

**Report for An Bord Pleanála**

**on**

**Appeal against Condition 2 on Fire Safety Certificate FSC2203665DC**

**for**

**The Proposed Construction of an Apartment Building Over  
Basement Car Park**

**at**

**Cherrywood T5 Apartment Blocks, Cherrywood, Dublin 18**

Client:	An Bord Pleanála
An Bord Pleanála Ref:	316079-23
Our Ref:	ABP_R026_Issue 1
Date:	27 <sup>th</sup> October 2023

## 1.0 Introduction

This report sets out my findings and recommendations on the appeal submitted by Jensen Hughes, acting on behalf of Quintain Ireland Ltd., against Condition 2 on Fire Safety Certificate FSC2203665DR by Dun Laoghaire Rathdown County Council in respect of an application for works related to proposed construction of apartment building over a basement car park at Cherrywood T5 Apartment Blocks, Cherrywood, Dublin 18.

It is noted that having regard to the nature of the Condition under appeal, it is considered that the appeal can be adjudicated upon without consideration of the entire of the application.

## 1.1 Subject of Appeal

Condition 2 of the granted Fire Safety Certificate (FSC2203665DR) by Dun Laoghaire Rathdown County Council are as follows: -

**Condition 2:**

*A suitable automatic sprinkler system is to be installed throughout the development (within the flats and the common areas) and the basement car park. The sprinkler coverage to these spaces will need to be sufficient to protect against the fire hazards within both the residential and non-residential areas. In this regard it is considered appropriate to protect the residential parts of the building using BS 9251: 2021 and the non-residential parts using IS EN 12845: 2015 +A1: 2019 as advised by Clause 4 of BS 9251: 2021.*

**Reason:**

*To comply with the provisions of Part B of the Second Schedule to the Building Regulations 1997 to 2021.*

## 2.0 Documentation Reviewed

- 2.1 Fire Safety Certificate Application (application form, compliance report and fire safety drawings) submitted by Jensen Hughes, on behalf of Quintain Ireland Ltd., on 19<sup>th</sup> May 2022.
- 2.2 Additional Information from Jensen Hughes to Dublin Fire Brigade dated 29<sup>th</sup> November 2022.
- 2.3 Granted Fire Safety Certificate No. FSC/036/2022 from Dublin City Council dated 20<sup>th</sup> February 2023.
- 2.4 Letter of Appeal from Jensen Hughes, acting on behalf of Quintain Ireland Ltd., received by An Bord Pleanála on 16<sup>th</sup> March 2023.
- 2.5 Fire Officer's report on Fire Safety Certificate Appeal dated 5<sup>th</sup> April 2023 to An Bord Pleanála.
- 2.6 Jensen Hughes response to Fire Officer's report dated 23<sup>rd</sup> January 2023 to An Bord Pleanála.

### 3.0 Building Control Authority's Case

In response to the appeal of Condition 5 Dublin Fire Brigade offer the following rebuttal: -

#### **BS 9251: 2021 Overview**

BS 9251: 2021 was used by the applicant to justify the open plan layout apartments as permitted in Section 1.6.3 of TGD-B 2020. BS 9251: 2021 is clear in highlighting the requirements for sprinklers in other areas where the code of practice is being used for domestic and residential occupancies such as;

Subsection 4.1 of BS 9251 – Initial Consideration states as follows;

Note 3 'In buildings where there is a mix of residential, non-residential and commercial use (e.g. where flats are above shops, car parks, bin stores, offices and retail units), it is generally appropriate to protect the residential parts using this British Standard and the non-residential parts using BS EN 12845. See also 5.5 and 5.6'.

Section 5.4 states 'Sprinkler protection should be provided in all parts of the premises except for the areas listed in that section. The Guidance of item (h) would suggest that any ancillary space directly connected to a residential building should be sprinkler protected'.

If a car park (underneath a block of flats – as outlined in BS 9251: 2021) has an area less than 100m<sup>2</sup> a residential system in accordance with BS9251: 2021 is required. In carparks with an area greater than 100m<sup>2</sup> a sprinkler system in accordance with BS / IS EN 12845: 2015+A1: 2019 should be provided.

#### **Technical Guidance Document B Review**

##### **Technical Guidance Document B 1997**

In section 3.5.2 of Technical Guidance Document B 1997, the general principles for buildings used for car parks were as follows;

Buildings or parts of buildings used as parking for cars and other light vehicles are unlike other buildings in certain respects, and merit some departures from the usual provisions for the restriction of fire spread within buildings because;

- The fire load is well defined; and
- There is evidence that fire spread is not likely to occur between one vehicle and another, in well-ventilated above ground parking, and there is corresponding low probability of fire spread from one storey to another. Ventilation is all important in car parks, and as heat and smoke cannot be dissipated so readily from a car park that is not open-sided fewer concessions are made.

##### **Technical Guidance Document B 2006 and 2020 (Reprint)**

In Technical Guidance Document B 2006, Section 3.5.2 the general principles for buildings used for car parks are as follows;

- The fire load is well defined; and
- Where the car park is well ventilated, there is a low probability of fire spread from one storey to another. Ventilation is the important factor, and as heat and smoke cannot be dissipated so readily from a car park that is not open-sided fewer concerns are made. The guidance in paragraphs 3.5.2.2 to 3.5.2.5 is concerned with three

ventilation methods; open-sided (high level of natural ventilation), natural ventilation and mechanical ventilation.

- Note: Because of the above, car parks are not normally expected to be fitted with sprinklers

Interestingly in 2006, the guidance in relation to car parks was modified, in particular the following statement was removed 'there is evidence that fire spread is not likely to occur between one vehicle and another'.

The following background research into car park fires (both conventional and EV cars) raises questions with regard to the principles adopted in TGD B and in particular, the clear statement outlining that the fire load is well defined in car parks.

#### **TGD B-Basement Car Park Ventilation**

It is noted that Section 3.5.2 of Technical Guidance Document B highlights the importance of the ventilation factor in car parks, however ventilation is required in car parks to allow for the transportation of products of combustion away from the fire location, which assists control of fire spread and is essential for protecting the lives of firefighters. The current minimum smoke ventilation for car parks is typically 10 air changes per hour for a basement - mechanical or natural ventilation having an aggregate area not less than 2.5% of the floor area at that level.

It is noted that in accordance with BS 7346-7:2013: Code of practice on functional recommendations and calculation methods for smoke and heat control systems for covered car parks, there is no requirement currently to meet any set visibility or temperature criteria for a safe means of escape or during the firefighting phase based on typical minimum smoke ventilation in car parks. The system only required to assist smoke movement and ensure that it doesn't adversely impact conditions during the course of a fire (typical clause 9 design). Such ventilation systems / design are very likely to be inappropriate for a multiple vehicle fire.

EV car fires produce higher volumes of smoke with a prolonged burn period which in turn exacerbates the risk in a basement as highlighted further in the report.

It is also noted that that the expected toxicity from failed batteries is of big concern also from a means of escape and fire-fighting phase perspective.

The subject case will have a naturally ventilated car park with an aggregate area of not less than 2.5% of the floor area.

#### **Draft Building Regulations**

The Draft Building Regulations (brown book) and the Proposed Building Regulations (blue book) contained a prescriptive requirement that basement car parks be provided with a sprinkler system to BS:5306. It is noted that this was the only area or building use where this was a requirement and circa 50 years later Dublin Fire Brigade are making the case for the same provision. In the interim the type of cars in use have drastically changed and have now far more plastics and combustible components as further reviewed throughout the report. In addition, the car parks are now going to contain electric vehicles and hybrid vehicles. By 2030 there will be more of these vehicles in the car parks than standard internal combustion engine cars.

#### **Background Research into Car Fires**

Dublin Fire Brigade's argument summarised as follows: -

- The cars used and the materials they were constructed from have a far lower calorific value than modern vehicles.
- Plastics are the predominant manufacturing material in cars now compared to when the above analysis was undertaken.
- Running fuel fires due to failure of plastic fuel tanks in the early stages of vehicle fires can be expected and will spread fire. It is estimated that 85% of European vehicles have plastic fuel tanks." (BRE Fire Spread in Car Parks BD2552 p.12)
- Cars used for experiments are smaller than modern cars.
- Radiated heat and direct flame impingement, due to larger vehicles in restricted spaces and low ceilings, will give temperatures in excess of 1100°C (BD2552 p.64).
- Sprinklers are effective in both controlling a developing and fully developed fire. Without sprinklers fire is likely to spread from car to car and dangerous levels of smoke are likely for long periods (BD2552 p.46).
- Basement car parks can no longer be considered to have well defined fire loads.
- Concerns are raised with regard to assumptions that fire service attends 3 out of 5 fires within 3 minutes in metropolitan areas.

### **Case Studies**

Dublin Fire Brigade list a number of case studies and their argument is that these demonstrate that the traditional view is that fires do not spread from the vehicle of fire origin and that fire load is well defined in a basement car park. The case studies highlight the increase in spread of fire to multiple cars which become involved. Fire will spread as a result of the intensity, in particular with high ceiling jet temperatures.

### **Electric Vehicles**

Dublin Fire Brigade go into depth regarding EV's and their argument is summarised as follows:  
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Dublin Fire Brigade is supportive of environmental policies and recognises the need to adapt to changing technologies with regard to alternative fuel sources for transportation. However, international and national guidance has not kept pace with the extensive use of plastics over the last 30 years or so, including plastic fuel tanks, which has significantly changed the way vehicles behave in fire. Modern vehicle design (such as EV's, with high capacity batteries) cannot be subject to the same lag between a significant change in the fire load within buildings such as the subject case and the guidance which is supposed to support their safe design.

Where guidance does lag, it may be said that buildings may be considered prohibitively dangerous for both their occupants and attending fire fighters. Research and innovation with battery technology continues to evolve which means that consideration needs to be given to how future technologies may behave in fire and potentially impacting on the built environment.

Dublin Fire Brigade calls for more research into fires in car parks, with a view to establishing improvements in guidance for the requirements of sprinklers in car parks within Technical Guidance Document B. Basement car parks should not be deemed low risk with a well-defined fire load.

Current guidance does not take into consideration the fire loading of modern vehicles, electric vehicles, Hydrogen vehicles and the risk of running fuel fires from plastic fuel tanks.

The outdated appreciation of fire load of modern vehicles in Technical Guidance Document B states that "Car parks are not normally expected to be fitted with sprinklers". Dublin Fire Brigade believe that a form of suppression such as sprinklers is vital to allow the suppression and control of fire development to allow for both safe means of escape for occupants (including persons with disabilities) and to allow fire crews to be able to access the basement for firefighting.

It is clear that EV car fires will become the common place. These occurrences in underground car parks will clearly expose residents and fire fighters to additional hazards. The installation of a sprinkler system to the underground car park appears to be the only viable solution in preventing fire spread to other vehicles and potentially from one storey to another at this point in time.

It is the view of Dublin Fire Brigade that a multi EV car fire will be of a significant challenge.

## 4.0 Appellant's Case

The appellant submits the following argument: -

### **Condition 2**

The basis of compliance for the Fire Safety Certificate application is TGD - B: 2006 + A1: 2020 and BS 5588:1990 Part 1 amd 2004) for the building.

The reason given by the Building Control Authority for requiring sprinkler coverage to be provided to the non-residential parts using IS EN 12845: 2015+ A1: 2019, was to comply with Part B of the Building Regulations.

The travel distance in residential corridors exceeds 7.5m, and therefore in compliance with Building Regulations (Section 1.6 of TGD-B) a residential sprinkler system designed in accordance with the recommendations of BS 9251: 2021 will be provided to all residential areas on ground and upper floors. This has been clearly identified in Section B3.6.1 of the granted FSC.

The purpose of residential sprinkler provision in TGD-B is to accommodate open plan layouts and extensions of travel distances within common areas, which are not impacted by the car park and vice versa.

Therefore, sprinklers were not proposed in the Fire Safety Certificate design of the development, within the Basement car park and Bike Store, beside the entrance basement car park, as this provision is not required to comply with the requirements of Building Regulations.

Considering TGD-B, this document specifically notes that carparks are not normally, expected to be fitted with sprinklers. Furthermore, Section 3.5.2 of TGD-B denotes the following regarding car parks: -

*"Buildings or parts of buildings used as parking for cars and other light vehicles are unlike other buildings in certain respects, and merit some departures from the usual provisions for the restriction of fire spread within buildings because:*

- 1. The fire load is well defined and not particularly high:*
- 2. Where the carpark is ventilated, there is a low probabiity of fire spread from one storey to another. Ventilation is the important factor, and as heat and smoke cannot be dissipated so readily from a carpark that is not open sided fewer concessions are made.*

***Note: Because of the above, car parks are not normally expected to be fitted with sprinklers."***

Based on the above, it can be concluded that a 'normal' basement car park, naturally or mechanically vented, does not require sprinklers to comply with Building Regulations.

An example of a normal car park would be one in which means of escape provisions, surface linings, compartmentation, ventilation and fire fighter access and facilities largely comply with the recommendations of the TGD-B.

For example:-



- Travel distances, protected escape routes, exit capacity etc. in line with code recommendations
- Minimum requirements for smoke venting achieved (i.e. natural smoke vents sized based on 2.5 % of the floor area or alternatively a mechanical extract system achieving 10 ACH in a fire scenario).
- Fire fighter access to the car park is not unusually restricted.
- Exits are sized based on 2 persons per car parking space or 30m<sup>2</sup>/person.
- Stairs provided with lobby protection, with permanent smoke vents to the outside.
- An automatic fire alarm system incorporating manual call points. It is noted that automatic fire alarm detection is not normally required to car parks.
- Class 1 (National) or Class C s3, d2 (European) surface linings.
- Appropriate period of fire resistance for elements of structure (i.e. 60 minutes in this case, relevant to the height of the adjacent blocks)

An example of an abnormal car park would be one in which there are significant combustible wall and ceiling linings, or there is large amount of combustibles that are not fire separated from the car park.

Another example of a car park that is 'not normal' or abnormal is a car park that includes automatic facilities where cars are stacked vertically on top of one another. In this case, fire spread could more readily occur between a car at floor level and a car stacked on top, particularly as the petrol tank may be exposed. This could result in a much larger fire.

A further example of an abnormal car park is one in which there are non-code compliant issues, such as extended travel distances, unusually difficult fire brigade access, insufficient smoke ventilation etc.

The basement carpark in this development is considered to be a “normal” carpark. In fact:

- The Basement level is designed as a separate compartment, i.e. is enclosed in 60 minutes fire resisting construction (including 60 minutes fire resistance for all elements of structure).
- Travel distances are compliant with the limits as set out in TGD-B, therefore providing sprinkler coverage to the Basement level will offer little improvement over the current design.
- The Basement level is smoke ventilated with a minimum of 2.5% natural ventilation, as per Section 5.4.3.1. It should be noted however that based on the current layout, this figure will be almost doubles the requirement at 4.5% natural ventilation within the Basement car park.
- There is sufficient access to the basement carpark from the two escape stairs serving the basement.
- An automatic fire detection and alarm system, including manual call points have been incorporated into the design.
- All surface linings within the ground floor undercroft carpark will meet the minimum of Class 1 (national) or Class C s3, d2 (European) classification for surface spread of flame.
- First aid firefighting equipment will be provided to the basement car park in the form of fire extinguishers and dedicated fire hose reels. The fire hose reels will be available for firefighting personnel to combat a fire which occurs in the basement.

The risk of smoke spreading from the carpark compartment to the upper floors of the development will also be further mitigated by the incorporation of double lobby protection to the internal stairs, where the outer lobby of each is provided with a minimum of 0.4m<sup>2</sup> permanent smoke ventilation direct to the external. Therefore, although the car park smoke ventilation will protect against a build-up of pressure occurring, resulting in hot smoke forcing itself into the stair core lobbies, these permanently open passive smoke vents will provide a route for any smoke entering these lobbies to pass directly to the external, rather than resulting in a further build-up of pressure within the lobby, which could cause smoke to force itself into the secondary lobby and then into the escape stairs.

Further to the above, the following considerations should be noted as additional protection measures to omit sprinkler coverage in the basement car park based on the following:-

- Dry riser outlets will be provided within the Basement level, which will provide sufficient coverage within the footprint of the car park to allow firefighting personnel to respond effectively to an incident anywhere in the Basement. This will also add to the firefighting capabilities of the dedicated fire hose reels.
- The evacuation strategy for the upper floor levels over the residential blocks incorporates simultaneous evacuation to alert occupants to escape upon detection of a fire, rather than a stay put strategy that would present a high risk situation for residents.

It should also be noted that at the time of writing, no code of practice or guidance document in Ireland or the UK has been revised to recommend that sprinklers should be provided in car parks in any instance.

In fact, ADB (England and Wales) TBE (Northern Ireland), TGD-B (ROI) and BS 9999 state the opposite, i.e., that sprinklers are not provided in car parks. This is also confirmed by BS 7346 Part 7, which states that sprinklers are not required in car parks to comply with Building Regulations in England, Wales, Scotland and Northern Ireland. BS 7346 Part 7 is also adopted for the design of car parks in Ireland.

With regard to the bike store mentioned above, the other non-residential area included in the FSC application, it should be noted that the bike store is less than 100m<sup>2</sup> in area and it does not connect internally to the building therefore based on TGD-B it is not required to sprinker this room.

Taking all the above into consideration, it is not deemed necessary to provide sprinklers in the Basement Car Park and bike store of Block B2 of the Cherrywood T5 development.

## 5.0 Consideration

### Condition 2

It is clear from Dublin Fire Brigades submission that they consider that multi EV car fires will be of a significant challenge and it is their view that all basement car parks should be provided with sprinkler protection. In their submission they refer to draft Building Regulations and multiple case scenarios. However, the building control function in assessing a Fire Safety Certificate application is to assess whether or not the application has demonstrated compliance with Part B of Second Schedule of the Building Regulations.

As per 'The Guidance' (page 3) of Technical Guidance Document B 2006 AMD 2020 'where works are carried out in accordance with the guidance in this document, this will, prima facie, indicate compliance with Part B of the Second Schedule of the Building Regulations.'

In paragraph 4 of section 5.4.3.1 of Technical Guidance Document B 2006 AMD 2020 it states the following: -

**'Basement car parks are not normally expected to be fitted with sprinklers.'**

Therefore, for prima facie compliance with Part B of the Second Schedule of the Building Regulations a basement car park does not have to be provided with sprinkler protection.

One potentially valid argument that Dublin Fire Brigade make is that because BS 9251: 2021 was used by the applicant to justify the open plan layout apartments as permitted in Section 1.6.3 of TGD-B 2020 then the recommendations of this British Standard with respect to sprinkler coverage must be adhered to, in particular, Subsection 4.1 of BS 9251 Note 3 and Section 5.4.

Subsection 4.1 of BS 9251 Note 3 states: -

'In buildings where there is a mix of residential, non-residential and commercial use (e.g. where flats are above shops, car parks, bin stores, offices and retail units), it is generally appropriate to protect the residential parts using this British Standard and the non-residential parts using BS EN 12845. See also 5.5 and 5.6'.

Section 5.4 states: -

'Sprinkler protection should be provided in all parts of the premises except for the areas listed in that section. The Guidance of item (h) would suggest that any ancillary space directly connected to a residential building should be sprinkler protected'.

Technical Guidance Document B 2006 was amended in 2020 and specifically allows for open plan apartments and extended travel distances in apartment corridors. It introduced guidance on the use of domestic sprinkler systems and allowed the following: -

- The means of escape requirements in open plan flats are determined by the maximum travel distance within the flat. Where the travel distance is less than or equal to 9m, the provisions of 1.1.2 apply. Where the maximum travel distance exceeds 9m, and where the appropriate alternative means of escape has not been provided, the following provisions apply:
  - A sprinkler system in accordance with Section 1.8 should be provided....

- Where every flat to a protected corridor / lobby on the same storey is provided with a sprinkler system and the same protected corridor / lobby is provided with a smoke control system, the travel distance on that storey can be further extended up to a maximum of 15m.

Section 1.8.1 states where a sprinkler system is provided, it should be in accordance with BS 9251: 2014, or equivalent.

The clear purpose of the provision of the sprinkler system is to protect the means of escape. Further it is noted that in the protection to the corridor it is clear the rest of the building does not have to be provided with sprinkler protection, only the impacted corridor.

Reference to BS 9251: 2014 (since superseded by BS 9251: 2021) is for the design of the sprinkler system not its coverage. The coverage is either in an open plan apartment or in apartments off a corridor with a dead-end travel of up to 15m. It allows for alternative design solutions for means of escape. Whether or not the basement car park is provided with sprinkler protection is irrelevant and has no bearing on the proposed means of escape from the apartments.

## 6.0 Conclusions

### Condition 2

If the guidance in Technical Guidance Document Part B AMD 2020 is followed, then prima facie, this is in compliance with Part B of the Second Schedule of the Building Regulations. Technical Guidance Document Part B AMD 2020 does not recommended sprinklers in basement car parks. Therefore, Condition 2 should be removed from the granted Fire Safety Certificate.

## 7.0 Recommendation

On the basis of my findings and conclusions I recommend that An Bord Pleanála grant the appeal and instruct that Condition 2 be removed from the Fire Safety Certificate.

Signed by:

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**Des Fortune**

MSc(Fire Eng), BSc(Eng), CEng MIEI, MIFireE

Date: **30<sup>th</sup> October 2023**