KENSINGTON CONSULTING
////// Civil and Structural Engineers

KC Ref: 24132

13 September 2024

PA & JM Murray Family Trust
C/- Farm Chief
PO Box 619
INVERCARGILL 9810

Attn: Mr A Murray

Dear Anthony,

Proposed New Commercial Building
30 Wallacetown Lorneville Highway, Lorneville, Invercargill
FireFighting Water Supplies

As requested, we have carried out an assessment of the firefighting water supplies required for the proposed new commercial building at 30 Wallacetown Lorneville Highway, Lorneville, Invercargill.

The proposed new commercial building is shown on the concept drawings prepared by XL Structural Ltd titled "Farm Chief, 30 Wallacetown Lorneville Highway, Invercargill" and listed in the table below.

Table 1: Drawings

Drawing No.	Title	Date / Revision
P03	Site Plan	-
P04	Site Location Plan	-
P05	Ground Floor Plan	-
P06	First Floor Office Plan	-

We understand the building will be used for the sale and servicing of farm equipment and the concept drawings indicate that the building will contain a workshop, showroom, parts store, offices and amenities. The preliminary drawings indicate that the building will be one firecell with a limited area intermediate floor, and the total firecell floor area will be in the order of 2,110 m^2.

There is a requirement to provide firefighting water supplies to the site so that Fire and Emergency New Zealand (FENZ) can carry out their activities in the event of a fire. There is no reticulated water supply at the site and we have assessed the required stored firefighting water supply for the site in terms of *SNZPAS4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice*.

We understand that the building will be non-sprinklered and the use in the building is considered to be fire hazard category FHC2. The building has been considered as one firecell and the floor area of the building is in the order of 2,110 m^2. The required water supply classification as per Table 1 in SNZPAS4509 is therefore FW7, and the required volume of firefighting water supply must be determined by calculation.

The required volume of stored water supply has been assessed using the calculation method contained in Appendix H of SNZPAS4509 and a copy of the calculations is enclosed. The calculations indicate that the maximum fire size is limited by the amount of ventilation to the firecell. The required volume of fire fighting water supply has been calculated as being in the order of 860 m^3 based on the building being one firecell.

One option to reduce the required volume of firefighting water supply would be to create an internal fire separation along gridline 7 so that the workshop is contained in one firecell, and the remainder of the building is contained in a separate firecell. If the internal fire separation was incorporated into the

design of the building the required volume of fire fighting water supply has been calculated as being in the order of 590 m^3.

Note that both of the volumes calculated above are based on the firefighting water supply having a suction coupling with a static pick-up (i.e. open water source or tank with <10 m of static pressure head). If this type of water supply is provided, there must be an approved hardstand for a fire appliance located less than 5 m from the coupling point. The stored firefighting water supply must be located less than 90 m from the building.

The access to the firefighting water supply, design of the hardstand, signage to identify the water supply and the design of coupling points must be as per *SNZPAS4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice.*

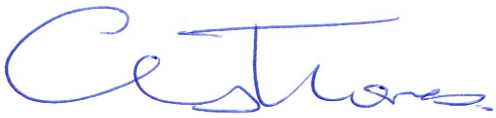
It is noted at the start of this letter that the required firefighting water supply has been calculated based on the assumption that the building is not protected by an automatic sprinkler system. If the owner chose to install an automatic sprinkler system in the building, the required volume of stored firefighting water supply would reduce to 45 m^3.

Because there is no reticulated water supply to the site the water for the automatic sprinkler system would need to be stored in a tank, and the firefighting water supply would be incorporated into the same tank as additional demand. The volume of water that is required for the automatic sprinkler system would need to be determined by a sprinkler system designer as part of the detailed design of the building. However, given the floor area of the building, the height in some parts of the building and the likely demand, the volume of water for the sprinkler system is also anticipated to be significant.

Note that any change in the overall floor area of the building, or changes to the amount of floor area used for different activities will have an impact on the required volume of firefighting water supply. We recommend that a review is carried out once the floor plans for the building have been finalised to check that the proposed firefighting water supply is adequate.

Do not hesitate to contact me on 218 7936 if you require any additional information.

Yours sincerely
Kensington Consulting



Chris Thomas BE CIVIL (Hons), ME FIRE, MEngNZ
Civil Engineer

Encl: Calculation of firefighting water supply

Fire fighting water supplies

Farm Chief - 30 Wallacetown Lorneville Highway, Lorneville, Invercargill

Building as one firecell

Calculation of Fire Fighting Water Supplies

Determine Fire Heat Release Rate

Method as per Appendix H of SNZ PAS 4509 New Zealand Fire Service Firefighting Water Supplies Code of Practice

H6.1 - Ventilation Controlled Fire

$$Q_{vent}(MW) = 0.092\,\Delta H_c A_v \sqrt{H_v}$$

Wall	i	H_i (m)	B_i (m)	Area, H_iB_i (m^2)	Height x Area, $H_i A_i$ (m^3)	Open (1) / Closed (0)	
North	1	2.1	1	0.0	0.0	0	- PA DOOR
	2	9	0.125	1.1	10.1	1	- Leakage (Based on 0.005 m2/m2 of wall per C/VM2 for unlined ext wall)
South	1	9	0.01	0.1	0.8	1	- Leakage (Based on 0.001 m2/m2 of wall per C/VM2 for lined ext wall)
	2	2.8	4	0.0	0.0	0	- Entry Door
	3	2.7	10	27.0	72.9	1	- GF Window
	4	2.7	10	27.0	72.9	1	- GF Window
	5	2.7	10	27.0	72.9	1	- FF Window
	6	2.7	10	27.0	72.9	1	- FF Window
East	1	2.7	5	13.5	36.5	1	- GF Window
	2	2.7	4	10.8	29.2	1	- FF Window
	3	3	4	0	0.0	0	- Roller door
	4	5	5	0	0.0	0	- Roller door
	5	5	5	0	0.0	0	- Roller door
	6	5	5	0	0.0	0	- Roller door
	7	5	5	0	0.0	0	- Roller door
	8	5	5	0	0.0	0	- Roller door
	9	2.1	1	0.0	0.0	0	- PA Door
	10	2.1	1	0.0	0.0	0	- PA Door
	11	2.1	1	0.0	0.0	0	- PA Door
	12	8.4	0.21	1.8	14.8	1	- Leakage (Based on 0.005 m2/m2 of wall per C/VM2 for unlined ext wall)
	13	8.4	0.01	0.1	0.7	1	- Leakage (Based on 0.001 m2/m2 of wall per C/VM2 for lined ext wall)
West	1	2.7	5	13.5	36.5	1	- GF Window
	2	2.8	5	14	39.2	1	- FF Window
	3	2.8	5	14.0	39.2	1	- FF Window
	4	5	5	0.0	0.0	0	- Roller door
	5	5	5	0.0	0.0	0	- Roller door
	6	2.1	1	0.0	0.0	0	- PA Door
	7	2.1	1	0.0	0.0	0	- PA Door
	8	2.1	1	0.0	0.0	0	- PA Door
	9	8.4	0.21	1.8	14.8	1	- Leakage (Based on 0.005 m2/m2 of wall per C/VM2 for unlined ext wall)
	10	8.4	0.015	0.1	1.1	1	- Leakage (Based on 0.001 m2/m2 of wall per C/VM2 for lined ext wall)

A_v (m^2) = 178.8 $\sum H_i A_i$ = 514.4

H_v (m) = $\frac{\sum H_i A_i}{\sum A_i}$

H_v (m) = 2.9

ΔH_c (MJ/kg) = 18

Q_{vent} (MW) = 502.2

H7 - Fuel Controlled Fire

$$Q_{fuel}(MW) = A_{fuel} Q''_{fuel}$$

A_{fuel} (m^2) = 2110 - Building Floor Area

$Q''_{fuel}(\frac{MW}{m^2})$ = 0.35 - FHC2 (Qfuel = 0.35) for offices / retail / warehouse

Q_{fuel} (MW) = 738.5

H8 - Design Fire

Q_{fire} (MW) = 502.2 -Ventilation controlled fire governs

H9 - Select Firecell with Largeat Q_{fire}

Q_{fire} (MW) = 502.2 - Building is one firecell

H10 - Modification of Heat Release Rate

Q_{max} (MW) = $K_1 K_2 Q_{fire}$

K_1 = 0.90 - Structure occupied

K_2 = 1.00 - No fire alarm system

Q_{max} (MW) = 451.9

Fire fighting water supplies

Farm Chief - 30 Wallacetown Lorneville Highway, Lorneville, Invercargill

Building as one firecell

Calculation of Fire Fighting Water Supplies

Determine Water Extinguishing Capability

Method as per Appendix J of SNZ PAS 4509 New Zealand Fire Service Firefighting Water Supplies Code of Practice

J2 - Maximum Fire Heat Release Rate

Q_{max} (MW) = 451.9

J3 - Calculate Water Flow Required for Firefighting

M_{water} (L/s) = 0.58 Q_{max}

M_{water} (L/s) = 262.1

J4 - Calculate Exposure Protection

M_{exp} (L/s) = A_{exp} ϕ

A_{exp} (m^2) = 0 - No adjacent building

ϕ (L/s/m^2) = 0.1

M_{exp} (L/s) = 0

J5 - Calculate Total Water Flow Required

M_{tot} (L/s) = M_{water} + M_{exp}

M_{tot} (L/s) = 262.1

J6 - Assess Adequacy of Available Firefighting Water

$M_{available}$ (L/s) = $M_{measured}$ / C_1 C_2

$M_{measured}$ (L/s) = 0 - No reticulated water supply

C_1 = 1.0

C_2 = 1.0

$M_{available}$ (L/s) = 0.0

M_{tot} < $M_{failure}$ Fail - Need to provide water storage for fire rating

J9 - Calculate duration of fire

t_{fire} (s) = (ΔH_c M_{fuel})/Q_{max}

ΔH_c (MJ/kg) = 18

M_{fuel} (kg) = 55000

Q_{max} (MW) = 451.9

t_{fire} (s) = 2190.6

= 0.61 hours

Volume (m^3) = t_{fire} M_{tot}

Volume (m^3) = 574.2

C_1 Factor = 1.5 - Suction coupling, static pick-up

Factored Volume (m^3) = 861.3