ARDENLEA
FIRE CONSULTING LIMITED

Fire Strategy Report -

Haydon Drive Block D

For:

Hunters

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N.B. Author and Reviewer are not related

Contents

Introduction

The details within this strategy report are provided to inform the fire design requirements for this project.

This fire strategy report seeks to build a sustainable fire safety design. Approved Document B Volume 1 has been used as the design standard.

This strategy will ensure:

- The design will facilitate compliance with the functional requirements of Building Regulations 2010 (as amended 2018) with specific attention given to Regulation 38 in this regard.

This strategy report is based upon a desk-based review of proposed plans, following extensive consultation with the principal designer and project team. This document should accompany the plans submission in respect of the Building Regulations application.

The construction is based on the classifications of Purpose Group 1(b); this being Residential (Dwellings) – A dwellinghouse that does have a habitable storey greater than 4.5m above access level.

1. Premises Description.

Haydon Drive is a residential development of 21 affordable family homes on a 0.58 hectare site in Pinner, on behalf of the London Borough of Hillingdon.

This report refers only to Block D of this development, which is located towards the Western boundary of the site. Block D is considered as one building containing four adjoining dwellinghouses; These are similar to the other terraced dwellinghouses on the development site.

Each block is accessed directly from Haydon Drive, which is a dead end road (with pedestrian access to Joel Street only).

Block D Shown by the Red Arrow

The dwellinghouses within Block D will be of traditional masonry construction with a pitched tiled roof. Each dwelling house has an approximate footprint of 12m x 6m. The external walls of each plot adjoin on either side and provide a compartment wall between the units. The building footprint layout is shown in figure below.

Plots 18 to 21.

Plots 18,19,20 and 21 are all four-bedroom dwellinghouses set across ground, first and second floors, with an independent entrance directly from outside.

The dwelling houses in this block have a similar layout; plot 20 and 21 are mirror image, plot 19 is identical to plot 21 and plot 18 is slightly smaller than the others; There is an entrance from a small enclosed front garden into a protected staircase, which provides access into: A kitchen, a service cupboard, a unity cupboard, a WC and an open plan living/dining (LD) room, respectively. The LD has a final exit door on the rear elevation leading into an enclosed rear private garden. All plots have a private front and rear garden, and all the gardens have a final exit gate to ultimate safety.

The protected staircase ascends to a first-floor landing area where there is access to a bathroom and two bedrooms (one with an ensuite). The staircase continues to second floor level where there is a further two bedrooms and WC off the landing area, respectively.

There is a balcony off the rear bedroom at first floor level of each plot.

There is no basement for the building and no direct access to the external roof area but the dwellings have a concealed loft/roof void. There is allocated car parking along Haydon Drive.

The only service to the dwellinghouses is electricity; Heating and cooling is provided by an Air Source Heat Pump. The electrical connection to the plot is on the front elevation directly into the utility cupboard along with the incoming water.

There are rooflights on the north facing roof slope and PVs on the south facing roof slope, respectively.

There is a bin and bike store, respectively in the front enclosed garden area.

2. Review of proposed plans.

The following sections follow the functional requirements of Building Regulations 2010: B1 through to B5. The comments are based upon a review of drawings provided by Hunters.

Drawing Number	Drawing Description
Hunters - M10029-XX-ZZ-DR-A-05-2501	Ground- Floor -Second
Hunters - M10029-XX-ZZ-DR- A-03-0330	Site plan

Table 1 Drawing register

3. Means of Warning and Escape (B1)

3.1 Evacuation Strategy

The primary objective of an evacuation strategy is to ensure that in the event of a fire, the occupants of a building can reach a place of ultimate safety outside the building.

The evacuation strategy must not rely on external assistance (e.g. from the Fire and Rescue Service).

If a fire occurs in a dwellinghouse all occupants are expected to evacuate immediately and call the fire service.

"Get out – Stay out" - and call the Fire Service out.

3.2 Fire detection and alarm systems

BS 5839 Part 6 provides specific recommendations for fire alarm systems for dwellings (new build and existing properties). The category of system that is appropriate depends primarily on the fire risk. These categories are shown in Figure 1 below.

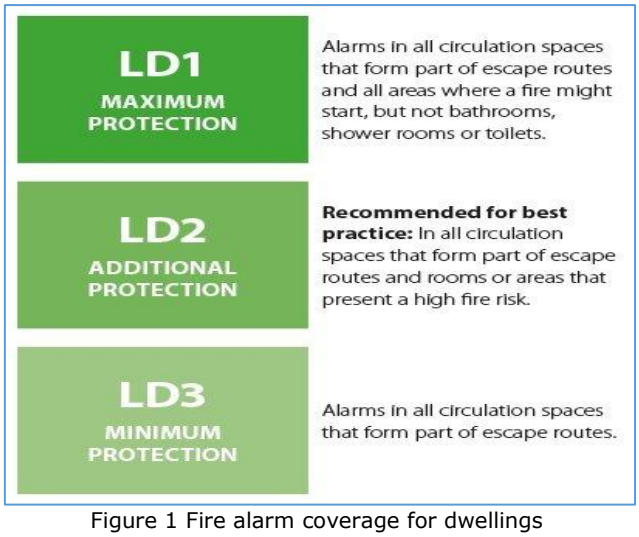


Figure 1 Fire alarm coverage for dwellings

The provision of a BS 5839 Part 6 coverage Type LD2 Grade D1 standard fire alarm is recommended in all Plots. This will comprise hardwired and interlinked smoke detection in the hallway at ground floor level and in the landing areas at first and second floor levels respectively, with heat detection in the kitchen.

The fire alarm system in each Plot should be standalone (i.e. not interconnected to any other fire alarm systems) and it must only sound within the affected Plot when activated.

3.2 Means of escape.

The fire design is based upon that for a dwellinghouse with one storey more than 4.5m above ground level.

Specially the means of escape complies with section 2.5 of ADBV-1: As it has a Protected stairway –separated by fire resisting construction at all storeys, that extends to a final exit.

There are balconies at first floor of the rear bedroom of each plot: ADBV-1 refers to the use of BS 9991 for guidance around balconies. Seeking relevant information as per Annex D of BS 9991:

- *All balconies should be guarded with protective barrier conforming to BS 6180. For open balconies, at least 50% of the vertical section should be open and the area of the opening should be uniformly spread around the surfaces.*
- *The escape route from the balconies should not pass through more than one access room.*
- *The interior of the access room should be clearly visible from all parts of the balcony unless the access room is provided with a fire detection and alarm system in accordance with BS 5839-6.*
- *Any cooking facilities in the access room that is provided with a fire detection and alarm system in accordance with BS 5839-6 should be remote from the balcony and positioned in such a way that it does not prejudice the escape route through the access room. Alternatively, the cooking facilities should be enclosed.*
- *Where the travel distances from the balcony access door to the furthest point on the balcony exceeds 7.5m, it should be provided with an alternative escape route without going via the same access room, or the access room should be provided with an automatic smoke detection (not just heat detector).*

Within the design of this Block D development egress from the balconies appears to be available via the into the protected first floor landing and this is a suitable arrangement.

Each balcony achieves the travel distance of being less than 7.5m from balcony access door to the furthest point on the balcony.

Flashing beacons on each balcony, linked to the respective fire alarm system, would enhance means of escape from these areas.

There is no restriction on stair width in each Plot, other than to meet any requirements of Part M.

The cooking facilities in the kitchen should be located such that they do not prevent exit if they are involved in a fire. ADB does not provide clear direction in terms of distance from the potential fire source. However, the location of the cooking equipment in each dwellinghouse should provide at least 1.8m horizontal distance between the cooking appliance and the escape route. This 1.8m distance draws similarities to recommendations related to final exits and the need for them to be sited such that they are clear of immediate risk from radiated heat.

Doors on egress routes should remain readily openable with simple fastenings on the side where a person is seeking egress. The operation of these fastenings should be readily apparent, without the use of a key and without having to manipulate more than one mechanism.

3.3 Means of Escape for persons at special risk

There is no lift in any of the Plots. Therefore, it is reasonable to assume that wheelchair users or persons with significant mobility impairments will not be able to access the upper floor of these dwellinghouses. Therefore, no specific provisions are required.

4. Internal fire spread – linings (B2)

Although unlikely to be the first materials to ignite, wall and ceiling linings of an enclosure such as a room can have a dramatic effect on the development of a fire and, in particular, the time it takes for the room to become completely involved.

Surface finishes and floor coverings should not comprise of materials that might contribute to the surface spread of flame and/or fire or adversely affect the means of preventing such propagation. A painted plastered finish is generally the easiest method of complying with this standard.

The recommendations from ADB in relation to the surface spread of flame are extracted in Table 4.1 below.

Table 4.1 Classification of linings

Location	Classification
Small rooms of maximum internal floor area of 4m²	D-s3, d2
Garages (as part of a dwellinghouse) of maximum internal floor area of 40m²	
Other rooms (including garages)	C-s3, d2
Circulation spaces within a dwelling	
Other circulation spaces (including the common areas of blocks of flats)	B-s3, d2[1]

NOTE:

1. Wallcoverings which conform to **BS EN 15102**, achieving at least class C-s3, d2 and bonded to a class A2-s3, d2 substrate, will also be acceptable.

5. Compartmentation (B3)

It is important that the structure and key construction elements of a building remain fully functional for a reasonable period during a fire. It is obviously beneficial if these elements remain in a serviceable condition after the fire for ease of reinstatement. In addition, a fire should be contained by fire resisting elements of the building to prevent it spreading to other parts of the building. This containment should include voids and cavities that could provide a path for fire.

With an upper storey less than 11m above access level, the structural fire resistance requirement for load bearing elements of structure is REI 30. See note 5 and table from ADBV-1 below:

Table B2 Minimum periods of fire resistance

Purpose group of building	Minimum periods of fire resistance[1] (minutes) in a:						
	Basement storey* including floor over		Ground or upper storey				
	Depth (m) of the lowest basement		Height (m) of top floor above ground, in a building or separated part of a building				
	More than 10	Up to 10	Up to 5	Up to 11	Up to 18	Up to 30	More than 30
1. Residential:							
a. Block of flats							
– without sprinkler system	90 min	60 min	30 min†	60 min+§	Not permitted[2]	Not permitted[2]	Not permitted[2]
– with sprinkler system[3]	90 min	60 min	30 min†	60 min+§	60 min+§	90 min+	120 min+
b. and c. Dwellinghouse	Not applicable[4]	30 min*†	30 min†	60 min[5]	60 min[5]	Not applicable[4]	Not applicable[4]

5. A minimum of 30 minutes in the case of three storey dwellinghouses, increased to 60 minutes minimum for compartment walls separating buildings.

Each upper storey should be a compartment floor to the above standard.

Each Plot should be separated from the adjacent dwelling by (compartment) walls of REI 60 fire resisting standard.

There do not appear to any places of special fire hazard in these plots which fall within the ADB definition below and would require fire compartmentation.

Place of special fire hazard A room such as any of the following.

- Oil-filled transformer room.
- Switch gear room.
- Boiler room.
- Storage space for fuel or other highly flammable substance(s).
- Room that houses a fixed internal combustion engine.

Definition for Place of Special Fire Hazard (ADB Appendix A)

The fire resisting performance of compartment walls and floors (or any other parts of the building which are required to prevent fire spread) should be not less than that specified below when tested in accordance with the relevant part of BS 476: Parts 20 to 24 or classified in accordance with BS EN 13501 Parts 2, 3 or 4.

This applies to:

- Load-bearing walls, for load-bearing capacity, integrity and insulation from either side.
- Non-load-bearing walls and partitions, for integrity and insulation from either side.
- Fire doors for integrity from either side, with the exception of doors to lift wells where performance is in respect of exposure of the landing side only.
- Floors, for load-bearing capacity, integrity and insulation with respect to exposure of the underside only.

5.2 Sprinklers

There is no compliance requirement for domestic sprinklers based on British Standard 9251, although their installation is recommended to enhance means of escape and resilience.

5.3 Cavities

Cavity barriers or a fire resisting ceiling (minimum EI 30) should be provided above a protected stairway enclosure.

There do not appear to be any significant cavities in the proposed design although this should be confirmed.

The void in the roof space is less than 20m in any direction, therefore no cavity barriers are required in this area. A compartment wall or other suitable cavity barrier should separate the roof void between individual Plots.

Cavity barriers should be provided in other areas in accordance with Section 5.18 of ADB. For example, this will include around all openings in the external walls, such as windows, doors and service penetrations and at the top and bottom of the cavity. Cavity barriers should be provided around service penetrations through the external walls in accordance with Building Control Alliance (BCA) Technical Guidance Note 26.

Within external walls, cavity barriers should be provided in line with any locations where fire rated walls or floors meet the façade.

Cavity barriers in external walls should pass through all insulation and other materials within the external wall, forming a seal between the edge of the fire rated wall/floor and the inner face of the external cladding.

Cavity barriers should achieve a fire resistance of at least 30 minutes for integrity and 15 minutes for insulation. Alternatively, if located in a stud wall or partition, or provided around openings in the external wall, they may be formed of:

a) Steel at least 0.5mm thick;

b) Polythene-sleeved mineral wool, or mineral wool slab, in either case under compression when installed in the cavity; or

c) Calcium silicate, cement-based or gypsum based boards at least 12mm thick.

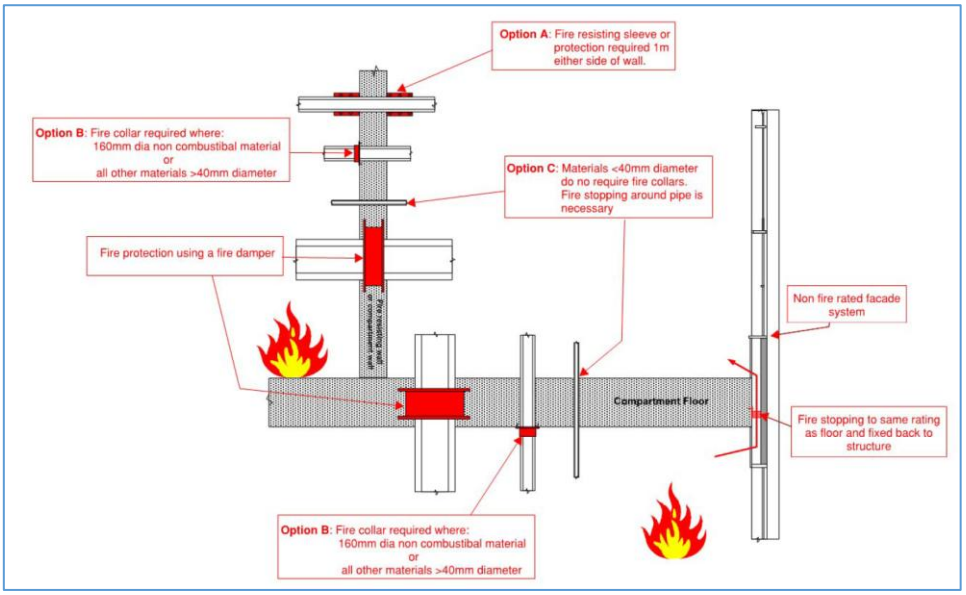
Fire stopping (the seal between the fire rated wall/floor and the external wall) should be of the same fire resistance as the fire rated wall/floor.

5.4 Protection of openings and fire stopping

Where pipework penetrates any protected shaft (staircase), compartment wall or floor then the openings must be suitably fire stopped.

Fire-stopping should be provided at the junction of fire-separating walls and external walls in order to maintain the fire resistance period of fire-separating walls and thereby prevent a fire from travelling around the junction and into the neighbouring space. Penetrations through lines of fire-resisting separation should be fire-stopped to achieve the same fire resistance as the separation.

All pipes, ductwork and services passing through fire-resisting separations should be either enclosed in fire-resisting construction (i.e. shafts) of matching fire resistance or provided with fire dampers of matching fire resistance. Certain small-diameter pipes require only fire-stopping around the pipe, dependent on pipe material and the type of fire-resisting barrier penetrated. Typical options are shown in the figure below:



6. External fire spread (B4)

6.1 Resisting fire spread over external walls

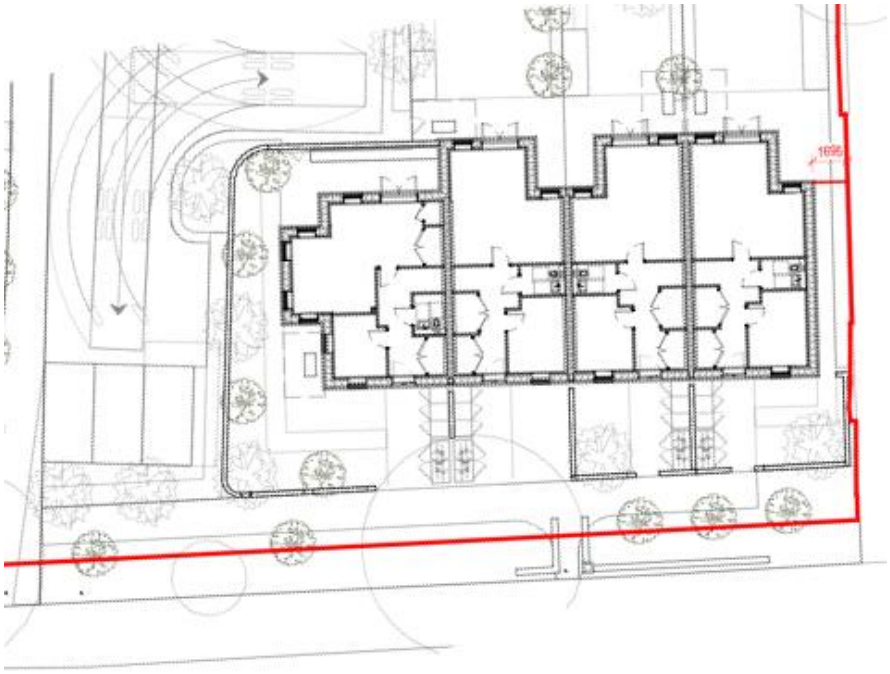
When a building is on fire, heat will radiate through non-fire-resisting openings in the external walls. This heat can be intense enough to set fire to adjoining buildings. To reduce the chance of this occurring, the Building Regulations place limits on the area of external elevation with no fire resistance. This area is known as the 'unprotected area' and is affected by such factors as distance from the boundary, use of the building and compartment size.

Where not required as compartment walls, it is recommended that external walls of the buildings should provide at least 60 minutes fire resistance from inside, subject to the unprotected area allowance where no fire resistance is necessary.

As the pitch of the roof on each Plot is less than 70 degrees, it is not considered as an external wall.

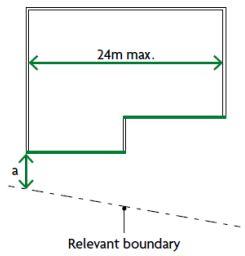
Boundary locations are taken as the centre of a public highway, the boundary of the site or a notional boundary mid-way between buildings on the same site (as Regulation B4 is concerned with the heat flux at half the distance between buildings).

The boundaries in relation to Block D are shown below:



As this building conforms with the definition of a small residential building in ADB 11.18 (extracted below), the following protected area allowance can be used. This applies for all boundary distances greater than 1m.

See para 11.18



Minimum distance (a) between side of building and relevant boundary (m)	Maximum total area of unprotected areas (m²)
1	5.6
2	12
3	18
4	24
5	30
6	No limit

Diagram 11.7 Permitted unprotected areas in small residential buildings

The distances from each Building elevation to the relevant boundary appear to be as follows:

- Haydon Drive – > 6m, no restriction
- Rear Garden – > 6m, -no restriction
- East – 1.7m, the max total permitted unprotected area should be <8m^2
- Front garden – > 6m, no restriction

These parameters should be confirmed by the Designer.

6.2 External wall coverings

On a building less than 11m in height, the external surfaces (i.e. outermost external material) of external walls should provide a Reaction to Fire Performance of Class B-s3, d2(2) or better where the building is less than 1000mm from the relevant boundary. This will be applicable on the walls adjoining Plots 19 and 20 from either side and the wall must be fire resisting from both sides with the surface material having a surface spread of flame classification of B-s3, d2 or better.

At this building heights, there is no restriction on wall covering which is 1000mm or more from the relevant boundary.

Regulation 7(1A) of the Building Regulations 2010 prohibits the use of relevant metal composite materials in the external walls, and specified attachments, of all buildings of any height.

It would also be worth confirming with NHBC any requirements of the external wall materials for the purpose of warranty.

6.3 Resisting fire spread over roof coverings

Table 12.1 from ADB Vol 1, extracted below, sets out the requirements for type of roof covering based upon separation distance from the relevant boundary. It is likely that a $B_{ROOF(t4)}$ specification will be required but the Designer should confirm.

Table 12.1 Limitations on roof coverings

Designation[1] of covering of roof or part of roof	Distance from any point on relevant boundary			
	Less than 6m	At least 6m	At least 12m	At least 20m
$B_{ROOF(t4)}$	●	●	●	●
$C_{ROOF(t4)}$	○	●	●	●
$D_{ROOF(t4)}$	○	●[2][3]	●[3]	●
$E_{ROOF(t4)}$	○	●[2][3]	●[3]	●[3]
$F_{ROOF(t4)}$	○	○	○	●[2][3]

● Acceptable.
○ Not acceptable.

NOTES:

Separation distances do not apply to the boundary between roofs of a pair of semi-detached dwellinghouses and to enclosed/covered walkways. However, see Diagram 5.2 if the roof passes over the top of a compartment wall.

Polycarbonate and uPVC rooflights that achieve a class C-s3, d2 rating by test may be regarded as having a $B_{ROOF(t4)}$ designation.

1. The designation of external roof surfaces is explained in Appendix B.
2. Not acceptable on any of the following buildings.
   a. Dwellinghouses in terraces of three or more dwellinghouses.
   b. Any other buildings with a cubic capacity of more than 1500m³.
3. Acceptable on buildings not listed in (2) if both of the following apply.
   a. Part of the roof has a maximum area of 3m² and is a minimum of 1500mm from any similar part.
   b. The roof between the parts is covered with a material rated class A2-s3, d2 or better.

The rooflights need not be fixed shut- if they meet Broof(t4)- as they are within 6m of relevant boundary.

6.4 Solar Panels

The Designer reports that PV panels will be installed on the roof. New rooftop PV installations, including panels and fixing systems, should not lower the fire performance/classification of the roof.

The design of PV installation should be undertaken in accordance with the IET PV Code of Practice and Microgeneration Certification Scheme (MCS) requirements.

The PV installations should be installed on non-combustible roofs meeting Class A1/A2 s1, d0 to BS EN 13501-1.

If the design cannot be classified as 'low voltage', then additional fire protection requirements/mitigations shall be incorporated into the design.

7. Access and Facilities for the fire service (B5)

To extinguish a fire within this building, it is important that the fire service can gain access to the premises. This section deals with the various facilities intended to aid the fire service access to the building and for fighting a fire in the building.

7.1 Firefighting access

Access for a fire service pumping appliance to the development is from the public highway. The Designer has confirmed that Haydon Drive, which serves Block D, is of a suitable width and has turning facilities in line with the requirements of ADB Vol 1. The requirements are extracted below from ADB Volume 1.

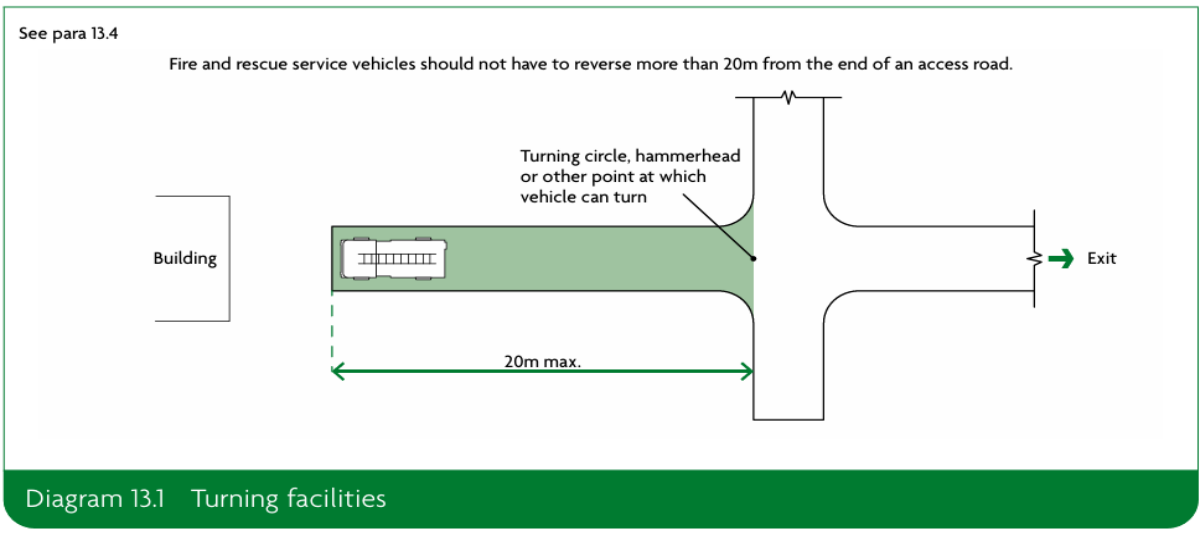


Diagram 13.1 Turning facilities

Table 13.1 Typical fire and rescue service vehicle access route specification

Appliance type	Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.5
High reach	3.7	3.1	26.0	29.0	4.0	17.0

There is fire service pumping appliance access to the front of each plot and the distance for hose laying to the furthest point of the building is less than 45m. Again, this is suitable based on ADB Vol 1 guidelines.

It should be confirmed that there is a public fire hydrant within 90m of the access point to the building.

8. Other Provisions

8.1 Emergency Lighting and Secondary power

There is no requirement for emergency lighting in a dwellinghouse.

8.2 Signage

There is no requirement for fire signage in a dwellinghouse.

8.3 Fire Emergency Plan

This will be based on the same principle as any other single private dwelling such that occupants if they suspect a fire, raise the alarm, get out of the building and summon the Fire Service.

Furthermore, it is advisable to provide fire safety information (based on government guidance documents that are available online) to all dwelling occupants.

8.5 Fire Fighting Equipment (FFE)

As set out in government fire safety guidance, there is no requirement or recommendation for FFE within single private dwellings.

Appendix 1 Proposed Plans