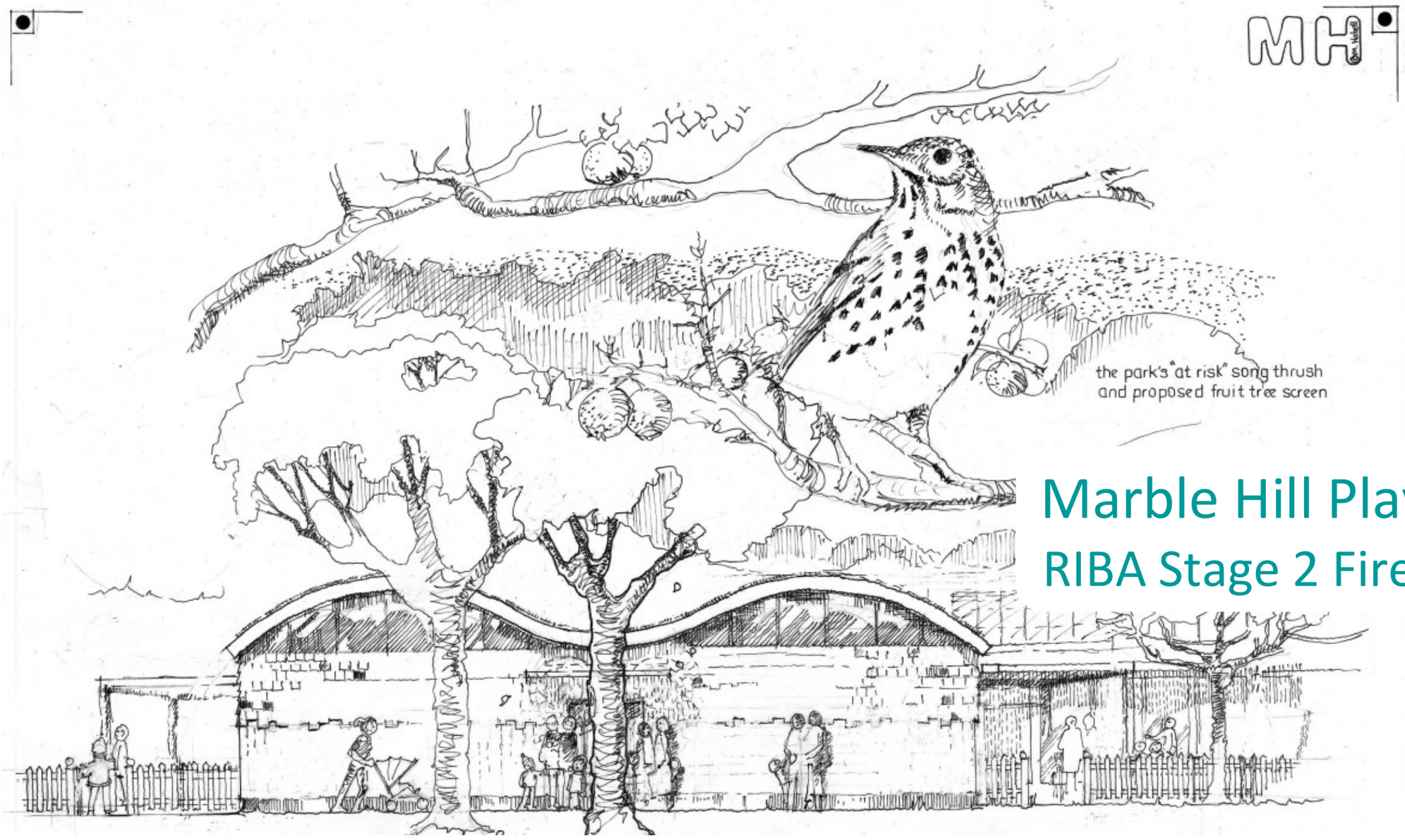
FIRE + RISK CONSULTANTS



Marble Hill Play Centre

RIBA Stage 2 Fire Strategy

Revision: R01
Date: 25/06/21
Project Number: LO21109

Prepared for:	Marble Hill Community Project
Project Location:	London
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Quality Management

Revision	Date	Comment	Author	QA & Technical Review	Approver
R00	23/06/2021	First issue for comment	L. Caddy	K. Watson	D. Maeso
R01	25/06/2021	Update to capture client comments	L. Caddy	K. Watson	D. Maeso

Contents

1 INTRODUCTION

1.1 Appointment and Project Summary

OFR Consultants (OFR) are assisting the Marble Hill Community Project with the development of the fire safety strategy for the new Marble Hill Play Centre, located near Twickenham, London.

The strategy described herein has been developed to demonstrate how compliance with Part B of Schedule 1 to the Building Regulations (2010, as amended in 2018) may be achieved.

OFR have been engaged following the development of the drawing information and submission of the planning application. At the next stage, it is OFR's understanding that a full design team will be appointed, and the plans will be developed in cognisance of this outline fire strategy.

1.2 Report intent

This report is commensurate with a RIBA Stage 2 level of detail, and thus can be considered a concept fire strategy. The aim of this report is to advise the client and design team of the legislative requirements, challenges, design options that should be considered as the design progresses. These include elements of the fire safety design that present a deviation from standard guidance and represent an approvals risk.

This report is intended to document the strategic fire safety design approach to be adopted rather than provide detailed construction and specification information. Following comment from the design team, this report is intended for submission to approval authorities for their information and to progress the regulatory approvals process.

1.3 Drawing Information

This report is based on the work in progress drawing information produced by Martin Habell architects, as documented within the planning application published on the 8th of March 2021. It is noted that these drawings are a work in progress and will be developed further at the next design stage.

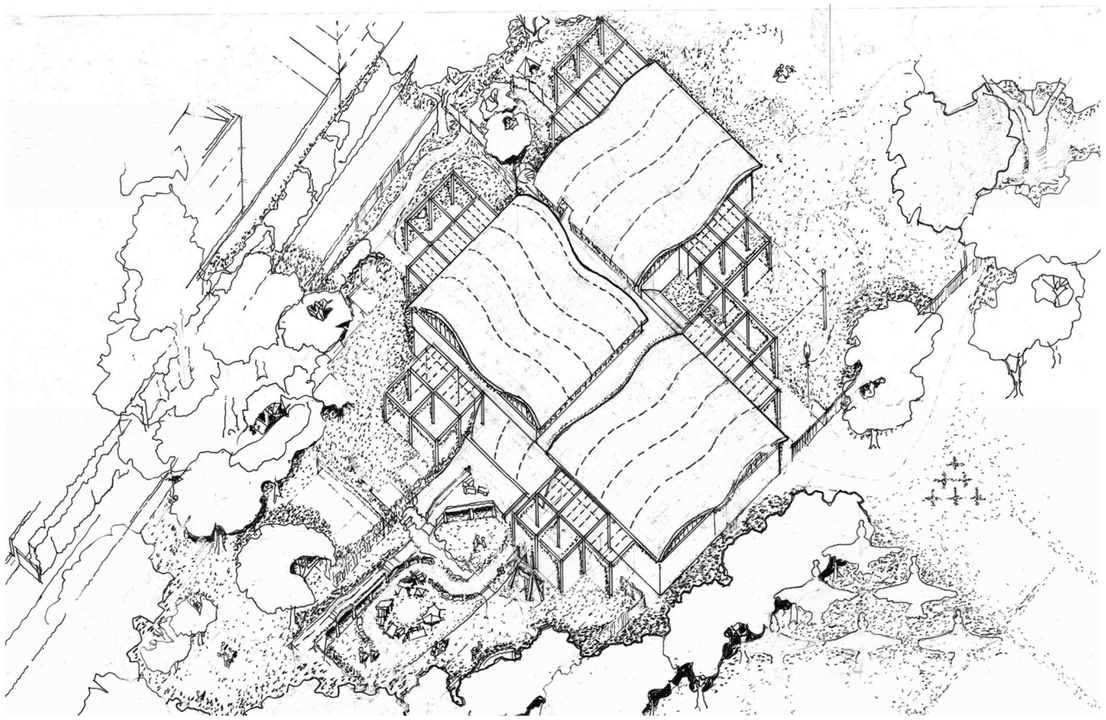

Figure 1: Bird's Eye View of Proposal

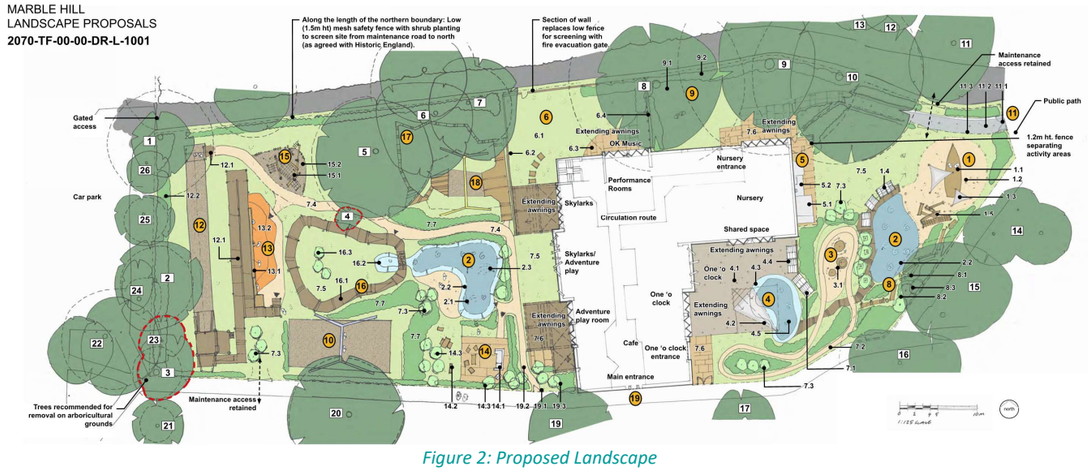

Figure 2: Proposed Landscape

1.4 Building Overview

The proposal is to demolish the existing buildings on site and in their place construct the new Marble Hill Play Centre. The proposed building against the existing construction is illustrated as per Figure 3.

The proposed two storey building is to be a play centre which will operate as a space providing support to special needs children and as such has been designed in consideration of the needs for occupants who may need assistance in escaping. It is also noted that this building will operate under a high level of management.

As part of this assessment, it is assumed that the occupants within the building may be unfamiliar with their surroundings given occupants will require assistance in escape. Although it is expected that they are going to be accompanied by staff for the entire time, who will be familiar with the layout and exits. This forms part of the risk profile as outline in Section 1.5.The proposed ground and upper floor arrangements are to consist of a number of community and back of house areas, all connected off a shared circulation corridor. The respective exits into the corridors vary across the spaces.

The proposed building sits at a height of 2.5m, as measured from the ground floor access level to the first floor, as this is the highest occupied floor of the building.

1.5 Risk Profile

In BS 9999:2017, guidance on the fire strategy design is informed by risk profiles, which are derived by the occupancy and the expected fire growth rate. The relevant occupancy characteristics are:

- A: Occupants who are awake and familiar with the building; and
- B: Occupants who are awake and unfamiliar with the building.

Fire growth rates are given a numerical risk rating between 1 and 4 to describe the characteristic growth rate, with the relevant growth rates being:

- 1: Slow;
- 2: Medium; and
- 3: Fast.

The relevant risk profiles for the development based on this consideration are given in Table 1.

Table 1: Risk profiles

Occupancy	Risk Profile	Comment
Community Areas	B2	Typical for expected use of space, also considering occupants may be unfamiliar with space given they will require assistance in escape.
Back of house plant and storage areas	A3	Typical for plant / storage areas.

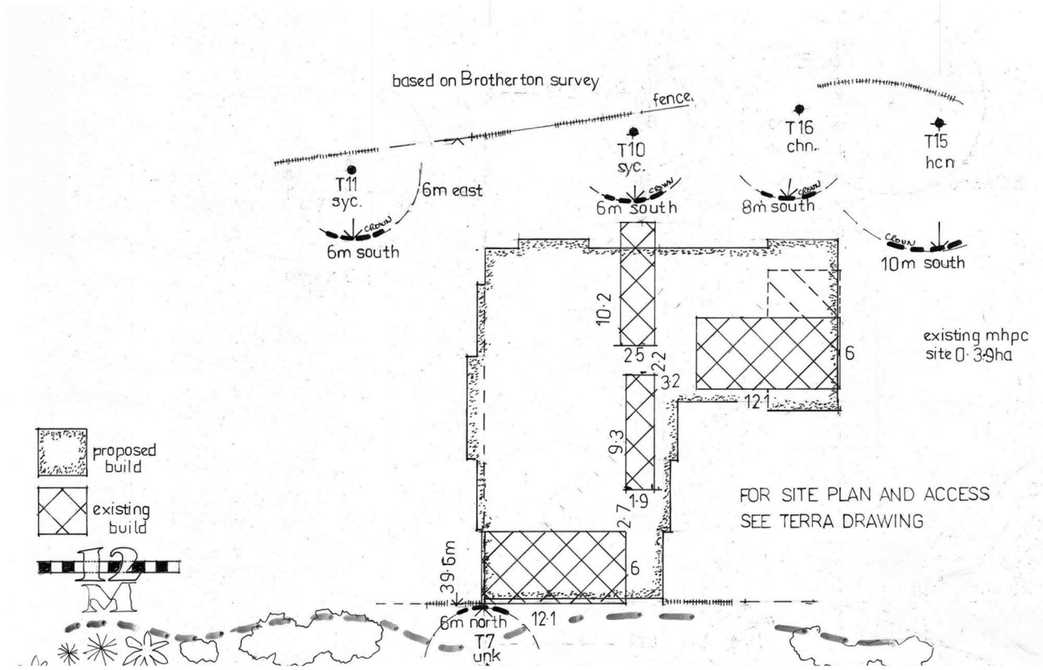

Figure 3: Proposed build against existing

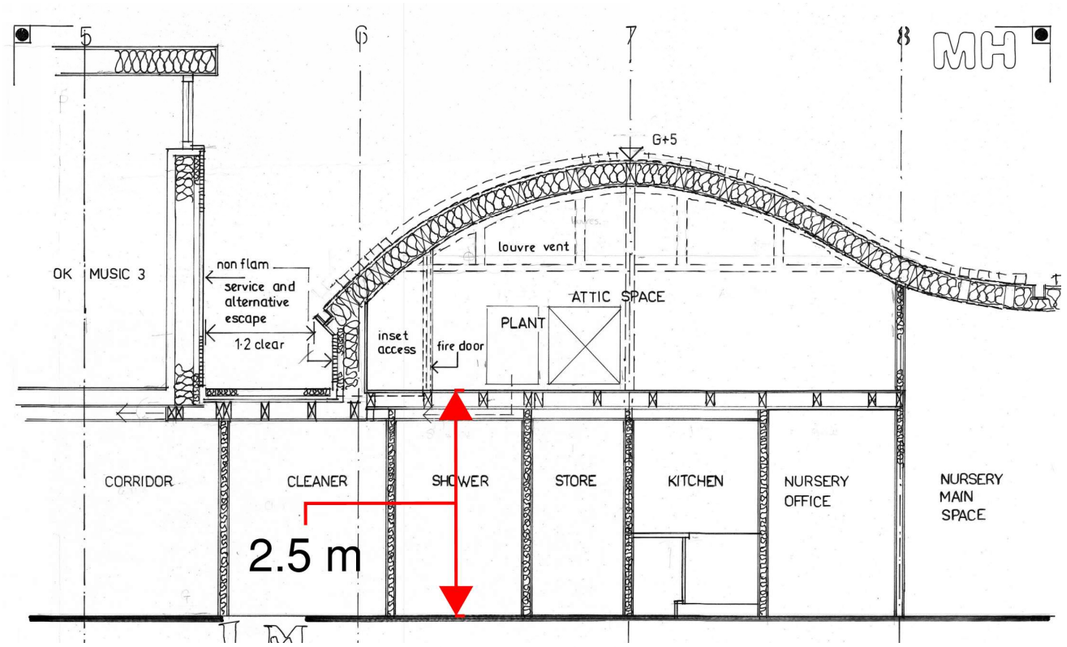

Figure 4: Proposed section

1.6 Legislative Requirements

Fire safety of building works is legislated by the Building Regulations 2010 (as amended in 2018) “the Regulations”. The Regulations have been enacted under the Building Act 1984 and are published by the Controller of Her Majesty’s Stationery Office (HMSO). The Regulations impose requirements on people carrying out building work. The requirements are functional rather than prescriptive in nature which means that the designer is given the freedom to choose the method they use to satisfy the legislation.

This outline strategy intends to demonstrate compliance through addressing the requirements of Part B of the Regulations that governs fire safety of building design. These requirements are segregated into distinct aspects of building design as follows:

- B1 – Means of warning and escape;
- B2 – Internal fire spread (linings);
- B3 – Internal fire spread (structure);
- B4 – External fire spread; and
- B5 – Access and facilities for the fire and rescue service.

All aspects of the fire safety design remain subject to review by the Building Control body (including their statutory consultation with the local fire and rescue service), and, ultimately, formal approval by the Building Control body.

The strategy has been developed to demonstrate how the requirements for fire safety under the Building Regulations 2010 (as amended) can be satisfied, using primarily the guidance contained in BS 9999:2017.

At the relevant stage, this report is to form part of the information pack handed over to the building operators under Regulation 38 to assist the responsible person to operate and maintain the building with reasonable safety in accordance with the Regulatory Reform (Fire Safety) Order 2005 “FSO”.

The strategy has been developed in cognisance of the Construction (Design and Management) Regulations 2015 (CDM 2015), which sets out what designers are required to consider in order to protect anyone involved in the construction or ongoing use of a project. The strategy does not address site fire safety during the building works. The Health and Safety Executive (HSE) issues guidance notes on identifying and managing fire precautions during the works and they should be consulted by the appropriate party.

Unless explicitly stated in this report, all design elements are expected to be in accordance with the relevant Approved Documents and / or British Standard and / or best practice guidance.

1.7 New London Plan

The New London Plan was published in March 2021 and is now readily available. The Plan is part of the statutory development for London, meaning that the policies in the Plan should inform decisions on planning applications across London. In support of the New London Plan, three draft guidance documents outlining the details required to comply with Policies D5 and D12 have been released under the reference Draft Fire Safety Guidance (pre-consultation, for information), these can be referred to for specific guidance on these points.

Policy D5 ‘Inclusive Design’ of the London Plan requires developments to incorporate evacuation lifts to ensure safe and dignified emergency evacuation for all building users, including those requiring level access from the building.

Policy D12 of the London Plan requires development proposals to achieve the highest standards of fire safety, embedding these at the earliest possible stage.

The new Marble Hill Play Centre is located within the plan’s jurisdiction. Furthermore, the majority of occupants within the centre will have mobility impairments, requiring a high degree of assistance to evacuate. It is therefore recommended that consideration is given to the New London Plan and the provision of evacuation lifts within the building. This is however to be aligned with any future planning applications and the relevant provisions provided, further detail is outlined within Section 4.5.3.

2 Fire Strategy Summary

Table 2 provides a summary of the various fire safety features for the building.

Table 2: Fire strategy summary

Fire Safety Element	Provision
Height to top-most occupied floor level	2.5 m
Evacuation Strategy	Simultaneous evacuation of entire building
Fire alarm and detection	L2 in accordance with BS 5839-1
Structural fire resistance rating	30 minutes (Load bearing capacity)
Compartmentation / fire resisting separations	30 / 60 minutes fire resistance to store / plant rooms 30 minutes fire resistance to stairs / lift shafts and proceeding protected lobbies 120 minutes fire resistance to any rooms containing life safety equipment
External Wall Requirements	Entire façade to meet Class B-s3, d2 30 minutes REI party wall to south elevation
Roof protection	$B_{ROOF}(t4)$
Firefighting	Perimeter access from Beaufort Road

3 KEY ITEMS OF THE FIRE STRATEGY

Table 3 provides a summary of the key design challenges for the development. This table highlights the key areas of the fire safety design that require the attention of the design team and the approval authorities.

Table 3 - Significant Items for the Attention of the Design Team and Approval Authorities

Item	Proposal
Evacuation of Mobility Impaired Persons (MIP)	For the building, given the consideration for an increased amount of MIP occupants as part of this design proposal for the Marble Hill Play Centre, it is recommended that the lift core should be designed as an evacuation lift. This evacuation lift would allow occupants within the upper floor of the building to egress through the lift to a protected space at ground floor., The protected route at ground floor should also provide level access for the MIP occupants to complete escape from the building. It should also be noted that the size of the space for MIP occupants to wait should be sufficiently large and a suitable number of evacuation lifts should be reflective of the expected number of MIP occupants within the building. In this instance it is therefore recommended that additional space within this lobby/corridor and further lifts be provided to this building.
Active Fire Safety Systems - Sprinklers	As part of the design it is not necessary to provide sprinklers for life safety, this is not required as per guidance recommendations for this building as per BS 9999. It should be confirmed in line with the client and insurers viewpoint that this is not expected as part of the design.
External Fire Spread – Proximity to boundaries	Based on the assumed site boundary, the North, East and West facing elevations do not require fire protection. However, the South facing elevation currently sits within 1 m on the site boundary and therefore should be constructed as a compartment wall, having 30 minutes of fire resistance (REI). This includes any window openings, which should be unopenable to maintain the integrity of the party wall. These boundary assumptions will need to be confirmed.

4 Means of Escape

4.1 Evacuation Strategy

The proposed Marble Hill Play Centre is to operate under a simultaneous evacuation strategy, whereby all areas of the building simultaneously evacuate in the event of a fire anywhere within the building.

4.2 General Escape Provisions

BS 9999:2017 advocates various fire safety provisions as functional risk profile, which is derived from a combination of the occupancy characteristic and the expected fire growth rate. The BS 9999 recommendations for travel distances and horizontal escape widths for the proposed building in line with the proposed risk profiles are outlined in Table 4.

Direct and actual travel distances have been listed for all cases, as not all the floor layouts are known at this stage. When the final fit-out layout is known, the actual travel distances will need to be complied with throughout.

The capacity of each storey exit is to be determined in accordance with BS 9999:2017.

Where a door width is less than 1050mm, the number of persons safely accommodated by that exit width should be calculated using the equation below:

$$N = \frac{500}{M}$$

Where:

- N is the number of persons safely accommodated by the door width; and,
- M is the minimum door width per person [mm].

Where a door is 1050mm wide or more, the number of persons safely accommodated by that exit is the width divided by the minimum door width per person.

If a storey has two or more storey exits, it is assumed a fire might prevent the occupants from using one of them. Therefore, when calculating the aggregate of the exit widths, the exit giving the worst-case scenario will be discounted.

It is noted that, in accordance with BS 9999, the minimum storey exits should not be less than 850mm clear width in consideration of unassisted wheelchair access. A door which provides a means of escape for more than 60 persons should also open in the direction of escape. Doors not opening in the direction of escape will have limited capacity to 60 persons.

It should also be considered that all escape doors are considered an acceptable means of escape. In the current design, the proposed sliding doors are only suitable for escape when they are designed to fail open on loss of power or can break open from any position throughout their operating parameters (see BS 7273-4). This will need to be confirmed to be suitable as part of their inclusion.

As part of the current design, it should also be understood that currently the fire strategy outlines the requirements in satisfying the Building Regulations alone and that the additional requirements as part of any considerations of the London Plan 2021 have not been integrated as part of this fire strategy. These items are outlined in Section 4.5.3 and will need further consideration in line with any planning submissions for the building.

Table 4: Escape Parameters

Occupancy	Risk Profile	Direct Travel Distance (m)	Actual Travel Distance (m)	Exit Width (mm/person)	Stair Width (mm/person)
Community Areas	B2	13 (One directional) 33 (Two directional	20 (One directional) 50 (Two directional	4.10	4.80 (1 floor)
Plant and Storage Areas	A3	12 (One directional) 30 (Two directional	18 (One directional) 45 (Two directional	4.60	N/a
General escape considerations: • Exits that serves more than 60 people should open in the direction of escape. • Exits should achieve a minimum clear width of 800m (850mm where unassisted wheelchair access is necessary, see Clause 16.6.1.b of BS 9999. • Capacity of exits less than 1,050mm in width should be calculated on a clear door width of 500mm, as per Clause 16.6.1 of BS 9999. • Where double doors are provided the clear width of one of the leaves should be not less than 800 mm.					

4.3 Horizontal Escape

4.3.1 Ground Floor

From the ground floor, there are a number of exits from the various room into this central corridor. It will need to be confirmed if any of these spaces also have directly to the outside for escape purposes.

From the shared circulation corridor, there are three final exits across the building as follows:

- One to the south which will be through the main reception for the play centre;
- One to the north which shares the final escape route past the stair and lift core;
- A second one to the north which escapes off to the right of the previously mentioned route.

These three final escape routes are as illustrated in Figure 5. These should typically be separated by cross corridor fire doors to split up and protect the escape routes.

Travel distances within the rooms and along the corridor should be limited to 20m and 50m for one and two directional escapes, respectively. This is inclusive of the layouts within the rooms.

Given the three exits across the building, one exit will typically be discounted, and therefore leaving two alternative exits. At an assumed minimum exit width of 850mm this will allow approximately 277 people to occupy the ground floor. Additional occupants may be able to occupy individual rooms if additional exits are provided direct to the outside. It will also need to be noted in line with Section 4.5.2 that there will be merging flows with the stair and therefore this final exit may need to be increased.

4.3.2 First Floor

From the first floor, there are again a number of exits from the various rooms into the corridor. From the shared circulation corridor, there is one route for escape which is to the stair core located in the north-west corner of the floorplate. This route is also located next to the lift core which is recommended to be used for MIP escape purposes.

An alternative route is available from the north-east corner of the building, which connects with the external roof plant and escape along an external spiral stair directly to the ground floor. This is not to be considered for escape purposes from this level except for the external plant. This is where it is accessed indirectly from the majority of first floor areas and does not provide suitable escape provisions for MIP occupants.

This escape route is as illustrated in Figure 6. The actual travel distances within the rooms and along the corridor should be limited to 20m and 50 for one and two directional escapes, respectively. This is inclusive of the layouts within the rooms.

Given the alternative exit through the external spiral stair will not be suitable for the proposed occupancy which primarily consists of MIP occupants, the occupancy of this level is limited to 60 people unless a second stair suitable for escape purposes is provided. Whereby the travel distance to the protected enclosure of the stair will also need to be within 20m, as currently appropriate.

It is also noted that the stair and lift core should be within a protected enclosure to allow MIP occupants to remain while they complete their escape, it is also advised that consideration to additional lifts / refuges are included on the basis of a large occupancy of MIP occupants within the building, this is further detailed within Section 4.5.3.

From the external plant at this level, escape can be made through the external spiral stair and the travel distances are to fall within the allowable 60m within open air as appropriate.

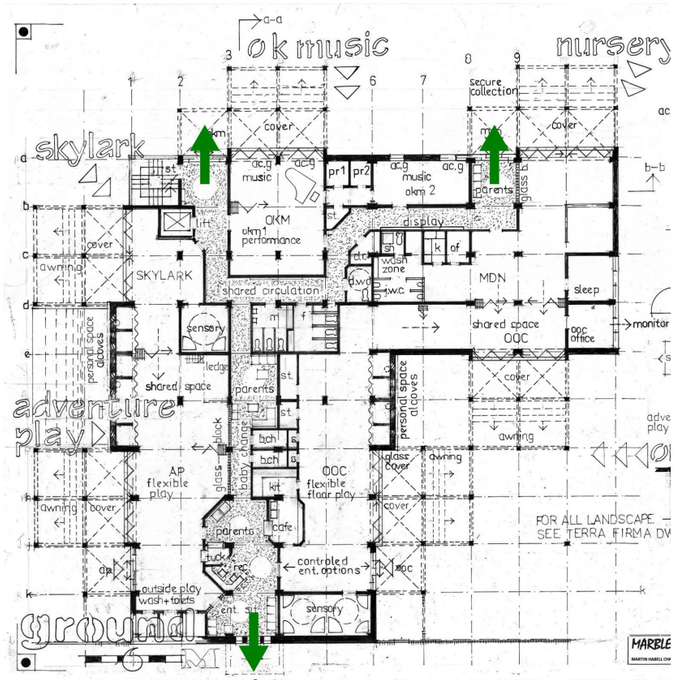

Figure 5: Ground Floor Escape

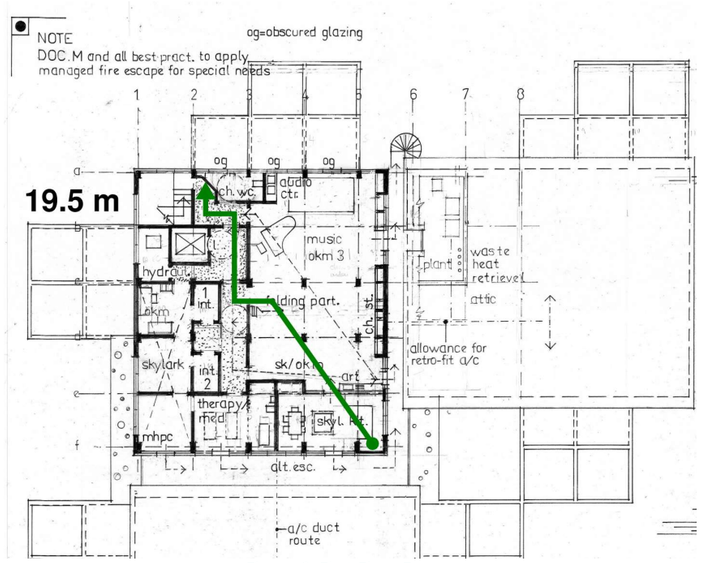

Figure 6: First Floor Escape

4.4 Inner Rooms

As a general note for the designing of the building, any room from which the only escape route is through another room (the access room), is defined as an inner room. An inner room can be at risk if a fire starts in the access room. Access rooms should therefore not be places of special fire hazard, such as storage spaces for fuel or flammable substances. It should also be noted that the occupancy of inner rooms should not exceed 60 persons. All inner rooms should be provided with:

- Visual panels within the doors to the access rooms; or
- Linked fire detection and alarm system to the access room to provide a means of early warning.

It will need to be reviewed as part of the design if any inner room arrangements exist and need further consideration.

4.5 Vertical Egress

4.5.1 Stairs

The building is to be effectively served by a single escape stair, and this will need to provide a protected route for escape out of the building. This stair core should have a minimum clear width of 1,000mm and be enclosed in a fire sterile space which is separated off from the ground and first floors, until escape is complete from the building.

The additional external spiral stair is not to be considered for escape purposes as it is accessed indirectly from the majority of first floor areas and does not provide suitable escape provisions for MIP occupants.

4.5.2 Stair Discharge

The stairs discharge route leading to the final exit at ground level must have the same standard of fire-resisting enclosure and lobby protection as the stair it serves, where all doors should open in the direction of escape.

On the first floor of the building, the stairs should be separated from the community and back of house areas by a protected lobby / corridor. Therefore on the ground floor, the final exit routes should be separated from any room by a protected lobby. This final exit route from the stair is as illustrated in Figure 7.

4.5.3 Evacuation of Mobility Impaired Persons (MIP)

It should be noted that under the Regulatory Reform (Fire Safety) Order 2005, it is the duty of the responsible person along with their appointed safety assistants to assist everyone to a place of ultimate safety outside the building in the event of an emergency.

Within a protect lobby spaces measuring 1400 x 900 mm should be provided to the primary stair core of the building, enabling occupants with impaired mobility to assemble in a place of safety while the other occupants descend/ascend before they make their way out of the building at their own pace or with assistance, if necessary. These spaces are to be located such that they do not impede the movement of occupants onto stairways or escape routes. It is proposed to locate refuges within a protected lobby which should form part with the lift core.

Any disabled member of staff will have a Personal Emergency Evacuation Plan (PEEP) and the procedures are to be practiced. A Generic Emergency Evacuation Plan (GEEP) will need to be written for visitors who would need assistance to escape. An assessment should be undertaken as part of this to ensure that an appropriate management procedure is in place such that at an appropriate number of staff is in place for MIP occupants who need assistance with escape.

Further to the above, and as part of the requirements of the London Plan 2021 outlined in Section 1.7 in addition to those required as part of satisfying Part B of the Building Regulations, the following should be noted as part of the design:

- One lift per stair core should be provided as an evacuation lift with day-to-day functionality;
- The lift / stair core should be contained within a protected fire sterile enclosure, where this enclosure might need consideration regarding smoke ventilation to allow MIP occupants to wait for a potentially extended period of time.

It should also be noted that the size of the space for MIP occupants to wait should be sufficiently large and a suitable number of evacuation lifts should be reflective of the expected number of MIP occupants within the building. In this instance it would be recommended that additional space be provided within this lobby / corridor and further lifts be provided to this building.

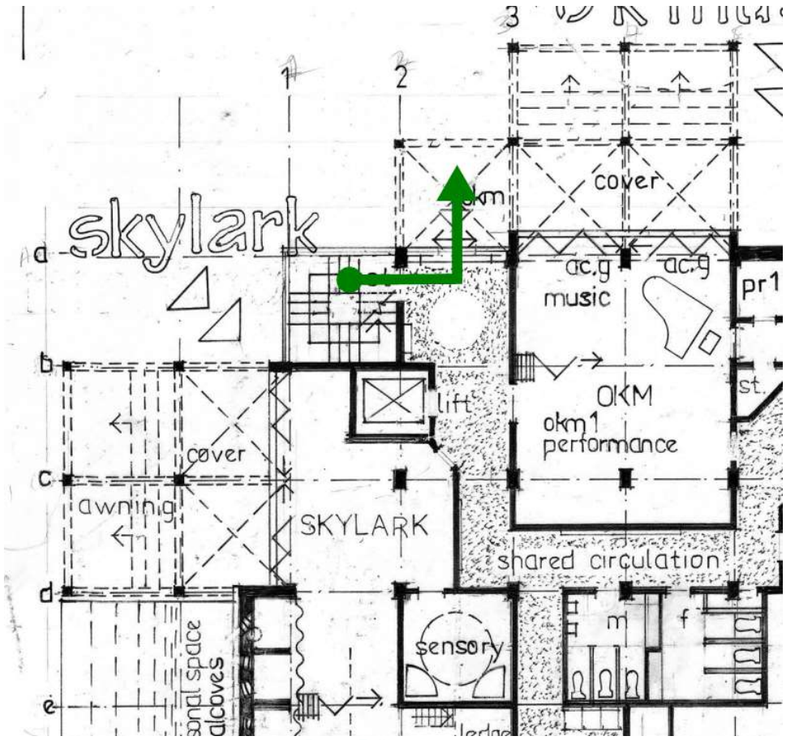

Figure 7: Stair final exit

5 Active Fire Safety Systems

5.1 Fire Detection and Alarm Systems

As a minimum requirement by guidance recommendations, this building only requires a manual fire alarm system. However, given the consideration of providing early means of warning for occupants who may require assistance in escape. It is recommended that all areas of the building should be fitted throughout with a Category L2 fire detection and alarm system, as per BS 5839-1: 2017. Any plant rooms should be treated as places of high fire risk.

5.1.1 Podium and Roof Top Spaces

The roof top areas should be provided with visual and audible fire alarm. Where the alarm provisions will activate with fire detection anywhere within the building.

5.2 Emergency Power Supplies

Emergency power supplies are necessary for all active fire safety systems, these should be designed in accordance with BS 8519, these are required for all of the following:

- Automatic fire detection and alarm system;
- Emergency lighting (to be specified as the design progresses).
- Evacuation lifts for MIP evacuation (Refer to Section 4.5.3).

Some systems (such as lighting and fire detection and alarm) may utilise local battery back-up instead of the emergency generator arrangement. The provision of emergency power supplies will be developed further as the design progresses, with reference to the relevant standard for the fire safety system / provision.

5.3 Emergency Lighting

Suitable lighting will be provided to all premises to enable the safe movement of persons along escape routes to a place of relative or ultimate safety. Emergency escape lighting should be provided in accordance with Table 8 in BS 5266-1:2016, BS EN 1838:2013 and BS EN 60598-1:2021.

Emergency lighting will illuminate all occupied areas, common evacuation routes (internal and external as necessary) and essential areas including plant areas (external plant also). It will also illuminate a safe exit route including fire exits, fire alarm call points, changes in level or direction and fire-fighting equipment.

5.4 Escape Signage

Fire safety signs will be installed in common areas where necessary to provide clear identification of fire precautions, fire equipment and means of escape in the event of fire.

The installation of escape signage and fire safety signs should follow the guidance contained within BS 5499-4:2013. The signs should consist of a graphical symbol, and should normally incorporate, or be accompanied by, a supplementary text sign and an arrow. The graphical symbol should conform to BS ISO 3864-1:2011. All parts of the building will be fitted with appropriate fire safety signage to comply with The Health and Safety (Signs and Signals) Regulations 1996, BS EN ISO 7010:2020+A1:2020 should be conformed with for these purposes.

The purpose of fire signage is to direct persons towards fire exits, or to provide specific information or warning about equipment, doors, rooms or procedures. They should be recognisable, readable and informative, as they convey essential information to regular and infrequent users of the premises, and the Fire and Rescue Service (FRS).

6 Internal Fire Spread

6.1 Linings

Wall and ceiling linings should satisfy those listed in Table 5. Parts of the wall area in rooms may be of poorer performance than specified in this table but not poorer than D-s3, d2. This variation is limited to a total area not exceeding one half of the room floor area, subject to a maximum of 60 m².

6.2 Protection of Elements of Structure

All elements of structure are to be designed to achieve 30 minutes of fire resistance, as per the recommendations of BS 9999: 2017 for an B2 risk profile.

Elements of structure that only support a roof do not generally require fire resistance. Structure is considered to support more than only a roof if it supports a load other than the roof itself (e.g. rooftop plant) or is essential to the stability of a compartment or other fire-resisting wall (internal or external).

It is recognised that timber is to be adopted as part of the structural frame solution. The proposed building is ground plus one storey and falls under Consequence Class 1 (CC1), as per Approved Document for CC1 buildings, STA guidance (*STA Structural timber building fire safety guide: Volume 6 – Mass timber structures)* advocates that adherence to the structural fire resistance periods documented in BS 9999: 2017 is an acceptable route to meeting the requirement B3: Internal Fire Spread (Structure) of the Building Regulations. Therefore adopting the stated 30 minutes fire resistance rating is suitable as part of the fire strategy design.

6.3 Compartmentation and Fire-resisting Separations

Compartmentation and fire-resisting recommendations for development are presented in Table 6. This should be co-ordinated with the design team as the design progresses.

Table 5: Internal lining recommendations

Location	Euro Class
Small rooms ≤ 30 m² in retail units	D-s3, d2
Other rooms	C-s3, d2
Circulation spaces	B-s3, d2

Table 6: Compartmentation and fire-resisting separation recommendations

Elements requiring separation	Fire resistance (mins)
Storerooms	30
Plant rooms	60
Protected lobbies	30
Any room containing life safety equipment	120
Stair cores	30
Lift shafts	30
Risers	30

7 External Spread of Fire

7.1 External Wall Construction

The distance between the proposed external walls and the building's site boundary is less than 1000 mm away on the south elevation (TBC at the next design stage); further to the above the building is to be designed to a B2 risk profile. Therefore the external surface of the entire facade should be of classification Class B-s3, d2 or better, in accordance with BS EN 13501-1:2018.

Cavity barriers should be provided in accordance with Section 33 of BS 9999, such the maximum dimensions in any direction between cavities does not exceed 20m. They should also be provided at the junction between every external / internal cavity wall, and around openings.

7.2 Roof Coverings

For the building, the separation distance is in some instances less than 6 m. Therefore, all roof coverings should be of European Class B_{ROOF} (t4).

It also been noted that a green roof is to be included as part of the design and it is therefore recommended that the *"Fire Performance of Green Roofs and Walls",* issued by the Department for Communities and Local Government, DCLG (August 2013), and "The Green Roof Organisation GRO fire risk guidance document". These documents should be adopted as a basis of design for the green roof proposed in this design. The document assesses the suitability of certain green roofs based on their organic build-up and likelihood to promote fire spread. It describes the fire risk imposed by a typical build-up of a roof garden, that being, a base "growing layer" consisting of organic matter topped by the resulting vegetation / shrubbery above.

Like BS 9999, the document also states that the designer should ensure adequate measures are in place so that a fire in adjacent building will not spread to another building through the medium used to cover the roof. In other words, the material specified will need to resist burning brands and/or radiation from an adjacent building.

The document concludes that if a fire started amongst the vegetation on a green roof, the risk is considered negligible and no different to that of a normal garden or park. However, if the fire penetrates the growing organic layer and breaks through the roof into the storey below that would be a breach of the provisions for external fire spread.

7.3 Fire Spread between Blocks

To limit the potential for fire spread between buildings, the amount of unprotected area permissible upon a building's elevations should be appraised based on their proximity to the boundaries. Following the approach documented within BR 187, the amount of allowable unprotected area (i.e., the area of an elevation offering no fire resistance) of external walls is determined based on building use and compartment dimensions. To mitigate against the direct effects of fire (i.e. external flaming), external walls within 1m of the relevant should be constructed as compartment walls.

An initial external spread assessment has been undertaken based on the assumed site boundary (red in Figure 8) to ascertain whether fire protection of the elevations is necessary – a summary is presented in Table 7. Note that in all cases assessed, the height of the radiating panel has been taken as the full height of the building.

Based on the site boundary shown in Figure 8 (TBC at the next design stage), the North, East and West facing elevations do not require fire protection. However, the South facing elevation currently sits within 1 m on the site boundary and therefore should be constructed as a compartment wall, having 30 minutes of fire resistance (REI) from both sides. This includes any window openings, which should be unopenable to maintain the integrity of the external wall.

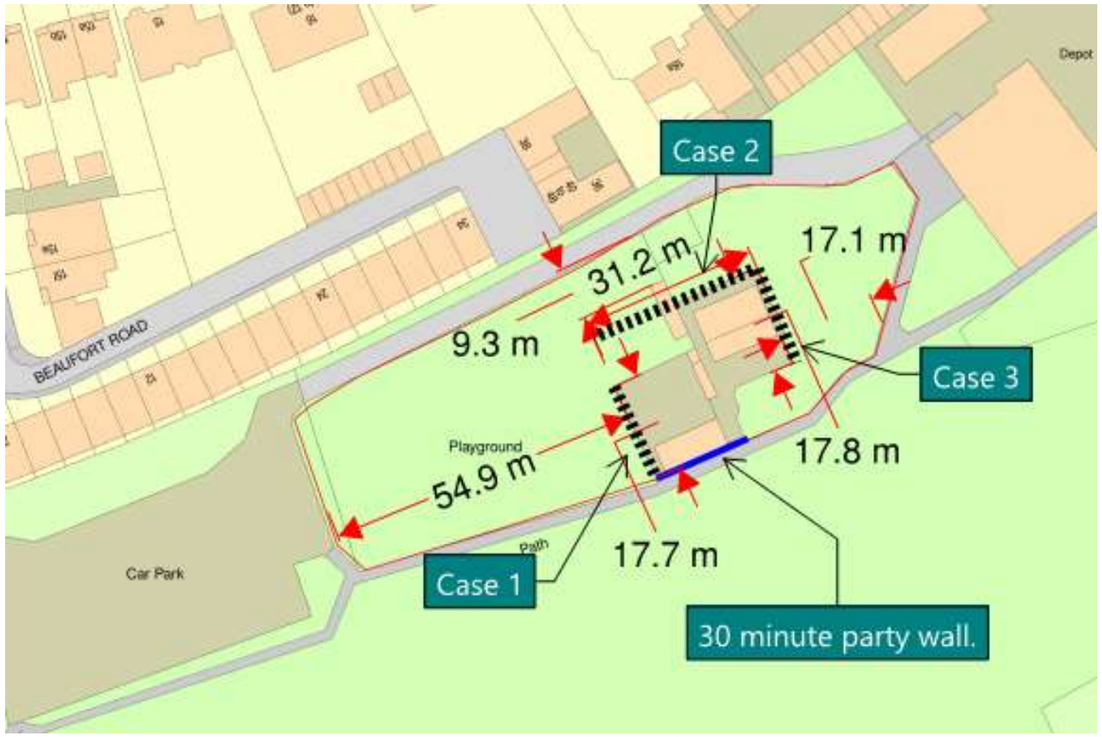

Figure 8: Assessed external fire spread cases

Table 7: Summary of external fire spread assessment

	Width (m)	Height (m)	Boundary distance (m)	Flux (kW/m²)	Permissible unprotected area (%)
Case 1	17.7	4.8	54.9	84	100
Case 2	31.2	4.8	9.3	84	100
Case 3	17.8	4.8	17.1	84	100

8 Fire Service Access and Facilities

8.1 Vehicle Access

Vehicle access to the site is from the north via a slip road which is accessed off of Richmond Road, from this point access can be made into the Marble Hill car park which allow firefighter access to the perimeter of the building. This route is as illustrated in Figure 10.

Access routes and hardstanding's are to comply with the those listed in Table 8 for pump appliances. These are expected to be adequate for access routes along Beaufort Road, given they are an existing condition within a developed area of London. Nevertheless, this should be confirmed as the design progresses.

It is also noted that as this slip road is a dead-end access route in excess of 20m, the car park will need an appropriate turning circle at the location as shown in Figure 10, again the provisions for this will need to be confirmed for its suitability as part of the design.

For the building, all areas are to be accessed directly off the street and are to be provided with a minimum of 15% perimeter access, as per guidance recommendations of BS 9999 for a small building less than 11m in height. This is to be confirmed at the next stage of the design.

8.2 Water Supplies

Hydrants should be within 90 m of the building entry point to support fire-fighting operations. Provisions are expected to be satisfactory by virtue of being an existing condition in a developed area. However, it is recommended that water supply information (including hydrant location and flow rates) is confirmed.

Table 8: Fire service vehicle access route recommendation

Appliance type	Minimum width of the road between kerbs	Minimum width of gateways	Minimum turning circle between kerbs	Minimum turning circle between walls	Minimum clearance height	Minimum carrying capacity
Pump	3.7 m	3.1 m	16.8 m	19.2 m	3.7 m	14.0 tonnes

Figure 9: Satellite view of site (As taken from google maps)

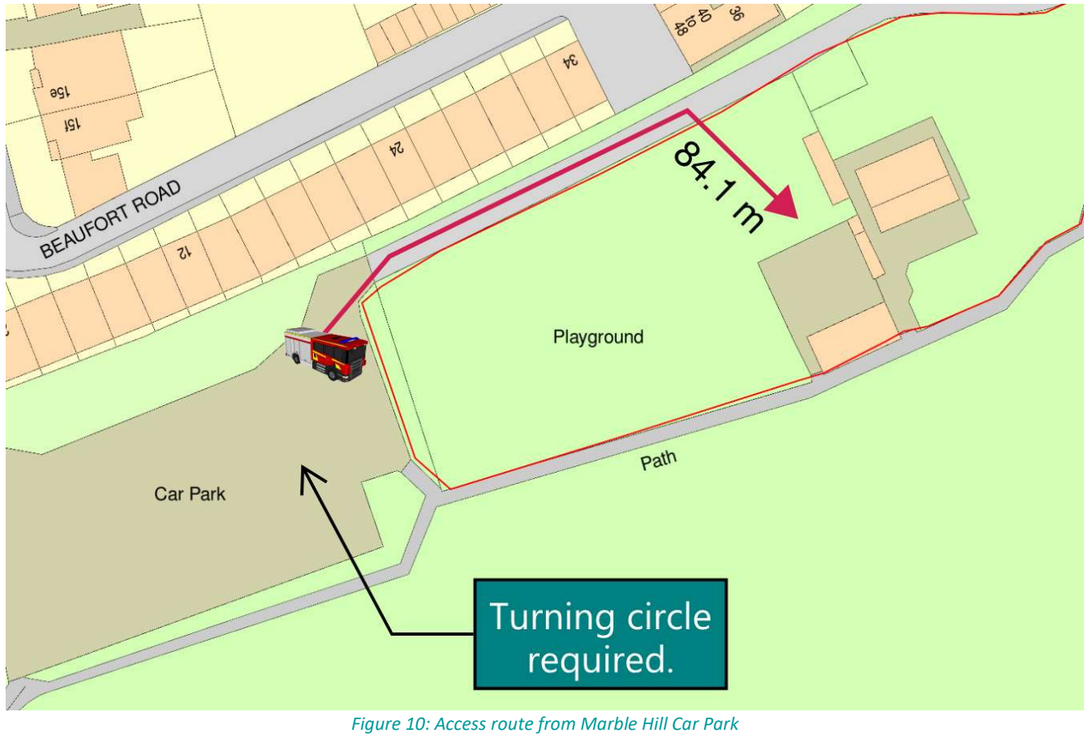

Figure 10: Access route from Marble Hill Car Park