LONDON FIRE BRIGADE

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Freedom of Information request reference number: 7961.1

Date of response: 16/10/2023

Request:

I understand that the LFB has written to either TFL or Ballymore or Barnet Council stating that it cannot support an underground bus garage due to risk to firefighters.

Please can I have a copy of this correspondence

Response:

Please see attached letter from the London Fire Brigade to the London Borough of Tower Hamlets.

We have dealt with your request under the Freedom of Information Act 2000. For more information about this process please see the guidance we publish about making a request on our website: https://www.london-fire.gov.uk/about-us/transparency/request-information-from-us/

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London Borough of Tower Hamlets Building Control

The London Fire Commissioner is the fire and rescue authority for London

Date 30 November 2022
Our Ref TBC (Edgware Central)
Your Ref TBC (Edgware Central)

Dear [redacted]

Premises: Edgware Central Electric Vehicle Bus Garage

The London Fire Commissioner (the Commissioner) is the fire and rescue authority for London. The Commissioner is responsible for enforcing the Regulatory Reform (Fire Safety) Order 2005 (as amended) in London.

With reference to your recent request for advice, we offer the following:

Documents reviewed:

- LBTH BC email and content dated 06/10/2022
- Mott MacDonald Edgware Central Fire Strategy Overview dated 31/08/2022
- Mott MacDonald Draft Fire Strategy Technical Note dated 19/05/2022

LFB Fire Engineering Group comments:

1. The London Fire Brigade is not satisfied with the proposals.

2. Overall, the design team has simply approached a large (both in size and number) electric vehicle bus garage in the same way as a conventional car park designed to meet the minimum requirements as defined in BS 9999:2017, which does not address the specific hazards posed by alternative fuel vehicles in this environment. Especially, it has not been recognised that, like some other emerging technologies, the electric vehicle (EV) industry lacks sufficient published fire safety research to determine if the widespread use of EVs (and especially large goods and passenger EVs) is compatible with current UK fire safety regulations and guidance.

3. We would expect that, prior to proposing any fire safety recommendations or solutions, sufficient information, underpinned by robust and evidenced research, is gathered to ensure those recommendations are adequate to mitigate the unique risks introduced by this emerging technology. In particular, while we understand there is ongoing research into the risks posed by EVs, there is insufficient information at this time in respect of the main risk component: Lithium-Ion batteries, to adequately inform the above; and therefore, further research is required to address the risks and issues identified in our later comments.

4. In our view, the design team is severely underestimating the fire loading and unique difficulties posed by EV fires generally and a large number of electric buses in particular. A first-principles fire engineered/performance-based design approach would likely be our minimum expectation. We question what underpinning electric bus fire research will be referenced to support a performance-based approach.

   The fire resisting separation is proposed to be only 120mins; given the fire loading and potential for a number of electric buses to be involved in fire for a protracted period of time, we question if this is sufficient. The smoke ventilation design appears to be premised upon an air change rate necessary to achieve a 10m visibility distance for a 10MW fire; we question the basis for these design assumptions and would expect to see this justified in any future Building Regulations consultation. We reiterate that there is no basis for the assumption that current guidance is automatically satisfactory for emerging technologies such as electric buses or that a 'code compliant' solution is appropriate. We do not consider the proposed premises to fall within the scope of a 'common building situation'.

5. The development also appears to be predominantly a tall residential flat development with a large electric bus garage below. In our view the two occupancies cannot be viewed separately in respect of the design, published guidance or any qualitative design review (QDR). We note the possible two-stair solution for the residential flat buildings above, however there are other evolving evacuation and firefighting issues that may need to be considered for tall residential buildings. In any event, there is not enough information for us to comment on the residential components other than that already stated.

6. We note that a QDR will be undertaken but would suggest that, based on our comments above, the QDR should be undertaken to ensure the viability of the proposal itself, not as a route to justifying a pre-determined decision or outcome. In any event, we would expect that any design that falls outside the recommendations of or scope of guidance documents such as Approved Document B and BS 9999:2017 would follow a fire engineering framework similar to the framework detailed in BS 7974:2019; a process that demonstrates the validity of the fire safety design solutions.

   One of the main important factors in any such framework or QDR is the *'What if'*/sensitivity study (BS 7974:2019, clause 5.5.3 refers) which includes assessment of system failures or foreseeable events which may negatively impact on the ability of the proposed design to demonstrate a suitable level of fire safety. This may include (but is not necessarily limited to):

   a. Failure of any proposed mechanical smoke ventilation system (MSVS);

   b. Failure of any automatic water fire suppression system (AWFSS);

   c. Failure of any other risk-critical active fire safety systems, such as fire and smoke curtains.

7. It would be instructive for the responsible person/s and/or design team to discuss the proposed development with their preferred electric bus manufacturer/s to determine the level of structural and other fire safety considerations required for their product, with the supporting research and testing.

8. We concur with the comments made separately by our Transport Liaison Group, detailed below.

LFB Transport Liaison Group (LFB TLG) comments:

Please find our initial findings in relation to the underground bus garage at Edgware. At this moment in time the project is not feasible as laid out in in the proposals supplied.

9. The following are preliminary observations and comments for further discussion in a future Qualitative Design Review (QDR).

10. Our principal concern is relates to the ability for firefighters to approach a fully developed electric bus fire located centrally in either (North or South) compartment, when at full stabling (parking) capacity.

11. It is understood that electric buses will be stabled approximately 1m apart with up to 95 vehicles in each compartment. Formation and density of stabled tall vehicles would impede movement of firefighters moving towards the fire location. Upon reaching the fire location, formation and density of stored vehicles would impede access to the perimeter of any bus on fire, limiting the direct application of water on the fire source and limiting the effectiveness of any firefighting operations.

12. Purported Heat Release Rate (HRR) values of up to 30MW have been estimated for a fully developed electric bus fire involving Lithium-Ion batteries undergoing thermal runaway, therefore 1m stabling distances would likely facilitate radiative fire spread and further hinder firefighters from approaching. Fire temperature values of up to 1200°C have been reported for EV fires, therefore we would expect suitable worst-case realistic fire temperature curves to be considered for any structural fire protection being proposed.

13. In our opinion, lithium-Ion battery fires should be considered to have an ultra-fast growth rate and a 165°C threshold for thermal runaway, when estimating design fire spread. Research in this area is limited and under continual review.

14. We question if any sprinkler system can be designed to suppress/control an electric bus fire with a Lithium-Ion battery pack undergoing thermal runaway, especially when considering the close stabling, ceiling heights, location of the batteries and shape of the vehicle. We recommend consideration be given to exploring alternative means of automatic fire suppression, for example a drencher or foam suppression system, adapted for this type and location of fire. We would expect it to be demonstrated that any automatic fire suppression system proposed is suitable for the proposed application.

15. If firefighters are unable to gain access and apply extinguishing media to the vehicles involved in fire, then any suppression system would need to be capable of being supplemented via a suitably designed tanks and pump set or facilitated by fire appliances from public hydrants.

16. Due to the known characteristics of fires involving Lithium-Ion battery technology, suppression or firefighting extinguishing media may need to be applied for hours or days, with local supply and environmental waste implications.

17. With special reliance on any suppression system for this location and scenario, we seek further information relating to the fail-safes or redundancy of systems being considered additional to Annex F (BS EN 12856)?

18. We make the following specific comments in response to the Mott McDonald *Technical Note Executive Summary*:

    a. *A Qualitative Design Review (QDR) will be undertaken*. LFB TLG: Noted.

    b. *As an outline design, the Bus Garage will be designed in accordance with BS 9999*. LFB TLG: Noted.

    c. *The Bus Garage will operate on a simultaneous evacuation regime i.e. all occupants will evacuate on the sound of a single alarm*. LFB TLG: Noted.

    d. *The Bus Garage will be fitted with a High Hazard II (HHP2) category sprinkler system design in accordance with BS EN12845*. LFB TLG: Can it be demonstrated that any category of sprinkler design could control or suppress an electric bus fire in thermal runaway?

    e. *All stairs within the Bus Garage will fire-fighting cores*. LFB TLG: Noted.

    f. *The Bus Garage and all other accommodation will be fire separated by 120 minutes of fire resisting construction*. LFB TLG: Would this time be sufficient given the fire scenario?

    g. *The Bus Garage will be separated into a minimum of two main compartments separated by 120 minutes of fire resisting construction*. LFB TLG: Noted.

    h. *The Bus Garage will be provided with a perimeter corridor to aid in: limiting travel distances; and aid firefighter ingress*. LFB TLG: Noted, but firefighter access to the centre or furthest point of a fully stabled compartment will need to be explored further.

    i. *The floor above will be constructed as a compartment floor*. LFB TLG: Noted.

    j. *The Bus Garage will be mechanically ventilated in accordance with BS 9999*. LFB TLG: Fire and ventilation model design details will need to be discussed further to incorporate the fire scenario above.

Any queries regarding this letter should be addressed to the person named below. If you are dissatisfied in any way with the response given, please ask to speak to the Team Leader quoting our reference.

Yours faithfully,

[redacted]

for Assistant Commissioner (Fire Safety)
Directorate of Operations
FSR-AdminSupport@london-fire.gov.uk

NOTE: The contents of this letter are without prejudice to any requirements or recommendations that may be made by the Commissioner under the Regulatory Reform (Fire Safety) Order 2005, the Petroleum (Consolidation) Regulations 2014, or the local authority or the Health and Safety Executive under other legislation. All alterations should comply with the appropriate provisions of the current Building Regulations.

Reply to [redacted]