Canterbury
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Te Poari Hauora ō Waitaha

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28 August 2018

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RE Official information request CDHB 9917

We refer to your email dated 9 August 2018 requesting the following information under the Official Information Act from Canterbury DHB, regarding information referred to in our response to OIA request CDHB 9899. Specifically requesting three reports related to Hillmorton Hospital Campus:

Hillmorton Hospital (Reports: for Building 1 Manaaki and Roko Building):

- **Mechanical / Hydraulic Condition report by Cosgrove**
- **Electrical condition report by Cosgrove**
- **Fire report by Cosgrove**

Please find attached the following Appendices as requested:

Appendix 1 – Hillmorton Hospital Te Whare Manaaki & Te Whare Hohou Roko – Electrical Services Inspection Report.
Appendix 2 - Hillmorton Hospital Te Whare Manaaki & Te Whare Hohou Roko – Mechanical and Hydraulic Services Inspection Report.
Appendix 3 – Te Whare Manaaki Hillmorton Hospital – Fire Strategy Report and

Please note: We have redacted certain detailed plans from the reports for security reasons.

I trust that this satisfies your interest in this matter.

Please note that this response, or an edited version of this response, may be published on the Canterbury DHB website ten working days after your receipt of this response.

Yours sincerely

Carolyn Gullery
Executive Director
Planning, Funding & Decision Support

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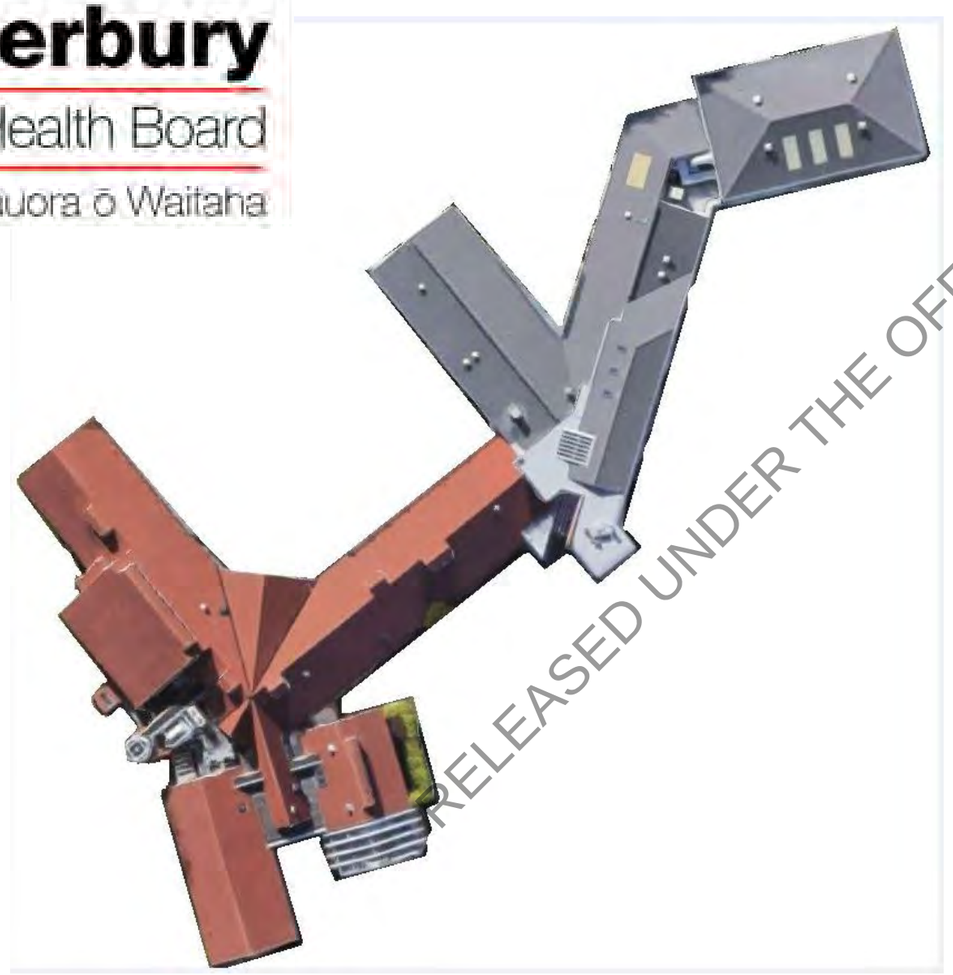

Hillmorton Hospital
Te Whare Manaaki &
Te Whare Hohou Roko

Electrical Services
Inspection Report

for

Electrical Services

Revision	Electrical Services
Report	
Date:	25 November 2016
File Ref:	15158 E

Document Control

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Rev No	Date	Revision Details	Author	Approver
A	21.11.16	Electrical Service Report	TB/TY	

Executive Summary

From the site survey we identified a number of areas which could be improved. The report breaks down the electrical building supplies into ‘Te Whare Manaaki’ and Te Whare Hohou Roko’ and each building electrical services.

Any development changes to either buildings will require further detailed investigations to determine finer details, especially the older building ‘Te Whare Manaaki’.

Generally overall the electrical services in both buildings are in reasonable condition, given the age of the outlets, lighting, etc. There are a few minor items that should be addressed, which will improve the serviceability of the building for future development and operations. Other improvement can be made to reduce the operational cost, by replacement of old fluorescent luminaires to FED type for energy savings

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1 Introduction

1.1 SITE INTRODUCTION

The ‘Te Whare Manaaki’ and ‘Te Whare Hohou Roko’ Buildings house the CDHB Forensic Long Stay Patients. These buildings provide treatment and housing to long stay patients which have mental health issues. The buildings are operated on a 24/7 basis and contains nurse stations, support offices, a mixture of accommodation, lounges, canteen and amenity facilities.

The ‘Te Whare Manaaki’ building is believed to have been built around the 1980 – 1990’s, and included a minor refurbishment around the late 90s – early 2000s, as reviewed through of old As Built documents and drawings. Therefore the installed electrical services installed would be around 15 plus years old.

The ‘Te Whare Hohou Roko’ building was later added between 1999-2000, as recorded from construction documents and drawings. The associated electrical services installed are approximately 15 years old.

1.1.1 Client Brief & Site Investigation

Cosgroves were engaged by CDHB to carry out a visual building health check of the ‘Te Whare Manaaki’ & ‘Te Whare Hohou Roko’ buildings at Hillmorton Hospital in Christchurch. The Electrical services visual inspection of the buildings were carried out on the 5th of October 2016, the following areas were covered below:

- Te Whare Manaaki – Seclusion room, distribution boards, general & patient area
- Te Whare Manaaki – Roof services and plant room
- Te Whare Hohou Roko – Distribution boards
- Te Whare Hohou Roko – Roof services and plant room
- North Villa Sub-station – Main distribution board room

The purpose of the inspection was to provide an assessment of the general condition of the electrical services in the buildings.

Hillmorton Hospital – North Site map

1.1.2 Areas Not Accessed

The following areas were not inspected:

- ‘Te Whare Manaaki’ – Ceiling void areas above the staff changing and office rooms.
- ‘Te Whare Manaaki’ & ‘Te Whare Hohou Roko’ – patient rooms, kitchens, offices, gymnasiums, lounges, amenities rooms and majority of the corridors.

These areas were not inspected, as this was not necessary as part of the review.

2 Electrical Building Supply

2.1 ELECTRICAL FORSENIC SUPPLY

'Te Whare Manaaki' and 'Te Whare Hohou Roko' buildings each have an independent electrical supply provided from North Villa Sub-Station. The North Villa Sub-Station main distribution board has the capabilities to have an external generator connected for back-up power during any long outages on the Orion's network, the local electricity distributors.

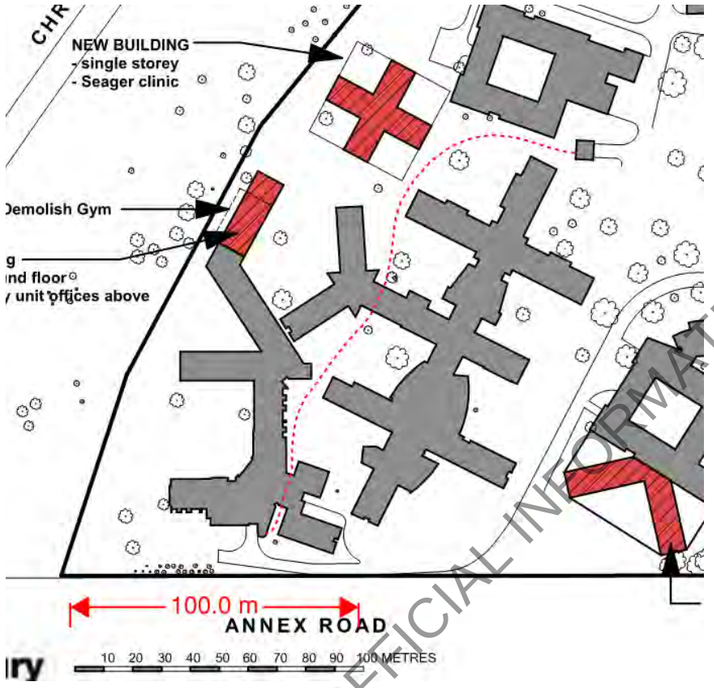
During the review of the existing documents or drawings, there were no accurate records of the reticulation routes for either 'Te Whare Manaaki' or 'Te Whare Hohou Roko' buildings.

The electrical supplies to each building are three phase with neutral connections. Neither building has independent maximum demand indicators (MDI's), therefore there are no records or indication of the power demand for each of the buildings.

The main distribution board in the North Villa Sub-station has been upgraded in approximately 1999/2000, and further additions for the generator were upgraded at a later date.

2.1.1 Te Whare Manaaki

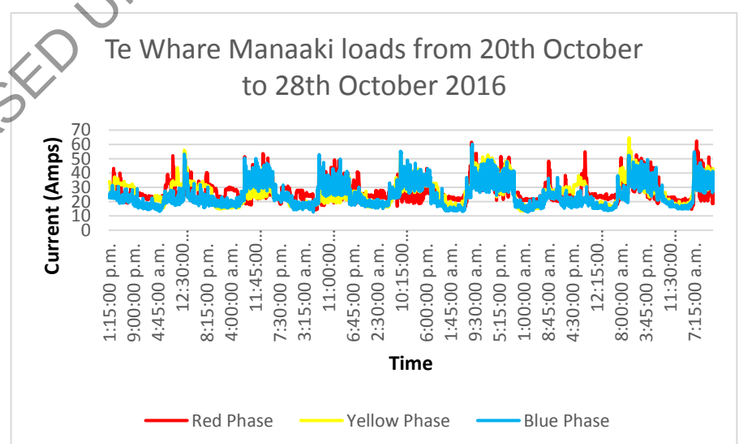
The original electrical sub-main cable to the building main distribution board (MSB/DB.5) has been disconnected due to a faulty cable. A replacement sub-main cable has subsequently been installed. This route has not been recorded on any documents, however after a conversation with Kevin Thomas from Hillmorton Hospital maintenance team, the information gathered has produced a sketch for the likely sub-main route as shown in the figure below.



Assumed sub-main cable route from North Villa Sub-station to Te Whare Manaaki

The new cable is assumed to be 3 x 1C x 240mm² Cu XLPE/PVC, over this distance the cable could support a balance load of 250 Amps per a phase, or an unbalance load of 127 Amps per phase.

The maximum current recorded over 20th October to 28th October 2016 is approximately 65 Amps, as shown in graph below.



Te Whare Manaaki load graph

It is recommended that CDHB should budget for the survey of the sub main route, as this will help with future development and maintenance. Also future investigation into the distribution board fusing is required to determine the available capacity on the incoming supply.

2.1.2 Te Whare Hohou Roko

The main-submain cable is terminated to DB.L1, this was installed from the original construction of the building and is supplied by the North Villa Sub-Station.

The sub-main cable is 7 x 1C x 185mm² Cu XLPE/PVC, which indicates that the electrical supply is likely to have a reduced neutral cable.

At the issue of this report, the data logger for the maximum current loads of this building had not been completed.

It is recommended that CDHB should budget for the survey of the sub main route, as this will help with future development and maintenance. Further investigation to the neutral cable should be carried out to ensure that the cable has not been damaged. Also the current flow in the neutral cable should be monitored, to assess if the current flows are exceeding the cable capacity.

2.2 SUMMARY RECOMMENDATION

- Sub-main cables should be surveyed and marked on a plan for future reference.
- Investigate the neutral cable condition and current loads
- Further investigate maximum demand load for each sub-main, to determine allowable capacity for future loads on existing building supply.

3 Te Whare Manaaki

3.1 INTRODUCTION

The electrical services in the 'Te Whare Manaaki' building are estimated to be 15 plus years old. The older equipment and fittings are mainly from the original construction of the building, however there has been additions added.

3.1 CONDITION ASSESSMENT

The summary of the general visual inspection of the electrical services conditions are provided in bullet point format for clarity:

3.1.1 General area assessment

- CCTV system is currently undergoing an upgrade
  - Currently there are issues with ventilation of server rack
  - Old CRT screen monitors are still used, and will probably fail due to age of monitors.
- Emergency lighting not compliant
  - No emergency lights provided in patient care areas
- Five distribution boards are installed throughout the building
  - One distribution board will be affected by the proposed alteration works & will required to be relocated.
  - Switchgear installed is primarily by Westinghouse
  - The switchgear was manufactured sometime during the late 80s/90s and equipment has become obsolete.
  - The distribution boards does not meet current standards.
  - Distribution boards are protected by 25kA rated MCCB's, but the fixed tripping mechanisms in these devices have very low rating providing very low levels of discrimination, if any, between themselves and the downstream protective devices.
- The sub-main cables from the main switchboard, do not have dedicated earth cables.
  - Further investigation is required to determine the earthing methodology.
  - Cable sizes are unknown, it is estimated to be 1 x 4C 25mm^2 Cu XLPE/PVC cable.
- Existing luminaires are old fluorescent type.
  - Luminaires could be updated to LED type, to reduce operating costs.

3.1.2 Roof void space

- Electrical cabling installation is untidy and bunched in numerous areas.
- Telecommunication cabling installation is untidy and not installed in accordance with the standards or good practice.
- Cables are unsupported with the exception of being draped over nails on the roof trusses.

3.1.3 Seclusion and lounge area

- There are currently two integral emergency lights.
  - Only one has the main indicator operational
- Exposed services at low level subject to mechanical damage

3.1.4 External fence area

- CCTV conduits at high level are damaged and exposing internal grade cables to the external environment.

3.2 INSPECTION PHOTO

3.3 SUMMARY RECOMMENDATION

- Ensure current and new CCTV system operates smoothly.
- Upgrade the emergency lighting and signage throughout the building.
- Replace old main switchboard and distribution boards, for ease of future maintenance.
- Ensure earthing is provided between the distribution boards.
- Tidy and secure cabling in the roof void, for ease of future maintenance and reduce cable damage.
- Replace any damaged electrical outlets, lighting, etc.

4 Te Whare Hohou Roko

4.1 INTRODUCTION

The electrical services in the ‘Te Whare Hohou Roko’ building are estimated to be 15 plus years old. There is a large range of old equipment and fittings used, since the construction of the building, along with new equipment and luminaires added.

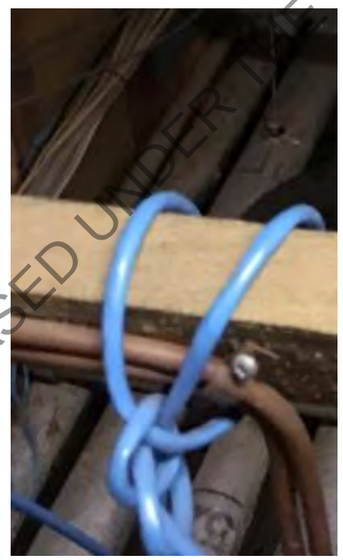
4.1 CONDITION ASSESSMENT

The summary of the general visual inspection of the electrical services conditions are provided in bullet point format for clarity:

4.1.1 General area assessment

- CCTV system is currently undergoing an upgrade
- Emergency lighting not compliant
  - No emergency lights provided in patient care areas
- Two distribution boards are installed throughout the building
  - Incoming electrical main is protected by 400 Amp Moeller MCCB and set at 300 Amp.
- Existing luminaires are old fluorescent type.
  - Luminaires could be updated to LED type, to reduce operating costs.

4.2 INSPECTION PHOTO



4.3 SUMMARY RECOMMENDATION

- Ensure that current and new CCTV system operates smoothly.
- Upgrade the emergency lighting and signage throughout the building.
- Tidy and secure cabling in the roof void, for ease of future maintenance and reduce cable damage.
- Replace any damaged electrical outlets, lighting, etc.

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Te Whare Hohou Roko & Te Whare Manaaki Mechanical & Hydraulic Services Inspection Report

for

Mechanical, Hydraulic & Hydraulic Services

Report Issued
31st October 2016
Reference: 15158M

Document Control

Document ID:

Rev No	Date	Revision Details	Author	Approver
A	25/11/16	1st Issue	PE	PB

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1 Executive Summary

From the site survey we have identified a number of areas which will be required to be addressed. Presented in the report body are a number of recommendations which are ranked in importance, with building areas grouped under headings such as 'Patient' and 'Administration Areas' etc. It is hoped that breaking down the report and ranking the issues should allow the reader to focus on areas of particular interest.

The issues being experienced in the 'Te Whare Manaaki' and 'Te Whare Hohou Roko' mechanical services can best be summarised under:

- Condition
- Controls
- Maintenance

The lack of as-built drawings and equipment data (particularly for the 'Te Whare Manaaki' building has been a hindrance and while most data has now been uncovered there are still knowledge gaps which would ideally be filled. All accumulated data will be submitted to CDHB to aid their record keeping.

Condition

As the following report sections will discuss the condition of aspects of the two buildings Mechanical and Hydraulic Services installation need to be addressed as part of the planned building renovations. Budgetary allowances will need to be made to replace:

- Three Roof Packaged Chillers; the Temperzone chillers utilise a phased out refrigerant known as R22. While limited stocks of this gas exist (mainly from reclaimed older systems) it is a finite resource. The chillers may remain operational for one week, one month or one year. Should a chiller de-gas due to a minor component failure the entire unit would need to be replaced.
- Corrosion of the existing Heating and Chilled Water Pipework has already impacted the operation of the FCU's. Installation of pipework strainers by maintenance staff has lessened the problem however water testing should be carried to allow the system water to be treated and prevent further future corrosion and pipe failure.
- Domestic Hot Water Cylinders and systems operation pressure and pipework network.
    - The condition of both buildings hot water cylinders is currently good however at 15 - 20 plus years old, both cylinders are nearing the end of their life expectancy.
    - Domestic hot water pipework could also be replaced if the system was to be upgraded to operate at mains pressure.
- Several new fan coil units in the 'Te Whare Manaaki'.
    - Wide scale replacement of existing flexible ductwork due to its condition.
    - Cleaning of existing grilles and diffusers and the provision of additional grilles.
- New Ventilation systems in both buildings
    - In areas affected by the window replacements.
    - A holistic review of the ventilation system is also required as the methodology utilised in the 1990's has since been supersede by heat recovery ventilation units (HRV's) etc.
    - Additional cooling systems in rooms which have lost openable casements.
- A complete review of the BMS systems for both buildings including provision of local controllers and sensors.

The air tightness of the mechanical systems is poor, it is likely the fibres from the attic space pink batt insulation, regraded flexible ductwork insulation and fan coil unit plenum box linings are migrating into the conditioned space.

The 'Te Whare Manaaki' building due to its age and services condition, will required immediate attenuation and extensive upgrade works if it is intended for this facility to remain operational.

Controls

The operational status of the existing buildings control systems needs to be confirmed. In several instances the motorised actuators associated with both fan coil units (FCU's) and heater batteries has been removed and left unattached to the valve body. This effectively prevents the FCU's from modulating their output and respond to the changing room conditions.

Staff expressed their frustration over their lack of control over their environments. Modern BMS systems can allow users various degrees of restricted access to make limited set-point adjustment and monitoring space conditions via networked PC's. Due to the mental state of patients it is unlikely that they will complain about their environment, with staff needing to assume that responsibility on their behalf. The ability for staff members to identify problems and notify maintenance staff or take corrective access should be addressed as a priority.

Maintenance

The condition of the existing services (especially in 'Te Whare Manaaki') is a result of age and poor maintenance access. As has been discussed in the report below if maintenance staff cannot safely access plant it cannot be maintained. This was evident from the condition of the air filters in the FCU's and outdoor air intakes, with the condition of the air filters in the Seclusion Area.

Direction needs to be given as the planned life expectancy of the buildings, this will help maintenance staff to move away from reactive maintenance actions and plan preventative maintenance actions. Yearly condition assessments would allow budgetary allowances to be made for the replacement of plant reaching the end of its operational life.

2 OVERVIEW

2.1 INTRODUCTION

The 'Te Whare Roko' & 'Te Whare Manaki' buildings house the CDHB Forensic Long Stay Patients. The principle function of the buildings is to house and provide treatment for long stay occupants with mental health issues on a 24/7 basis. Each building block contains a nurse station and supporting offices which provide an administration centre for staff while also housing CCTV and security systems, with the balance of the building providing a mixture of accommodation, lounges , canteen facilities and amenities.

The 'Te Whare Manaaki' building is believed to have been constructed circa 1990's, Christchurch City Council have building consent records dating from the mid 1980's to 1998. The as-built documents which have been included in this reports appendix relate to the alternation work completed in 1998 and notes that certain FCU's had been reused and relocated. It can therefore be assumed that the installed Mechanical Services are between. 20 – 30 plus years old.

The 'Te Whare Hohou Roko' building construction documents date this section of the Forensic Long Stay buildings as being completed between 1999 / 2000, making the buildings and their associated services approx. 15 years old.

CDHB – Building Campus

2.1.1 Client Brief & Site Investigation Methodology

Cosgroves were engaged by CDHB to carry out a visual building health check of the 'Te Whare Hohou Roko' & 'Te Whare Manaaki' buildings at Hillmorton Hospital in Christchurch. The services inspection of the buildings were carried out between 5th and 6h of October 2016. The inspections of the Mechanical and Hydraulic services were undertaken on a visual basis with limited on site measurements taken and covered the following building areas:

- 'Te Whare Manaaki' – Office and Patient Areas
- 'Te Whare Manaaki' – In ceiling services, with limited access to certain areas.
- 'Te Whare Hohou Roko' – Office and Patient Areas
- 'Te Whare Hohou Roko' – In ceiling services.

The purpose of the inspections was to provide a condition assessment of the existing mechanical and hydraulic building services systems, document visual services defects, identify if possible areas of building code non-compliance and prepare a written report providing recommendations ranked in order of importance.

Site measurements of the domestic hot water and FCU air off temperatures where taken with an IR Thermometer and a Thermocouple Probe. Site measurements were taken for information purposes only and in the case of the domestic hot water system were used to confirm hot water wait times and temperatures.

2.1.2 Areas Not Accessed:

The following areas were not inspected:

- 'Te Whare Manaaki' – Ceiling void above G005 – G016 Staff Room and Staff Changing Rooms.
- 'Te Whare Hohou Roko' – Gymnasium, Kitchen, 1st Floor Offices

These areas were not inspected due to restricted access and staff reporting no operational issues in these areas. These areas may need to be inspected in the future to confirm plant and services condition, this inspection focused mainly on patient and administration areas.

2.2 HEATING AND COOLING SYSTEMS - OVERVIEW

The Hillmorton Hospital Energy Centre, is the central generation location for low pressure heating water for the 'Te Whare Manaaki' and 'Te Whare Hohou Roko' buildings with heating water being reticulated below ground to the local plant rooms within each building. The heating water (noted 'HL' on accompanying plans) is utilised for localise generation of domestic hot water and heating water for Fan Coil Units (FCU's or Air Conditioning Units), radiators and underfloor heating systems.

Each building has been provided with local packaged air cooled chiller, which have been positioned on flat roof sections above the respective plantrooms. The chillers produce chilled water (noted 'RW' or 'refrigerated water' on accompanying plans) which is utilised by the building Fan Coil Units (FCU's) for cooling.

A Temperzone UCA 30kW (R22) chiller was originally provided for the 'Te Whare Manaaki' building (Installed mid 1980's), with an additional 30kW chiller installed as part of later building renovations and system expansion in 1998/2001 (believed to be a Temperzone PWAC model), providing a total capacity of 60kW total for the 'Te Whare Manaaki' building. These chillers are piped in series with a chilled water buffer tank (located in the plant room), this limits short cycling of the chillers and provides protection against periods of chiller defrost. Due to the location of these chillers (roof mounted) their physical condition could not be inspected.

A Temperzone PWAC 46kW (R22) chiller was provided for the 'Te Whare Hohou Roko' building (Installed in 1999/2000's) and is located on the roof plant area adjacent to the Gym AHU. This unit appears to be in good condition with the exception of external pipework insulation which is in need of replacement. This chiller has been piped directly in series with the chilled water pipework system with no buffer tank being provided. This is an unusual arrangement however it may have been judged that there was sufficient water volume in the system pipework network.

The chillers manufacture Temperzone, has confirmed that both the PWAC and UCA model chillers utilise R22 refrigerant gas. This refrigerant has been phased out due to its ozone depletion properties and the use of drop in or replacement gas is not permitted by the manufacture. For this reason CDHB should budget for the replacement of these chillers as failure may occur in the coming years.

'Te Whare Hohou Roko' – Chiller Enclosure

'Te Whare Manaki' – Chiller Enclosure – Could not be inspected due to access.

2.3 DOMESTIC HOT WATER SYSTEMS - OVERVIEW:

Both the 'Te Whare Manaaki' and 'Te Whare Hohou Roko' buildings are provided with recirculated domestic hot water systems.

- 'Te Whare Manaaki' building is provided with a 600 litre triple element low pressure electric hot water cylinder (working pressure 7.6m or 0.745bar).
- 'Te Whare Hohou Roko' building is provided with a 700 litre, boiler supplied indirect hot water cylinder (working pressure 1.5bar).

Both hot water cylinders appear (externally) to be in good condition. Assuming a cylinder life of 15-20 years, these systems are nearing the end of their expected life.

Copper pipework has been utilised to reticulate the domestic hot and cold water to the various outlets within the building. All domestic water outlets within patient bedrooms are provided with local tempering valves and motorised isolation valves, controlled by staff via switches located in services cupboards external to the bedrooms in One large water cistern and a small number of in ceiling cisterns have been provided in both buildings to cover periods of water interruption as required by the G12 NZBC. As with the chiller due to the water tanks location these could not be inspected.

As mentioned above the domestic water system is operating at low pressure. Current design practice is to operate at mains pressure (between 2.5-4.0 bar). The CDHB need to give some consideration to either maintaining the system at its current low pressure rating or modernising it to operate at mains pressure. A system upgrade presents benefits in terms of water pressure at outlets, improved system performance and access to a greater range of tapware. Evidence that the system is under performing is evident from the provision of local hot and cold water booster pumps in the 'Te Whare Manaaki' Seclusion areas.

It is recommended that a changeover to mains pressure is considered at a minimum for the 'Te Whare Manaaki' building. However given the age of the pipework we consider the risk of raising the water pressure is too high without first replacing the existing pipework and fixtures and fittings.

3 'Te Whare Manaaki'

3.1 INTRODUCTION

As mentioned above the age of the mechanical services in the 'Te Whare Manaaki' building are estimated to be in the region of 15 to 20 plus years old. Provided below is the building footprint with a colour coded breakdown of the various mechanical systems and areas they serve ('Te Whare Manaaki' – Mechanical System Zones Diagram). As can be seen the patient bedrooms are either provided with, underfloor heating and natural ventilation or air conditioning via in-ceiling fan coil units (FCU's). Lounges and Patient Canteen have been provided with wall hung radiators (c/w thermostatic valve) and are also naturally ventilated. Administration areas have been provided with Air Conditioning and mechanical ventilation via in ceiling fan coil units.

A review of the mechanical system allocations with respect to the building orientation and expected solar loadings highlights some unusual base building system selections. The bedrooms & lounge areas highlighted in red below generally face North, North West & North East, with the blue highlighted bedrooms typically facing south, south east and south west.

Removed for security reasons

Typically the rooms located along the northern orientated facades should experience the highest cooling loads due to their prolonged exposer to the sun path, while the southern orientated rooms should experience a greater heat loss.

However as can been seen from the diagram below, the southern orientated bedrooms have been provided with FCU's (a heating and **cooling** system) with the northern orientated rooms being provided with underfloor heating (heating only system c/w openable windows). While a valid design reason may exist for the system selections, the provision of heating only systems for the rooms located along the north façade and heating and cooling systems for room located along the southern facade on the surface appears unconventional.

A further issue which has arisen relates to the planned window replacement (with no opening sections), the existing windows have failed due to onsite modifications which have resulted in the excess rusting etc. Provide on the following page is a marked-up building plan summarising the proposed windows changes and the possible implications of this work.

For rooms with fixed window openings it is recommended that the ventilation requirements would be met through the use of heat recovery ventilation units or HRV's. HRV unit units incorporate fans, filters and solid core heat recovery sections to transfer heat from the spill air to the supply. These can typically recover up to 65% of the heat energy from the exhaust air and transfer it to the incoming outdoor air. A typical system shall comprise of ceiling supply and extract grilles, balancing dampers, sheet metal and flexible ducting. Were possible the ventilation supply air is to be delivered directly to the bedroom air conditioning unit, were this is not feasible new ceiling diffusers would be required.

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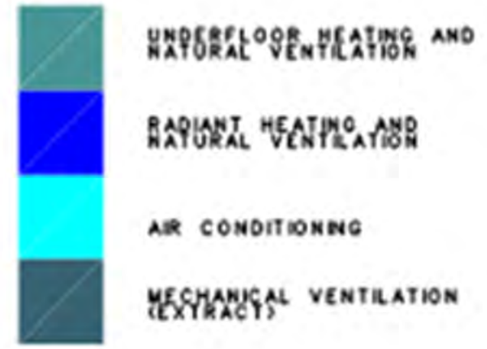
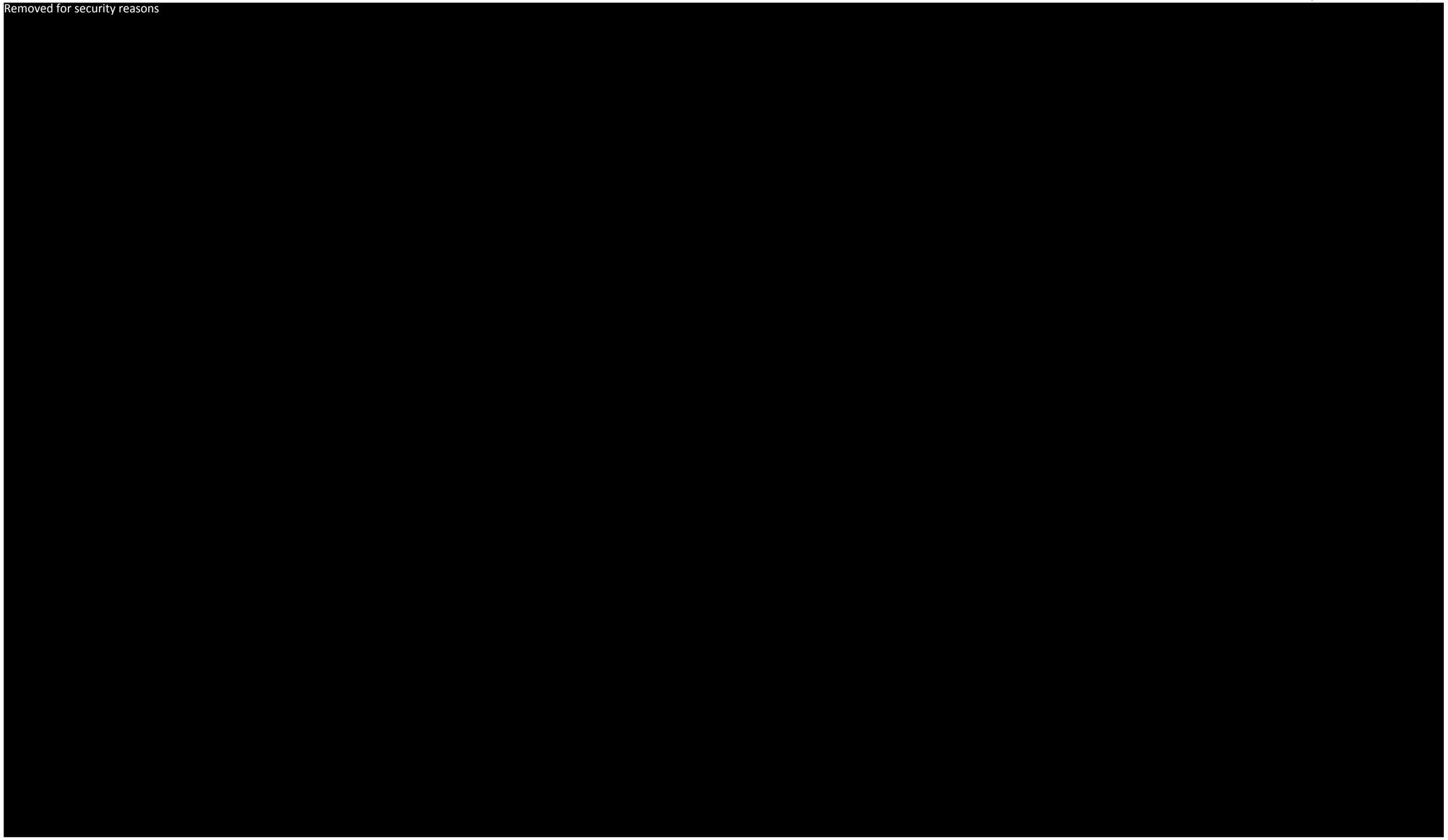


'Te Whare Manaaki' – Mechanical System Zones Diagram



‘Te Whare Manaaki’ – Window Replacement Proposals

3.2 CONDITION ASSESSMENT - TE WHARE MANAAKI

Presented below is a summary of the room and plant condition assessments based on the visual inspections. Comments will be based on an area by area basis and provided in bullet point format for clarity:

3.2.1 Seclusion Rooms and Lounge Area

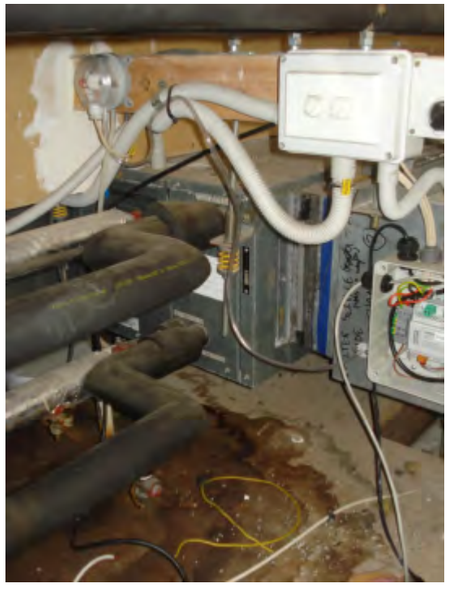
Each Seclusion Room and the Lounge has been provided with independent Fan Coil Units, the room inspected for the purpose of the report was Seclusion Room No.3, room reference G34. Please also refer to as-built drawings in the report appendix. Note the de-escalation lounge was not surveyed as this area is subject to extensive renovations.

- Seclusion Room No.3 is serviced by fan coil unit FC-13, which is a Temperzone model 'DF251' and is noted as providing an airflow of 220 l/s to the room. Each room is provided with 50l/s of toilet extract and approx. 13.5l/s of outdoor air.
    - Tamper proof temperature sensors were not noticed within the room and it should be confirmed if these have been provided.
    - It would appear that the FCU fan speed and set-point temperature is set via a pot type controller attached to the body of the FCU casing. It should be confirmed if this is a set and forget system or if a BMS connection has been provided.
- Based on the airflow data provided on the as-built layouts, the overall air balance for the Seclusion Room area is negative by 485l/s. This indicates that a large quantity of air from adjoining rooms (outside of the seclusion areas) and outside the building is being drawn into this area via windows and doors and gaps in structure etc. Based on a review of the toilet ventilation systems make-up air path and the documented design airflows, it is likely that the toilet extract system is also not achieving the design exhaust airflow rates due to the restriction to airflow.
    - The introduction of a HRV unit to recover heat from the exhaust air stream and transfer it to the incoming outdoor air stream will reduce the heating system operational costs while improving the indoor air quality. A further refinement with the use of a CO2 sensor would also allow the HRV unit to modulate its output based on the Seclusion area use further reducing operational costs.
- Domestic hot water temperature was recorded at 40°C, with local isolation valves provided in a panel access externally to the room.
    - The wait time for domestic hot water exceeded 3 minutes, which exceeds the 60 second benchmark and may present legionella risks.
- It was confirmed that no secondary return pipework connection has been provided in the roof plant space. This section of the building has also been provided with a pair of domestic cold and hot water booster pumps, which would indicate that the original water pressure and flowrate to this area of the building was unsatisfactory.
- A review of the plant area confirmed that the plant is difficult to reach and the regular servicing has not been carried out. Outdoor air filters have not been regularly cleaned and ductwork corrosion is noticeable in the region of the air intake (see photos).

Recommendations (ranked in level of importance):

1) Install one solid core HRV unit to replace the existing outdoor air, toilet and lounge sluice sink exhaust air systems. This should correct the air area balance and reduce of the load on the heating and cooling systems.
2) Replace all defective ductwork associated with FC-1, FC-10 & FC-15.
3) Confirm temperature control methodology for fan coil units, review the possibility of room temperature sensors.
4) Confirm level of BMS control and monitoring of FCU's stats points i.e. air speed, operation mode (heating or cooling) and return and supply air temperatures.
5) Review method of access to the plant area, in conjunction with future planned works, this currently present health and safety concerns.
6) Trace heat the domestic hot water pipework to reduce hot water wait times. It is unlikely that a secondary return pipework connection can be provided due to the pressure rise caused by the local booster pumps.

3.2.2 Inspection Photo's:



Pictured above are examples of two installed FCU's in the Seclusion Area Plantroom. It can be seen that the general condition of the plant area is poor and there is some evidence of water damage to the plantroom floor where holes have developed over time. Redundant control wiring is visible in both photos and it suggests that modifications to the FCU's controls have been undertaken at some point, with controller casings not being re attached to the units. Also visible is the poor condition of existing flexible ductwork.

Pictured above are the local domestic hot and cold water booster pumps which have been provided to ensure adequate water pressure in the Seclusion Area.

Pictured above are the local air-intake filter and filter frame providing outdoor air to the Seclusion Area, it is clear from the photo's that their condition is poor, evidence of rusting and filter loading is clear. It is likely that the outdoor air fan is not delivering the design outdoor air to the seclusion rooms.

3.2.3 Administration Office Areas

The administration office areas encompass the following rooms, Office G29, Assessment G32, Reception G25, Waiting G10, Control G05, Clinic and House Keeping. The function of some of these rooms has been revised over years and it can be safely assumed that the original air conditioning design would not have accounted for the current Staff numbers and their ever increasing reliance on IT systems etc.

Temperature problems were reported by the users of the majority of the administration rooms.

Office G29 (Nurse Station), Adjoining Room G002 and G032 Assessment Room

- G29 & G02 are supplied with conditioned air from FC-10 and FC-15. FC-15 also serves G032, the old assessment room, now being used as a manager's office. The model number of either Fan Coil Unit is not known however as-built documents note these AC units as being original fan coil units which are to be reused, suggesting that they are possibly 20 to 30 years old.
- FC-10 was found to have suffered a fan failure in the past and is now provided with a make shift perspex panel in order to allow the maintenance staff to confirm the fan operation, this is not air tight and is likely to be significantly reducing the volume of conditioned air returning form the rooms (refer to Inspection photos below).
- The supply air temperature from FC-10 was recorded at approx. 33^{o}C, while the supply air temperature from FC-15 was noted as being 17^{o}C. The difference in temperature between the two FCU's serving essentially the same space suggests an issue with the FCU control set-up as both FCU's should be operating as one. Staff members have complained that the rooms regularly overheat.
- A closer inspection of FC-10 & FC-15 indicated that the return air plenum connections for both units are not air tight and the condition of the connected ductwork to both fan coil units is poor.
- A further issue affecting the FCU performance is the lenght of flexible ductwork which has been used, the long lengths of flexible ductwork will likely add to the total fan resistance reducing the system performance when compared to rigid ductwork.
- A further concern is the ratio of untampered outdoor air to FCU return air, in the case of FC-10 & FC-15 the percentage of outdoor air to total air is approx. 40 to 45%. Depending on how the FCU regulates its supply air temperature, the condition (temperature) of outdoor can greatly influence the performance of the FCU.

Control Room (G05)

- G05 is supplied with conditioned air from FC-16. The model number of the Fan Coil Unit is also not known however as-built documents note these AC units as being new fan coil units installed around 1998/1999. Access to this section of the roof was restricted and the FCU could not be inspected, it is therefore highly likely that the units are not being regularly maintained.
- G05 contains a Comms rack, 5 No. LCD screens and the CCTV system and openly connected to the adjoining Reception booth G026. The lack of a physical barrier between the two rooms is resulting in sub-cooling of the Reception Room G026. Any future planning should address this issue.

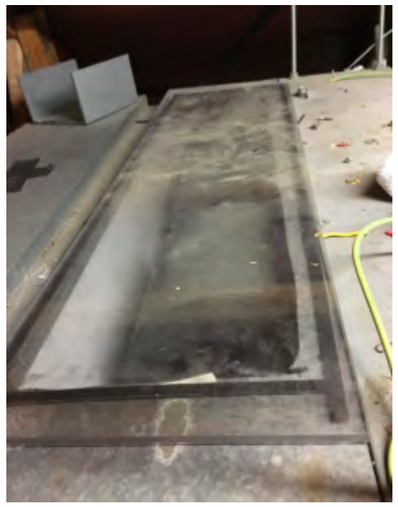
Housekeeper (G029) & Clinic (G088)

- G029 and G088 are supplied with conditioned air from FCU reference FC-1. The model number of the Fan Coil Unit is not known however it is believed to be a DF Temperzone Unit. As-built documents note these AC units as being an original fan coil unit which has been reused, suggesting it is possibly 20 to 30 years old.
- A review of the as-built documents indicates that the original design did not allow for a return air path from the Housekeeper Room (G029). Due to this it is likely that this room is not receiving its design airflow rates and the majority of the AC's supply air is being delivered to the Clinic. Given the intention to move the drug fridge to this room in the coming months, this arrangement will increase the instances that the room overheats.
- As was the case with FC-10 & FC-15 a further concern it the ratio of un-tempered outdoor air to FCU return air. As the temperature of outdoor air will vary with external conditions it will greatly influence the performance of the FCU.

Recommendations (ranked in level of importance):

1) Replace FC-10, FC-15 and FC-1, noting that the replacement fan coil unit for FC-10 should be sized to cater for rooms G039 & G002. This should allow a smaller unit to be provided for G032.
2) Following from recommendation No.1, it is assumed that all defective ductwork associated with FC-1, FC-10 & FC-15 be replaced.
3) Provide a new FCU return grille from the Housekeeping Room G029.
4) Install either a heating coil (lower cost) or a solid core HRV unit (space permitting) to replace the existing outdoor air system supplying FC-16, FC-15, FC-1, FC-10 etc.
5) Confirm temperature control methodology for fan coil units, allowing to install room controllers and averaging temperature sensors within all staff rooms allowing staff to control their internal environments.
6) Confirm level of BMS control and monitoring of FCU's stats points i.e. air speed, operation mode (heating or cooling) and return and supply air temperatures.

3.2.4 Administration Office - Inspection Photos:

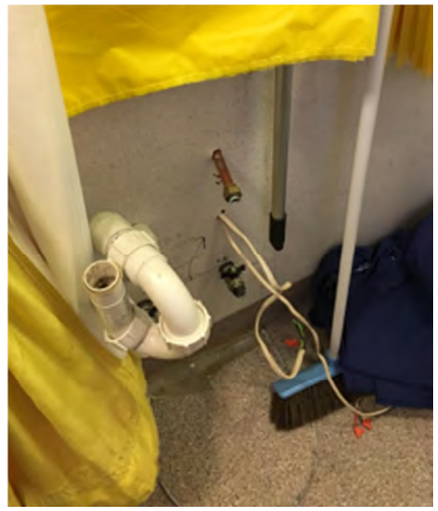


Shown above is the condition of FC-10 fan casing, as can be seen a make shift Perspex panel was been provided to allow visual inspection of the FCU fan following a fan failure. While this is a 'out of the box' solution to the monitoring the fan motor status it is not a long term solution.

As shown is the condition of the internal fan motor housing, with casings visibly rusty with internal insulation lining beginning to fail with fibre migration highly likely.

Shown above is the air intake housing associated with SF-2 and the rusting of the outdoor air intake suggests that rain is being drawn into the system resulting in the poor condtion of the ductwork and filter housing.

The condition of air filter housing associated with FC-casings and their air tightness is a concen. Fibre migration, dust etc. can by-pass the filter and be transported to the occupied spaces below.



Room G032 has an adjoining Room G032A which was once provided shower and toilet facilities and is now being used as a store room. As can be seen in the photo above the plumbing and drainage connections for the old fixtures are still inplace and need to be properly capped and removed.

Pictured above is a section of flexible ductwork from FC-1 reticulating to the Housekeeping (G029) & Clinic (G088) Rooms. As can be seen the ductwork insulation has completely detatched from the inner ductlining and the ductwork is also unsupported adding to the FCU fan resistance and reducing system performance.

Pictured above is a 3 port valve motorised valve actuator which should be controlling the output of the heating coil associated with FC-1. This valve acutator has been detatched and left sitting next to the unit, this eliminates the control ability of the FCU.

Shown above is the MCC panel for the 'Te Whare Manaaki' building wing, the panel shows some signs of past upgrades. This panel would be replaces as part of any building upgrade works .

3.2.5 Patient Bedrooms

As discussed above the patient bedrooms have been provided with two different systems. The north facing rooms have been provided with heating only systems, while the south facing bedroom have been provided with air conditioning via in ceiling fan coil units (FCU's). The patient bedrooms in 'Te Whare Manaaki' have been provided with WC's only with showers being provided in adjoining rooms (which were not inspected). These two room types will be reviewed separately with comments provided for each system:

Bedroom G058 – South Facing Bedroom

- G058 is supplied with conditioned air from FC-3. The model number of the Fan Coil Units is not known however as-built documents note this AC unit as being an original fan coil unit which is to be reused, suggesting that it is 20-30 years old. No airflow, ducting routes etc. have been documented on as-built drawings. Outdoor air appears to be drawn into the FCU from a soffit vent.
- Both the supply and return grilles are located on the ceiling, supply and return air temperatures where recorded at 40°C and 28°C respectively. Further investigation in the attic identified that the FCU's heating and cooling coils motorised actuators had not been installed preventing any control of the FCU's output.
- The through wall toilet exhaust fan was not operational and it would appear that maintenance staff have connected a central toilet extract system to the FCU return plenum box as a 'quick fix'. This is not permitted under the NZBC G4 as it allows the migration of odours from adjoining sanitary spaces and the possible migration of bacteria etc to the FCU system.
- No room temperature sensor was visible with the bedroom and as previously noted it has been assumed the fan coil unit is controlling its output via a return air temperature sensor. It would appear that the FCU fan speed and set-point temperature is set via a pot type controller attached to the body of the FCU casing. It should be confirmed if this is a set and forget system or if a BMS can override the settings externally.
- Domestic hot water temperatures and wait times were found to be acceptable.

Bedroom G061 – North Facing Bedroom

- The bedroom has been provided with an underfloor heating system, no room space temperature sensor was visible and it is assumed that the system regulates its output based on an in-slab floor temperature sensor.
- Openable windows provide the room ventilation requirements and no dedicated toilet exhaust is provided. As discussed earlier the planned provision of fixed windows will require a new ventilation system and a possible additional cooling system.
- To comply with NZBC G4 for habitable spaces the room should be provided with openable windows equal to 5% of the bedroom floor area or provided with a mechanical ventilation supply. The proposed window replacements will require an alternate ventilation system to be provided.
- While the room temperature was stable at the time of inspection, staff commented that it was subject to temperature swings which may need to be further investigated. A further concern with the effectiveness of the underfloor heating system are:
  - The carpet floor covering and its tog value ('*tog' is a measure of thermal resistance*).
  - The condition of the in-slab pipework.
  - Confirmation of how the system output is being controlled.
- Domestic hot water temperatures and wait times were found to be acceptable.

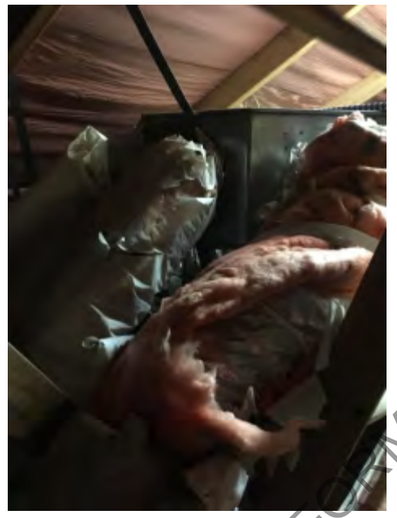
Recommendations (ranked in level of importance):

1) Disconnect toilet exhaust system from AC return grille box and provide a separate toilet exhaust grille.
2) Check that all three port valve motorised actuator are installed and are functioning correctly.
3) Replace all defective ductwork associated with FC-3 & FC-4.
4) Replace FC-1, FC-2 given the age of the FCU's it is likely that they will need to be replaced in the near future. Their replacement would also address points 2 to 4 below.
5) Confirm temperature control methodology for fan coil units. Local controls could be positioned within the plumbing voids to allow staff to adjust room temperatures without the need to call maintenance staff. Or a BMS interface could be provided in the Nurse Station to allow staff to monitor and adjust room temperatures etc.
6) Investigate the tog rating of the carpet underlay in the rooms with underfloor heating, low tog carpet underlay is available and will improve the effectiveness of the heating system.
7) Pressure test the underfloor heating loops at the manifolds to confirm the system integrity is still sound.
8) Confirm level of BMS control and monitoring of FCU's stats points i.e. air speed, operation mode (heating or cooling) and return and supply air temperatures.
9) Confirm level of BMS control and monitoring of the underfloor heating system stats points i.e. flow and return water temps, pump status and floor slab temperature.

3.2.6 Patient Bedrooms - Inspection Photos:

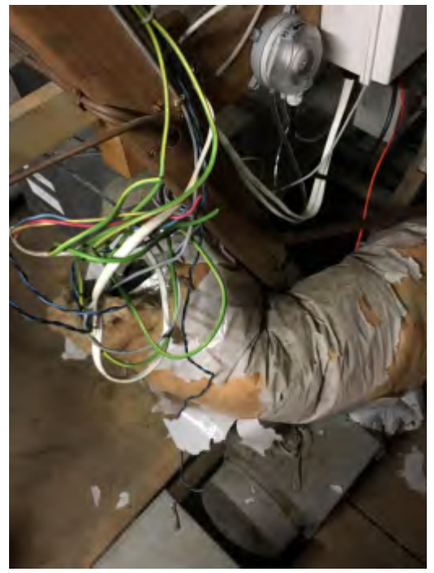
Pictured above is a defective bathroom fan from one from bedroom G058. If these systems are not operational they should be removed.

Pipework insulation has been provided on the hot water pipework, however both the hot and cold water pipes should be insulated as they are located in an uninsulated service cupboard.



Shown in the photos above is the condition of the fan coil unit secondary ductwork, the efficiency of the system will be greatly reduced due to its poor condition. Design airflow will also be greatly reduced due to the pinhole leaks etc. in the ductwork network.

Pictured above is a 3 port valve motorised valve actuator which should be controlling the output of the FCU heating coil. This valve acutator has been detatched and left sitting next to the unit, this eliminates the control ability of the FCU.



Further examples for the poor ductwork condition is evident in the photos above, also visible are modifications to the control wiring which has been modified and or replaced in an untidy manor with the redundant cabling being left in place.

Further examples of the poor ductwork condition is evident in the photo above.

4 ‘Te Whare Hohou Roko’

4.1 INTRODUCTION

This section of the Hillmorton Forensic Long Stay Unit is serviced by:

- Air Conditioning via Fan Coil Unit (FCU’s)
    - Administration and Patient Bedrooms
- Underfloor Heating with Mechanical Ventilation
    - Sitting Rooms and Main Living Rooms
- Radiators with Mechanical Ventilation
    - Administration rooms.

The building areas serviced by the mechanical systems mentioned above have been represented on a colour coded building plan below. It is evident from the condition of the building services that this building being the more modern of the two. It Architectural layout is similar to ‘Te Whare Manaaki’, with Patient Rooms located either side of a central living and administration areas.

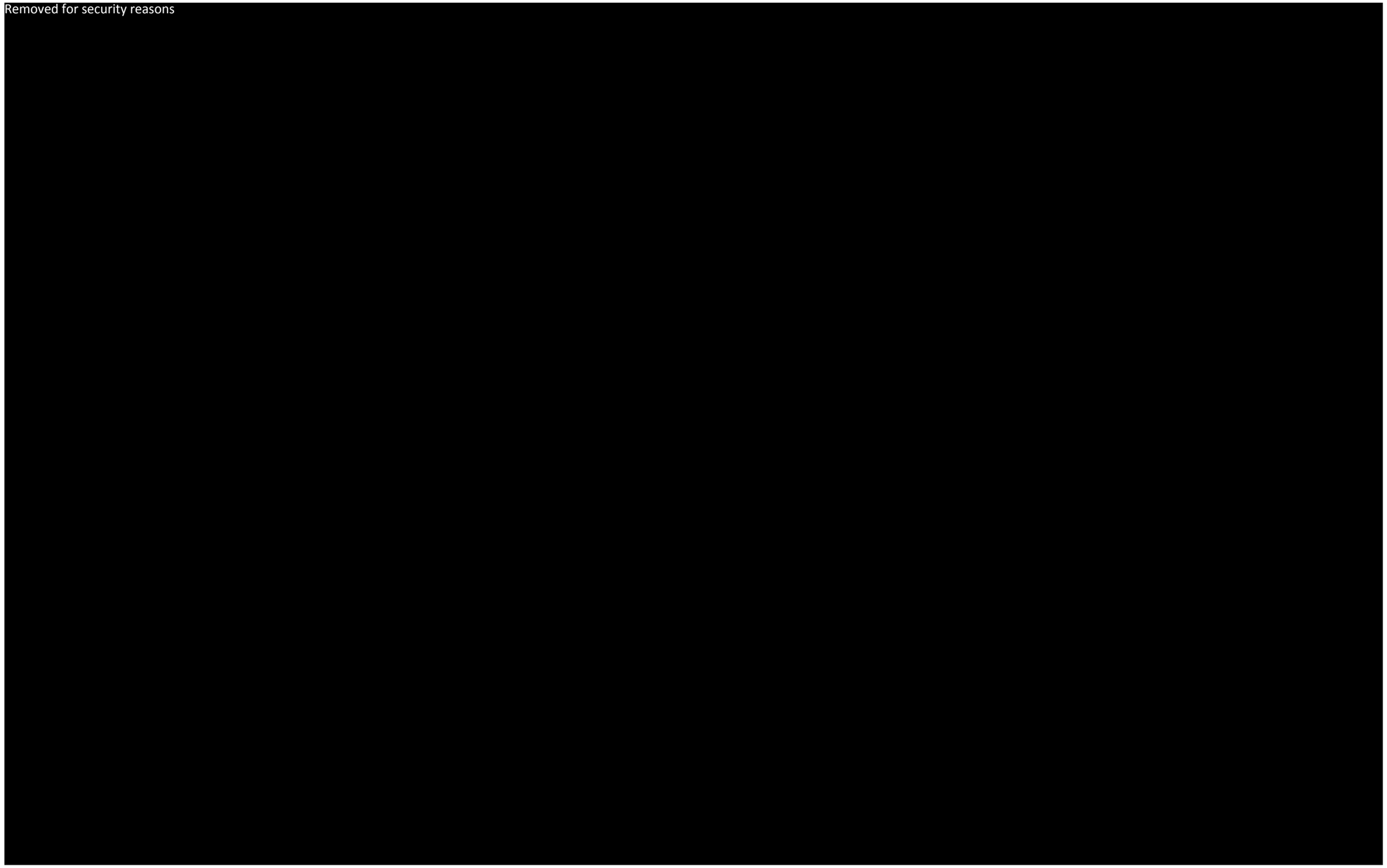
Like ‘Te Whare Manaaki’ window failures have also resulted in the planned replacement of existing windows. With reference to the building layouts ‘Te Whare Hohou Roko’ – Mechanical System Zones Diagram & Window Replacement Proposals sketches provided below it can been seen that the in contrast to ‘Te Whare Manaaki’ the majority of rooms appear to have been provided with a mechanical ventilation outdoor air supply.

However like the ‘Te Whare Manaaki’ building, further investigation will be required to confirm that this system is delivering NZBC code compliant ventilation rates and that due to the planned deletion of openable casements additional cooling systems may be required. However when compared to the ‘Te Whare Manaaki’– Window Replacement Proposals sketch the impact of this work is much smaller in ‘Te Whare Hohou Roko’.

As a general rule the condition of the services in ‘Te Whare Hohou Roko’ are generally superior to those in ‘Te Whare Manaaki’ and this is attributed to the building age.

‘Te Whare Hohou Roko –

Mechanical System Zones Diagram Ground Floor



‘Te Whare Hohou Roko –

Mechanical System Zones Diagram First Floor

‘Te Whare Hohou Roko –

Window Replacement Proposals

4.2 CONDITION ASSESSMENT – 'TE WHARE HOHOU ROKO'

Presented below is a summary of the room and plant condition assessments based on a visual inspection of the 'Te Whare Hohou Roko'. The Gymnasium, Kitchen and Workshop areas were not inspected. Comments will be based on an area by area basis and provided in bullet point format for clarity:

4.2.1 Administration Offices & Aux Spaces

The following areas made up the 'Te Whare Hohu Roko' administration areas:

- Housekeeper / Store – *Radiators c/w Mechanical Ventilation*
- Interview Offices – *Radiators c/w Mechanical Ventilation*
- Office 1 – *Fan Coil Unit No. 6*
- Multi-Purpose Room – *Fan Coil Unit No.7*
- Whanau Room – *Fan Coil Unit No.8*

Housekeeping / Store & Interview Office

- As noted above these rooms are heated via wall mounted radiators and provided with outdoor (or fresh air) supplied to the room via a ducted mechanical ventilation system via fan EC-01.
- The room occupants noted that overheating on sunny days is an issue. On the day the Housekeeper / Store room was inspected the ventilation supply air temperature was approx. 27°C. This highlights that a control change may improve the space temperature condition. A typical tempered outdoor air temperature of 16-20°C would be preferable.
- Access to the radiator thermostat control valve was hindered by room furniture layout.

Office 1:

- Office No.1 is supplied with conditioned air from FC-06 which has a cooling capacity: 5.7kW (T) 3.7kW (S) and a heating capacity of 2.1kW. The unit condition is good with the exception of the absence of seismic restraints.
- The supply air from FCU-6 to the room was recorded as 20°C with a return temperature of 24°C. This would suggest that the fan coil unit was in cooling mode, given the presence of 5PC's, lighting and CCTV panels a design cooling temperature of 12.5 – 14°C would have been expected. It may indicate either a problem with the FCU or a controls issue.
- The room also serves as a staff tea room and should also be provided with a local exhaust system.
- Excessive vibration was noticeable in the room, the wall adjoining the office and the library was visibly vibrating. It is expected that this is due to the mounting of EC-01 in the roof void above.

Multi-Purpose Room:

- The Multi-purpose room is supplied with conditioned air from FC-07 which has a cooling capacity: 8.0kW (T) 5.4kW (S) and a heating capacity of 4.6kW. The unit condition is good with the exception of the absence of seismic restraints. First impressions of the fan coil unit sizing is that it is excessive for the room use and occupancy.
- The room temperature in the Multi-Purpose room was recorded at 32°C and Staff reported that the room was so hot that it could not be used. A review of the FCU confirmed its condition is good but the heating and cooling coil control valve has been removed, effectively preventing the unit from controlling the room temperature.
- The exhaust grille in the adjoining toilet was also seen to be blocked by lint and dust, reducing its effectiveness.

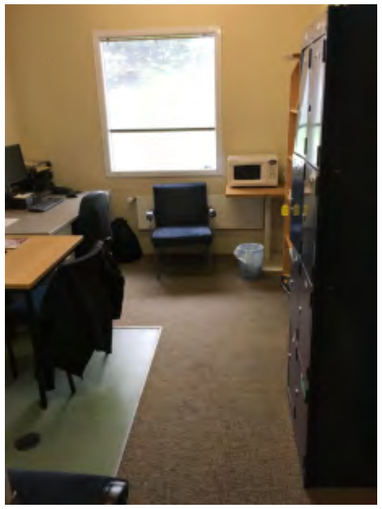
Whanau Room:

- The Multi-purpose room is supplied with conditioned air from FC-08 which has a cooling capacity: 8.0kW (T) 6.0kW (S) and a heating capacity of 12.6kW. The unit is positioned in a ceiling bulkhead and it's condition could not be inspected. As with FCU-07 the plant selection must be questioned the heating and cooling capacities seem excessive for what effectively is a living room / kitchen of the southern side of the building.
- The room temperature was also noticeably warm and supply and return temperatures of 40°C and 26°C were recorded and likely indicates a control issue.
- The room has a high window to wall ratio and some though should be given to the application of a film and or window replacement to improve the thermal performance of the room.
- A local kitchen exhaust hood has been provided which is not ducted to the external of the building. As the cooking facilities are not often used it is recommended that the kitchen hood is ducted to the external of the building.

Recommendations (ranked in level of importance):

1) Check that all three port valve motorised actuators and confirm they are installed and are functioning correctly.
   - In particular the operation and design air off temperatures of EC-01 should be confirmed.
2) Confirm temperature control methodology for fan coil units. Local controllers and temperature sensors should be provided in all administration rooms.
   - Consideration should be given to the provision of cooling systems for the Housekeeper/Store and Interview Rooms due to their change of use to administration offices.
3) Confirm level of BMS control and monitoring of FCU's stats points i.e. air speed, operation mode (heating or cooling) and return and supply air temperatures.
4) Provision of one new fan coil unit for the Housekeeper / Store and Interview Offices.

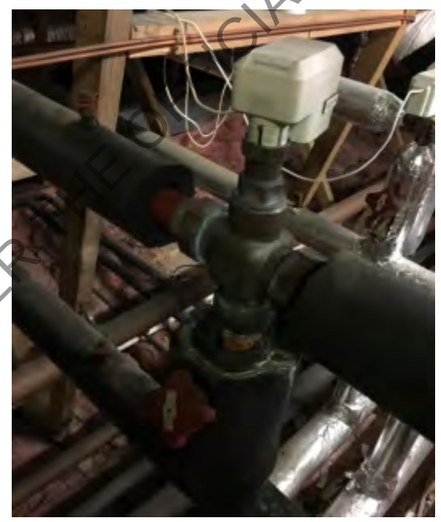
4.2.1 Administration Offices - Inspection Photos:



Pictured above is the Housekeeping Room with wall hung radiator, visible in the picture is the base build floor waste gully. As can be seen the room funcion is has now moved from a cleaners room to an more adminstrative role.

Pictured above is a 3 port valve motorised valve actuator which should be controlling the output of the heating coil associated with EC-1. This valve acutator has been detatched and left sitting next to the unit, this eliminates the control ability of the heating coil to modulate its output.

Pictured above is a typical FCU and supporting hanger rods, these are all excessively long. A review of the seismic bracing of the existing mechanical services should be undertaken.



The pipework condition in the area of FCU No.3, 3 port valve should be assessed. Visible signs of corrosion were noticeable, with pipework insulation also in a poor condition.

4.2.2 Patient Bedrooms

Room 9 and 10 were inspected to gauge the condition of the mechanical and hydraulic services provided for these patient rooms. The design of the air conditioning systems for this block of bedroom differs from that seen in 'Te Whare Manaaki' with supply air from the Fan Coil Unit (FCU) being introduced via a sidewall diffuser incorporated into the bedroom wardrobe.

Bedroom No.9:

- Bedroom No.9 is supplied with conditioned air from FC-4. The fan coil unit serves three rooms (bedroom 7, 8 & 9). It has a cooling capacity: 4.57kW (T) 3.05kW (S) and a heating capacity of 2.0kW. While the cooling capacity valves appear to be appropriate, each bedroom only receives 660 Watts of heating capacity. This heating capacity is required to heat the room and temper incoming outdoor air and this allowance seems light.
- The resulting room noise in the bedroom from the supply air grille was louder than expected. As the problem is localised to bedroom No.9 it is likely that the FCU's airflow has become unbalanced.
- The rooms WC and shower areas are ventilated via a centralised ventilation system. While the toilet ventilation rates were not tested the airflows documented on the as-built plans are acceptable.
- As with the bedrooms in 'Te Whare Manaaki' no room temperature sensor was visible with the bedroom, it has been assumed the fan coil unit is controlling its output via a return air temperature sensor. Provision of a stainless steel flush-plate box housing a thermocouple should be considered. It would appear that the FCU fan speed and set-point temperature is set via a pot type controller attached to the body of the FCU casing. It should be confirmed if this is a set and forget system or if a BMS can override the settings externally.
- Domestic hot water temperature was found to be 55°C which exceeds the permitted 45°C however hot water delivery wait times were found to be acceptable.

Recommendations (ranked in level of importance):

1) Check all three port valve motorised actuators and confirm they are installed and are functioning correctly.
2) Review outdoor air tempering to bedroom FCU's, provision of a local tempering coil or a heat recovery ventilation unit could be provided to temper incoming OA reducing the thermal loads being imposed on the FCU's.
3) Confirm design airflows are being achieved.
4) Confirm temperature control methodology for fan coil units. Local controls could be positioned within the plumbing voids to allow staff to adjust room temperatures without the need to call maintenance staff. Or a BMS interface could be provided in the Nurse Station to allow staff to monitor room temperatures etc.
5) Confirm level of BMS control and monitoring of FCU's stats points i.e. air speed, operation mode (heating or cooling) and return and supply air temperatures.

Supply air diffuser in bedroom incorporated into bedroom wardrobe.

Ceiling air diffusers in bedroom, in 'Te Whare Hohou', neither building have used anti-ligature ceiling diffusers.

4.2.3 Common Area

The majority of common / living rooms have been provided with underfloor heating and natural and or mechanical ventilation. The inspection of these rooms highlighted no major problems with staff not reporting any during the inspection. Of concern is the lack of as-built documents for the underfloor heating system, while manifold positions have been highlighted on the plans the extent of the circuits are not known.

Recommendations (ranked in level of importance):

1) Check all three port valve motorised actuators and confirm they are installed and are functioning correctly:
   - o In particular the operation and design air off temperatures of EC-01 should be confirmed.
2) With respect to the underfloor heating systems, it is recommended that its operational effectiveness is confirmed. Should it be found that it is operating below design levels the following points should be investigated:
   - o The carpet floor covering and underlay with its tog value confirmed.
   - o The condition of the in-slab pipework.
   - o Confirmation of how the system output is being controlled.

5 REPORT APPENDIX

‘Te Whare Manaaki’

- Overall Floor Plan and Room References
- Air Conditioning & Ventilation – AB
- Heating & Chilled Water – AB
- Ventilation Details
- Seclusion Area Details

Te Whare Hohou Roko

- Ground Floor, Ventilation – AB
- First Floor, Ventilation – AB
- Ground Floor, Heating – AB
- First Floor, Heating – AB
- Ground Floor, Domestic & Chilled Water – AB
- First Floor, Domestic & Chilled Water – AB

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Te Poari Hauora ō Waitaha

IAN KRAUSE ARCHITECTS

Te Whare Manaaki
Hillmorton Hospital
Annex Road South
Fire Strategy Report

Issue A: Coordination
November 2015
Reference: 15158

Summary – Te Whare Manaaki, Hillmorton Hospital

This report reviews compliance of the Fire Safety provisions of the NZ Building Code for the proposed alteration to the intensive care unit, Te Whare Manaaki, on the Hillmorton hospital campus. This is a 1 storey building used as a care/detention facility. Below is an overview of the fire safety features proposed for NZ Building Code compliance:

Fire Safety System	Type Ref.	Comments
Life Rating	60 minutes	Applies to internal fire separations
Property Rating	60 minutes	Applies to the external walls
Fire Alarm System	7	A Type 6 automatic fire sprinkler system, and a Type 5 VESDA smoke detection and alarm system is to be installed throughout
Smoke Control in Air Handling Systems	9	There is no HVAC equipment that spans between firecells.
Fire Hydrant System	18	Not required since hose run distance is not greater than 75 m.

Building Act 2004 - NZFS DRU Involvement?	Yes	No
Evacuation Scheme Required, or would be required if no sprinklers are installed?	✓	
NZ Fire Service Engineering Unit Review Required?		✓

This report is based on the meetings and documents as described in Section 1.3.

This report is specific to this project and any material contained herein cannot be used for any other project.

Items to be confirmed:

1. ***Architect to increase door width throughout the alteration area.***
2. ***Architect to confirm whether foamed plastics are to be utilised.***
3. ***Architect to provide surface finishes schedule.***

Document Control

Document ID: G:\PROJECTS\15 - Projects\15158 - Intensive Care Unit, Hillmorton Hospital\Fire\Fire Report\15158, Fire Strategy Report, Intensive Care Unit, Rev A.docx

Rev No	Date	Revision Details	Author	Approver
A	16/11/15	Coordination	JH	CD

TABLE OF CONTENTS

APPENDIX

1. INTRODUCTION

This report is written for the Building Control Authority as required by the NZ Building Act 2004 to enable a review of the minimum performance requirements of NZ Building Code Part C "Protection from Fire". This report is not a contract document for the project but is to form part of the documentation used for a Building Consent application and used as guidance for the contract works only.

Note: This Fire Strategy Report addresses minimum fire safety requirements only, as determined by the NZ Building Code. It does not consider loss control for the building and contents, unless specifically referenced. Refer to the Appendices for further advice in this regard.

1.1 PROJECT DESCRIPTION

The existing intensive care building (Te Whare Manaaki) on Hillmorton Hospital campus, is proposed to have an alteration to the seclusion area. Due to the alteration, the remainder of the building is to be reviewed for fire-safety compliance and upgraded based on "As Near As is Reasonably Practicable" (ANARP) basis. The proposed ungrade is limited to Te Whare Manaaki unit only. The existing adjacent building (Te Whare Hohou Roko) is not modified as part of this work[1].

Te Whare Manaaki is a one storey building, designed as a mental health care facility offering a secure environment to accommodate clients. The northern portion of the building includes two sleeping sections and a communal section, and is occupied by the patients. There is a staff only area at the south-western corner of the building.

This facility is highly secure. There is a 1:1 staff to patient ratio and all areas are CCTV monitored by a permanent staff member in the control room. The staff are able to visually monitor the patients via monitoring equipment, and control the access of all doors. The south-eastern corner is occupied by patients who need seclusion. This area is intermittently occupied and when occupied the patients are supervised.

This project is to provide a lounge facility and bedrooms in order to provide a transitional zone for patients as they are integrated into the facility.

1.2 COMPLIANCE REQUIREMENT

Since this is an existing building, the building is required to comply with the NZ Building Act ***Section 112*** for Means of Escape from Fire and Spread of Fire throughout the building (Te Whare Manaaki). The criterion used for assessing compliance is the NZ Building Code Acceptable Solutions C/AS3 and C/AS5. Where the building design does not meet the Aceptable Solutions, a gap assessment is to be used to establish the extent of non-compliance for the existing building, and a sacrifice/benefit analysis is to be undertaken to fulfil the requirements of NZ Building Act S112 for existing buildings, on an ANARP basis.

[1] Refer to pre-application meeting minutes in Appendix G

1.3 Stakeholder Consultation

The following documents were referred to in preparation of this report:

1. Architectural drawings, "Te Whare Manaaki", file ref 1949, issued September 2015 by Ian Krause Architects Ltd.
2. Site inspection to review the existing fire safety precautions.
3. Meeting with CDHB Bruce Hellyer (28th September 2015) to discuss project scope and the proposed building extension work.
4. Meeting with CCC on 12th August 2015.
5. Meeting with the CDHB nurse manager.

2. Occupancy

The following table summarises the design occupancy for this building using the values given in Table 1.2 of Acceptable Solution C/AS5 of the NZ Building Code.

Description		Risk Group	Floor Area (m^2)	Occupant Density (m^2/people)	Occupant Load	
					Design	Actual
G	East Wing	SI	175	# beds	9	9
G	West Wing	SI	138	# beds	7	7
G	New Bedroom Suite	SI	92	# beds	2	2
G	Seclusion	SI	63	# beds	2	2
				Total patient	***18***	***18***
G	Nurse Station	WB	30	10	3	3
G	Office (G032)	WB	18	10	2	2
G	Offices (G011-15)	WB	46	10	5	5
G	Offices (G024-025)	WB	44	10	4	4
G	Office (G027)	WB	20	10	2	2
G	Monitoring Room	WB	20	10	2	2
				Total Staff	***18***	***18***
				Building Total	***36***	***36***

The primary risk group for this facility is SI Risk Group. Occupants are in the care for medium to long term. They are familiar with their environment and have a high level of staff supervision. Occupants have free access to their bedrooms and common areas.

In accordance with the Evacuation Report, there are 18 beds with a maximum of 18 staff during day time from Monday to Friday. The actual maximum occupant load is 26 people.

3. Fire Safety Precautions

3.1 Building Classification

Detention care facilities and offices are listed in Table 1.1 of C/AS3 and C/AS5 as being SI risk group, WB risk group respectively.

3.2 FIRE SAFETY PRECAUTIONS

C/AS5/2.2.1 & C/AS5/2.3.1

C/AS3/2.2.1 & C/AS3/2.3.1

Acceptable Solution C/AS5 specifies the required fire safety precautions for a sprinkler protected building containing WB risk groups with firecells of less than 100 people, storage height less than 3 m, and escape height no more than 4 m as:

- Life rating = 30 minutes. This applies to fire rating requirements in Part 3: Means of escape and Part 4: Control of internal fire and smoke spread.
- Property rating = 60 minutes. This applies to fire rating requirements in Part 5: Control of external fire spread, except that where the storage height is greater than 3.0 m and the building is closer than 15 m to any relevant boundary, the rating shall be 90 minutes.
- Type 2 manual alarm system. A direct connection to the Fire Service is not required where a phone is available at all times for emergency calls.
- Type 18 building fire hydrant system, unless the Fire Service hose run distance to Fire Service vehicular access to any point on any floor is less than 75 m.

Acceptable Solution C/AS3 specifies the required fire safety precautions for a sprinkler protected building containing SI risk groups with escape height no more than 10 m as:

- Life rating = 60 minutes. This applies to fire rating requirements in Part 3: Means of escape and Part 4: Control of internal fire and smoke spread.
- Property rating = 60 minutes. This applies to fire rating requirements in Part 5: Control of external fire spread.
- Type 7 automatic sprinkler and alarm system. The water supply for the sprinkler system to be maintained as a single supply in compliance with NZS 4541:2013, given the occupant load is less than 100 people.
- Type 9 smoke control in any air handling system.
- Type 18 building fire hydrant system, unless the Fire Service hose run distance to Fire Service vehicular access to any point on any floor is less than 75 m.

3.3 PROPOSED FIRE PROTECTION

3.3.1 Automatic Sprinkler System

The existing Type 6 automatic fire sprinkler system is to be maintained and modified throughout the altered area in accordance with the requirements of NZS 4541:2007. This may involve additional fire sprinkler heads. Sprinkler heads are to be quick response, institutional classification.

The system is to form a single zone. A single public reticulated water supply is sufficient given there are less than 100 people receiving hospital care or in detention. The existing sprinkler valve room is to be retained.

3.3.2 Alarm Systems

The existing Type 5 enhanced smoke detection and alarm system to NZS 4512:2010 with VESDA aspirating smoke detection system, manual call points and sounders is to be modified throughout the alteration area for Code compliance. This may involve additional VESDA ducts with sampling points, manual call points (key operated secure units), and sounders (to match the existing sounders). A compatibility of sound is to be maintained throughout. The fire alarm system is required to have a direct brigade connection, given the presence of the sprinkler system in accordance with NZS 4541:2007.

The existing fire alarm panel in the monitoring room is to be modified to interface the VESDA, manual call points to the sounder system.

3.3.3 Smoke Control

A Type 9 smoke control system is required. The existing ventilation system will automatically shut down on activation of the fire alarm.

3.3.4 Evacuation Sequencing

The building is to operate under a managed evacuation scheme on activation of the fire alarm. This is as currently agreed with the NZ Fire Service and managed by the CDHB.

3.3.5 Hand-held Fire Fighting Equipment

Hose reels are provided throughout the building, and to be retained in compliance with NZS 4503:2005. Fire blankets provided in cooking areas are to be retained in compliance with NZS 4503:2005. Fire extinguishers are provided throughout the building in compliance with NZS 4503:2005. Due to the secure natural of the building, fire extinguishers are locked away in areas where they are easily accessible by the staff only.

3.3.6 Ancillary Devices

The NZFS can gain access to the building from an appliance parked on Annex Road. Since fire hose run distance to the furthest point on the ground floor from the point of NZFS vehicular access does not exceed 75m, a Type 18 fire hydrant system is not required within the building.

3.3.7 Electromagnetic Door Locks

Electromagnetic door locks are required to release if the fire alarm activates, but they will be locked during a smoke alarm activation. Due to the natural of the occupants, the entrance doors to the unit (Te Whare Manaaki) are locked 24/7 and can only be unlocked by the control room which is located inside the building between the air-lock doors. The building has a managed evacuation procedure. All security doors are monitored by a central system and CCTV. Staff carry bouth key and card access at all times.

3.3.8 Emergency Lighting

Compliance Document F6, NZ Building Code requires the installation of emergency lighting in the following areas:

F6/AS1/1 2

a) an escape route from the point where the initial open path travel distance exceeds 20 m.

b) at every change of level in an escape route.

c) in all exitways.

d) in the escape routes of the classified use Community Care.

Please refer to the attached sketches for guidance on the coverage. The emergency lighting is to last for a minimum duration of 30 minutes, and be installed in accordance with AS/NS 2293 Part 1 and 3 as amended by Appendix B (NZBC Part F6) and NZBC G9. Please refer to emergency lighting design documents for details of installation.

3.4 NZ FIRE SERVICE REQUIREMENTS

The NZ Fire Service has specific requirements with respect to the Fire Safety and Evacuation of Buildings Regulations. This building is required to have a registered evacuation scheme. The proposed fire protection systems are expected to meet the requirements of the Fire Service.

4. MEANS OF ESCAPE

4.1 SINGLE ESCAPE ROUTE

A single escape route is allowed for the office area as these areas will contain less than 50 people (18 staff) and the open path length does not exceed the limits specified in Table 3.2 of C/AS5 (i.e. 50 m max). C/AS5/3.13

4.2 EGRESS METHODOLOGY

The patients in the east wing can escape to the northern courtyard via the lounge in the communal area, or egress into the adjacent building (Te Whare Hohou Roko) as the second means of escape, allowing access directly to the outside.

The patients in the west wing can escape to the northern courtyard via the lounge in the communal area or via the exit door at the end of the west wing's corridor.

The patients in the communal area can escape to the northern courtyard via the lounge and via the exit door at the end of the west wing, or escape to the eastern courtyard via the new lounge next to the nurse's station.

The patients in the new suite under alteration work can escape to the eastern courtyard or to the northern courtyard via the lounge in the communal area.

The patients in the seclusion rooms are required to stay in the rooms unless their safety is compromised. If they need to be evacuated they will be taken out into the secure courtyard. This existing evacuation strategy is agreed with the NZFS and is to be maintained and managed.

Single means of escape for seclusion rooms:

NZBC Acceptable Solution C/AS3 requires at least two means of escape for all SI Risk Group occupants. Due to the nature of the patients in the seclusion rooms, it is proposed to retain the existing escape methodology on the following "As Nearly As Reasonably Practicable" basis:

- The southern external courtyard is next to the seclusion rooms. The travel distance is 13 m. The patients are able to reach a safe place in a reasonably short time.
- Due to the use of the room (temper proof room), the single means of escape is unlikely to be blocked.
- VESDA has been installed in the secure rooms to provide early detection.
- Although not designation as escape routes, there are alternative doors leading into the reminder of the building.
- The area is CCTV monitored at all times. Should a fire originate in the area, early visual detection is possible.

4.3 Width of Escape Routes

The following table compares the allowable and actual exit widths from each area. C/AS3/3.3.2

Description	Total exit width less one exit (mm)		C/AS4 Compliance?
	Required	Actual	
Patient living area			
Open path doors	950[a]	660	**No**
Open path corridor	1200[a]	1780	Yes
Staff office area			
Open path doors	760[a]	800	Yes

Note: a = based on minimum width

The minimum allowable widths do not account for disabled access requirements. Refer to NZBC Clauses D1.

The above table shows that open path door width doesn't meet the requirements of C/AS3.

Architect to increase door widths throughout the alteration area.

Doors within the existing building:

The doors within communal area have a width less than 950 mm. This does not meet the requirements of the NZBC Acceptable Solution C/AS3 (2014). It is proposed to retain the existing door on the following "As Nearly As Reasonably Practicable" basis:

- There is a low population in the building. The patients are using the facility similar to a hotel or home with a communal space. Wider doors in SI Risk Groups are often for the purpose of bed or assisted evacuation. The occupants in this facility are generally able-

bodied. There is not a high proportion of assisted evacuation required. Note that the egress doors in group activity areas (i.e. the meeting room, gym, lounge, library, and laundry room) are wider than 950 mm and meet the requirements.

- The whole patient living area for SI Risk Group is covered by emergency lighting complying with NZBC Part F6, and illuminated EXIT signs are to be installed throughout the building in accordance with NZBC Part F8. The installation of the new signage and emergency lighting has enhanced the way finding.

4.4 Height of Escape Routes

C/AS3/3.3.1

Within escape routes, the clear height is required to be no less than 2100 mm across the full width. Isolated ceiling fittings not exceeding 200 mm in diameter may project downwards to reduce this clearance by no more than 100 mm.

Doors on escape routes are required to have a clear height of no less than 1955 mm for the required width of the opening. Final exit doors are proposed to be at least 2.1 m high and this will comply with the requirements of C/AS3.

4.5 Path Lengths

C/AS3/Table 3.2

The following table compares the allowable versus actual travel distances.

Level	Description	Purpose Group	Path Lengths				OK?
			Allowable		Actual		
			DOP	TOP	DOP	TOP	
G	East Wing	SI	20	50	7	43	Yes
G	West Wing	SI	20	50	8	44	Yes
G	Gym	SI	20	50	18	41	Yes
G	Library	SI	20	50	17	33	Yes
G	Alteration area	SI	20	50	7	25	Yes
G	Seclusion rooms	SI	20	50	13	13	Yes
G	Office – G024	WB	75	150	10	24	Yes
G	Office – G028	WB	75	150	19	19	Yes

Note: DOP = Dead end open path length (m)
TOP = Total open path length (m)

The table shows that all escape route travel distances are within the requirements of C/AS3 and C/AS5.

4.6 Doors

C/AS3/3.15.3

Egress doors are required to open in the direction of travel where more than 50 people will use the escape route (for an open path). The door opening directions indicated on the architectural plans will comply by opening in either direction, since the occupant load is 36 people (< 50 people).

C/AS3/3.15.2

Due to the use of the building, the doors are controlled by magnetic locks, and locked at all times to prevent a client/patient leaving without permission. During a smoke alarm activation, these doors will be kept closed, unless a fire alarm is activated by activating a manual call point or the sprinkler system. These doors will automatically unlock to allow for the

occupants to evacuate during a confirmed fire under staff assistance and supervision.

4.7 VISION PANELS

Vision panels are required to ensure that passing evacuees are not struck or obstructed through opening of doors. They are required on doors which: C/AS3/3.15.6

a) Are hung to swing both ways,

b) Subdivide corridors used as escape routes.

This applies to the existing corridor doors in west and east wings. All the new fire doors are to have vision panels.

4.8 SIGNAGE

Illuminated EXIT signage is to be installed throughout the building in compliance with NZBC Part F8. Refer to Electrical Engineer's documentation for specified details. F8/AS1

Stickers are to be placed on all fire and smoke-stop doors, identifying them as per NZS 4520:2010. They are to be fixed to both sides of the door leaf adjacent to the handle or push plate, stating "Fire Door, Please Keep Closed" or "Smoke Control Door, Please Keep Closed", except that door leaves fitted with hold open devices shall have a sign stating only "Fire Door" or "Smoke Control Door". Note, stickers will be used for the purpose of maintaining the door as tamper-proof.

5. SPREAD OF FIRE

5.1 FIRECELLS AND SMOKECELLS

The proposed new altered area is to be fire separated to form a firecell with a 60 minute fire rating. The new fire rated walls are to be extended above the ceiling to the underside of the roof. The egress doors in the new fire separations are to be -/60/-$_{SM}$ fire doors with vision panel and closing mechanism that is agreed with client as tamper-proof.

Any gaps between fire separations and the roof or the external parameter walls are required to be suitably fire stopped to maintain the integrity of the fire separation.

Group sleeping areas with smoke separations:

Group sleeping firecells are allowed for SI Risk Group as per NZBC Acceptable Solution C/AS3. The firecells are required to be subdivided by either non-fire rated partitions with a gap no less than 400 mm on the top of the partitions, or full height smoke separations including smoke control doors.

The existing west and east wings contain sleeping areas. Each sleeping area contains 7 and 9 bedrooms respectively, and is fire separated as group sleeping firecells with a 30 minute fire rating. Part of the seclusion area is to be demolished due to the alteration work. The remaining

seclusion area is to be maintained as a separate firecell with a 30 minute fire rating. In accordance with NZBC Acceptable Solution C/AS3, the fire separations are required have a 60 minute fire rating. The existing 30 minute fire separations and non-fire rated bedroom partitions are proposed to be retained on the following "As Nearly As Reasonably Practicable" basis:

- Upgrading the existing plasterboard to the requirements of NZBC Acceptable Solution C/AS3 will have significant impact on the operating of the facility.

- Due to the nature of the building, VESDA has been installed to provide early detection of a fire. The VESDA is monitored by staff in the secure control room.

- Fire extinguishers and hose reels are installed in compliance with NZS 4503:2005 throughout the building. In addition, fire blankets are provided in the kitchen which has a fire hazard.

- The existing 30 minute fire separations will be upgraded by:

  a) Being extended above the ceiling to the underside of the roof. The new fire separations above the ceiling are required to have a 60 minute fire rating, in compliance with NZBC C/AS3. This applies to the fire separations between the communal section and the sleeping sections in west and east wings, the fire separation between building Te Whare Manaaki and building Te Whare Hohou Roko, and the fire separations for the seclusion section.

  b) Installing fail-safe close devices on the existing fire doors on activation of the fire alarm. In addition, minimum 200°C heat and smoke seals are to be installed to the top, latch and hinge edges of the doors.

  c) Fire sealing service penetrations through newly formed fire separations.

- Each sleeping cell is enclosed by partitions without any openings between each other. These partitions will provide a certain degree of smoke separation ability. In addition, as part of the upgrade work, minimum 200°C heat and smoke seals are to be installed on the existing doors, to upgrade the smoke separations between each sleeping cell and the escape corridor.

5.2 BOUNDARY EXPOSURE

The alteration area is remote from the adjacent building. Therefore the new external walls are not required to be fire rated.

5.3 FOAMED PLASTICS

Foamed plastics forming part of a wall, ceiling or roof system requires compliance with C/AS5 clause 4.17.2. This means that the complete system has to achieve a Group Number as specified in Section 5.6 and

C/AS3/Table 4.1
&
C/AS3/4.17.2

the foamed plastic has to meet the flame propagation criteria as specified in AS 1366.

Architect to confirm whether foamed plastics are utilised.

5.4 Service Penetrations

Where services pass through fire separations or are installed in fire separations, the continuity and effectiveness of the fire separations shall be maintained as required by NZBC Acceptable Solution C/AS3 (this will include services through walls as applicable). Fire resistant materials are to be approved as per NZS/AS 1530 Part 4.

5.5 Surface Finishes

Since the building height is less than 7 m and new exterior walls are more than 1 m away from the adjacent building, there is no requirements from C/AS3 for the new external wall claddings.

C/AS3 requires the following surface finish properties in the listed areas for a sprinklered building:

Building Elements	Maximum Permitted Group Number	Flammability Index
Wall linings and ceiling linings: Sleeping spaces and treatment areas	2	-
Wall linings and ceiling linings: all other occupied spaces	3	-
Flooring: sleeping spaces and treatment areas	Non combustible, or when tested to ISO 9239-1 have a critical radiation of not less than 2.2 kW/m^2	
Flooring: all other occupied spaces	Non combustible, or when tested to ISO 9239-1 have a critical radiation of not less than 1.2 kW/m^2	
Ducts for HVAC systems: internal surfaces	2	-
Ducts for HVAC systems: external surfaces	3	-
Acoustic treatment and pipe insulation within air handling plenum	3	-
Suspended flexible fabrics: Underlay to roofing or external cladding when exposed to view	-	not > 5
Suspended flexible fabrics: All occupied spaces including exitways	-	not > 12

These surface finish properties are to apply throughout the alteration area.

Architect to provide surface finishes schedule.

6. Fire Fighting

6.1 Fire Service Vehicular Access

C/AS3/6.1

Where buildings are located remote from the street boundaries of a property, pavements situated on the property and likely to be used for vehicular access by fire appliances shall:

a) Be able to withstand a laden weight of up to 25 tonnes with an axle load of 8 tonnes or, have a load bearing capacity of no less than the public roadway serving the property, whichever is the lower,

b) Be trafficable in all weathers,

c) Have a minimum width of 4.0 m,

d) Provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings,

e) Provide access to a hard-standing within 20 m of:

   i. An entrance to the building, and
   ii. An inlet to fire sprinkler or building fire hydrant systems.

Since the building is readily accessible from Annex road, the fire service vehicular access is expected to comply.

7. FIRE REPORT CONCLUSIONS

For the building to comply with the NZBC Fire Safety objectives, the following fire safety features will be required:

1. The existing Type 6 automatic fire sprinkler system is to be maintained and modified throughout the altered area in accordance with the requirements of NZS 4541:2007. This may involve additional fire sprinkler heads. Sprinkler heads are to be quick response, institutional classification.

2. The existing Type 5 enhanced smoke detection and alarm system to NZS 4512:2010 with VESDA aspirating smoke detection system, manual call points and sounders is to be modified throughout the alteration area for Code compliance. This may involve additional VESDA ducts with sampling points, manual call points (key operated secure units), and sounders (to match the existing sounders). A compatibility of sound is to be maintained throughout. The fire alarm system is required to have a direct brigade connection, given the presence of the sprinkler system in accordance with NZS 4541:2007.

3. The existing hand-held fire fighting equipment is to be retained in compliance with NZS 4503:2005.

4. A Type 9 smoke control system is required. The existing ventilation system will automatically shut down on activation of the fire alarm.

5. Emergency lighting is required to be installed throughout the building in compliance with NZBC Part F6. The emergency lighting is to last for a minimum duration of 30 minutes, and be installed in accordance with AS/NS 2293 Part 1 and 3 as amended by Appendix B (NZBC Part F6) and NZBC G9. Please refer to emergency lighting design documents for details of installation.

6. The minimum requirement for egress doors in open paths is 950 mm. The current design has a door width of 660 mm. Architect to increase door width throughout the new altered area.

7. Vison panels are to be provided on all new fire doors.

8. Illuminated EXIT signage is to be installed throughout the building in compliance with NZBC Part F8. Refer to Electrical Engineer's documentation for specified details.

9. Stickers are to be placed on all fire and smoke-stop doors, identifying them as per NZS 4520:2010. They are to be fixed to both sides of the door leaf adjacent to the handle or push plate, stating "Fire Door, Please Keep Closed" or "Smoke Control Door, Please Keep Closed", except that door leaves fitted with hold open devices shall have a sign stating only "Fire Door" or "Smoke Control Door". Note, stickers will be used for the purpose of maintaining the door as tamper-proof.

10. The new altered area is to be fire separated from the reminder of the building with a 60 minute fire rating. The fire separation is to be extended above the ceiling to the underside of the roof

11. The existing fire separations are to be retained, and extended above the ceiling to the underside of the roof with a 60 minute fire rating.

12. Where services pass through fire separations or are installed in fire separations, the continuity and effectiveness of the fire separations shall be maintained as required by NZBC Acceptable Solution C/AS3 (this will include services through walls and floors as applicable). Fire resistant materials are to be approved as per NZS/AS 1530 Part 4.

13. The Code requires the following surface finish properties in the listed areas:

Building Elements	Maximum Permitted Group Number	Flammability Index
Wall linings and ceiling linings: Sleeping spaces and treatment areas	2	-
Wall linings and ceiling linings: all other occupied spaces	3	-
Flooring: sleeping spaces and treatment areas	Non combustible, or when tested to ISO 9239-1 have a critical radiation of not less than 2.2 kW/m^2	
Flooring: all other occupied spaces	Non combustible, or when tested to ISO 9239-1 have a critical radiation of not less than 1.2 kW/m^2	
Ducts for HVAC systems: internal surfaces	2	-
Ducts for HVAC systems: external surfaces	3	-
Acoustic treatment and pipe insulation within air handling plenum	3	-
Suspended flexible fabrics: Underlay to roofing or external cladding when exposed to view	-	not > 5
Suspended flexible fabrics: All occupied spaces including exitways	-	not > 12

These surface finish properties are to apply throughout the alteration area.

APPENDIX A: GUIDANCE NOTES FOR ACHIEVING A CODE COMPLIANCE CERTIFICATE FOR FIRE SAFETY SYSTEMS

The fire alarm installer shall supply a Producer Statement, Statement of Compliance or equivalent on satisfactory completion of the inspections and commissioning tests. This document(s) is to be in a form meeting the requirements of the NZ Building Code and associated Standard NZS 4512:2010, and to be signed by suitably qualified personnel such as FPIS Ltd, AON or similar.

Where services pass through fire separations or are installed in fire separations, the continuity and effectiveness of the separations shall be maintained as required by NZBC C/AS3 2014/4.4 (this will include services through walls and floors as applicable). Certification is required from the installer(s) that all penetrations through fire separations have been installed in full accordance with manufacturer's requirements.

Signs to comply with NZBC Acceptable Solution C/AS3 2014/3.16.1

APPENDIX B: SUMMARY OF PRECAUTIONS REQUIRED FOR SERVICE PENETRATIONS

Abstract: Attached is a summary sheet for fire rating of service penetrations. The following listed items should be adhered to during construction for achieving appropriate fire rating integrity of services penetrations:

1. Test certificates are required for all service penetration fire rating products used. Non-certified products will be deemed non-compliant.
2. Fire rating products must be installed in strict compliance with the manufacturer's requirements for the application and for the specified tested / assessed system.
3. Service penetrations shall be made available for inspection to competent qualified persons (i.e. council inspector, consultant engineer, or Licensed Building Practitioner) to sample selections of penetrations.
4. It is recommended that components of fire-stopping systems not be 'mixed and matched' from different manufacturers.
5. Proposal of all fire stopping systems should be provided for the fire engineer's approval prior to commencement of installation.
6. Fire stopping systems are required to be installed by competent trained persons.

FIRE RATING OF SERVICE PENETRATIONS – SUMMARY SHEET

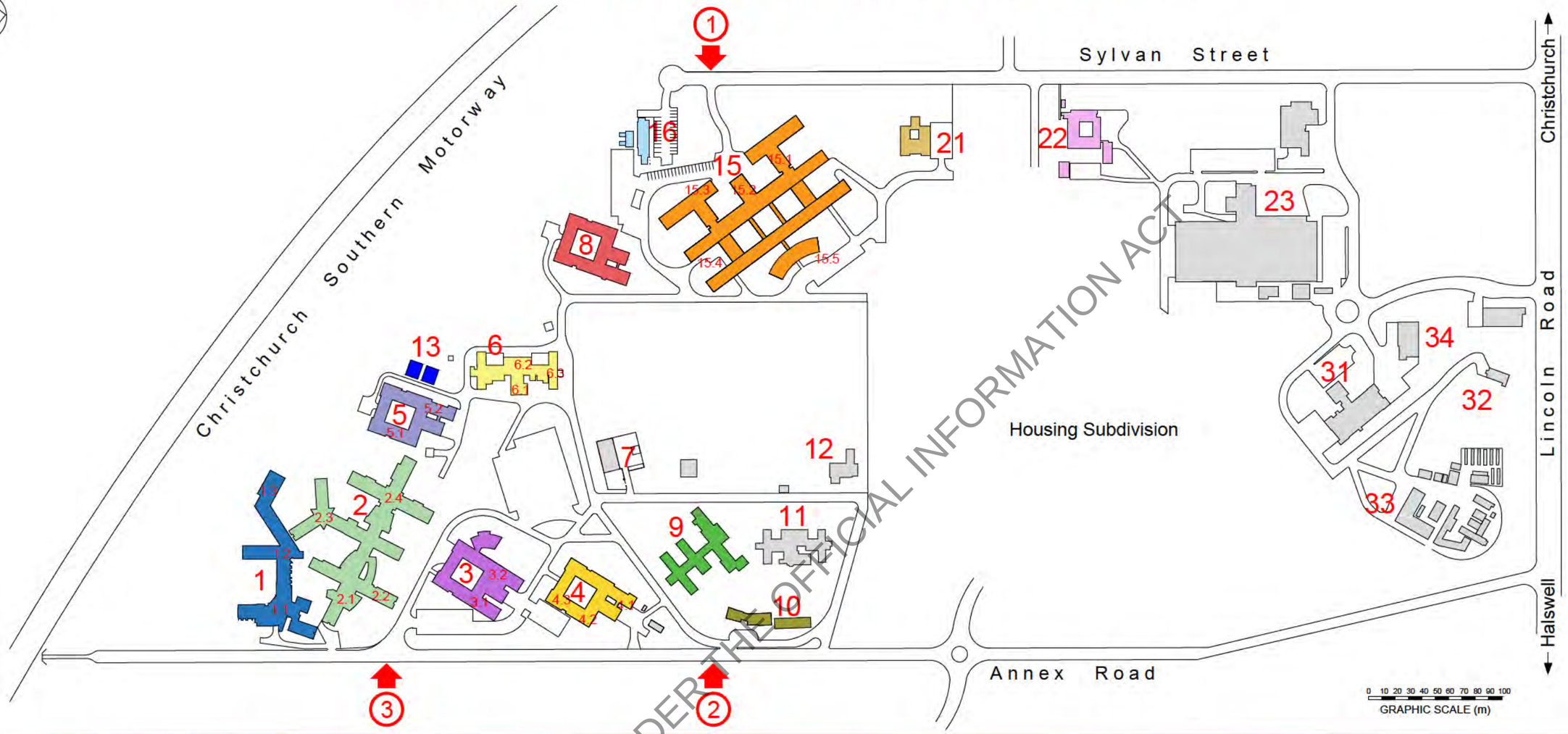
SERVICE	CONCRETE SEPARATION	DRY WALL SEPARATION
Plastic Pipe	Fix fire collar against masonry surface and around pipe. Ensure any gaps between pipe and concrete are fitted with fire rated mastic sealant. *Firepro B310FG Fyre Collars* are suitable. For sprinkled buildings fire collars are to be fitted for pipes equal to or greater than 25mm, fire rated mastic sealant is to be located around pipes less than 25mm.	Fixed block of laminated Gib® Fyreline, solid timber or similar in wall cavity through which the pipe passes. Install fire collar around pipe and against block surface. *Promat Promaseal Fire Collar* kits are suitable products. Ensure gaps between fire collar and adjoining surfaces are filled with fire rated mastic sealant. For sprinkled buildings fire collars are to be fitted for pipes equal to or greater than 25mm, fire rated mastic sealant is to be located around pipes less than 25mm.
Metal Pipe	Ensure full grout or fire retardant compound between metal pipe and concrete surface. Fill any cavities with fire rated mastic sealant or mortar seal. For insulated pipe, replace insulation with *Kaowool* or *Fyrefibre* for a set distance as described in *Winstones Gib®* catalogue 'Penetrations in GIB Fire Rated Systems', October 2012 (suitable up to 60 min. FRR).	Wrap fire strip seal, such as *Firepro IBS*, around pipe across dry wall thickness, and encase strip seal sleeve, such as *Firepro B340* steel sleeve. Seal gaps with fire rated mastic sealant (i.e. *Flamex*). For insulated pipe, replace insulation with *Kaowool* or *Fyrefibre* for a set distance as described in *Winstones Gib®* catalogue 'Penetrations in GIB Fire Rated Systems', October 2012 (suitable up to 60 min. FRR).
Ductwork	Fit proprietary fire damper into opening, including a suitable sleeve or frame to allow fixing to the wall structure as per suppliers instructions. Connecting ducting is to be slip fixed only to damper to ensure that the damper is not physically damaged through failure of the connecting ductwork. Any cavities filled with fire mortar or similar. Small gaps filled with fire rated mastic sealant. Allow for access panel and test latches. *Holyoakes* or *Halton* damper units are suitable	
Electrical Services	Install bulkhead and coating system for cable tray penetrations, such as the *Promat Promaseal* system. Otherwise, use suitable fire rated mastic sealant around singular penetrations. Where ladders or trays pass through fire rated elements, terminate the ladders or trays at both sides of the openings and provide holes for the cables only. All holes are to be fire stopped with a proprietary product that is equal to or greater than the fire resistance of the materials being filled and is installed to the manufacture's specifications.	
Recessed Fittings: Lights, Cabinets, Flush Boxes	Usually not applicable for lights. Ensure full grout or fire mortar seal around recessed features.	*Lights & Cabinets*: Form fire rated recess constructed from same thickness wall lining (i.e. *Gib®*) as per the ceiling or wall, except extra layer for top section of recess. Refer *Winstones Gib®* Catalogue 'Penetrations in GIB Fire Rated Systems', October 2012. *Flush Boxes*: Install proprietary intumescent blocks into flush boxes. Apply fire rated mastic sealant around outer edges/gaps.

APPENDIX C: SITE PLAN

Abstract: Attached is a copy of the site plan, showing the general layout of the building.

HILLMORTON HEALTH CAMPUS

AS AT OCTOBER 2014



KEY

1. Forensic Services **(Best Entrance 3)**
   - 1.1. Te Whare Manaaki
   - 1.2. Te Whare Hohou Roko
   - 1.3. Exercise Area
2. Te Awakura - Acute Inpatient Services **(Best Entrance 3)**
   - 2.1. North Adult Inpatient
   - 2.2. Clinical Services Unit, Judges Room, Clozapine Clinic
   - 2.3. West Adult Inpatient
   - 2.4. East & South Adult Inpatient
3. Aroha Pai **(Best Entrance 3)**
   - 3.1. Intellectual Disability Assessment, Treatment and Rehab (AT & R)
   - 3.2. PSAID Inpatient Unit (Psychiatric Services for Adults with Intellectual Disability)
4. Te Waimokihi **(Best Entrance 2)**
   - 4.1. Forensic Community Unit
   - 4.2. Te Korowai Atawhai
   - 4.3. IDLT (Intellectual Disability Liaison Team), PSAID Outpatient team
5. Te Whare Mauri Ora **(Best Entrance 2)**
   - 5.1. Forensic Rehabilitation Unit
   - 5.2. Kennedy Detoxification Unit
6. Avon Administration **(Best Entrance 2)**
   - 6.1. Management Team, Administration, DAMHS, Villa Services
   - 6.2. Avon Cafe
   - 6.3. Pharmacy, Clinical Governance Resource Unit
7. Energy Centre and Site Maintenance
8. Tupuna Villa
9. Recreation Centre **(Best Entrance 2)**
   - 9.1. Hereford Centre
   - 9.2. Anxiety Disorders Unit
10. Kiwi Kids Nursery & Pre-school **(Best Entrance 2)**
11. Cluny Villa (To Be Demolished)
12. Chapel (To Be Demolished)
13. Meeting Rooms 3 & 4 **(Best Entrance 2)**
15. Fergusson Building **(Best Entrance 1)**
    - 15.1. Community & Alcohol Drug Service
      Christchurch Methadone Programme
    - 15.2. School and Community Dental Admin
    - 15.3. National Cervical Screening Programme
    - 15.4. Psychiatric Emergency Service
      North Adult Community Service
      South Adult Community Service
      East Adult Community Service
      West Adult Community Service
      Rural Adult Community Service
      Single point of entry (SPOE)
    - 15.5. Hospital Dental Service
16. Community Dental Service. Portacom at Rear Consumer & Family Advisors, Chaplains **(Best Entrance 1)**
21. Training Unit, Library **(Best Entrance 1)**
22. Youth Specialty Service
23. Laundry
31. Food Services & Main Kitchen
32. Vacant
33. Lincoln Green, Vacant
34. Grounds Maintenance

APPENDIX D: KEY FIRE SAFETY REQUIREMENTS

Abstract: Attached is a copy of the floor plan showing the required fire safety features that are to be incorporated into the building design.

Removed for security reasons

Removed for security reasons

APPENDIX E: MBIE SCORE SHEET

Abstract: Attached is the score sheet for the existing building – Appendix 1 from “Requesting information about means of escape from fire for existing buildings”

Appendix 1: Building score sheet

Complete this score sheet to get a total score for the existing building (refer to Consider the key factors for further information).

You can then use Table 1: Recommended information requirements – means of escape from fire to help you decide how much information you might typically request as part of the building consent process.

BUILDING SCORE SHEET

	Key factors	Points	Score
Likelihood of existing building complying	**Building age**		
	Approved from 1 June 2001 onwards	0	
	Approved between 1 January 1993 and 31 May 2001	1	
	Approved on or before 31 December 1992	3	3
	Information held on the building by the BCA or TA (Score one of these only and choose the most comprehensive assessment)		
	For buildings approved from 1 June 2001: no consents made	0	
	Full building assessment on file dated 1 June 2001 or later	2	
	Full building assessment on file dated on or before 31 May 2001	4	
	One or more partial building assessments on file	6	
	No assessment on file for building additions or alterations	8	
	Unable to determine history of building	8	8
Extent of proposed work	**Extent of the proposed building work**		
	Minor	0	0
	Moderate	3	
	Significant	6	
Potential consequences of not complying	**Building importance level**		
	Level 1	0	
	Level 2	4	
	Level 3	8	8
	Level 4 and Level 5	12	
	Additional points for building level 1, 2 or 3 with sleeping facilities	4	
	TOTAL SCORE TO USE WITH TABLE 1		19

APPENDIX F: GAP ASSESSMENT SPREADSHEET

Abstract: Attached is a gap assessment table outlining non-compliance items within the building and proposed upgrades.

Te Whare Mannaki, Hillmorton Hospital (Job Ref: 15158) - Fire Safety Gap Analysis Assessment November 2015 - v1)					
Fire Safety Element	**Existing**	**Required (C/AS3)**	**Gap between Existing + Required**	**'ANARP' proposed improvement**	**Intend to Include or Exclude with Upgrade?****
Fire Protection Systems - Type 7 System	Type 6 sprinkler system + Type 5 VESDA system	Type 7 Automatic sprinkler system with smoke detectors, manual call points and AS2220 sounders.	Nil	Nil	Exclude
Fire Protection Systems - Type 9 System	The existing ventilation system will automaticlly shutdown upon a fire alarm activation	Type 9 smoke control in air handling system. All distributed air-conditioning and mechanical ventilation plant which is not required or designed for fire safety to shutdown on smoke detection system.	Nil	Nil	Exclude
Fire Protection Systems - Type 18 System	N/A	Type 18 building fire hydrant system where the fire hose run distance exceeds 75m from single point of NZFS vehicular access.	N/A	N/A	N/A
Hand Held Fire Fighting Equipment	Hose reels and fire extinguishers complying with NZS 4503:2005 are installed throughout the building. In addition, fire blankets are provided in the kitchen.	Required by NZS 4541:2013	Nil	Nil	Exclude
Electromagnetic door hold open devices	All doors are electromagnetic locked, and controled by the control room	Hold-open device required between open paths and exitways where the occupancy is greater than 1000, and for subdividing long corridors, and where an escape route passes into an adjacent firecell, and locations where the doors may be kept open by unauthorised means, and in early childhood centres located on upper floors of multi-storeyed buildings.	Nil	Nil	Exclude
Electromagnetic door locks	All doors are electromagnetic locked, and controled by the control room, but will automatically open upon a fire alarm activation	All exit doors are to be free to exit in an emergency.	Nil	Nil	Exclude
Access Controlled (Security) Doors	All doors are electromagnetic locked, and controled by the control room, but will automatically open upon a fire alarm activation	Access controlled doors to fail safe in event of power failure and interface with the fire alarm system.	Nil	Nil	Exclude
Emergency lighting + Signage	EXIT signage are provided in the building	To meet the coverage requirements of NZBC F6 & F8.	Emergency lighting and illuminated EXIT signs are required throughout the building in compliance with NZBC Part F6 &F8	Emergency lighting and illuminated EXIT signs are to be installed throughout the building in compliance with NZBC Part F6 & F8	Include
Width of Escape Routes	The corriodors are at least 1.6 m wide	8mm/person or 1200mm, whichever is the greater, with widest exit width disregarded.	Nil	Nil	Exclude

Fire Safety Element	Existing	Required (C/AS3)	Gap between Existing + Required	'ANARP' proposed improvement	Intend to Include or Exclude with Upgrade?**
Height of Escape Routes	TBC	No less than 2100mm across full width Isolated ceiling fittings not exceeding 200mm may reduce height by no more than 100mm. Doors to have a clear height of 1955mm.	TBC	TBC	TBC
Path Lengths	East wing: DOP = 7 m, TOP = 43 m West wing: DOP = 8 m, TOP = 44 m Communal: DOP = 18 m, TOP = 41 m Seclusion: DOP = 13 m, TOP = 13 m Office: DOP = 19 m, TOP = 19 m	For SI risk group DOP = 20m maximum, and TOP = 50m maximum For WB risk group DOP = 50m maximum, and TOP = 120m maximum	Nil	Nil	Exclude
Number of escape routes	At least two means of escape are provided except for the seclusion area.	Up to 50 people = 2 escape route, 51 - 150 people = 3 escape routes, 151 - 250 people = 4 escape routes,	Occupants are required to be provided by at least two means of escape	Due to the natural of the seclusion rooms, it is proposed to retain the existing methodology (single means of escape)	Exclude
Doors	All doors are electromagnetic locked and controled by the control room, but will automatically open upon a fire alarm activation. Width < 950 mm	Open in direction of travel for more than 50 people, Manual sliders limited to 20 people, Door to open in direction of travel for more than 50 people, Automatic sliding doors to fail safe open, Egress door locks to be easily opened from inside	The existing door width is less than the minimum requirement (950 mm)	Retain the existing doorset due to the small number of people using the doors	Exclude
Vision Panels	Vision panels are provided on the existing fire doors in the west and east wings	Vision panels required on doors which are hung to swing both ways, lead into or are within exitways, or subdivide corridors used as escape routes.	Vision panels are required on doors that subdivide the corridors in east & west wings.	Retain the existing doorset	Exclude
Fire + Smoke Ratings	The existing plasterboard is to provide a 30 minutes fire rating between the sleeping areas and the communal area.	Each floor, units and firecell to be separated by 60 minute fire rating.	Fire rating is required to be 60 minutes	Retain the existing plasterboard, and extend the fire separation above the ceiling to the underside of the roof. The new fire separations are to have a 60 minutes fire rating.	Include
Services Penetrations through Fire/Smoke Separations	Unsealed	All penetrations are to be treated so as to not compromise the fire or smoke separation. The minimum rating is 30 minutes for Intermediate floors and 60 minutes for safe path stairs.	Penetrations are required to be sealed to maintain the existing 30 minutes fire rating	Penetrations are to be sealed to maintain the existing 30 minutes fire rating	Include
Fire and Smoke doors	TBC	Certified -/30/-sm -/60/30sm fire doors	Fire doors with smoke control ability are required	Smoke seals are to be installed on the bedroom doors and the existing doors in the existing fire separations	Include

Fire Safety Element	Existing	Required (C/AS3)	Gap between Existing + Required	'ANARP' proposed improvement	Intend to Include or Exclude with Upgrade?**
Fire/Smoke door signage	TBC	All fire and smoke doors to have signage identifying them as per NZS4520.	TBC	TBC	TBC
Property Rating	The building is remote from the adjacent buildings and title boundaries	Property rating to be ## minute FRR, with up to ##% allowable unprotected area.	Nil	Nil	Exclude
Vertical Fire Spread	Sprinkler protected	No unprotected openings allowed at a level lower than another property sleeping activities or exitways.	Nil	Nil	Exclude
Horizontal Fire Separation	Remote from the adjacent buildings and the title boundaries	Horizontal fire separation by sprinkler system, distance separation, limiting unprotected areas or using fiere resisting glazing shall be provided if sleeping firecell is less than 90 degress to adjacent firecell.	Nil	Nil	Exclude
EPS panels	TBC	EPS panels to comply with AS1366 flame propagation criteria and surface finsh criteria.	TBC	TBC	TBC
External surface finish properties	Building height <7 m Distance to relevant boundaries > 1 m No requirements for external claddings	Maximum Peak heat release rate = 100 kW/m2 150 kW/m2 Maximum Total heat released = 25 MJ/m2 50 MJ/m2	Nil	Nil	Exclude
Internal surface finish properties	TBC	Group Number = 1S in exitways, 2S in crowd spaces (wall + ceiling linings), 3 in all other occupied spaces. Floor coverings have specific requirements regards non-combustibility or critical radiant flux. Refer equivalent ratings below.	TBC	TBC	TBC
General Requirements	(general fire safety features requiring improvement)	Refer attached sketch drawing.	As per attached sketch drawing	As per attached sketch drawing	Include
** - the QLDC are the final arbiters on whether an item is included or excluded. This chart identifies what we propose to exclude or include.					
+ - Equivalent Surface Finish References (refer MBIE Guidance Document, 12 Sept 13 - http://www.dbh.govt.nz/guidance-internal-surface-finish-requirements)					

APPENDIX G: COMPLIANCE SCHEDULE

	Specified System ***Description: Location:***	**Maintenance Procedure / Performance Standards**	**Frequency of Inspections**	**Maintained By**	**Specified System Modified By**
1	Automatic Systems for Fire Suppression (Sprinkler System) ***Location: Throughout the building***	NZS 4541:2013	As specified by the Standard	Independent Qualified Person	***Existing*** ***Altered***
2	Emergency Warning System for Fire or Other Dangers (Manual and/or automatic Detection systems) ***Location: Throughout the building***	NZS 4512:2010	Monthly Annually	Independent Qualified Person Independent Qualified Person	***Existing*** ***Altered***
3/3	Automatic Fire Doors or Windows Forming part of Fire Wall, which are designed to close shut and remain shut on alarm of fire including smoke control doors fitted with hold open devices. ***Location: As per Fire Report***	Visual inspection to ensure that doors are in good working order and as required by Compliance document C/AS5	3 Monthly Annually	Independent Qualified Person Independent Qualified Person	***New*** ***Existing*** ***Altered***
4	Emergency Lighting System Systems from 1995 ***Location: As per Fire Report***	AS/NZS 2293 Part 2:1995	As specified by the Standard	Independent Qualified Person	***New*** ***Existing***
15/2	Final Exit Doors and Other Exit Doors ***Location: As per Fire Report***	Visual inspection to ensure all the means of escape are in good repair and in accordance with Compliance document C/AS5 or NZS 1900 for buildings built and as altered prior to the introduction of the Building Act.	Daily (CS, CL, CO, CM) Monthly (other occupancies) Annually	Owner Owner Independent Qualified Person	***New*** ***Existing***

15/3	Fire Separations Protecting a Means of Escape ***Location: As per Fire Report***	Visual inspection of Fire Partitions including door and their proper operation and in accordance with Compliance document C/AS5.	Monthly Annually	Owner Independent Qualified Person	***New*** ***Existing*** ***Altered***
15/4	Signs for communicating information intended to Facilitate Evacuation ***Location: As per Fire Report***	All signs are to be clearly visible and unobstructed. Signs shall be refurbished before they become illegible, and shall be replaced immediately should they be missing.	Monthly Annually	Owner Independent Qualified Person	***New*** ***Altered***

APPENDIX H: INSPECTION SCHEDULE

PROJECT: Te Whare Mannaki, Hillmorton Hospital
LEVEL OF CONSTRUCTION MONITORING: CM2 (refer IPENZ Guidance Note)

CM2	*"Review, preferably at the earliest opportunity, a sample of <u>each</u> important work procedure, material of construction and component for compliance with the requirements of the plans and specifications and review a representative sample of <u>each</u> important completed work prior to enclosure or completion as appropriate. Be available to provide the constructor with technical interpretation of the plans and specification."*

ITEM #	ELEMENT	INSPECTION REQUIREMENT
1.	Fire Rated Construction *[Structural engineer to inspect + verify structural performance]* *[PS3 to be provided by Contractor for all work aligned to fire ratings, including Trade penetration]* *[Mechanical engineer to inspect + verify the mechanical systems interface including fire dampers – this will be covered by the Contractor's PS3 and Mechanical engineer's PS4]*	The following fire separations need to be inspected: • 30 minute 2-way FRR internal fire separations extended to the underside of the roof, throughout the building.
2.	Means of Escape	The following systems need to be inspected: • Egress paths – unobstructed, door opening direction, hardware, way-finding, widths • Illuminated exit signs – as per Electrical Design (PS3 & PS4 by others), visual inspection by Cosgroves • Door Interfaces – door opening forces
3.	Fire Protection Systems. *[FPIS certification to be obtained from Contractor for each system group]*	• Sprinkler System – existing sprinkler system to be modified in compliance with NZS 4541:2013. • Alarm System – existing fire alarm system to be modified in compliance with NZS 4512:2010. • Hand Held Fire Fighting Equipment – monitor location, installation + signage for systems.
4	Commissioning	• Cosgroves can be present to witness of commissioning of fire safety systems and alarm interfaces.

The Contractor is to advise our office when the installation of each of these systems is advanced to a level to enable inspection. This includes pre-lining for fire rated systems, and first fix for fire safety system.

Any technical enquiries or notification for inspections can be directed to: Christine Duncan, Associate & Senior Fire Engineer Cosgroves (Ph 377 8600)

APPENDIX I: PROPERTY PROTECTION MEASURES

Abstract: The following describes additional property protection measures that the building owner may wish to consider incorporating into the building design.

Property Protection Measures

As has already been mentioned, the Fire Report has been written for the purposes of complying with minimum Code requirements. No property protection measures have specifically been addressed. However, there are various property protection measures the building owner may wish to consider, which may serve to mitigate the loss of stock, property, or continued business in the event of a fire, and additionally offer incentives for reduced insurance premiums.

There are various options of passive and active fire protection available, and further combinations of these can be derived to assess the most cost effective solution. The three general options are described as follows are for guideline purposes only to assist the building owners in their assessment of property protection measures.

Further evaluation of the feasibility and cost benefits of each of the options would need to be undertaken by the building owner.

Automatic Heat and/or Smoke Detection
The installation of an automatic heat or smoke detection system, to NZS4512, would activate an alarm and can be direct connected to the Fire Service for a prompt response to a fire situation. This can provide a level of Fire Service intervention even when the building is unoccupied. In an occupied situation, the alarm system will notify occupants, of whom a suitably qualified occupant may be in a position to extinguish any fire in its' early stage of development. Hence, an automatic detection system can provide a level of property protection.

Sprinkler Protection
Installation of a sprinkler system to NZS4541 will provide both detection and suppression in the early stages fire and is recognised as the most effective fire protection measure, when used within buildings. A NZS4541 compliant sprinkler system will call the Fire Service out on sprinkler activation and commence suppression of the fire. Suppression by the NZS4541 sprinkler system would be expected to be to an extent whereby, if the fire is not actually extinguished by the time of NZFS arrival, the fire size would be expected to be controlled within the small area of sprinkler operation. The small controlled fire size would be expected to be easily extinguished by the Fire Service.

Installation of a sprinkler system also offers construction savings by allowing reductions in fire rating requirements of the Code. As an example, the Property Rating requirement is halved.

Multiple Firecells
Subdivision of the building into firecells offers property protection by limiting the extent of fire damage to within the confines of the firecell of fire origin. Additional firecell separation will be expected to reduce both loss of stock (due to fire or smoke damage) and business operations (after the fire event).

The firecell separation between the two firecells could vary between the full Property Rating separation, which would protect against a full burn out, down to a lesser extent (say 30 minutes FRR) which may be adequate to ensure that Fire Service intervention would prevent further spread of fire to another firecell. The smaller (or more numerous) the firecells, the easier it will be for the NZFS to contain and suppress a fire within that firecell.

Various practicalities of achieving the firecell separation and the associated costs will have to be weighed up against the expected benefits (from insurance premium reduction, or business continuance estimates etc.) of the extent of firecell protection. Firecell separations, in conjunction with a fire alarm system, and/or sprinkler system offer a high level of property protection.