

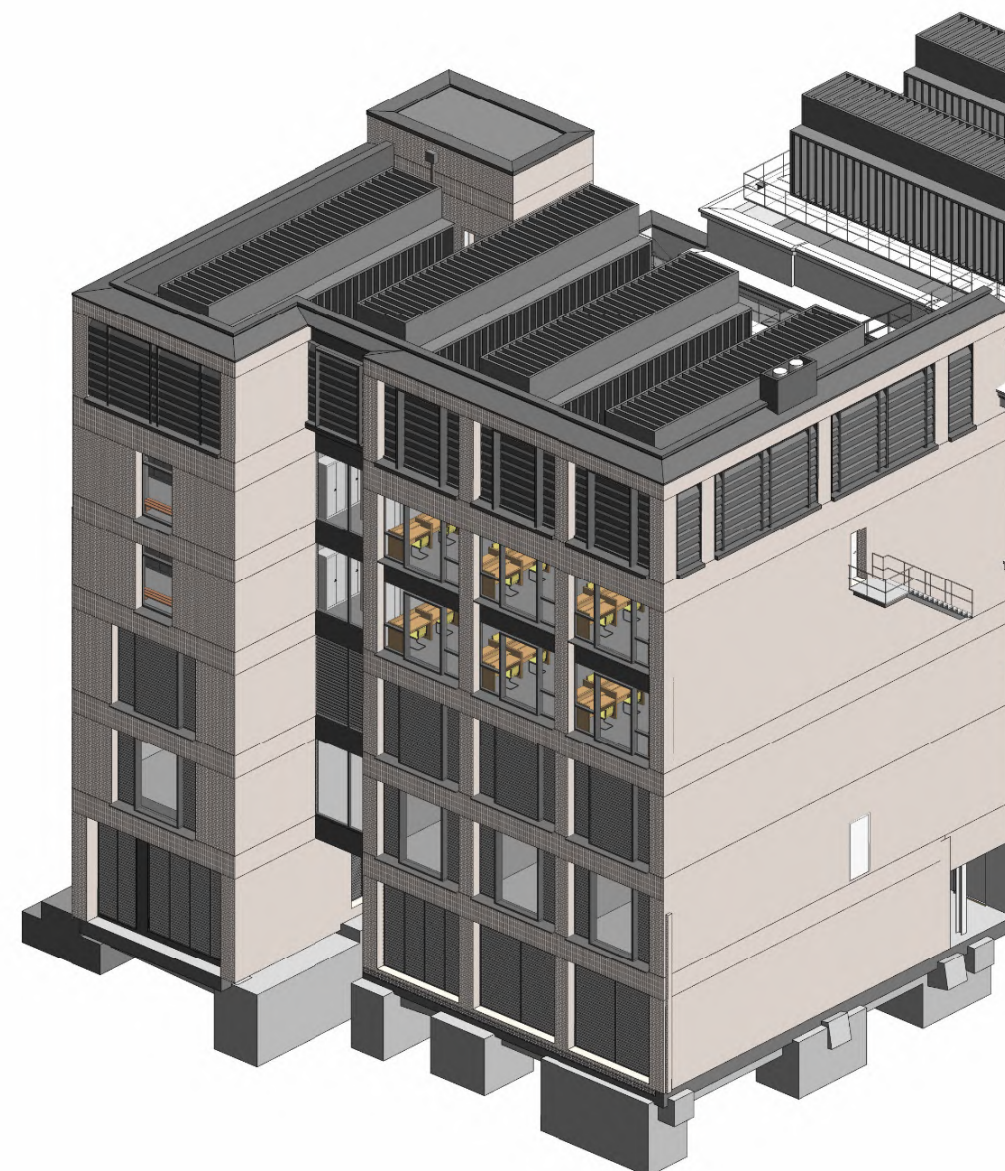
The British Museum

Energy Centre Programme – South West Energy Centre (SWECC)

Fire Statement

Reference: 2920400-ARUP-RP-YF-007

01 | 19 October 2023



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 2920400

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Executive Summary

Arup has prepared this Fire Statement to describe the fire strategy that has been developed for the Energy Centre Programme (ECP) at the British Museum’s (referred to as BM/the Museum within this report) Bloomsbury Estate. The ECP consists of demolition of existing Energy Centre to internal West Road. Removal of temporary buildings to the south of the existing energy centre on the internal West Road and to the north and east of the White Wing facing Montague Street. Erection of new energy centre incorporating maintenance support accommodation to internal West Road, new substation off Montague Street, all together with associated internal and external works, service runs, erection of plant, landscaping, and temporary works associated with construction.

The fire strategy implements the guidance of BS 9999:2017 ‘*Fire safety design, management and use of buildings – Code of practice*,’ to demonstrate, commensurate with design development, compliance with the functional requirements of Part B of the Building Regulations 2010 (as amended).

This Fire Statement has been developed to support the planning application for the ECP and particularly the South West Energy Centre (SWEC) building. The SWEC building is classified according to the London Plan as a major development due to the total floor space being greater than 1,000 sqm. The fire safety information herein has been collated to satisfy criteria outlined in policy D12 of the London Plan 2021.

The development also includes a new Incoming Substation (ISS). This is a single storey development with an approximate total internal floor area of 44.5sqm. Being outside the scope of the definition of a major development, other than reference to the location of the ISS no other information is included in this fire statement.

None of the proposed works include any residential areas.

The BM and their appointed teams will need to evidence that any proposed demolition works, construction works, and any new distribution works comply with relevant fire safety legislation e.g., Construction Design and Management Regulations 2015, Building Regulations 2010 (as amended), Fire Safety Order 2005 (as amended). Separate design information outside the scope of the Fire Statement will need to be developed at the appropriate stage of the project.

The building will be provided with the following fire safety measures:

- Simultaneous evacuation in the event of a fire within the SWEC building. This needs to be co-ordinated with the British Museum master fire strategy for progressive horizontal evacuation if an adjacent fire sector (separate compartment) has a fire incident.
- Structural fire resistance shall achieve a minimum of 60 minutes loadbearing fire resistance (R) in accordance with Table 23 of BS 9999. However, the BM may incorporate higher minimum level of protection to satisfy their property / asset protection objectives.
- A category L1/P1 fire detection and alarm system in accordance with BS 5389-1:2017 will be provided to satisfy the Museum’s master fire strategy. This exceeds the minimum category M requirements under BS 9999: 2019.
- An evacuation lift to aid evacuation of persons with limited mobility is included within the North staircase only. The south staircase does not have a lift shaft. Refuge points with a two-way Emergency Voice Communication (EVC) system are to be provided in both the North and South protected staircase above ground level.
- The different risk / hazard rooms in the building shall achieve the minimum periods of fire resistance as per as per Table 29 of BS 9999:2017 for the relevant ancillary use. However, the British Museum may incorporate higher minimum level of protection to satisfy their property / asset protection objectives.
- Fire resisting external wall / doors or active fire curtains are currently allowed for in the design to assist with means of escape from the North staircase past the plant rooms, opening onto the external escape route, and to assist with property protection requirements of the lightwell between the British Museum and SWEC offices.
- As the SWEC building is less than 18m but more than 11m in height, an escape stair, and an unvented lobby with a fire main is required in accordance with Table 17 of BS 9999. The dry riser outlet shall be positioned in the protected staircase such that all areas of the floor plate (including roof level) are within 45m, measured on a route suitable for laying hose.

Sprinklers have not been allowed for with the SWEC building as compliance with BS 9999: 2017 would not require sprinkler protection for the current design, e.g., it is not a building with height of less than 30m.

Departures from Guidance

BS 9999:2017

The RIBA Stage 3 design of the SWEC building has not at this stage incorporated any known variations from BS 9999: 2017 provided the requirements within the Stage 3 Fire strategy (ref: 2920400-ARUP-RP-YF-006, dated 28/07/2023) and the markups in the Appendices are incorporated into the building design.

London Plan 2021

An evacuation lift shall be provided in accordance with Annex G of BS 9999:2017 within the North stair core of the SWEC building to be used to evacuate people who require level egress from the building. This is provided to achieve compliance with the guidance of London Plan 2021 Clause 3.12.8 where equitable means of escape should be provided within the building.

The London Plan requires that developments incorporate safe and dignified emergency evacuation for all building users by as independent means as possible. Therefore, inclusive design requires at least one lift per core (or more subject to a capacity assessment) to be a suitably sized fire evacuation lift, which is suitable to be used to evacuate people who require level access from the building.

No further clarity is provided if the requirements relate to lift cores or stair cores.

In developing the design for the SWEC building account has been taken of the floors likely to be occupied by mobility impaired person (i.e., Level 04 and Level 05). The single direction travel distance limit from the furthest point of the office floor layout is not exceeded (See Section 4.7 and Figure 3). This concept needs to be agreed with the Planning Authority and Approval authorities.

Conclusions

It is concluded that the life safety standards required for compliance with Part B of the Building Regulations as well as Policy D12 and D5 of the London Plan 2021 can be satisfied through the fire safety principles outlined within this report, commensurate with design development.

The fire strategy is to be developed from this planning Fire Statement, including (if adopted) any proposed alternative fire engineering solutions, will be discussed, and agreed with Building Control and the LFB at the Building Regulations approval stage.

1. Introduction

The British Museum (referred to as BM/the Museum within this report) have commissioned Arup to provide fire engineering design services during the RIBA stage 3 works for the proposed the Energy Centre Programme (ECP) on the Bloomsbury Estate.

The ECP consists of demolition of existing Energy Centre to internal West Road. Removal of temporary buildings to the south of the existing energy centre on the internal West Road and to the north and east of the White Wing facing Montague Street. Erection of new energy centre incorporating maintenance support accommodation to internal West Road, new substation off Montague Street, all together with associated internal and external works, service runs, erection of plant, landscaping, and temporary works associated with construction.

Part of the fire design service is to provide a Fire Statement to support the planning application to be submitted to the London Borough of Camden (LBC). This is in line with the requirements of The London Plan 2021 that covers all major development proposals.

Policy D12 requires that:

A. *In the interests of fire safety and to ensure the safety of all building users, all development proposals must achieve the highest standards of fire safety and ensure that they:*

- 1. identify suitably positioned unobstructed outside space:*
 - a. for fire appliances to be positioned on*
 - b. appropriate for use as an evacuation assembly point*
- 2. are designed to incorporate appropriate features which reduce the risk to life and the risk of serious injury in the event of a fire; including appropriate fire alarm systems and passive and active fire safety measures.*
- 3. are constructed in an appropriate way to minimise the risk of fire spread*
- 4. provide suitable and convenient means of escape, and associated evacuation strategy for all building users*
- 5. develop a robust strategy for evacuation which can be periodically updated and published, and which all building users can have confidence in*
- 6. provide suitable access and equipment for firefighting which is appropriate for the size and use of the development.*

B. *All major development proposals should be submitted with a Fire Statement, which is an independent fire strategy, produced by a third party, suitably qualified assessor. The statement should detail how the development proposal will function in terms of:*

- 1. the building’s construction: methods, products and materials used, including manufacturers’ details*
- 2. the means of escape for all building users: suitably designed stair cores, escape for building users who are disabled or require level access, and associated evacuation strategy approach*
- 3. features which reduce the risk to life: fire alarm systems, passive and active fire safety measures and associated management and maintenance plans*
- 4. access for fire service personnel and equipment: how this will be achieved in an evacuation situation, water supplies, provision and positioning of equipment, firefighting lifts, stairs and lobbies, any fire suppression and smoke ventilation systems proposed, and the ongoing maintenance and monitoring of these*
- 5. how provision will be made within the curtilage of the site to enable fire appliances to gain access to the building*
- 6. ensuring that any potential future modifications to the building will take into account and not compromise the base build fire safety/protection measures.*

This Fire Statement describes how the above requirements are met for the construction of the SWEC building. The development also includes a new Incoming Substation (ISS). This is a single storey development with an approximate total internal floor area of 44.5sqm. Being outside the scope of the definition of a major development, other than reference to the location of the ISS no other information is included in this fire statement.

If shortcomings are identified in the current arrangement compared to the guidance within BS 9999:2017 “*Fire safety in the design, management and use of buildings – Code of practice*,” herein referred to as BS 9999, these shall be documented, and the agreed solutions discussed with the relevant enforcing bodies that they satisfy the requirements of:

- Policy D12,
- The functional requirements of the Building Regulations 2010 (incorporating the Building (Amendment) Regulations 2018),
- The Fire Safety Order 2005.

The design has been assessed and enhancements proposed as considered reasonable and within the scope of the construction works.

2. Project Overview

The South-West Energy Centre Building (referred to in this report as the SWEC building) is a new, five-storey building located on The British Museum’s Bloomsbury Estate within the London Borough of Camden. The function of the building is to provide offices and support utility services for the main Museum buildings.

The five-storeys are used to house plant equipment and offices to support the main museum buildings.

The ground floor contains accommodation:

- Generator rooms,
- Transformer rooms,
- Bulky goods store.

The first floor contains the following accommodation:

- Switch rooms (including a comms room),
- Storerooms,
- A plant room.

The second floor contains water source heat pump (WSHP) plant.

The third and fourth floors contains the following accommodation:

- Offices,
- Meeting rooms,
- Storerooms,
- Changing rooms.

The rooftop (fifth floor) contains air source heat pump (ASHP) plant only.

The SWEC building sits within the approximate footprint of the existing building. The northern, eastern, and southern walls are adjacent to other Museum buildings and the western elevation are near to neighbouring gardens and perimeter properties on Bloomsbury Street.

The SWEC building has a topmost occupied storey height of approximately 16.05m and an overall building height of approximately 24.25m when measured from the ground floor (i.e., Level 01).

The building footprint is approximately 405m² with an aggregate floor area of approximately 1962 m².

2.1 Risk profile

BS 9999: 2017 requires risk profiles to be assigned to the building to define key characteristics about fire hazards and the building occupants.

Risk profiles are given as a combination of occupancy characteristic and likely fire growth rate. The occupancy characteristic is principally determined according to whether the occupants are familiar or unfamiliar with the building and whether they are likely to be awake or asleep. The occupancy characteristic is determined in accordance with Table 2 of BS 9999: 2017.

The fire growth rate is determined based on the volume and types of materials typically associated with common building uses. The fire growth rate is determined in accordance with Table 3 of BS 9999: 2017.

As the occupants of the SWEC will be restricted to BM staff, the occupancy characteristic is A (awake and familiar). Any contractors working in the building will need to be briefed and trained in accordance with BM processes to satisfy the Fire Safety Order 2005 and are therefore considered as occupancy characteristic A.

Considering the rooms throughout the SWEC building, Arup propose that a Category 2 (medium) fire growth rate is allocated to the building.

Therefore, the primary risk profile for the SWEC building is A2. This can be agreed with the appointed Building Control Body and LFB as part of the Building Regulations application.

3. Building’s Construction

Method, products, and materials used, including manufacturers’ details (Policy D12: B1)

Based on information provided by project architects, Wright & Wright, the SWEC building is composed of steel superstructure and internal blockwork construction with concrete floors. The external walls are to be of similar blockwork construction.

4. The Means of Escape for All Building Users

Suitably designed stair cores, escape for building users who are disabled or require level access, and associated evacuation strategy approach (Policy D12: B2).

4.1 Evacuation Strategy

A simultaneous evacuation strategy will be adopted throughout the building. In the event of a fire, all floors will be evacuated immediately. This needs to be co-ordinated with the BM Master fire strategy for progressive horizontal evacuation if an adjacent fire sector (separate compartment) has a fire incident.

4.2 Occupancy Numbers

The current design is based on the occupancy numbers shown in Table 1. The occupancy numbers have been discussed with Wright & Wright Architects during earlier design stages and were originally based on floor space factors for each room. It is worth noting that:

- Whilst all plant rooms are included in the total occupancy, it is unlikely that all plant rooms would be occupied at full capacity at the same time.

- The plant rooms are not permanently occupied spaces and typically used infrequently by maintenance staff and contractors.
- The Design and Access Statement (DAS) for third (Level 04) and fourth floor (Level 05) offices references in Chapter 4 that SWEC delivers 48 desks and an additional four desk in the new Building Management Suite. Office desks are broken down to 24 desks at Level 04 and 24 desks at Level 05. The mess areas at Level 04 and 05 are aligned to equal the provision of desk, i.e., 24 seats at Level 04 and 24 seats at Level 05. For fire safety purposes these additional numbers from the mess room seats are included in the maximum occupancy numbers, whilst in practise this is unlikely to be the case. The reason for this approach is to provide the BM with a degree of flexibility and futureproofing. The means of escape requirements in section 4.3 - 4.6 highlight how the required clear widths for horizontal and vertical escape are influenced by the minimum widths stated in BS 9999:2017 and not the maximum occupancy numbers.

Table 1 Summary of occupants of the SWEC building based on floor space factors of BS 9999.

Level	Use	Area (m2)	Basis (m2/person)	Occupancy (m2 ÷ m2/person)
Ground floor (Level 01)	Transformers	96.05	30	4
	Store	28.74	30	1
	Generator room	95.18	30	4
	Total			9
First floor (Level 02)	Switch room	48.04	30	2
	Storage	71.31	30	3
	Switch rooms	143.23	30	5
	Plant	12.22	30	1
	Total			11
Second floor (Level 03)	Plant	303.5	30	11
	Total			11
Third floor (Level 04)	Office	98.16	Figure from Wright & Wright	24
	Mess	58.63	Figure from Wright & Wright	24 ^{Note 1}
	Storage	27.46	30	1
	Meeting room	21.26	Seating available	10
	Engineering centre	17.98	6	3
	Total			62
Fourth floor (Level 05)	Office	99.65	Figure from Wright & Wright	24
	Mess	58.63	Figure from Wright & Wright	24 ^{Note 1}
	Storage	27.46	30	1
	Meeting room	21.26	Seating available	10
	Engineering centre	17.98	6	3
	Total			62
Fifth floor (Level 06)	Plant	370.74	30	13
	Total			13
Total occupants				168
Note 1 - Excluded from DAS occupancy numbers but included for means of escape calculation for future flexibility				

Cupboards, toilets, changing rooms and circulation spaces are excluded from the occupancy number in Table 1.

4.3 Number of Exits

A minimum of one escape route / exit per room or storey is required for up to 60 persons based on the requirements of Table 10 of BS 9999.

The minimum number of exits must also consider the travel distances stated in Section 4.4 below.

4.4 Travel distances

The maximum recommended travel distances from Table 11 of BS 9999 are summarised in Table 2.

Based on the increased level of detection within the building providing by the L1 / P1 system, clause 18.2 of BS 9999 permits an 15% increase in travel distances. The maximum travel distance including the 15% increase shown is the number shown in brackets for Risk Profile A2.

All travel distances shown in Table 2 are below the maximum travel distance listed in Table 15 of BS 9999 when additional fire protection measures are applied.

Table 2 Travel distances of the SWEC building.

Area	Risk Profile	Two – way travel		One way travel distances	
		Direct (m)	Actual (m)	Direct (m)	Actual (m)
Internal areas of the SWEC building	A2	37 (42)	55 (63)	15 (17)	22 (25)
External area of Level 06 (roof top)	Normal risk	NA	200	NA	60

The travel distances within the SWEC building meets these recommendations.

4.5 Horizontal exit widths

4.5.1 General capacity

The minimum width of doors on escape routes should not be less than:

1. The aggregate width of the storey exits, determined by multiplying the expected total number of occupants on that storey by the minimum door width per person in Table 12 of BS9999:2017. This is 3.6mm/person for risk profile A2 risk, OR
2. Not less than 850 mm where unassisted wheelchair access is necessary, OR
3. Not less than 800 mm regardless of risk profile.

As a workplace, the criteria in item 2 above have been applied. On this basis, Table 3 shows the minimum storey exit width per floor, and the current design occupancy numbers for each level.

Reference should be made to Section 4.5.1 of the RIBA stage fire strategy for further information that equation 1 of BS 9999:2019 (n = 500/m) is satisfied by the current design, and the maximum number of people safely accommodated by a door less than 1050mm.

Table 3 Minimum storey exit width per floor.

Floor	Occupancy (persons)	Minimum storey exit widths (mm)
Level 01 Ground floor	9	850
Level 02 First floor	11	850
Level 03 Second floor	11	850
Level 04 Third floor	62	850

Level 05 Fourth floor	62	850
Level 06 Fifth floor	13	850
Total	168	N/A

4.6 Vertical means of escape

The SWEC building has two staircases to the north and south of the building as shown in Figure 3. The North stair extends from Level 01 to Level 06 and the South stair extends from Level 01 to Level 05. This meets the guidance of Clause 16.3.3 and Clause 17.3.3 of BS 9999 as the SWEC building has:

- a floor level more than 11m (i.e., 16m) above ground level, and
- an occupancy of more than 60 persons but less than 600 persons.

The absolute minimum clear width of the escape stairs to meet clause 17.4.1 and clause 20.2.4 of BS 9999:

- Should be not less than the width(s) of any exits(s) affording access to them. See Section 4.5.1.
- Should not be reduced at any point on the way to a final exit; and
- Should be not less than 1,000 mm for downward travel and 1,200mm for upward travel.
- Should not be less that the minimum width of escape for simultaneous evacuation as per Table 13 of BS 9999:2017. These are calculated in the table below simply for the purpose of evidencing that this is not the constraining factor. The number of people is the total number of occupants on the upper floors, this assumes a stair is discounted due to the absence of lobby protection to the South stair.
- Fire-fighting stairs should be designed in accordance with BS 5395-1, with a width between the walls or balustrades of not less than 1.1m. Refer to clause 20.2.4 of BS 9999:2017 for further information.

Based on Table 13 of BS 9999 and the building having a risk profile of A2, the minimum width factor to use for the north stair and south stair (serves five storeys) is 2.45. As per clause 15.6.6 e of BS 9999:2017 the ground floor has been considered as a story when using Table 13 of BS 9999:2017 and so merging exit calculations are not required. The minimum width per person has been calculated and summarised in Table 4.

Table 4 - Evidencing consideration of minimum widths per person

Staircase	Risk profile	No of floors	Width per person (mm)	Number of people	Minimum clear width based only on Table 13 (width/person x number of people)
North	A2	5	2.45	155	380 mm
South	A2	5	2.45	155	380 mm

4.6.1 Final exit widths

The building’s final exits occur whereby termination of an escape route from a building gives direct access to a street, passageway, walkway, or open space, and is sited to enable the rapid dispersal of persons from the vicinity of a building so that they are no longer in danger from fire and/or smoke.

The exit routes from the North and South stair to the final exit to the West Road should be at least as wide as the North and South stairs leading to these routes in accordance with Clause 17.2.7 of BS 9999. Wright & Wright are to evidence the final exit routes that achieve the minimum clear widths required during Stage 4.

Occupants egressing from the North stair are required to travel along the external corridor to reach the West Road at which point escape in either direction is available (See Figure 1).

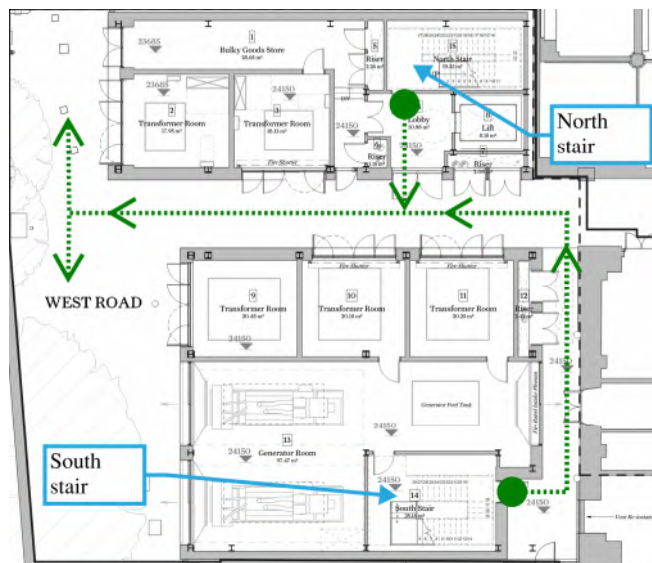


Figure 1 - North stair external escape route

Occupants egressing from the South stair are required to travel along the external corridor and past the North staircase final exit to also reach the West Road at which point escape in either direction is available (see Figure 1).

To avoid a single point of failure the current options currently being considered are.

- A transfer staircase into the New Wing at Level 02 (first floor). The design team are currently seeking to consult with LWF who can provide feedback in terms of the feasibility of this option and / or any constraints that would need to be considered by the design team. See Figure 2.

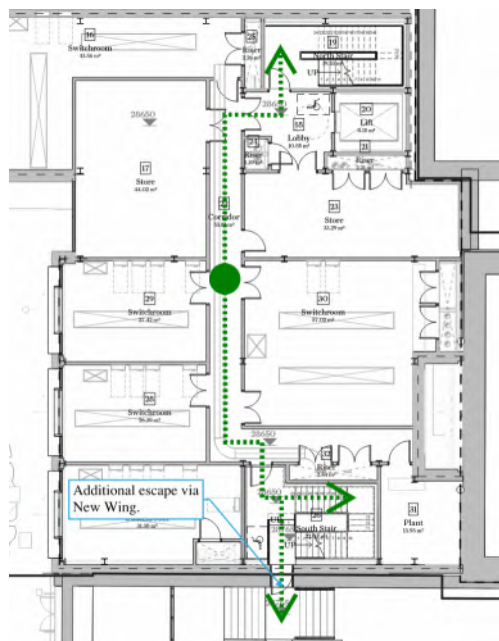


Figure 2 - Cross over stairs

- Proceeding through the plant room within the adjacent New Wing building and using the final exits of the New Wing building. This is dependent on a specific assessment to consider if this route is suitable or there are too many challenges that prohibit the use of this route.

On conclusion of agreement with the BM, following receipt of LWF input, this strategy shall be updated during RIBA Stage 4 to capture the agreed concepts.

4.7 Means of escape for all building users

An evacuation lift shall be provided in accordance with Annex G of BS 9999:2017 within the North stair core of the SWEC building to be used to evacuate people who require level egress from the building. This is provided to achieve compliance with the guidance of London Plan 2021 Clause 3.12.8 where equitable means of escape should be provided within the building.

The London Plan requires that developments incorporate safe and dignified emergency evacuation for all building users by as independent means as possible. Therefore, inclusive design requires at least one lift per core (or more subject to a capacity assessment) to be a suitably sized fire evacuation lift suitable to be used to evacuate people who require level access from the building.

No further clarity is provided if the requirements relate to lift cores or stair cores.

In developing the design for the SWEC building account has been taken of the floors likely to be occupied by mobility impaired person (i.e., Level 04 and Level 05). The single direction travel distance limit from the furthest point of the office floor layout is not exceeded as shown in Figure 3. This concept needs to be agreed with the Planning Authority and Approval authorities.

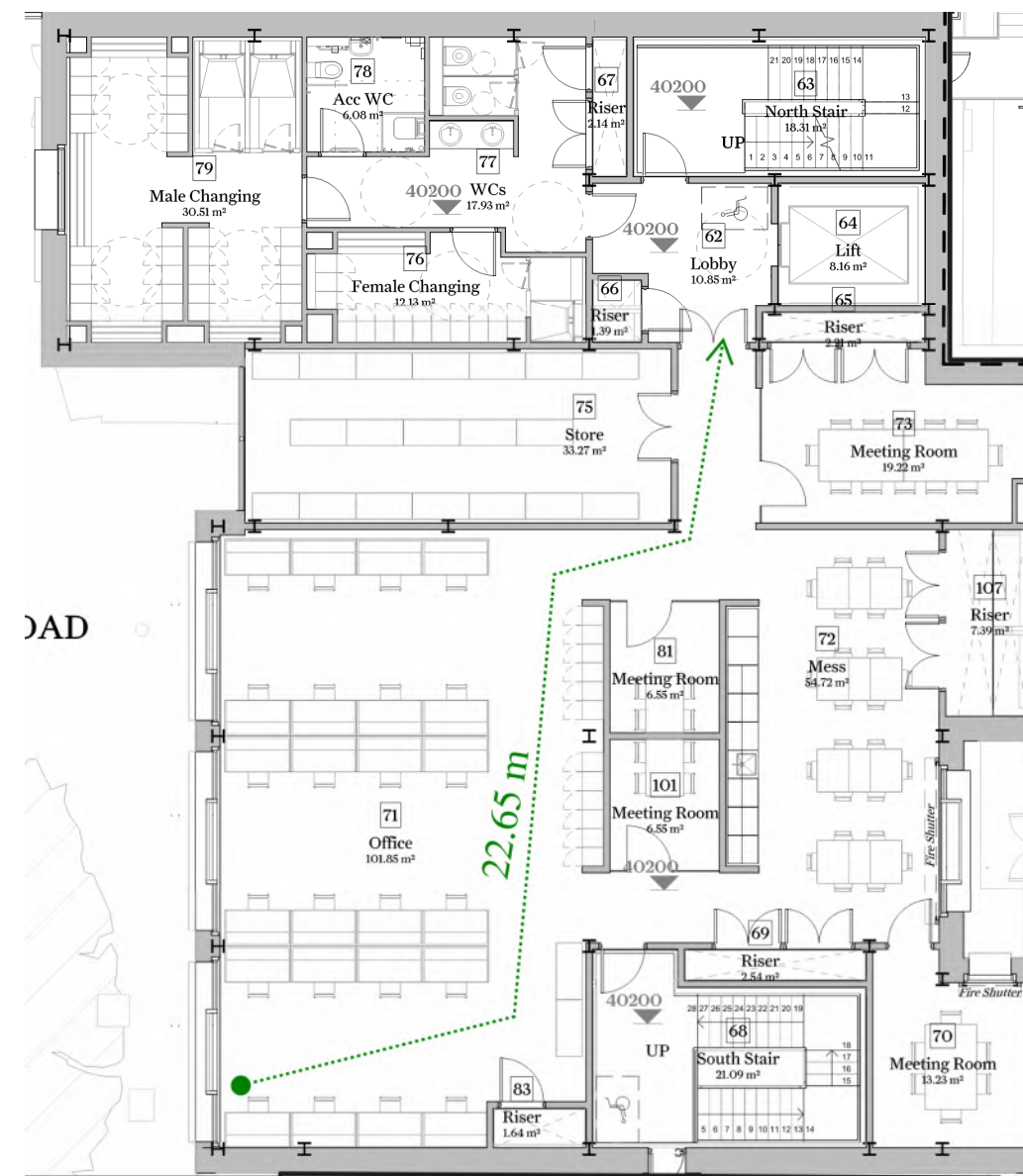


Figure 3 Evidence of compliance of single direction travel distance for mobility impaired persons on Level 04 and Level 05.

The evacuation lift should be designed and installed in accordance with the relevant provisions in BS EN 81-20 and BS EN 81-70.

The upper floors of the North and South stair shall include refuge areas in accordance with Annex G of BS 9999:2017 within the protected staircases.

The refuge/s shall be provided with an emergency voice communication system which complies with BS 5839-9: 2011. The emergency voice communication system shall consist of type B outstations which communicate with a master station. The master station shall be connected to the Main Control Room of the Museum. The location of the master station needs to be co-ordinated during RIBA Stage 4.

A management system shall be in place to assist with evacuation of occupants with reduced mobility out of the building. This might involve the use of the firefighting lift for evacuation purposes and/or the use of emergency evacuation chairs. Staff shall be designated and trained in the evacuation of persons with reduced mobility.

The end user of the building will need to develop and implement a management strategy to enable mobility impaired occupants to egress using the above building provisions. It is expected that the management strategy will include at least the following:

- On activation of the fire alarm, all occupants of a building shall begin to evacuate via the designated escape routes and exits provided. Persons with an impairment that would prevent or affect their ability to evacuate on their own, will be expected to make their way to the nearest ‘Refuge Area’ and activate the Emergency Voice Communication System to call for assistance.
- The building management team will identify the floors where the call for assistance have been made.
- The building management team will dispatch a lift operator to the required lift.
- The evacuation lift will be put into ‘evacuation mode’ using the lift control key on the control panel in the lift car.
- The building management team should acknowledge the activation of the EVCS (using the telephone handset provided) and advise that assisted evacuation has commenced.
- The lift operator will be in constant contact with the building management team at the fire panel, who will advise which levels require assistance and in which order. Where there are multiple requests for assistance, the building management team at the fire panel will determine the priority and sequence of collection.
- Where more than one operation of the evacuation lift is necessary, those persons rescued shall be met by a member of the building management team at exit level and escorted to a place of safety outside the building.
- The operation should be repeated until all persons have been evacuated.

The building management team and the lift operators should be trained to perform the procedure stated above (or other procedures put in place by the BM).

4.7.1.1 Further measures

The following provisions will be included within the SWEC building to enable ease of evacuation for occupants with a wide range of mobility or sensory impairments:

- The building is not open to members of the public. Information about the expected occupants should be available prior to their attendance at the building.
- Where a need is identified, building management will therefore prepare personal emergency evacuation plans (PEEPs) for occupants who may need additional assistance during an evacuation, taking into account their specific needs.

4.8 Assembly points

When occupants have evacuated the building, they will make their way to the assembly points located outside of the building. These are expected to be located on pavement areas along the West Road within the Bloomsbury Estate, away from the building elevation. The location and size required is to be further reviewed and assessed by the building operators in the next design stages. The assembly points should be line with the British Museum Master Fire Strategy (document reference: 14075-FS-01-G).

5. Features which Reduce the Risk to Life

Fire alarm systems, passive and active fire safety measures and associated management and maintenance plans (Policy D12: A3)

5.1 Fire detection and alarm

The building will be provided throughout with an L1 / P1 fire detection and alarm system in accordance with BS 5839-1:2017. Manual call points will also be provided throughout in accordance with BS 5839-1:2017. The system will function as a double knock system in line the British Museum Master Fire Strategy (document reference: 14075-FS-01-G).

5.2 Emergency lighting

Emergency lighting will be provided in accordance BS 9999:2017 Clause 15.4 and BS 5266-1.

5.3 Escape signage

Escape signage will be provided in accordance with BS 5499-4:2013.

5.4 Emergency power

Emergency power is required for all life safety systems in accordance with Section 37.2.3 of BS 9999. The installation of these systems shall be in accordance clause 37.2.3 of BS 9999: 2017, and subsequent cited standards e.g., BS 8519 for systems such as the evacuation lift. This requirement also applies to any life safety systems within the British Museum’s Bloomsbury Estate to which the equipment in the SWEC building provides emergency power supplies to.

Fire safety systems with lower electrical demands for backup supplies e.g., fire detection and alarm systems, emergency voice communication systems or emergency lighting systems shall comply with their specific British Standard in respect of back up battery supplies.

5.5 Internal fire spread

Wall and ceiling linings are to achieve the following surface spread of flame European classifications to BS EN 13501-1:

- Within circulation spaces: B-s3, d2
- Rooms larger than 30 m²: C-s3, d2
- Rooms smaller than 30 m²: D-s3, d2

This applies to all internal partitions and linings installed or modified as part of the refurbishment works.

5.6 Structural fire resistance

As the topmost occupied storey of the SWEC building is less than 18m (approximately 16.0m) above firefighting access level. Elements of structure for the building should be provided with at a minimum 60-minute fire resistance for loadbearing capacity (R), when tested to the relevant parts of BS EN 1365 or BS 476, in accordance with Table 24 of BS 9999:2017. The current structural design of the SWEC building is composed of a steel superstructure. This minimum property protection requirement is yet to be defined by the Museum.

5.7 Fire compartmentation

5.7.1 Provision of compartmentation

In accordance with Table 28 of BS9999:2017, there is no limit on the size of a single compartment in an unsprinklered building with a height of topmost occupied floor of 16.0m and an occupant risk profile of A2.

The footprint of the SWEC building is approximately 405m² when measured on the fifth floor.

5.7.2 Ancillary accommodation

In accordance with BS 9999: 2017, clause 31.4.7 areas of ancillary accommodation shall be separated from other parts of the building by the minimum periods of fire resisting construction as per Table 29 of BS 9999: 2017. A summary of this is provided below:

- Stores (greater than 1m² but less than 450m²), Changing rooms – minimum 30 minutes fire resisting construction where flammable or highly flammable liquids are not used or stored (confirmed by architect Wright & Wright).
- Transformers, Switch rooms – minimum 60 minutes fire resisting construction. See note 1 below.
- Generator room – minimum 120 minutes fire resisting construction. This minimum period of fire resistance required may be reduced for compliance with BS 9999:2017 if the room is not associated with life safety systems.

Note 1 - Any electrical substation or enclosure containing any distribution board, generator, powered smoke control plant, pressurization plant, communication equipment, and any other equipment associated with life safety and fire protection systems should satisfy the requirements in Table 29 of BS 9999 to have robust solid non-combustible construction having a minimum standard of fire resistance of not less than 120 min. This shall be incorporated into the scheme if required as part of further design development.

The internal fire compartmentation is shown in the fire safety markups form Appendix A of this report for each of the different floors. This shall be kept under review as the design develops, particularly with regards to Note 1.

5.7.3 Openings

5.7.3.1 Fire curtains

Within the RIBA Stage 3 design of the SWEC building, fire curtains are provided to the openings of transformer rooms on Level 01 which open onto the external corridor used for escape. This is to assist the means of escape design as well as mitigating the likelihood of fire spread between plantrooms.

Fire curtains will also be provided to assist with compartmentation between the SWEC and main museum, for window openings in the office that open onto the lightwell.

The minimum EI or EW ratings are to be agreed as part of the property protection fire risk assessment for all fire curtains used in the development.

The fire shutters provided should be tested and installed to BS 8524-1 and BS 8524-2 respectively.

5.8 External fire spread

The SWEC building is located within the British Museum Bloomsbury Estate. The SWEC building is bounded by existing Museum buildings on the north, east, and south walls. The west elevation of the SWEC building faces the internal access West Road, across which is the site boundary line and beyond that, private properties (i.e., residential, hotels).

The risk of external fire spread from the SWEC building to the site boundary has been assessed using the Enclosing Rectangles methodology detailed in the BRE report ‘External Fire Spread: Building Separation and Boundary Distances’ (BR 187, BRE 2014). A detail markup of the measurements and commentary for the BR 187 assessment is included in Appendix B.

Only the West elevation of the faces the Bloomsbury Estate relevant boundary line and therefore the BR 187 assessment is undertaken for the West elevation.

Wright & Wright wall detail drawings show that all elevations of the building will be composed of blockwork masonry.

The current external fire spread assessment for the West elevation is based on the site boundary shown on the markup in Appendix B. This is based on previous information by Wright & Wright to consider this wall line as the site boundary.

This assessment concluded that some (i.e., 2A, 3A, and 4A) radiating panels assessed will require a level of fire protected to mitigate the risk of external fire spread. A summary of the results is provided in Table 5.

Table 5 BRE 187 External fire spread assessment.

Radiation panel	Emitter Radiation (kW/m2)	Width (m)	Height (m)	Separation distance (m)	Unprotected Percentage (%)
1A	168	2.2	4.4	4.4	100.0
1B	168	4.2	4.4	4.4	100.0
1C	168	4.4	4.4	7.3	100.0
1D	168	8.5	4.4	6.5	100.0
2A	168	6.7	3.7	4.4	82.7
2B	168	3.3	3.7	8.6	100.0
2C	168	4.4	3.7	7.3	100.0
2D	168	4.2	3.7	7.0	100.0
2E	168	4.4	3.7	6.5	100.0
3A	168	24.1	3.7	4.4	40.5
4A	84	23.9	6.9	4.4	45.9

The current design is progressing on the basis of fire doors in external walls and fire curtains that can activate upon operation of detection in the room of fire origin to co-ordinate the electrical equipment ventilation requirements and external fire spread requirements.

Fire doors shall be tested or classified in accordance with BS EN 13501-2 (or to the relevant parts of BS 476). Fire curtains should be tested and installed in accordance with BS 8524-1 and BS 8524-2 respectively, and be gravity fail safe. The specification of any doors or fire curtains to meet minimum life safety standards would be 60E 15I. As part of Stage 4 works the relevant performance criteria for the doors and fire curtains shall be agreed with the appointed Building Control body if the fire curtains are only tested for EW (Integrity, radiation) ratings.

New roofing materials proposed for the roof areas must meet the current fire safety guidance, Table 36 of BS 9999:2017 and achieve a classification of Broof (T4) when tested and classified to BS EN 13501-5.

6. Access for fire service personnel and equipment

How this will be achieved in an evacuation situation, water supplies, provision and positioning of equipment, firefighting lifts, stairs and lobbies, any fire suppression and smoke ventilation systems proposed, and the ongoing maintenance and monitoring of these (Policy D12: B4) and how provision will be made within the curtilage of the site to enable fire appliances to gain access to the building (Policy D12: B5)

6.1 Firefighting provisions

As the SWEC building is less than 18m but more than 11m in height, an escape stair, and an unvented lobby with a fire main is required in accordance with Table 17 of BS 9999. This is achieved through the North stair which forms firefighting star with a fire main. The fire main in the North stair core provides hose reel access to within 45m across the floor plate, over a distance suitable for laying hose. An automatic opening vent (AOV) is provided at the top of the North stair to assist in firefighting activities.

6.1.1 Fire hydrants

In accordance with BS 9999, hydrants should be provided to within 90m of dry riser inlets. This is achieved as the Master fire strategy (Appendix L) shows two hydrants (i.e., numbered 74 and 73) are located within range of the

SWEC building. The adequacy of the exiting flow rates for the site hydrants should be confirmed in the next design stages together with collecting information on its current compliance status e.g., what certification is available for the system.

6.2 Site access for the fire and rescue service

The SWEC building is located on the Bloomsbury Estate of the BM which consists of multiple buildings with an internal road system. Compliance with BS 9999:2017 would require fire tender access within 18m of the fire main (dry riser) inlet.

The BM have appointed Momentum Transport Consultancy to undertake analysis of the existing site's capability for firefighting access. Refer to their report Swept Path Analysis – Technical Note dated 7/12/22. The report identifies two potential routes.

However, as acknowledged in Momentum Transport Consultancy report, neither option is compliant with the requirements in current fire safety guidance for fire service access based on:

- Option A – travel through the site – pinch points along the route based on the vehicle sizes used in their modelling.
- Option B – the reversing distance of more than 20m being exceeded.

The need for further consultation with LFB is also acknowledged in the Technical Note produced by Momentum Transport Consultancy.

The British Museum met with LFB on the 26/09/2023. A copy of the meeting minutes is included in Appendix C of this fire statement to evidence consideration of firefighting access to the site as well as early discussion in relation to SWEC development and the need for ongoing updates with LFB.

Records of additional meetings or correspondence between LFB and the BM in relation to fire-fighting access and facilities, in particular any specific agreements for the site can be referenced into later version of the building fire strategy, master fire strategy and any construction phase fire safety plans.

7. Fire safety information & the golden thread

Ensuring that any potential future modifications to the building will take into account and not compromise the base build fire safety/protection measures (Policy D12: B6)

As the design develops, aspects of the fire strategy that rely on ongoing fire safety management and changes to the wider design approach will be developed and clearly identified in the fire strategy report.

The fire strategy documentation is to be updated throughout the stages of design for the building, ensuring that it remains reflective of how the building complies with all relevant fire safety legislation and regulation.

Regulation 38 of the Building Regulations 2010 (as amended) requires fire safety information to be passed from the person carrying out the work to the responsible person(s). This is to ensure that the responsible person(s) can adequately manage and maintain the building in terms of fire safety.

The fire strategy forms an integral part of the fire safety information transfer from the design, construction stages to the occupation stages for this building. This fire strategy and any subsequent revisions will be passed to the responsible person(s).

The persons carrying out the work should provide fire safety information to the responsible person not later than the date of completion of the work, or the date of occupation of the building or extension, whichever is the earlier (Regulation 38).

Fire safety information includes:

- The fire safety design information, which includes the fire strategy report plus as-built drawings and schedules. This details the basis of design, all assumptions made at the time of design, and provides full details of the fire

safety requirements including the evacuation approach for all occupants including disabled people, escape routes, compartmentation measures, areas of high risk with particular hazard assumptions, structural fire protection, external fire spread, fire service facilities, all fire safety systems in the building such as sprinklers, smoke extract and fire alarm, and specific management requirements. All modifications to the fire strategy during the construction stages (post design) should be clearly documented.

- Installation documentation, including records and certificates to demonstrate that the fire safety measures, and all fire safety systems have been installed and commissioned correctly. This can include certificates for installation, testing, component commissioning, system commissioning and client acceptance. It should also include as installed drawings including the types, positions and routing of equipment, and a record of any variations from the original design specification.

Operation and maintenance documentation, including all relevant information on the operation, maintenance and testing requirements of the fire protection features and systems. The frequency of each type of test/inspection for different systems should be defined, as should any specific requirements for bespoke systems, or unusual access requirements. A logbook or CAFM (Computer Aided Facilities Management) system is normally used to record systems testing and maintenance.

8. Summary

Table 6 below summarises the requirements from Policy D12 of the London Plan 2021 and an overview of the approaches to be adopted by the BM.

Table 6 - Summary of the approach relating to Policy D12 of the London Plan

Item	Requirement	Approach
A	In the interests of fire safety and to ensure the safety of all building users, all development proposals must achieve the highest standards of fire safety and ensure that they:	-----
A.1	Identify suitably positioned unobstructed outside space:	-----
A.1.a	for fire appliances to be positioned on	Refer to Appendix C for recent correspondence with LFB which included the proposed SWEC scheme and take into account existing site constraints.
A.1.b	appropriate for use as an evacuation assembly point	This is addressed by the British Museums fire safety management system which includes an emergency evacuation procedure for both Front of House and Back of House. All areas of the ECP will be back of house and the location of assembly points shall be included in the back of house emergency procedure.
A.2	are designed to incorporate appropriate features which reduce the risk to life and the risk of serious injury in the event of a fire; including appropriate fire alarm systems and passive and active fire safety measures.	BS 9999:2017 has been adopted as the primary design guide. Owing to site constraints any variations form BS 9999: 2017 shall be agreed with the appointed Building Control Body (BCB). The BCB will need to consult with LFB as part of their statutory duties.
A.3	are constructed in an appropriate way to minimise the risk of fire spread	The new developments as part of the ECP will need to demonstrate that they satisfy the relevant requirements of the BM Master fire strategy, and any variations agreed with the BM.
A.4	provide suitable and convenient means of escape, and associated evacuation strategy for all building users	
A.5	develop a robust strategy for evacuation which can be periodically updated and published, and which all building users can have confidence in	The new SWEC building fire strategy developed to assist the Building Regulations application will outline the overarching strategy. The BM fire safety management system will need to develop a suitable and sufficient emergency evacuation procedure and determine appropriate periods and situations when a review is required to comply with their duties under the Fire Safety Order 2005 (as amended).

Item	Requirement	Approach
A.6	provide suitable access and equipment for firefighting which is appropriate for the size and use of the development.	Refer to the approach described in rows A.2 – A.4
B	All major development proposals should be submitted with a Fire Statement, which is an independent fire strategy, produced by a third party, suitably qualified assessor. The statement should detail how the development proposal will function in terms of:	-----
B.1	the building’s construction: methods, products and materials used, including manufacturers’ details	Refer to Section 3 of this fire statement and the DAC submitted with the planning application. Records of specification and evidence to demonstrate what materials have been used including manufacturers details to be included with information provided to the BM as part of Regulation 38 of the Building Regulations.
B.2	the means of escape for all building users: suitably designed stair cores, escape for building users who are disabled or require level access, and associated evacuation strategy approach	<p>BS 9999:2017 has been adopted as the primary design guide. Owing to site constraints any variations form BS 9999: 2017 shall be agreed with the appointed Building Control Body (BCB). The BCB will need to consult with LFB as part of their statutory duties.</p> <p>The new developments as part of the ECP will need to demonstrate that they satisfy the relevant requirements of the BM Master fire strategy, and any variations agreed with the BM.</p> <p>An evacuation lift is proposed for the North Stairs. The BM will need to develop Personal Emergency Evacuation Procedures (PEEP’s) to satisfy their duties under the Fire Safety Order 2005 (as amended).</p>
B.3	features which reduce the risk to life: fire alarm systems, passive and active fire safety measures and associated management and maintenance plans	Refer to the approach described in row B.2.
B.4	access for fire service personnel and equipment: how this will be achieved in an evacuation situation, water supplies, provision and positioning of equipment, firefighting lifts, stairs and lobbies, any fire suppression and smoke ventilation systems proposed, and the ongoing maintenance and monitoring of these	<p>Refer to</p> <ul style="list-style-type: none">the approach described in row B.2,Appendix C of this fire strategy.Details of site hydrants are provided in Appendix L of the BM master fire strategy and summarised in Section 6.1.1 of this fire statement for hydrants relevant to SWEC.
B.5	how provision will be made within the curtilage of the site to enable fire appliances to gain access to the building	Refer to Appendix C of this fire strategy.
B.6	ensuring that any potential future modifications to the building will take into account and not compromise the base build fire safety/protection measures	Compliance with Regulations 38 of the Building Regulations 2010 (as amended) should assist the BM in complying with their duties under relevant fire safety legislation e.g., Fire Safety Order 2005 (as amended). See Section 7 of this fire statement.

9. Verification

The report has been checked and approved by:

Rav Dhanjal

Director | Fire Engineering

BSc (Hons) PgD MSc CEng MIFireE



Appendix A

Arup fire safety markups architectural drawings produced by Wright & Wright

- Key:**
- = 240 minutes fire resistant construction
 - = 120 minutes fire resistant construction
 - = 60 minutes fire resistant construction
 - = 30 minutes fire resistant construction
 - FD 120s = 120 minute fire door (FD 120 S)
 - FD 120 = 120 minute fire door (FD 120)
 - FD 60s = 60 minute fire door (FD 60 S)
 - FD 60 = 60 minute fire door (FD 60)
 - FD 30s = 30 minute fire door (FD 30 S)
 - FD 30 = 30 minute fire door (FD 30)
 - -> = Compliant travel distance
 - ➔ = Final exit
 - ➡ = Storey exit
 - = Evacuation lift
 - = Refuge areas
 - ✕ = Dry fire main outlet (indicative)
 - ↓ = Dry fire main inlet (indicative)
 - This area must be kept fire sterile and shall be signed accordingly so that no items are stored in these areas.

Fire resistance in terms of integrity, insulation and where applicable load-bearing capacity. The drawings shows fire resisting walls only. Any loadbearing column or beams shall be provided with fire resistance but these are not shown on this markup.

If one element of structure supports or carries or gives stability to another, the fire resistance of the supporting element should be no less than the minimum period of fire resistance for the other element (whether that other element is loadbearing or not).

There are limited exceptions to this rule within BS 9999: 2017.

STREET

34 BLOOMSBURY STREET

32 BLOOMSBURY STREET

DUVEEN GALLERY

The SWEC building is currently intended to sit within Fire Sector C. Wright & Wright Architects have noted there is possibility to allow for the SWEC building to sit within its own fire sector boundary. At issue of this RIBA Stage 3 report the decision to have as a separate fire sector is still being discussed with the British Museum and LWF Fire Engineering Consultants.

ADJUSTED FIRE SECTOR BOUNDARY

The layout in this area is currently in abeyance. Fire safety requirements are to be considered with any changes to the layout as part of design development during RIBA Stage 4. This includes the need for the dry riser inlet to be within the fire-fighting stairs and not accessed from other areas of the building. This has been discussed with Steensen Varming (M&E) during co-ordination in RIBA Stage 3, who will raise the required changes with Wright & Wright Architects as part of design development.

Fire curtains have been incorporated into the design primarily for property protection purposes such that these can be incorporated into the cost plan and can be factored into the property protection assessment. The property protection assessment is due to be undertaken circa September 2023 such that any physical control measures determined necessary can be incorporated into the stage 4 design.

It has been agreed with Steensen Varming (M&E) during co-ordination that fire and smoke dampers shall be provided to the ductwork penetrating this areas. The ductwork shall also be insulated such that compartmentation is retained for REI. Note whilst BS 9999 permits the openings to be a minimum of 60 minute fire resisting the minimum periods applied to the project shall be agreed as part of the property protection risk assessment.

As part of the stage 3 design the use of this existing staircase as an alternative exit is in discussion with the British Museum and LWF Fire Engineering Consultant. This will need to be agreed early on in RIBA stage 4 in conjunction with the need to determine which fire boundary the SWEC building sits within.

To satisfy clause 17.9.4 of BS 9999 a protected lobby should also be provided between the south escape stairway and the generator and fuel storage room. This is because the later rooms would be classified as a place of high fire risk

WESTERN GALLERIES

To satisfy clause 17.9.4 of BS 9999 a protected lobby should also be provided between the north escape stairway and a the generator and fuel storage room. As the layout is subject to change this will need to be reviewed as part of the ongoing changes for the room layouts in this area.

EXTERNAL CORRIDOR

The fire strategy does not cover any requirements relating to the Dangerous Substance and Explosive Atmosphere Regulations 2002 (as amended). The British Museum require a separate DSEAR assessment to be undertaken by a competent person, and any relevant requirements incorporated into the building design.

LYCIAN BUILDING

The need for any fire separation (or not) between the air intake for existing parts of the museum will need to be agreed between the British Museum, LWF and the design team during RIBA stage 4. The requirement for fire separation also need to be considered for the entrance to the plant area. This is dependent if the means of escape from the south stairs into the Lycian building is adopted.

RIBA Stage 4 requires co-ordination to determine the fire stopping design for this shaft. Note upper levels are currently illustrated as being 120 min fire resisting and 60 minute fire doors until such time as the detailing of this area is established as the riser may be open to the risk room.

Note on Arup Fire comments
The purpose of this set of markups is to provide fire safety comments for the RIBA Stage 3 design with regards to life safety only. Comments within this markup are based on BS 9999: 2017 guidance to meet the functional requirements of Part B of the Building Regulations 2010 (as amended).

Property protection (building and contents) considerations are subject to a separate risk assessment. The BM have appointed Arup to assist with this and the findings / requirements will need to be coordinated within the SWEC building design to satisfy the Master Fire Strategy.

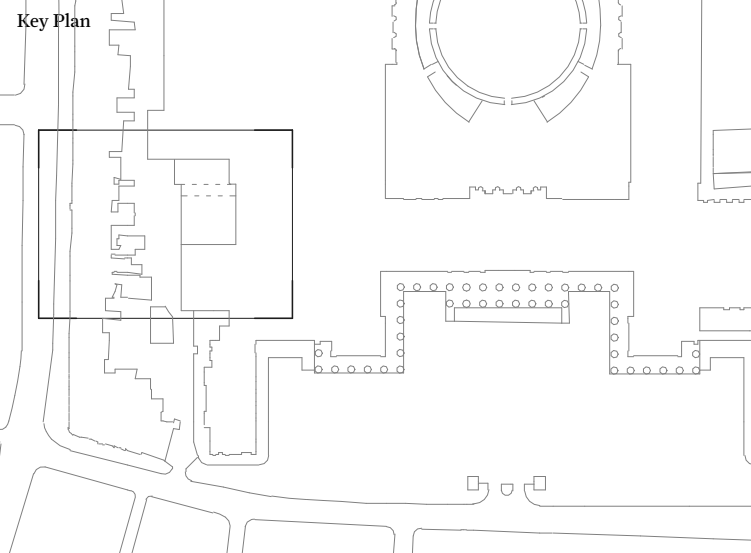
SWEC Stage 3 - Means of escape & Compartmentation Markup

British Museum
(292040-00)

27/7/23 | Prepared by: JN | Checked by: GR | Approved by: DS
Page 1 of 8

SK-012

ARUP



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Key:

- Site Boundary
- Adjusted Fire Sector Boundary

Note:

P1	Draft Stage 03 Issue for Costing	14.07.2023
Rev	Note	Date Issued By Issued To

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Client

British Museum

Project Name

SWEC Programme:
South-West Energy
Centre

Stage

RIBA Stage 03

Drawing Title

Proposed SWEC Level
01 (Ground Floor) Plan
- Phase 02

Drawing Number

10771-WW-SW-01-DR - A-2141

Scale

Sheet Size

Issue Date

1:100

A1

14.07.2023

Revision

Status

P1

S2 - Suitable for Information

Key:

= 240 minutes fire resistant construction

= 120 minutes fire resistant construction

= 60 minutes fire resistant construction

= 30 minutes fire resistant construction

FD 120s

= 120 minute fire door (FD 120 S)

FD 120

= 120 minute fire door (FD 120)

FD 60s

= 60 minute fire door (FD 60 S)

FD 60

= 60 minute fire door (FD 60)

FD 30s

= 30 minute fire door (FD 30 S)

FD 30

= 30 minute fire door (FD 30)

● ->

= Compliant travel distance

>

= Final exit

>

= Storey exit

= Evacuation lift

= Refuge areas

⊗

= Dry fire main outlet (indicative)

⬇

= Dry fire main inlet (indicative)

Fire resistance in terms of integrity, insulation and where applicable load-bearing capacity. The drawings shows fire resisting walls only. Any loadbearing column or beams shall be provided with fire resistance but these are not shown on this markup.

If one element of structure supports or carries or gives stability to another, the fire resistance of the supporting element should be no less than the minimum period of fire resistance for the other element (whether that other element is loadbearing or not).

There are limited exceptions to this rule within BS 9999: 2017.

As per the notes on page 1 the inclusion of the dry riser as part of the staircase / lobby design have been discussed with Steensen Varming (M&E) during co-ordination so that the design is simplified and will form part of a boxed in riser at each level not a fully accessible cupboard. The pipework shall either satisfy the requirements of Table 31 of BS 9999:2017 or have the necessary propitiatory fire stopping

As the corridor is longer than 12m and connects two exits it should be subdivided by self closing fire doors.

Riser services TBC to establish the need for fire separation between the risers. Comment applies to all levels.

It has been agreed with Steensen Varming (M&E) during co-ordination that the sky-light will not be used to provide any ventilation for mechanicals services.

Door fire resistance rating increased from 30 minutes fire resisting (typical for protected staircase) to 60 minutes fire resisting as the door separates two buildings.

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Key:
— Site Boundary
- - - Adjusted Fire Sector Boundary

Note:

P1	Draft Stage 03 Issue for Costing	14.07.2023
Rev	Note	Date

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Client
British Museum

Project Name
**SWEC Programme:
South-West Energy
Centre**

Stage
RIBA Stage 03

Drawing Title
**Proposed SWEC Level
O2 (First Floor) Plan -
Phase O2**

Drawing Number
10771-WW-SW-02-DR -A-2142

Scale	Sheet Size	Issue Date
1:100	A1	14.07.2023

Revision	Status
P1	S2 - Suitable for Information

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SWEC Stage 3 - Means of escape & Compartmentation Markup

British Museum
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Page 2 of 8

SK-012

ARUP

Key:

= 240 minutes fire resistant construction

= 120 minutes fire resistant construction

= 60 minutes fire resistant construction

= 30 minutes fire resistant construction

FD 120s

= 120 minute fire door (FD 120 S)

FD 120

= 120 minute fire door (FD 120)

FD 60s

= 60 minute fire door (FD 60 S)

FD 60

= 60 minute fire door (FD 60)

FD 30s

= 30 minute fire door (FD 30 S)

FD 30

= 30 minute fire door (FD 30)

● ->

= Compliant travel distance

>

= Final exit

>

= Storey exit

= Evacuation lift

= Refuge areas

⊗

= Dry fire main outlet (indicative)

⬇

= Dry fire main inlet (indicative)

Fire resistance in terms of integrity, insulation and where applicable load-bearing capacity. The drawings shows fire resisting walls only. Any loadbearing column or beams shall be provided with fire resistance but these are not shown on this markup.

If one element of structure supports or carries or gives stability to another, the fire resistance of the supporting element should be no less than the minimum period of fire resistance for the other element (whether that other element is loadbearing or not).

There are limited exceptions to this rule within BS 9999: 2017.

The positioning of plant shall not impede on escape routes. Steensen Varming (M&E) and Wright and Wright Architects much co-ordinate to make sure minimum clear width for escape routes are incorporated into the design when positioning plant equipment.

It has been agreed with Steensen Varming (M&E) during co-ordination that the sky-light will not be used to provide any ventilation for mechanicals services.

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Key:
Site Boundary
Adjusted Fire Sector Boundary

Note:

P1	Draft Stage 03 Issue for Costing	14.07.2023
Rev	Note	Date Issued By Issued To

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Client	British Museum
Project Name	SWEC Programme: South-West Energy Centre
Stage	RIBA Stage O3
Drawing Title	Proposed SWEC Level 03 (Second Floor) Plan - Phase O2
Drawing Number	10771-WW-SW-RF-DR -A-2143
Scale	Sheet Size Issue Date
1:100	A1 14.07.2023
Revision	Status
P1	S2 - Suitable for Information

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Key:

= 240 minutes fire resistant construction

= 120 minutes fire resistant construction

= 60 minutes fire resistant construction

= 30 minutes fire resistant construction

FD 120s

= 120 minute fire door (FD 120 S)

FD 120

= 120 minute fire door (FD 120)

FD 60s

= 60 minute fire door (FD 60 S)

FD 60

= 60 minute fire door (FD 60)

FD 30s

= 30 minute fire door (FD 30 S)

FD 30

= 30 minute fire door (FD 30)

= Compliant travel distance

= Final exit

= Storey exit

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= Dry fire main inlet (indicative)

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There are limited exceptions to this rule within BS 9999: 2017.

36 BLOOMSBURY STREET

34 BLOOMSBURY STREET

32 BLOOMSBURY STREET

ADJUSTED FIRE SECTOR BOUNDARY

WEST ROAD

DUVEEN GALLERY

WESTERN GALLERIES

EXTERNAL CORRIDOR

For life safety purposes this room need not be enclosed in fire resisting construction. The property protection risk assessment can consider if the value of any facilities / assets in this room are significant to the British Museum operations, to the extent that a minimum period of fire resistance is provided to the room to protect the equipment in the room from a fire elsewhere on the floor plate.

The rooms indicated are noted as inner rooms. At Stage 2, a Category P1/L1 fire detection and alarm system was included within the SWEC fire strategy. This satisfies the requirements of inner rooms within BS 9999 Clause 16.3.4. If the category is changed, this will need to be reviewed during the Stage 3 design.
Applicable to Third floor and Fourth floor.

SWEC Stage 3 - Means of escape & Compartmentation Markup

British Museum
(292040-00)

27/7/23 | Prepared by: JN | Checked by: GR | Approved by: DS
Page 4 of 8

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ARUP

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Key:

- Site Boundary
- Adjusted Fire Sector Boundary

Note:

P1 Draft Stage 03 Issue for Costing 14.07.2023

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Client

British Museum

Project Name

SWEC Programme:
South-West Energy
Centre

Stage

RIBA Stage 03

Drawing Title

Proposed SWEC Level
04 (Third Floor) Plan -
Phase 02

Drawing Number

10771-WW-SW-RF-DR -A-2144

Scale Sheet Size Issue Date

1:100 A1 14.07.2023

Revision Status

P1 S2 - Suitable for Information

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Key:

= 240 minutes fire resistant construction

= 120 minutes fire resistant construction

= 60 minutes fire resistant construction

= 30 minutes fire resistant construction

FD 120s

= 120 minute fire door (FD 120 S)

FD 120

= 120 minute fire door (FD 120)

FD 60s

= 60 minute fire door (FD 60 S)

FD 60

= 60 minute fire door (FD 60)

FD 30s

= 30 minute fire door (FD 30 S)

FD 30

= 30 minute fire door (FD 30)

● ->

= Compliant travel distance

>

= Final exit

>

= Storey exit

= Evacuation lift

= Refuge areas

⊗

= Dry fire main outlet (indicative)

⬇

= Dry fire main inlet (indicative)

Fire resistance in terms of integrity, insulation and where applicable load-bearing capacity. The drawings shows fire resisting walls only. Any loadbearing column or beams shall be provided with fire resistance but these are not shown on this markup.

If one element of structure supports or carries or gives stability to another, the fire resistance of the supporting element should be no less than the minimum period of fire resistance for the other element (whether that other element is loadbearing or not).

There are limited exceptions to this rule within BS 9999: 2017.

ADJUSTED FIRE SECTOR BOUNDARY

WEST ROAD

DUVEEN GALLERY

WESTERN GALLERIES

EXTERNAL CORRIDOR

LYCIAN BUILDING

36 BLOOMSBURY STREET

34 BLOOMSBURY STREET

32 BLOOMSBURY STREET

NEW

SWEC Stage 3 - Means of escape & Compartmentation Markup

British Museum
(292040-00)

27/7/23 | Prepared by: JN | Checked by: GR | Approved by: DS
Page 5 of 8

SK-012

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Site Boundary
Adjusted Fire Sector Boundary

Note:

P1	Draft Stage 03 Issue for Costing	14.07.2023
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Client	British Museum
Project Name	SWEC Programme: South-West Energy Centre
Stage	RIBA Stage 03
Drawing Title	Proposed SWEC Level 05 (Fourth Floor) Plan - Phase 02
Drawing Number	10771-WW-SW-RF-DR -A-2145
Scale	Sheet Size Issue Date
1:100	A1 14.07.2023
Revision	Status
P1	S2 - Suitable for Information

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Key:

= 240 minutes fire resistant construction

= 120 minutes fire resistant construction

= 60 minutes fire resistant construction

= 30 minutes fire resistant construction

FD 120s

= 120 minute fire door (FD 120 S)

FD 120

= 120 minute fire door (FD 120)

FD 60s

= 60 minute fire door (FD 60 S)

FD 60

= 60 minute fire door (FD 60)

FD 30s

= 30 minute fire door (FD 30 S)

FD 30

= 30 minute fire door (FD 30)

● ->

= Compliant travel distance

>

= Final exit

>

= Storey exit

= Evacuation lift

= Refuge areas

⊗

= Dry fire main outlet (indicative)

↓

= Dry fire main inlet (indicative)

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ADJUSTED FIRE SECTOR BOUNDARY

WEST ROAD

DUVEEN GALLERY

WESTERN GALLERIES

EXTERNAL CORRIDOR

LYCIAN BUILDING

36 BLOOMSBURY STREET

34 BLOOMSBURY STREET

32 BLOOMSBURY STREET

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Key:
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Adjusted Fire Sector Boundary

Note:

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Client

British Museum

Project Name

SWEC Programme:
South-West Energy
Centre

Stage

RIBA Stage 03

Drawing Title

Proposed SWEC Level
O6 (Fifth Floor) Plan -
Phase 02

Drawing Number

10771-WW-SW-RF-DR -A-2146

Scale

Sheet Size

Issue Date

1:100

A1

14.07.2023

Revision

Status

P1

S2 - Suitable for Information

SWEC Stage 3 - Means of escape & Compartmentation Markup

British Museum
(292040-00)

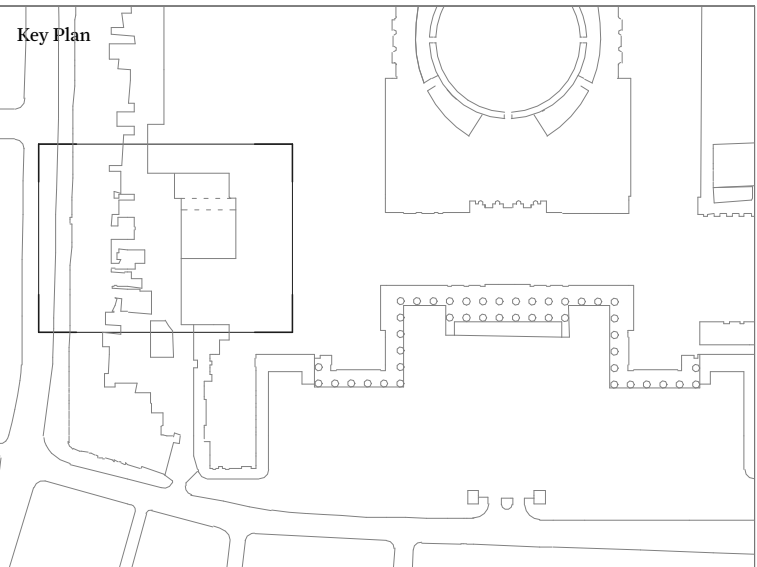
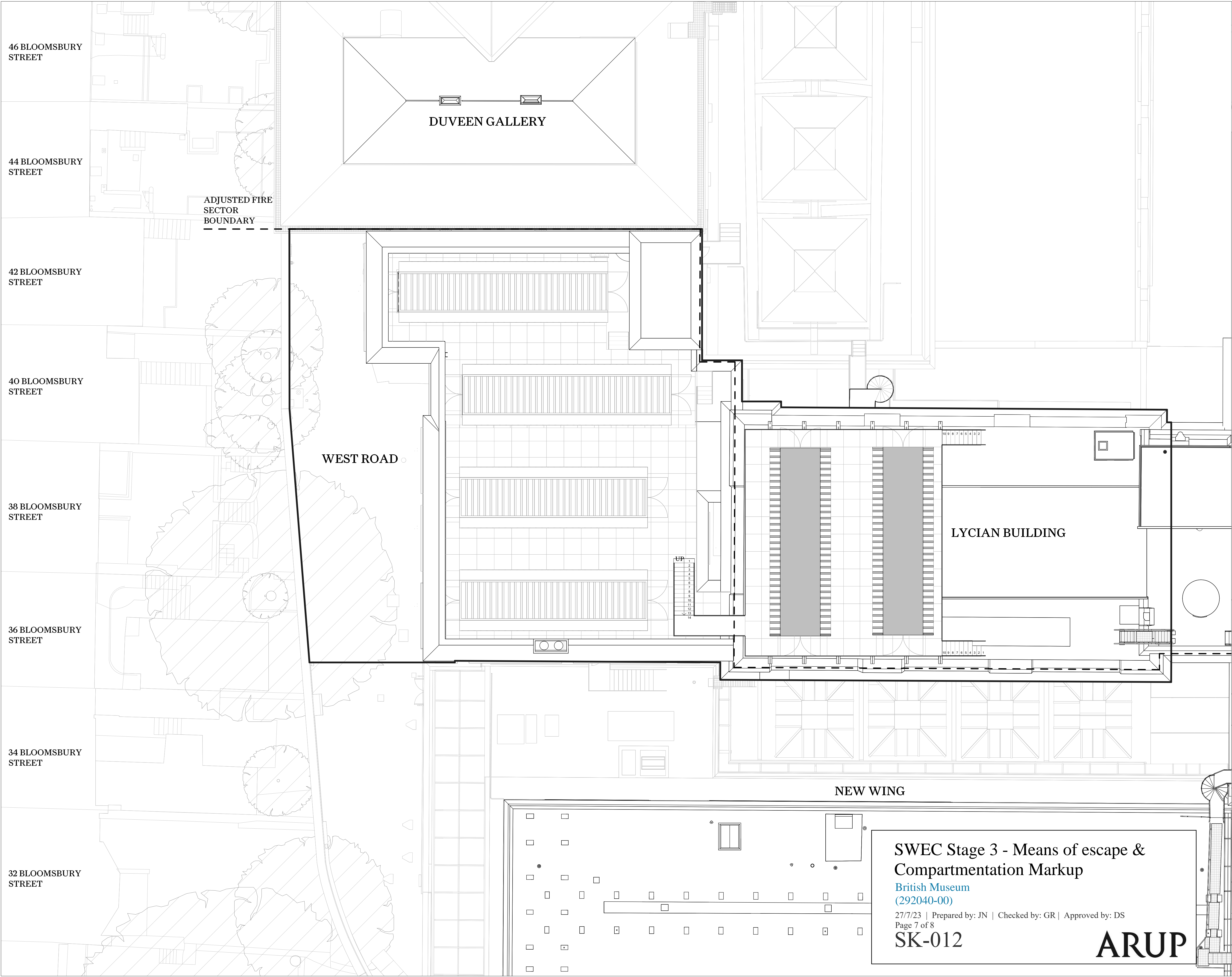
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Key:
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- - - Adjusted Fire Sector Boundary

Note:

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Client
British Museum

Project Name
**SWEC Programme:
South-West Energy
Centre**

Stage
RIBA Stage 03

Drawing Title
**Proposed SWEC Roof
Plan - Phase 02**

Drawing Number
10771-WW-SW-RF-DR -A-2147

Scale	Sheet Size	Issue Date
1:100	A1	14.07.2023

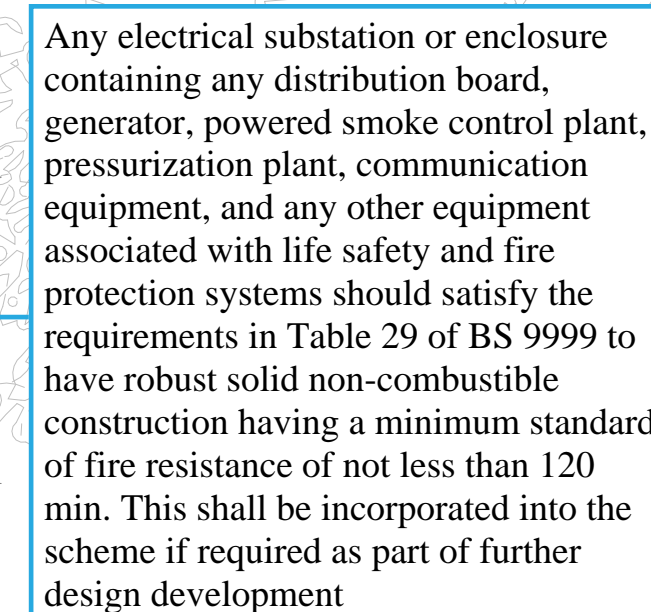
Revision	Status
P1	S2 - Suitable for Information

SWEC Stage 3 - Means of escape & Compartmentation Markup
British Museum
(292040-00)
27/7/23 | Prepared by: JN | Checked by: GR | Approved by: DS
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 = Dry fire main inlet (indicative)

There are limited exceptions to this rule within BS 9999: 2017.



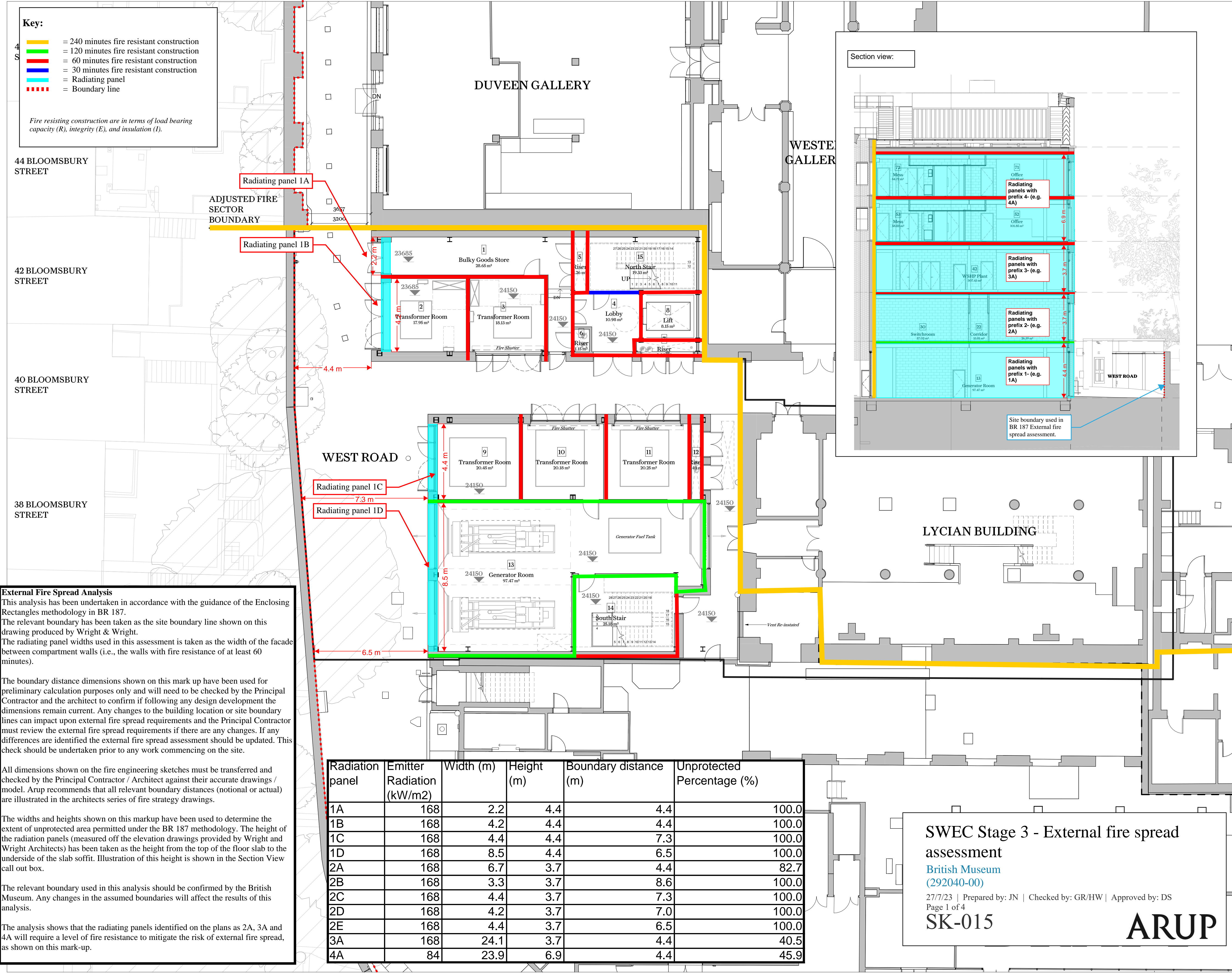
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Revision	Status
P1	S2 - Suitable for Information

Appendix B

External fire spread assessment in accordance with BR 187



Key Plan

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Key:

- Site Boundary
- Adjusted Fire Sector Boundary

Note:

P1 Draft Stage O3 Issue for Costing 14.07.2023

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Client
British Museum

Project Name
SWEC Programme: South-West Energy Centre

Stage
RIBA Stage O3

Drawing Title
Proposed SWEC Level O1 (Ground Floor) Plan - Phase O2

Drawing Number
10771-WW-SW-01-DR -A-2141

Scale Sheet Size Issue Date
1:100 A1 14.07.2023

Revision Status
P1 S2 - Suitable for Information

SWEC Stage 3 - External fire spread assessment

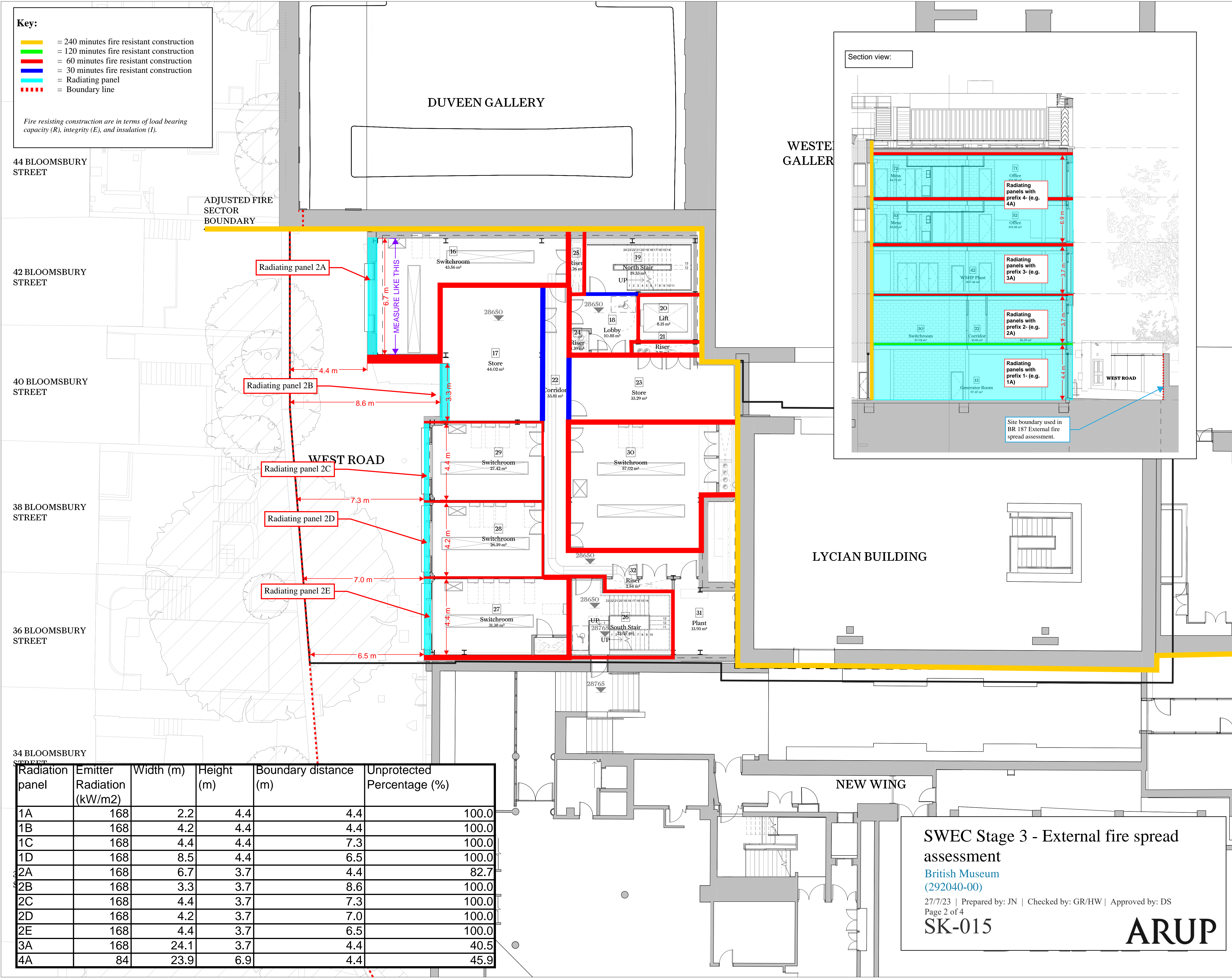
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Key Plan

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Key:

- Site Boundary
- Adjusted Fire Sector Boundary

Note:

P1 Draft Stage O3 Issue for Costing 14.07.2023

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Client
British Museum

Project Name
**SWEC Programme:
South-West Energy
Centre**

Stage
RIBA Stage O3

Drawing Title
**Proposed SWEC Level
O2 (First Floor) Plan -
Phase O2**

Drawing Number
10771-WW-SW-O2-DR -A-2142

Scale Sheet Size Issue Date
1:100 A1 14.07.2023

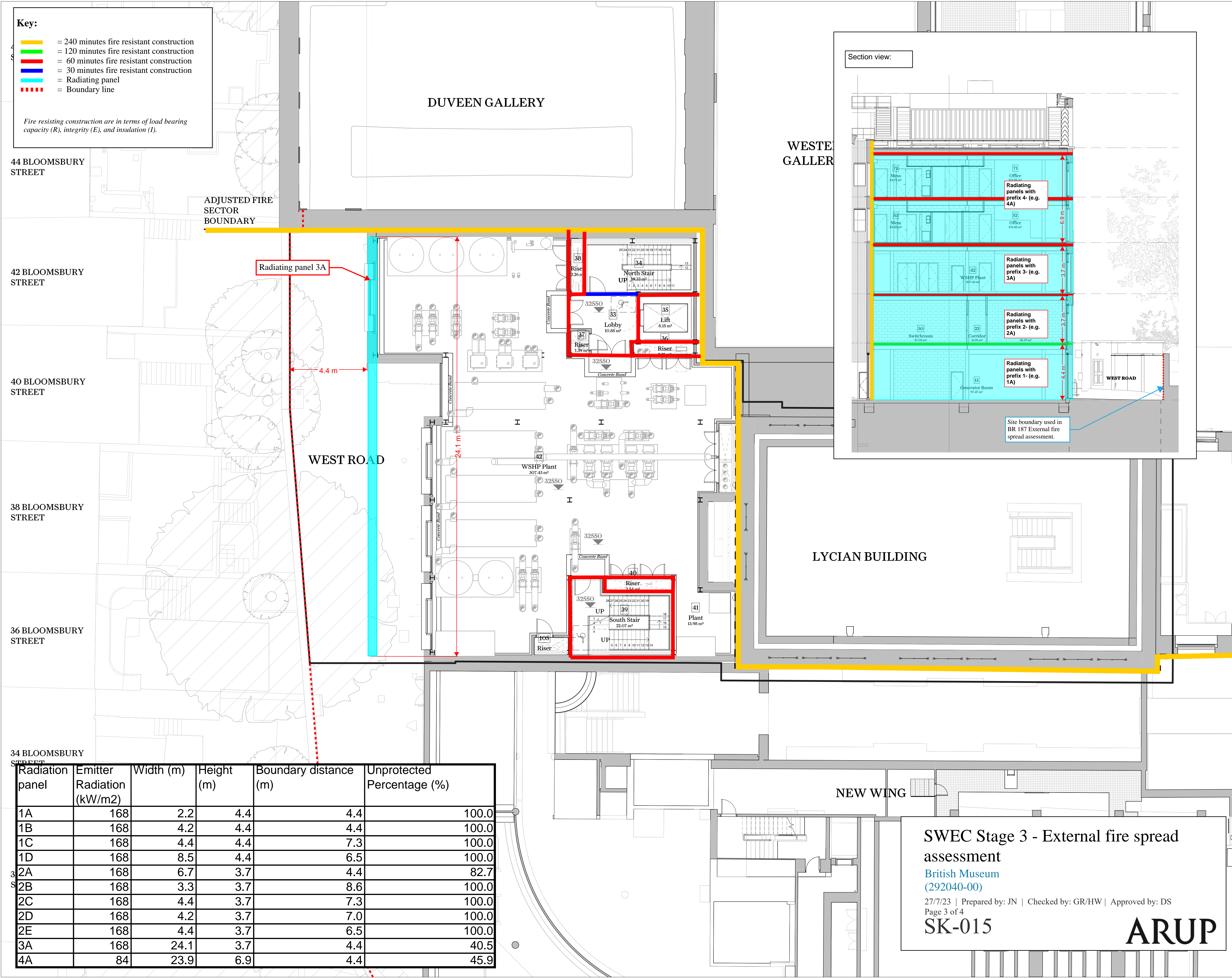
Revision Status
P1 S2 - Suitable for Information

**SWEC Stage 3 - External fire spread
assessment**
British Museum
(292040-00)
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Key:

= 240 minutes fire resistant construction

= 120 minutes fire resistant construction

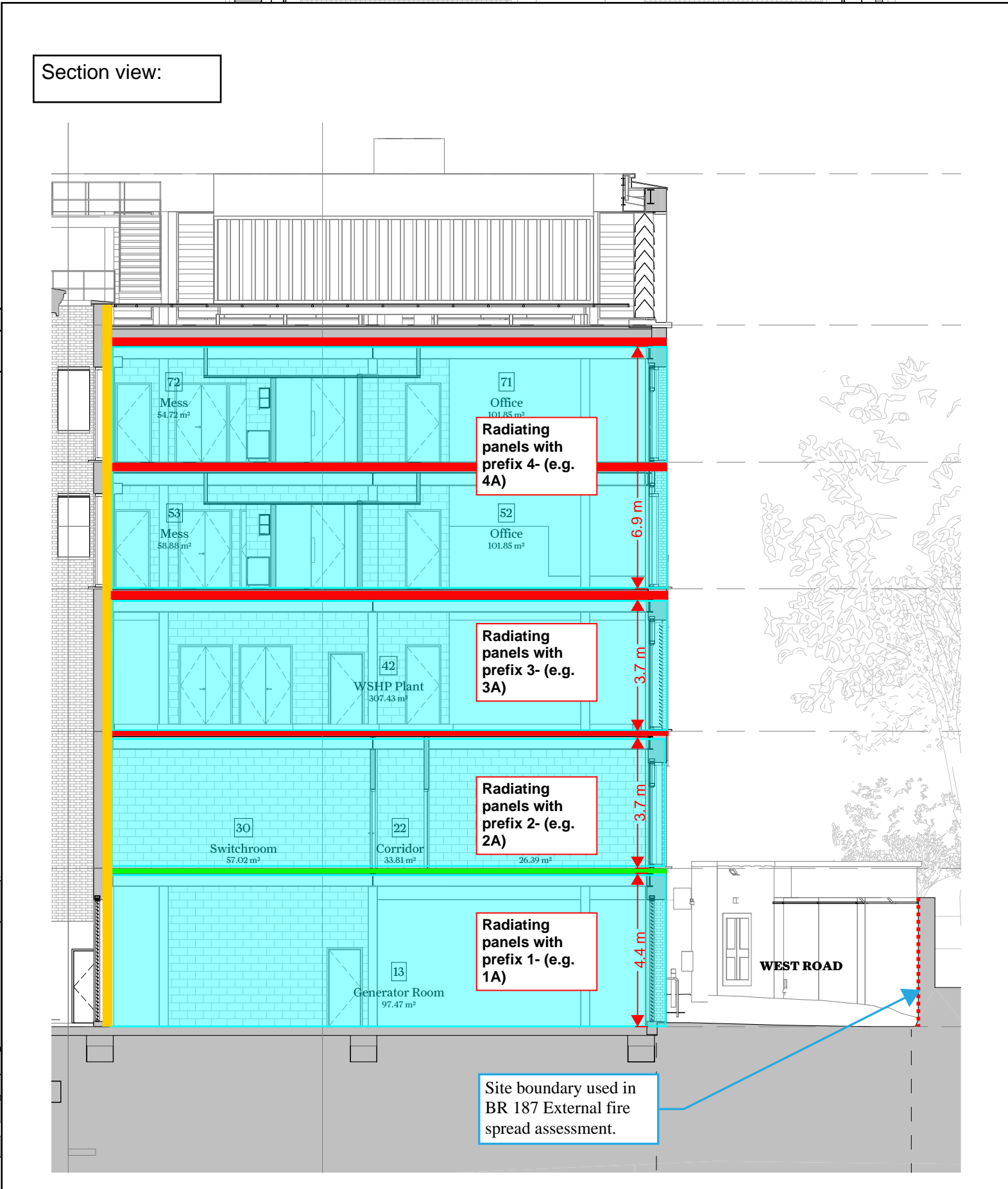
= 60 minutes fire resistant construction

= 30 minutes fire resistant construction

= Radiating panel

= Boundary line

Fire resisting construction are in terms of load bearing capacity (R), integrity (E), and insulation (I).



Key Plan

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Key:

Site Boundary

Adjusted Fire Sector Boundary

Note:

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Client

British Museum

Project Name

SWEC Programme:
South-West Energy
Centre

Stage

RIBA Stage 03

Drawing Title

Proposed SWEC Level
03 (Second Floor) Plan -
Phase 02

Drawing Number

10771-WW-SW-RF-DR -A-2143

Scale Sheet Size Issue Date

1:100 A1 14.07.2023

Revision Status

P1 S2 - Suitable for Information

SWEC Stage 3 - External fire spread
assessment

British Museum
(292040-00)

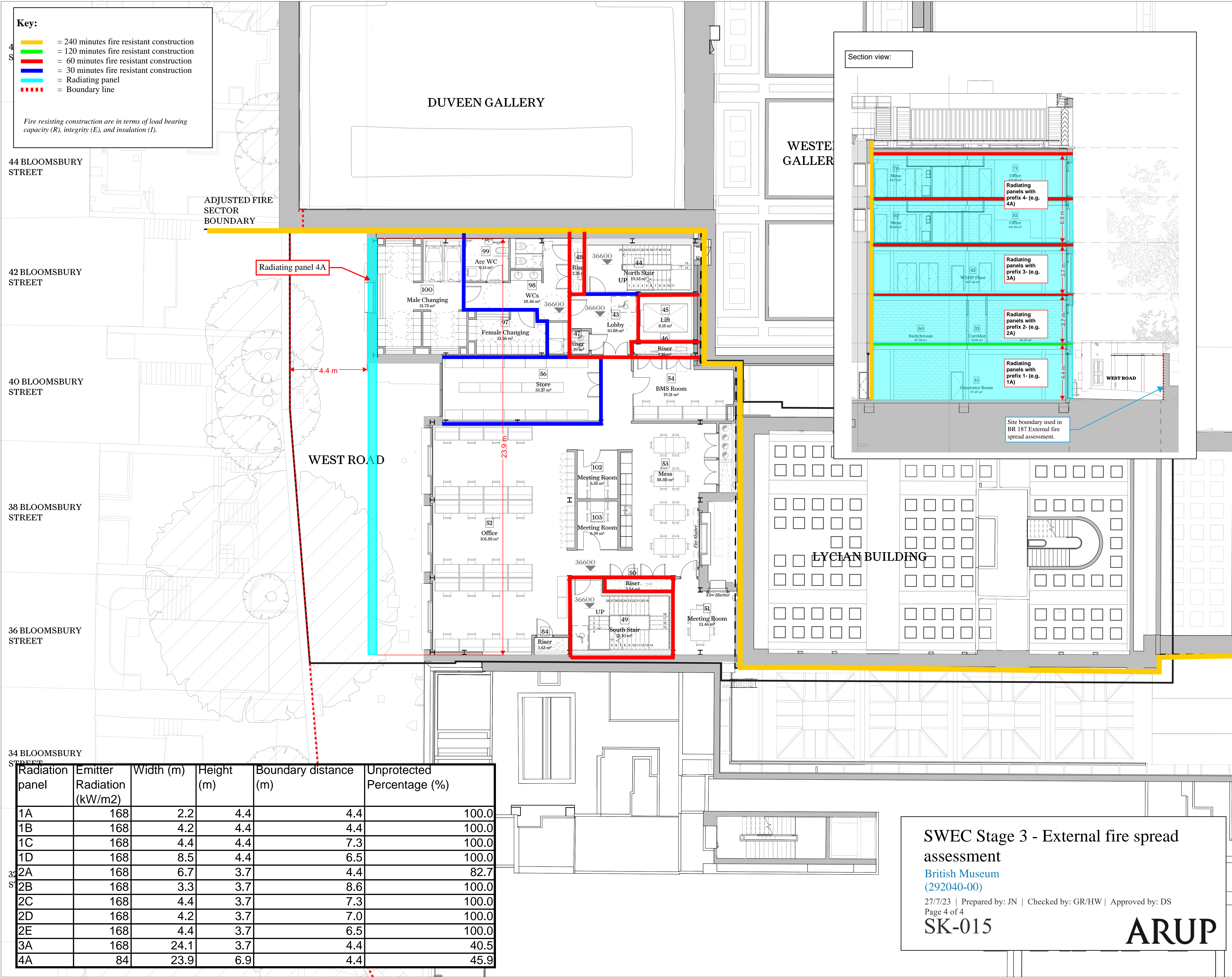
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Radiation panel	Emitter Radiation (kW/m2)	Width (m)	Height (m)	Boundary distance (m)	Unprotected Percentage (%)
1A	168	2.2	4.4	4.4	100.0
1B	168	4.2	4.4	4.4	100.0
1C	168	4.4	4.4	7.3	100.0
1D	168	8.5	4.4	6.5	100.0
2A	168	6.7	3.7	4.4	82.7
2B	168	3.3	3.7	8.6	100.0
2C	168	4.4	3.7	7.3	100.0
2D	168	4.2	3.7	7.0	100.0
2E	168	4.4	3.7	6.5	100.0
3A	168	24.1	3.7	4.4	40.5
4A	84	23.9	6.9	4.4	45.9

SWEC Stage 3 - External fire spread assessment

British Museum
(292040-00)

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Client

British Museum

Project Name

SWEC Programme: South-West Energy Centre

Stage

RIBA Stage 03

Drawing Title

Proposed SWEC Level 04 (Third Floor) Plan - Phase 02

Drawing Number

10771-WW-SW-RF-DR -A-2144

Scale **Sheet Size** **Issue Date**

1:100 **A1** **14.07.2023**

Revision **Status**

P1 **S2 - Suitable for Information**

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Appendix C

Energy Centre Programme and London Fire Brigade Initial Briefing Session Minutes

Energy Centre Programme and London Fire Brigade Initial Briefing Session Minutes

SENSITIVE

Date: 26/09/23

Time: 09:30 – 11:30

Location: Board Room

Attendees:

British Museum	Sarah Mather (SM), Client Project Manager Alex Surguladze (AS), Design Manager James Adshead (JA), Health and Safety Manager David Meinck (DM), Technical Manager Hayley Osborn (HO), Health, Fire and Safety Advisor
Stace	William Horton (WH), Energy Centre Programme Manager Sam Appleby (SA), Assistant Project Manager
London Fire Brigade	Jon Singleton (JS), Soho Station Commander Stephen Holden (SH) Fire Officer David Doyle (DD) Fire Officer Mark Huntington (MH) Heritage Coordinator
LWF	Paul May (PM) Fire Safety Surveyor
Real PM	Andrew Knott (AK) Construction Advisor & Planner

Minutes/Action Points:

Item	Detail	Action
1.0	Fire Tender Access	
	<ul style="list-style-type: none"> East Road <ul style="list-style-type: none"> Noted that fire tender access is unachievable down the East Road in existing condition due to width restriction. LFB confirm that for emergency pedestrian access to be maintained for firefighting personnel and laying of hose. LFB confirm suitability for the use of hoses from fire tender parked in north east (NE) corner and/or Front Forecourt to hydrants and dry risers on East Road without fire tender access down the East Road. North Road <ul style="list-style-type: none"> Noted that during distribution route work on the North Road that road should be kept clear for fire tender access. West Road <ul style="list-style-type: none"> Noted that whilst the SWEC construction and distribution route works are ongoing on the West Road fire tender access is unsuitable and can be managed and overcome. LFB confirm suitability for the use of hoses from fire tender parked in southwest (SW) corner and/or North Road to hydrants and dry risers on East Road without fire tender access down the West Road. 	

Item	Detail	Action
	<ul style="list-style-type: none"> ○ LFB confirm that for emergency pedestrian access to be maintained for firefighting procedures. ○ Noted that a requirement for vehicle testing from North Road to West Road should take place, noting that Momentum Swept Path analysis has previously concluded that a fire tender would be too large to complete the turn. ○ Action: SM to liaise with LFB to organise vehicle testing of fire tender through NE gate, turning into the North Road, underneath the WCEC tunnel, down the West Road and out through the SW gate. • South Forecourt <ul style="list-style-type: none"> ○ Noted that the South Forecourt via the Front Gate will have load bearing for fire tenders. ○ Front Gate security queue by the West Lawn should be considered further regarding fire tender access to the Front Forecourt. 	SM
2.0	Fire Hydrants and Dry Risers	
	<ul style="list-style-type: none"> • Noted that the hydrants and dry risers are tested every 6 months. <ul style="list-style-type: none"> ○ LFB questioned testing frequency is being achieved. Action: JA, HO and DM to review. ○ Post meeting comment – the hydrants and dry risers are tested every 12 months, with the most recent testing completed in March 2023. • Noted that LWF are working on another piece of work for the Museum regarding capacity of fire hydrants (Class E). • LFB note that dry risers should be labelled with numbers for ease, fire hydrant signage should be clearer and any redundant fire hydrants should be removed to avoid confusion. Action: JA, HO and DM to consider further but not to be part of the Energy Centre Programme of works. 	JA, HO, DM JA, HO, DM
3.0	Museum Means of Escape	
	<ul style="list-style-type: none"> • Noted that the Energy Centre Programme is considering Means of Escape restrictions and mitigations in close detail with LWF. 	
4.0	Communication Going Forward	
	<ul style="list-style-type: none"> • Noted that ongoing meetings and visits from LFB during different phases of the programme of works would be beneficial and should be maintained. • Noted that an information pack is available from the Front Gate security huts for LFB when entering site in an emergency. Pack includes floor plans of the Museum highlighting fire hydrants, access points and dry risers. <ul style="list-style-type: none"> ○ LFB highlighted that the plans are not suitable due to the information not being clear and too detailed. Action: HO, JA and DM to review. ○ Action: LFB - to review information pack and send comments across to JA, HO and DM. • Action: SM – Following review by LFB of minutes taken from Initial Briefing Session, a table top exercise will be organised to discuss different scenarios. 	HO, JA, DM LFB SM

Item	Detail	Action
	<ul style="list-style-type: none"> ○ Scenarios such as phases of the programme, fire, water leak etc. 	
5.0	AOB	
	<ul style="list-style-type: none"> • Noted that plant equipment in the proposed SWEC building is positioned on floors beneath office support due to equipment being heavy and difficult to move. • Noted that during the programme of works Hot Works will take place but will be minimised. The Museum has a comprehensive Permit to Work system to cover any Hot Works. • Noted that water damage should be considered in addition to fire. <ul style="list-style-type: none"> ○ The Museum has inhouse training on savage and salvage kits are located around the Museum. • Action: SM to issue out presentation slides and existing drawings of the fire hydrants and dry risers. • Noted that it is vital that the storage of construction materials on sites are managed. • Noted that it is vital that extra vigilance for all construction site access and construction stie staff areas to be managed as the chances of fire in these areas increases. • Noted that the Museum should have a general salvage store that can be accessed externally by firefighters and staff. <ul style="list-style-type: none"> ○ Noted that it is vital that the stores access is maintained during the construction phases. 	SM