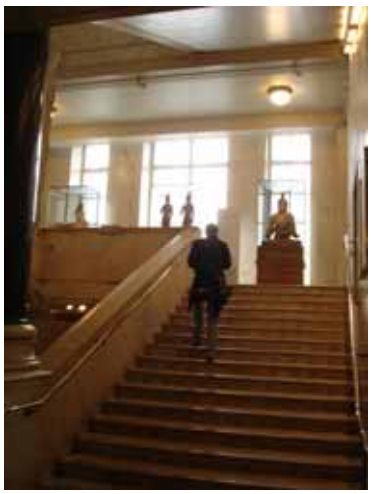

Fig.16 – Looking up to the first half landing

2.2.3 Back of House Corridor, Ref 15

History

This space was originally intended as an extension of the loading-bay designed as part of Sir J J Burnet's building.

Alteration

The loading bay has been partitioned off to provide an access corridor and ramp, and the south window adapted to include a door, to give staff access from the North Road to the North Entrance area.

Daylight Requirement

Daylight quality is not essential to its use.

Significance

This area is of no intrinsic architectural significance.

Effects of the New West Development

Under the North West Development proposals this access will be altered. The windows will be shielded from daylight by a new Level 2 floor slab.

Mitigation

Artificial light will be adapted to the new circumstances.

2.2.4 North Stair, Ref 17

History

Sir J J Burnet's North Stair of 1904-14 has been described as "providing .....one of the great staircases of London – rising from a low lobby and gradually opening up in both space and light, but also one of the most handsome lift shafts in existence, literally crowned at its climax by the Royal Arms". It has survived without significant alteration.

Daylight Requirement

The visitor approaches the stair from the Entrance Hall, rising via the gloom of the lowest flight (which is screened from external daylight by a mahogany panelled partition) then ascends the stair which is increasingly lit by daylight filtered through the robust columns which support the half landing, and finally emerges into the upper space fully lit by the top west windows, and enriched by a gilded and vaulted ceiling (sequence Figs.14 to 19).

Significance

The North Stair is one of the Museum's fine staircases. It is the effect of light, not the view, which is of significance (the windows have obscured film applied to them and the height of the sills prevents a meaningful view).

The Effect of the North West Development

The location of the new development's northern elevation will leave the centre and north lights of the west window unobstructed. However, the Daylight Study by Arups shows the lower landing windows being affected by the reduction in light, but the top landing windows being only partly affected (the south side).

The effect of increasing light as one ascends the stair will therefore still be effective, and, indeed, the effect may even by accentuated. However, the general effect at the lower levels will be to reduce the ambient light.

Fig.21 – Figure sculptures on the first half landing overwhelmed by the daylight from the windows

One problem with the current arrangement of the North Stair is that the strong back light from the windows prevents the most effective use of the landings for display. The first floor landing exhibits are front lit by spotlights, but on a brightly lit day these are ineffectual. The shielding effect of the new development will make the lighting of exhibits more effective.

Mitigation
Artificial light in the North Stair will be enhanced following a very careful analysis of the required distribution of light in order to reinforce the intended effect of increasing illumination towards the top landing.

2.2.5 The Wellcome Gallery, Ref 18

History
The north "aisle" of Sir Robert Smirke's "Large Room" occupied the bay immediately north of the North Wing. At Level 6 this was heightened in 1851 by the addition of a gallery (the brickwork of the east and west elevations still survives).

Sir J J Burnet's 1904-14 King Edward Building development also included his rebuilding and enlarging of the Smirke "Large Room" library to form a new "North Library". The floor of the galleries above was supported by a high steel structure which accommodated the deep coffering of Burnet's Library ceiling.

Within 20 years the Burnet Library had been gutted and a new undistinguished library was inserted in its place. This was aligned north-south, with a central "nave" and with east and west aisles either of giant Doric columns. Around the perimeter was a gallery, the space below being lit by newly inserted windows.

The space within the deep high level steel structure was used to insert a new upper mezzanine floor, which was lit from the upper part of the Burnet windows which were refenestrated for that purpose.

Alterations
The most recent alteration followed the evacuation of the British Library, with the conversion of the former Library as the new Wellcome Trust Gallery. This did not require daylight and consequently the east and west windows were blocked.

Daylight Requirement
The Wellcome Gallery requires no natural light, as it is entirely lit by artificial means, and there are no circumstances which can presently be envisaged when this might change.

2.2.6 The Africa, Egypt and Sudan Offices, Ref 19

History
These offices are formed in the same space described under 2.2.5, however, within 20 years the Burnet Library had been gutted and a new undistinguished library was inserted in its place. This was aligned north-south, with a central "nave" and with east and west aisles either side of giant Doric columns.

The space within the deep high level steel structure was used to insert a new upper mezzanine floor for departmental offices which was lit from the adapted upper parts of the Burnet windows.

Daylight Requirements
As a result of the low ceiling and the depth of the floor plate, the east and west windows are of benefit only locally, and additionally provide an outside view. The spaces are currently lit by supplementary electric lighting.

Significance
These rooms are architecturally of low significance.

The Effect of the North West Development
The west facing windows will be shielded by the new development.

Mitigation
Electrical illumination will be improved if necessary.

2.2.7 North West Development Connection, Ref 20

History
Formerly a top-lit gallery designed by JJ Burnet, now lined with cabinets designed by Sir Robert Smirke and with a west-facing window introduced in the 1930's.

Daylight Requirements
Top-lit room, side window gives view only.

Significance
Architecturally the room was designed on a grand scale as a single gallery space between Room 63 and the North Stairs. In its sub-divided form this significance is reduced, but it would be capable of being opened up again as a gallery.

Effect of the North West Development
The west window will be converted as an access from the new development, however, the form of the window will be retained.

Mitigation
Top lit, so no effect on daylight levels.

2.2.8 Room 21 – ME Store and Workspace, Ref 21

History
Formerly a top-lit gallery designed by JJ Burnet, now lined with cabinets designed by Sir Robert Smirke and with a west-facing window introduced in the 1930s.

Daylight Requirement
Top-lit room, side window gives view only.

Significance
Architecturally the room was designed on a grand scale as gallery space of one room between Room 63 and the North Stairs. In its sub-divided form this significance is reduced, but it would be capable of being opened up again as a gallery.

Effect of the North West Development
Shielding effect of the new development on the west window, and reduced view.

Mitigation
Top-lit, so no effect on daylight levels.

2.3 The King Edward VII Building

2.3.1 Basement Corridor, Ref 22

History

Built as the basement storey of the King Edward VII Building to the designs of Sir J J Burnet in 1904-14. The north and south 'aisles' are day lit with a wide outside 'area' to allow daylight to penetrate.

Present Activity

Currently used as a circulation/access corridor, with five bays partitioned off to provide non-collections store rooms with south facing windows.

Daylight Requirement

Daylight is not required to the store rooms, and light levels are not critical to the access corridor. The store rooms north of the corridor are partitioned off and so do not benefit from south light.

Significance

The spaces are utilitarian in character and finish, and are of low significance, the store room partitions are late 20th century and are of no significance.

Effect of the North West Development

Despite the approximate 4m distance of the new development from these windows there will be reduced light to the basement windows.

Mitigation

To compensate for reduced light levels if necessary by providing additional artificial lighting.

2.3.2 The Centre for Anthropology, Ref 23

History

Built to the designs of J J Burnet in 1904-14 and previously housing the State Papers as part of the British Library.

Present Activity

The Centre of Anthropology provides a study centre for the Ethnography Department. The central area is used for reference material, whilst the south 'aisle' is used for meeting rooms and reception.

Daylight Requirement

The south aisle meeting rooms and reception currently benefit from some south light (but not from direct sunlight).

Effect of the North West Development

The impact of the new development will be to reduce light levels. This will affect the reception and the meeting room marginally but all of the spaces currently need permanent artificial light so the reduction in daylight will have minimal effect.

Mitigation

Artificial illumination will continue to be required throughout the day.

Fig.21 – A view along the Hotung Gallery

Fig.22 – The Hotung Gallery shortly before its completion showing the pendant electric lights

Fig.23 – One of the side bays on the south side south side

Fig.24 – The sun-shading screen on the

Fig.25 – One of the side bays on the north side

2.3.3 The Hotung Gallery and the Amaravati Gallery, Ref 24

History

Sir J J Burnet designed the principal gallery of the King Edward VII Building as a single long, aisled room (reputedly the longest in Europe) divided into bays by columns, each bay lit by windows to north and south (Fig.21). At the centre of the room, an axis with Smirke's main museum building, there is a circular opening through the floor giving a view to the entrance hall below and making a visual link with the adjacent North Stair.

The creation of impressive long public galleries had of course already been exemplified at the Museum in Sir Robert Smirke's earlier King's Library (described in 1875 as 'one of the finest rooms in London') and the Egyptian Sculpture Gallery. Long galleries were a feature, too, of other Victorian and Edwardian Museums such as the Victoria and Albert and the Natural History Museum. At the British Museum Burnet was characteristically outdoing even these both in the scale of the gallery and in the bold modelling of the Beaux Arts interior which echoes in its detail the monumental external façade.

The subdivision of the room longitudinally into a series of bays (Fig.24) is emphatically reinforced by the deep modelling of the central ceiling, and by the ceiling downstand beams and the glazed showcases which span between the aisle piers and the perimeter walls. Furthermore, as originally conceived, each cross-axis was marked by a pair of prominent electric pendant lights (Fig.22 – these have long since disappeared). The spill of daylight into the centre of the room from the side windows completes the effect of a string of pearls drawn out along a central axis.

Present Arrangement

The gallery continues to be displayed in the same way as it was originally conceived, and it now houses the Museum's collection of Chinese, Indian, South Asian and South East Asian collections, with the Amaravati display of Indian sculptures in a sealed gallery at the western end.

Daylight Requirement

As a result of its east-west axis there has always been a strong imbalance between the daylight entering from the north and from the south windows. As a consequence the south windows have been fitted with permanent light-reducing film and blinds (Fig.23) in order to redress the balance and to reduce the glare of strong light.

Although the north windows afford a view out to Montague Place (during the summer a view largely of London plane trees {Fig.25}), the south windows look to the rear over the Bindery and, beyond it, the North Wing. The south windows were fitted with opaque film when the gallery was refurbished 20 years ago to avoid distracting back-of-house views. The interior walls were also enriched with gold leaf in order to heighten the experience of grandeur.

Significance

The Hotung Gallery is one of the most memorable and grand interiors in the Museum and one of the few interiors (following the demise of his North Library) in which J J Burnet was able to express his Beaux Arts style as part of a forceful and integrated whole. It is of the highest significance.

Effect of the North West Development

The north facade of the new development is to be built over four metres away from the south windows of the King Edward Building. The Arup lighting study shows that there will be some reduction in light levels to these windows. The new building will however shield the facade from the effects of direct.

The reduction in south light will also have the effect of correcting the present differences in daylight intensity between the north and the south sides, allowing the architecture of the room be read as a more balanced composition.

Mitigation
The Museum expects the reduction in south light (and particularly sunlight) to have a positive effect on the balance of light in the room. It will allow the present fabric blinds to be removed from the south side. If it is found that the reductions in light result in the opposite imbalance, a scheme of internal lighting will be introduced which will redress the balance of light between north and south by enhancing internal light along the south side.

2.3.4 Gallery 95, Chinese Ceramics, Ref 25

Description
Above the principal gallery is a row of windows which once lit the Prints and Drawings Offices (now Gallery 95).

Daylight Requirement
To the north these windows still provide light, but the south windows have been blocked internally. If at a future date these windows are brought back into use there will be a need to control light intensity in order to balance the daylight from north and south.

Effect of the North West Development
The new development would shield these windows from direct sunlight if they were in the future to be re-opened, and would reduce the amount of daylight to levels which would more readily balance the intensity of the north light.

Mitigation
No mitigation is required at present.

2.3.5 Other south-facing Windows, Ref 25 and 26

Description
The remaining south-facing windows light the temporary fire escapes (25 and 26) and, above, an unused space (26).

Daylight Requirement
There are currently no requirements for daylight to any of these spaces.

Effect of the North West Development
The temporary fire escape will be removed once the permanent route is available within the new development

Mitigation
If new uses are found for these spaces appropriate measures will be taken with regard to lighting.

Appendix A Daylight Impact Assessment
Study for Existing on-site Buildings by Arup Lighting

Arup**Lighting**

The British Museum

North West Development Project

Daylight Impact Assessment Study for Existing On-Site Buildings

ArupLighting

The British Museum

North West Development Project

Daylight Impact Assessment Study for Existing On-Site Buildings

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Job number

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Document ref			

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		Name	Pavlina Akritas	Florence Lam	Andrew Sedgwick
		Signature			
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		Description	Issue		
			Prepared by	Checked by	Approved by
		Name	Pavlina Akritas		
		Signature			
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		Signature			
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		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document ✓

Contents

1 Introduction

A daylight study was carried out for the new North West Development Project to assess the impact of the new building on the existing British Museum buildings on-site.

2 Methodology

A 3D model was supplied by the architects for both the existing building (to be demolished) and the new North West Development building. These were imported into computer analysis software RADIANCE and were used to calculate the vertical sky component and thus the daylight factor.

The daylight calculations are based on the BRE method and provide calculated values for Vertical Sky Component which represents the amount of daylight arriving at a point on a window in the façade, expressed as a percentage of the total available.

The data is assembled and published in a table.

3 Design Criteria

3.1 General

The design criteria offered is based on the recommendations set out in BRE document 209 “Site layout planning for daylight and sunlight - A guide to good practice” and the CIBSE Code for interior lighting 1994.

The BRE document 209 states “The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly because natural lighting is only one of the many factors in site layout design.”

For new developments BRE 209 states that “Any reduction in the total amount of skylight can be calculated by finding the vertical sky component [VSC] at the centre of each window.”

“For a room with non-continuous obstructions there is the potential for good daylighting provided that the VSC is not less than the value for a continuous obstruction of altitude 25°. This is equal to a VSC of 27%.”

“The reference point [calculation point] is in the external plane of the window wall. Windows to bathrooms, toilets, store rooms, circulations areas and garages need not be analysed.”

Further it is stated that “If the VSC is greater than 27% then enough skylight should still be reaching the window of the existing building. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.8 times its former value, then occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window is likely to appear gloomier, and electrical lighting will be needed more of the time.”

Previous work has shown that there is a direct relationship between the VSC and daylight factor. According to Lighting Guide LG7: 1993, “The daylight factor is a conventional expression for the extent to which daylight is available at a particular position in an interior. It is defined as the ratio of the illuminance at a point on a horizontal plane due to an unobstructed hemisphere of the same sky. The CIE overcast sky is usually assumed.”

3.2 Suggested Design Criteria

Vertical sky component [VSC] is the measure of the amount of daylighting that is incident on a window, and is expressed as a percentage of the horizontal illuminance at the same point under an unobstructed sky.

BRE 209 states that for existing properties a 27% VSC or a figure that is 80% of the base line condition is acceptable.

It should be noted that the maximum VSC possible is 40%, thus 27% represents approximately two thirds of the maximum possible.

According to the CIBSE Code for Interior Lighting 1994, “If electric lighting is not normally to be used during daytime hours, the average daylight factor should be not less than 5%.”

“If electric lighting is to be used during daytime the average daylight factor should be not less than 2%. In a room where the average daylight factor is significantly less than 2%, the general appearance is of an electrically lit interior“.

Previous work has shown that there is a direct relationship between VSC and average daylight factor. This is given by the following curve.

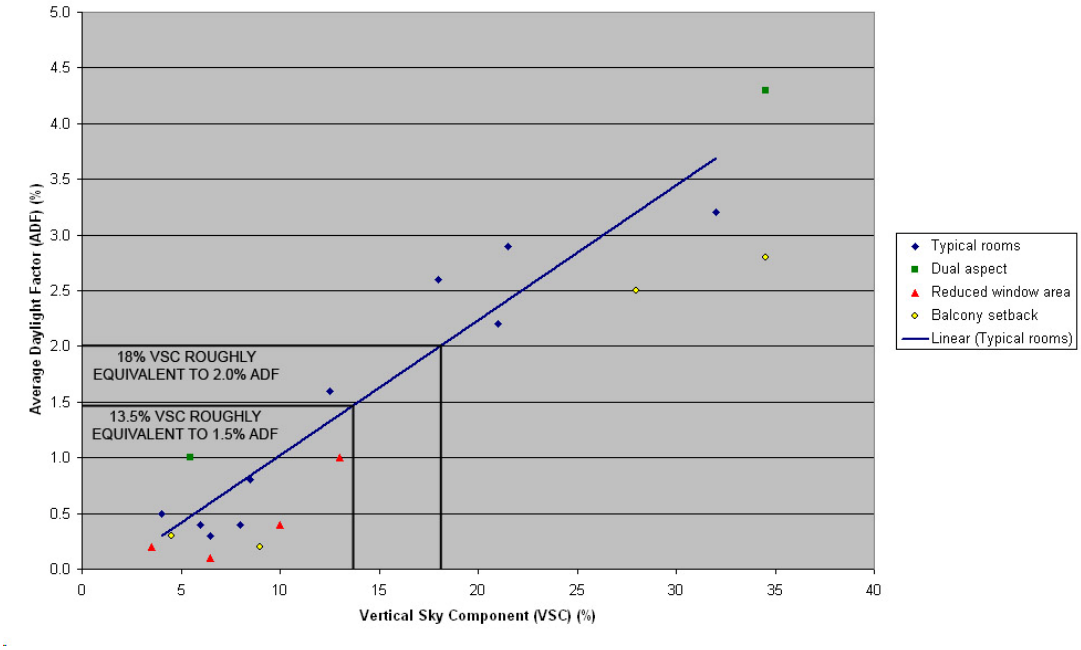

Figure 3.1: Vertical sky component versus average daylight factor

4 Window Reference

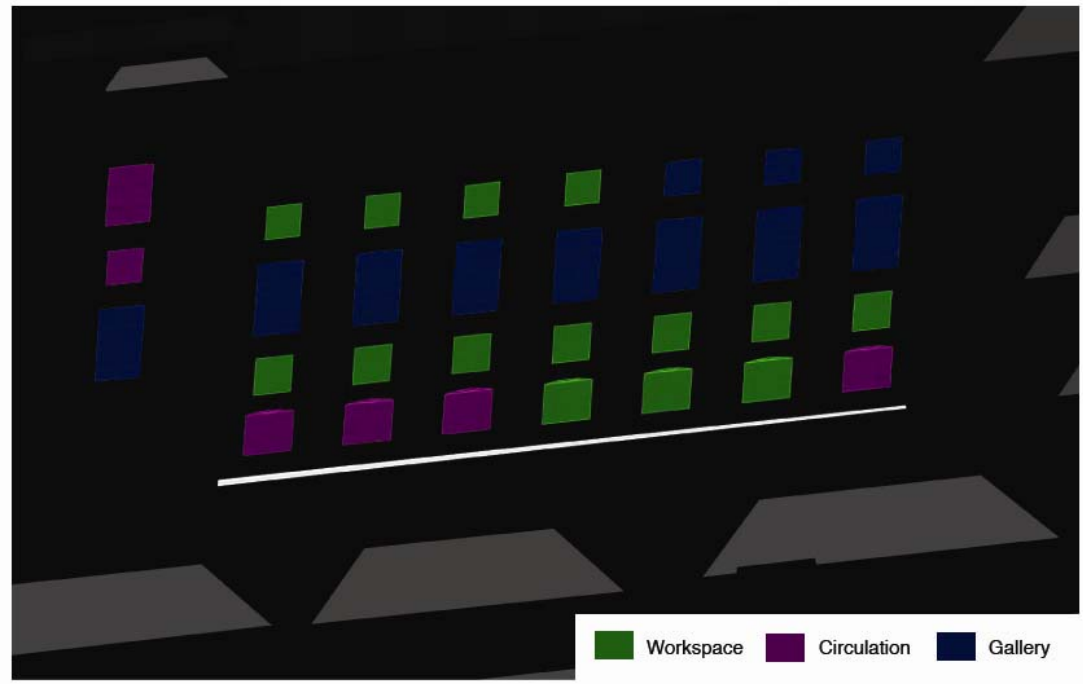

Figure 4.1: Window Reference – south façade

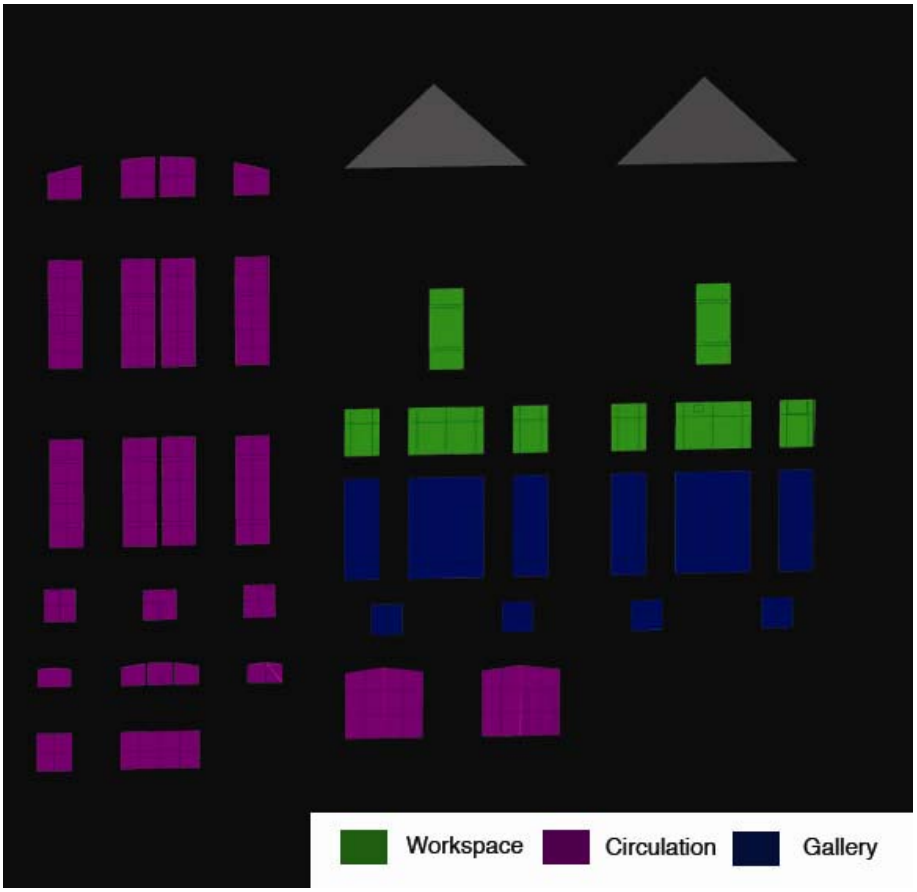

Figure 4.2: Window Reference – west façade 1

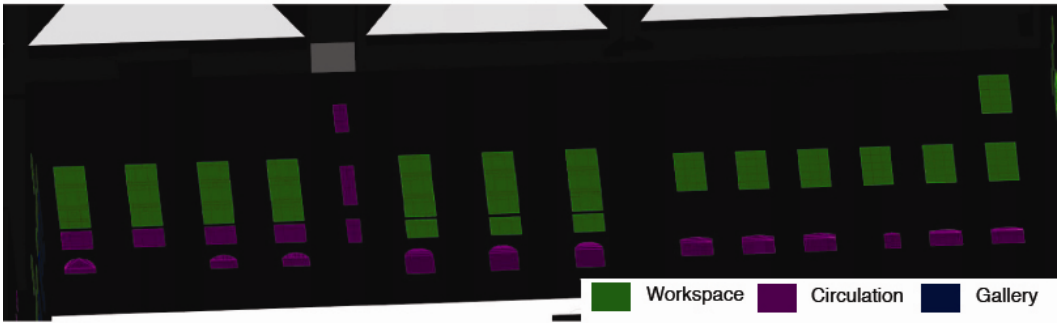

Figure 4.3: Window Reference – north façade

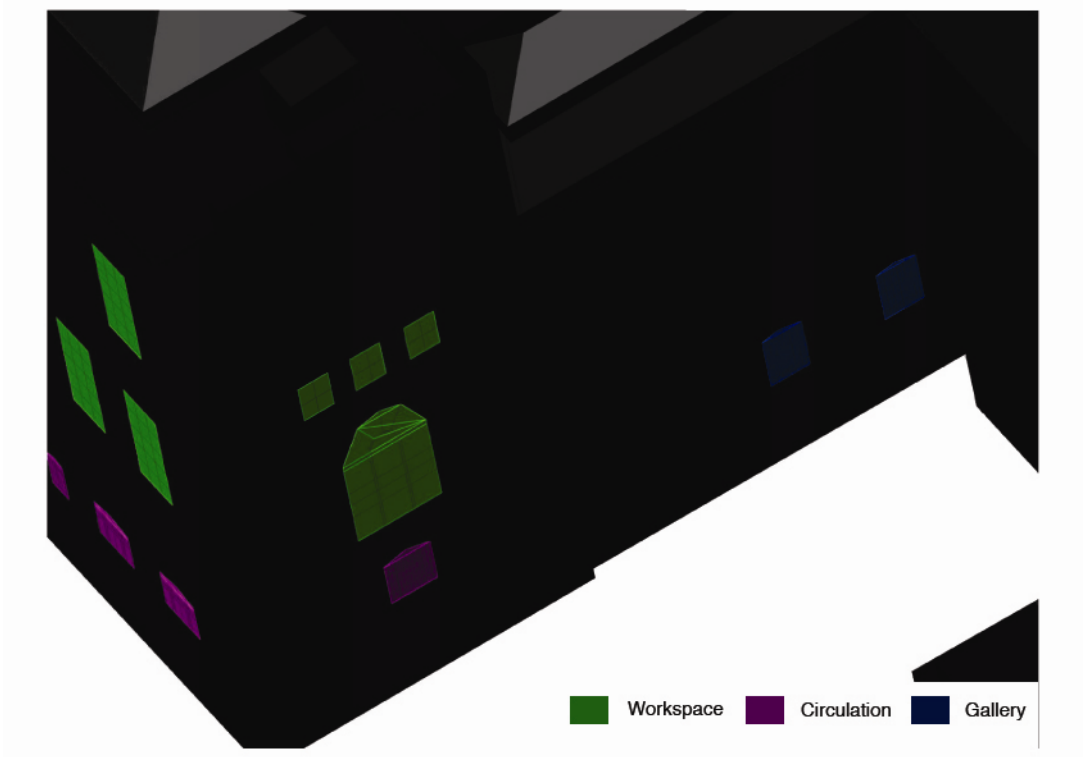

Figure 4.4: Window Reference – west façade 2

5 Results

5.1 Workspace

5.1.1 Points Location

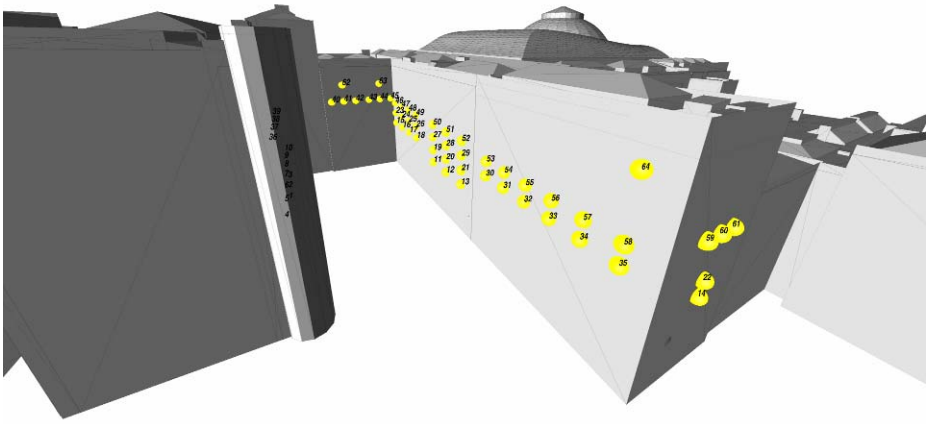

Figure 5.1: Workspace points location view 1

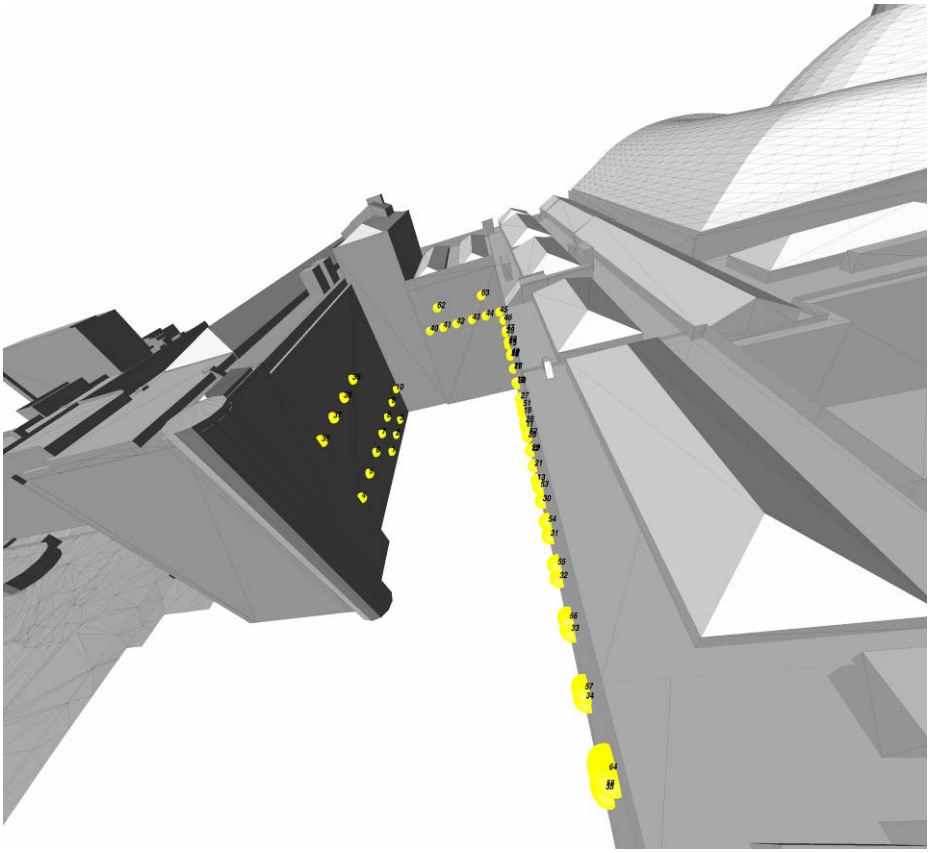

Figure 5.2: Workspace points location view 2

5.1.2 Daylight Factor

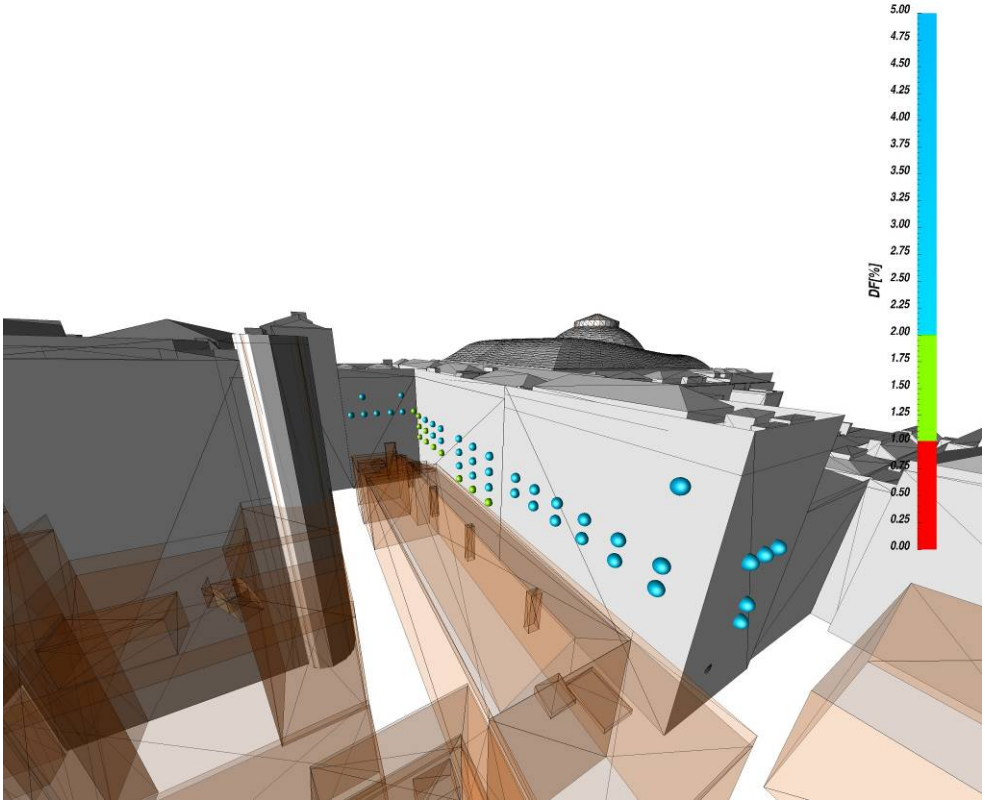

Figure 5.3: Existing building – Workspace average daylight factor view 1

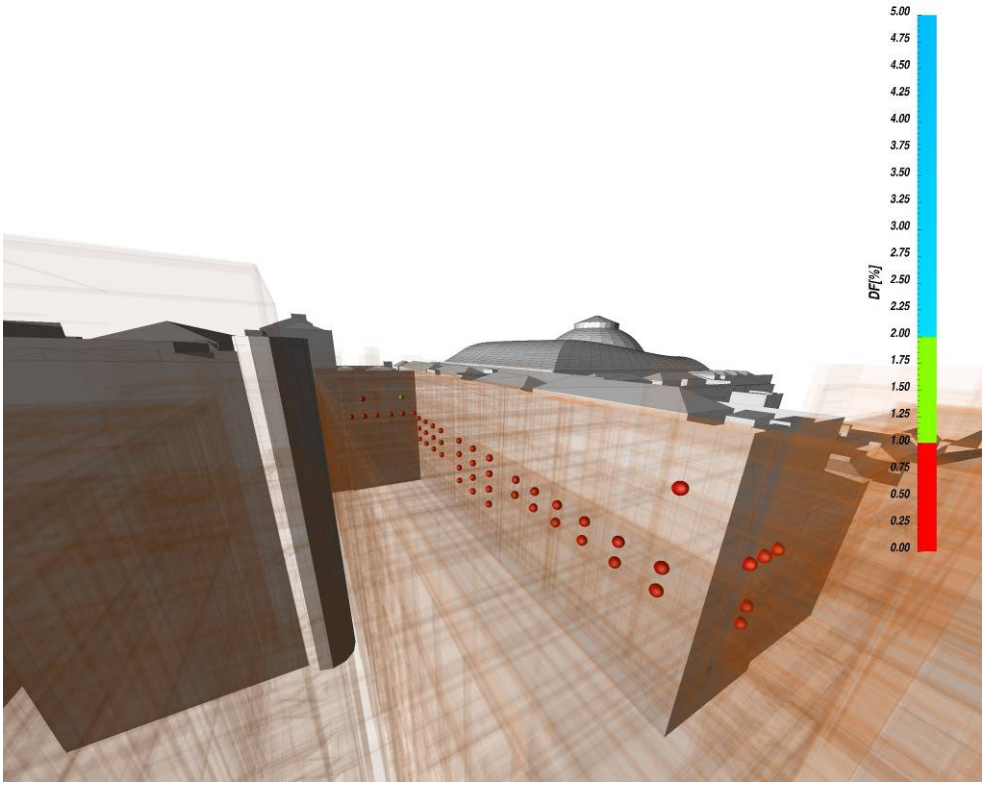

Figure 5.4: New building – Workspace average daylight factor view 1

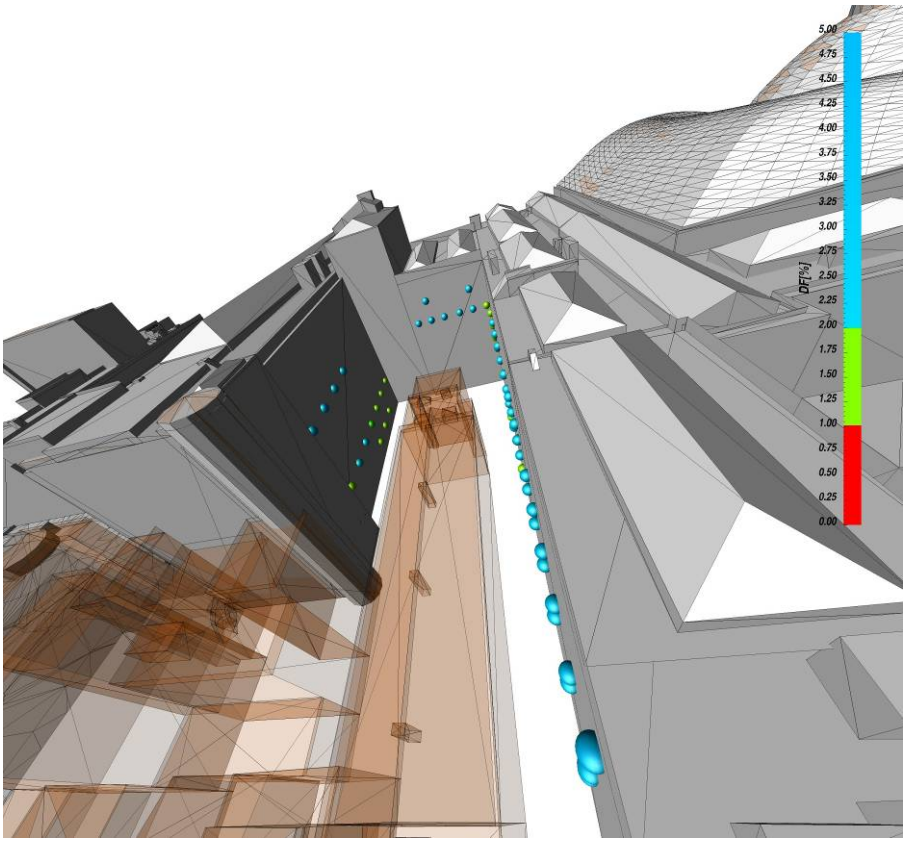

Figure 5.5: Existing building – Workspace average daylight factor view 2

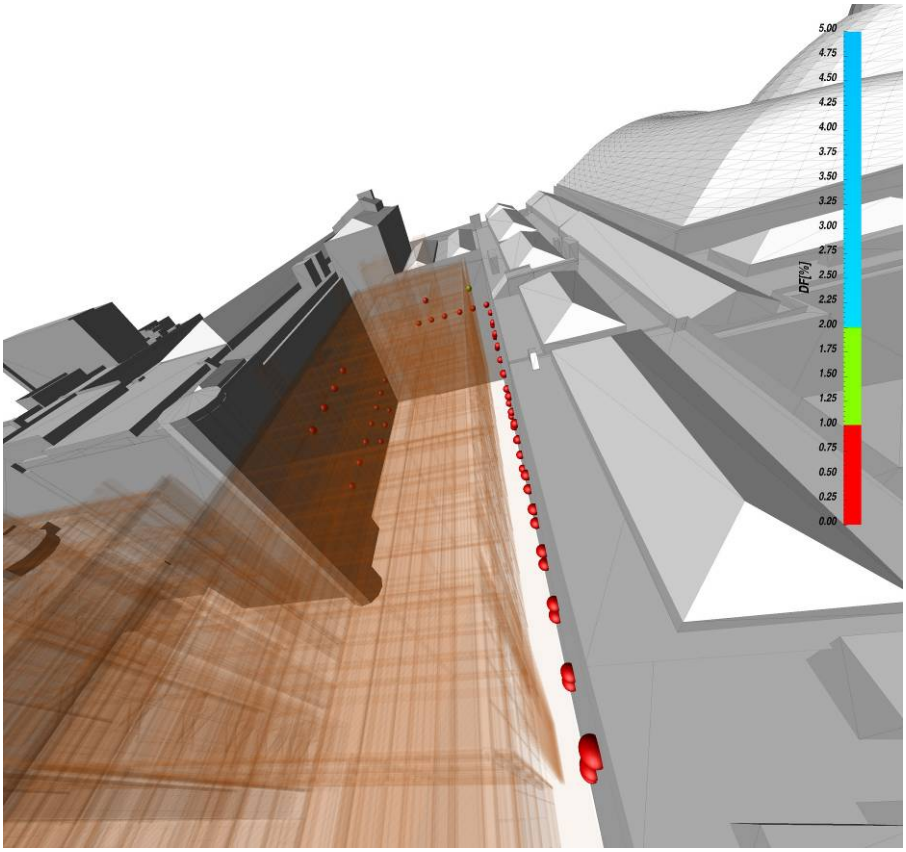

Figure 5.6: New building – Workspace average daylight factor view 2

5.2 Circulation

5.2.1 Points Location

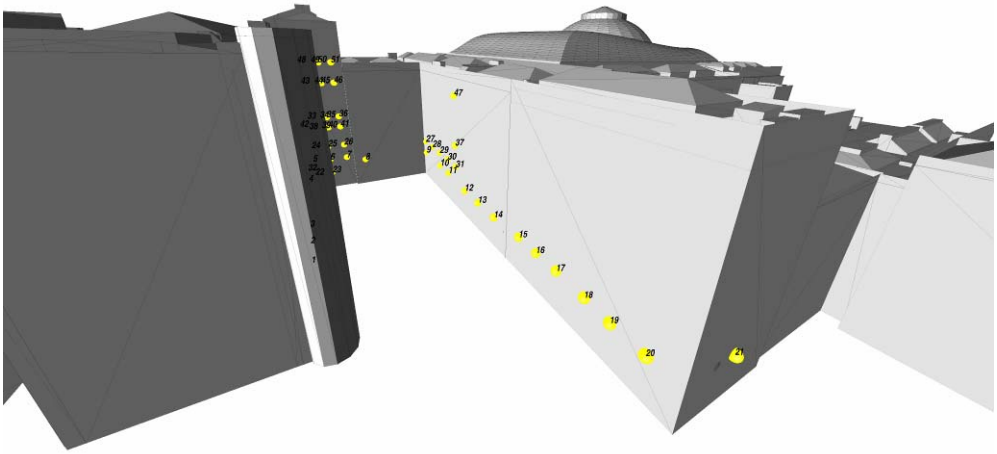

Figure 5.7: Circulation points location view 1

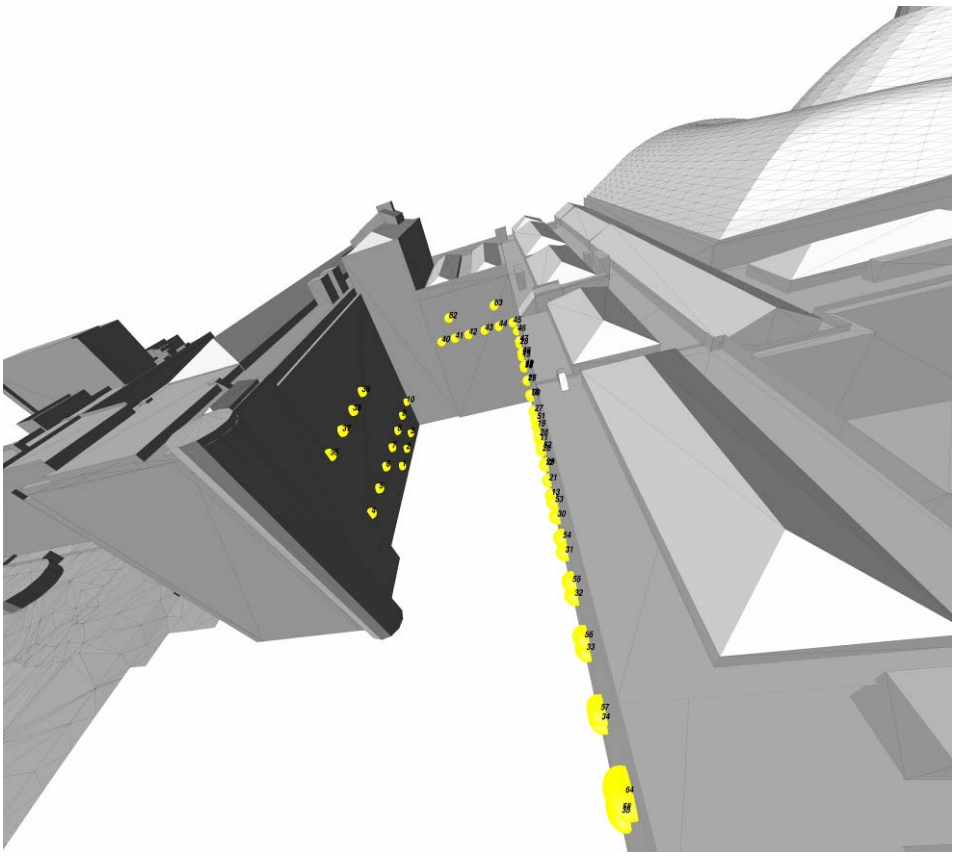

Figure 5.8: Circulation points location view 2

5.2.2 Daylight Factor

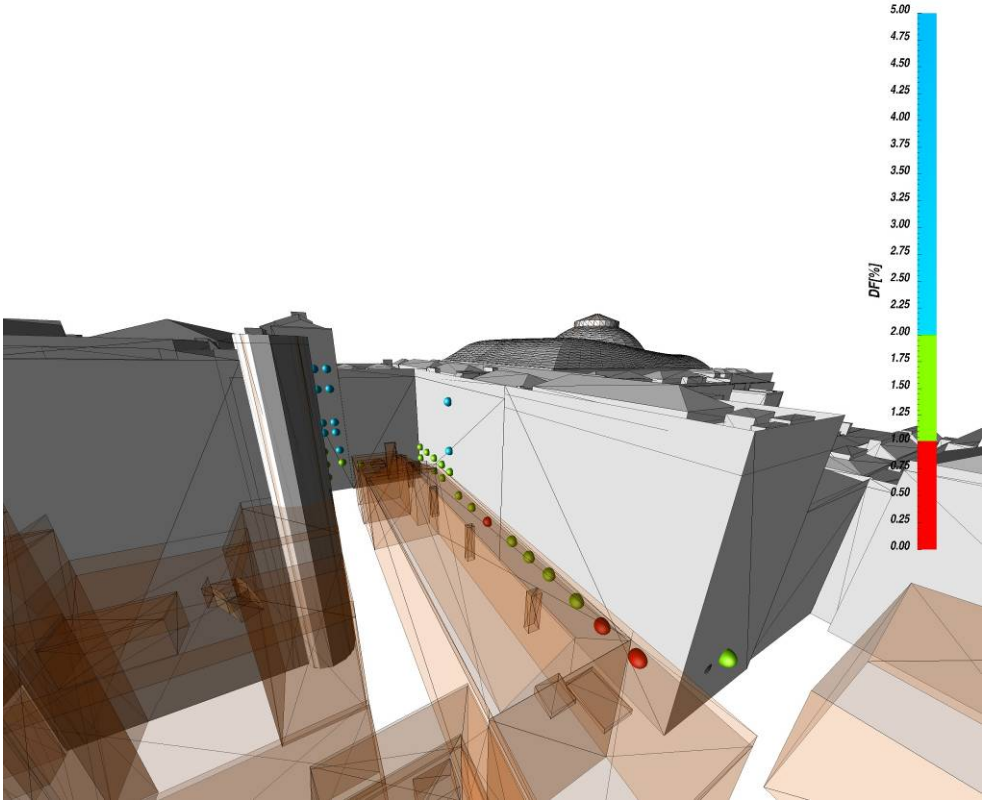

Figure 5.9: Existing building – Circulation average daylight factor view 1

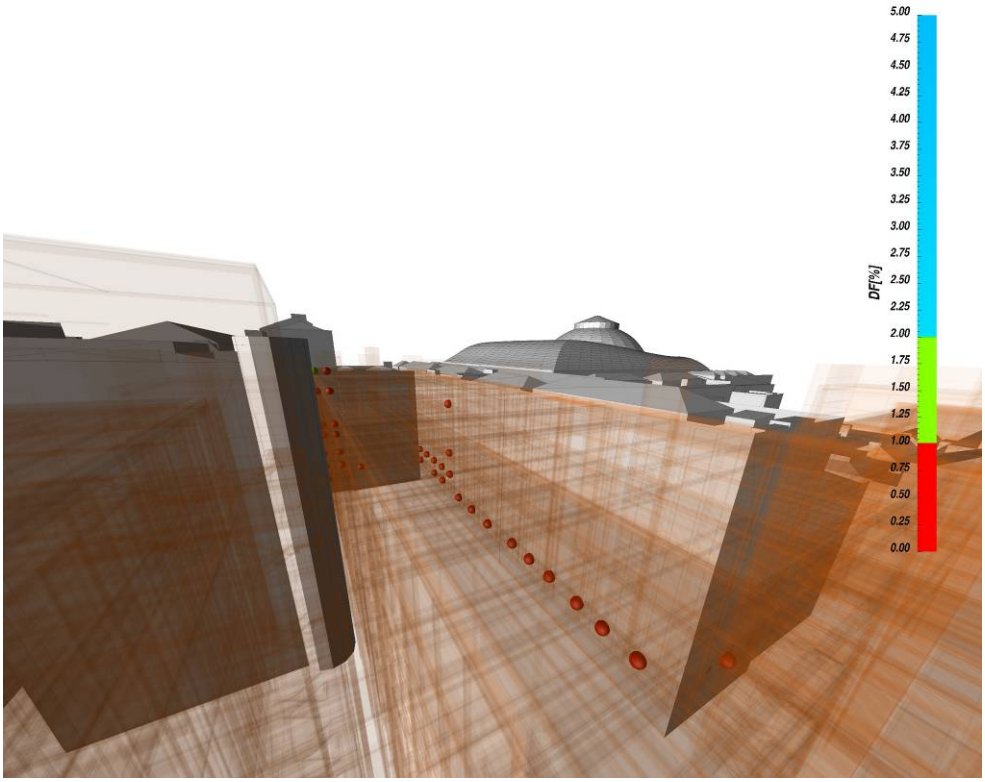

Figure 5.10: New building – Circulation average daylight factor view 1

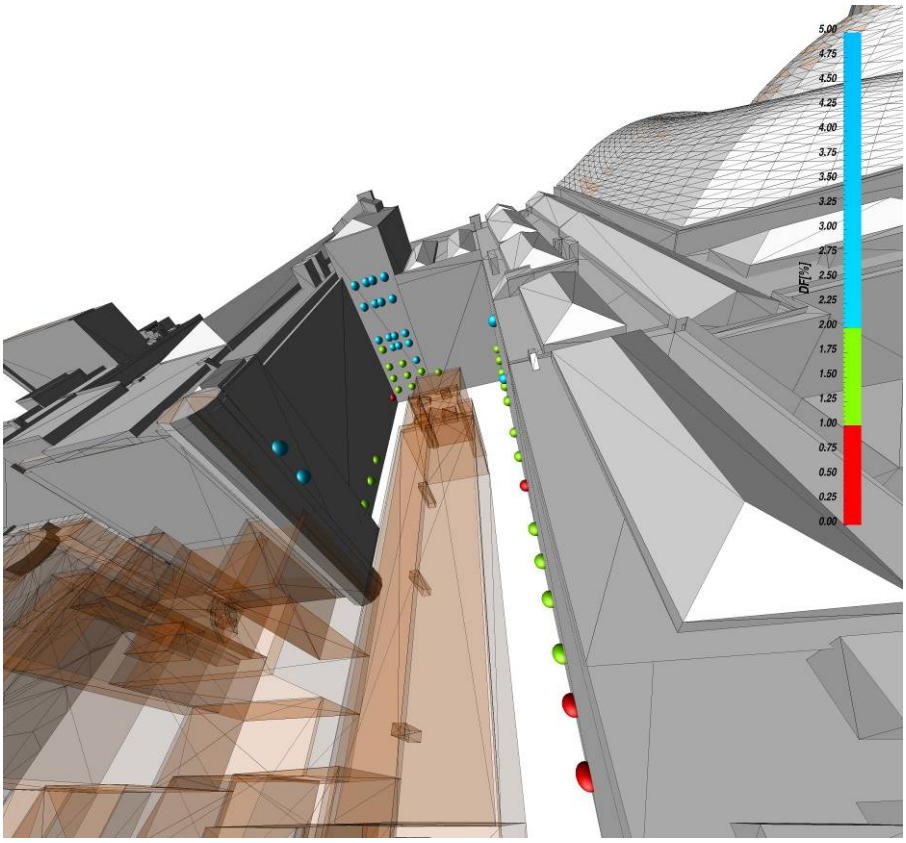

Figure 5.11: Existing building – Circulation average daylight factor view 2

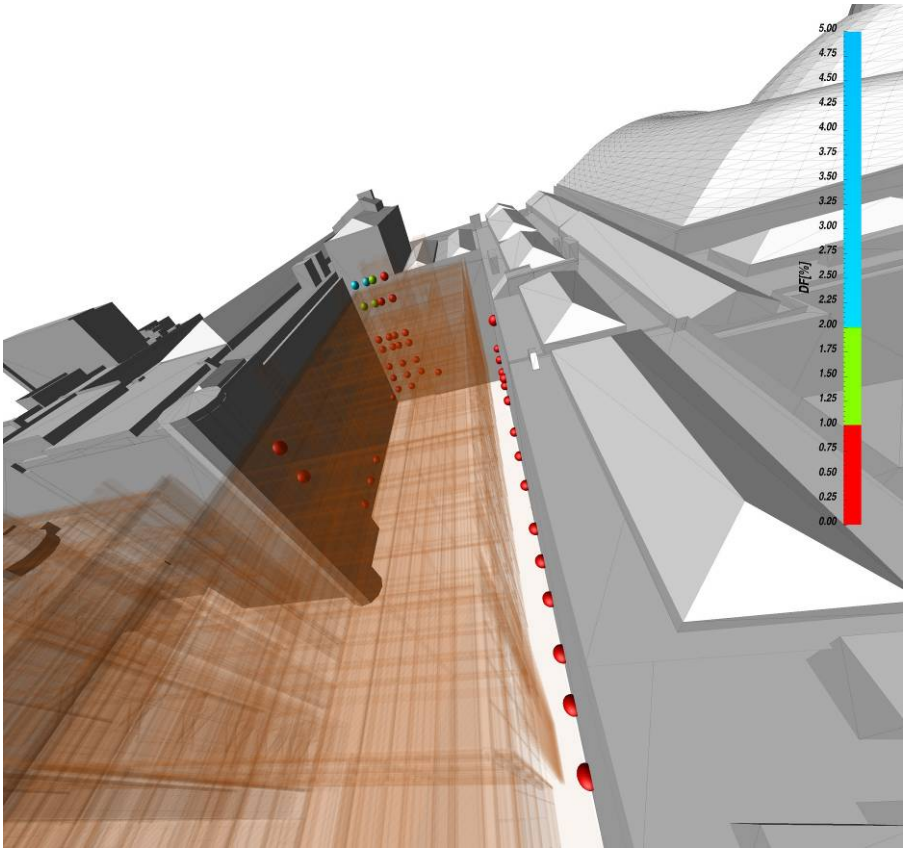

Figure 5.12: New building – Circulation average daylight factor view 2

5.3 Galleries

5.3.1 Points Location

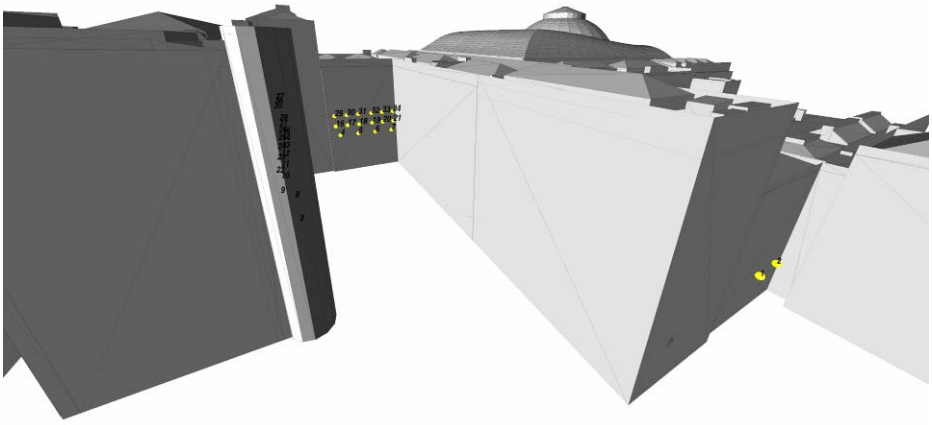

Figure 5.13: Galleries points location view 1

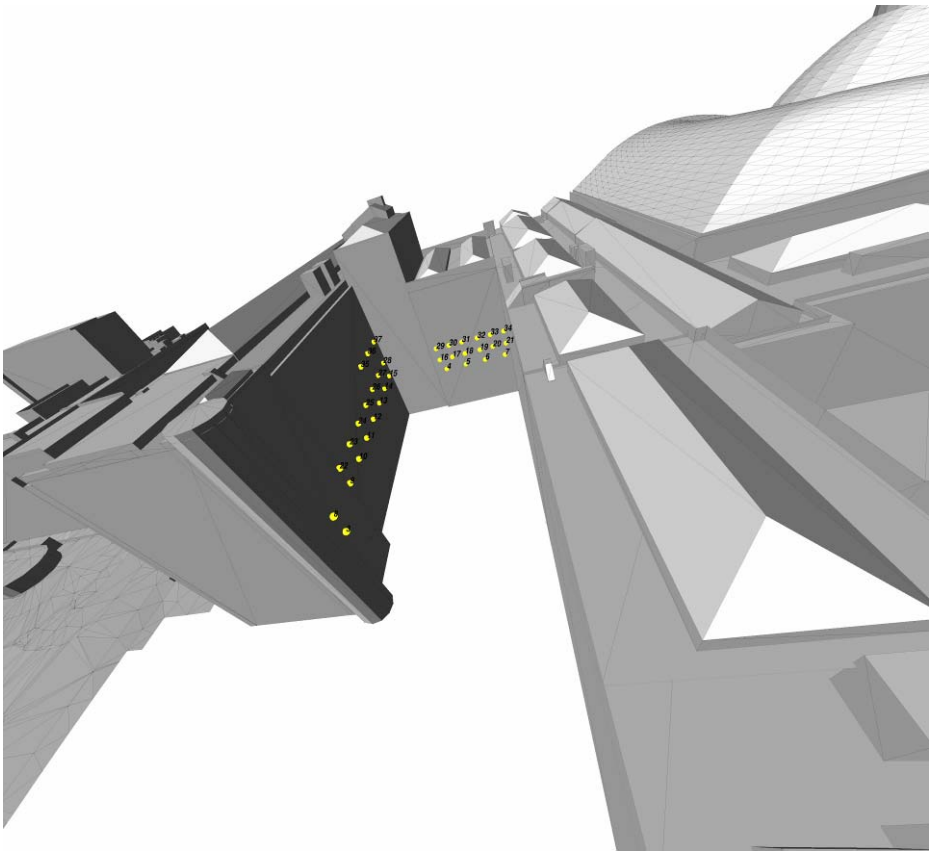

Figure 5.14: Galleries points location view 2

5.3.2 Daylight Factor

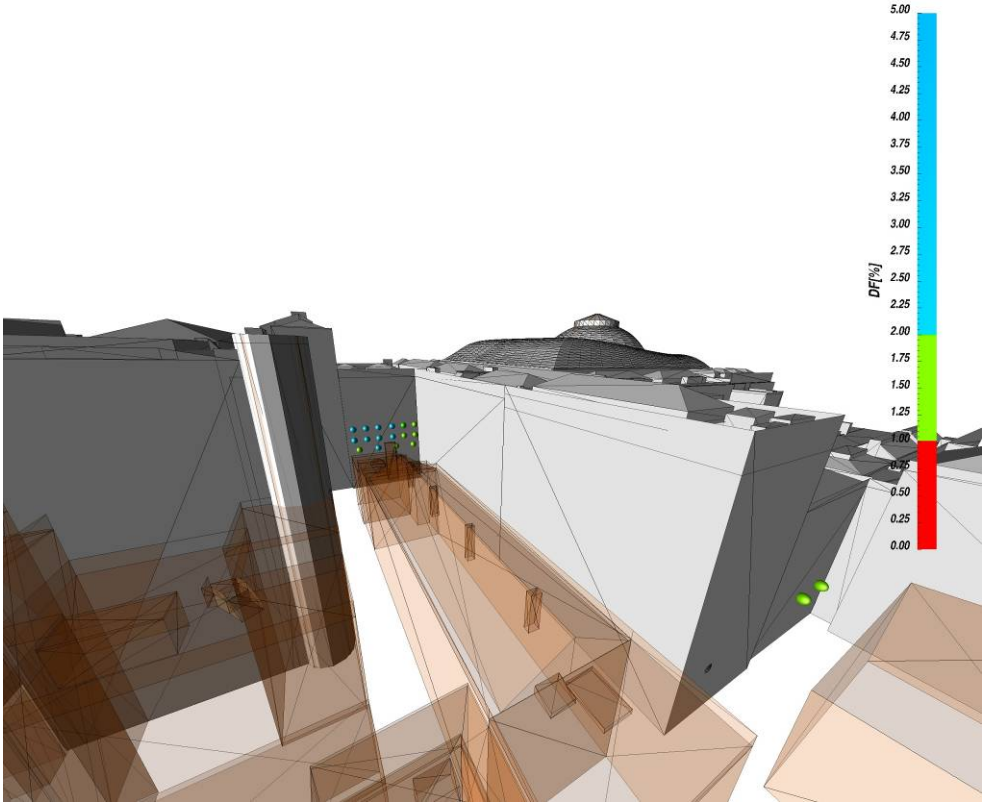

Figure 5.15: Existing building – Galleries average daylight factor view 1

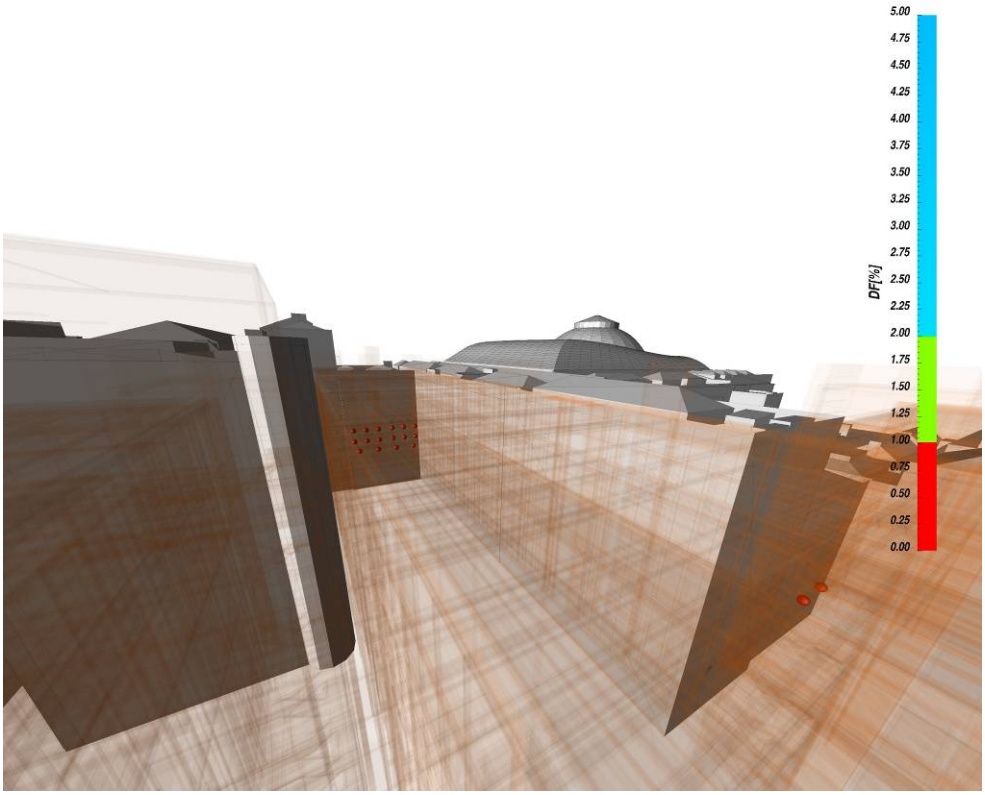

Figure 5.16: New building – Galleries average daylight factor view 1

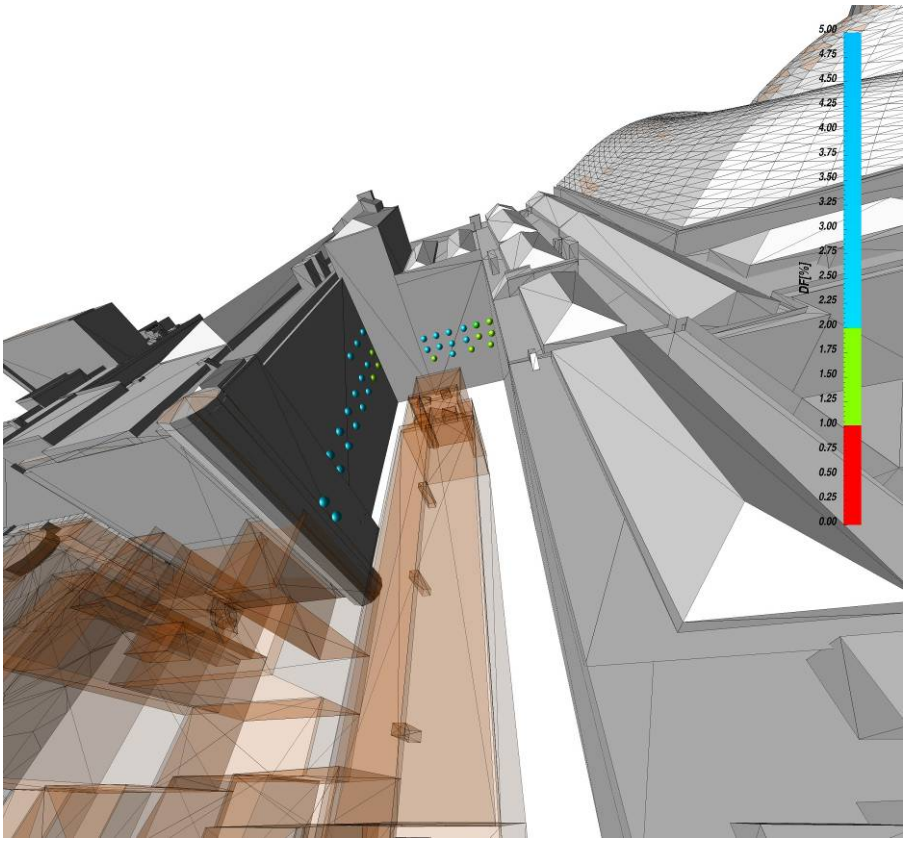

Figure 5.17: Existing building – Galleries average daylight factor view 2

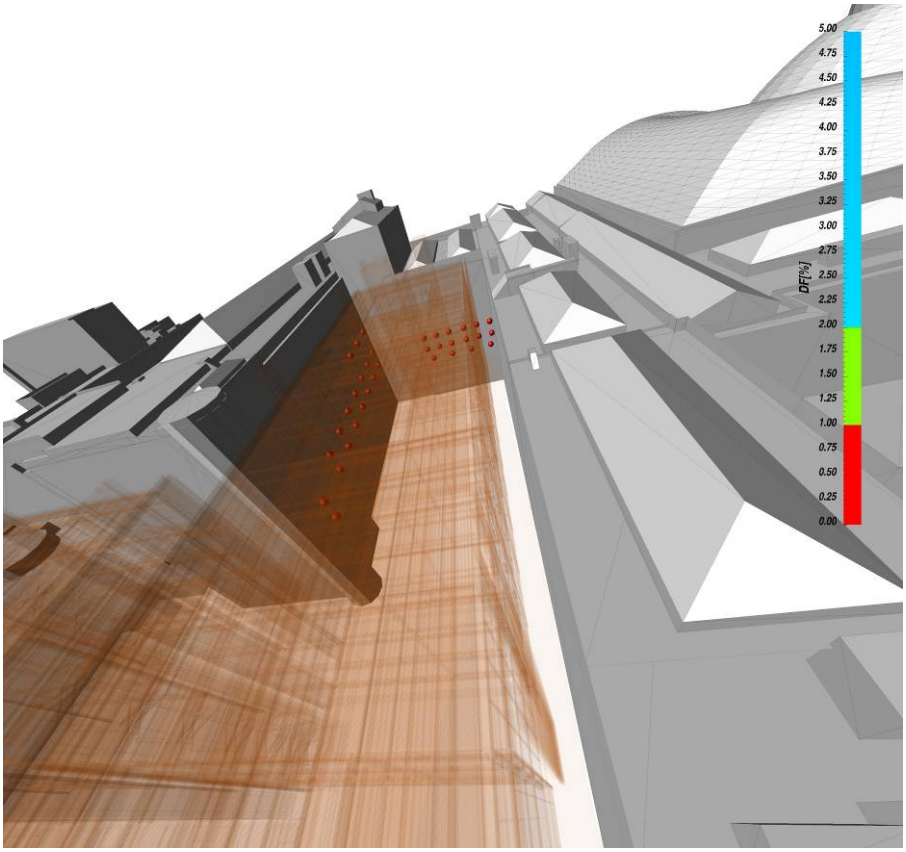

Figure 5.18: New building – Galleries average daylight factor view 2

6 Conclusions

The results of the study conclude that the new North West Development building will significantly affect the daylight availability for the surrounding British Museum buildings. Whilst a good degree of daylight penetration is currently available to the existing adjacent buildings in particular on the upper floors, it is anticipated that with the new development (fig 6.1), the amount of daylight available in their interiors will be minimal, i.e. average daylight factor of less than 1%.

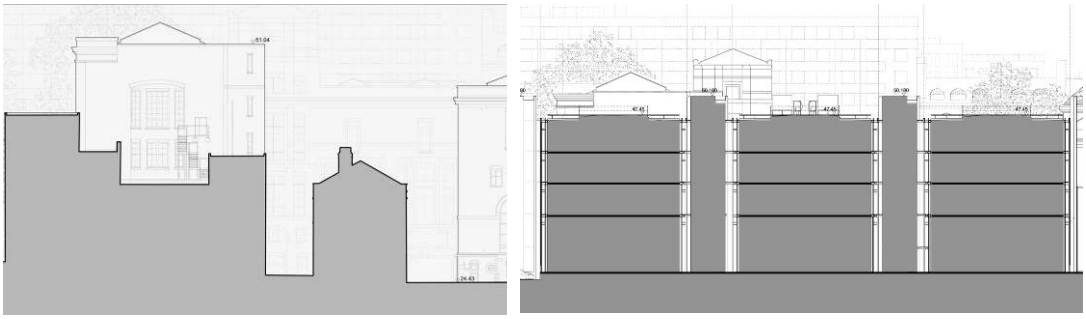

Figure 6.1: Sections of existing and new buildings

For the circulation and gallery areas, the reduction in daylight might be less of an issue in comparison to the offices. In particular for galleries where natural lighting is to be closely controlled for conservation reasons, the natural reduction of daylight might be considered beneficial.

On the other hand, daylight is often preferred in workspaces. Whilst view out can be maintained with the existing windows, it is recommended that the interior lighting be reviewed and considered for upgrade to improve the visual environment and energy efficiency as the lights will require to be switched on throughout the work day.

Appendix B Matrix 'Daylight Impact on Existing Buildings' May 2009

North West Development - Daylight impact on existing buildings
May 2009

(NB – areas shaded in light gray will be connection points into the NWD.)

	Area	Activity in Area	Potential Impact	Recommended Mitigation
	North Range, Smirk building			
1	**Plant rooms**		No requirements for daylight or view. Windows currently frosted.	None.
2	**FM store room**	Storage. Staff use of space to access material.	No requirements for daylight or view. Windows currently frosted.	None.
3	**Contractor toilets**	Back of house toilets.	No requirements for daylight or view. Windows currently frosted.	None.
4	**East Supplementary Room - Wellcome prep area**	Will become part of NWD.		None.
5	**Stairwell**	Back of house circulation.	No requirements for daylight or view.	
6	**West Supplementary Room - Central Library**	Will become part of NWD.		None.
7	**Mezzanine levels - currently Central Library**	Will become part of NWD.		None.
8	**Middle East Department offices**	Members Middle East Department occupy this space and carry out desk	Day light and view will be impacted.	Improvements to internal lighting to be developed.

		work.		
9	**Organic Conservation Studio**	Current activity will be relocated to new building. Future use and requirements of space not known. May become link to NWD.	Day light and view will be impacted.	Improvements to internal lighting to be developed once future intention is known.
	West Elevation, Smirk building			
10	**Events kitchen**	Back of house food preparation. Future use and requirements of space not known.	No requirements for daylight or view with current use. Windows currently part frosted.	None.
11	**Arched Room, Middle East Department (arched window plus three small windows above)**	Middle East Department Students room. Study space for Museum staff and public. Numbers in room are restricted due to fire escape regulations. Object storage. Cuniform tablets are studied under artificial light.	Day light and view out of arched window, and windows along north wall, will be impacted. Pavilion 5 will provide permanent shading which roller blind is currently used to control on arched window. Benefits from daylight from windows on north elevation is minimal as it lights the top of the book stacks.	Study by PMT and Arup to review lighting and draw up proposals for improved lighting scheme. Repositioning of pavilion 5 to improve view from arched window. Design of pavilion 5 has also been changed to create a large atrium type space so the view from the Arched Room will be maintained, and indeed improved. There will be an unimpeded view to the rear of the properties on Bedford Square.
	Below Duveen Gallery			

12	**Stone conservation studio**	Studio will move into NWD. Future use and requirements of space not known.	Daylight and views limited currently by stone conservation building. Windows currently frosted a lower level.	
	East elevation, linking KEB and Smirk			
13	**Prints and Drawings workshop**	Framing workshop for prints and drawings. Objects and one member of staff occupy the space.	Daylight and view will be impacted. There is a requirement for good lighting.	Improvements to internal lighting to be developed.
14	**Staff toilets**	Back of house toilets.	No requirements for daylight or view. Windows currently frosted.	None.
15	**Back of house corridor**	Back of house circulation	No requirements for daylight or view. Windows are frosted.	None.
16	**Staff ladies toilets**	Back of house toilets.	No requirements for daylight or view. Windows currently frosted.	None.
17	**North Stairs**	Public circulation route. Asia objects on display.	Daylight will be impacted. Light required. Windows are frosted so no requirement for view.	Improvement to internal lighting to be developed.
18	**Wellcome Gallery**	Public gallery.	None – windows are	None.

		AOA objects on display.	blacked out, not visible in gallery. No requirement for daylight or view.	
19	**Ancient Egypt and Sudan offices - including Keeper and secretary**	Members AES Department occupy space and carry out desk work.	Daylight and view will be impacted. There is a requirement for lighting and need for consideration of view.	Improvements to internal lighting to be developed. Possible review of department layout to maximize spaces that will provide natural daylight to office spaces.
20	**NWD model room**	Current use is for NWD. In future will become link point into NWD.		None.
21	**Middle East store/ office**	ME staff and objects occupy space.	Daylight and view will be impacted. There is a requirement for light but not for a view.	Improvements to internal lighting to be considered.
	King Edward Building, South elevation			
22	**Basement corridor**	Back of house circulation. May be point of connection into new building?	No requirements for daylight or view. Windows currently frosted.	None.
	Store Rooms x 2	Back of house storage for non collection material. Future use of space not known. May become part	No requirements for daylight or view. Windows currently frosted.	None.

		of connection to NWD?		
23	**Centre for Anthropology**	Public library, open daily. Office space for library staff. Study space for Museum staff and public.	There is a requirement for light but not for a view. Three most easterly windows are currently frosted.	Improvements to internal lighting to be developed.
24	**Hotung Gallery**	Public gallery.	There is a requirement for light but not for a view on south side. Windows on south side have blinds and are frosted. Daylight is also provided from north side of gallery.	Improvements to internal lighting to be developed.
25	**Percival David Foundation Gallery**	Public gallery.	None – windows are blacked out - cases line the windows. Daylight comes from windows on north side of gallery.	None.
26	**Store/ office – vacant space**	Vacant space. Previously used for store. Future use of space not know.	Daylight and view will be impacted.	Improvements to internal lighting to be developed once future intention is known.