

AN BORD PLEANALA REPORT

REF ABP-317213-23

On

Appeal against Condition 3 of Fire Safety Certificate No.

FSC2201739DC/7DN

Submission No. 3006584

For

**Sandymount Ave. basement/podium and associated works, proposed
construction of a single storey basement car park and associated
ground floor escape routes**

At

Sandymount Avenue, Sandymount, Dublin 4

Report Prepared By: Bryan Dunne

Ref No.: ABP/2024-R01

Date: 19th March 2024

1. INTRODUCTION

This report sets out my findings and recommendations on an appeal submitted by Maurice Johnson & Partners (the appellant), acting on behalf of their client Mr. Christopher Jones against Condition No. 3 of Granted Fire Safety Certificate (FSC) Application FSC2201739DC/7DN granted by Dublin City Council (the Local Authority) on the 24th April 2023 in respect of the proposed construction of a single storey basement car park and associated ground floor escape routes at Sandymount Ave., Sandymount, Dublin 4.

The FSC was granted with four conditions, only condition 3 is been appealed and as such none of the other conditions form part of this assessment.

CONDITIONS SUBJECT OF THIS APPEAL

CONDITION 3:

An automatic sprinkler system shall be provided to the basement carpark in accordance with I.S E.N 12845: 2015 + A1: 2019-fixed firefighting systems - automatic sprinkler systems - design, installation and maintenance.

Reason:

To comply with the provision of Part B of the Second Schedule of the Building Regulations, 1997 to 2022.

2. DOCUMENTATION REVIEWED

1. FSC application form, drawings and report produced by the appellant and submitted to the BCMS system on the 23rd March 2022.
2. Local Authorities request for additional information dated the 12th April 2022.
3. Additional information submitted by the appellant to the BCMS system on the 11th November 2022.
4. Local Authorities request for additional information dated the 31st January 2023.
5. Additional information submitted by the appellant to the BCMS system on the 13th February 2023.
6. Fire Safety Certificate Grant issued by the Local Authority, Ref: FSC2201739DC/7D, Managers Order No. FSC 1161/23/7D dated the 24th April 2023.
7. Appeal submission by the appellant to An Bord Pleanála dated 24th of April 2023.
8. Appeal submission by the Local Authority – Fire Officer’s Report dated the 27th June 2023.
9. Further submission by the appellant to An Bord Pleanála on the 18th July 2023.

3. CASE PUT FORWARD BY THE LOCAL AUTHORITY

CONDITION 3

In support of their case for sprinkler protecting the proposed basement car park the Local Authorities response to this appeal was broken down under the following headings:

- (a) Review of the initial Fire Safety Certificate (FSC) application
- (b) Observations on the appeal argument
- (c) A review of the fire risks associated with modern vehicles in an enclosed car park
- (d) Conclusion

(a) Review of the Fire Safety Certificate Application

The Local Authority make the point that while Technical Guidance Document B (TGD B) provides guidance to individuals on how to deal with the requirements of the Building Regulations the guidance cannot include for every aspect of building design and it is their view that the Building Regulations allows for the consideration of new hazards to changes in technology and materials that may not currently be addressed in current guidance documents. It is on this basis that's the Local Authority contacted the appellant and asked them to confirm that the basement would be sprinkler protected. In their response to this request the appellants confirmed they would not be provided as they were not required under TGD-B. In addition, they confirmed they would provide dry falling for mains and exhaust ventilation both of which would assist fire service operations should a fire occur. Hose reels conforming to IS EN 671-1:2012 were also proposed at basement level.

(b) Observations on the appeal argument

TGD-B makes two key points when it comes to not requiring sprinklers in basement car parks:

- *The fire load is well defined and not particularly high, and*
- *Where a car park is well ventilated, there is a low probability of fire spread from one storey another*

It is the Local Authorities opinion that these statements are outdated for the following reasons:

- Modern vehicles are generally larger and have a greater fire load associated with them. The increased fire loads in vehicles including electric vehicles along with the use of plastic fuel tanks is likely to result in fires between vehicles in enclosed spaces
- The number of electric vehicles on the road is increasing
- Fires in electric vehicles generally lasts longer and results in a much greater release of heat and smoke then fires in conventional vehicles

It is for the above reasons that the Local Authority recommend the provision of sprinklers to provide a level of early intervention that will reduce the likelihood of fire spread between vehicles.

In addition, it is the Local Authorities view that in providing a residential sprinkler system in a building in accordance with BS9251, it includes extending that system into car parks as there is no permission to omit car parks under Section 5.4.

Appendix A: Fire Risks Associated with Modern Vehicles in an Enclosed Car Park

As part of their accompanying documentation the Local Authority carried out a review of the following documents:

- (i) Fire Note 10 “Fire and Car Park Buildings” produced by The Ministry of Technology and Fire Offices Committee Joint Fire Research Organisation, 1968
- (ii) “Fire Spread in Car Parks” produced by the BRE in 2006 after been commissioned by the UK Department of Communities and Local Government
- (iii) NFPA’s Modern Vehicle Hazards in Parking Garages & Vehicle Carriers, 2020

A summary of some of the key findings from the above documents identified:

- Modern cars are larger than those manufactured in the 50's and larger cars means a reduction in the distance between them when parked
- During the early stages of a vehicle fire the failure of any plastic fuel tank is expected which could result in fire spread between vehicles
- Fires in partially and fully closed car park are more severe than in open sided car parks
- Vehicle fire temperatures in excess of 1100dec C are expected as a result of larger vehicles in tighter spaces with lower ceilings
- As well as causing structural damage, spalling of concrete can be dangerous for fire fighters
- An increase in the amount of plastics in modern vehicles adds to the total fuel load of the average vehicle. This increased plastic content may manifest itself as faster flame spread within a vehicle, easier ignition and more rapid fire spread to neighbouring vehicles
- Some tests of multiple modern vehicles have shown very rapid fire spread between parked vehicles of the order of 10 to 20 minutes. Similar spread rates have also been reported in some of the larger losses involving car park fires. Based on these findings it is clear the test data from older vehicles should not be used as a basis for development of codes and regulations
- 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)

Case Studies

The Local Authority includes a list and brief summary of relevant case studies from car park fires both nationally and internationally where fire spread beyond the vehicle of origin and involved multiple vehicles which in some instances resulted in fatalities. They include the following table which compares the risks associated with modern vehicles which they encounter.

Risk	ICE (Internal combustion Engine) Car Fires	EV (Electrical Vehicle) Car Fires	EV Vehicle Notes
Environmental Damage	Environmental damage from firefighting water run off	Environmental damage from firefighting water run off	Exponentially higher toxic run off containing heavy metals given the quantities of water needed to extinguish
Gases produced	Large volumes of Carcinogenic/Mutagenic/Reproductive toxin gases	Large volumes of Carcinogenic/Mutagenic/Reproductive toxin gases	Given the extinguishment difficulties, Toxic Smoke production is like to greatly exceed ICE Vehicle values
Fire Spread	Potential for fire spread to other vehicles	Potential for fire spread to other vehicles	Given the extinguishment difficulties, the likelihood for fire spread to adjoining vehicles increases significantly
Heat Release Rate	High heat release rate ($\geq 3\text{MW}$)	High heat release rate ($\geq 3\text{MW}$)	Similar values identified

Effluent	Corrosive/Toxic effluent from battery	Corrosive/Toxic effluent from battery	
Fuel Tanks	Potential for plastic fuel tank to rupture creating a running fuel fire	Not Applicable	Not Applicable
Pyrotecnic Explosion	Potential for Pyrotecnic explosion of airbag inflators system	Potential for Pyrotecnic explosion of airbag inflators system	Similar characteristics
Smoke Spread and Volume	Possible smoke egress into stairwells compromising means of escape	Possible smoke egress into stairwells compromising means of escape	Higher smoke volumes exacerbate this risk
Shock Hazard	Not Applicable	Electric Shock hazard	High Voltage Battery System

Structural Integrity/Fire Protection Concerns

Concern is expressed by the Local Authority that the fire protection requirements for basements doesn't take into account the fire load of modern cars nor the extensive use of electric vehicles.

TGD-B Basement Car Park Ventilation

Under Section 3.5.2 of TGD-B the current minimum ventilation requirements for mechanical or natural ventilation are typically 10 air changes per hour or 2.5% of the car park floor area. The point is raised by the Local Authority that there is currently no requirement in BS 7347-7: 2013 to meet any set visibility or temperature criteria for either the means of escape or the firefighting phase of any fire incident and that the existing requirements are very likely to be inappropriate for multiple vehicle fires.

Broader Implications Considered

Additional considerations identified by the Local Authority include:

- 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 the fire brigade having to escort the transported EV post fire incident
- The possible need for Lock Authority to consider full vehicle immersion technology post suppression

Conclusion

The Local Authority are of the view that based on their first hand experience in tackling fires involving modern vehicles, past assumptions in relation to car park

fires e.g. *the fire load is defined and not particularly high* can no longer be relied upon. For the reasons summarised above they consider it appropriate to sprinkler protect basement car parks to allow for safe means of escape for occupants and allow fire crews access the area for firefighting.

As a result, the Local Authority included Condition 3 on the granted FSC.

4. CASE PUT FORWARD BY MAURICE JOHNSON & PARTNERS

CONDITION 3

The case being put forward by Maurice Johnson & Partners (the appellant) in respect to Condition 3 can be summarised as follows:

1. MJP response to DFB observations and assessment of the appeal:

The appellant does not agree with the Local Authorities comment that Section 3.5.2 of Technical Guidance Document B (TGD B) is out of dated and no longer relevant. They argue that due to the low number of cars parked side by side (in their design) and the fact that they are proposing to ventilate the car park mechanically rather than naturally it is not feasible that a fire could spread to every car in the car park. In addition, they note that a number of the examples of car park fires put forward by the Local Authority were fires that occurred prior to the publication of the 2020 TGD B, where there would have been an opportunity for The Department of Housing, Planning and Local Government to updated this Section and Section 5.4.3.1 of TGD B but didn't.

They do not agree with the position put forward by the Local Authority that BS9251 requires sprinklers in basement car parks, making the following points:

- Sections 1.6.3(a), 1.7.1 paragraph (4) and 1.8 of TGD B are very clear in only requiring sprinkler protection within an apartment and not in other parts of a building, apart from buildings with a top floor in excess of 30m (which the proposed building is not). The provision of partial sprinkler coverage within this development is to offset the means of escape layouts of the proposed apartments and common corridors serving the apartments.
- BS9251 is not a specification but a code of practice which takes the form of guidance and recommendations.

Finally, the appellant makes the point that while the Local Authority state that their reason for the sprinkler condition is to comply with Part B1 and B5 of TGD B they are of the opinion that the proposed design exceeds the requirement of both these Parts of TGD B.

2. MJP response to Appendix A

It is the view of the appellant that the Local Authority have taken a selective approach in the documents cited in Appendix A. The appellant notes there have been three iterations of TGD B since 1991 with none of the updates recommending the need for sprinkler protecting car parks/basement car parks. A comparative analysis is put forward comparing two known fires (Brookwood Abbey and Northwood Apartments) with this schemes proposed design. They summarise their findings are identified in Table 1 below.

	Brookwood Abbey	Northwood Apartments	Sandymount Avenue
Natural or mechanical ventilation	Natural	Natural	Mechanical
Dry mains to assist fire fighters	No	No	Yes
Vents located near apartment windows above	Yes	Yes	No (mechanical system will exhaust away from the building)
Basement lobby vents separated from above ground vents	No	Yes	Yes
Combustible insulation at basement	-	Yes	No
Sprinkler protection provided/proposed	No	No	No

TABLE 1

The appellant states that the building design in Sandymount Avenue is significantly more robust than that in Broomwood Abbey or Northwood Apartments on the basis that:

- Superior means of escape is provided for occupants of both the car park and the upper floors
- The introduction of a dry main allows for a reduced time for fire fighter setup
- The provision of a mechanical ventilation system in lieu of the traditional natural system allows fire fighters to enter the car park from an upwind position
- With a podium slab offering a fire resistance in excess of 120 minutes there is a low risk of structural failure during the initial means of escape phase and subsequently the firefighting phase of any potential incident

In addition, the appellant provides two examples of car park fires in Rotterdam and Limburg where neither car park was sprinklered and both were mechanically ventilated and in both fire incidents there was no widespread damage.

3. Conclusion

The appellant submits that the proposed design exceeds the requirements in of Sections B1 and B5 of the Building Regulations and that the provision of sprinklers in basement car parks is not required.

It is for the above reasons that the appellant recommends the removal of Condition 3.

5. ASSESSMENT

CONDITION 3

While the Local Authority goes to some lengths to explain their reasoning for this condition 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.

It would be my opinion that not having the basement car park 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. In addition, I would be of the view that conditions such as this that are imposed by some Local Authorities lead to inconsistency in building design nationally which is something I believe is to be avoided. If the Local Authority are of the view

that basement car parks should be sprinkler protected they should lobby the Department of Housing, Planning and Local Government to have TGD-B amended thus clarifying the situation for both Local Authorities and consultants alike.

6. RECOMMENDATIONS

Condition 3

On the basis of my assessment, I recommend that An Bord Pleanála grant the appeal and instruct the Local Authority to remove Condition 3 from the Fire Safety Certificate.

Signed: 

Bryan Dunne

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

Date: 19th March 2024