

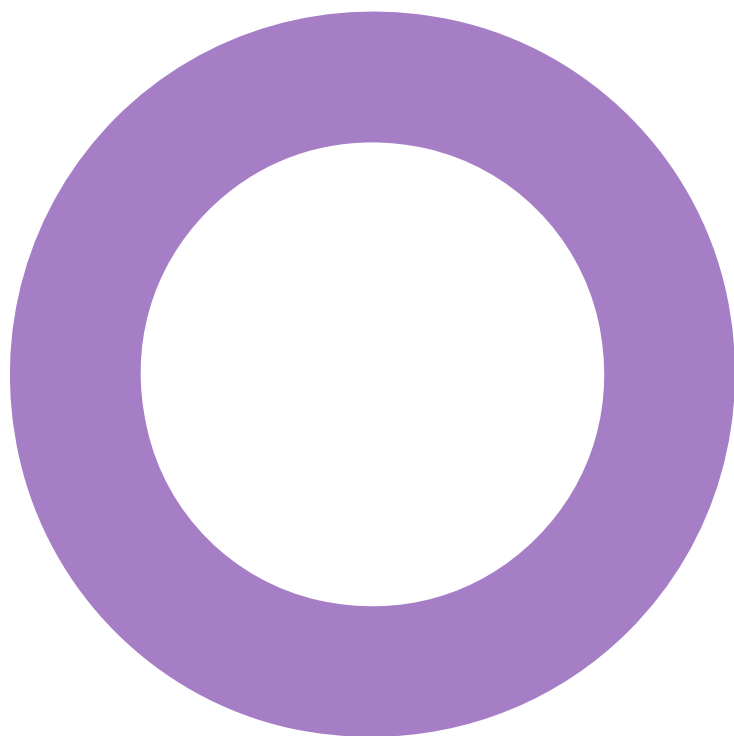


FORMER JOHN LEWIS DEPOT, LETCOMBE STREET, READING
(ALSO KNOWN AS JLP MILL LANE)

FIRE ENGINEERING - QUALITATIVE DESIGN REVIEW
AUGUST 2024

**John Lewis, Letcombe Street.
Reading.**
John Lewis Partnership.

FIRE ENGINEERING
QUALITATIVE DESIGN REVIEW
SUMMARY REPORT
REVISION P04 – 07 JUNE 2024



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
P01	08/04/2024	Qualitative Design Review Report	LC	ES	MH
P02	30/04/2024	Revision update for planning comments	LC	ES	MH
P03	15/05/2024	Revision update to latest GA	LC	BR	MH
P04	07/06/2024	Revision to incorporate client comments	ES	CR	MH

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1. Introduction

John Lewis Partnership takes fire safety very seriously, and is committed to ensuring its buildings comply with current best-practice fire safety standards to ensure the safety of all future residents on this basis. Hoare Lea has been appointed to provide fire safety advice for the former John Lewis Depot, Letcombe Street (also known as JLP Mill Lane) residential Build to Rent (BTR) scheme located in Reading, England.

A Qualitative Design Review (QDR) has been undertaken with the aim to determine whether the recommendations within guidance document Approved Document B – Volume 1 (2019 with 2020 and 2022 amendments) [2] are considered appropriate for the site. This process helps identify if any enhanced measures of protection are required to mitigate for any risk either not considered in the guidance documents or brought on due to the height, and/or non-typical conditions, of the building.

The QDR follows the guidance of BS 7974[1], in accordance with the structure detailed below:

1. Review of architectural design and selection of materials including their suitability and fire properties, occupant characteristics and client requirements;
2. Establish functional objectives for fire safety;
3. Identify fire hazards and possible consequences;
4. Establish trial fire safety engineering designs;
5. Set acceptance criteria;
6. Identify method of analysis; and
7. Establish fire scenarios for analysis.

A QDR workshop was undertaken on 25th of March 2024 with all available relevant stakeholders. The parties in attendance were as follows:

- JLP (client);
- CJCT (architects);
- M3 (project management);
- Fairhurst (structural engineer); and
- Hoare Lea (fire engineer and MEP engineer).

The following parties were unable to attend:

- The HSE; and
- The Royal Berkshire Fire and Rescue Service.

This building (the architectural design of which is detailed in Section 2 of this document) will be subject to the Gateway 2 process, as of the time of writing this report, there is currently no mechanism for which the Building Safety Regulator (BSR), i.e. the Approving Authority, can attend QDR workshops. I HSE and Royal Berkshire Fire and Rescue Service (i.e. the Local Fire Service) have been unable to take part in the QDR process to date. In light of this the QDR process has been held with as many relevant parties as possible.

This report has been produced alongside, and should be read in conjunction with, the Fire Planning Statement (Document reference: 08278-HRL-XX-XX-RP-FE-100001-P03) with the intention that it will also be appended to the fire strategy once complete during RIBA Stage 3/4, and prior to the Gateway 2 Submission. This document is to be viewed as a working document such that any design changes throughout the detailed design process will be assessed holistically by all members of the design team for the purposes of fire safety.

The Fire Safety Strategy has been designed in accordance with Approved Document B – Volume 1(2019 with 2020 and 2022 amendments) [2] and other guidance documents, e.g. BR 187 used for external fire spread assessments, NHBC studies and guidance for open plan flats, and BS 9991 for balcony deck approach where appropriate. The development is considered to have a classification of purpose groups 1(a) and 1(c) as depicted in ADB Volume 1 Table 0.1

Compliance with Part B of the Building Regulations is achieved by following the guidance of either Approved Document B (ADB). If followed, ADB will satisfy the functional requirements of the Building Regulations 2010 (as amended) [3]; otherwise, a fire engineering justification will be required.

Any departures from fire safety guidance are detailed within this report for discussion throughout the design process with the Statutory Authorities.

Where not explicitly described within the Fire Strategy report it is assumed that in all other respects the building will be designed to comply with the relevant sections of ADB or the supporting British Standards references therein.

Table 1: Summary of the proposed John Lewis Letcombe Street residential development.

Project name	former John Lewis Depot, Letcombe Street, Reading (also known as JLP Mill Lane)
Project Address	Letcombe Street, Reading, RG1 2HN
Reasons for QDR	The development is subject to the Building Safety Act 2022 (BSA) which considers the development a High-Risk Building (HRB), this document and general QDR process has been followed to support the BSA Gateway 1 and 2 submission. Furthermore the building is over 30m tall (~32.605m) and as such the QDR was carried out to identify any specific risks due to the height of the building.
Proposed building structure	Typical construction, i.e. reinforced concrete structure throughout.
Means of escape provisions	A minimum of two stairs, and two alternate directions of escape is provided for all levels.

2. Architectural design.

The building height, as measured from the ground level to the top most occupied storey, designed at 32.605m and will comprise of 11 storeys (i.e. Ground Floor (GF), and Level 01 to Level 10). The building is provided with four stairs, three of which are designed as firefighting shafts. All levels are served by a minimum of two stairs.

The site is located on the edge of the town centre in central Reading, surrounded by Mill Lane, Letcombe Street and Crossland Road to the North, West and South East respectively. Fire Service vehicle access is provided via Letcombe Street and Crossland Road.

Stair Cores; A, B and C are interconnected at each level so the building is considered to from one single building, noting that Core A extends to level 06, Core B to Level 09 and Core C1, C2 to Level 10.

The uses of the building are proposed to be as follows:

- Ground Floor consists of plant, switch rooms, substations life safety, comms room, sprinkler tank room, cycle store, workspaces, gym, fitness studio, back of house offices, ancillary office spaces, dining, kitchen areas and ground floor commercial unit;
- Residential flat units are located on levels 01 to 10. Core A extends to level 05, Core B to level 09 and Core C1 and C2 to level 10.



Figure 1: Ground floor general arrangement and stair core denomination.

3. Fire Safety Design

The building has been designed using Approved Document B 2019 incorporating 2020 and 2022 amendments. At the time the fire strategy design began this fire safety design guidance document represented the most up to date fire safety design guidance document, (i.e. this was also the case as of the date of the QDR workshop 25/03/2024).

An updated Approved Document B was issued by the Government on 29th March 2024. This document was released after the QDR workshop was held and as such this report does not currently refer to this document. However, the recommendations of the updated March 2024 guidance will be considered as the design develops. Hoare Lea fire considers that the proposed design meets the functional requirements of The Building Regulations 2010 (as amended)[3].

Alternative fire safety design guidance is available. Following the guidance within BS 9991: 2015 and the draft BS 9991: 2021 was considered. Both BS 9991: 2015 and the draft BS 9991: 2021 were issued before the updates that were provided to Approved Document B in 2022 and 2023 and the 2023 Government announcements to require two stairs in developments over 30m. The BS 9991 draft is also likely to change significantly prior to final issue.

On this basis it was considered most appropriate to follow the design guidance in ADB. No objections were provided to this proposal from attendees at the QDR.

4. Functional objectives for Fire Safety.

The functional objectives for the design of the John Lewis Letcombe Street development is 'life safety', and this is to be achieved by fulfilling the functional requirements of the Building Regulations 2010 (as amended).

JLP have requested that LPC (Loss Prevention Council) sprinkler rules are considered for the commercial sprinkler system to the ground floor and have further specified that best practice advice is followed for all aspects of the fire safety design where available British Standards and Approved Documents may not specifically address a particular fire safety risk that is present in the development.

It is noted that Approved Document B – Volume 1 (2019 with 2020 and 2022 amendments) does not consider the risk of electric vehicle charging, however, as the risk of electric vehicle charging is a credible risk this has been considered as part of the QDR. It was discussed within the QDR workshop that with respect to the fire safety design of possible electric bike storage on the ground floor and the electric refuse store tug charging provisions, enhancements to minimum requirements in the guidance of Approved Document B – Volume 1 (2019 with 2020 and 2022 amendments) are to be considered. The recommendations that were implemented are described in Section 6.6.

Property protection and business continuity were not specified as functional objectives of the QDR process but may indirectly benefit from life safety provisions.

5. Hazard assessment.

As noted in the introduction John Lewis Partnership takes fire safety very seriously, and is committed to ensuring its buildings comply with current best-practice fire safety standards to ensure the safety of all future residents on this basis.

As part of the formalised QDR process the first stage is to identify any potential fire safety hazards that **could** be present in the building. All these potential fire hazards will be analysed in Section 6 of this report and any associated risks will be assessed and mitigated.

As part of the QDR workshop the hazard identification exercise was carried out with all the workshop attendees. The hazards identified as part of this process and the associated possible consequences identified have been detailed in Table 2. All hazards are assessed and provided with a trial design to resolve as demonstrated in Section6. Table 2 also presents several ‘what-if’ scenarios which have been selected to investigate the redundancy in the design.

Table 2: Hazard identification with associated possible consequence.

Item	Fire hazards	Possible consequences
1.	Smoking and barbeques on private balconies.	A fire on a balcony would increase the risk of external fire spread or for fire to spread into the flats.
2.	Kitchen fire in a residential flat, e.g. unenclosed kitchens in open plan flats.	The flat layouts affect an occupant’s ability to evacuate. All flats adopt an open plan layout Open plan layouts with an unenclosed kitchen may lead to more smoke spread throughout the internal area of the flat and additionally could increase smoke spread into the protected common corridor when occupants evacuate the flat towards the means of escape stair.
3.	Smoke spread into common corridors from a fire in the building	Smoke in the residential common corridors could impact on occupant escape or fire service access to the building.
4.	A fire in the refuse stores at ground floor, or in the refuse chute lobbies on residential floors. Possible fire sources: – Refuse; – Electric tug; – Electric tug charging unit.	A fire in the refuse store could spread from the store to the residential corridors through the refuse chute.
5.	Fire in the parcel room. Possible fire sources: – Packaging and cardboard; – Combustible storage.	A fire in the parcel store at ground floor may spread from the parcel room and spread to the communal spaces.
6.	Fire in the commercial unit. Possible fire sources: – Food preparation equipment; – Commercial storage.	A fire in the commercial unit at ground floor could spread from the unit to the residential amenities.
7.	A fire in the plant rooms.	A fire in the ground floor plant room may impact safe means of escape from amenities at the ground floor.
8.	A fire in the bike store. Possible fire sources: – Electric bike batteries.	A fire in the bike store could spread from the store and impact the means of escape for the ground floor amenities, or cause structural collapse.

Item	Fire hazards	Possible consequences
9.	Fire in the riser cupboard rooms.	A fire in the residential floor riser cupboard rooms could spread throughout the residential common corridor, and to other residential floors.
10.	Fire on the Brown roof. Possible fire sources: – Vegetation; – PV panels.	A fire on the vegetation of the brown roof could spread across the full extent of the roof.
11.	Electric Vehicles (EVs) parked adjacent to the building.	An EV vehicle fire adjacent to the building would increase the risk of external fire spread or risk of fire and smoke into flats.
12.	Fire in a building which leads to a need for someone with a mobility impairment to evacuate the building.	Persons with mobility impairments may take longer to evacuate the building and could also have difficulty navigating stairs.
13.	Fire leading to disproportionate structural collapse in the building.	If not sufficiently protected a fire that impacts on the building structure could lead to disproportionate structural collapse in the building
What-if analyses		
1.	Sprinkler fails to operate.	Sprinkler systems play an important part in reducing the severity of a fire, both in terms of size and heat release. As such sprinklers failing to activate would allow the fire to grow in size and severity.
2.	Firefighter lift fails to operate.	If a firefighting lift fails, this could extend the time until firefighters can reach the floor of fire origin.
3.	Evacuation lift fails to operate.	If an evacuation lift fails, this could extend the time taken for persons with mobility issues to evacuate.
4.	Compartmentation failures, such as holes or breaches.	This would allow for smoke and heat to spread between compartments.
5.	Automatic fire detection fails to operate.	With the automatic fire detection system failing to operate, this increases the risk of a fire to go undetected for a longer period of time and therefore delaying the evacuation procedure.
6.	Smoke control system fails to operate.	This would allow for smoke and heat to spread between compartments.

6. Trial designs.

In accordance with BS 7974 trial designs are defined as a group of fire safety measures, which are assessed to determine what (if any) additional fire safety measures are required to meet the specified functional objectives. Where it is identified that it is necessary to provide additional architectural design elements or provide various fire safety measures to achieve the functional objectives of The Building Regulations 2010 (as amended)[3] as part of these trial designs these design changes will be included as part of the fire strategy design.

Multiple trial designs can be identified to provide an acceptable solution or mitigation to the hazards identified as part of the building design. In developing a trial design, the focus is not solely on the provision of additional fire protection systems but a review of the potential for reducing or eliminating the identified hazards by amending the construction, materials or layout of the building.

The trial designs detailed in this report analyse different designs with varying degrees of incorporated fire safety measures in order to assess which design is the most appropriate for the site. The trial designs are presented with the minimum level of fire safety design required (i.e. the first trial design may meet the minimum requirements listed in code guidance and optimally meet other building criteria in terms of operability, ease of construction and cost) and all successive designs increase the fire safety provisions.

There are other factors apart from fire safety that determine whether a particular design is acceptable, and trial designs that are impractical or that conflict with design or operational requirements should be ruled out unless there is no other practical alternative.

The fire hazards identified in Section 5 will form part of the considerations made in this assessment.

6.1 Trial designs 1. – Internal flat design

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
1.	Open plan flat: - Grade D2 Category LD3 standard detection; - Provisions of a BS 9251 category 4 sprinkler system Individual flat balcony: - Of materials achieving class A1 or A2-s1, d0; - Minimum FR construction of REI 30; and - Imperforate soffit External wall construction: - A2-s1, d0 or better	1. Smoking and barbeques on balconies. 2. Kitchen fire in a residential flat.	Smoking and barbeques on balconies: A cigarette on a flat balcony may cause a smouldering fire which could be unnoticed at first. If the fire is allowed to grow it may spread along the balcony and the adjacent facades as well as into the flat. This would present a risk to occupants within the flat and other areas within the building. With the external wall construction and balconies achieving European classification A2-s1,d0, this would significantly limit the risk of fire spread as well as ignition of the balconies. Category LD3 standard detection may not provide the best-case awareness for occupants anywhere in the flat. This trial design could be considered sufficient to address the risk of fire spread across the external façade and into the flats, but the trial design could be improved in terms of occupant awareness.

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
			Kitchen fire in a residential flat: For an unenclosed kitchen inside a flat (i.e. not separated via fire resisting construction, (i.e. as is the case for all flats on the development), a kitchen fire could allow for smoke and heat to travel into the corridor or other flats when occupants move to escape from the flat. Occupants inside the flat may also be exposed to toxic gases and excessive heat while making their escape. The sprinkler system is designed as a Category 4 system, which is provided with back up power and pump sets which adds redundancy to the design and reduces the likelihood of the sprinkler system not functioning on demand. Additionally the level of awareness could be improved to decrease the pre movement time prior to moving to escape. Whilst the sprinkler system is expected to slow the growth of or in the best case extinguish the fire, it is considered that this trial design is not suitable as it does not mitigate the risk of a kitchen fire impacting the means of escape from the occupant inside the flat.
2	Open plan flat: - Grade D LD1 AFD; - BS 9251 category 4 sprinkler system; - Open plan flats will not exceed 16m x 12m; - Open plan flats will be situated on a single level only; - Ceilings in flats will have a minimum height of 2.25m; - Cooking appliances will not be adjacent to entrances of flats; - Cooking appliances will be located at least 1.8m from a 0.85m wide escape route; and		Smoking and barbeques on balconies: In addition to the justification given above. Category LD1 AFD will improve the means of warning for the occupants of the space. This trial design could be considered sufficient to address the risk of fire spread from smoking an barbeques on the balconies. Additionally, John Lewis Partnership will seek to manage the development such that occupants will not be permitted to use barbeques on balconies. Kitchen fire in a residential flat:

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
	- Flat entrance doors will be a minimum of 850mm wide. Individual flat balcony: - Of materials achieving class A1 or A2-s1, d0; - Minimum FR construction of REI 30; - Imperforate soffit; and - Management will restrict use of barbeques on balconies. External wall construction: - A2-s1, d0 or better		Category LD1 AFD will improve the means of warning for occupants in the flat, and will reduce the premovement time taken for occupants to begin to move to the external, this will reduce the time occupants will be exposed to any toxic gasses or heat and smoke. The size of flats is limited to 16m x 12m such that travel distances and complexity of the internal fit on the route to the final escape route are inherently limited. The flat ceilings will be a minimum height to ensure that smoke layer will not immediately descend to a head height considered reasonable within the first instance of the a fire event. Cooking appliances have been designed such that they are not located adjacent to the exits and are sufficiently far away from a route considered accessible for unassisted wheelchair access (i.e. 850 mm). Were a fire to occur occupants would not have to pass close by the source of the fire where the risk to health is the greatest. This trial design could be considered sufficient to address the risk of an unenclosed kitchen fire in a residential flat. To support this qualitative assessment it has been discussed and agreed by the design team to perform a quantitative comparative computational fluid dynamics assessment, which will assess the considered worst case flats against an open plan flat considered complaint by the National House Building Council (NHBC) studies.

6.2 Trial designs 2. – Refuse strategy

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
1.	Refuse store: - Fire resisting enclosure of construction achieving 60 minutes fire resistance; - Refuse chutes and the stores are approached by a	3. Smoke spread into common corridors from a fire in the building. 4. A fire in the refuse stores at	A Fire in the refuse stores and refuse chute lobbies: Charging of the electric tug in the storage room increases the risk of a fire starting from the electric battery charging.

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
	protected lobby with 0.2m² permanent ventilation; Refuse chute lobbies are provided with construction REI 60 and associated E 60 Sa door sets;	ground floor or in the refuse chute lobbies on residential floors. Possible fire sources: - Refuse; - Electric tug; - Electric tug charging unit.	Due the size of refuse storage areas, the fire loading could be large when at maximum storage capacity. The refuse stores are open to the chute such that there is no separation from the chute riser to the refuse storage rooms. A fire in the refuse store could cause heat and smoke to spread up the refuse chutes and into the refuse chute lobbies across all floors. The residential corridor lobby access to the refuse chute is ventilated such that any clearance can be achieved from any smoke spread from the chute into the residential corridor. The refuse chute passes through compartment floors which achieve 120 minutes fire resistance but is provided with a lower level of fire resistance. This trial design is not considered fully sufficient to address the risk of fire spread from the electric tug charging facilities, spread of heat and smoke to the residential floors above and to the rest of the ground floor amenity spaces.
2	Refuse store: - Fire resisting enclosure of construction achieving 120 minutes fire resistance; - Refuse chutes and the stores are approached by a protected lobby with 0.2m² permanent ventilation; - Refuse chute lobbies are provided with construction EI 60 and associated E 60 Sa door sets; - Electric tug is located in a separate protected enclosure with construction achieving 120 minutes fire resistance (REI 120).		A Fire in the refuse stores and refuse chute lobbies: The fire resistance of the refuse storage enclosure has been increased to 120 minutes to maintain 120 minutes fire separation from the open chute riser that passes through all floors and the ground floor accommodation. The charging risk of the electric tug battery has been removed from the refuse storage area, such that the potential ignition source is in an enclosure achieving 120 minutes fire resistance. This trial design could be considered sufficient to address the risk of fire spread from the electric tug charging facilities, spread of heat and smoke to the residential floors above and

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
			to the rest of the ground floor amenity spaces. There is however an operational risk that occupants could store refuse in the refuse chute lobby space prior to placing it down the chute. This trial design is not considered fully sufficient to address the risk of a refuse fire in the refuse chute lobbies and as a consequence smoke spread to the residential floors and into the chute.
3.	Refuse store: – Fire resisting enclosure of construction achieving 120 minutes fire resistance; – Refuse chutes and the stores are approached by a protected lobby with 0.2m² permanent ventilation; – Refuse chute lobbies are provided with construction REI 60 and associated E 60 Sa door sets; – Electric tug is located in a separate protected enclosure with construction achieving 120 minutes fire resistance (REI 120); – Reduced refuse chute lobby size such that there is no room for refuse to be left in the lobby; and – Fire resisting hopper door.		A Fire in the refuse chute lobbies: The refuse chute lobby is being assessed with the intent that it is further reduced in size to decrease the likelihood of occupants storing rubbish in the refuse chute lobby. The small refuse chute lobby will still be afforded 0.2m² permanent ventilation to external. The refuse chute hopper door is also being assessed whether it can be provided fire resistance such that there is both an E 60 Sa door from the residential corridor to the lobby and an effective fire resisting door directly into the refuse chute. This trial design could be considered sufficient to address the risk of a refuse fire in the refuse chute lobbies.

6.3 Trial designs 3. – Corridor design

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
1.	Corridor layout: – Every flat is separated from the residential corridor by 60 minutes fire resisting construction, and	2. Kitchen fire in a residential flat, e.g. unenclosed kitchens in open plan flats.	The building is designed on a stay-put evacuation strategy such that a fire can be assumed to be contained to the flat of fire origin, for a reasonable time before Fire Service intervention. The fire resistance

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
	associated E 30 Sa door sets; – The corridor is provided with L5 category detection; – All flats have access to more than one stair; – All corridors are either provided with a ventilated corridor access (with a maximum of 7.5m travel distance in an unventilated corridor) to the stair or ventilated lobby access (with maximum travel distance of 7.5m from a flat door to a stair door); – Three firefighting stairs are provided and one means of escape stair; – All firefighting stairs (Core A, B and C1) have an associated firefighting lift, and a passenger lift; – The means of escape stair (Core C2) is not provided with a lift; – Each stair is provided with a refuge location; – Only a means of escape stair and firefighting stair serve level 10, such that there is only one passenger lift and one firefighting lift serving level 10.	3. Smoke spread into common corridors from a fire in the building. 9. Fire in the riser cupboard rooms. 12. Fire in a building which leads to a need for someone with a mobility impairment to evacuate the building.	between the flats and the residential corridor to 60 minutes (REI 60) is considered sufficient to achieve this strategy, and no further enhancements to fire resistance are considered necessary. Smoke from a fire in a residential flat could spread to the common corridor when an occupant makes their way to escape. The detection to the corridor will activate the smoke ventilation system provided to the corridor or lobby in front of the stair. Where there is a fire in the service risers, similarly smoke could spread to either the corridor or lobby access to the stair. It is noted that some stair cores have lobby access (where flats open into a ventilated the enclosure that opens to the stair) and some have corridor access. It could be considered that both layouts protect the stair sufficiently. As the layout is not consistent across the scheme there could be some risk of confusion for the Fire Service during operations. Additionally where lobby access is provided to the stair some flat doors are located closer to the stair door than where corridor access is provided, this could potentially allow smoke into the stair where the flat doors are closer when occupants are making their escape. Occupants are provided with a refuge location in the stair, such that a managed process can be followed to allow for the evacuation of mobility impaired users, or those otherwise unable to evacuate down the stairs without assistance. Note for fire service access to the corridor providing access to means of escape stair Core C2 a firefighting lift is only accessible from Core C1 (which is the firefighting stair), although it is still a short (<10m) distance from Core C2. This trial design could be considered sufficient to address the risk of fire in a residential flat

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
			or service risers spreading to the stair, however some improvements could be made with respect to mobility impaired evacuation and the ventilation system arrangement.
2.	- Every flat is separated from the residential corridor by 60 minutes fire resisting construction, and associated E 30 Sa door sets; - The corridor is provided with L5 category detection; - All flats have access to more than one stair; - The fire fighting stairs are arranged such that they open into a smoke ventilated lobby providing access to the stairs and lifts, with flats accessed from this lobby via unventilated corridors less than 7.5m in length; - Three firefighting stairs are provided and one means of escape stair; - All firefighting stairs (Core A, B and C1) have an associated firefighting lift and an evacuation lift; - Each stair is provided with a refuge location; - The means of escape stair is not provided with a lift, but the stair has been located as close as possible to the Core C1;		All stair firefighting cores are provided with corridor access (i.e. flats are accessed of an unventilated corridor and all stairs are approached by way of a ventilated lobby/corridor. This will assist in preventing smoke spread to the stair even further. Each core (with the exception of core C2) is provided with a dedicated evacuation and dedicated firefighting lift. Stair Core C2 has been located closer to stair core C1 such that access to the lifts in Core C1 are as close as is possible for use for flats in the C2 corridor. Stair C2 is provided with a refuge such that occupants can wait to be assisted to an evacuation lift. This trial design could be considered sufficient to address the risk of fire in a residential flat or service risers spreading to the stair and improves for mobility impaired escape, however Core C on level 10 is only provided with one firefighting lift and evacuation lift as such there is no redundancy should one of these lifts be out of service which could be improved.
3.	- The means of escape stair (Core C2) is provided with a dry fire main; - Both lifts in Core C1 are provided as dual purpose firefighting and evacuation lifts.		Both lifts in Core C1 are provided with dual purpose firefighting and evacuation functionality, such that when lift is out of use for maintenance the alternative lift can be used for both evacuation and firefighting. It is not expected that mobility impaired evacuation will impact on the Fire Service intervention, as the evacuation is expected to be completed before the Fire Service arrive

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
			due to only the flat of fire origin evacuating and the small (6) number of flats on Level 10. A dry fire main has bene provided as an enhancement to the means of escape stair such that the Fire Service have tactical options for firefighting on Level 10. This trial design could be considered sufficient to address the risk of fire in a residential flat or service risers providing further enhancements to the design with evacuation lifts and an extra dry fire main in the means of escape stair.

6.4 Trial designs 4. – Non-residential use areas

Iteration s of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
1.	All Areas: - Separated from the residential levels and firefighting/means of escape shafts by 120 minutes fire resistance. - Provided with category L3 detection. - Commercial sprinkler system to BS EN 12845. Parcel room: - No fire safety provisions. Commercial unit: - Separated from the residential areas of the building by a compartment wall achieving a minimum of 60 minutes fire resistance. Plant rooms: - Separated from the ground floor amenity by 30 minutes fire resistance. Cycle store: - No fire safety provisions.	5. Fire in the parcel room. Possible fire sources: - Packaging and cardboard; - Combustible storage. 13. Fire in the commercial unit. Possible fire sources: - Food preparation equipment; - Commercial storage. 7. A fire in the plant rooms. 8. A fire in the bike store. Possible fire sources: Electric bike batteries.	All areas: Minimum detection of L3 could be considered sufficient to address the risk of fire in any day-to-day occupied space. There is some risk that spaces that are not occupied on a day to day basis or are occupied for short times infrequently could have a fire and occupants would not know. It is considered that this trial design could be sufficient to address the hazards, but earlier warning would provide an enhanced benefit. It is not considered that the commercial sprinkler system requires any upgrade from the existing design. Parcel room: The parcel room is a storage space that by ADB guidance does not require further fire safety protection measures. It is noted however that a lot of packaging and combustible materials are proposed to be stored in this space, such that the fire loading could be considered as larger than other ground floor non-storage spaces.

Iteration s of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
			This trial design may not be sufficient to address the risk of the increased fire loading from the storage materials. Commercial unit: The commercial unit is separated from the residential amenity ground floor by a compartment wall achieving 60 minutes fire resistance. It is not known what the ground floor commercial unit will be used for, but any storage in this space will be associated with a different fire loading risk than that of the rest of the ground floor amenity spaces e.g. any storage of combustible materials or kitchen and food preparation units. Were the use of this space to be changed in the future the fire resistance may not be considered sufficient to address the associated hazard of fire risk in the space. Plant rooms: No atypical design is associated with any of the plant rooms, and in accordance with ADB the rooms of special fire hazard should be provided with 30 minutes fire resistance. It is not considered that increasing the fire resistance of the plant spaces would provide any extra benefit to mitigate the risks of any fire hazard. It is however noted that some services run along the corridor providing access to the fitness studio and switch rooms. This trial design could be considered sufficient to address the risk of fire in the plant rooms but the route to the switch room could be further protected form services. Bike store: A bike store fire is not a risk considered within the guidance of ADB, as such no fire resistance to the space would need to be considered. A relatively new risk of fire loading is associated with electric bike batteries. It is considered that electric bike batteries increase the risk of fire loading to the space. This trial design is not considered sufficient to address the risk of electric bike batteries.
2.	All Areas: – Separated from the residential levels and		All areas:

Iteration s of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
	firefighting/means of escape shafts by 120 minutes fire resistance; – Provided with category L1 detection; – Commercial sprinkler system to BS EN 12845 and LPC rules. Parcel room: – Enclosure of construction achieving 30 minutes fire resistance. Commercial unit: – Separated from the residential areas by a compartment wall achieving a minimum of 120 minutes fire resistance. Plant rooms: – Separated from the ground floor amenity by 30 minutes fire resistance; – Sprinklers provided to the corridor approach. Cycle store: – Cycle store separated by 120 minutes fire resistance. – Cycle store accessible from external by the fire service (if required). – No charging facilities provided within the cycle store.		Enhanced detection will be provided to the ground floor i.e. L1 detection. This will provide detection in all areas. The sprinkler system will be provided with enhancements in accordance with LPC rules. It is considered that this trial design could be sufficient to address the hazards. Parcel room: The enclosure of the parcel room when provided with 30 minutes fire resistance, and the sprinkler system will ensure that if a fire does start in the parcel room the fire will be maintained to the compartment for a reasonable time prior to Fire Service intervention and allow safe escape for all occupants on the ground floor. This trial design is considered sufficient to address the risk of the combustible storage in the parcel room. Commercial unit: The commercial unit is separated form the residential development by fire resistance required of that of the same as elements of structure. It is considered that this trial design mitigates the hazard of any fire with commercial storage or kitchen and food preparation from that of the residential development areas. Plant rooms: Services open to the corridor approach are considered reasonable on the basis of the provision of sprinkler s to the corridor. Any fire risk associated with the services will be kept to the corridor enclosure or in best case extinguished. This is considered a significant enhancement and this trail design could be considered sufficient to address the risk of fire in the plant space or corridor providing access. Cycle store: The cycle store is separated from the rest of the development by construction achieving 120-minute fire resistance. Access is also provided directly from the external such that the fire service can operate from the external. This trial design could be considered

Iteration s of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
			sufficient to address the risk of an electric bike fire and protect the rest of the development from fire spread.

6.5 Trial designs 5. – Roof use

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
1.	Brown Roof: – The roof is provided with a covering material achieving BROOF(t4); – Where vegetation is provided green roof and wall safety provisions are to be considered;	10. Fire on the Brown roof. Possible fire sources: – Vegetation; – PV panels.	Brown Roof: A fire on the roof could spread through the vegetation or growing medium located on the roof, such that spread is worse where materials are not achieving BROOF(t4). Fire in PV panels could also cause spread across the vegetation or roof. This design is not considered sufficient to address the risk of fire on the brown roof, Fire safety guidance is needed to be considered for vegetation similar to green roofs.
2.	Brown Roof: – The roof is provided with a covering material achieving BROOF(t4); – Fire breaks are provided around openings into the building (i.e. roof lights, SVPs, RWPs, – PV panels are provided with fire breaks; – Fire breaks are provided in the vegetation every 40m; – PV panels are provided with a cut-off switch; – PV panels are provided with Arc fault protection.		Brown Roof: The potential for fire in the PV panels is mitigated by the cut-off switch, preventing power generation. Were a fire to still occur the fire break between the vegetation and the panel will assist in preventing fire spread across the vegetation. The vegetation is separated into 40m by fire breaks to prevent the risk of fire spread throughout the roof. All openings into the building are separated form the vegetation by fire breaks to prevent fire and smoke spread into the building. This design could be considered sufficient to address fire spread on the brown roof.

6.6 Trial designs 6. – Electric Vehicles.

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
1.	– No car parking spaces are provided within the building. – Parking spaces for people with mobility impairments are provided adjacent to the building on Letcombe street. – No electric vehicle charging facilities are provided to the mobility impaired spaces. – Façade materials achieve A2-s1,d0.	11. EVs parked adjacent to the building.	No carparking spaces are provided within the building as such it is not considered there is a risk of an EV fire occurring in the building. Fires in EVs are more likely to occur during charging, no charging facilities are proposed to be provided to the external carparking spaces. There is a possibility that an EV could be parked in one of these spaces and set on fire. However, the spaces are located approximately 4.8m from the external wall of the building and the external façade materials of the building are in line with Regulation 7 and proposed to achieve A2-s1,d0 (with permitted exceptions). Any fire that would occur would be open to the external air and hence allow heat and smoke to vent directly to atmosphere. On this bases this trial design could be considered sufficient.

6.7 Trial designs 7. – Structural fire resistance and façade design.

Iterations of trial design	Design element fire Safety provisions	Fire Hazards considered	Qualitative and quantitative assessment to be undertaken
1.	Elements of structure: – Minimum of 120 minutes fire resistance; Façade: – External wall construction should achieve A2-s1, d0 in accordance with Regulation 7.	13. Fire	The building structure is provided with the highest level of fire resistance that is listed within ADB guidance. Furthermore the requirement for 120 minutes fire resistance is introduced for buildings over 30m. The Letcombe street development is only just over this threshold (32m) and as such this is not expected to introduce an additional risk. The building is used for residential purposes, sprinkler protected throughout and consists of traditional building materials and is typical in its structural design. Therefore it is not considered necessary to increase the fire resistance of the elements of structure. After completing an external fire spread analysis it has not been considered necessary to provide any façade as fire resisting construction. All façade construction should achieve A2-s1,d0 and the requirements of Regulation 7. This design could be considered sufficient to address all hazards considered as part of the QDR.

7. ‘What-if’ analysis.

7.1 Item 11 – Sprinkler failure

7.1.1 Associated risks

Fire could remain uncontrolled to a single fire resisting compartment and therefore involve more combustibles, consequently creating more onerous conditions for escape prior to Fire Service intervention.

7.1.2 Qualitative assessment

The building is to incorporate a Category LD1 AFD system throughout the flats . Each storey will each have a minimum of two means of escape stairs. Each stair core will be protected by separate mechanical smoke control systems. If the sprinklers were to fail, the high level of fire compartmentation, early detection in place, and smoke ventilation, would enable evacuation to proceed swiftly. It should be noted that travel distances within common corridors are not excessive (with some via external balconies). Additionally, regular inspections, maintenance and testing of the sprinkler system will be incorporated therefore limiting the risk of sprinkler failure.

For fire spread on the ground floor, all residential levels are separated by 120 minutes fire resisting compartment floors, such that fire could be expected not to impact the residential floors for a reasonable time prior to Fire Service intervention.

It is noted that both the residential sprinkler system is designed to category 4 in BS 9251 which provides backup power and pump sets which increase the reliability of the system. The commercial system is designed to BS EN 12845 incorporating the LPC rules which again provides additional reliability to the sprinkler design.

As detailed in PD 7974-7:2021, statistical data shows overall reliability for sprinkler systems for all building types to be 88% or 94.3% (as based on different collections of studies undertaken). Therefore, it is considered that the risk of sprinkler failure is sufficiently mitigated in consideration of the type of building and high level of management to be implemented for the building.

7.2 Item 12 – Firefighter lift fails to operate

7.2.1 Associated risks

Firefighter’s intervention is delayed as swift access to the flat of fire origin would only be accessible through the firefighting stair or via one of the other firefighting lifts in another core. Consequently, the fire will likely continue for a longer period of time and therefore increase the duration of exposure for structural members. Further, although the fire is likely to be controlled by the sprinklers, there is also a risk of additional fire spread within the compartment.

7.2.2 Qualitative assessment

The firefighting lift is separated from the flats via a protected lobby (provided with smoke ventilation) and corridor smoke ventilated via a mechanical smoke ventilation system. It is considered that this in conjunction with the high level of fire compartmentation, Category LD1 AFD system, and sprinkler system (as detailed previously) provides an adequate level of protection to the firefighters lifts. It should also be noted that each floor is served by a minimum of two firefighting lifts. As such in the event one lift is down for maintenance an alternate lift will always be available.

Each firefighting lift is to be provided with an independent secondary power supply (as per the guidance of BS 9999) which will provide a redundancy to ensure lift operability during a fire and the shaft will be protected as a protected shaft.

Any sprinklers installed in the firefighting lobby should be sited such that they do not drench the lift landing doors or controls in order to limit the risk of water ingress into the lift well (accordance with Annex N of BS 9999). Electrical equipment within the firefighting lift well and on the car should be protected against water in accordance with BS EN 81-72, this may be achieved through the provision of drainage channels and drainpipes which transfer any water entering the lobby into the smoke shaft as opposed to entering the lift stair.

With the above implemented, it is considered that a firefighter lift failing to operate is adequately mitigated, especially given the provision of a minimum of two separate firefighting lifts per storey.

7.3 Item 13 – Evacuation lift fails to operate

7.3.1 Associated risks

Evacuation of mobility-impaired persons is delayed as swift access to the floor of fire origin and from it, in managing evacuation, would only be accessible through the stair. Consequently, mobility impaired occupants may be exposed to a fire for a longer period of time and therefore increase the duration of exposure of untenable conditions to persons waiting to be evacuated via the evacuation lift.

7.3.2 Qualitative assessment

The evacuation lift is separated from the flats via a protected lobby and corridor smoke ventilated via a mechanical smoke ventilation system. A refuge is located in the stair for occupants to wait prior to assistance to the evacuation lift. It is considered that this in conjunction with the high level of fire compartmentation, Category LD1 AFD system, and sprinkler system (as detailed previously) provides an adequate level of protection to the firefighter lift.

It should also be noted that each floor of each residential block is served by a minimum of two evacuation lifts, thereby if one is out of action for maintenance or failure, it is considered there is always an alternative evacuation lift in close proximity.

7.4 Item 14 – Compartmentation failures

7.4.1 Associated risks

Any breaches or faults within the compartmentation introduces the risk for smoke and heat to spread beyond a compartment. Several trial designs herein this QDR in part rely on adequate compartmentation, i.e. protected shafts, protected corridors, fire resistance between apartments/suites etc.

7.4.2 Qualitative assessment

In accordance with Table B.7 in PD 7974-7:2021, with fire resisting construction provided it has been determined from historical data from USA incidents, 1989-1994, that in 77% of the cases the extent of the fire damage was constrained to the room of fire origin. With the provision of detection and sprinkler system, this is increased to 95% with 3% of the cases being constrained to the floor of fire origin. Further, with fire resisting construction omitted, although detection and a sprinkler system remain, the historical data implies that in 92% of the cases the fire will be constrained to the room of fire origin.

Additionally, in consideration that the building will be provided with management presence; the regular inspection and maintenance of fire safety provisions within the building will reduce the risk of any compartmentation failures.

It is noted that the development is designed as a build to rent development as such JLP will retain control over any works carried out within the building and as such can ensure that refurbishment works to flats do not compromise the compartmentation within the building.

As such, with the provisions of an automatic fire detection system and sprinkler system throughout the building it is considered that the risk of internal fire spread is mitigated. It should be noted, however, in order to avoid reliance on fire stopping in certain cases it is recommended that no air ducts are provided between residential flats.

7.5 Item 15 – Automatic fire detection fails

7.5.1 Associated risks

Were the fire detection system to fail to operate, it is considered that the time taken for occupants to begin their evacuation would be prolonged. Further evacuation of mobility-impaired persons by building management would also be delayed, as well as response by the fire brigade.

7.5.2 Assessment

The detection system in the communal areas is designed to BS 5839-1 and the detection system in the apartments is designed to BS 5839-6. Both these systems are designed with a number of redundancies to decrease the likelihood of detectors failing to operate. Should a detector in the communal areas of the building have a fault this will be identified on the fire alarm panel where investigation work can be undertaken.

Traditionally detectors in residential flats have less control over them from management, however, the apartment systems are designed to be Grade D2 which consists of a mains fed detector with a battery backup supply.

It is noted that the proposed that the detection system in the flats is linked to the panels such that should there be a detector activation within a flat the building management are made aware.

In addition as the development is provided as a build to rent development JLP will retain management of the building and as such will be able to implement a management policy to replace flat detectors as they come towards the end of their life.

Sprinklers are to operate either on excessive heat as caused by the fire (independently from the automatic fire detection system). Therefore, were the automatic fire detection system to fail the sprinklers are assumed to still operate and therefore be capable of controlling the fire if not extinguishing it. On this basis, it is considered that the risk is sufficiently mitigated.

7.6 Item 16 – Smoke control system fails

7.6.1 Associated risks

Were the smoke control system within the common corridors to fail to operate, it is considered that the time taken for occupants to begin their evacuation could be prolonged as occupants wait for smoke to clear, or smoke will spread to the stair. Further evacuation of mobility-impaired persons by building management would also be delayed, as well as response by the Fire Service.

7.6.2 Assessment

Each smoke ventilation system will typically be provided with duty and standby fans with mains and back-up power supplies and therefore, a full system failure is not likely. Notwithstanding the above, should one of the mechanical fan assisted smoke shafts fail completely, the provision of LD1 fire detection and alarm systems will ensure that the occupants of the flat of fire origin will receive an early warning of the fire and the sprinkler system will limit the fire size to enable a swift and safe evacuation of the occupants. Once occupants have evacuated the flat of fire origin, the fire compartmentation around the flat in conjunction with the sprinkler system will assist in mitigating further fire spread. As mentioned previously, there are no excessive travel distances within the corridor and therefore there is a short travel distance between each flat and the nearest protected staircase. Each storey has more than one direction of escape and a minimum of two stairs, in the worst-case scenario were smoke to spread throughout one stair the alternate stair is available for escape. As all residential corridors are provided with corridor access, the door to the unventilated section of the corridor would close using the self-closing devices preventing smoke from spreading to the protected stair lobby. Additionally some of the flat access corridors are balcony access such that smoke could dissipate to the atmosphere.

8. Conclusion.

This document outlines the Qualitative Design Review (QDR) for the former John Lewis Depot, Letcombe Street site in Reading.

The purpose of the QDR process is not for approval or sign off of the design, which is achieved by the Building Regulation application stage (i.e. at the Gateway 2 process).

This report is to be considered a working document to assess design choices and their considered effect to the fire safety risk within the site and further to determine whether the recommendations within guidance document Approved Document B – Volume 1 (2019 with 2020 and 2022 amendments) are considered appropriate.

This document will also be issued alongside the Gateway One form to provide background information to the fire strategy design decisions made throughout the early design process.

A follow up meeting will be carried out to discuss the outcomes of this report as the design progresses further through the design process.

The design of the building is considered to fulfil the function requirements of The Building Regulations 2010 (as amended).

References.

- [1] British Standards Institution (BSI), *BS 7974 : Application of fire safety engineering principles to the design of buildings - Code of Practice*, 2019th ed. BSI Global, 2019.
- [2] Department for Communities and Local Government (DCLG), *Approved Document B : Fire safety Volume 1 - Dwellings 2019 edition incorporating 2020 and 2022 amendments*, 2019th ed., vol. 1. 2022.
- [3] Her Majesty's Stationery Office (HMSO), *The Building Regulations 2010, England and Wales*. The Stationary Office, 2010.



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