

Fire Safety Engineering Design Review for DA Submission



327-335 Burley Road, Horsley Park
NSW (Lot 202, formerly Lot 204)

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1. General

Scientific Fire Services (SFS) has undertaken a preliminary review and high-level assessment of the architectural drawings and concepts proposed for the warehouse/processing and associated office development for the previously approved SSD 10436 for Lot 202 (formerly referred to as Lot 204) situated at 327-335 Burley Road, Horsley Park NSW. The following provides a summary of the fire safety risk engineering aspects and 'in-principle' support for the proposed design.

2. Modification

This Fire Safety Engineering Design Review has been prepared specifically to address modifications to the approved SSD 10436 for Lot 202, formerly referred to as Lot 204. The renaming of the lot is due to alignment with the subdivision numbering across the entire estate.

Since the approval of SSD-10436 in March 2021 ESR have sought to modify the existing consent on the following occasions:

Table 2.1: SSD-10436 MOD Applications

MOD Number	Date of Lodgement	Date of Approval	Modification Description
MOD 1	3 May 2021	04 August 2021	Modification to the approved layout and design of Warehouse 201.
MOD 2	Yet to be lodged. A scoping meeting was held with the DPIE on the 4 August 2021.	N/A	Further modification to the approved layout and design of Warehouse 201 including: Instillation of six warehouse temperature control units onto roof of Warehouse 201; Removal of roller shutter doors from the western elevation of Warehouse 201; and Amalgamation of Warehouse tenancies 2B & 3, and fit-out works for cold storage for use by the future tenant.

3. The Project

The subject site is located at 327-335 Burley Road, Horsley Park NSW whereby it is proposed to design and construct a Class 7b storage warehouse/Class 8 processing facility and associated Class 5 office/administration portions. The storage warehouse building is proposed to be sub-divided into three (3) separate tenancies as summarised below:

- Warehouse A: 9,000m²
- Office A: 500m²

- Warehouse B: 2,670m²
- Office B: 400m²
- Warehouse C: 2,943m²
- Office C: 613m²

The building having a rise in storeys of not more than 2 (by virtue of the office portions) has a total floor area of approximately 16,126m² (excluding external awning structures). The building shall be treated as a *Large Isolated Building* and furthermore, shall be provided with automatic sprinkler protection throughout.

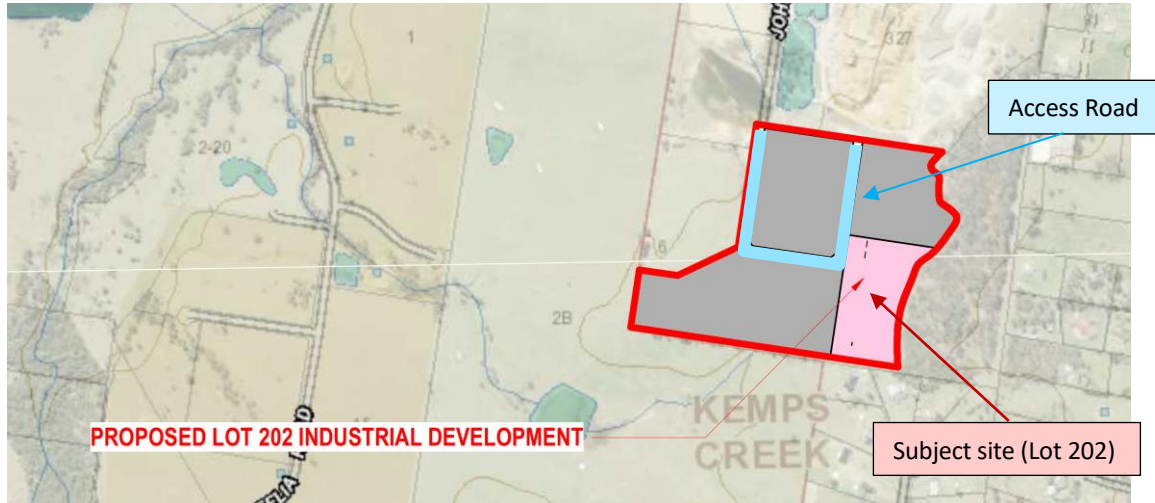


Figure 3.1: Key plan

Lot 202 is situated on the south-easter corner of the broader Horsley Park Logistics Park as illustrated below.

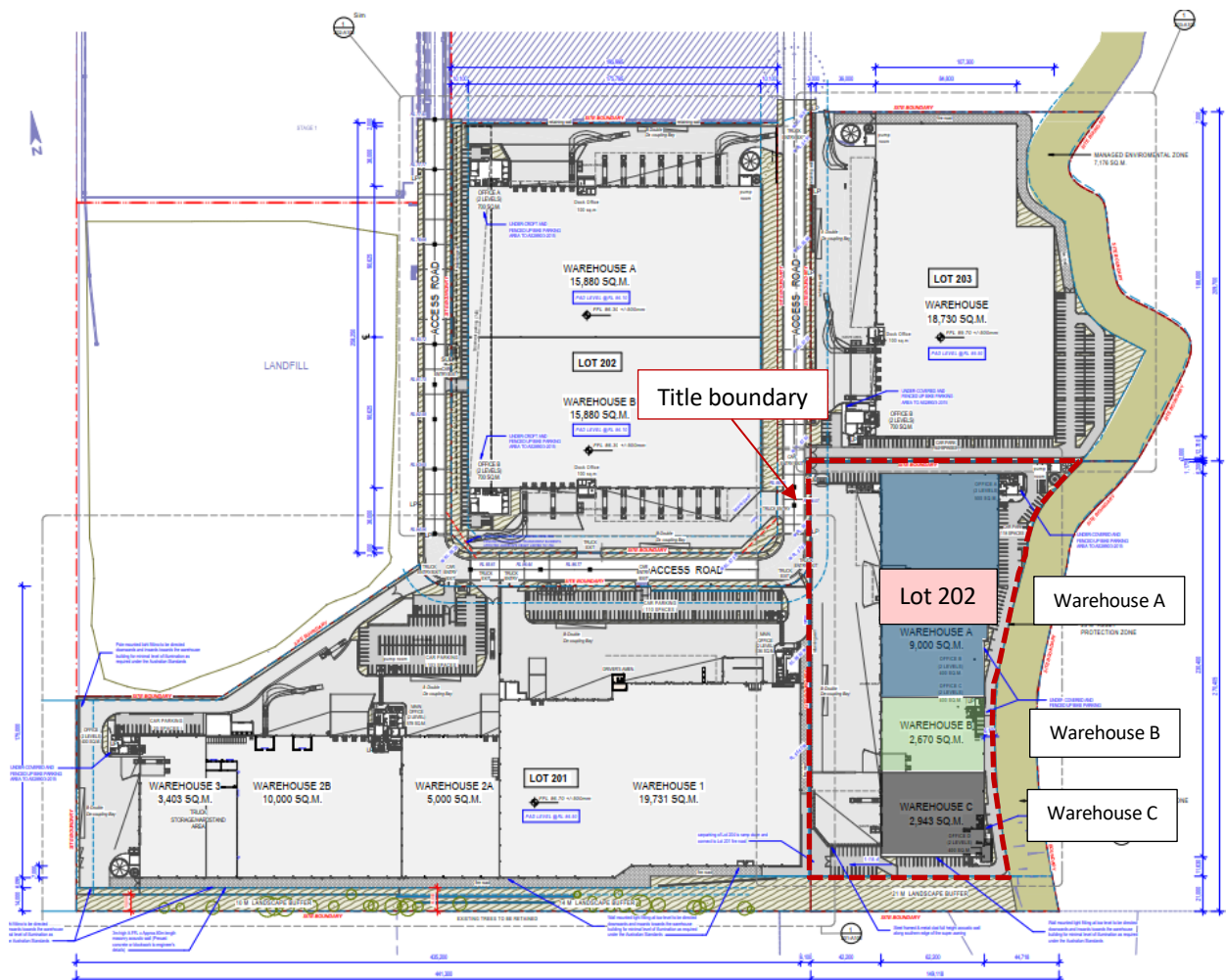


Figure 3.2: Estate Plan

Overall, the building shall comprise a rise in storeys of two (2) with a ridge height of up to 13.7m. As the volume of the proposed building exceeds the maximum volume limitation as permitted in Table C2.2 of Volume One of the NCC, the building has been classified as a *Large Isolated Building*. The building is required by Clause C1.1 of the NCC to be constructed in accordance with Type C fire-resisting construction and shall be provided with an automatic sprinkler system incorporating storage sprinkler system in accordance with Clause E1.5 of Volume One of the NCC and AS2118.1:2017.

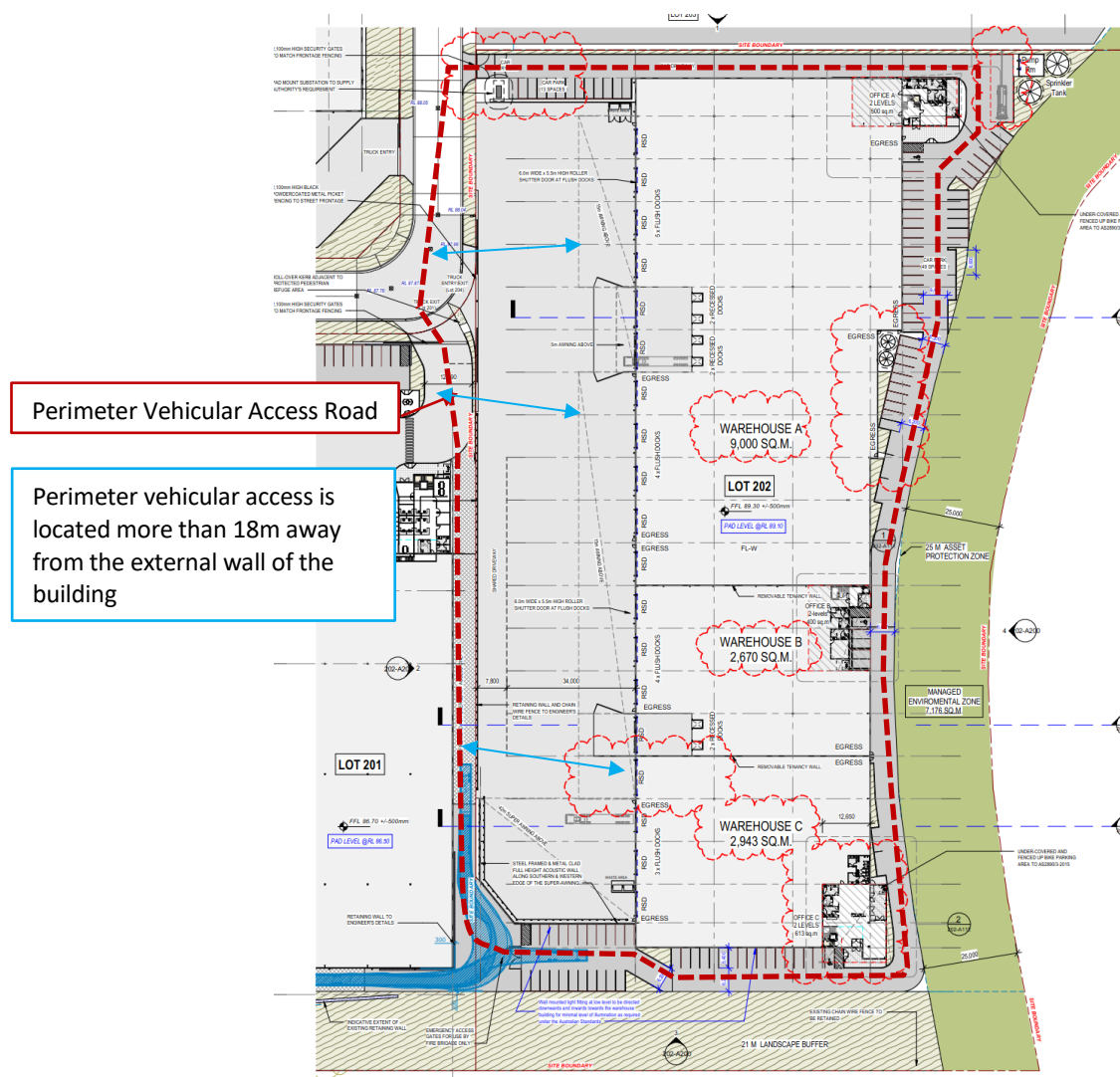


Figure 3.3: Lot 202 Site Plan

The building description based on the BCA classification system is provided in Table 3.1.

Table 3.1: BCA Description of the building(s)

Summary of Building/Tenancy	
Building Classification(s):	Class 5 (Office), Class 7b (Warehouse) & Class 8 (Processing)
Number of Storeys Contained:	Two (2)
Rise in Storeys:	Two (2)
Effective Height:	Ridge Height of up to 13.7m
Required Type of Construction:	Type C (Large Isolated Building)

4. Purpose

The preliminary fire safety engineering review has been undertaken to determine 'in-principle' whether the design will achieve meet the relevant *Performance Requirements* of the Building Code of Australia (BCA) (ABCB, 2019 Amendment 1). The design review relates to the fire-resisting construction, egress provisions and fire protection and equipment services proposed for the entire development.

The design issues specific to the subject building will be formally assessed through the application of the fire safety risk engineering process in accordance with the International Fire Engineering Guidelines (IFEG) (ABCB, 2005). It is the expectation that a suitable performance solution will be developed and supported through robust fire engineering methodologies of the current design proposal.

In the context of fire resisting construction, the fire resistance level for the broader part of the building is not proposed to deviate from the prescriptive provisions of the BCA; achieving the minimum fire rating for building elements commensurate with Type C fire resisting construction (i.e. in accordance with Part C from Volume one of the Building Code 2019 Amendment 1). It has however been identified that the super awnings located along the western portion of the building forms part of the external wall and is located within close proximity to the title boundary (within 3.0m) without the required fire rating prescribed by Type C fire resisting construction. Similarly, the same super awning consists of openings that are located within 3.0m from the title boundary. This has been further outlined in Section 4.1 of this statement.

From a perimeter vehicular access perspective, it is proposed to review and rationalise the requirement for open provisions and perimeter vehicular access around the *Large Isolated Building* for attending fire brigade personnel. This has been further outlined in Section 4.1 of this statement.

In the context of occupant egress for all warehouse portions, egress distances (and the distance between alternative exits) have been identified to exceed the maximum prescribed distances. More specifically, exit travel distances to an exit (where 2 exits in separate directions is available) is measured to exceed 40m whilst the distance between alternative exits exceeds 60m. In order to reduce the impact of the identified egress related design issues, measures including a post incident mechanical smoke clearance system, the reliance on the large volume within the warehouses and the presence of storage sprinklers (initiating a building wide alarm) will assist in controlling and/or suppressing a potential fire and provide safe conditions during occupant egress and fire brigade intervention. With respect to the office portions, it has been identified that the egress travel distances to a single exit (on the first floor levels) exceeds the maximum distance of 20m. To compensate for the extended travel distances within the office portions, a smoke detection and alarm system shall be proposed throughout the office portions. This has been detailed in Section 4.2.

In the context of fire services and equipment, the building shall be served by the standard suite of fire safety measures which are commensurate with a building of this size and nature. This shall generally include sprinkler protection, fire hydrant system, fire hose reel system, emergency lighting and exit signage, portable fire extinguishers and a manually operated smoke clearance system. As part of the fire strategy, it is proposed to rationalise the external fire hydrant and booster assembly locations, omit the requirement for protection measures around the external fire hydrant provisions and review the method of measurement to permit fire hydrant coverage to be achieved via the more recent and published fire hydrant standard and coverage strategy. The location of the sprinkler booster assembly at the rear of the site is also proposed to be permitted and as previously mentioned, it is also proposed to rationalise the requirement for an automatic smoke hazard management whilst substituting this system with a post incident/manually operated smoke clearance fan system. Finally, the exit signage heights throughout the warehouse portions are proposed to be mounted greater than 2.7m above the finished floor level. All of this has been further outlined in Section 4.3.

4.1 Fire Resistance, Perimeter Vehicular Access and Open Space Provisions

Scientific Fire Services understand that deviations have been identified from the prescriptive provisions of the BCA with respect to the fire resistance/perimeter vehicular access/open space provisions. The design issues relating to fire resistance, open space and perimeter vehicular access provisions shall be addressed through a qualitative methodology with consideration given towards the effectiveness and efficacy surrounding the following:

- Operational firefighting ability and any potential impacts on operational functions undertaken during firefighting operations;
- Review the potential for fire spread to the adjacent property/title boundary;
- The proposed and rationalised FRL may potentially have a negative impact on the life safety and occupants and Fire Brigade Intervention;
- Potential firefighter impacts as a direct result of the function and use of the building, likely fire load, potential fire intensity and hazard in association with the active and passive fire mitigation systems;

- Fire appliance and other emergency vehicle access around the entire site including the ability to ensure emergency vehicles do not obstruct appliance manoeuvrability and access around the site.

With respect to the proximity of the super awning situated within minimum setback distances to the title boundary, the methodology to be adopted to address the proposed rationalization of FRL to the super awnings shall consider the presence of the perimeter vehicular access track width separating buildings on the same site, and the resulting distance between external walls of the subject buildings being comparable to the DtS provisions of the BCA.

The holistic assessment methodology relative to firefighting operations shall consider the Standard Operational Guideline's (SOG's) of firefighting personnel which is expected to be obtained following direct consultation with the FRNSW specific to access being greater than 18m and the provision of a gates within the perimeter vehicular access roadway. These shall be supported through the typical fire brigade operations, and the provision of additional measures which include signage/mud-maps and also where gates present the ability to unlock and open the gate through the adoption of conventional padlocks with 003 key locks to enable fire-fighter access. The preliminary assessment conducted by Scientific Fire Services indicates that the vehicular and open space provisions can readily satisfy the relevant *Performance Requirements*, namely CP2 and CP9 from the BCA.

4.2 Occupant Egress Provisions

Preliminary review of the project information highlights a number of egress related design issues which include the distance of travel within the warehouse/processing portions exceeding the maximum prescribed distances of 40m and the distance between alternative exits exceeding 60m.

The design issues associated with the occupant egress throughout the warehouse/processing portions will be evaluated by way of an overall holistic assessment that will be developed with consideration of all occupants from the warehouse/processing portions. The design issues will be addressed through a deterministic and absolute approach demonstrating occupant and fire brigade life safety for acceptable durations of time. The exit travel distance and distance between alternative exits will be addressed with consideration to the fire safety systems installed within the building to ensure tenability limits are not breached during the evacuation process or firefighting operations.

The identified design shall be supported through computational modelling (i.e. CFD modelling and Pathfinder Evacuation Modelling) which shall suitably assess credible fire scenarios, the overall evacuation times of occupants and also the impact on attending fire brigade personnel upon arrival on site. The assessment will ensure that occupants would have adequate times to evacuate and also attending personnel to commence water application activities before being exposed to untenable conditions. The preliminary assessment conducted by Scientific Fire Services indicates that the proposed design solution relative to occupant egress from the warehouse/processing portions shall meet the relevant *Performance Requirements*, namely DP4 and EP2.2 from the BCA.

With respect to the office portions, it has been identified that the egress travel distances to a single exit (on the first floor levels) exceeds the maximum distance of 20m. To compensate for the extended travel distances, a smoke detection and alarm system shall be proposed throughout the office portions. The preliminary assessment to be conducted by Scientific Fire Services will conclude that the proposed design solution relative to occupant egress from the warehouse/processing portions shall meet the relevant *Performance Requirements*, namely DP4 and EP2.2 from the BCA.

4.3 Fire Services & Equipment Provisions

Scientific Fire Services understand that the deviations from the prescriptive provisions of the BCA identified with respect to fire services & equipment for the proposed building design shall generally be designed to achieve compliance with the relevant DtS provisions unless otherwise noted herein. From a compliance perspective, the proposed design shall achieve compliance with the relevant *Performance Requirements* of the BCA.

4.3.1 Fire Hydrant System and Fire Hydrant Booster Assembly Location

The preliminary review of the project information notes that based on the presence of awnings structure serving the building that the fire hydrants in a number of locations are likely to be situated beneath these covered areas. In order to support this design approach, a qualitative risk based assessment shall be undertaken specific to the benefits of sprinkler protection, the provision of full back hydrants that provide protection to hydrants under the awnings and also the concessions outlined in the latest AS2419.1:2017 for sprinkler protected building.

Furthermore, it is proposed to rationalise the fire hydrant booster assembly locations. The evaluation shall give consideration to the potential risks associated with the proposed fire hydrant booster assembly location (i.e. not being within direct line of sight of the main entry to each building/warehouse/processing tenancy) and the proposed fire safety measures which shall assist attending Fire Brigade personnel in locating the fire booster assembly. The identified measures shall include block plans, additional signage denote the booster location on site, the adoption of a red strobe light to clear denote to attending fire brigade personnel the location of the fire hydrant booster assembly.

Finally, it is proposed to review the method of measurement to permit fire hydrant coverage to be achieved via the more recent and published fire hydrant standard.

The overall strategy and approach shall be also presented and consulted with Fire & Rescue NSW specific to the impact of fire crews and their ability to safely access the subject hydrants to undertake their operations. The preliminary assessment undertaken by Scientific Fire Services suggests that the identified design issue for the hydrant systems can satisfy the relevant *Performance Requirements*, namely EP1.3 from the BCA.

4.3.2 Sprinkler Booster Assembly Location

The preliminary review of the design has identified that the proposed location of the sprinkler booster assembly being at the rear of the site is technically not within site of the main entrance or located at the principal entry to the site. The methodology to be adopted to address the design issue relative to the location of the sprinkler booster assembly shall be based upon a qualitative evaluation. The evaluation shall give consideration to the potential risks associated with the proposed sprinkler booster assembly location and the proposed fire safety measures which shall assist attending Fire Brigade personnel in locating the respective booster assemblies. The identified measures shall include block plans, additional signage denoting the sprinkler booster location on site, the adoption of a red strobe light to clear denote to attending fire brigade personnel the location of the sprinkler booster and also to ensure that the booster is accessible to accommodate fire brigade operations. The preliminary assessment undertaken by Scientific Fire Services suggests that the identified design issue for the sprinkler booster can satisfy the relevant *Performance Requirements*, namely EP1.4 of the BCA.

4.3.3 Smoke Hazard Management

The preliminary assessment of the respective building has identified that the smoke hazard management provisions of the respective buildings shall be rationalised. The methodology to be adopted to address the egress and smoke hazard management provision will be a quantitatively assessed through an ASET vs RSET assessment through computational modelling (i.e. CFD modelling and Pathfinder Evacuation Modelling) ensuring occupants within the building have the ability to evacuate to a road or open space before being exposed to untenable conditions. Furthermore, the same quantitative analysis will ensure that the omission of a smoke hazard management ensures fire-fighters have the ability to access the building within a timeframe which enables the commencement of water application activities before being exposed to untenable conditions. The design shall rely upon the overall building area/volume, occupant characteristics, the provision of either natural ventilation, rationalised smoke exhaust fan capacities and/or the adoption of post incident fans achieving 1 air change per hour. The preliminary assessment undertaken by Scientific Fire Services suggests that the identified design issues for the smoke hazard management system can satisfy the relevant *Performance Requirements*, namely EP2.2 of the BCA.

4.3.4 Exit Signage Heights to Warehouse/Processing Portions

The preliminary review of the design based on the overall size of the respective warehouse and intended use has recognised the impact on the required exit sign heights. These shall be addressed quantitatively analysing the fire and evacuation modelling outcomes to determine the effective height of the signs that can be adopted whilst affording occupants suitable wayfinding. In this instance, an ASET vs RSET assessment shall be undertaken demonstrating that the smoke layer height is maintained above the top of the exit sign (e.g. mounted between 3.6m-5.5m above the finished floor level measured to the top of the exit signage for at least the time taken for occupants to evacuate the storage portion of the building. Furthermore, the proposed mounting height the exit signs shall be deemed acceptable with respect to occupant visibility via an analysis of the viewing angle and distance. The preliminary assessment undertaken by Scientific Fire Services suggests that the identified design issues for the exit signage heights can satisfy the relevant *Performance Requirements*, namely EP4.2 of the BCA.

5. Statement of Endorsement

The fire and life safety related design issues will be addressed through the performance-based path of compliance. Scientific Fire Services can confirm that the proposed design will achieve fire safety design compliance to the Performance Requirements of CP2, CP9, DP4, , EP1.3, EP1.4, EP2.2 & EP4.2 of the BCA (ABCB, 2019 Amendment 1).

The formulation of the Performance Based Design Brief (formerly referred to as the Fire Engineering Brief) represents the next step in the approvals process. Scientific Fire Services shall commence the process of developing this document and will provide a formal comprehensive FEB submission. As part of the process, a Fire Engineering Brief Questionnaire (FEBQ) document shall be prepared in accordance with the Fire and Rescue NSW proforma and formally submitted as part of the referrals process.

Finally, and in order to ensure that the client can obtain a Construction Certificate for the proposed building works, Scientific Fire Services will prepare a Fire Safety Engineering Report (FSER) incorporating stakeholder conditions, comments and advice to the satisfaction of the Principle Certifying Authority (PCA).

On the basis of the review of the proposed design issues identified herein, Scientific Fire Services can confirm that the documentation in relation to the subject development will achieve fire safety design compliance to the relevant Performance Requirements of the National Construction Code Series – Volume 1 – Amendment 1, Building Code of Australia (BCA).

I trust the above is satisfactory for your current purposes. Should you have any queries, please do not hesitate to contact me on (02) 9221-3658 or email to parkan.behayeddin@scifire.com.au



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Appendix A. Preliminary List of Design Issues

Design Issue to be Addressed	NCC DtS Provision	Performance Requirement
<p>It has been identified that the super awnings located along the western portion of the building form part of the external wall and are located within close proximity to the title boundary (within 3.0m) without the required fire rating pursuant to Type C fire resisting construction.</p> <p>It should be noted that the super awnings contain openings that are located within 3.0m from the title boundary.</p>	<p>Clause C1.1 inter alia Specification C1.1 &</p> <p>Clause C3.2 inter alia Clause C3.4</p>	CP1 & CP2
<p>The following design issues have been identified with respect to the proposed perimeter vehicular access serving the building:</p> <ul style="list-style-type: none"> The perimeter vehicular access is located more than 18m away from the external wall of the building (Warehouse A, B, and C) due to the recess docks (i.e. up to 45m); and Any perimeter fence gates (and gates forming part of the vehicular access) that are proposed to be locked are required to be fitted with suitable conventional padlocks to enable fire-fighter access with a standard key (i.e. 003 key locks). Alternatively, non-conventional padlocks are permitted provided access keys are provided to Fire & Rescue New South Wales (FRNSW) responding fire station stations. <p>Note: External hardstand fencing is not proposed with the Modification 3 submission.</p>	<p>Clause C2.3 inter alia Clause C2.4</p>	CP9
<p>It has been identified that the exit travel distance to one of the alternative exits and distance between alternative exits within the <u>warehouse portion</u> exceeds the maximum prescribed exit travel distances. More specifically:</p> <p>Warehouse A, B & C</p> <ul style="list-style-type: none"> To permit the distance of travel to designated exits to exceed 40m; and To permit the distance of travel between alternative exits to exceed 60m. 	<p>Clause D1.4</p> <p>Clause D1.5</p>	DP4 & EP2.2
<p>It has been identified that the exit travel distance to an exit within the <u>office portion</u> exceeds the maximum prescribed exit travel distances. More specifically:</p> <p>Office A, B & C</p> <ul style="list-style-type: none"> To permit the distance of travel to a single exit (on the first floor levels) to exceed 20m. 	<p>Clause D1.4</p>	DP4 & EP2.2
<p>The fire hydrant system shall be designed and installed in accordance with AS2419.1:2005 with the exception of the following:</p> <ul style="list-style-type: none"> Permit the fire hydrant booster assembly to not be within sight of the main entry of the building; and Permit fire hydrants without the requirement for fire rated shield panels throughout the entire site; and Permit fire hydrants to be located beneath awning structures and furthermore, be designed to achieve external fire hydrant performance; <ul style="list-style-type: none"> In this instance, fallback fire hydrants will be required providing coverage to the fire hydrant located beneath the awning/canopy structure; and Permit fire hydrants coverage to be calculated based on Clause 3.5.3.3(b) of AS2419.1:2017, where the building parts receiving coverage are within 70m of the external fire hydrants. 	<p>Clause E1.3 inter alia AS2419.1:2005</p>	EP1.3
<p>It is proposed to permit the sprinkler booster assembly and pump room is not to be located adjacent to the principal vehicular entry, at the site boundary and not within direct line of sight of the main entry to the building.</p>	<p>Clause E1.5 inter alia AS2118.1-2017</p>	EP1.4
<p>It is proposed to omit the provision of an automatic smoke exhaust system within the building. In this instance, it is proposed to permit a manually operated smoke clearance system having a smoke clearance capacity of 1 air change per hour per warehouse/processing enclosure.</p>	<p>Clause E2.2</p>	EP2.2

Design Issue to be Addressed	NCC DtS Provision	Performance Requirement
Directional and non-directional exit signs are to be installed throughout the building in accordance with Part E4 from Volume One of the NCC and AS2293.1:2018 with the exception that the mounting heights of exit signage within the warehouse/processing portions of the building. In this instance, it is proposed to permit exit signs to be mounted 3.6-5.5m above the finished floor level within the warehouse/processing portion only in lieu of 2.7m as required by the prescriptive provisions from Volume One of the NCC.	Clause E4.8 inter alia AS2293.1:2018	EP4.2

Appendix B. Architectural Drawings

Drawing No.	Title	Date / Revision
200226-DA-202-A000	Lot 202 Title Sheet & Drawing List	P7
200226-DA-202-A100	Lot 202 Site & Facility Plan	P13
200226-DA-202-A110	Lot 202 Office Plan A	P4
200226-DA-202-A111	Lot 202 Office Plan B	P4
200226-DA-202-A112	Lot 202 Office Plan C	P6
200226-DA-202-A200	Lot 202 Warehouse Elevations	P10
200226-DA-202-A201	Lot 202 Office Elevations	P7
200226-DA-MS-A400	Estate Signage Plan	P3