Australian Government

Department of Agriculture, Water and the Environment

Australian Antarctic Division

SCIENTIFIC RESEARCH STATION MODERNISATION, MACQUARIE ISLAND

STATEMENT OF EVIDENCE TO THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

SUBMISSION 1

Date of Submission: JUNE 2021

THIS PAGE IS INTENTIONALLY BLANK

TABLE OF CONTENTS

1 INTRODUCTION

The Australian Antarctic Program

1.1 The *Australian Antarctic Strategy*[1] and 20 Year Action Plan was released in 2016 and sets out Australia's national Antarctic interests and vision for Australia's future engagement in Antarctica. The 20 Year Action Plan details the tangible steps to be undertaken to fulfil the strategy and realise its desired outcomes. A five-year review of the progress against the Action Plan is currently underway which will identify the next steps to 2035.

1.2 The Department of Agriculture, Water and the Environment (Department), through its Australian Antarctic Division (AAD), is responsible for leading, coordinating and delivering the Australian Antarctic program and administering the Australian Antarctic Territory, and the Territory of Heard Island and McDonald Islands, in the subantarctic.

1.3 A key action arising from the Australian Antarctic Strategy is: Establish Australia's position of science leadership in Antarctica through developing modern and flexible infrastructure, including progressing options for more efficient and flexible use of existing research stations.

1.4 Australia currently has three permanent research stations on the Antarctic continent, Casey, Davis and Mawson, as well as a research station on Macquarie Island in the subantarctic. In addition, Wilkins, located 70 km from Casey is operated through the summer to support intra-continental aviation operations.

1.5 Critical scientific and long-term monitoring is conducted at Macquarie Island by agencies including the AAD, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the Bureau of Meteorology (BOM), Geoscience Australia (GA) and the Tasmanian Government. Scientific programs undertaken on Macquarie Island include upper atmosphere physics, geosciences, medicine, meteorology, remediation, climate change, biological sciences and island pest eradication recovery monitoring.

1.6 The Government committed, in year two of the action plan, to develop an agreed approach to the future of the ageing Macquarie Island research station infrastructure, in collaboration with the Tasmanian Government. The Macquarie Island Modernisation Project addresses that commitment.

[1] *The Australian Antarctic Strategy and 20 Year Action Plan*
http://www.antarctica.gov.au/__data/assets/pdf_file/0008/180827/20YearStrategy_final.pdf

2 PURPOSE OF WORKS

Project Objectives

2.1 The Department, through the AAD, provides evidence to the Parliamentary Standing Committee on Public Works (PWC), of the proposed redevelopment of the research station and associated infrastructure on Macquarie Island. The redevelopment includes the renewal of field huts which are dispersed across Macquarie Island and the decommissioning and removal of redundant assets.

2.2 The aim of the Macquarie Island Modernisation Project (the project) is to address hazards to the use and operation of the research station associated with poor condition assets. The Project also aims to address high risk issues associated with the siting of facilities and improve operational efficiency through the rationalisation and consolidation of similar functions.

2.3 The redevelopment of facilities on Macquarie Island will ensure a year-round presence is maintained on Macquarie Island and will:

a. Maintain Australia's ability to conduct high priority research in the subantarctic
b. Allow for the continuation of globally significant scientific and environmental monitoring programs
c. Ensure that important inputs into weather prediction services are maintained
d. Facilitate the maintenance of Australia's commitments to the Comprehensive Nuclear Test Ban Treaty
e. Sustain Tasmania's capacity to monitor, protect and manage a designated Nature Reserve and World Heritage Area
f. Provide economic, industry and regional development opportunities to local industry
g. Provide a safer workplace for expeditioners and researchers on station
h. Provide a rationalised and more efficient station

2.4 On completion of this project, the redeveloped scientific research station at Macquarie Island will continue to support long term scientific monitoring programs by the Bureau of Meteorology, Geoscience Australia, and the Australian Radiation Protection and Nuclear Safety Agency.

2.5 In addition to the monitoring role, Macquarie Island is an important research site for conservation, environmental and climate research projects. While the island lies outside of the Antarctic Treaty area, the research conducted there plays a valuable role in informing the broader environmental management agenda in terms of management of threatened species, climate change, and environmental management of protected areas, both terrestrial and marine.

3 NEED FOR WORKS

Background

3.1 Macquarie Island is located 1,466 kilometres south east of Australia in the Southern Ocean and is part of the state of Tasmania (refer Attachment 1 - Macquarie Island Locality Plan). The 34 x 5 kilometre island, together with its surrounding waters extending out 12 nautical miles, form a listed World Heritage Area which was established in 1997. This World Heritage Area reserve is managed by the Tasmanian Parks and Wildlife Service of the Tasmanian Government's Department of Primary Industries, Parks, Water and Environment.

3.2 The island was discovered by sealers in 1810 and named after the New South Wales Governor, Lachlan Macquarie. The island was subsequently used as a temporary refuge by whalers and ship-wrecked sailors. In 1911, Sir Douglas Mawson established a small, short-lived station on the island, to serve as a communications link between Australia and Antarctica during his Australasian Antarctic Expedition of 1911-1914.

3.3 The research station at Macquarie Island, which has operated continually since its establishment in 1948, enables scientific research and long-term monitoring programs to be conducted in the subantarctic. Research conducted on Macquarie Island is linked to the priorities contained in the *Australian Antarctic Science Strategic Plan*[2] and is undertaken in accordance with the *Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006*[3].

3.4 Year-round operation of the station is necessary to support scientific research and monitoring programs and an effective network of huts is necessary to support scientific field work in other parts of the island.

3.5 Access to the site is only achieved by ship, historically supported by the RSV *Aurora Australis* and currently transitioning to the RSV *Nuyina* in 2022, operated or co-ordinated by the Australian Antarctic Division. One voyage per year is undertaken, carrying personnel and resupply cargo to the island. The research station facilities and infrastructure are required to fully support all expeditioner needs as a small self-contained community between resupplies, including safeguards in case of accidents or emergencies.

3.6 The island has rainfall averaging 980 mm per year and the daily mean air temperature ranges between approximately 7 °C in summer to 3 °C in winter. The average wind speed is 35 km/h and less than 1% of the year has calm conditions.

[2] *Australian Antarctic Science Strategic Plan (released 26 April 2020) https://www.antarctica.gov.au/science/australian-antarctic-science-strategic-plan/*

[3] *Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006 https://parks.tas.gov.au/Documents/Macquarie%20Island%20Nature%20Reserve%20and%20World%20Heritage%20Area%20Management%20Plan%202006.pdf*

3.7 Wildlife abounds on the island with large numbers of seals, penguins, and many species of sea bird including petrels being present. Access to many coastal areas of the island is restricted during periods of the year in order to protect threatened wildlife species, critical habitat, special ecosystems or historic localities.

3.8 Rabbits, rats and mice, brought to the island over nearly 200 years of visitation and occupation were eradicated in 2014, after a seven years investment in the $25 million eradication project.

Project Location and Site Selection

3.9 The Macquarie Island area includes three protection zones:

a. Tasmanian Nature Reserve – the island and its waters to three nautical miles;

b. World Heritage Area – the island and its waters to 12 nautical miles, inscribed in 1997 on the basis of the outstanding values of oceanic crust formation where it is the only place on earth where rocks from the earth's mantle are actively exposed above sea level; and secondly for its outstanding natural values as a remote location its vegetation, wildlife and natural beauty; and

c. Commonwealth Macquarie Island Marine Park - water lying to the south and east of the island and covering about 16.2 million hectares which protects the habitat of threatened species such as the royal and southern rockhopper penguins, the subantarctic fur seal, southern elephant seal and five species of albatross.

3.10 Under the Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006, the reserve is divided into three management zones:

a. Zone A –Services Zone located on the island Isthmus

b. Zone B – Limited Access Zone which is the remainder of the island

c. Zone C – Marine Zone the surrounding marine environment from the low water mark out to the limit of state waters which is three nautical miles

3.11 The existing station is situated at the Isthmus, a small, flat tract of land located near the northern end of the island in Zone A – Services Zone (refer Attachment 2 - Macquarie Island Research Station Site Plan). The field huts are dispersed across the island, in Zone B – Limited Access Zone.

3.12 Extensive site investigation works and studies have been undertaken including geotechnical investigations, site survey, building condition assessments and environmental impact assessments that inform the proposed works.

3.13 All project activity will be subject to approval by the respective Commonwealth, Tasmanian State and Huon Valley Council as the local authority for Macquarie Island.

3.14 The project has approval by Department of Agriculture, Water and the Environment under the Environmental Protection and Biodiversity Conservation Act 1999 and the Tasmanian Government's Nature Conservation Act 2002.

Current Facilities

3.15 The existing Macquarie Island Research Station consists of 48 buildings.

3.16 After nearly 70 years of operation, the research station is in a continuous state of decline with many structures at the end of their service life. The network of field huts is similarly affected.

3.17 The following key issues are impacting existing station buildings and infrastructure:

a. **Degraded condition of essential buildings and infrastructure.** An independent engineering review conducted in May 2016 confirmed that the majority of existing structures require significant investment and, given their location and age, pose increasing maintenance demands. It concluded that there is little benefit in continuing to try to maintain the research station by undertaking limited reactive and preventative works, given the relatively poor and degrading condition of assets and the significant risks associated with climate, contamination and occupational health and safety. As the poor condition of existing critical infrastructure has a high risk of failure and could lead to serious safety, environmental, and reputational consequences major works are necessary.

b. **Non-compliance with modern safety standards.** The majority of buildings on the station were construction prior to 1978 and do not comply with modern building code and safety standards. At least 22 of the 48 buildings contain asbestos.

c. **Areas prone to ocean inundation.** Parts of the station are vulnerable to ocean inundation by storm surge events resulting in sporadic damage to engineering infrastructure and buildings. Significant damage could be catastrophic to station operations and result in environmental harm if no further investment is made to protect this infrastructure.

Facility and Infrastructure Needs

3.18 Expeditioners typically spend twelve months (wintering population) at the station. Station life requires expeditioners to live and work in an isolated, confined and extreme environment. Habitability considerations on station are integral to assisting expeditioners respond to the psychosocial challenges of this unique environment.

3.19 Due to the remote location of the station and the extreme environment, facilities and infrastructure must be resilient, locally maintainable and sufficiently redundant in case of failure.

3.20 The facilities and infrastructure needs for the Macquarie Island Research station include:

a. Sleeping, messing and recreation facilities.

b. Medical facilities.

c. Office and related work areas including station operations, Bureau of Meteorology and Parks and Wildlife Service management, laboratories and other science research areas.

d. Workshops and other trade areas to repair, service and maintain all buildings, infrastructure, equipment and plant.

e. Stores for consumables, cold stores, field equipment and hazardous goods, and bio-secure area.

f. Site infrastructure and services including walkways, fencing, helipads, bulk fuel storage facility, power generation and distribution, ICT and communications, water supply (potable water), wastewater management, waste management and fire protection.

3.21 The existing accommodation capacity of the Macquarie Island station is 42 beds located in four separate buildings. Temporary spaces are used to accommodate short term population demands during resupply of up to 60 persons.

4 OPTIONS CONSIDERED

Options considered for Macquarie Island Scientific Research Station

4.1 The following options for a year-round research station were identified:

a. **Option 1 – life extension (preferred option) –** redevelop essential existing facilities and critical infrastructure to support a station population of 24 personnel and continue current levels of scientific activity.

b. **Option 2 – new station (minimum scope) –** new facilities and infrastructure to support a station population of 24 personnel and continue current levels of scientific activity.

c. **Option 3 – new station (full scope) –** new facilities and infrastructure to replicate the current station capacity of 40+ personnel, and provide a capacity for future growth in current levels of scientific activity.

4.2 Under all options considered:

a. existing station facilities would remain operational during the delivery of the project works. This will provide accommodation for the construction crew, and will allow for a limited range of priority research and monitoring activities to continue during the delivery of the works.

b. decommissioning of obsolete assets will occur after the construction of replacement facilities.

c. the field hut network would be upgraded. Options 1 and 2 include replacement and refurbishment of up to four of the six field huts, Option 3 includes the replacement of all six field huts.

4.3 A 'Do Nothing' option was not considered as it would not address the hazards caused by the research station's ageing infrastructure, and would not have met the Government's stated requirement to continue with a permanent year-round presence on the island and provide ongoing support to long term scientific monitoring and high priority field research.

Option 1 – Life extension of key existing facilities and infrastructure (preferred)

4.4 Option 1 would deliver a life-extension program of works for essential existing facilities and infrastructure required to deliver upon the key commitments of Government relating to this project.

4.5 Option 1 is based on the minimum station population to sustain year-round occupation plus a capacity, using flexible accommodation options, to undertake a moderate level of priority research over the summer period (consistent with activity levels in recent years).

4.6 The research station could accommodate 15 expeditioners to operate the station, with a total capacity year-round capacity for 24 expeditioners, including scientists.

4.7 An additional eight personnel (32 total) could be accommodated during the annual re-supply period by using temporary bedding to create dual occupancy rooms.

4.8 Key elements of Option 1 include:

a. Critical infrastructure upgrades (including a new fuel farm, potable and firefighting water treatment, storage and distribution, ICT, wastewater treatment and power distribution) to address condition and compliance issues, and improve station resilience through new siting of key assets.

b. A new living and mess building to address condition issues in the existing facility and provide a modern facility fit for sustaining the health and wellbeing of expeditioners.

c. New and refurbished accommodation to address condition issues (including asbestos), and provide accommodation spaces in accordance with modern standards to support expeditioner wellbeing.

d. New coastal inundation protection to reduce the risk and impact of storm surge on essential infrastructure and structures.

e. Major refurbishment of essential facilities, including bulk stores, medical, scientific operations and workshops, to address condition and compliance issues (including removal of asbestos) and support modern station operations and personnel.

f. Minor refurbishment of other accommodation and support infrastructure to address condition issues (including removal of asbestos).

g. Refurbishment (or replacement) of four of the six existing field huts, to address condition issues in the highest priority field huts.

h. Decommissioning and removal of obsolete facilities to remove WHS hazards and reduce ongoing maintenance costs.

4.9 Overall, this option delivers the following benefits:

a. supports year-round station operations (capacity of 24 personnel, short term peak of 32) and current levels of scientific activity.

b. addresses high risk condition and compliance facility and infrastructure risks, including non-conformances with building codes.

c. modernises the standard of accommodation and amenities for personnel with some new and some refurbished facilities.

d. reduces risks associated with storm surge and sea level rise through the installation of coastal protection barriers and the siting of new facilities and infrastructure. Tsunami risk would continue to be addressed through established emergency procedures and cache.

e. reduces the environmental impact of the station through upgrades to engineering infrastructure and the consolidation of station buildings. Major station buildings reduced to less than 20.

f. provides a service life extension of up to 10 years for refurbished facilities and up to 20 years for new facilities.

g. lowers the risk of project timeframes not being met (lower complexity of works).

h. presents opportunity to deliver the project with multiple smaller works packages, tailored for the scope, scale and complexity of the works. This approach enables on-going budget control decisions to be progressively made.

i. provides an in-budget project option.

Option 2 – new station (minimum scope)

4.10 Option 2 would deliver a new purpose-built research station in a new location south of existing station buildings and within the existing station limits.

4.11 As per Option 1, the Option 2 would support year-round operations, accommodate 24 expeditioners and current levels of scientific activity.

4.12 Option 2 could support an additional six personnel (30 total) in temporary bedding during the annual re-supply period.

4.13 Key elements of this option include:

a. all new engineering infrastructure.

b. all new facilities for operational, living and support functions.

c. retention and refurbishment of three existing workshop and storage facilities in good condition.

d. refurbishment (or replacement) of four of the six existing field huts, to address condition issues in the highest priority field huts.

e. decommissioning and removal of obsolete facilities to remove WHS hazards and reduce ongoing maintenance costs.

4.14 Overall, this option delivers the following benefits:

a. supports year-round station operations (capacity of 24 personnel, short term peak of 30) and current levels of scientific activity.

b. addresses high risk condition and compliance facility and infrastructure risks, including non-conformances with building codes.

c. modernises the standard of accommodation and amenities for personnel with new facilities.

d. reduces tsunami, storm surge and sea level rise risks by relocating all station functions to a consolidated location south of existing station buildings with the majority of facilities above 10m AHD.

e. reduces the environmental impact of the station through upgrades to engineering infrastructure and the consolidation of station buildings. Major station buildings reduced to less than 10.

f. provides facilities with a service life of up to 20 years.

Option 3 – new station (full scope)

4.15 Option 3 would most closely replicate the capacity of the current station but the number of buildings and their specific use would change. The station would accommodate up to 45 expeditioners and a temporary peak of up to 60 personnel during the annual re-supply period.

4.16 Option 3 provides a capacity that is greater than that utilised in the recent past. It is used to test the feasibility of a station that would provide a 'built' capacity to address any future requirement to increase the station size through an increase in research activities or other requirement. To fully utilise the increased capacity, the science program on Macquarie Island would need to be expanded beyond the current level of activity. This would in all likelihood have flow-on implications to the logistics and shipping program, at an increased cost.

4.17 Key elements of this option include:

a. all new engineering infrastructure.

b. new facilities for most functions, with capacity for future growth in scientific and operational requirements.

c. retention and refurbishment of three existing workshop and storage facilities in good condition.

d. replacement of all six existing field huts.

e. decommissioning and removal of obsolete facilities to remove WHS hazards and reduce ongoing maintenance costs.

4.18 Overall, this option delivers the following benefits:

a. supports year-round station operations (capacity of 40 personnel, short term peak of 60) with additional capacity in facilities to support growth in scientific activity.

b. addresses high risk condition and compliance facility and infrastructure risks, including non-conformances with building codes.

c. modernises the standard of accommodation and amenities for personnel with new facilities.

d. reduces tsunami, storm surge and sea level rise risks by relocating all station functions to a consolidated location south of existing station buildings with the majority of facilities above 10m AHD.

e. reduces the environmental impact of the station through upgrades to engineering infrastructure and the consolidation of station buildings. Major station buildings reduced to less than 20.

f. provides capacity for future growth in scientific operations.

g. provides facilities with a service life of up to 20 years.

Options Analysis and Proposed Course of Action

4.19 **Preferred Option.** Option 1 represents value for money in meeting the Government's commitment to maintaining a year-round capability on Macquarie Island. Option 1 is within the $50m funding commitment previously announced by the Government for the project.

4.20 Option 1 meets current capacity requirements at the lowest construction cost.

4.21 Option 1 retains capacity in its design to increase the station size in future, if necessary. The Department can also prioritise science projects to match the available capacity as currently happens across the broader Australian Antarctic Program.

5 SCOPE OF WORKS

Description of Proposal (Option 1)

5.1 The proposed works will see the redevelopment of the research station which will provide effective and efficient scientific laboratories, workshops, medical facilities, offices, living spaces, accommodation and amenities for expeditioners working and living on the island.

5.2 The general arrangement of the proposed works including new proposed Buildings, infrastructure site plans and details of other facilities being refurbished or demolished are detailed in Attachment 3 (Macquarie Island Research Station - Proposed works and concept plans).

Building Works

Accommodation

5.3 Garden Cove (eight beds) is demolished and replaced with a new building in the same location. The new building will temporarily support 24 beds during the construction period, reducing to eight bedrooms at completion. The eight bedrooms will be capable of supporting dual occupancy (i.e. up to 16 beds) during resupply or other emergency situations with temporary bedding. Additional spaces utilised for accommodation during the construction period will be converted to common room functions upon completion. Full demolition and replacement of the existing facility is proposed due to the extent of works required to remove asbestos from the existing building. Replacement provides better value for money, improvements in function and a longer economic life.

5.4 Hasselborough House (12 beds) is refurbished to address condition issues with the structure and internal finishes, including removal of all asbestos from the building.

5.5 Cumpstons Cottage (four beds) is refurbished to address condition issues with the structure and internal finishes.

5.6 Southern Aurora Accommodation Building (18 beds) is demolished. The removal of building will provide a suitable brown field location for the new mess facility; and remove redundant capacity and the poorest condition accommodation.

5.7 The accommodation works will be staged to maintain at least 28 beds on station at all times for personnel to maintain ongoing station operations and the delivery of the project works. At the completion of the project the total available will be reduced to 24 beds to meet operational needs.

Living and Messing

5.8 A new living and mess building will be constructed on the site of the demolished Southern Aurora Accommodation Building.

5.9 The new living and messing facility will provide a modern space to support the sustainment and wellbeing of expeditioners. This will include a commercial standard kitchen equipped with an oven, hot plate, deep fryer, grille, dishwasher, fridge, freezer and bain-marie servery to meet all expeditioner dietary needs. Three buffet style main meals are provided to expeditioners per day, utilising available produce delivered to the station during the annual resupply.

5.10 The new facility will address condition issues with the existing facility, and allow continuity of messing operations on the island during the delivery of the works. To reduce continuity risks, allowance has been made for all new kitchen equipment. Opportunities for existing equipment in good condition to be reused will be considered further in the detailed design development and staging of the works.

5.11 Refurbishment of the existing messing facility, while continuing to operate messing functions, would introduce significant risk and staging complexity to the project and is not considered practical or value for money. Following the relocation of messing functions to the new facility, the existing building will be refurbished to accommodate the relocation and upgrade of the medical facilities.

Medical

5.12 A new modern medical facility will be provided through the adaptive reuse of the existing mess building.

5.13 Macquarie Island is remote and can only be accessed by specialised shipping services capable of handling helicopters, amphibious vehicles i.e. LARC's and large inflatable craft. Evacuation of injured personnel might take a week at best, but may take much longer depending on shipping availability and the prevailing weather conditions in the Southern Ocean. It is essential that the station possesses a self-sufficient capability to handle any medical emergency and maintain a patient's wellbeing until possible evacuation back to Australia. Such a capability requires a modern, well-equipped medical facility able to support complex diagnosis, emergency surgery, dental procedures and intensive care to ensure the health and well-being of expeditioners.

5.14 The final design of the medical facility will adopt the Australasian Health Facility Guidelines to ensure it meets clinical requirements.

5.15 The existing medical facility will remain in use until completion of the new facility to ensure continuity of essential medical support to expeditioners on the island. Following the relocation of the medical functions to the new facility, the existing medical building which is in poor condition will be decommissioned and demolished.

Working Accommodation and Laboratories

5.16 Extension of the existing Clean Air lab to accommodate the relocation of ARPANSA systems, and refurbishment of the science building to address condition issues and enable the consolidation of science and operational functions, reducing the overall station building footprint.

5.17 The Post Office building will be refurbished to support the relocation of Tasmanian Parks and Wildlife Services facilities from the existing science building, to an independent facility that will consolidate the broader functions for the Tasmanian Parks and Wildlife Service to manage the island.

5.18 The existing Bureau of Meteorology upper atmospheric building will be refurbished to address condition issues and remove asbestos.

Workshops and Stores

5.19 The bulk supply storage (Green Store) building will be refurbished to address condition issues with the building structure and age of the cold storage facilities.

5.20 The mechanical workshop will be refurbished to address condition and functional deficiencies, including the addition of a vehicle service bay.

5.21 The Incinerator Building will be relocated to address health and safety concerns of the currently location to the wider station community and reduce the risk to the facility from coastal inundation and landslip.

5.22 Replacement or minor refurbishment of a number of small storage structures including gas and hazardous goods stores, portable generator storage and hydroponics.

Field Huts

5.23 Partial renewal of the field hut network (four of six huts) including the proposed construction of three new huts (replacing three huts which will be demolished and removed) and the proposed refurbishment of one other existing hut to provide emergency shelter and accommodation for scientists conducting research across the island.

FIXTURES, FITTINGS AND EQUIPMENT

5.24 Existing Fixtures, Fittings and Equipment in facilities on the island will be retained and reused where practical.

Engineering Services

Electrical Services

5.25 Proposed electrical services works to address new facility requirements and existing condition issues include:

a. refurbishment of the main electrical powerhouse;

b. a new distribution hut (in the southern station area), with emergency generator connection point;

c. refurbishment of the existing distribution hut (in the northern station area);

d. new power reticulation and distribution infrastructure to new facilities;

e. the fit-out of all new and refurbished buildings with lighting and power as required.

5.26 Lighting and power will be provided in accordance with Australian Standards. Electrical infrastructure and switchboards will include capacity to allow for future growth and emergency generator connections for essential facilities.

Mechanical Services

5.27 The mechanical services have been designed according to the functions and needs of each building. The mechanical services proposed will meet specific user needs, relevant ventilation, thermal comfort and air quality requirements and the mandatory requirements of the NCC.

5.28 The proposed works include the retention and extension of the hydronic heating network that utilises heat recovery plant within the power generation system to maximise efficiency.

Hydraulic Services

5.29 The potable water and wastewater networks will be upgraded and extended to meet the design requirements of the redeveloped station and each new facility.

5.30 The majority of the potable water network will be replaced to address existing condition issues. The scope of hydraulic services for water storage and processing will be to ensure the potable supply meets Australian Drinking Water Guidelines for quality and safety.

5.31 The wastewater networks and primary treatment of wastewater will be upgraded, including reticulated treatment and discharge infrastructure for facilities in the southern part of the station. The overall treatment of wastewater will address recommendations outlined within the Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006.

Fire Protection

5.32 Fire protection requirements and asset classifications have been made in accordance with NCC compliance where applicable. Fire detection and protection will be provided through a combination of standard alarm, extinguishers, hose reels and external hydrant coverage. The existing fire hydrant network will be extended to cover new and relocated facilities.

5.33 The station's fire-fighting water storage and fire pumps will be upgraded. Water storage capacity for a firefighting reserve, including additional capacity provided via a supplementary pumped sea water supply for firefighting situations, will be developed in accordance with NCC requirements, AAD fire response guidelines and standard operating procedures.

5.34 Specialised workspaces such as the new mess and plant rooms will have appropriate forms of fire suppression, including gaseous suppression systems to protect sensitive and expensive infrastructure and provide maximum protection to personnel.

5.35 All new fire protection systems will meet Australian Standards.

5.36 The risk of fire to station assets shall also be minimised where possible by maintaining physical separation between key facilities.

ICT

5.37 A new primary satellite communications facility will be constructed to address age and condition issues with the existing facility. The existing facility will continue to operate during the construction of the new facility to ensure essential station communications capabilities are not compromised during the delivery of the works. The existing backup satellite communications system (NBN) will also be relocated.

5.38 The primary and secondary communication facilities will be sited independently, in locations less at risk from the impacts of storm surge and closer to the science and operations building.

5.39 Data and communications site reticulation will be upgraded and extended to meet the requirements of new and refurbished facilities.

Bulk Fuel Storage

5.40 New bulk fuel tanks for the storage of Special Antarctic Blend (SAB) diesel. The fuel will supply the diesel generators, that are the primary source of electrical power for the station, and station vehicles. The storage facility will utilise best practice to provide stringent safeguards against potential fuel leaks and possible contamination.

5.41 The new fuel farm will address condition issues with the existing facility and be developed in a new location to ensure continuity of operations, while prioritising the replacement. New tanks are proposed to be stainless steel to ensure appropriate durability and longevity of assets.

5.42 Fuel reticulation to the main powerhouse and other fuel infrastructure associated with vehicle refuelling and aviation fuel storage will also be upgraded where required.

5.43 The scope of works will entail the removal of the existing fixed fuel storage tanks which are obsolete and in poor condition.

5.44 If contamination is uncovered during construction activities, and in consultation with the appropriate regulator (EPA Tasmania), deemed an unsatisfactory risk, the AAD has well established procedures to delineate, remediate and treat on site. On site treatment keeps the soil in the unique ecosystem where it belongs and reduces the logistical and bio-security risks of importing contaminated material to landfill sites in Australia, reduces the need to source backfill material and creating broader disturbance, and is a proven methodology for fuel contamination that in both Macquarie Island and Antarctica.

Civil Works

5.45 Limited civil works will be necessary to establish the site of new facilities and associated infrastructure works. Existing unsealed roads will be utilised to minimise the extent of new works where possible. New sections will be developed as required to provide safe and efficient access around the new layout of the redeveloped station. Redundant roads will be revegetated or remediated if deemed necessary and appropriate by the Tasmanian Parks and Wildlife Service.

5.46 Fencing will be erected to protect wildlife and surrounding site infrastructure where necessary from wallowing seals and limit access by nesting birds. Similarly, such measures will protect wildlife from potential injury during works.

5.47 Coastal inundation barriers will be installed on the western side of the isthmus to reduce the risk to critical facilities and infrastructure assets from storm surge inundation, coastal erosion and scouring.

5.48 Whilst no other civil works are foreseen, the scope of all such works will be finalised during the project’s detailed design phase.

Decommissioning and Removal

5.49 Works will include the decommissioning, demolition and removal of obsolete buildings and redundant infrastructure from the existing station and return of the waste material to Australia for safe disposal.

Scope Exclusions

5.50 The project scope does not include:

a. The remediation of existing contaminated sites on Macquarie Island outside of the immediate areas impacted by the project works.

b. Removal of the field huts that are not in the scope of works for refurbishment or replacement.

c. The supply and installation of specialised equipment, fittings and furnishings for scientific programs. Working closely with the key stakeholders, specialised equipment will be transferred from existing station facilities or supplied new to be installed and commissioned by their specialist technicians.

d. The ongoing operations and maintenance of the research station, which will be managed as 'Business as usual' by the AAD.

6 Planning and Design Concepts

6.1 The project's primary focus will be on the delivery of safe, updated and efficient scientific research station and field huts which are sensitive to their surrounding World Heritage Area.

Architecture

6.2 The architectural focus of the project will be the creation of a safe efficient and functional workplace and comfortable living spaces which will provide a resilient facility for the harsh external environment. Similarly each field hut will provide a safe and durable refuge for scientists conducting research in the island's wilderness.

6.3 Extensions and new buildings will be in a similar architectural style to the current buildings to match the current station built form.

Structure

6.4 New and redeveloped facilities will be designed and constructed to provide safe, robust protection from the island's high levels of wind and precipitation, be energy efficient, reduce impacts to the environmental and lower maintenance costs than the existing facilities.

6.5 The structural design for any new construction, upgrading or refurbishment works will be appropriate to meet the difficult factors found on Macquarie Island environmental

and geotechnical conditions. This includes the use industrial type solutions such as precast footings, lightweight industrial cladding and other prefabricated components to minimise onsite construction requirements where practical.

Acoustics

6.6 To the extent feasible in such an environment, acoustic attenuation measures will be taken to minimise noise and associated vibration in accommodation, the station leader's office and the radio communications office within the redeveloped station where noise attenuation is needed.

6.7 The scope of acoustic works will be finalised in the detailed design phase of the project.

Materials, Finishes and Furnishings

6.8 High quality and durable materials and finishes that reflect the station's contemporary design will be selected for the fit-out of laboratories, offices, living spaces and amenities.

6.9 Materials, finishes and furnishings will be standardised where appropriate, require minimal maintenance, be repairable locally and provide whole of life value for money.

Landscaping

6.10 Given the station's location in a World Heritage Area there will not be any landscape design. Any ground disturbance created through construction activity will be minimal and subject to approval by the Tasmanian Parks and Wildlife Service's Reserve Activity Assessment process. Targeted remedial works of these sites, such as revegetation, may be conducted if deemed necessary and appropriate by the Tasmanian Parks and Wildlife Service.

7 Environmental Sustainability

Energy Targets

7.1 New and redeveloped station facilities will adopt measures within the appropriate energy efficiency provisions of the National Construction Code to meet applicable energy targets.

Measures to Reduce Energy and Water Use

7.2 The project will incorporate environmentally sustainable design measures to arrive at a solution which is both robust, minimises impact and acknowledges its sensitive environment.

7.3 The reduction of the overall number of buildings on station, will reduce the total energy demand on site.

7.4 The following proposed measures will be refined and finalised during the detailed design phase of the project:

a. co-generation energy recovery systems utilising waste heat from diesel generators to reduce energy consumption.
b. effective building insulation to minimise heat loss.
c. energy efficient appliances and LED lighting to reduce electrical demand.
d. optimal window design, including glazing specifications and internal coverings, to support energy efficiency of buildings.
e. renewable energy generation systems, including potential for battery storage, to reduce overall demand on diesel power generation.
f. use of environmentally preferable products which are low emission.
g. water efficiency measures to reduce demand including high efficiency fixtures and equipment.
h. field huts will utilise remote area power supplies (small wind turbine, photovoltaic and battery storage) and roof rainwater capture.

Re-use of Existing Structures

7.5 Re-use of existing structures has been considered in the development of the works where their utility, safety and long-term viability can be established.

7.6 To minimise project cost, the environmental impact of the works, and the overall station footprint, existing facilities or ‘brown field’ sites have been identified where feasible.

7.7 Redevelopment of the site will allow consolidation of like functions to reduce the overall station building footprint and reduce the total number of buildings.

Demolition and Disposal of Existing Structures

7.8 Works will include the decommissioning, demolition and removal of obsolete buildings and redundant infrastructure from the existing station and return of the waste material to Australia for safe disposal.

Compliance with Local, State/Territory and Commonwealth Water and Energy Policies

7.9 All design and construction will comply with the National Construction Code, all relevant Australian Standards and International Standards.

Master and Site Planning, Including Details of Future Developments

7.10 Investigations completed on the island include assessment of suitable sites for new and future station infrastructure. This included assessment of environmental and biological factors, coastal processes and appropriate set-backs, geotechnical, survey, heritage, and local site factors including wind and tsunami risks.

7.11 Environmental Impact Assessments for new works will continue and will assess site planning for station facilities and infrastructure and field huts, short term and cumulative impacts, and consider construction and operational factors that will be completed by the Tasmanian Parks and Wildlife Service.

7.12 The Bureau of Meteorology, Geoscience Australia and other external consultants have been continually engaged to ensure newly located facilities do not impact on scientific operations and minimise risk from future sea level rise and extreme weather events where practical.

7.13 The long-term future development plan for the station envisages all facilities and infrastructure co-located toward the central isthmus, south of the existing station buildings. The site selection for new facilities and infrastructure as part of the project works will where practicable consider the potential future siting and sequencing of facilities.

7.14 All site planning will be finalised during the detailed design phase of the project.

Provisions for People with Disabilities

7.15 The current station historically made little provision for people with disabilities as all personnel are subject to stringent medical requirements to ensure they can survive in the physically demanding environment of Macquarie Island.

7.16 Equitable access requirements and the provision of accessible toilets will be resolved during the detailed design phase of this project.

7.17 All works carried out for new scientific research station facilities will meet the National Construction Code and Building Code of Australia as required.

Security Measures

7.18 The redeveloped station's design will utilise the Government's Protective Security Policy Framework to consider separation and other appropriate security measures to afford privacy and confidentially to station management, medical facilities, storage and external agency requirements.

7.19 Allowances for security measures have been made in the project budget.

Work Health & Safety

7.20 All project personnel, including contractors and sub-contractors will be subject to the *Work Health and Safety Act 2012 (Tasmania)* and other relevant WHS regulations.

7.21 The Australian Antarctic Division has Work Health and Safety policies and procedures in place which will apply to all personnel on the island, including project contractors and sub-contractors.

7.22 The station's construction will address workplace health and safety issues, such as:

a) working at height through the adoption of a low storey designs where the risk of falls from roofs or second storey structures is present.

b) exposure to hazardous material (i.e. asbestos) through pre-work investigations and the use of appropriate specialists to undertake removal and disposal works.

c) a volatile climate (i.e. regular high wind and rain) through the development of appropriate safe work method statements and procedures, constructability considerations and the staging of indoor and outdoor activities during higher risk periods.

d) remote community working and living, through AAD pre-departure screening, medical testing and expeditioner training policies and procedures.

8 OTHER CONSIDERATIONS

Legislation, codes and standards

8.1 The project will comply will all Commonwealth and Tasmanian legislation, codes and standards relevant to the project.

8.2 Key legislation includes:

a. *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)

b. *Building and Construction Industry (Improving Productivity) Act 2016*

c. *Biosecurity Act 2015*

d. *Work Health and Safety Act 2011* (Cth)

e. *Public Governance, Performance and Accountability Act 2013* (PGPA Act)

f. *Nature Conservation Act 2002* (Tasmania)

g. *National Parks and Reserves Management Act 2002* (Tasmania)

h. *Work Health and Safety Act 2012* (Tasmania)

8.3 Key codes and standards include:

a. *Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006*

b. *Code for the Tendering and Performance of Building Work 2016* (the Building Code) which, amongst other things, mandates compliance with certain designated building laws, WHS laws, Competition and Consumer Act and Migration Act

c. *National Construction Code 2016* which sets the minimum requirements for the design, construction and performance of buildings throughout Australia

Heritage and Geographical Considerations

8.4 All project activities at Macquarie Island will be subject to the cultural heritage management policies specified within the *Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006,* Environmental Impact Assessment (formerly Reserve Activity Assessment) undertaken by Tasmanian Parks and Wildlife Service and the *Environmental Protection and Biodiversity Conservation Act 1999* administered by Department of Agriculture, Water and the Environment.

8.5 There are no known built or cultural heritage issues which will constrain the redevelopment of the scientific research station or field huts at Macquarie Island.

Environmental Impact Assessments

8.6 The project has approval by Department of Agriculture, Water and the Environment under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* and the Tasmanian Government's *Nature Conservation Act 2002*.

8.7 A series of environmental impact assessments (previously Reserve Activity Assessments) have been completed by the Department to facilitate the investigation works on the project. These include site visits, geotechnical investigations, site selection, site monitoring and field hut investigations.

8.8 Further environmental impact assessments are required to support future stages of the project works. These will be conducted by the Department and the Tasmanian Parks and Wildlife Service, namely:

a. Construction site establishment and staging
b. Shipping and logistics
c. Station construction activities
d. Field hut construction
e. Demolition works
f. Construction site make-good and remediation

8.9 The following factors have been identified from the Australian Antarctic Division's long history of working within the station area, and are likely to be considered by such assessments:

a. asbestos contamination
b. bulk fuel management
c. construction noise
d. fuel and other contamination
e. Geo-conservation strategy
f. wastewater treatment
g. wildlife disturbance
h. construction waste and remediation

8.10 The results from these assessments will inform the detailed design of this project.

8.11 All asbestos material encountered during the construction and demolition works will be removed and disposed of in accordance with relevant legislation. Over 5,000 sqm of asbestos containing materials across 22 buildings have been identified.

8.12 Disturbance to wildlife will be managed under the existing *Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006* and well-established Australian Antarctic Division Standard Operating Procedures.

Delivery of Equipment and Materials

8.13 Cargo movements to and from Macquarie island are subject to strict customs and quarantine requirements (*Biosecurity Act 2015*). The project will manage cargo movements through the AAD Cargo and Biosecurity Centre in Hobart using the AAD Electronic cargo consignment (Econ) System to ensure compliance with all regulatory and legislative requirements.

8.14 Macquarie Island can only be accessed by specialised shipping services capable of handling helicopters, amphibious vehicles or barges (limited use) to transfer cargo and personnel from the ship to shore. The Island is not accessible by air from the Australian mainland and does not have any wharf or boat ramp facilities. Ship to shore logistics are a constraint on the size, weight and dimensions of cargo that can be delivered to the island. The transfer of cargo and personnel from ship to shore is also subject to favourable weather and ocean conditions and can result in delays.

8.15 The project works shall be delivered utilising one regularly scheduled annual AAD resupply shipping to the island (i.e. RSV *Nuyina* or other contracted vessel). Alternative logistic solutions will be considered if project risk can be reduced and greater value for money achieved.

8.16 Delivery on an annual basis influences and constrains the works based on the available materials on site. Standardisation of materials that can be used across multiple works, include provisions of spares to reduce the risk of missing or damaged items, will be incorporated into the design and procurement of the Works.

8.17 Where possible, materials and equipment will be pre-positioned on the island prior to the year of construction to minimise the risk of delivery and supply delays on the Works and to provide opportunities to accelerate if progress is ahead of schedule.

Site Personnel

8.18 The Department considers workplace health and safety as the highest priority. Whilst there are many examples of remote fly-in/ fly-out construction sites in Australia, working in remote cold-climate locations such as Macquarie Island for long periods of time is not suited to everyone.

8.19 People who visit Macquarie Island are required to live and work together harmoniously in conditions which are often harsh and inhospitable. The AAD undertakes rigorous assessment of personal qualities, and medical and psychological suitability of all people who work on Macquarie Island. Relevant project personnel will be required to undertake pre-departure training including voyage, field safety, trade based and first aid programs.

8.20 The AAD has implemented a number of precautionary measures to minimise the risk of COVID-19 on Macquarie Island, including pre-departure isolation periods and limiting the travel by non-essential personnel. The project will be developed and delivered in accordance with the latest Departmental polices and medical guidance.

Local Impact

8.21 The project will have a positive impact on all personnel (expeditioners and scientists) who work on Macquarie Island by providing improved research station and field hut infrastructure. The redeveloped station will be safer through improved facility and infrastructure condition and reduction of hazardous materials. It will also have lower environmental impact through reduced net building footprints.

8.22 There will be some inconvenience to personnel utilising the existing research station whilst the research station is being upgraded. The impact should be minimal however, as existing facilities will not be decommissioned until transition has occurred.

Consultation with Key Stakeholders

8.23 The Department recognises the importance of stakeholder input into the design process and incorporating comments and feedback into the proposed works. Consultation has been undertaken with:

a) Australian Antarctic Division users and operators, including:

(i) Engineering and Infrastructure sections

(ii) Polar Medicine Unit

(iii) Science operations

(iv) Logistics and Biosecurity

(v) Former and current Station leaders

(vi) Former and current Station teams

b) External users of the Macquarie Island facilities, including:

(i) Tasmanian Parks and Wildlife Service of the Department of Primary Industry, Parks, Water and Environment

(ii) Bureau of Meteorology

(iii) Geoscience Australia

(iv) Australian Radiation Protection and Nuclear Safety Agency

c) Other external stakeholders and authorities, including:

(i) Huon Valley Council

(ii) Department of Agriculture, Water and the Environment

8.24 Stakeholder feedback being addressed through the development of the designs includes:

a) Science Building – Alterations to the internal layout of the scientific lab spaces to improve operational efficiencies in accordance with future requirements.

b) Medical Building – Alterations to the internal layout to support improved patient care and medical functionality.

8.25 Consultation will continue to be undertaken as appropriate with relevant stakeholders during further detailed design development.

9 COST-EFFECTIVENESS AND PUBLIC VALUE

Project Costs

9.1 The Government confirmed overall project funding of $49.8 million in the May 2017 Budget.

9.2 The cost estimate for the proposed works is within the allocated project funding and includes construction costs, management and design fees, escalation and contingencies.

9.3 Net operating costs resulting from the proposed works may decrease due to the construction of new infrastructure as a result of the smaller 'footprint' and reduced number of buildings. More efficient energy systems and use of renewal technologies may also see a reduction in fuel consumption.

Project Delivery Strategy

9.4 The Project works will be fully designed and then delivered using a Construct-Only methodology.

9.5 The Project will be delivered as a program of works using a combination of contract packages to address individual facility, work package and delivery risks and to provide value for money to the Commonwealth. This includes:

a. Design services contracts

b. Supply only contracts

c. Fabrication, build and supply (to Hobart wharf) contracts

d. Construction safety and quality management (On Island) contracts

e. Labour- Hire (Construction Only) contracts

9.6 Works will be packaged where value for money can be achieved, including single or multi-year packages.

9.7 Design, Health and Safety, Contractor/s and other specialists will be engaged by the Commonwealth to support the detailed design development, procurement, construction management and delivery of the Works.

9.8 The delivery strategy is consistent with that utilised by the AAD in managing the development and regular maintenance of its wider research station assets. This approach reduces project risk through greatest alignment with established AAD operational and safety policies and procedures. The proposed approach provides value for money by addressing key contracting risks associated with the extreme inaccessibility of the site.

9.9 A Contract Administrator will be appointed to support the Commonwealth in managing the Projects delivery phase.

Construction Program

9.10 Subject to Parliamentary approval, construction is expected to commence mid-2022, aligned with the commencement of the 2022/2023 winter season. It is anticipated that all construction and decommissioning works will be completed by mid-2028. Anticipated key milestones are shown in the table below.

Table 1: Anticipated key milestone dates

Ref	Milestone	Target Completion Date
1	Initial Contractor engagements	December 2021
2	2022 Macquarie Island resupply ship departure / commence construction (year 1)	March 2022
3	2023 resupply ship departure / commence construction (year 2)	March 2023
4	2024 resupply ship departure / commence construction (year 3)	March 2024
5	2025 resupply ship departure / commence construction (year 4)	March 2025
6	2026 resupply ship departure / commence construction (year 5)	March 2026
7	2027 resupply ship departure / commence construction (year 6)	March 2027
8	Construction complete	March 2028

Public Value

9.11 The public value associated with the project includes:

a) **Meeting scientific capability needs:** This Project will facilitate sustainment of Australia's research and monitoring capability in the sub-Antarctic region.

b) **Employment opportunities:** It is anticipated that construction activities will create up to 16 jobs per year during the delivery of the works with additional jobs created in the fabrication, supply and delivery of materials to the island. The sustainment of the research station will also support ongoing employment opportunities through future maintenance of the Works. The project will provide opportunities for small to medium sized local and indigenous businesses.

c) **Health and Safety:** The project will reduce WHS risks to expeditioners, scientists and other persons visiting Macquarie Island posed by the condition of existing facilities and infrastructure.

9.12 The primary purpose of the facility is to provide a platform to undertake research of high scientific merit and to support long term monitoring programs. Southern Ocean, Antarctic and sub-Antarctic research represents Australia's commitment to national and international science programs of high significance.

9.13 This proposal will renew Australia's capability in the sub-Antarctic region by continuing its vital scientific research and monitoring roles at Macquarie Island. Scientific programs undertaken on Macquarie Island include upper atmosphere physics, geosciences, medicine, meteorology, remediation, climate change and biological sciences.

9.14 The Department's support for research is consistent with the Australian Antarctic Strategic and 20 Year Action Plan, and more specifically, the Australian Antarctic Science Strategic Plan.

9.15 Much of the research undertaken on Macquarie Island and surrounding waters can be considered a public good in that it is either not undertaken for commercial benefit, relates to the protection and/or greater understanding of a World Heritage area or supports monitoring of and enhances the understanding of global systems. It is difficult to measure the benefit flowing from this research but, as with all research conducted under the Australian Antarctic Science Program, it is made available to researchers around the world and contributes to our greater understanding of critical elements of our earth systems. There continues to be a strong demand to undertake research of high scientific merit on Macquarie Island and it is expected that this demand will continue.

9.16 Renewed and refurbished scientific laboratories and workshops will benefit Australian Public Service personnel from external agencies such as the Australian Radiation Protection and Nuclear Safety Agency, the Bureau of Meteorology and Geoscience

Australia as well as visiting scientists from the numerous Australian universities who conduct research on the island.

9.17 The redevelopment of the scientific research station and field huts will incorporate pre-fabrication techniques which will create jobs both during its construction at the remote Macquarie Island and during the prior manufacture of components in Australia.

Revenue

9.18 No revenue is expected to be derived from this project.

9.19 The Department encourages interest and continued investment in research by public universities, other research institutions and individual researchers. It does not charge for facility use or operating costs and hence provides in-kind support to the research effort. This approach is consistent with the Australian Antarctic Science Strategic Plan and 20 Year Australian Antarctic Strategic Plan.

9.20 The station is used by other Australian Government agencies (Bureau of Meteorology and Australian Radiation Protection and Nuclear Safety Agency) and the Tasmanian Government (Tasmania Parks and Wildlife Service). Both the Bureau of Meteorology and the Australian Radiation Protection and Nuclear Safety Agency contribute to operating costs based on the direct marginal cost of providing the service. No recovery is made from the Tasmanian Parks and Wildlife Service, nor is the Department charged for the benefits of this cooperative arrangement.

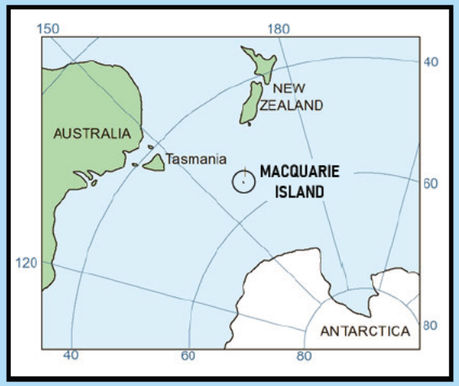
10 Attachments

Attachment 1 - Macquarie Island Locality Plan

Attachment 2 - Macquarie Island Research Station - Site Plan

Attachment 3 - Macquarie Island Research Station - Proposed works and concept plans

MACQUARIE ISLAND RESEARCH STATION - LOCALITIES



GEOGRAPHY

NORTH HEAD
HANDSPIKE POINT
MACQUARIE ISLAND RESEARCH STATION
ELIZABETH AND MARY POINT
EAGLE POINT
UNITY POINT
LANGDON POINT
NUGGETS POINT
DOUGLAS POINT
TUSSOCK POINT
BAUER BAY FIELD HUT
MAWSON POINT
CORMORANT POINT
BROTHERS POINT
BROTHERS POINT FIELD HUT
AURORA POINT
GREEN GORGE FIELD HUT
DOUBLE POINT
DAVIS POINT FIELD HUT
DAVIS POINT
SADDLE POINT
CAPE TOUTCHER
WATERFALL BAY FIELD HUT
ROCKHOPPER POINT
RAINE POINT
PRECARIOUS POINT
CAPE STAR
SOUTH WEST POINT
HURD POINT FIELD HUT
HURD POINT

SOUTH PACIFIC OCEAN

SOUTH PACIFIC OCEAN

00 3Km 6Km 12Km

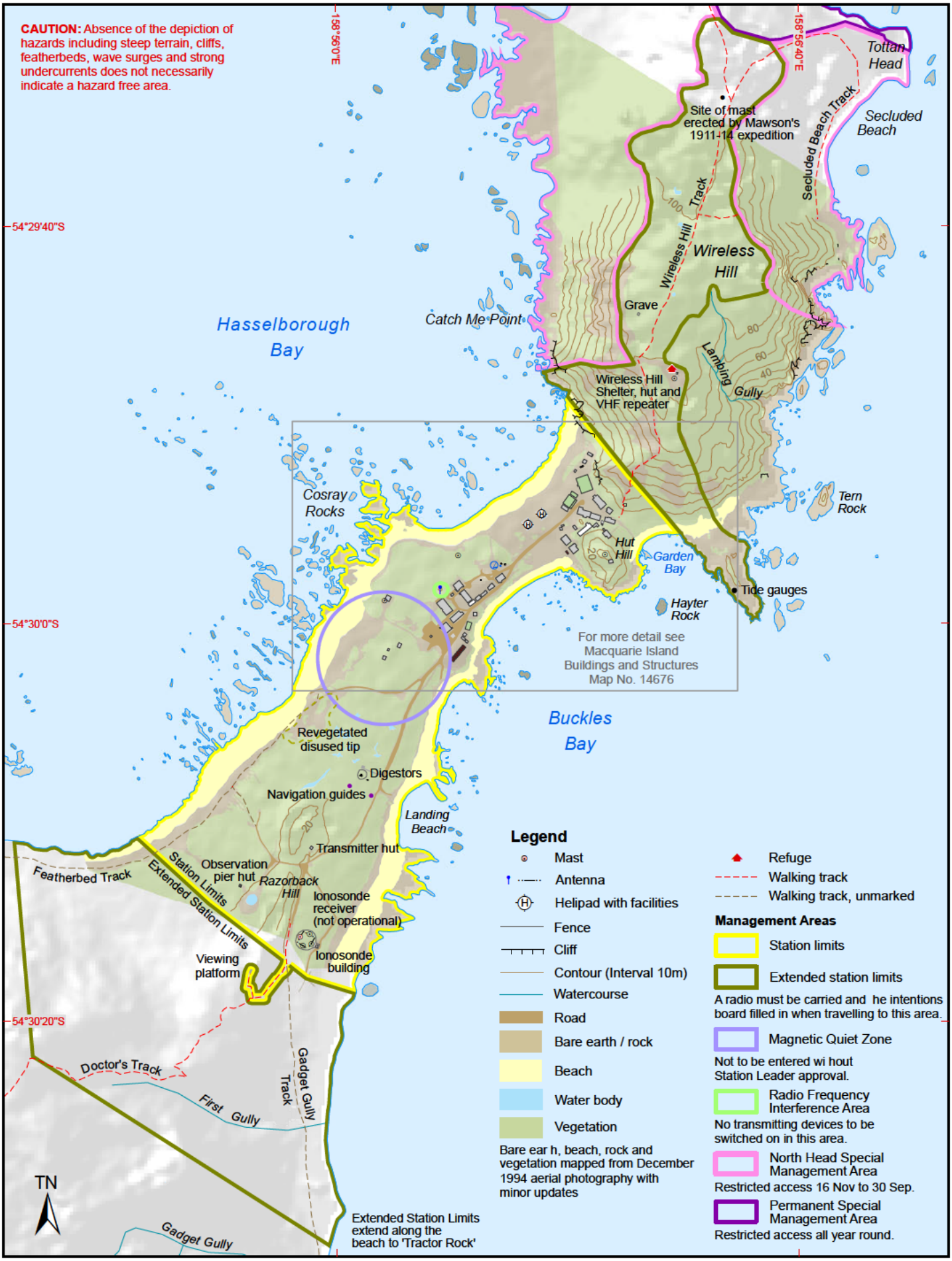
N

MACQUARIE ISLAND RESEARCH STATION
MODERNISATION PROJECT
L FE EXTENSION REFURBISHMENT AND RENEWAL

LOCALITY PLAN

MACQUARIE ISLAND
STATION LIMITS

Australian Government
Department of the Environment and Energy
Australian Antarctic Division



Horizontal Datum: WGS84
Projection: UTM Zone 57
Map Catalogue No. 14706

0 100 200 300 400 Metres

Produced by the Australian Antarctic Data Centre, Mar 2019
Map available at: *http://data.aad.gov.au/aadc/mapcat/*

MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

LIFE EXTENSION REFURBISHMENT & RENEWAL

DRAWINGS

BUILDING NUMBERS

1. CLEAN AIR LABORATORY
2. MAGNETIC ABSOLUTE HUT
3. PROTON PRECESSION MAG HUT
4. MAGNETIC VARIOMETER BUILDING
5. RIOMETER HUT
6. MACHINERY SHED
7. FUEL FARM
8. FLAMMABLE GAS STORE
9. COMPRESSED GAS STORE
10. FLAMMABLE LIQUID STORE
1. MECHANICAL WORKSHOP
12. SCIENCE BUILDING
13. BOAT SHED (OLD) / OVERFLOW STORAGE
14. OZONE HUT
15. TAS PWS NISSEN HUT
16. BOAT SHED
17. BIOLOGY BUILDING
18. MET TECH OFFICE / HOSE REEL BUILDING
19. MET OFFICE
20. BALLOON BUILDING
21. COMMS BUILDING
22. ANARESAT RADOME
23. HELICOPTER PADS
24. EMERGENCY POWER HOUSE
25. MAIN POWER HOUSE
26. FIRE HUT
27. ELECTRICAL DISTRIBUTION HUT
28. HYDROPONICS HUT
29. SOUTHERN AURORA
30. EMERGENCY / HAM RADIO HUT
31. PLUMBERS STORE
32. PUMP HOUSE / BREWERY
33. MULTIPURPOSE BUILDING
34. MESS
35. SURGERY
36. FIRE PUMP HOUSE
37. WATER TANKS
38. SAUNA
39. POST OFFICE
40. GARDEN COVE
41. CUMPSTONS COTTAGE
42. HASSELBOROUGH HOUSE
43. GREEN STORE
44. PAINT STORE
45. SEISMIC HUT
46. INCINERATOR BUILDING
47. BUNK HOUSE
48. SOLVENT STORE

NEW BUILDINGS

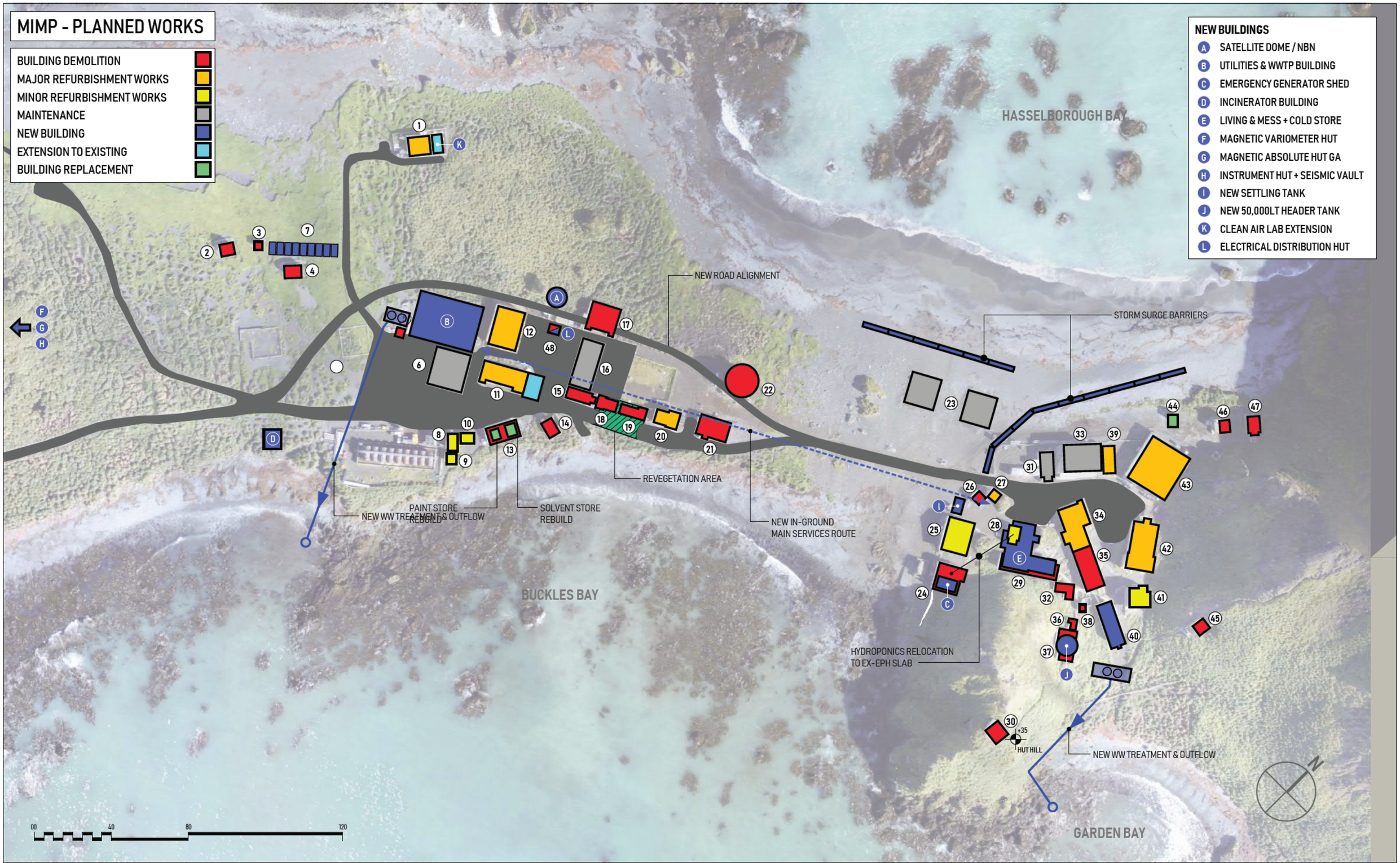
- A. SATELLITE DOME / NBN
- B. UTILITIES & WWTP BUILDING
- C. EMERGENCY GENERATOR SHED
- D. INCINERATOR BUILDING
- E. LIVING & MESS + COLD STORE
- F. MAGNETIC VARIOMETER HUT
- G. MAGNETIC ABSOLUTE HUT GA
- H. INSTRUMENT HUT + SEISMIC VAULT
- I. NEW SETTLING TANK
- J. NEW 50,000LT HEADER TANK
- K. CLEAN AIR LAB EXTENSION
- L. ELECTRICAL DISTRIBUTION HUT (S)

MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

L FE EXTENSION REFURBISHMENT AND RENEWAL

COVER PAGE



MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

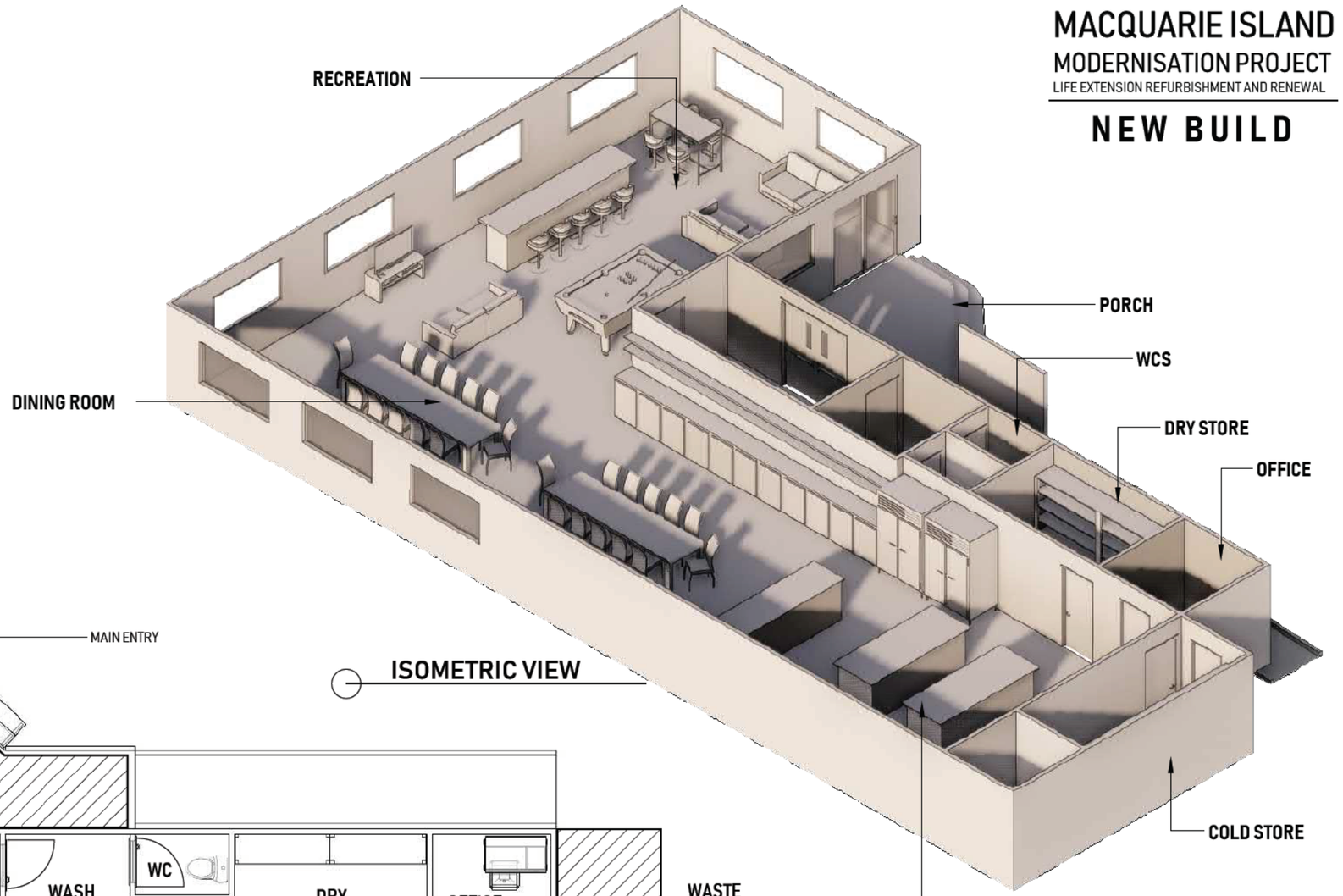
L FE EXTENSION REFURBISHMENT AND RENEWAL

PLANNED WORKS

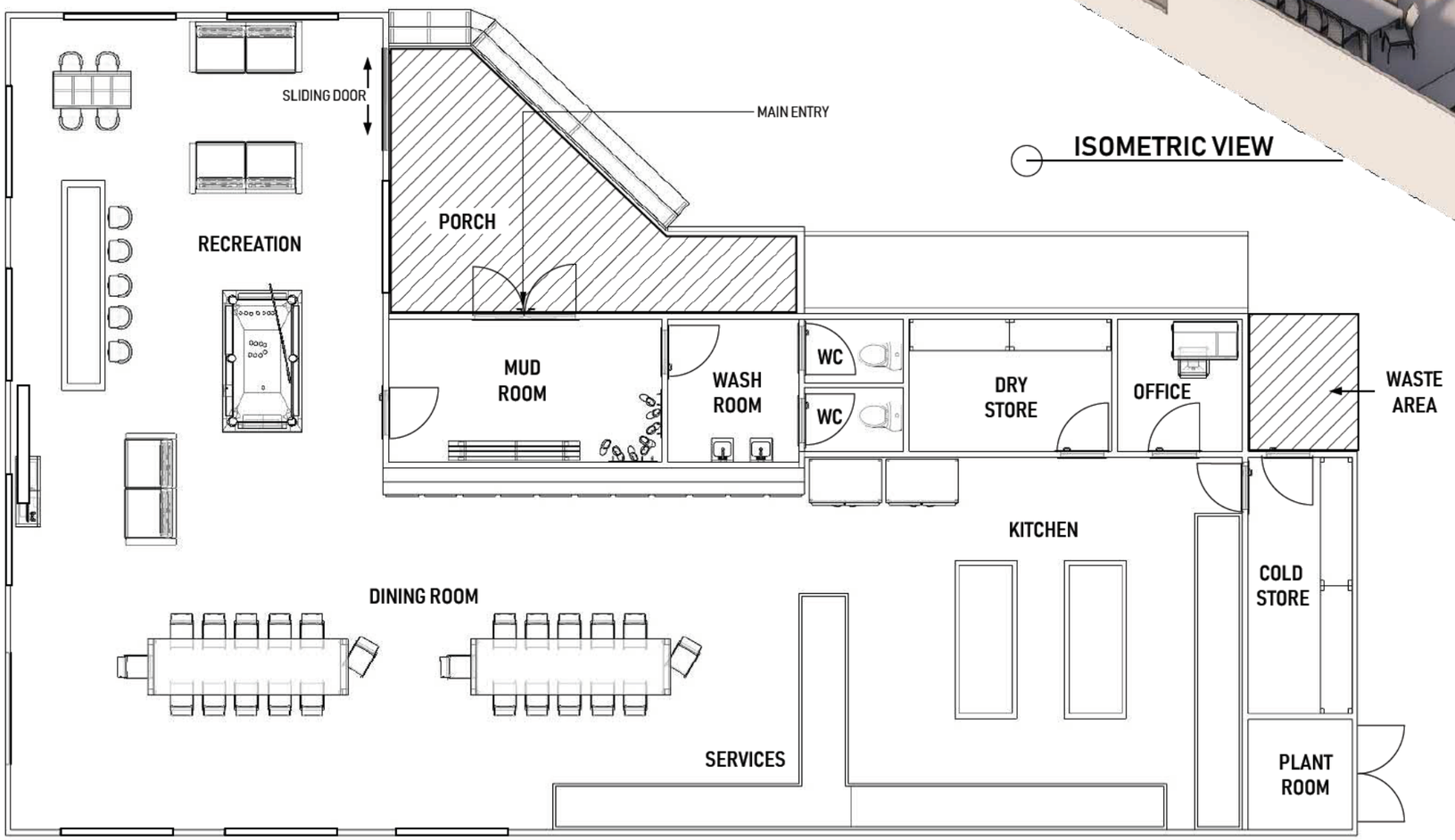
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

NEW BUILD

SITE LOCATION



ISOMETRIC VIEW



PLAN VIEW
1:100

LIVING / MESS

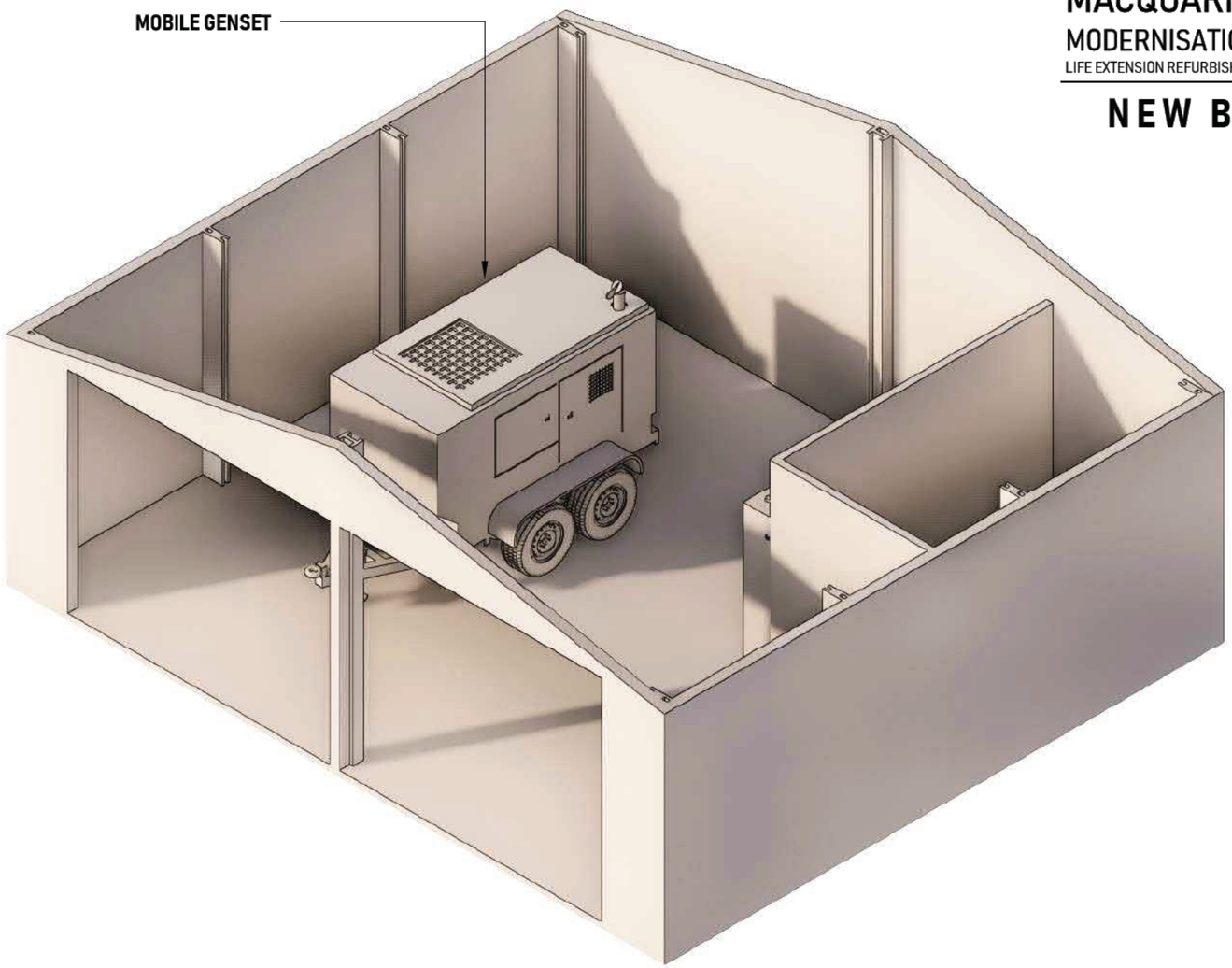
NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

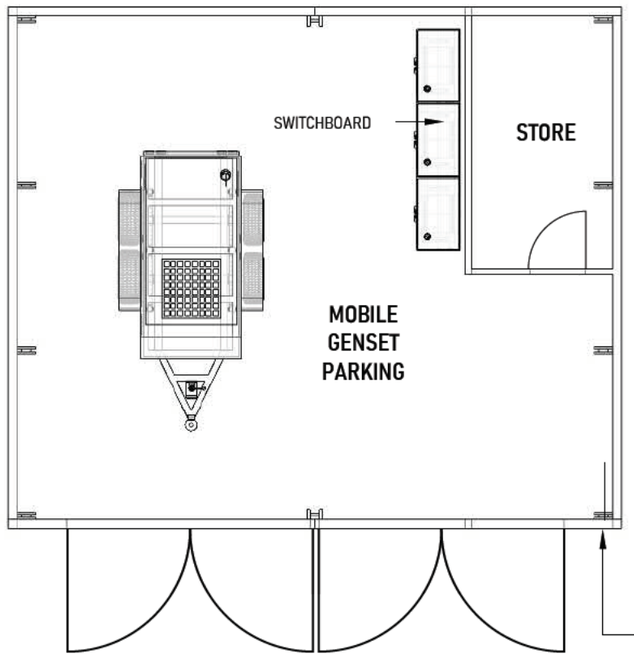
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

NEW BUILD

SITE LOCATION



ISOMETRIC VIEW



N-S TIMBER PORTAL FRAME / ECO-PLY CLADDING
CONSTRUCTION TYPE

PLAN VIEW
1:100

NORTH

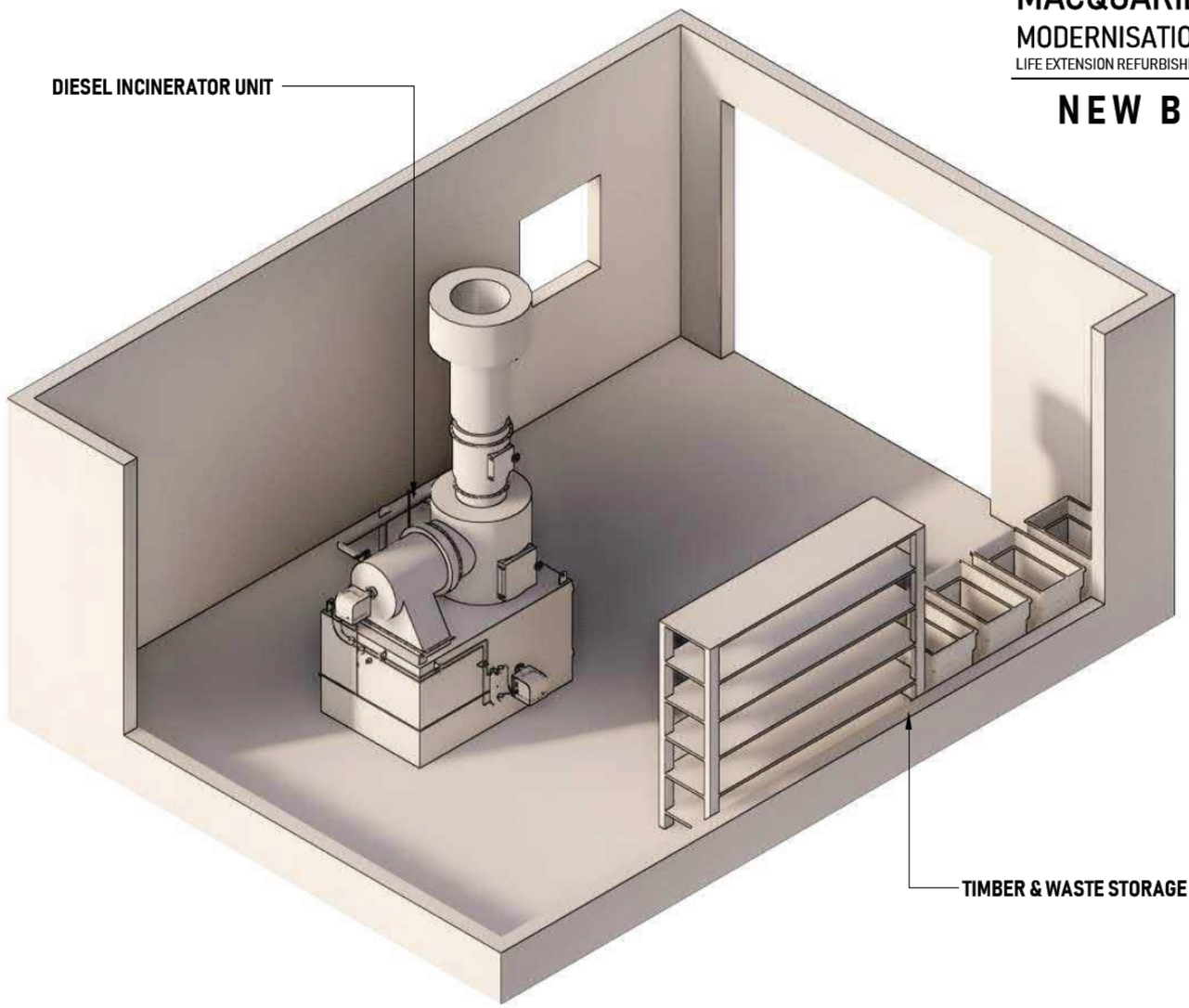
CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

GENERATOR BUILDING

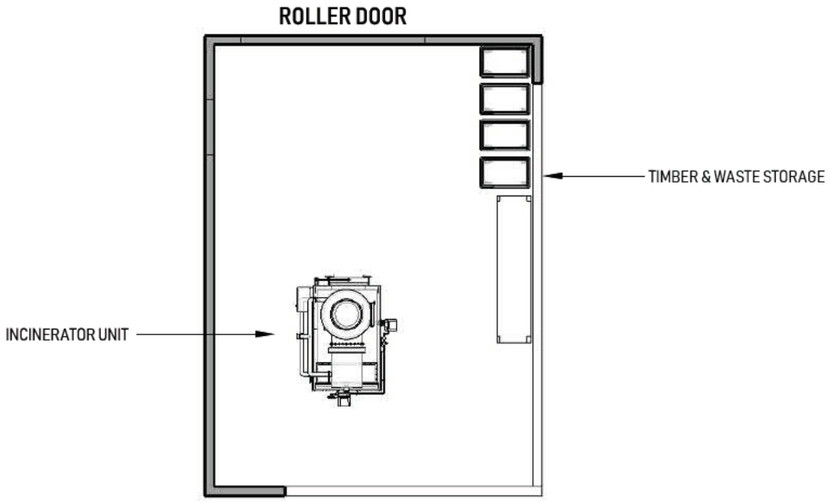
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

NEW BUILD

SITE LOCATION



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

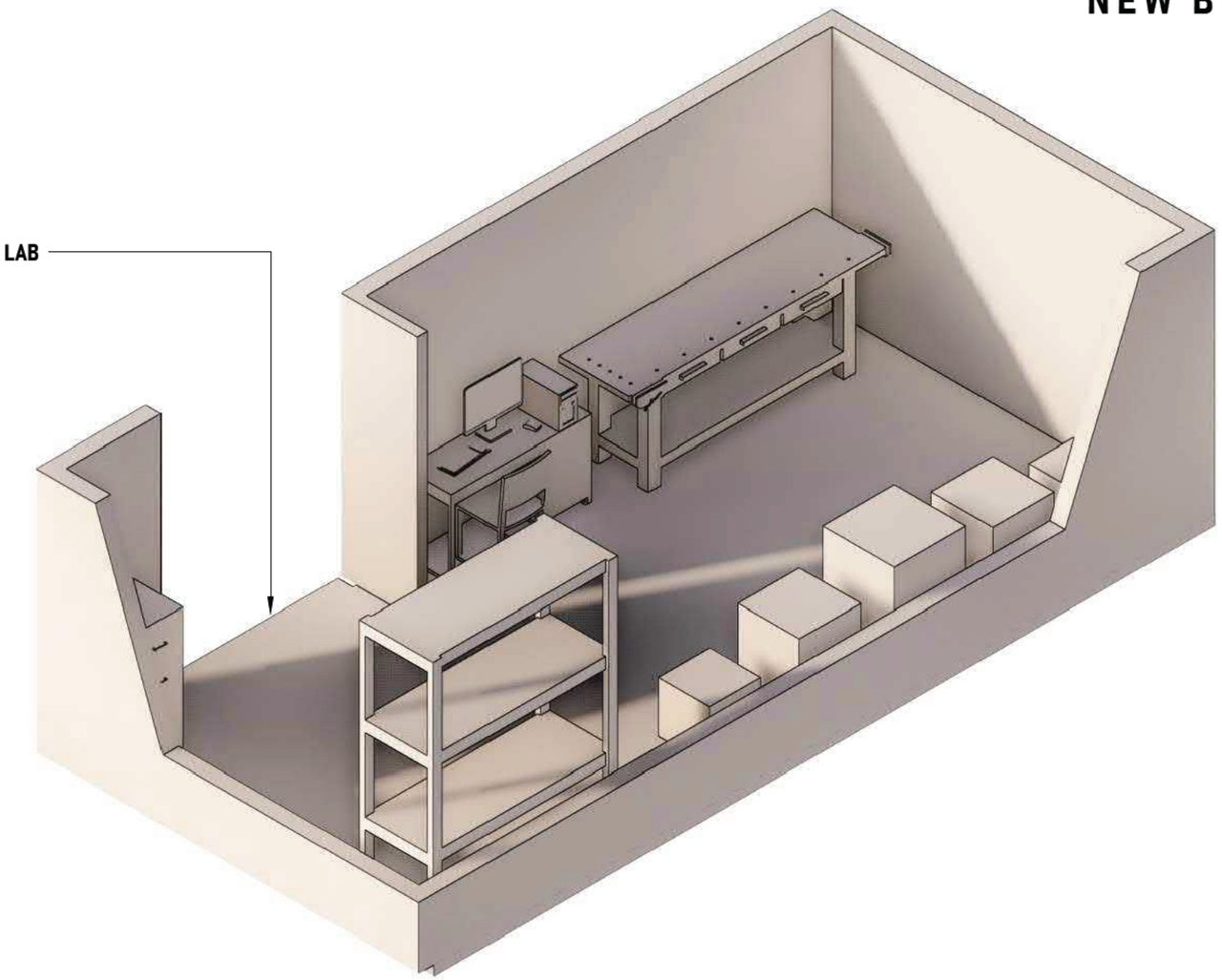
CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

WASTE MANAGEMENT BUILDING

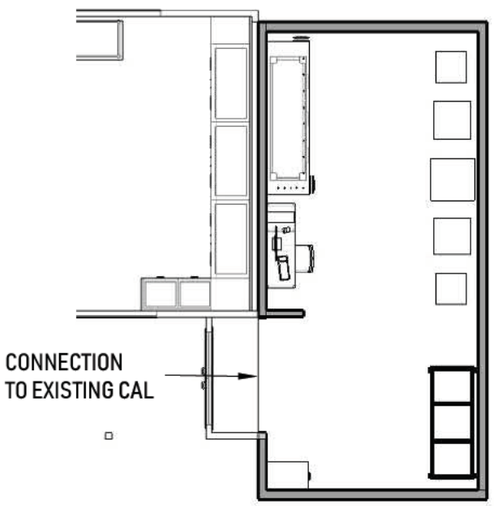
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

NEW BUILD

SITE LOCATION



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

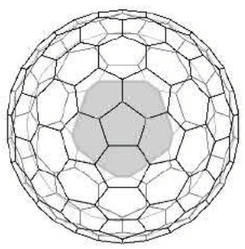
ARPANSA (CAL EXTENSION)

SITE LOCATION

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

NEW BUILD

ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

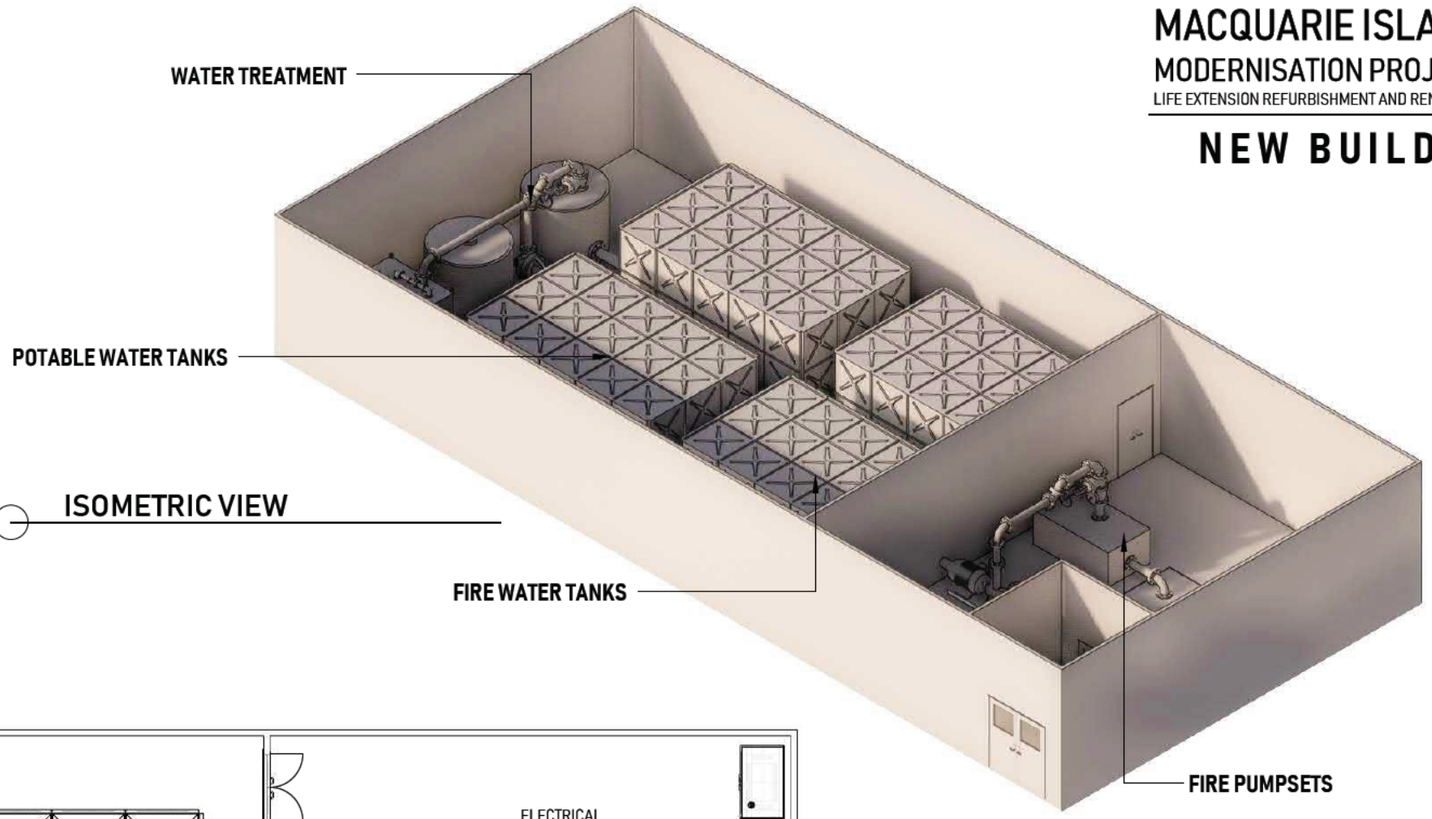
CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

NEW RADOME

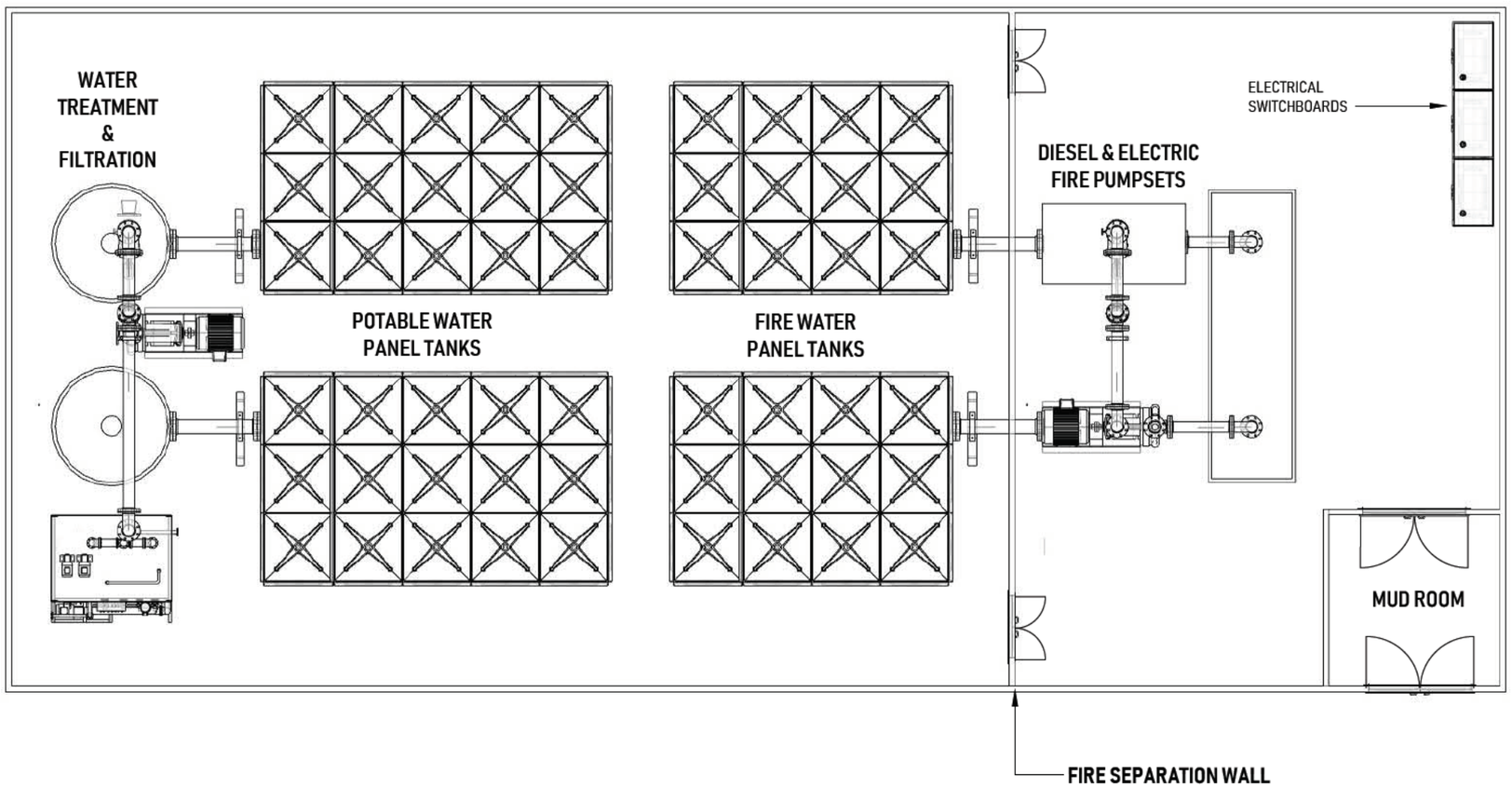
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

NEW BUILD

SITE LOCATION



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

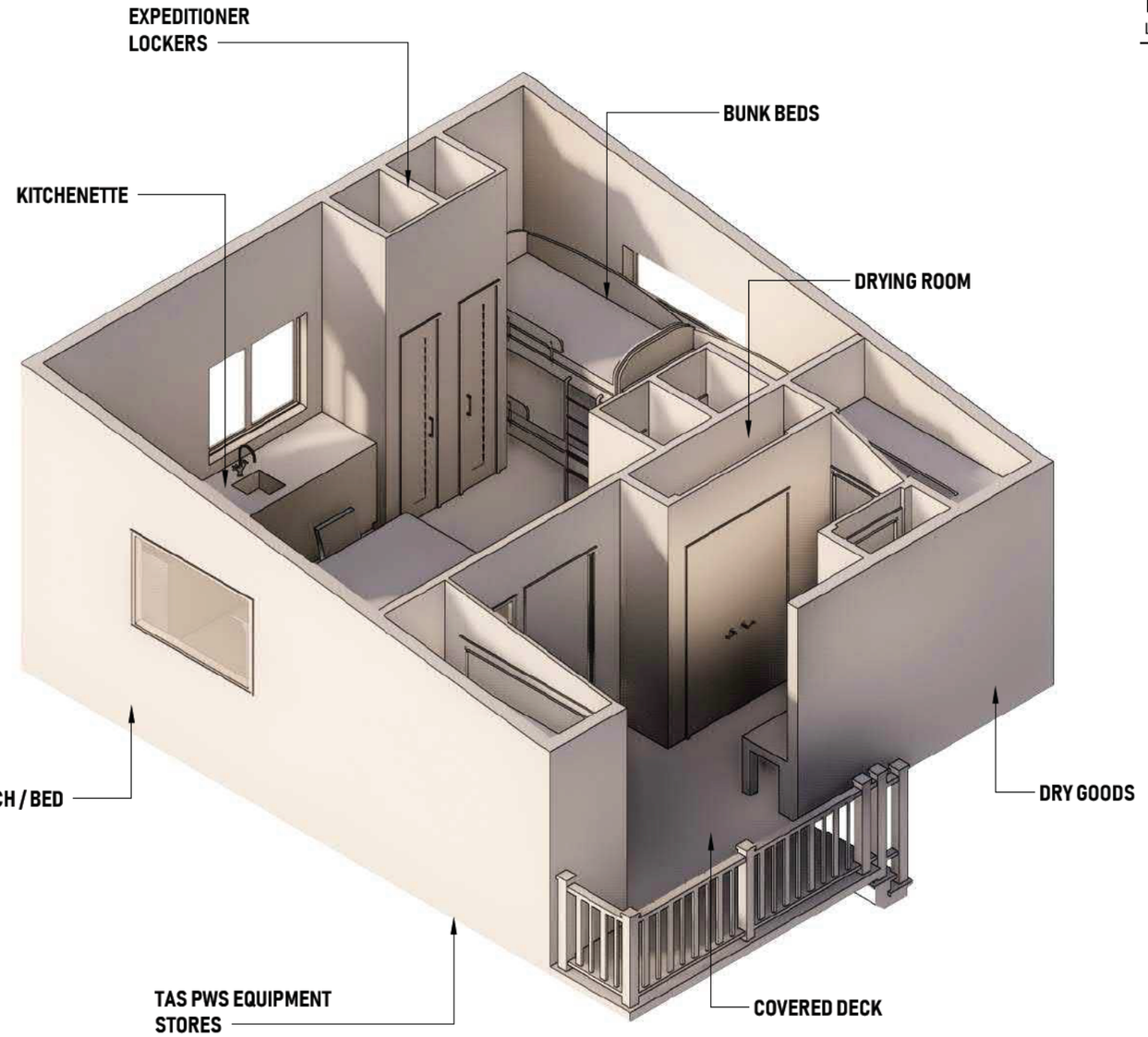
NEW UTILITIES BUILDING

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

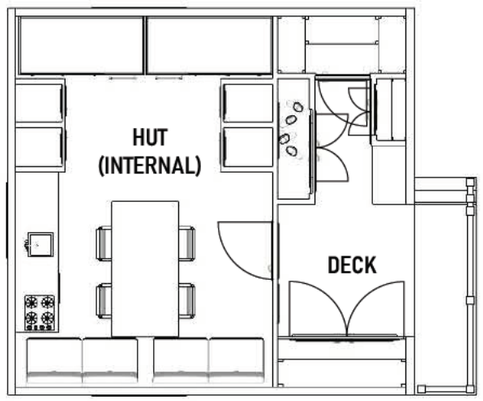
NEW BUILD

SITE LOCATION

TO REPLACE:
- BAUER BAY FH
- BROTHERS POINT FH
- HURD POINT FH



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

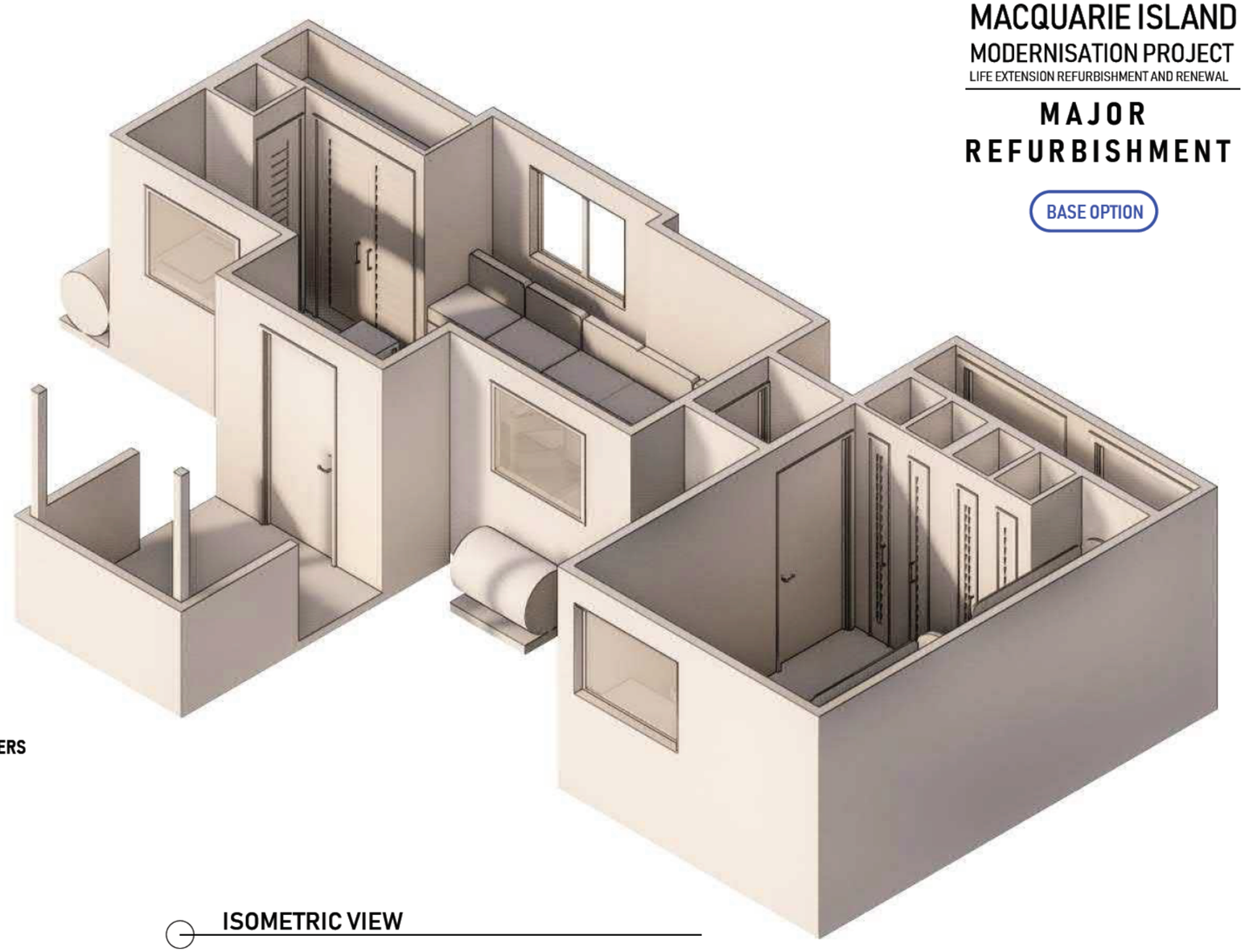
NEW FIELD HUTS (TYPICAL)

SITE LOCATION

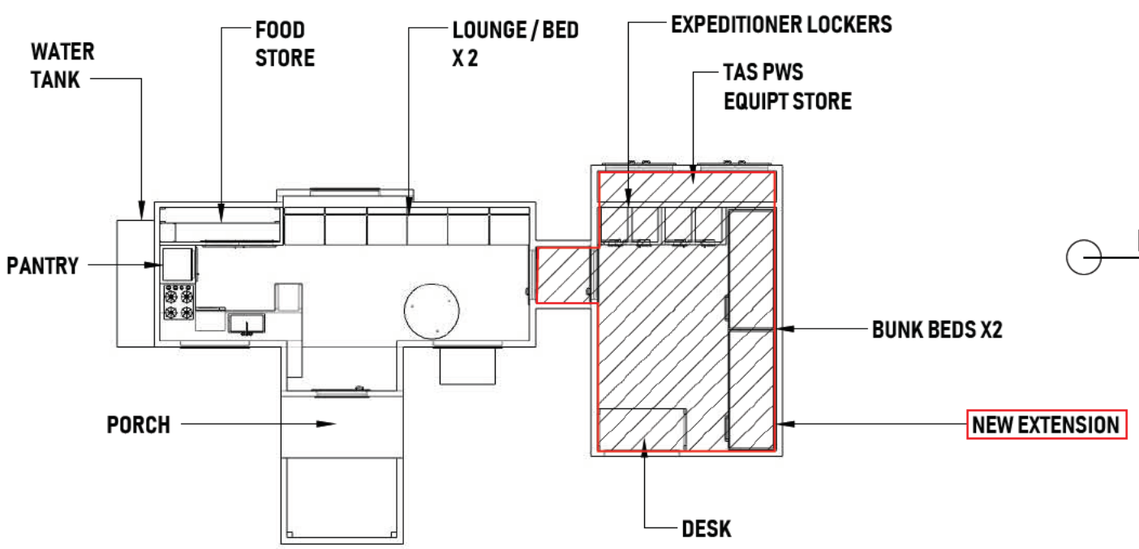
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

MAJOR REFURBISHMENT

BASE OPTION



ISOMETRIC VIEW



PLAN VIEW
1 : 100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

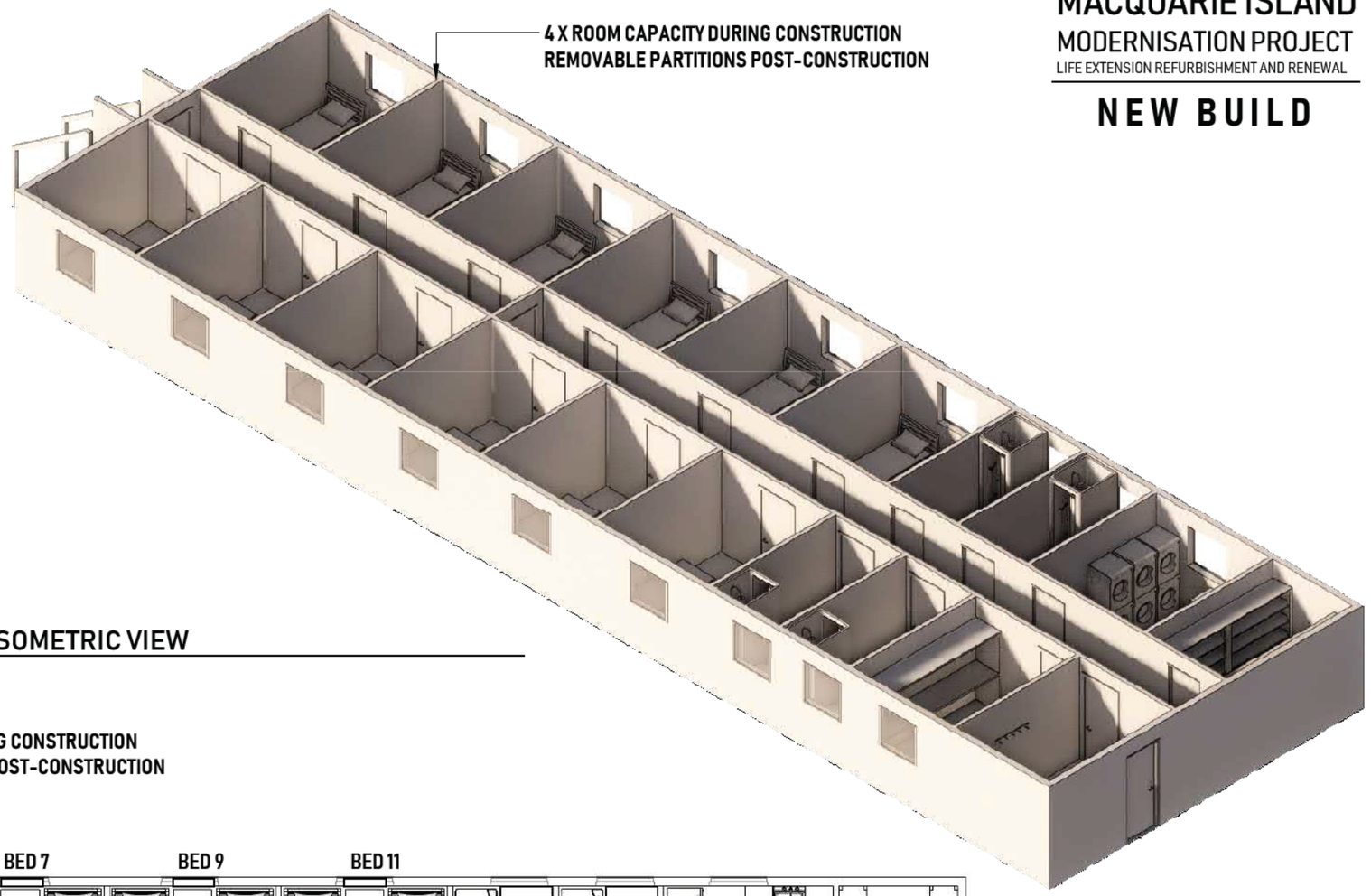
FF&E INDICATIVE ONLY

L1363 | GREEN GORGE FIELD HUT

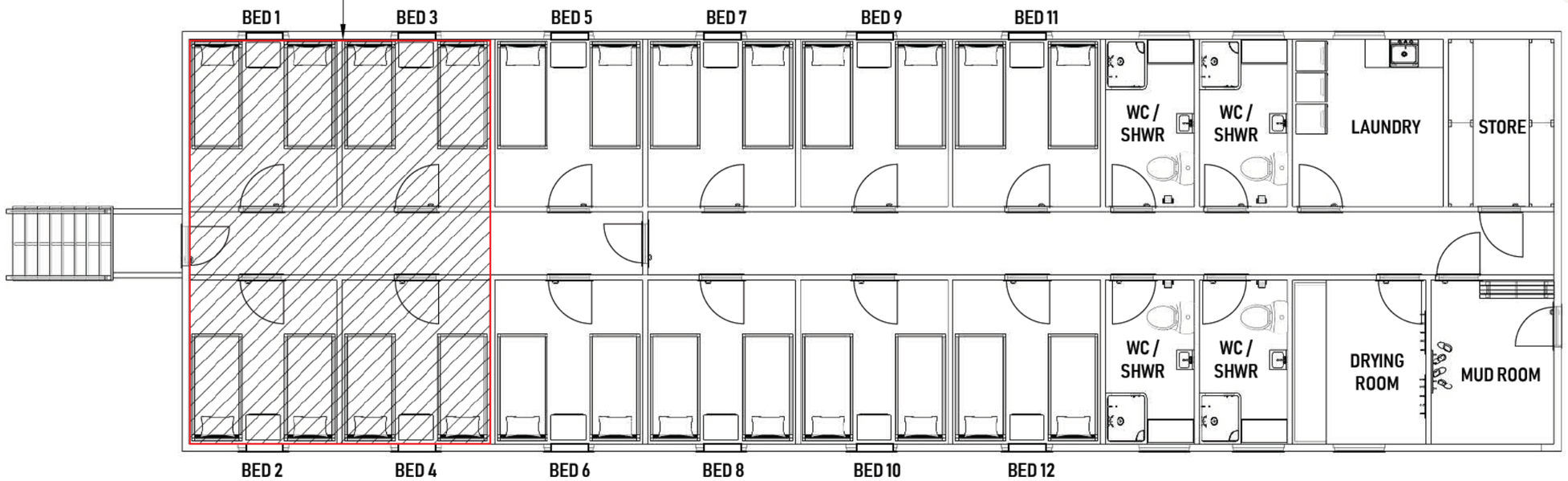
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

NEW BUILD

SITE LOCATION



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

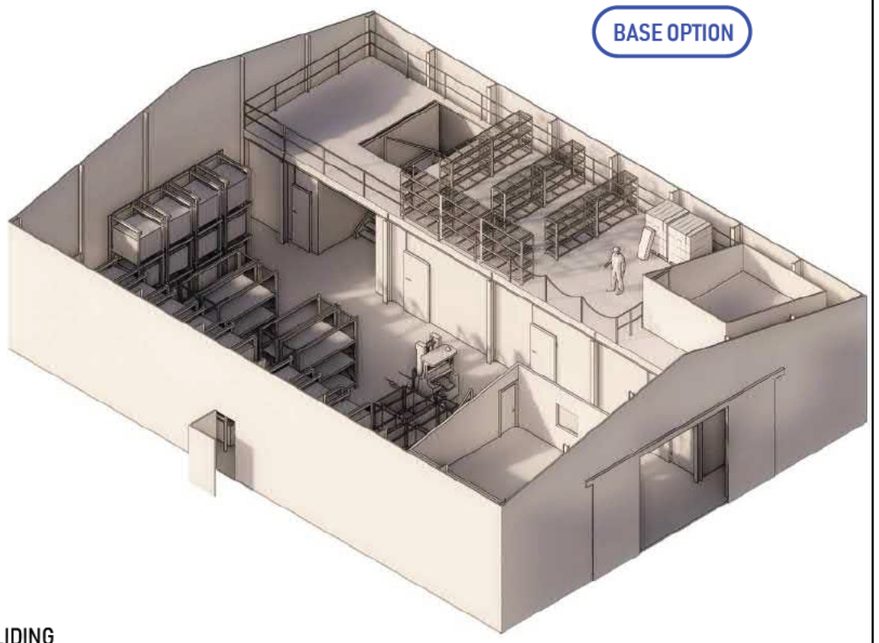
CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1253 | GARDEN COVE

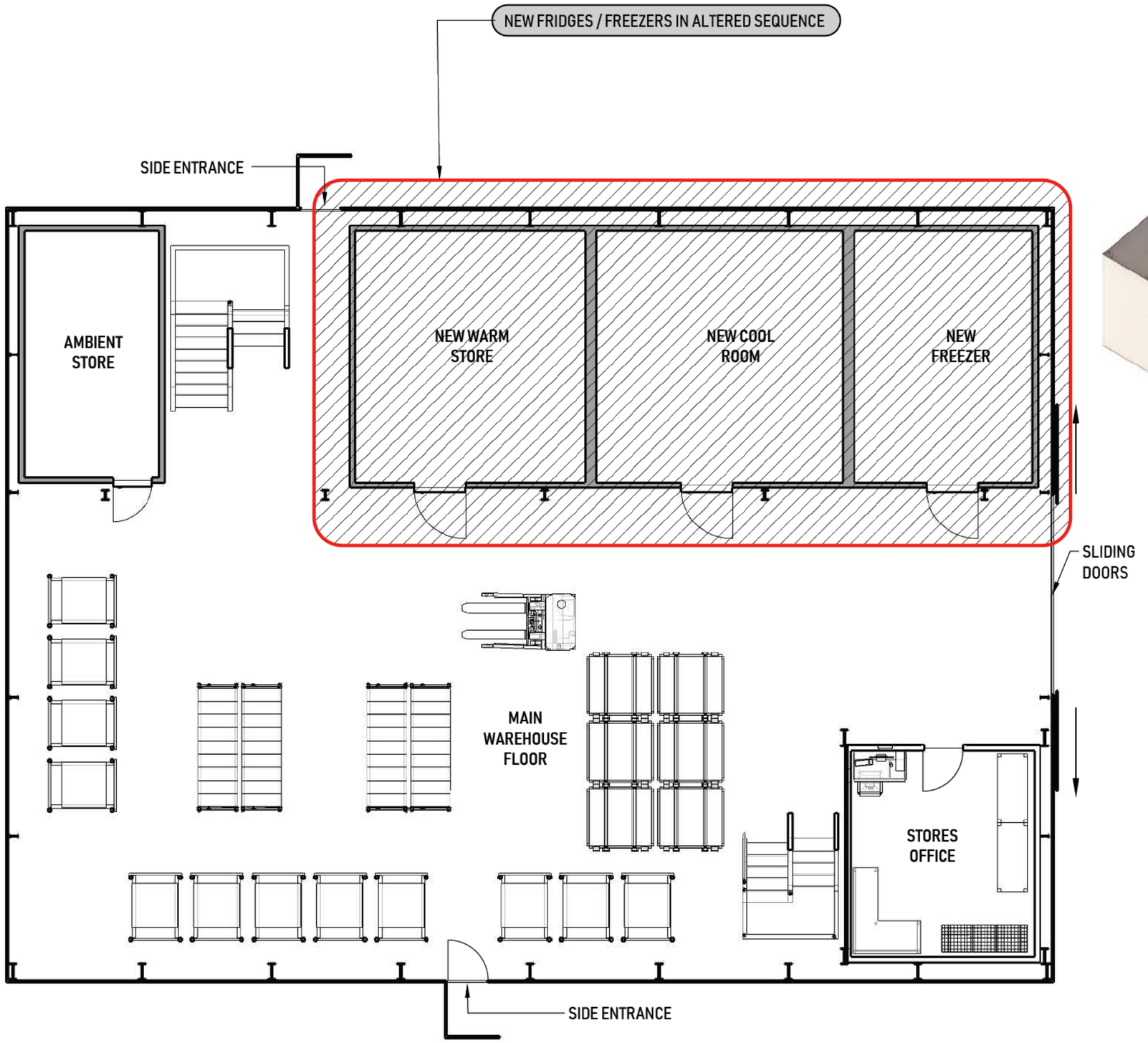
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

MAJOR REFURBISHMENT

BASE OPTION



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1271 | MAIN STORE

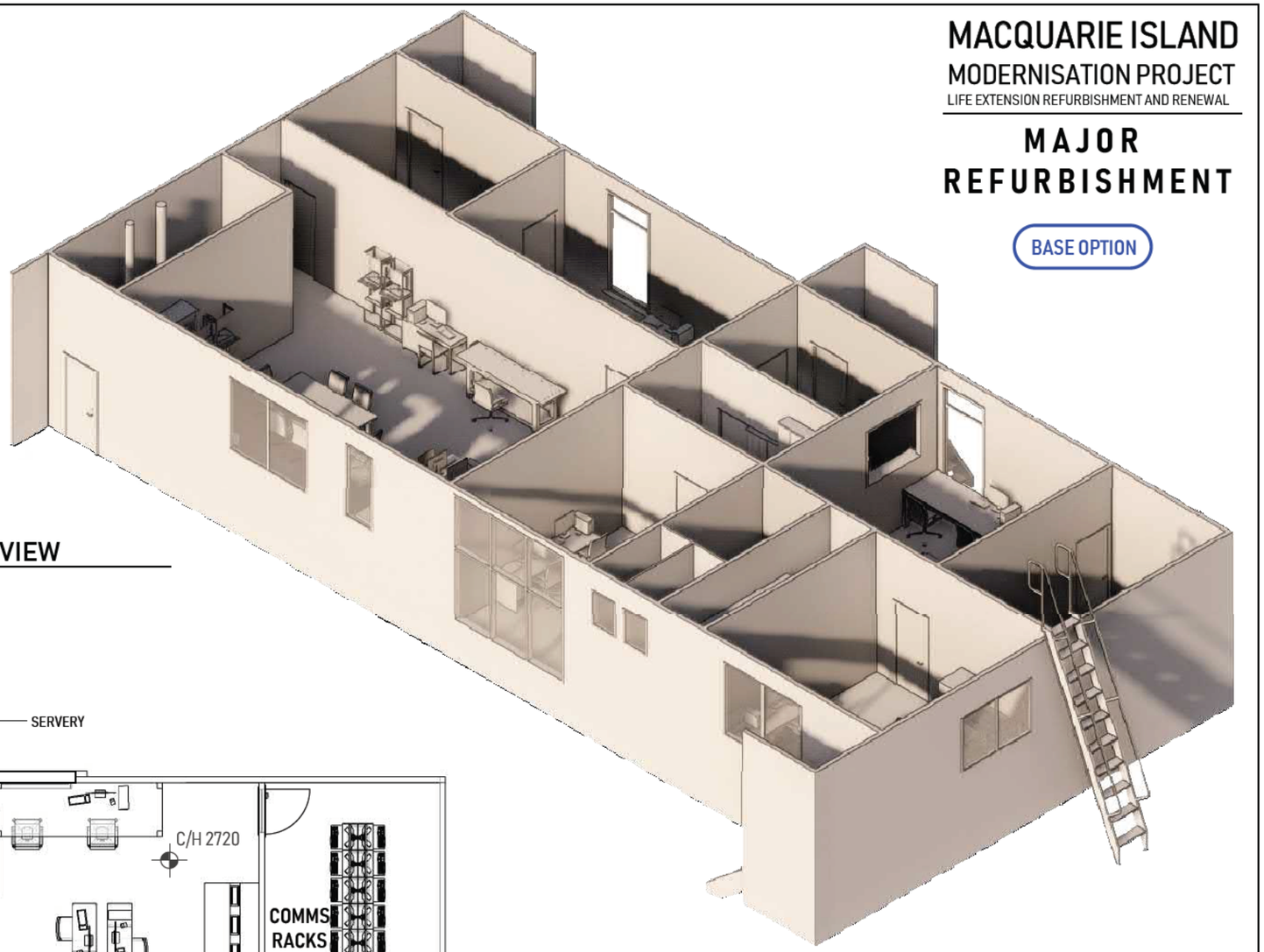
FF&E INDICATIVE ONLY

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

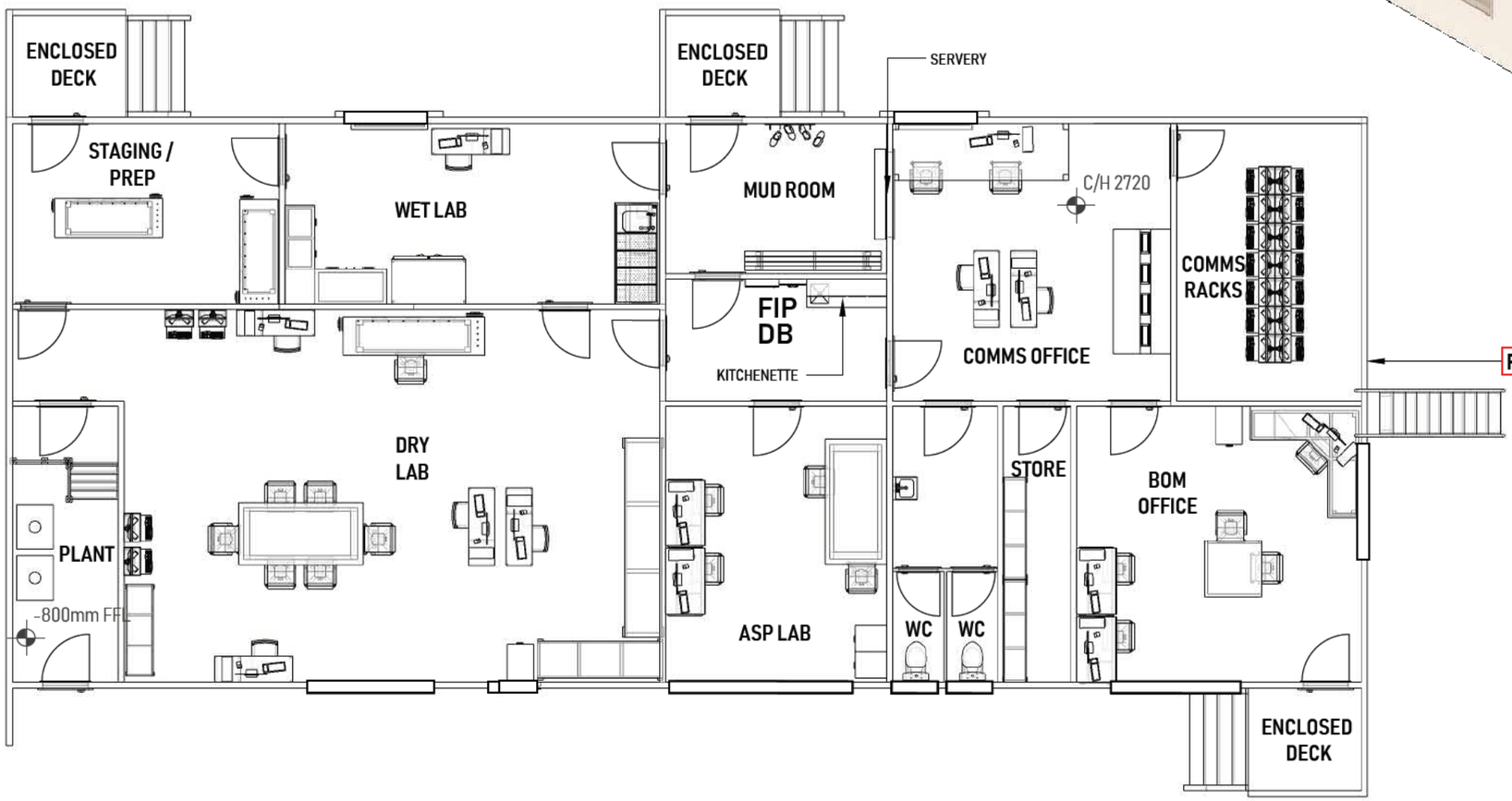
MAJOR REFURBISHMENT

BASE OPTION

SITE LOCATION



ISOMETRIC VIEW



FULL INTERNAL RECONFIGURATION

PLAN VIEW
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

L1299 | SCIENCE BUILDING

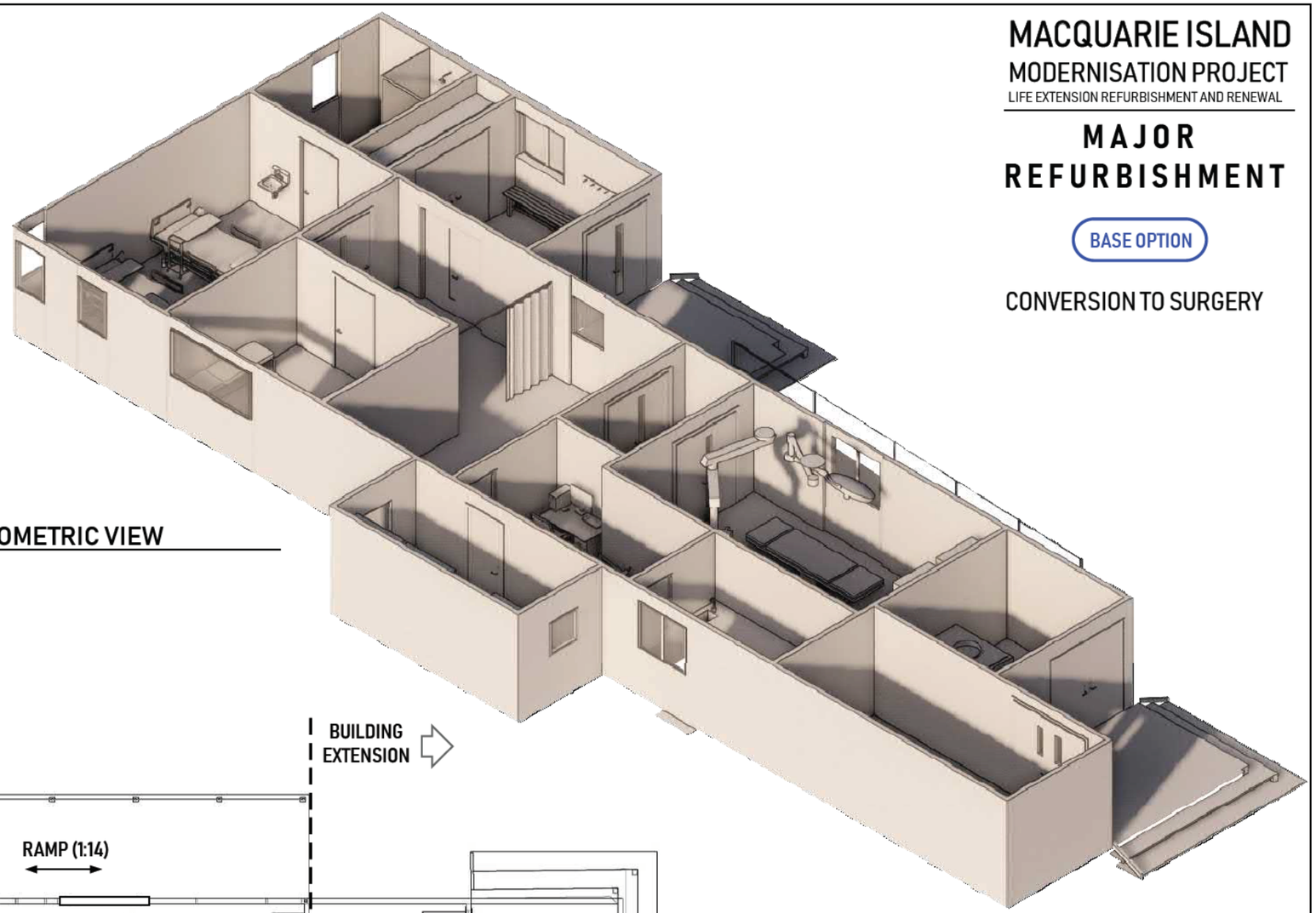
MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

MAJOR REFURBISHMENT

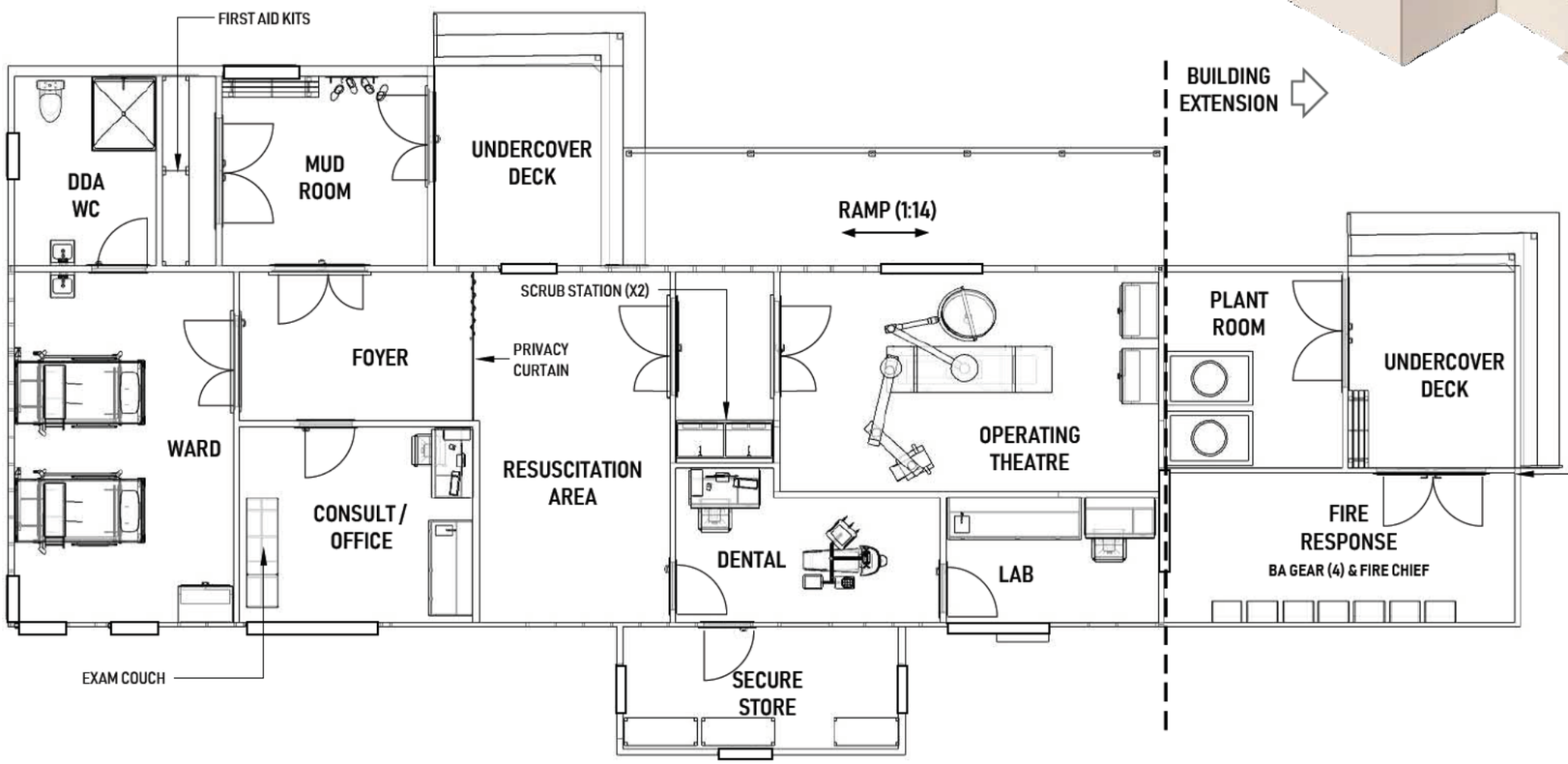
BASE OPTION

CONVERSION TO SURGERY

SITE LOCATION



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

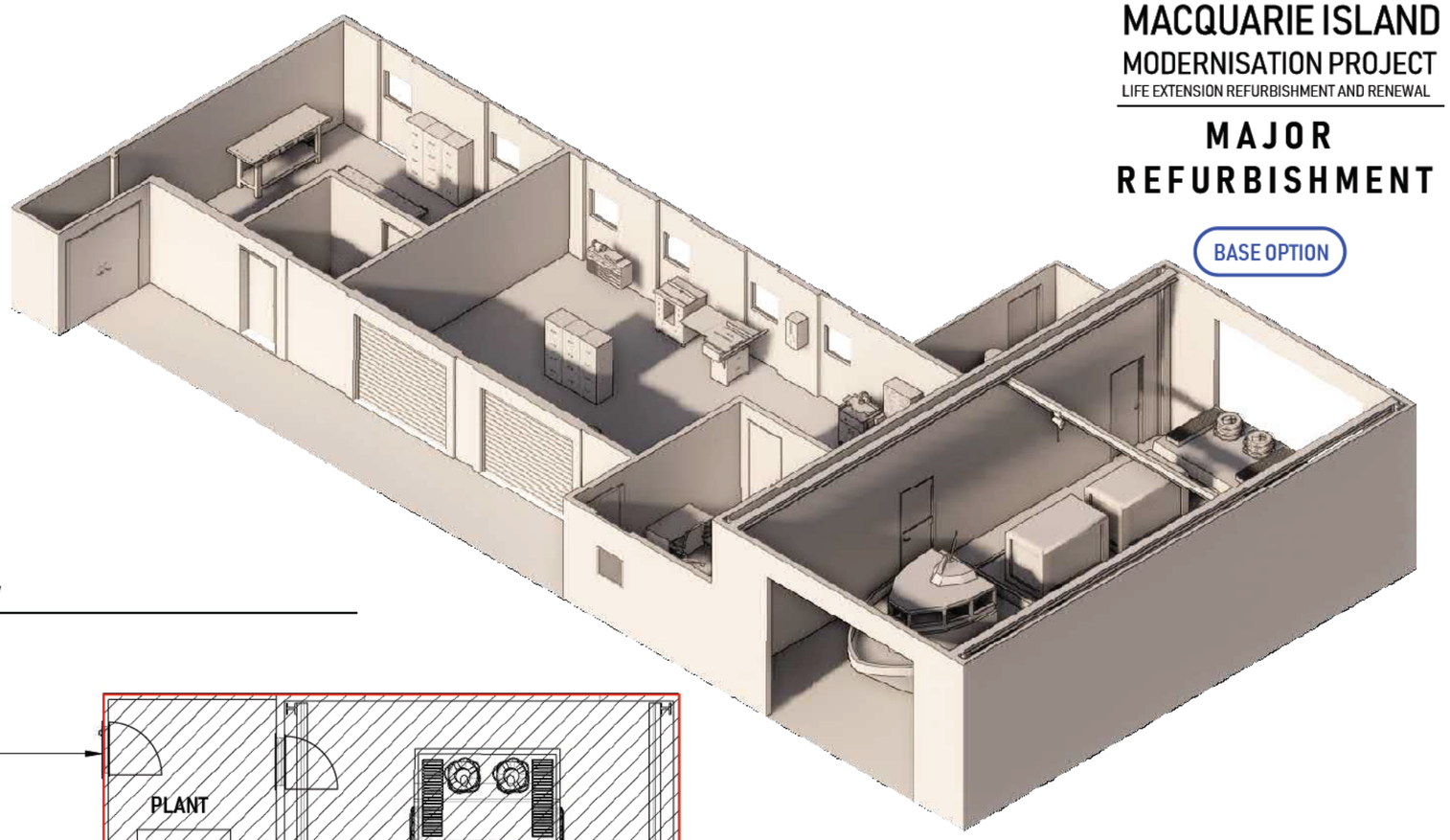
L1251 | SURGERY (FORMER MESS)

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

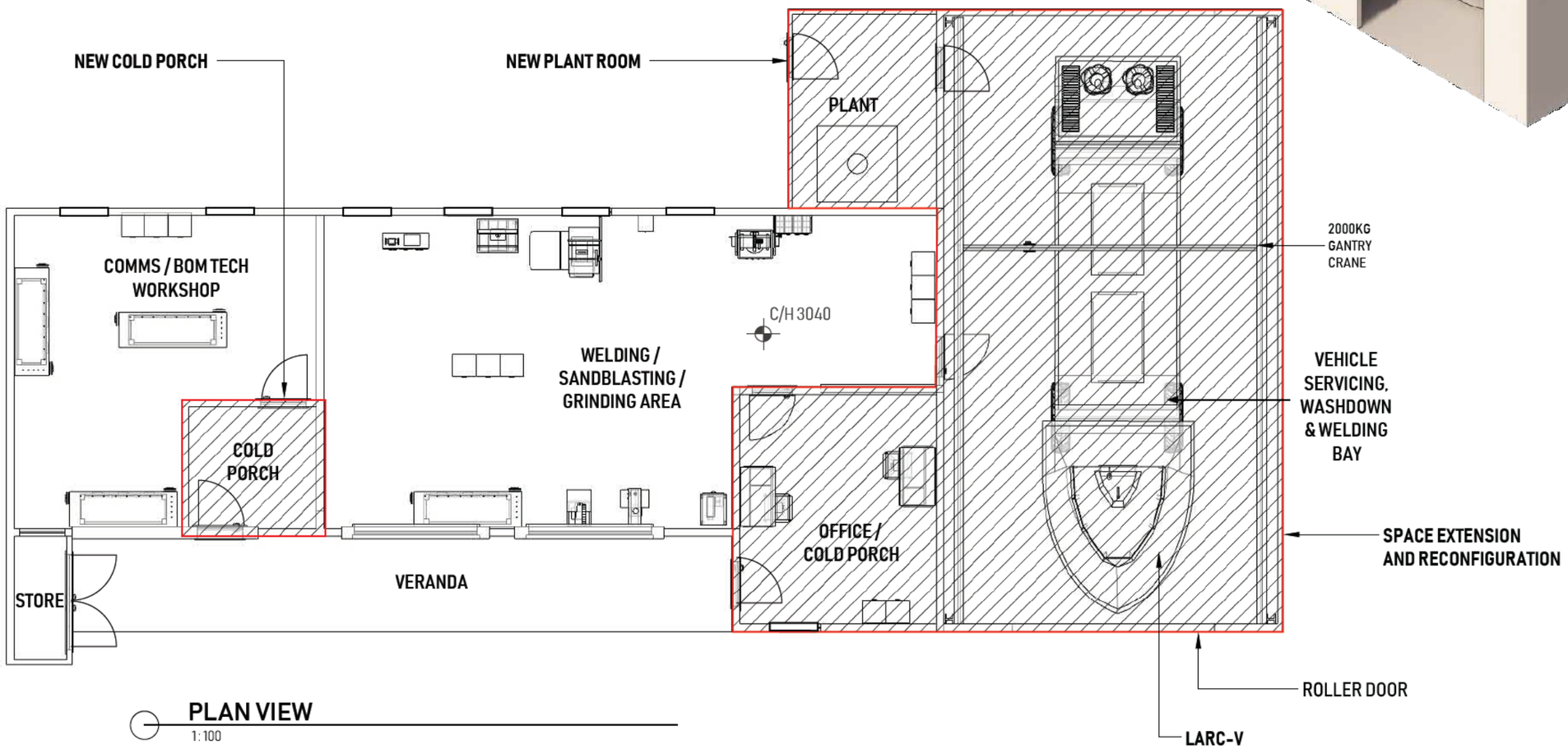
MAJOR REFURBISHMENT

BASE OPTION

SITE LOCATION



ISOMETRIC VIEW



PLAN VIEW
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1267 | MECH WORKSHOP

FF&E INDICATIVE ONLY

SITE LOCATION

BUILDING-WIDE WORKS

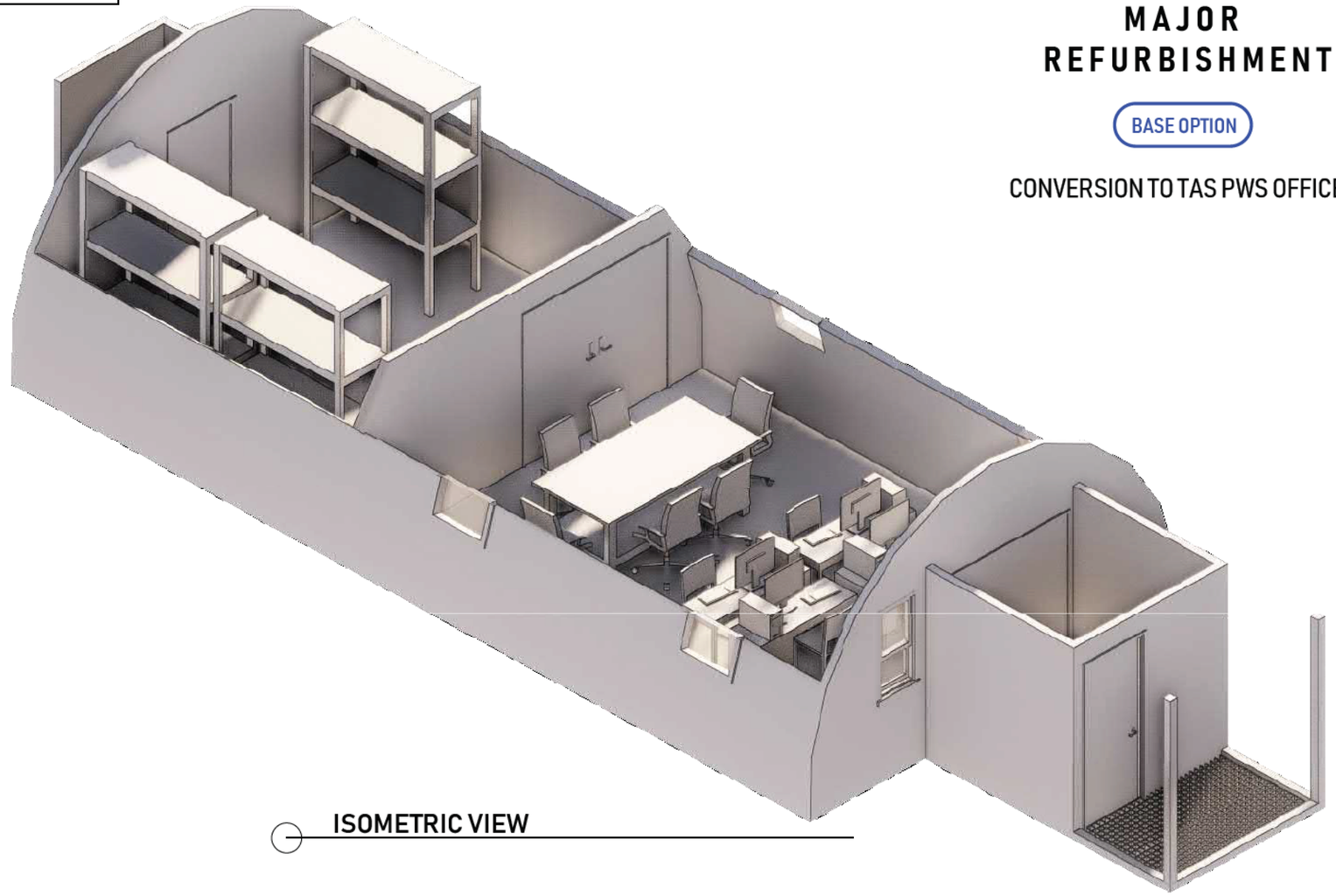
- COMPLETE ELECTRICAL REWIRE

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

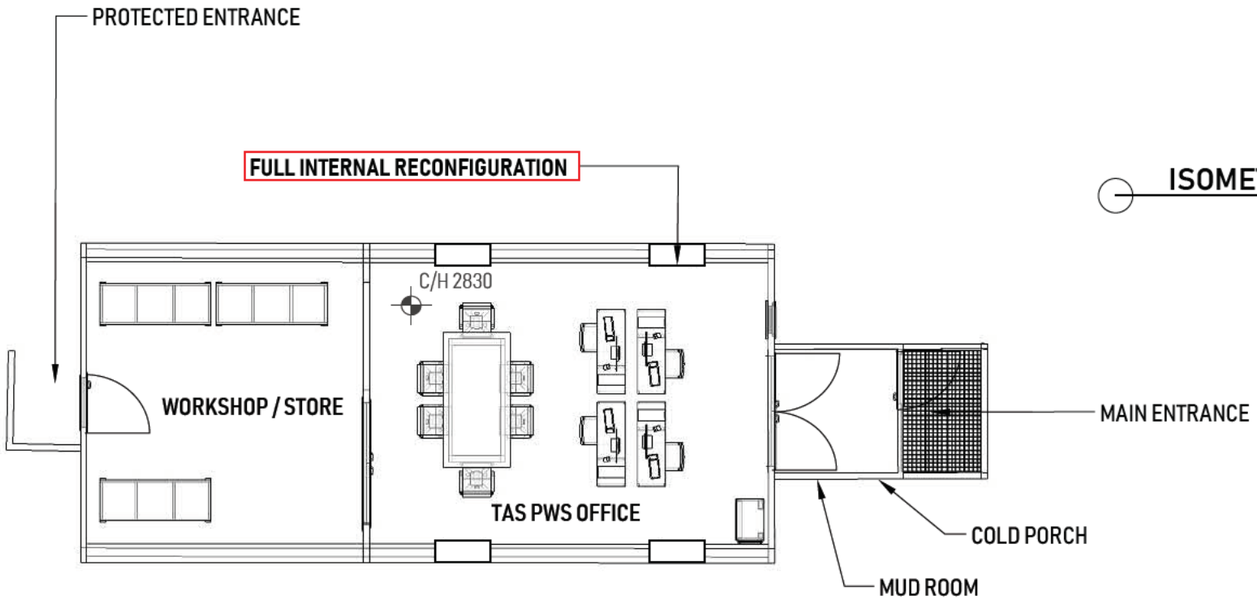
MAJOR REFURBISHMENT

BASE OPTION

CONVERSION TO TAS PWS OFFICE



ISOMETRIC VIEW



PLAN VIEW
1 : 100

NORTH

CONCEPT DRAWING

This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

L1270 | TAS PWS (FORMER POST OFFICE)

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

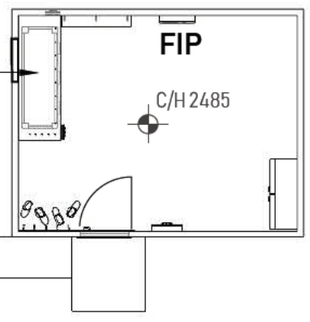
MAJOR REFURBISHMENT

BASE OPTION

BUILDING-WIDE WORKS

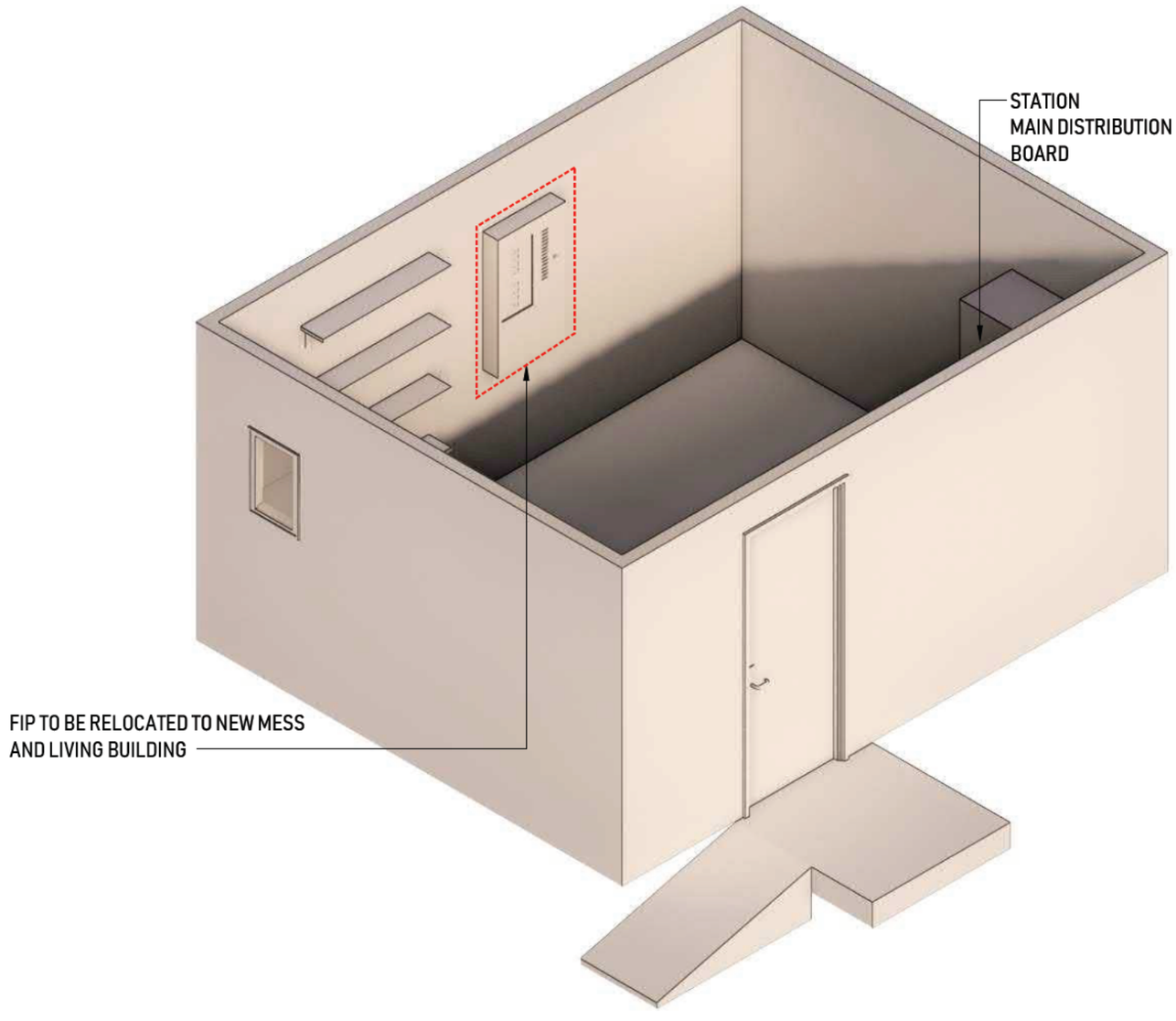
- REMOVE ASBESTOS FROM CEMENT PIPE AT BACK OF DB
- REPLACE CLADDING AND TREAT FOR LONGEVITY
- ALL WINDOWS AND DOORS TO BE REPLACED
- ROOF SHEETING TO BE REPLACED
- COMPLETE ELECTRICAL REWIRE

SITE LOCATION



WORKBENCH &
BA COMPRESSOR

PLAN VIEW
1:100



ISOMETRIC VIEW

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1247 | ELECTRICAL DISTRIBUTION HUT

FF&E INDICATIVE ONLY

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

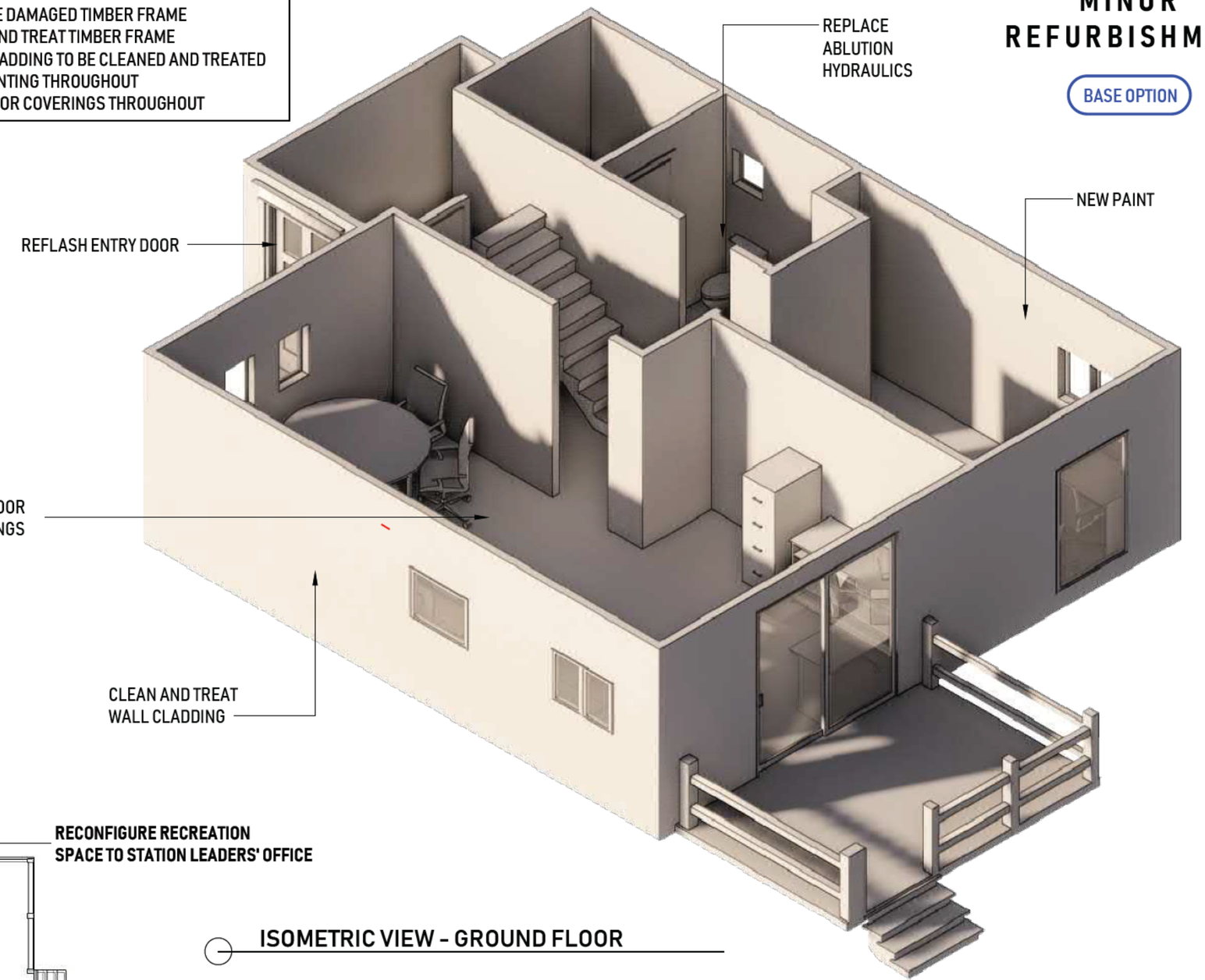
MINOR REFURBISHMENT

BASE OPTION

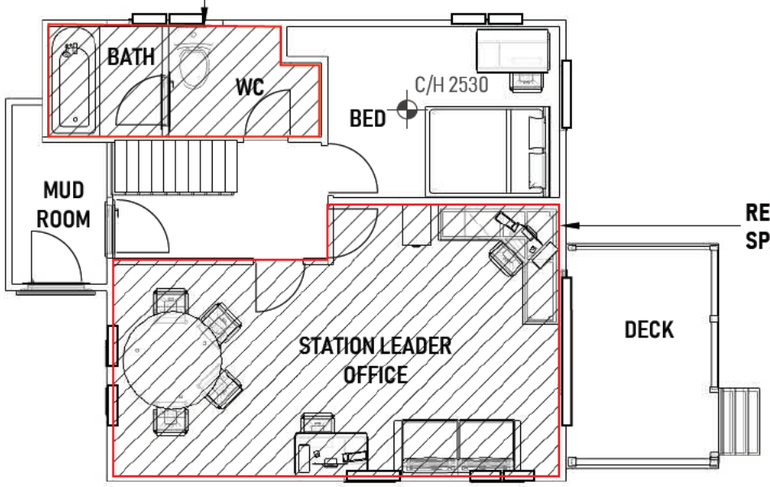
SITE LOCATION

BUILDING-WIDE WORKS

- REPLACE ABLUTIONS HYDRAULICS
- REFLASH ENTRY DOOR
- REPLACE DAMAGED TIMBER FRAME
- CLEAN AND TREAT TIMBER FRAME
- WALL CLADDING TO BE CLEANED AND TREATED
- NEW PAINTING THROUGHOUT
- NEW FLOOR COVERINGS THROUGHOUT



ISOMETRIC VIEW - GROUND FLOOR



PLAN VIEW - GROUND FLOOR
1:100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

L1256 | CUMPSTONS COTTAGE

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

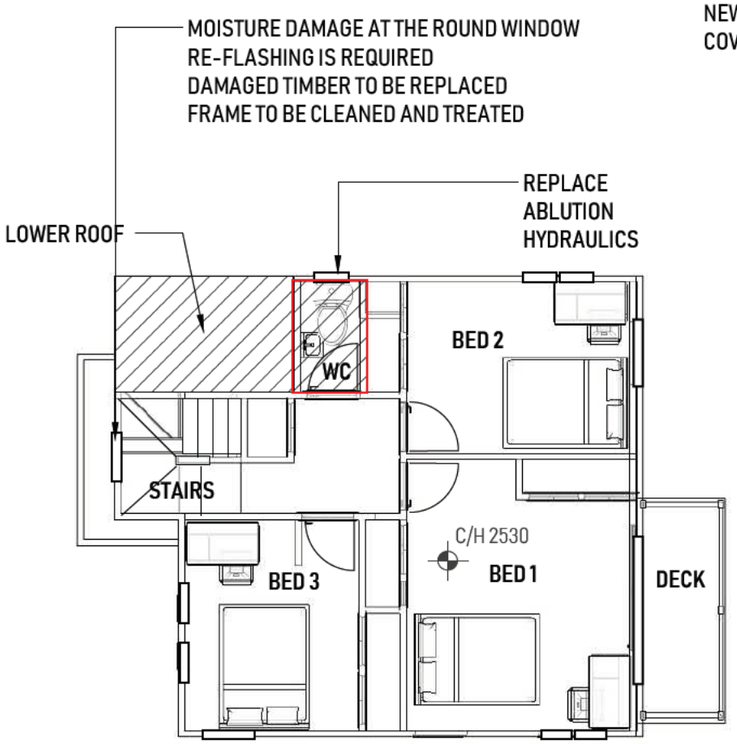
MINOR REFURBISHMENT

BASE OPTION

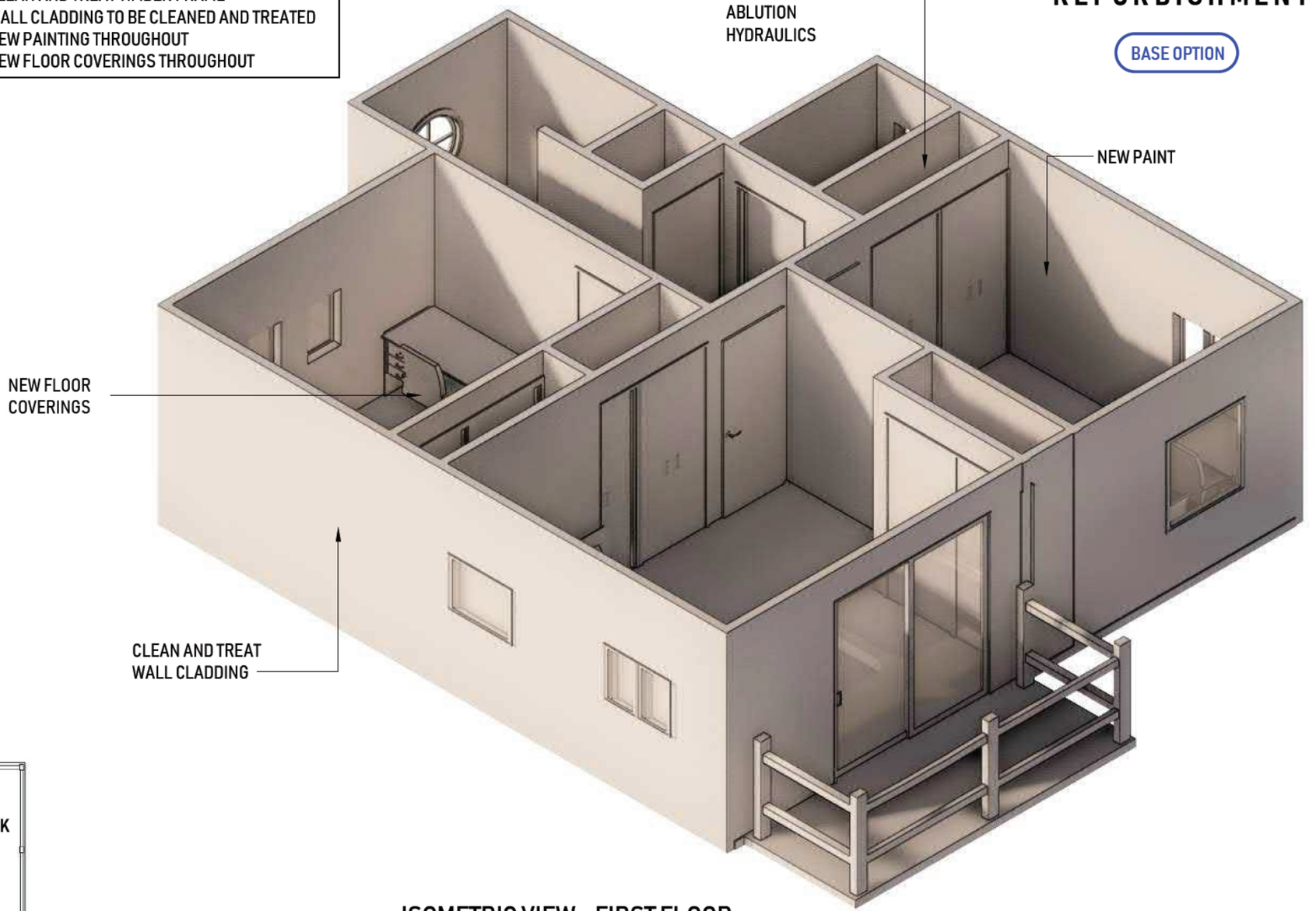
SITE LOCATION

BUILDING-WIDE WORKS

- REPLACE ABLUTIONS HYDRAULICS
- REFLASH ENTRY DOOR
- REPLACE DAMAGED TIMBER FRAME
- CLEAN AND TREAT TIMBER FRAME
- WALL CLADDING TO BE CLEANED AND TREATED
- NEW PAINTING THROUGHOUT
- NEW FLOOR COVERINGS THROUGHOUT



PLAN VIEW - FIRST FLOOR
1:100



ISOMETRIC VIEW - FIRST FLOOR

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

L1256 | CUMPSTONS COTTAGE

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

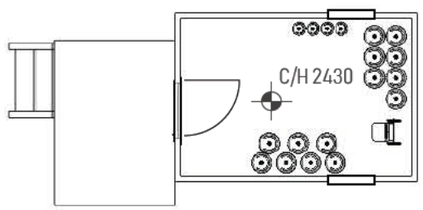
MINOR REFURBISHMENT

BASE OPTION

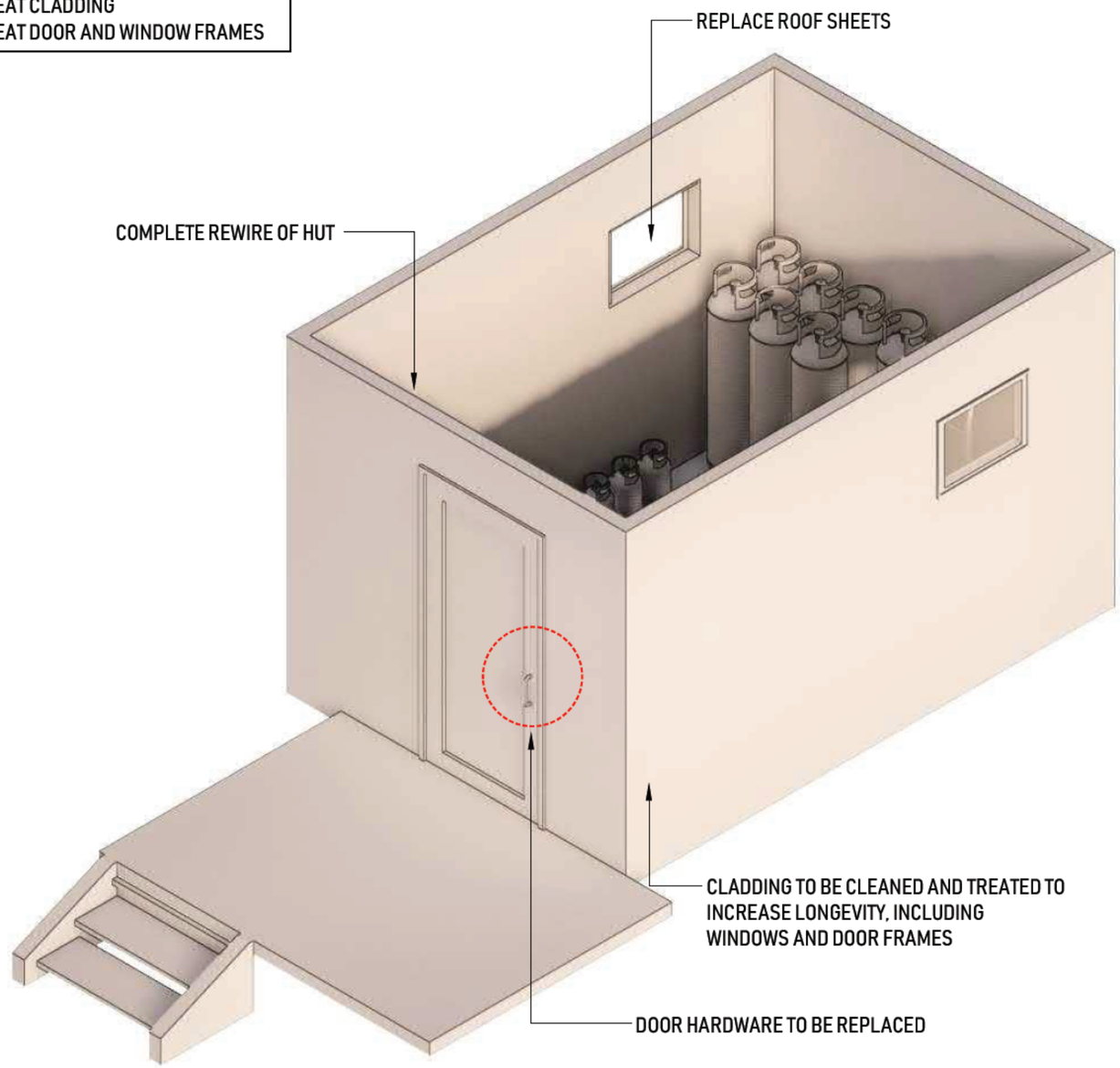
SITE LOCATION

BUILDING-WIDE WORKS

- COMPLETE ELECTRICAL REWIRE
- REPLACE ROOF SHEETING
- REPLACE DOOR HARDWARE
- CLEAN AND TREAT CLADDING
- CLEAN AND TREAT DOOR AND WINDOW FRAMES



PLAN VIEW
1:100



ISOMETRIC VIEW

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

L1277 | COMPRESSED GAS STORE

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

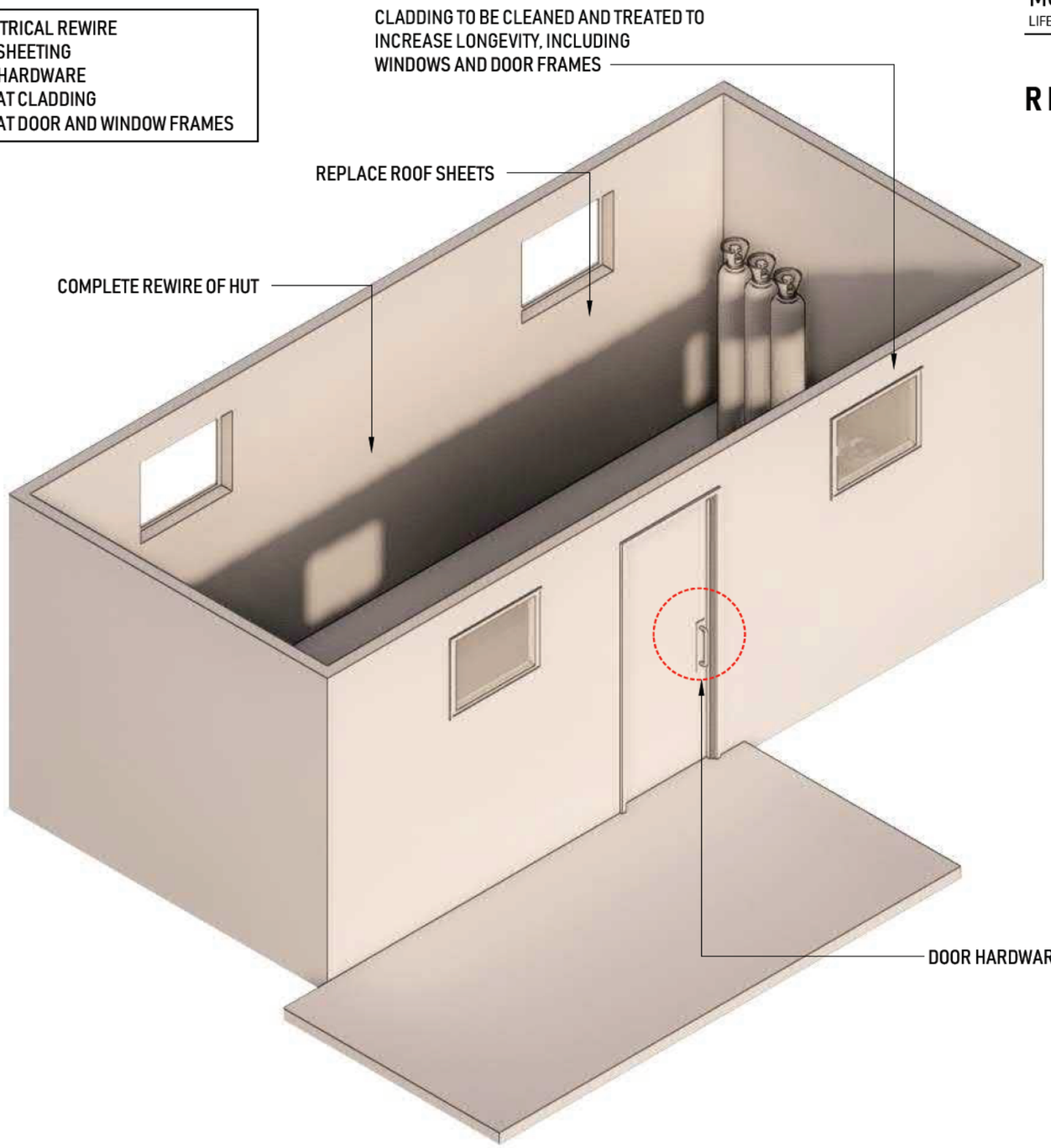
MINOR REFURBISHMENT

BASE OPTION

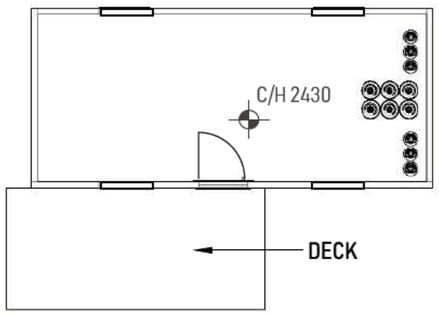
SITE LOCATION

BUILDING-WIDE WORKS

- COMPLETE ELECTRICAL REWIRE
- REPLACE ROOF SHEETING
- REPLACE DOOR HARDWARE
- CLEAN AND TREAT CLADDING
- CLEAN AND TREAT DOOR AND WINDOW FRAMES



ISOMETRIC VIEW



PLAN VIEW
1 : 100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1276 | FLAMMABLE GAS STORE

FF&E INDICATIVE ONLY

SITE LOCATION

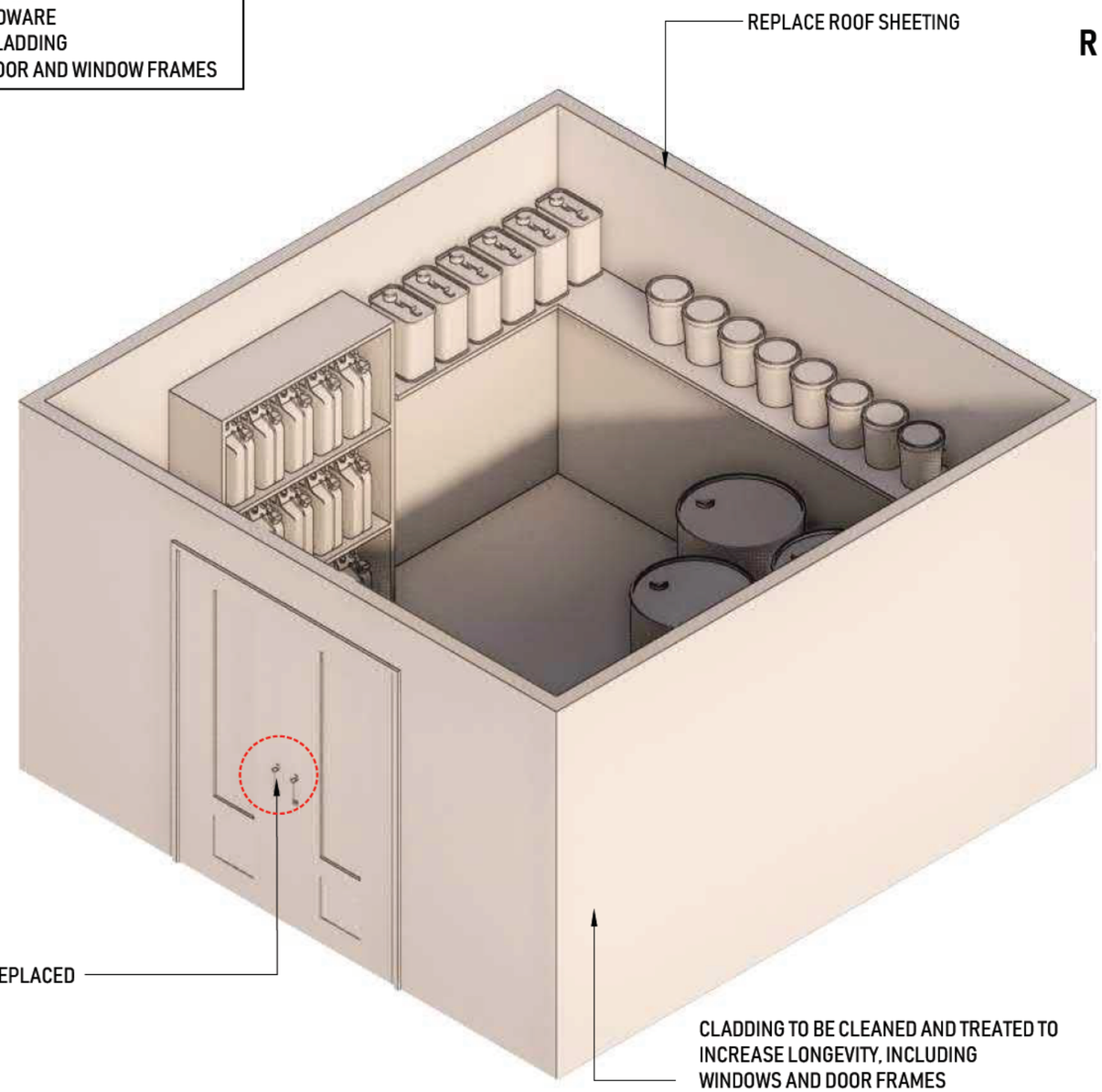
BUILDING-WIDE WORKS

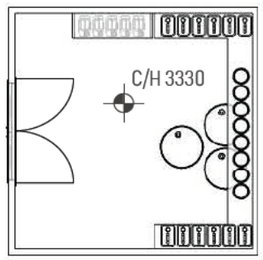
- COMPLETE ELECTRICAL REWIRE
- REPLACE ROOF SHEETING
- REPLACE DOOR HARDWARE
- CLEAN AND TREAT CLADDING
- CLEAN AND TREAT DOOR AND WINDOW FRAMES

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

MINOR REFURBISHMENT

BASE OPTION





PLAN VIEW
1:100

ISOMETRIC VIEW

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

L1273 | HAZARDOUS GOODS STORE

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

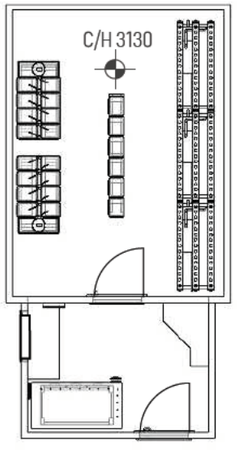
MINOR REFURBISHMENT

BASE OPTION

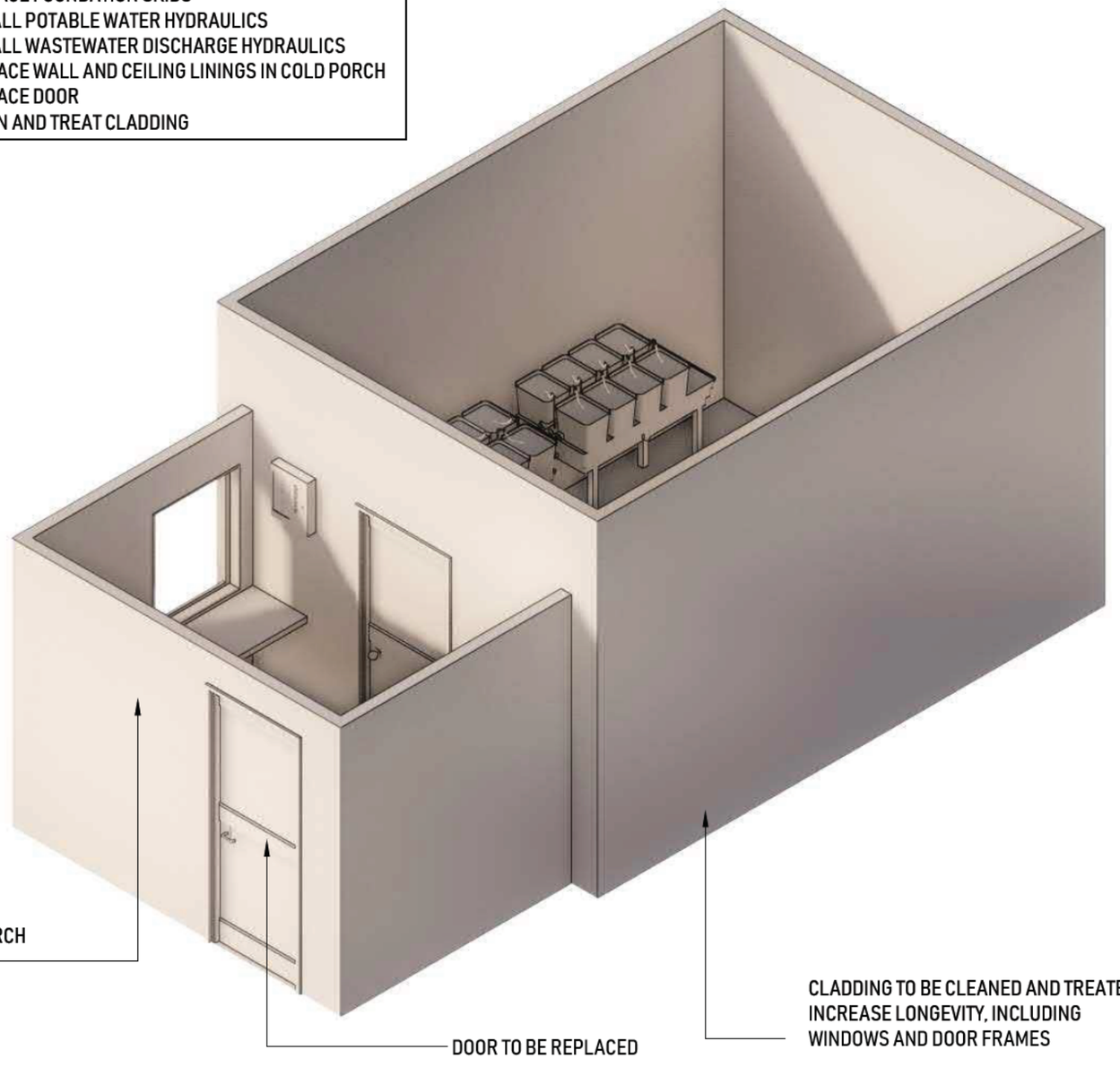
SITE LOCATION

BUILDING-WIDE WORKS

- RELOCATE BUILDING TO CURRENT SITE OF EPH
- REPLACE ALL WINDOWS
- REPLACE FOUNDATION SKIDS
- INSTALL POTABLE WATER HYDRAULICS
- INSTALL WASTEWATER DISCHARGE HYDRAULICS
- REPLACE WALL AND CEILING LININGS IN COLD PORCH
- REPLACE DOOR
- CLEAN AND TREAT CLADDING



PLAN VIEW
1 : 100



ISOMETRIC VIEW

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

FF&E INDICATIVE ONLY

L1250 | HYDROPONICS BUILDING

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

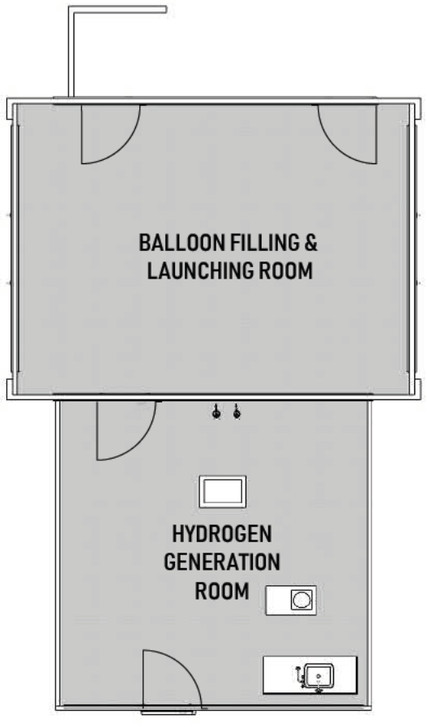
MINOR REFURBISHMENT

BASE OPTION

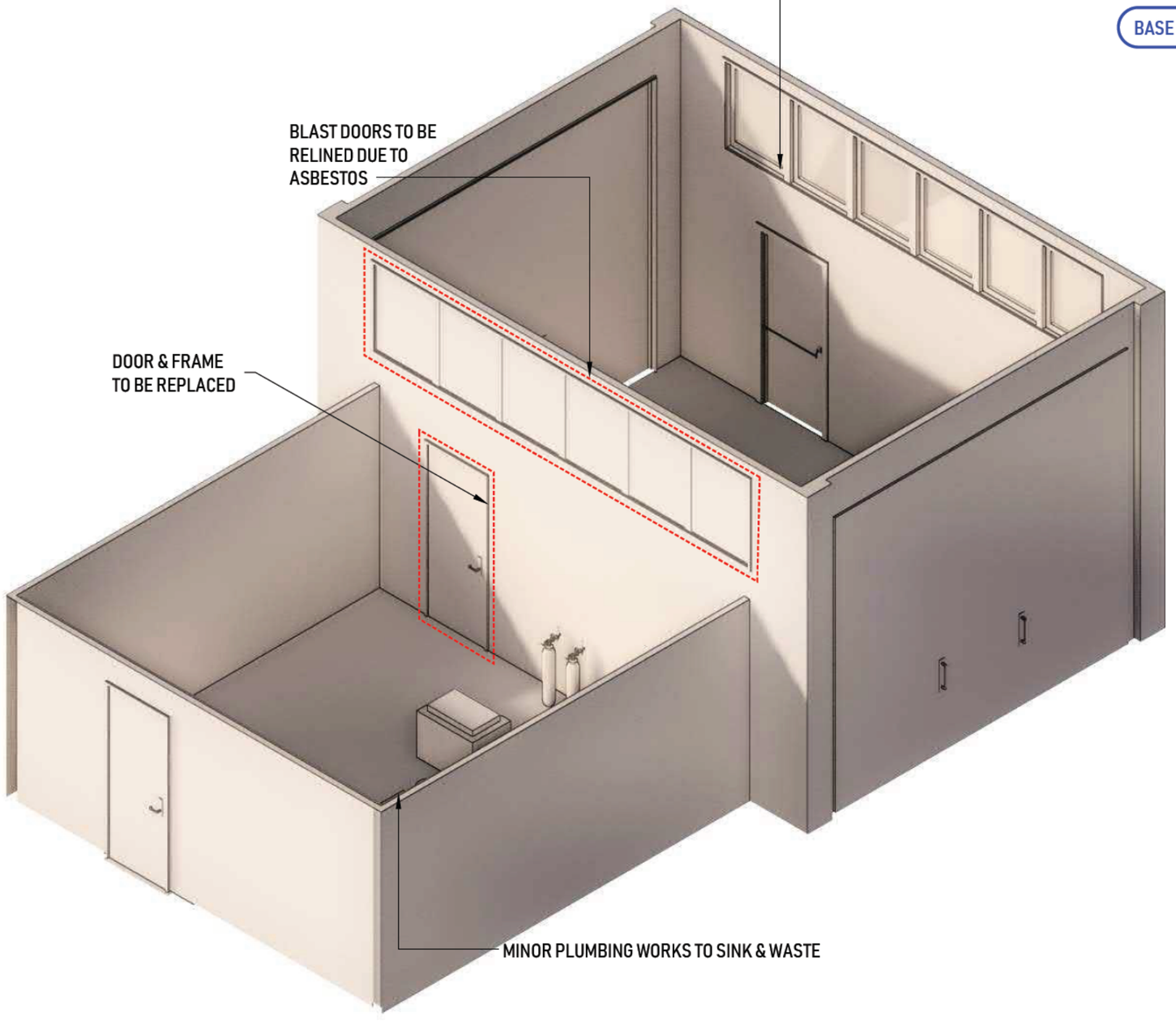
SITE LOCATION

BUILDING-WIDE WORKS

- REMOVE ASBESTOS UNDER TIMBER CLADDING (120M²)
- ROOF COLOURBOND SHEETS TO BE REPLACED
- ROOF TIE-DOWN STRUCTURE TO BE INSTALLED
- CLADDING TO BE REPLACED WITH 12MM SHADOWCLAD PLYWOOD



PLAN VIEW
1:100



ISOMETRIC VIEW

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1297 | BALLOON BUILDING

FF&E INDICATIVE ONLY

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

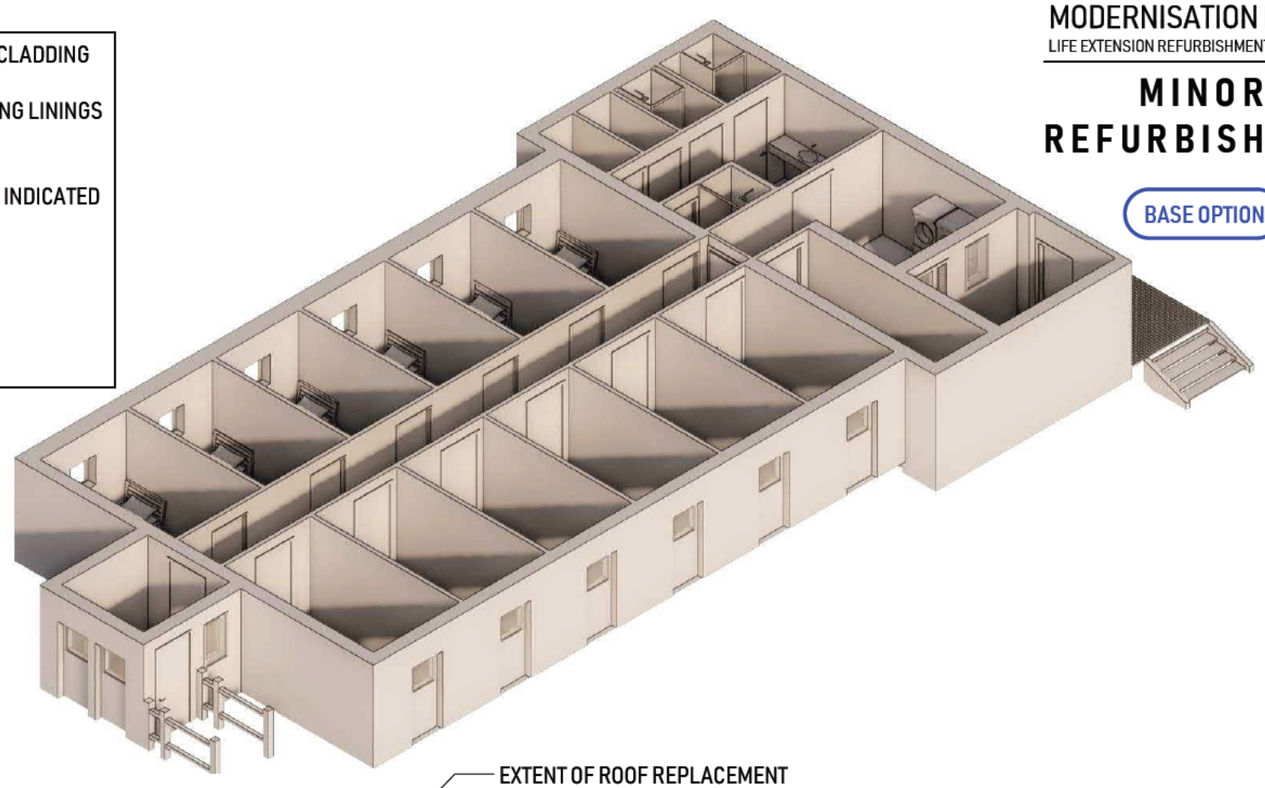
MINOR REFURBISHMENT

BASE OPTION

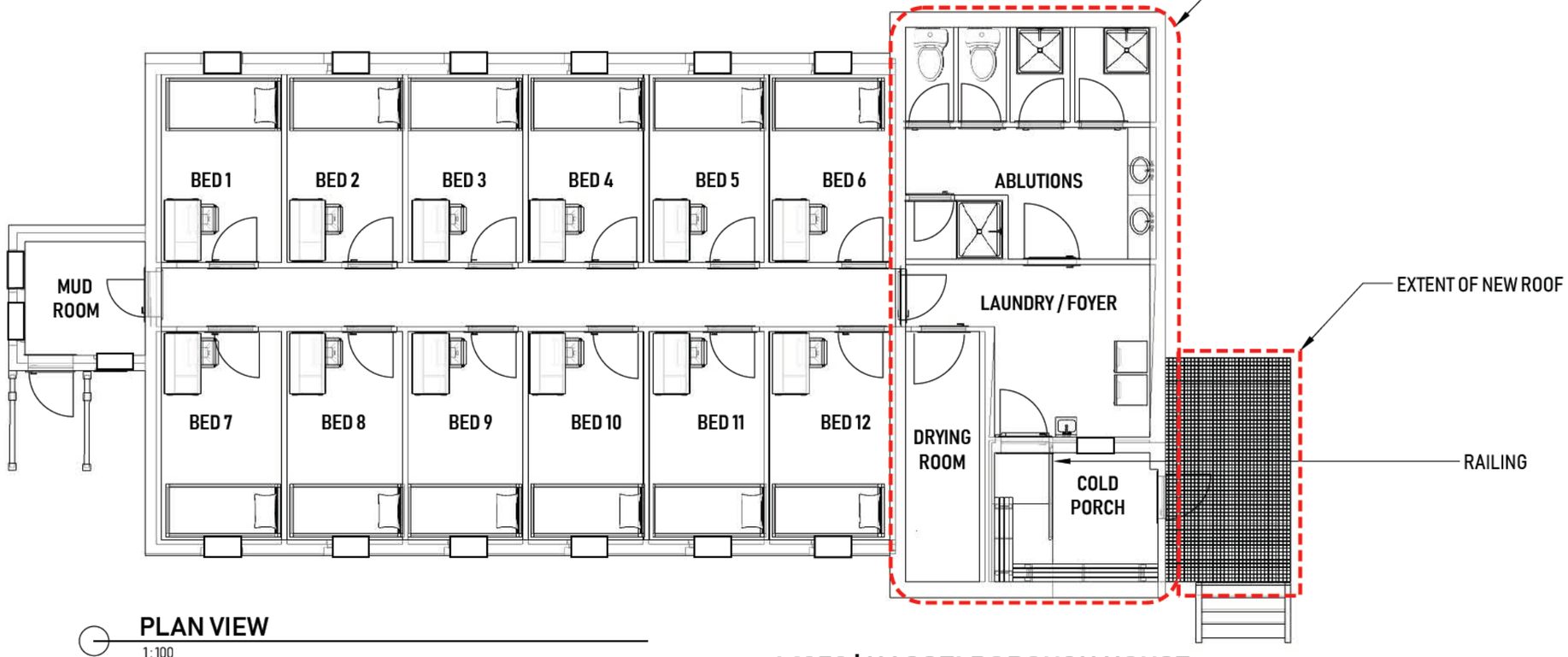
SITE LOCATION

BUILDING-WIDE WORKS

- REMOVE ASBESTOS UNDER TIMBER CLADDING
  - (20M²)
- REMOVE ASBESTOS IN WALL & CEILING LININGS
  - (1010M²)
- ALL WINDOWS TO BE REPLACED
- ROOF TO BE REPLACED IN AREAS AS INDICATED
- COMPLETE ELECTRICAL REWIRE
- NEW WALL & CEILING LININGS
- NEW HYDRAULICS AS REQUIRED
- NEW JOINERY
- NEW FF&E
- NEW FLOOR COVERINGS



ISOMETRIC VIEW



PLAN VIEW
1 : 100

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1252 | HASSELBOROUGH HOUSE

FF&E INDICATIVE ONLY

MACQUARIE ISLAND
MODERNISATION PROJECT
LIFE EXTENSION REFURBISHMENT AND RENEWAL

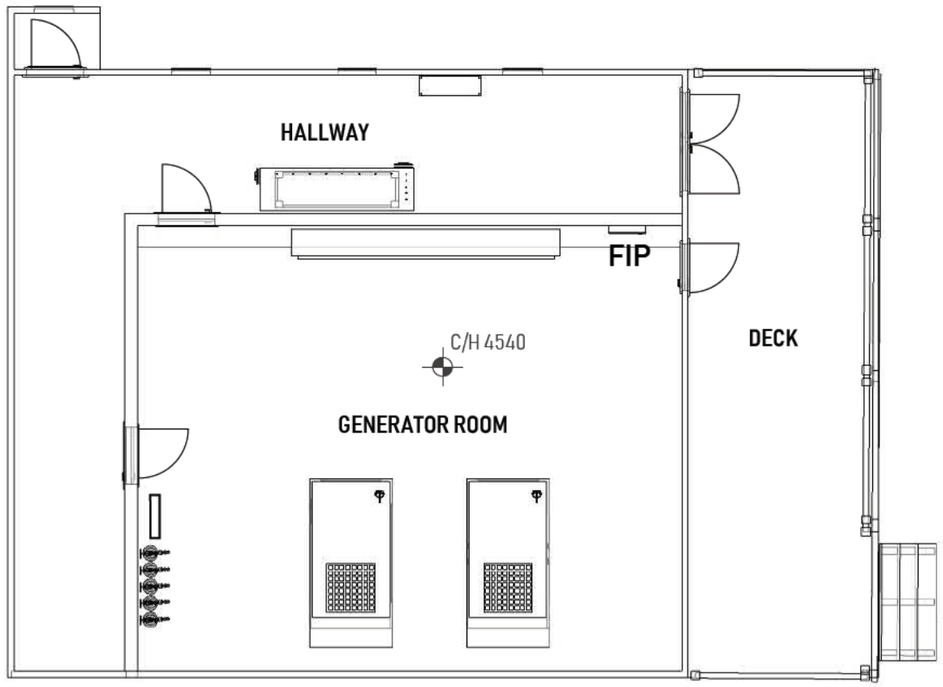
MINOR REFURBISHMENT

BASE OPTION

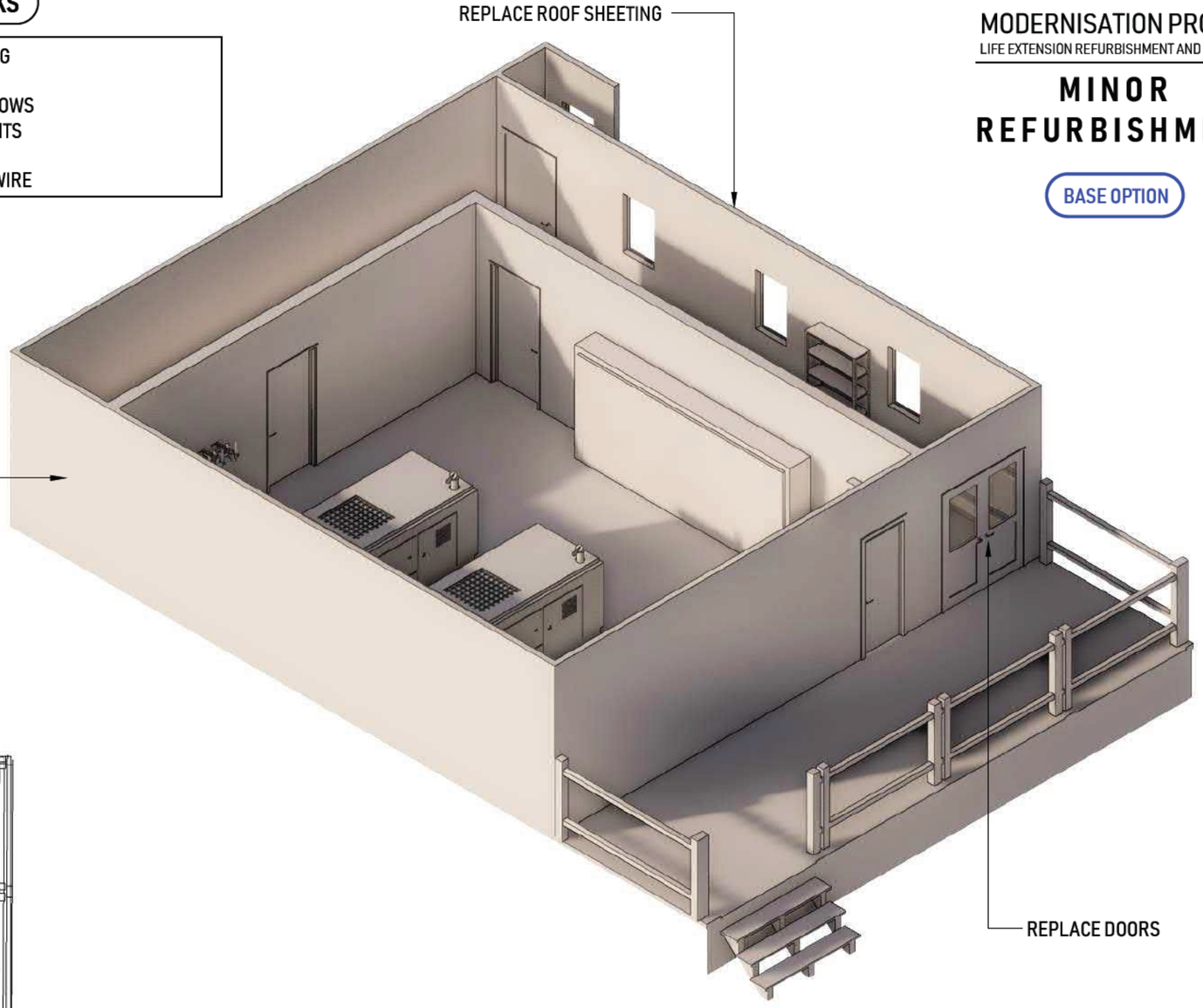
SITE LOCATION

BUILDING-WIDE WORKS

- CLEAN AND TREAT CLADDING
- REPLACE ROOF SHEETING
- REPLACE DOORS AND WINDOWS
- REPLACE / RESEAL SKYLIGHTS
- RESEAL COLD PORCH DOOR
- COMPLETE ELECTRICAL REWIRE



PLAN VIEW
1:100



ISOMETRIC VIEW

NORTH

CONCEPT DRAWING
This drawing is indicative only of the final proposed building layout and may be subject to change

L1953 | MAIN POWER HOUSE

FF&E INDICATIVE ONLY

NEW CONNECTIONS
- FROM ELEC DISTRIBUTION HUT – SOUTH TO:
  - ANARESAT VIA SCIENCE
  - INCINERATOR VIA MACHINERY SHED
  - FUEL FARM VIA MECH WORKSHOP
  - UTILITIES BUILDING (DIRECT)
  - BALLOON BUILDING (DIRECT)

ELECTRICAL DISTRIBUTION HUT – SOUTH
S NGLE MAIN SWITCHBOARD WITH SPARE CAPACITY FOR REASONABLE EXPANSION, INCLUDING THE POTENTIAL CO NECTION OF SOLAR RENEWABLES

ELECTRICAL DISTRIBUTION HUT – NORTH
S NGLE AIN SWITCHBOARD WITH SPARE CAPACITY F R R ASON BLE EXPANSION, NCLUD NG THE POTENTIAL C NNEC OLAR RENEWABLES

BACKUP SATCOM

HASSELBOROUGH BAY

BUCKLES BAY

GARDEN BAY

STREET LIGHTS

HUT HILL +35

NEW CONNECTIONS
- FROM ELEC DISTRIBUTION HUT – NORTH TO:
  - MACERATOR PUMP (DIRECT)
  - HYDROPONICS (DIRECT)
  - MESS AND LIVING (DIRECT)

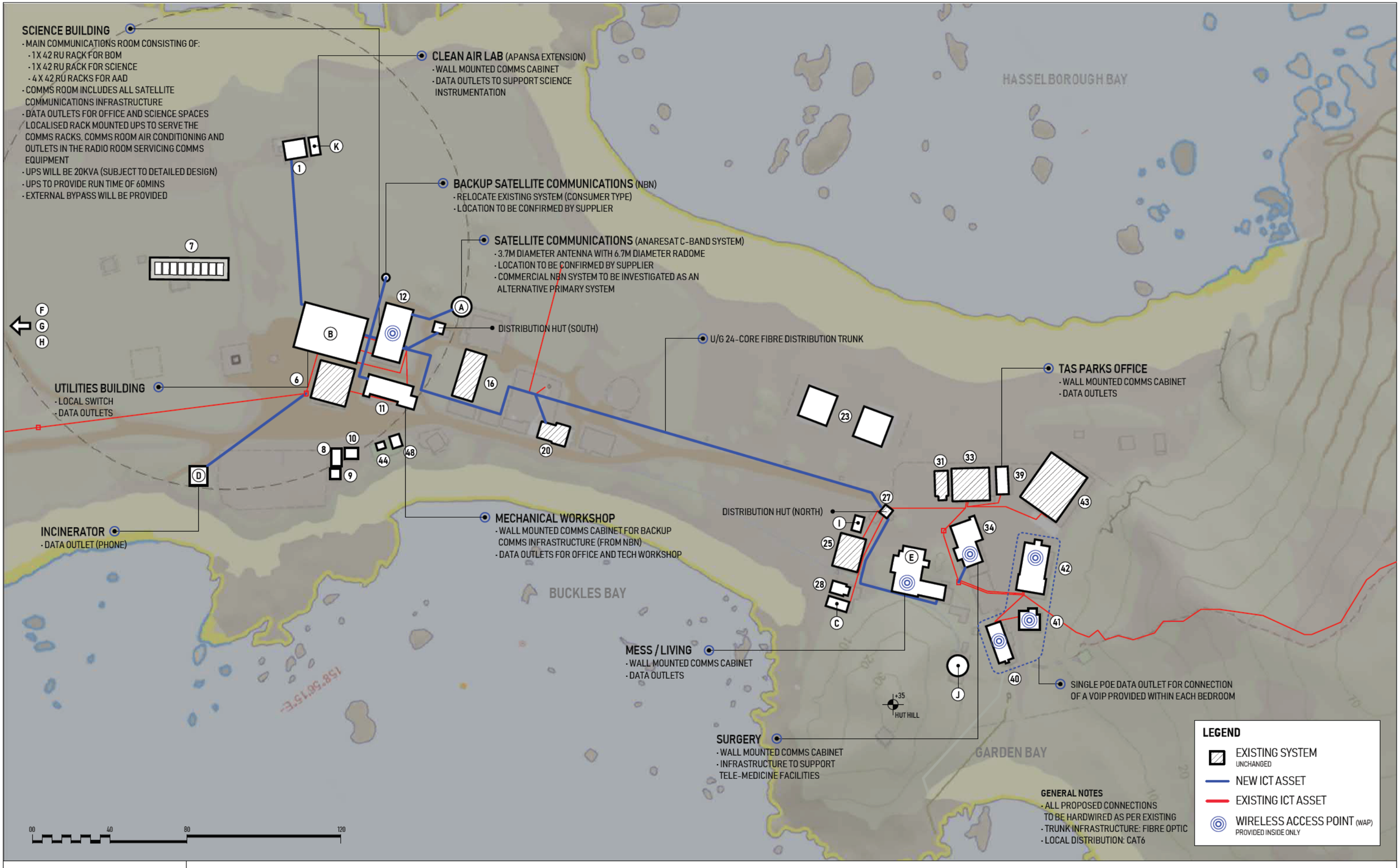
LEGEND
- EXISTING SYSTEM UNCHANGED
- NEW ELECTRICAL ASSET
- EXISTING ELECTRICAL ASSET
- REDUNDANT ASSET

00 40 80 120

MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT
L FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED ELECTRICAL LAYOUT

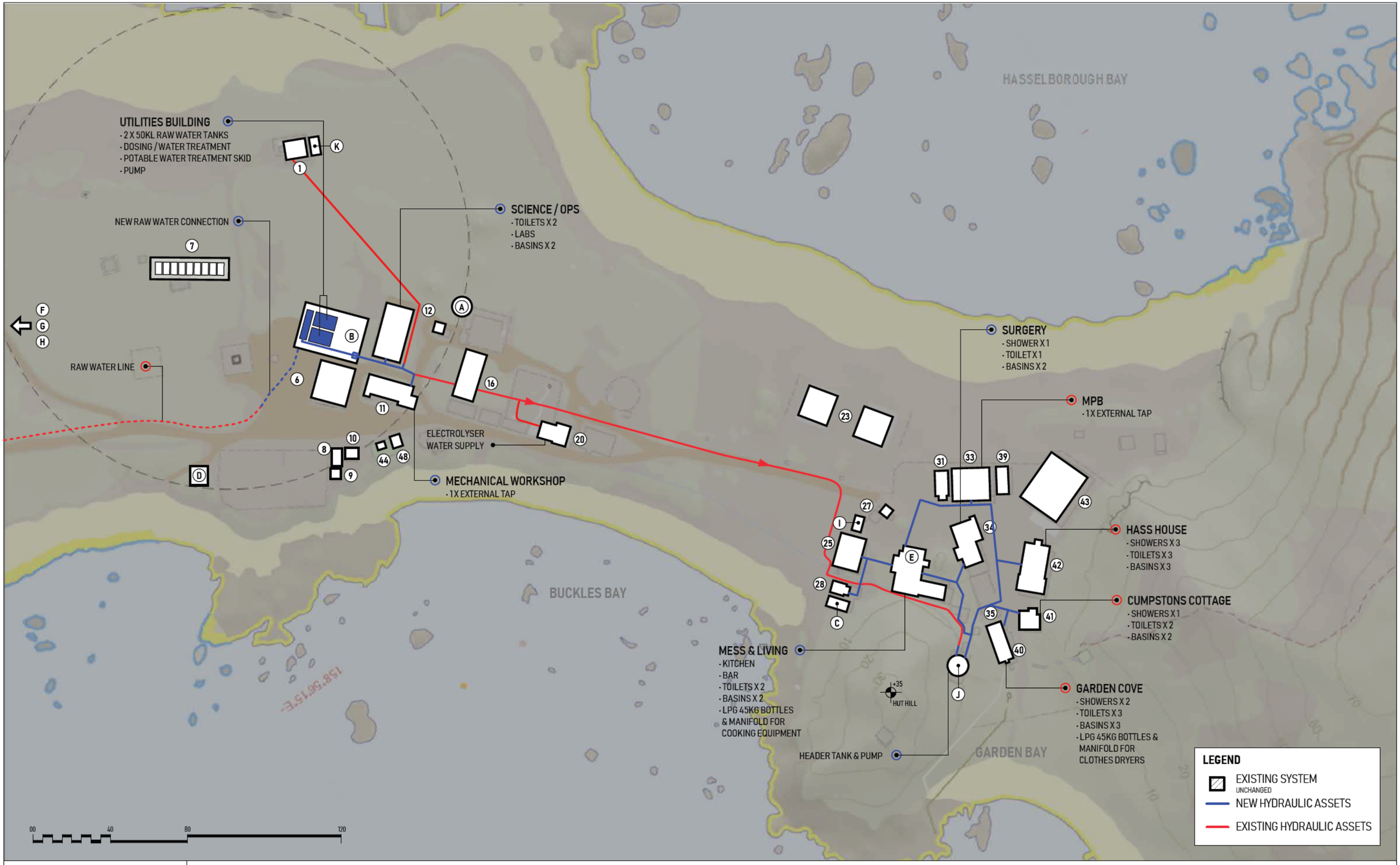


MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

L. FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED ICT LAYOUT

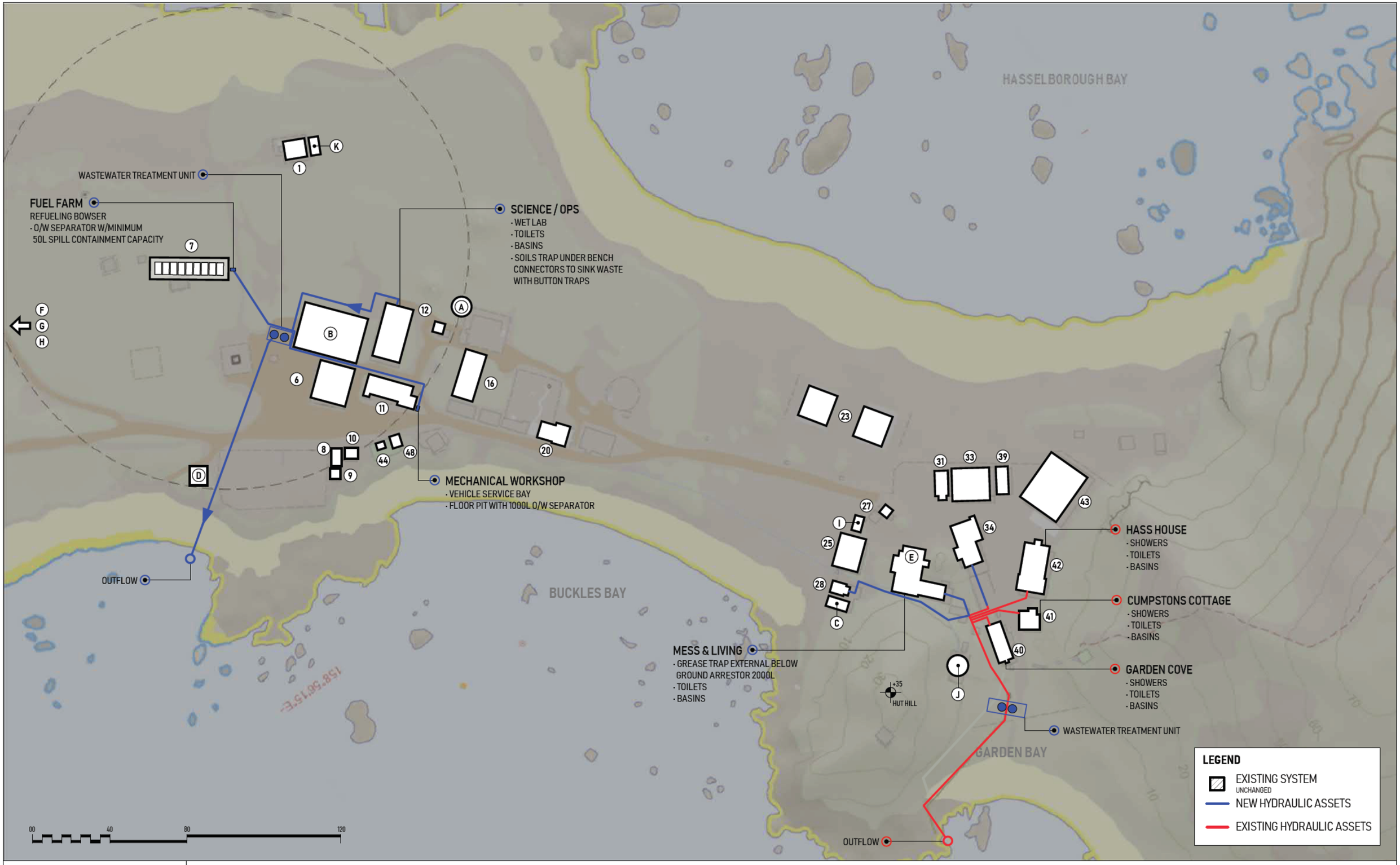


MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

L FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED WATER (POTABLE) LAYOUT



MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

L FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED SEWERAGE LAYOUT

HASSELBOROUGH BAY

BUCKLES BAY

GARDEN BAY

SCIENCE / OPS
- 160LT ELECTRIC HW HEATER

SURGERY
- 160LT ELECTRIC HW HEATER

HASS HOUSE
- 300LT ELECTRIC HW HEATER

CUMPSTONS COTTAGE
- 300LT ELECTRIC HW HEATER

GARDEN COVE
- 300LT ELECTRIC HW HEATER

MESS & LIVING
- 400LT ELECTRIC HW HEATER

+35
HUT HILL

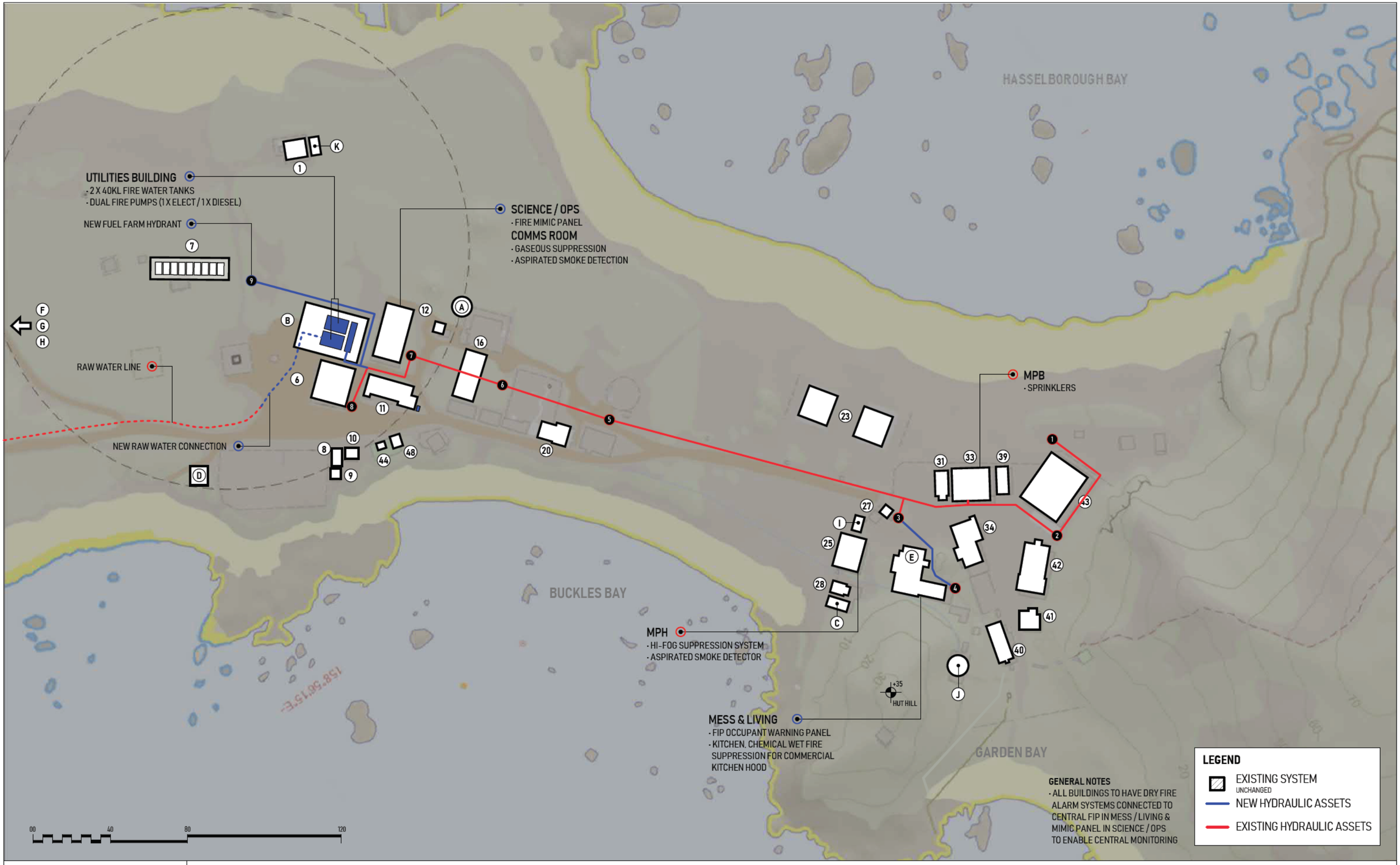
LEGEND
- EXISTING SYSTEM UNCHANGED
- NEW HYDRAULIC ASSETS
- EXISTING HYDRAULIC ASSETS

00 40 80 120

MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT
L FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED DOMESTIC HOT WATER LAYOUT

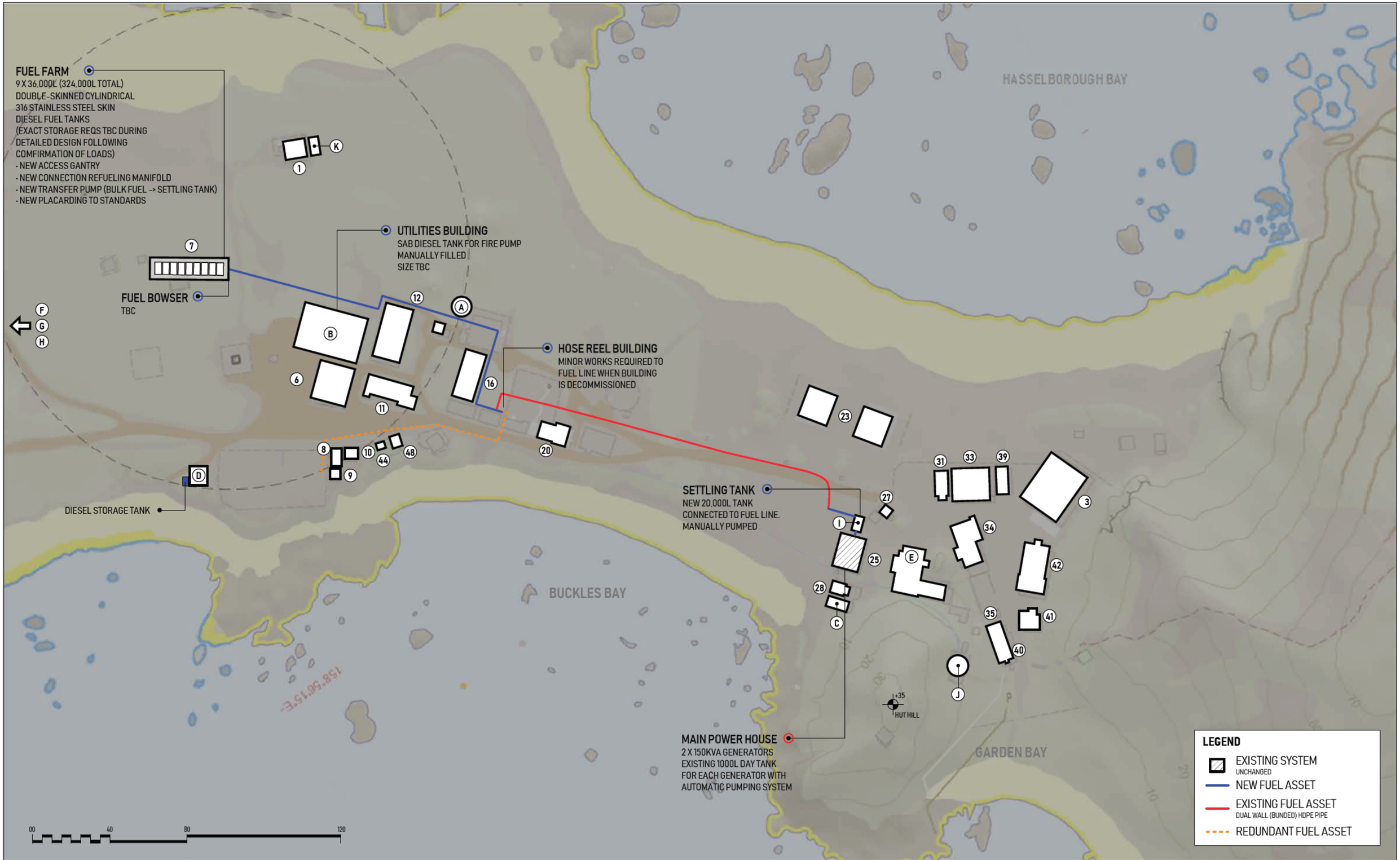


MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

L FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED FIRE PROTECTION LAYOUT



MACQUARIE ISLAND RESEARCH STATION

MODERNISATION PROJECT

L FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED FUEL LAYOUT

CLEAN AIR LAB
- EXISTING ELECTRICAL FLOOR HEATING
- NO HEATING IN ARPANSA RADIONUCLIDE ROOM

UTILITIES BUILDING
DEDICATED PACKAGE AIR-COOLED REFRIGERATE SYSTEMS PROVIDING HEATING AND CENTRAL SUPPLY AIR TO SEPARATE SCIENCE & OFFICE ZONES
- WET LAB: DUCTED FUME CUPBOARD 1800MM
- COMMS ROOM: DEDICATED SPLIT SYSTEM

SCIENCE BUILDING
DEDICATED PACKAGE AIR-COOLED REFRIGERATE SYSTEMS PROVIDING HEATING AND CENTRAL SUPPLY AIR TO SEPARATE SCIENCE & OFFICE ZONES
- WET LAB: DUCTED FUME CUPBOARD 1800MM
- COMMS ROOM: DEDICATED SPLIT SYSTEM

MESS / LIVING
- DUCTED HEATING HOT WATER AHU PROVIDING TEMPERED OUTSIDE AIR FOR OCCUPANTS AND MAKEUP AIR FOR KITCHEN HOOD
- HYDRONIC WALL-MOUNTED PANEL HEATERS THROUGHOUT SPACES
- KITCHEN - COMMERCIAL KITCHEN EXHAUST SYSTEM

BALLOON BUILDING
- WALL-MOUNTED ELECTRIC PANEL HEATER
- ROOF-MOUNTED MECHANICAL EXHAUST FANS WITH WALL-MOUNTED LOW LEVEL INTAKE LOUVERS

TAS PARKS OFFICE
- DUCTED HEATING HOT WATER PROVIDING TEMPERED OUTSIDE AIR FOR OCCUPANTS
- HYDRONIC WALL MOUNTED PANELS THROUGHOUT SPACE

INCINERATOR BUILDING
- NATURALLY VENTILATED DOORS WITH INTAKE AIR LOUVERS
- ROOF H COWL EXHAUST

GREEN STORE
- NATURAL VENTILATION WITHIN STORAGE AREA
- ELECTRICAL PANEL HEATING IN OFFICE

MECH WORKSHOP
- DUCTED SPLIT AIR-COOLED REFRIGERATE SYSTEM
- DEDICATED CEILING MOUNTED FCUS IN TECH WORKSHOP AND OFFICE. SPILL AIR SUPPLIED TO WORKSHOP
- MECHANICAL EXHAUST AT HIGH LEVEL THROUGH WORKSHOP WALL

NEW PIPING
- NEW HHW FLOW & RETURN CONNECTION TO TAS PARKS OFFICE FROM MPB

DG STORES
- NATURALLY VENTILATED DOORS / WALL INTAKE AIR LOUVERS
- ROOF H COWL EXHAUST

HASS HOUSE
- DUCTED HEATING HOT WATER FCU PROVIDING TEMPERED OUTSIDE AIR FOR OCCUPANTS
- EXISTING HYDRONIC WALL MOUNTED PANEL HEATERS WITHIN EACH BEDROOM

NEW PIPING
- NEW HHW FLOW & RETURN BELOW GROUND PIPEWORK BEHIND SAD, ALLOWING CONSTRUCTION OF NEW MESS / LIVING

GARDEN COVE
- DUCTED HEATING HOT WATER FCU PROVIDING TEMPERED OUTSIDE AIR FOR OCCUPANTS
- EXISTING HYDRONIC WALL MOUNTED PANEL HEATERS WITHIN EACH BEDROOM

SURGERY
- HYDRONIC ZONED HEATING HOT WATER AHU PROVIDING CONDITIONED OUTSIDE AIR FOR OCCUPANTS
- HYDRONIC WALL MOUNTED PANEL HEATERS
- NEGATIVE/POSITIVE AIR PRESSURE REGIME FOR MEDICAL SPACES
- OPERATING THEATRE LAMINAR AIR FLOW SYSTEM
- MEDICAL GASES
- MEDICAL SUCTION / VACUUM SYSTEM

NEW PIPING
- NEW HHW FLOW & RETURN TO BRIDGE EXISTING

HASSELBOROUGH BAY
BUCKLES BAY
GARDEN BAY
HUT HILL +35

LEGEND
- EXISTING SYSTEM (UNCHANGED MECHANICAL SERVICES)
- NEW HEATING HW FLOW & RETURN
- EXISTING HEAT NG HW FLOW & RETURN

00 40 80 120

MACQUARIE ISLAND RESEARCH STATION
MODERNISATION PROJECT
L. FE EXTENSION REFURBISHMENT AND RENEWAL

PROPOSED HEATING & HVAC LAYOUT