AN BORD PLEANALA REPORT

REF ABP-314945-22

On

Appeal against Conditions 1 and 3 of Fire Safety Certificate No. FSC2201524DR

Submission No. 3006259

For

Cherrywood T2 Apartment Block, Construction of four storey apartment building over a basement car park

At

Cherrywood T2 Apartment Block, Castle Street, Dublin 18

Report Prepared By: Bryan Dunne

Ref No.: ABP/2023-R01

Date: 20th March 2023

1. INTRODUCTION

This report sets out my findings and recommendations on an appeal submitted by Jensen Hughes (the appellant), acting on behalf of their client Quintain Ireland against Condition No. 1 and No. 3 of Granted Fire Safety Certificate Application FSC2201524DR granted by Dun Laoghaire Rathdown County Council (the Local Authority) on the 30th September 2022 in respect of the construction of a four story apartment building over a basement carpark at Cherrywood T2 Apartment Block, Castle Street, Dublin 18. The Granted Fire Safety Certificate has 5 conditions, conditions 2, 4 and 5 are not being appealed and as such have not been reviewed as part of this assessment.

CONDITIONS SUBJECT OF THIS APPEAL

CONDITION 1:

Sprinkler protection, designed and installed in accordance with IS EN12845:2015+a1:2019 shall be provided to the basement carpark.

Reason:

To comply with part B of the Second Schedule of the Building Regulations 1997 to 2021.

CONDITION 3:

The basement carpark smoke vents shall not be located immediately adjacent to the external walls of the building above. They shall be sited away from the building perimeter so that the elevations above are clear of any risk from fire or smoke from the Basement Level.

Reason:

To comply with part B of the Second Schedule of the Building Regulations 1997 to 2021.

2. DOCUMENTATION REVIEWED

1. Fire Safety Certificate application form, drawings and report produced by the appellant submitted to the BCMS system on the 3rd of March 2022.
2. Request No. 1 for additional information by the Local Authority on the 26th of April 2022.
3. Additional information cover letter, drawings and report produced by the appellant and uploaded to the BCMS system on the 1st of July 2022.
4. Request No. 2 for additional information by the Local Authority on the 25th of August 2022.
5. Additional information cover letter, drawings and report produced by the appellant and uploaded to the BCMS system on the 12th of September 2022.
6. Fire Safety Certificate Grant issued by the Local Authority, Ref FSC2201524DR, Managers Order No: FSC/1842022 dated 30th September 2022.
7. Appeal submission by the appellant to An Bord Pleanála dated 26th October 2022.
8. Appeal submission by the Local Authority – Fire Officer Report dated the 22nd of November 2022.
9. Further submission by the appellant to An Bord Pleanála on the 16th of December 2022.

3. CASE PUT FORWARD BY THE LOCAL AUTHORITY

CONDITION 1

In support of their case for sprinkler protecting the proposed basement car park the Local Authorities report can be summarised as follows:

1. **Overview of domestic and residential sprinkler standards and Building Regulations:**
   The Local Authority put forward the case that in providing residential sprinklers (to BS9251:2021) in apartments in lieu of protected entrance halls the applicant should have addressed other sections of the Standard and in particular Sections 4.1, 5.4, 5.5 and 5.6. Note 3 of Subsection 4.1 for example states *"In buildings where there is a mix of residential, non-residential and commercial units (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".*

2. **Technical Guidance Document B (TGD B) and Draft Building Regulations Review:**
   The Local Authority notes the changes in Section 3.5.2 of TGD B in the 1997 and 2006 versions of the document with particular emphases being put on the removal of the statement *"there is evidence that fire spread is not likely to occur between one vehicle and another"* in the 2006 version.

   They state that in order to allow for the transportation of the products of combustion away from the fire location, basement car parks are typically provided with either mechanical ventilation achieving typically 10 air changes per hour or be provided with natural ventilation with an aggregate area of not less than 2.5% of the floor area of that level. They note that in BS7346-7:2013 which is the "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 rates in car parks. The systems, they say, are only required to assist smoke movement and ensure that the smoke doesn't adversely impact conditions during the course of a fire. In their opinion standard ventilation systems are very likely to be inappropriate for a multiple vehicle fire. In particular the Local Authority expresses concerns with the new EV car fire producing higher volumes of smoke for a prolonged burn period.

They identify that 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 BS5306.

3. Background Research into Car Fires:

The Local Authority makes reference to the following documents:

a) Fire Note 10 "Fire and Car Park Buildings" produced by The Ministry of Technology and Fire Offices Committee Joint Fire Research Organisation, 1968

b) "Fire Spread in Car Parks" produced by the BRE in 2006 after been commissioned by the UK Department of Communities and Local Government

c) "Natural Fires in Closed Car Parks" research undertaken by Daniel Joyeux, 2007

A summary of the research above identified:

- The cars used and the material 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 1100deg 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 longer 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 services attends 3 out of 5 fires within 3 minutes in metropolitan areas.

4. Case Studies:

The Local Authority includes a list and brief summary of relevant case studies.

5. Electric Vehicles:

The Local Authority puts forward evidence from Hertzke et al (2018) on the increase in the sales of EV cars in the period 2010 to 2017 and from Diaz et al (2020) & DETEC (2020) stating that fires involving lithium-ion batteries pose hazards significantly different to conventional fires in terms of ignition, rate of development and toxicity of emissions.

6. **Dublin Fire Brigade Firefighting Intervention:**

   The Local Authority highlights the risks associated with an EV fire compared to an Internal Combustion Engine (ICE) fire and states the procedures in their approach to managing car fire incidents have to be reviewed taking into account:

   - The significant amount of water required to extinguish an EV fire.
   - An increase in the number of responding appliances to 2 possibly 3 pumps per incident.
   - The high quantity of toxic water runoff.
   - Toxic gases contaminating firefighters PPE requiring a full change after each EV fire.
   - The increase in the number of EV's increases the potential for multi-EV incidents putting additional demands on Local Authority resources.
   - The transport of the EV post suppression to mitigate against the potential for re-ignition.
   - The likely hood of DFB having to escort the transported EV post fire.
   - The possible need for DFB to consider full vehicle immersion technology post suppression.

CONDITION 3

It is the Local Authorities view that the proposed car park vents are positioned such that smoke from a fire in the basement will discharge directly below windows (including bedroom windows) of the apartments above. They state that Dublin Fire Brigade have attended incidents where smoke from a basement car park fire has re-entered the building at a higher level via openable windows (e.g. Northwood Apartments, Santry). They suggest that it is a reasonable requirement that smoke vents should not be positioned such that in scenario where a fire occurs in the basement and the windows from the apartments above happen to be open, that these apartments wouldn't fill with hot smoke thereby potentially spreading the fire and preventing the occupants from escaping the building.

4. CASE PUT FORWARD BY JENSEN HUGHES

CONDITION 1

The case being put forward by Jensen Hughes (the appellant) in respect to Condition 1 can be summarised as follows:

1. **Guidance provided in BS9251: 2021 Code of Practice for Fire Sprinkler Systems for Domestic and Residential Occupancies**
    - The application was based on the building being designed in accordance with Technical Guidance Document B:2006 + A1: 2020 (TGD B) and BS5588-1.
    - The purpose of the residential sprinkler provision in TGD B is to accommodate open plan layouts and extensions to travel distances in apartment common areas which are not impacted by the provision of a sprinkler system in the car park.
    - The fire cert application was based on the provision of a Category 2 sprinkler system to BS 9251 covering apartments and common corridors only.
    - Amenity areas are to be separated from the residential areas via compartment construction and protected lobbies in accordance with BS5588 Part 1 and therefore do not require sprinkler protection.
    - The basement will not be provided with sprinkler protection on the basis that:
        - The top storey height of the building is less than 10m.
        - The basement is designed as a separate compartment and is enclosed in 60 minute fire resisting construction (including elements of structure).
        - Travel distances in the basement comply with the limits as set out in TGD B.
        - The basement is provided with two stairs. The North stairs discharges directly to the outside from the basement level. The South stairs serves all floors of the building including the basement level but is provided with double lobby connection to both the stair and lift with 0.4m2 permanent ventilation to the outside by way of fire rated ductwork.
        - The ventilation being provided to the basement car park is more than double that required by Section 3.5.2 of TGD B.
        - Dry riser outlets will be provided at basement level.
        - Dedicated fire hose reels will be provided at basement level.
        - The evacuation strategy being proposed incorporates simultaneous evacuation.
    - A qualitative comparative analysis was provided between two residential blocks where the only difference was one block had open plan apartments and the other had apartments with protected entrance halls. The analysis was put forward to demonstrate how the provision of

sprinklers within the car park in residential developments should be considered independent from the provision of sprinkler coverage within the open plan apartments.

2. **Review of TGD B provisions in 1997, 2006 and 2020 edition and in the Draft Building Regulations (brown & blue book)**

The appellant highlights the fact that even though the Local Authority asserts that the guidance in TGD B is out of date and does not reflect the current generation of car types, through engagement with the Part B consultative committee the appellant can confirm that there is no proposal for changing guidance in relation to sprinkler protection to car parks. The appellant suggests that if the Local Authority are of the view that TGD B should be updated the appropriate forum would be to put forward their views in the public consultation stage of the next revision to TGD B.

The appellant points out that under Section 3.5.2 of TGD-B it specifically states that ***"Note: Because of the above, car parks are not normally expected to be fitted with sprinklers".*** A comparative analysis is put forward comparing a 'normal' basement car park to an 'abnormal' basement car park, with the conclusion being drawn that the basement being proposed in this application is of the normal basement type e.g., the means of escape, linings, compartmentation, ventilation and fire fighter access all which comply with the requirements of TGD B.

In addition, they note the following documents do not require the provision of basement car park sprinklers: ADB (England and Wales), TBE (Northern Ireland), TGD B (Republic of Ireland), BS 9999 and BS 7346 Part 7.

3. **Background Research into Car Fires, in which the DCC reference various car park fires in Ireland, UK and Europe in which multiple cars were ignited**

The appellant points out that research, undertaken in 2006-2010 work outlined by DCC focused on vehicles fuelled by petrol and diesel as opposed to EV cars and that even in the most recent revision to TGD B 2006 + A1 2020 the provision for not requiring car park sprinklers has remained unchanged.

4. **Electric vehicles – the Local Authority set out the specific challenges associated with fire occurrences/risks in EV vehicles compared to Internal Combustion Engine (ICE) vehicles and note that there is an ongoing change from ICE to EV vehicles driven by climate change considerations, particularly that significantly greaterwater volumes are required to deal with**

a fire occurrence in the battery packs of an EV vehicle than a fire in a ICE vehicle and they note that the fire may continue over an extended period of time.

The appellant notes that research by NFPA 'Modern Vehicle Hazards in Parking Structures and Vehicle Carriers' showed that the EV's tested as part of this study did not present a greater hazard than the ICEV's. To assist firefighting operations at basement level:

- The level of ventilation being provided is more than double that required in Section 3.5.2 of TGD B, 5.5%.
- Dry riser outlet (which is not required in single store basements) is being provided.
- Fire hose reels are being provided.

CONDITION 3

The appellant points out that the comments noted in DFB's Fire Officer's Report relate to their experience/opinion, but they have failed to demonstrate how the appellant has deviated from either TGD B or the Building Regulations. Furthermore, they state that proposed location of the car park smoke vents are in accordance with the requirements of TGD B and have not been positioned where they would prevent the use of the means of escape from the building.

5. ASSESSMENT

CONDITION 1

While the Local Authority goes to some lengths to explain their reasoning for this condition which included:

(1) carrying out a detailed review of TGD B (recent and superseded versions) & the Draft Building Regulations

(2) providing background information on car fires/EV's

(3) identifying their firefighting intervention procedures for both ICE (Internal Combustion Engine) and EV car fires

the fact remains that the requirement in Section 5.4.3.1 of TGD B (see below) is very clear in that *"basement car parks are not normally expected to be fitted with sprinklers".* In addition, it is worth noting that even though TGD B was updated in 2020 there were no amendments made to this section.

5.4.3.1 Basements - Smoke ventilation from basements generally take the form of outlets vents connected directly to the open air. Such ventilation should be provided from every basement storey except in the following:

(a) a basement in a dwelling house (Purpose Group 1(a) and 1(b));

(b) a basement having an area less than 200 m² and a floor which is not more than 3 m below the adjacent ground level.

Smoke vents should be sited at high level and should be distributed around the building perimeter to maximise the effectiveness of cross-ventilation. The clear cross-sectional area of all smoke vents, allowing for frames and louvres, should not be less than 2.5% of the basement storey served. Where a basement is compartmented, each compartment should be ventilated separately. Generally, smoke vents from basements should be permanently open and unobstructed, but where they are readily accessible from the outside, consideration can be given to suitably indicated removable covers. Smoke vents should not be positioned where they would prevent the use of the means of escape from the building.

As an alternative to outlet vents as described above, a system of mechanical extraction may be provided, where the basement is also protected by an appropriate sprinkler system complying with BS 5306: Part 2: 1990. The ventilation system should meet the criteria set out in 3.5.2.5 and should operate automatically on activation of the sprinkler system.

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

In my opinion not having the basement car park in this application sprinkler protected is in compliance with Section 5.4.3.1 of TGD B which would generally be accepted as prima facie compliance with Part B of the Second Schedule of the Building Regulations.

CONDITION 3

The appellant notes that in the Local Authorities submission they have failed to show how their design deviates from the requirements of TGD B. The Local Authority notes and provides an example of a case where smoke from a fire at basement level re-entered the building at a higher level through an opened window. Taking this logic however, they would also need to prevent smoke from, for example, an upper floor fire (of any building) spreading externally up and through an openable window to a floor over the fire floor. There is nothing in TGD B that prevents the basement vents being placed in the positions identified on the appellant drawings. Section 3.2.5.4 which deals with natural ventilation of car parks states *"Smoke vents at ceiling level may be used as an alternative to the provision of permanent openings in the walls. They should have an aggregate area of permanent opening totalling not less than 2.5% of the floor area and be arranged to provide a through draft."*. I believe that the appellant has shown that this is being provided in their application.

In their submission the Local Authority quotes Section 5.4.3.1 of TGD B and in particular *"Smoke vents should not be positioned where they would prevent the use of the means of escape from the building".* The basement floor plan drawing (Drawing No. EI/4615/6/3 Rev A) identifies 4 vents from the car park (vent 1, 2, 3 and the ramp opening). The location of the proposed vents in my view will have no effect on the means of escape from the building as building occupants in adjoining apartments (to the vents) will be evacuating away from the vents via the common protected corridor and protected stair. The positions of vents 1, 3 and the ramp opening will have no effect on the means of escape of evacuees as they are positioned on elevations well away from the main building exit. Vent 2 is the closest vent to the ground floor final exit. Evacuees leaving the building via the main exit are still more than 11m from the vent which in my view is more than adequate from a means of escape point of view. It is also worth noting that the building is being provided with a comprehensive fire detection and alarm system meaning that evacuees will be notified of any fire incident at an early stage giving them ample opportunity to evacuate at the early stages of a fire.

The requirement under Section 5.4.3.1 states that "Smoke vents should not be positioned where they would prevent the use of the means of escape from the building". A review of the basement plan (Drawing No. EI/4615/6/3 Rev A) and the ground floor plan (Drawing No. EI/4615/6/4 Rev B) clearly shows that this is the case. In all instances evacuees escaping the building are moving away from the proposed basement vents. It is also worth noting that there are no basement vents close

to the buildings main entrance that would hinder the means of escape from the buildings main exit in any way.

The appellant in my view is complying with the requirements laid down in TGD B.

6. RECOMMENDATIONS

Condition 1

On the basis of my assessment, I recommend that An Bord Pleanàla grant the appeal and instruct that Condition 1 be removed from the Fire Safety Certificate.

Condition 3

On the basis of my assessment, I recommend that An Bord Pleanàla grant the appeal and instruct that Condition 3 be removed from the Fire Safety Certificate.

Signed: 

Bryan Dunne
MSc(Fire Eng), BSc(Eng), Dip(Eng), CEng, MIEI, Eur Ing

Date: 20" March 2023