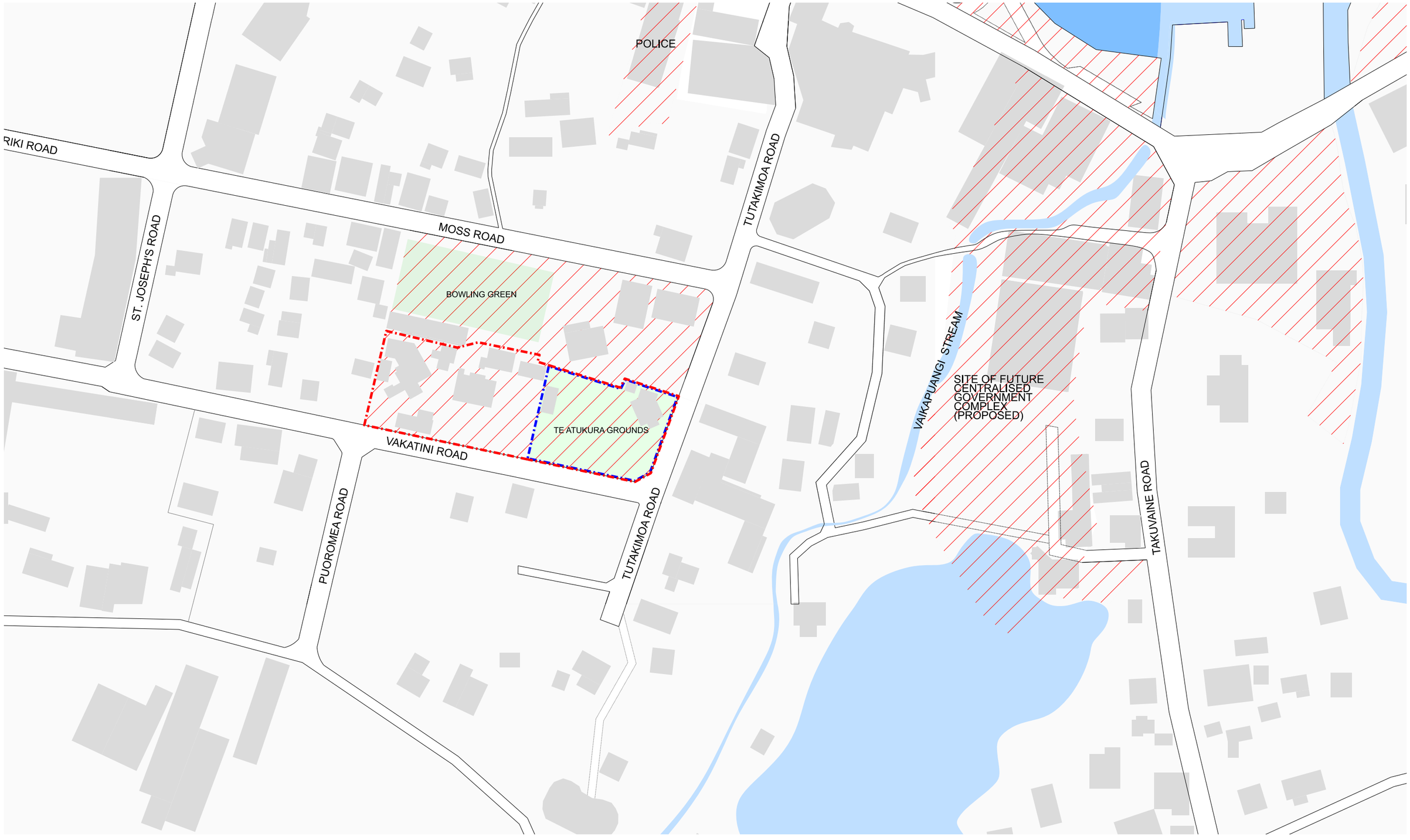
# Concept Masterplan Design Development Report

## National Emergency Operations Centre (NEOC)

## February 2023

This document outlines the design process undertaken to reach Concept-level proposals for the new NEOC building and surrounding site. It should be read in conjunction with the **Concept Masterplan Summary Report**



# Contents

# Contents

# Background & Purpose

## Brief, Objectives & Future Development
## 1:2500 @ A3

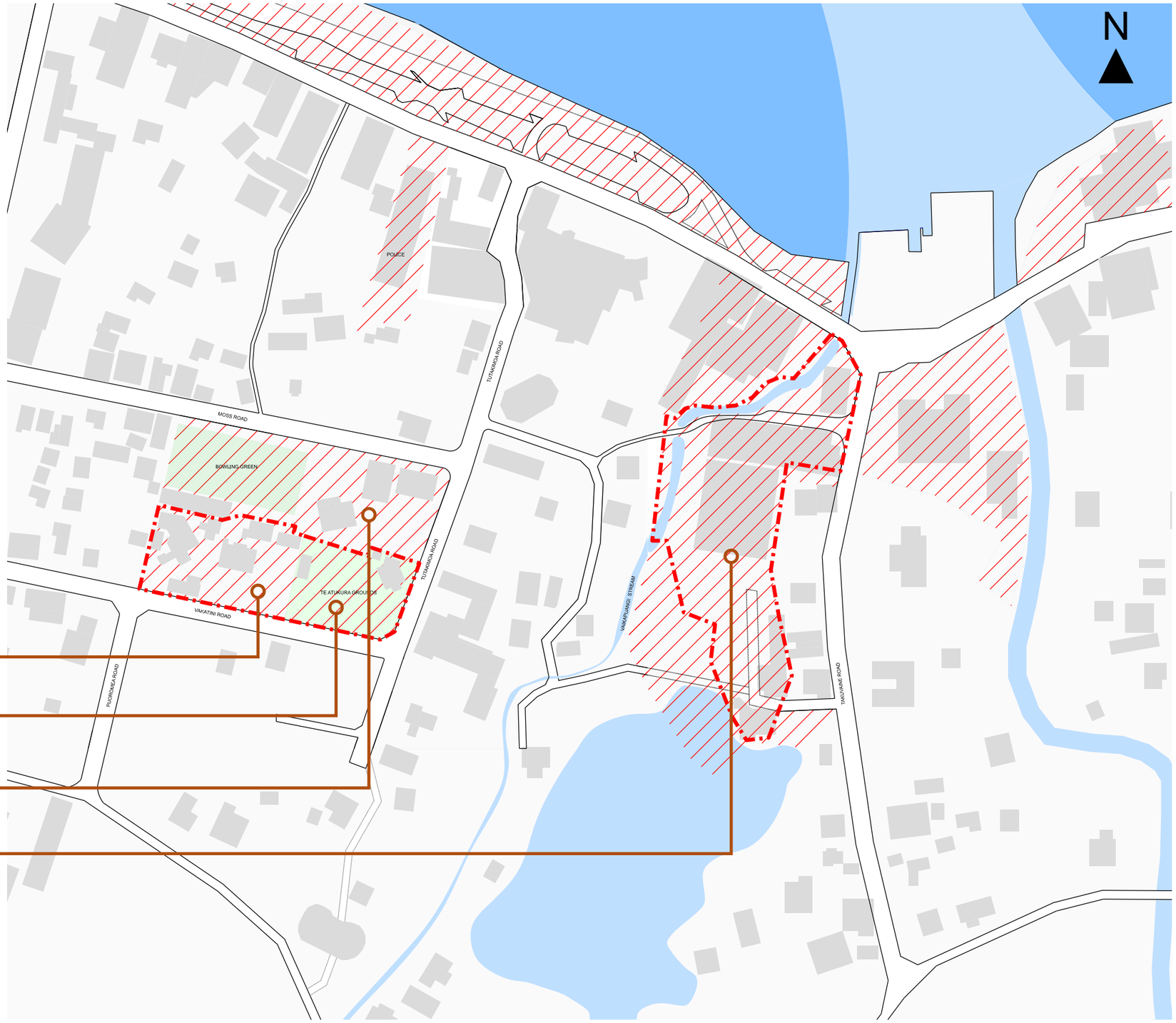
***CIIC, in conjunction with the Office of the Prime Minister (OPM), wish to construct an administrative building to Cook Islands Building Code cyclone category 5 standard that combines the following OPM divisions - Chief of Staff, Disaster & Emergency Management (EMCI), and National Security.***

### Existing OPM Compound

The Office of the Prime Minister maintains critical and sensitive functions of government. The OPM compound covers an area of approximately 150m x 50m including Te Atukura Grounds. It suffers from a legacy of poor upkeep and maintenance. The compound hosts ten OPM divisions within a sprawling complex of buildings that are now decades old with aging wooden or colonial style limestone structures that are nearing their end of life.

### Future Development

It is anticipated that most of the ten OPM divisions will eventually be relocated to the centralised government complex, which is proposed for construction at Vaikapuangi - away from the current OPM site. The remaining divisions will be housed in an efficient, purpose-designed layout within the existing OPM compound.



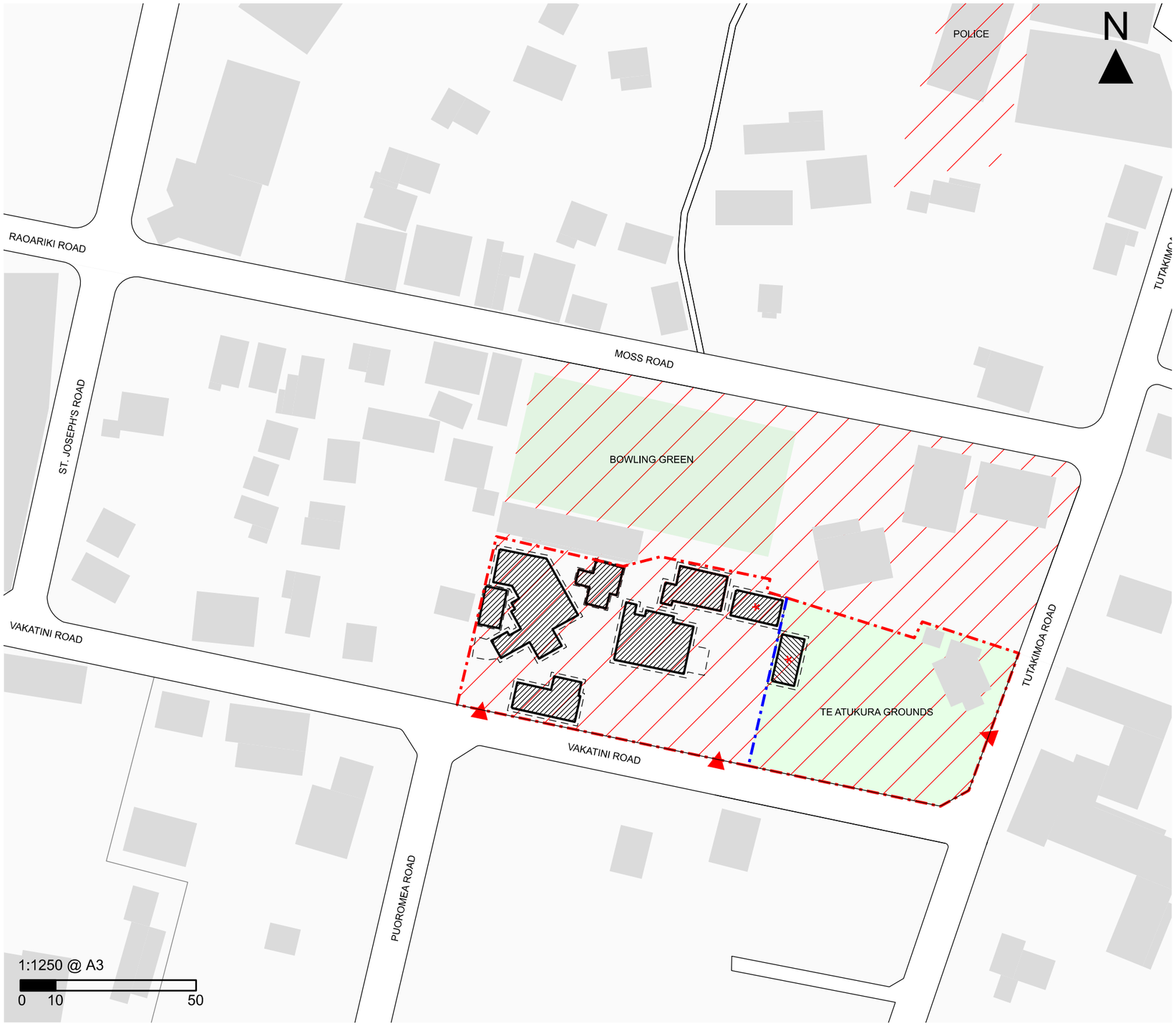
# Site Analysis

## Existing Block Plan
## 1:1250 @ A3

The existing OPM compound is situated on Tutakimoa 10 (hatched red) - a parcel of Crown Land edged by Moss Road to the North, Tutakimoa Road to the East and Vakatini Road to the South. To the West, there is an area predominantly comprising of private residences.

The site under consideration sits within Lease No. 1095 - (edged by the red site boundary.)

There is a notional separation between Te Atukura Grounds and the existing OPM site (blue boundary line). It should be noted that there are future ambitions to relocate parliament to the Te Atukura Grounds site. As a result, any masterplan proposals that occupy land on these grounds should be programmed to vacate the site ahead of commencement of the new Parliament construction.




CROWN LAND

LAND WITHIN LEASE No. 1095

EXISTING SITE ACCESS

BUILDINGS WITHIN OPM COMPOUND (FROM ROMANI + KATOA SITE SURVEY No. A902 )

BOUNDARY BETWEEN OPM COMPOUND & TE ATUKURA GROUNDS (FROM ROROCAD)

INDICATIVE LOCATION OF SURROUNDING BUILDINGS

APPROXIMATE LOCATION OF NEW PA ENUA & ICT BUILDING (to be verfied by updated survey)

# Site Analysis

## Key Plan & Phasing Strategy

The OPM Compound currently houses the following Government functions:

**1. EMCI**

**2. Deputy Prime Minister**

**3. Old Pa Enua Building**

**4. Climate Change**

**5. Office of the Prime Minister**

**6. National Security & Chief of Staff**

**7. ICT Building**

**8. New Pa Enua Building**

It is anticipated that the old Pa Enua building will be demolished ahead of commencement of construction of the new National Security/EMCI building (NEOC).

Upon completion of the new NEOC building, National Security and EMCI will relocate. Their existing buildings will be moved off site. Attention should be paid to continuity of EMCI and NS operations over the construction phase of the new NEOC

Construction of the new Centralised Government Complex at Vaikapuangi is likely to commence following the completion of the new NEOC building. ICT, Climate Change and Pa Enua buildings will remain on site until this point, before being rehoused in the new facility. Their existing buildings will be relocated off site at this time.

There is a long-term ambition to move Parliament to the Te Atukura Grounds. Once this development is complete, the remaining buildings (Deputy Prime Minister) will relocate to the new facility. The existing building is likely to be demolished at this point - but internal discussions have indicated that this demolition could be brought forward if it leads to more appropriate siting of the NEOC.

# New Building Location

## Key Considerations

**Site**

It is acknowledged that the site itself (Lease No. 1095, Tutakimoa 10 - "The OPM Compound") suffers from seasonal flooding and is particularly vulnerable to high rainfall events.

Following internal discussions, the possibility of establishing the NEOC in a less flood-prone area of the island was excluded owing to land constraints. Given this, the task is to locate the building appropriately within the confines of the site; acknowledging the need to limit flood risk and manage logistics of relocating various departments before, during and after the completion of the new facility.

This means considerations should be given not only to the NEOC itself, but also the adjacent spaces, which could be used as part of a landscape strategy to attenuate, store and divert flood waters. Additionally, allowances for stepped and ramped access to the new building should be noted when defining the location of the building within the site. The new building must be raised above both current and future projected flood levels to account for the impact of climate change and increasingly-frequent extreme weather events over the lifespan of the building.

**Location within Established Lease Boundary**

Internal discussions have determined that, given the level of investment and an ambition to create an exemplary new facility, the location of the NEOC within the compound should be largely on the basis of suitability in line with the following considerations:

- Ability to harmonise with the existing OPM heritage building - both in terms of massing and architectural style

- Provision of adequate space allowances for the required functions (at this stage, these are based on the allowances established by the previous proposal presented by LT Building services in 2021)

- Acknowledgement of the need for future expansion

- Logical circulation for visitors, VIP's, the PM and pedestrians, as well as emergency vehicles and construction vehicles

- Meaningful visitor sequence for processing guests visiting both the new NEOC and the OPM building

- Allowance for a direct link to the OPM for use by the PM in emergency events

- Challenges associated with demolition of existing buildings, temporary (and permanent) rehousing of staff, and space for construction activities whilst limiting disruption to departments

- Security concerns associated with proximity to boundaries with publicly-accessible buildings and land

**Previously-proposed Location**

The following pages assess the suitability of both the current and alternative locations for the NEOC within the compound. Of note is that since the formulation of the previous proposal, the new ICT and linked Pa Enua buildings have been constructed, occupying part of the proposed footprint of the NEOC. This determines that use of the previous location would necessitate the relocation of the new ICT building. However, the overarching concern expressed by CIIC is to find the optimal site, so this new development does not preclude the use of this area of the site per se.

Of greater significance, however, is the way in which the previously-proposed location is constrained by the existing OPM building - which will remain on site. More detailed exploration would be required to establish whether stepped and ramped entry and suitable emergency vehicle circulation past the new NEOC would be possible whilst maintaining adequate space allowances in line with the brief.

For these reasons, alternatives are explored in the following pages.

**Sequencing**

Provisions outlined on the previous page are on the basis of the current strategy - namely:

1. Demolition of Old Pa Enua Building

2. Construction of new NEOC

3. Demolition/relocation of existing EMCI & NS Buildings

4. Construction of new Government Complex (Vaikapuangi)

5. Climate Change, ICT and New Pa Enua relocated to new complex

6. Potential relocation of Parliament to Marine Resources site; with Te Atukura becoming shared OPM/Parliament grounds

7. Relocation of final buildings and departments, with only the existing OPM heritage building and new NEOC remaining

It was discussed, however, that this strategy might be altered to include the temporary relocation of the Deputy Prime Minister and associated staff currently accommodated within building #2 in order to free a new site which may prove more suitable.

**Te Atukura Grounds**

Te Atukura Grounds currently fall under the same lease as OPM, with a notional separation given by the dashed blue line shown on the previous page. Part of the grounds are already used for informal car parking and the new ICT building currently sits to the East of the notional boundary. For these reasons, consideration can be given to continued use of the grounds in the interim - perhaps for temporary re-housing of departments or additional car parking.

NB: Any temporary buildings proposed as part of the masterplan strategy should be considered notional only. These fall outside of the brief for this masterplan report and will need to be considered separately. It may be that displaced departments can be housed in existing facilities already available on the island, or that any notional new building(s) are sited elsewhere.

# New Building Location

## Option 3B: North-West of Site
## Single Stage NEOC Construction

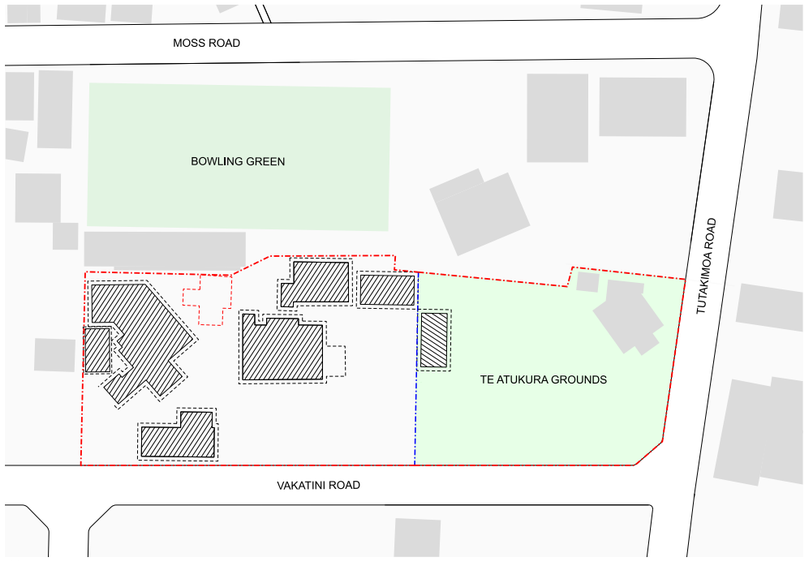
Option 3B proposes temporarily rehousing Deputy Prime Minister and associated staff to free up the most suitable site for the building.

This approach will allow the building to be sited clear of the boundaries, reducing security vulnerabilities and allowing for a perimeter road.

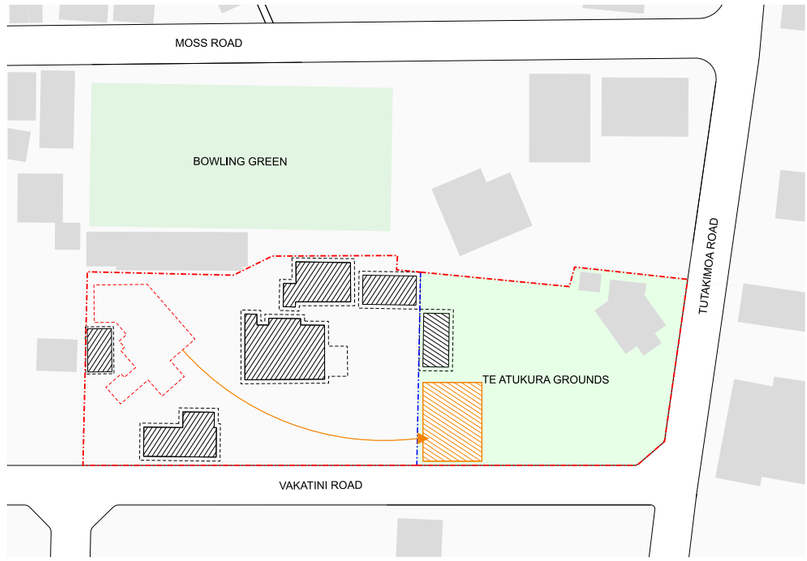
The relationship with the existing OPM Building is more sympathetic and lends to the establishment of a second green to the West of the OPM building, improving the setting of both buildings.

The new building will be built in one stage, limiting logistical challenges during construction.

Careful attention will need to be paid during the construction phase to limit disturbance to EMCI




^ **Site Layout Prior to Commencement (Old Pa Enua Building Demolished)**



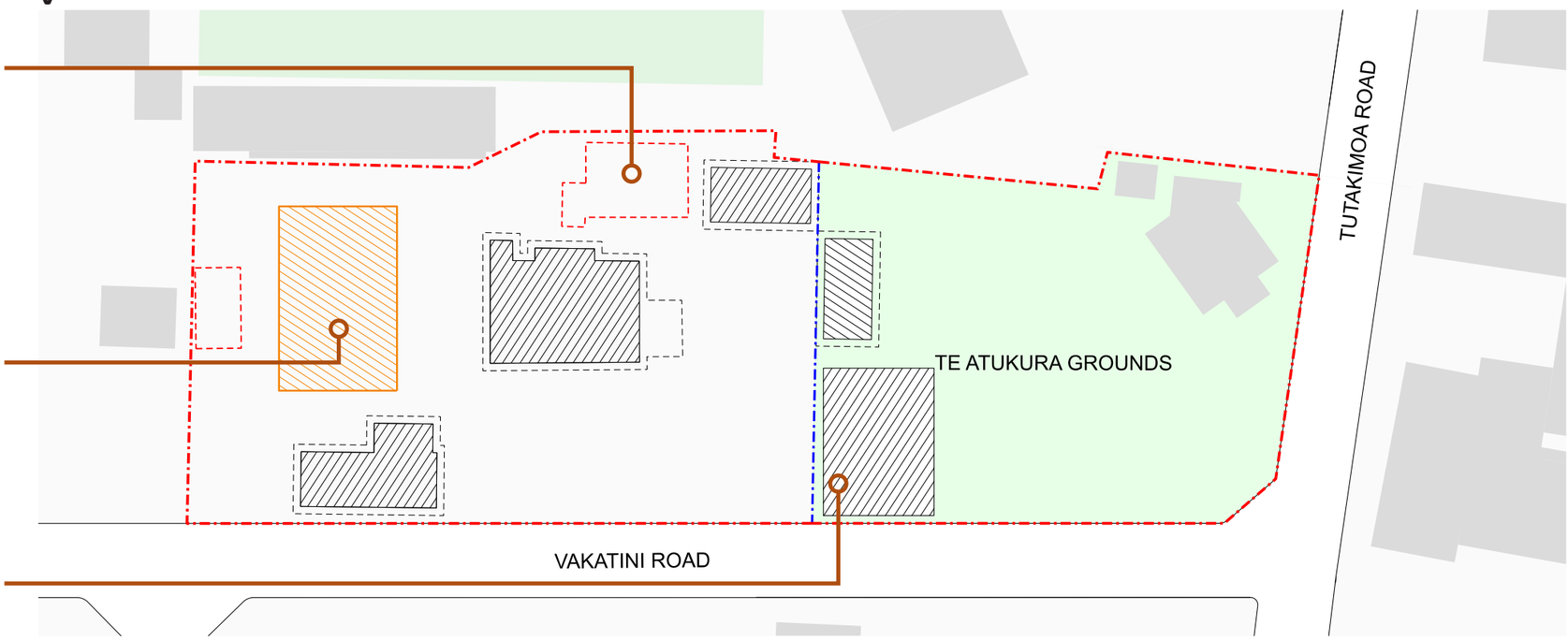

^ **Deputy Prime Minister Rehoused in Temporary Facility (location TBC)**

v **National Security & EMCI Relocate to New Building**

National Security/Chief of Staff building relocated off site following completion of new building

New building built in one phase. Offset from boundaries to enhance security, reduce visual impact and allow for a perimeter road

Notional Relocation of Deputy Prime Minister & Associated Staff to Make Way for New Building



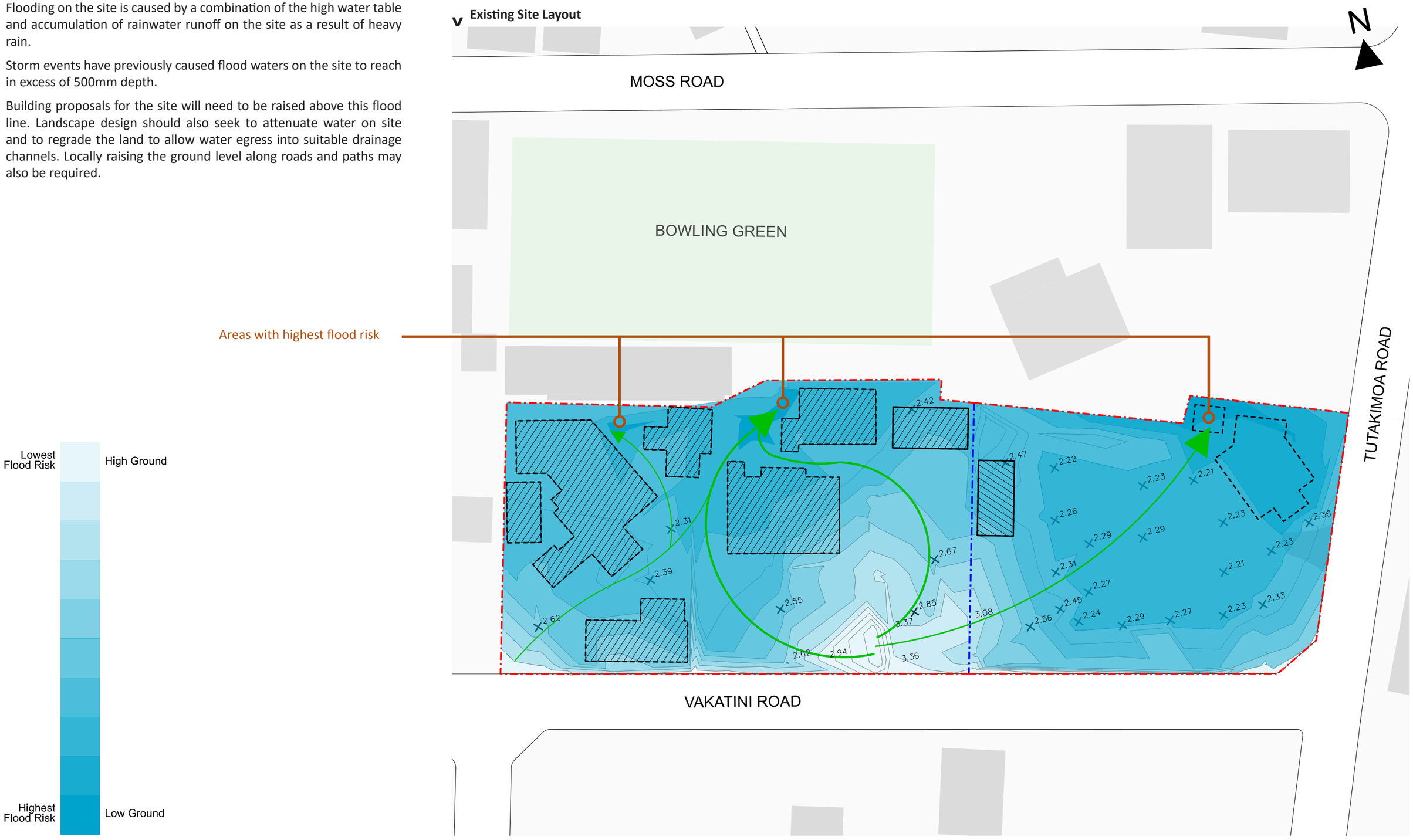
# Opportunities & Constraints

## Flood Risk - Existing Site Conditions

Flooding on the site is caused by a combination of the high water table and accumulation of rainwater runoff on the site as a result of heavy rain.

Storm events have previously caused flood waters on the site to reach in excess of 500mm depth.

Building proposals for the site will need to be raised above this flood line. Landscape design should also seek to attenuate water on site and to regrade the land to allow water egress into suitable drainage channels. Locally raising the ground level along roads and paths may also be required.



# Opportunities & Constraints

## Comparative Analysis - Flood Risk

The latest proposal (option 1) is located in one of the most flood-prone areas of the site. The risk of water ingress can be mitigated by raising the building above the flood line, but access to and from the building may still be problematic.

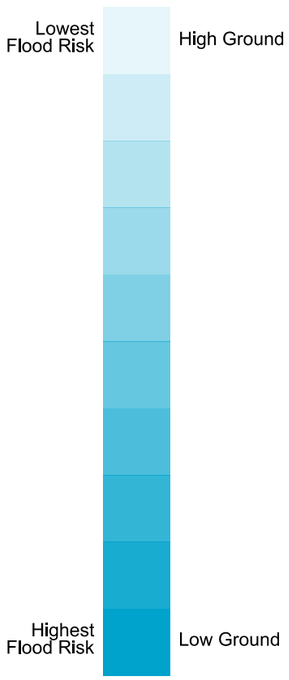
Given that EMCI will be under the greatest pressure during extreme weather events, it is critical that the building remains accessible and functional in these conditions. Locating the building on higher ground (option 2) will limit exposure to flood waters but, to achieve suitable resilience, a site-wide flood mitigation will need to be implemented.


**Option 1**

- Building located in low part of site; likely to experience significant flooding. Access to and from building likely to be waterlogged during periods of heavy rainfall


**Option 2**

- Building located on higher ground, but still subject to some risk of flooding. Access to and from building less likely to be waterlogged except during extreme rainfall events




**Option 3A**

- Building located on less flood prone area of site, with North-East of building most vulnerable


**Option 3B**

- Building on less flood prone area of site. Greater opportunity to manage surface water around perimeter of building owing to greater clearance from boundaries

# Opportunities & Constraints

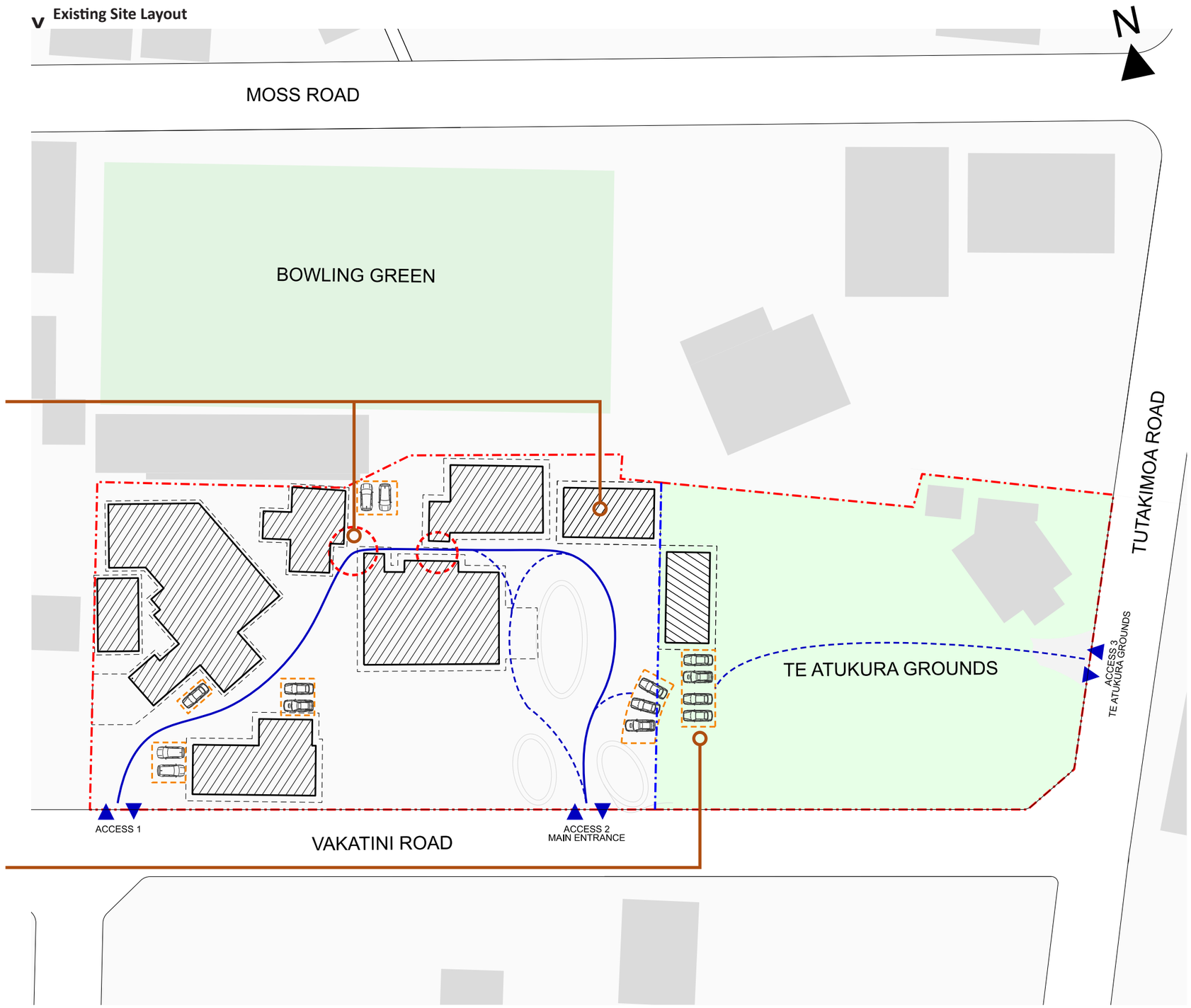
## Circulation & Parking - Existing Site Conditions

The approach to parking on site is ad hoc, with cars parked across the site and informal parking on the Te Atukura Grounds. The pinch points between the existing OPM building and the National Security/ Chief of Staff and Old Pa Enua make two-way circulation around the site problematic.

There is an opportunity to create more formal, distributed car-parking across the site, and to implement a one-way system to facilitate easier perimeter security checks. The one-way system would make security checks easier on entry as there would be only one entry point.

It may be possible to regularise parking on the Te Atukura Grounds in order to increase capacity. This would be on the understanding that the car parking would be relocated on completion of the new Parliament Complex.

Existing Site Layout




Reconfiguration of the site presents an opportunity to address pinch points and create one-way circulation

Opportunity to formalise parking either on Te Atukura Grounds (Parking to be relocated to current Deputy Prime Minister/Cabinet Services site following completion of new Parliament complex), or within existing OPM boundaries. Designated parking will ease circulation, avoid obstruction to emergency vehicles and enhance the visual qualities of the site.

# Opportunities & Constraints

## Comparative Analysis - Access & Circulation

### Option 1

If Option 1 is progressed, small changes to the proposed footprint will be required in order to ensure a minimum 4m road width in front of the building for emergency vehicle circulation. This will compress the building. Paired with the need for stepped and ramped access up into the raised building, this will have some significant layout implications.

In this option access to the building is always via a circulation route, and the building has limited opportunity for future expansion as it is constrained on all sides.

### Option 2

Option 2 makes use of parking on Te Atukura Grounds. Pinch points are eased, but emergency/construction vehicles would still take a sub-optimal route between the new building and the existing DPM building

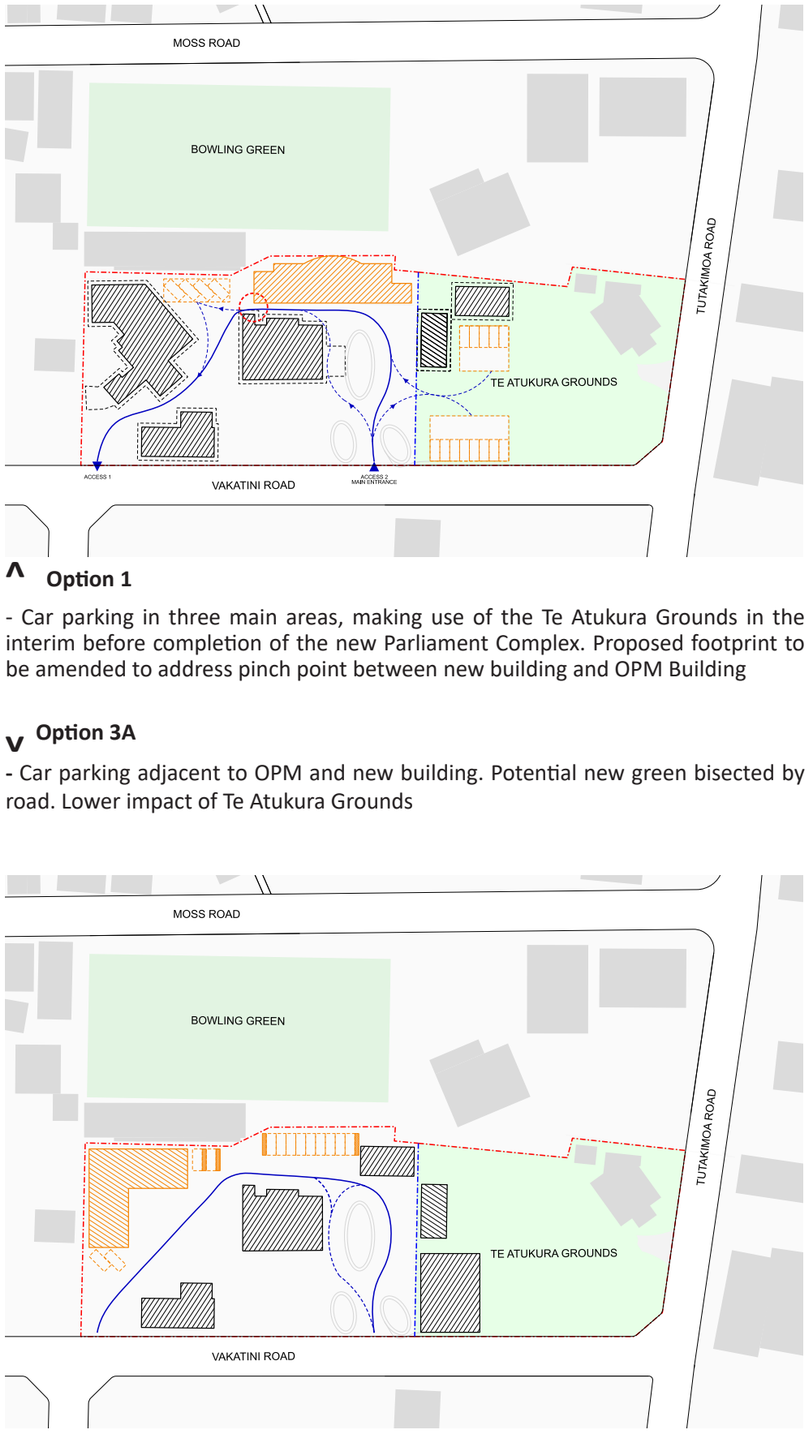
### Option 3A

Option 3A preserves the existing ceremonial route around the entrance for the PM, but regularises the circulation around the new building. This route allows sufficient space for emergency vehicles and footpaths for better pedestrian access around the site. However, the circulation route would create separation between the new building and the existing OPM building

### Option 3B

Option 3B pushes the circulation route to the perimeter. This allows a good relationship between OPM and the new building and an opportunity for a new green to enhance the setting of both buildings.

Security concerns to the perimeter area eased as the building is further from the public realm, and access during construction is improved.

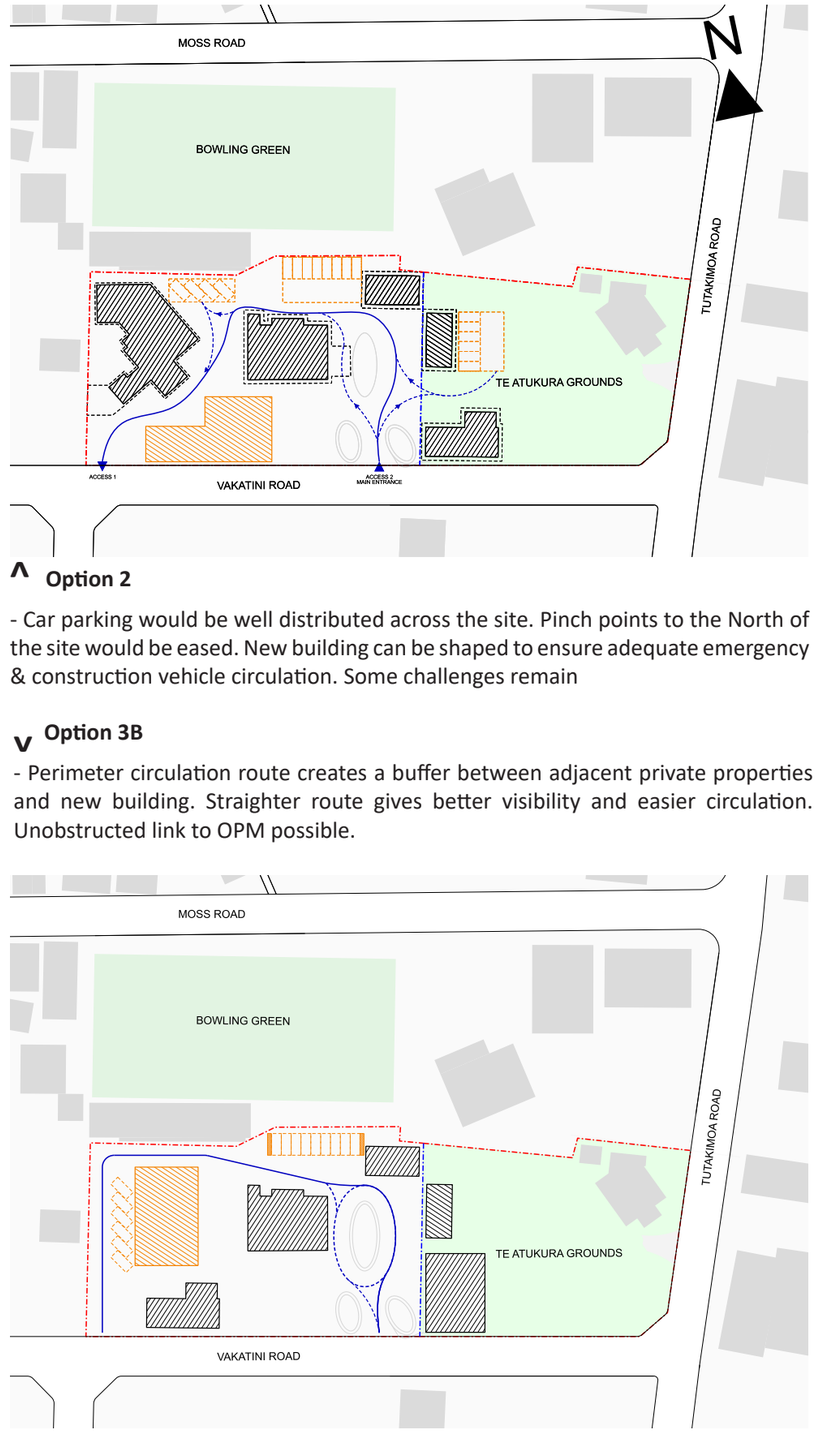



**^ Option 1**

- Car parking in three main areas, making use of the Te Atukura Grounds in the interim before completion of the new Parliament Complex. Proposed footprint to be amended to address pinch point between new building and OPM Building

**v Option 3A**

- Car parking adjacent to OPM and new building. Potential new green bisected by road. Lower impact of Te Atukura Grounds




**^ Option 2**

- Car parking would be well distributed across the site. Pinch points to the North of the site would be eased. New building can be shaped to ensure adequate emergency & construction vehicle circulation. Some challenges remain

**v Option 3B**

- Perimeter circulation route creates a buffer between adjacent private properties and new building. Straighter route gives better visibility and easier circulation. Unobstructed link to OPM possible.

# Opportunities & Constraints

## Landscape - Existing Condition

Notable landscape features on the site include:

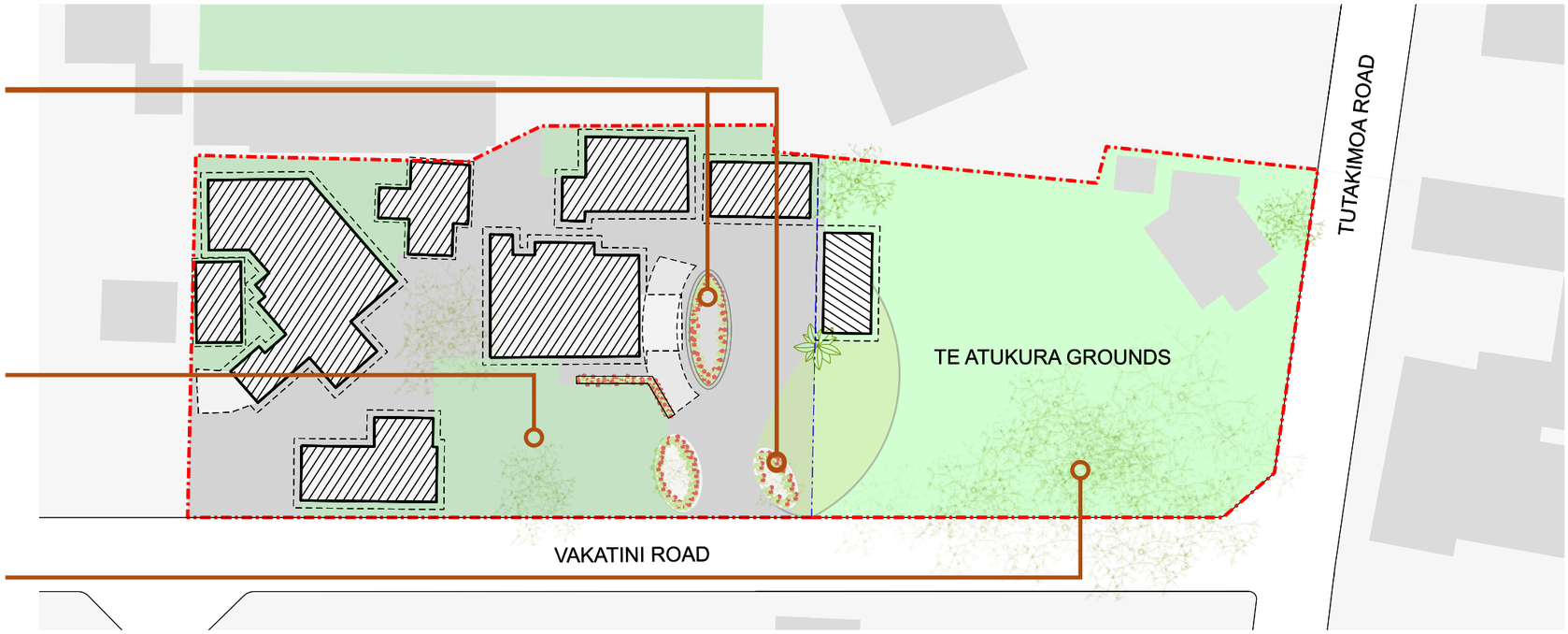
- A green to the South of the existing OPM building, edged to the West by the Climate Change Building

- A cluster of mature trees in the South-East corner of the Te Atukura Grounds

- Raised, oval planters framing the entrance and forming part of a ceremonial entrance to the front of the Office of the Prime Minister building

- Expanses of gravel road, forming the primary circulation route around the site, as well as informal parking on the wider sections of road


Landscape Overlay (Drone Capture August 2021)




Raised planters marking the entrance to the OPM building and framing the entrance to the site

Formal green in front of OPM

Cluster of mature trees in the South-East corner of Te Atukura Grounds

# Opportunities & Constraints

## Site Layout Opportunities - Option 3B
## Phase 1

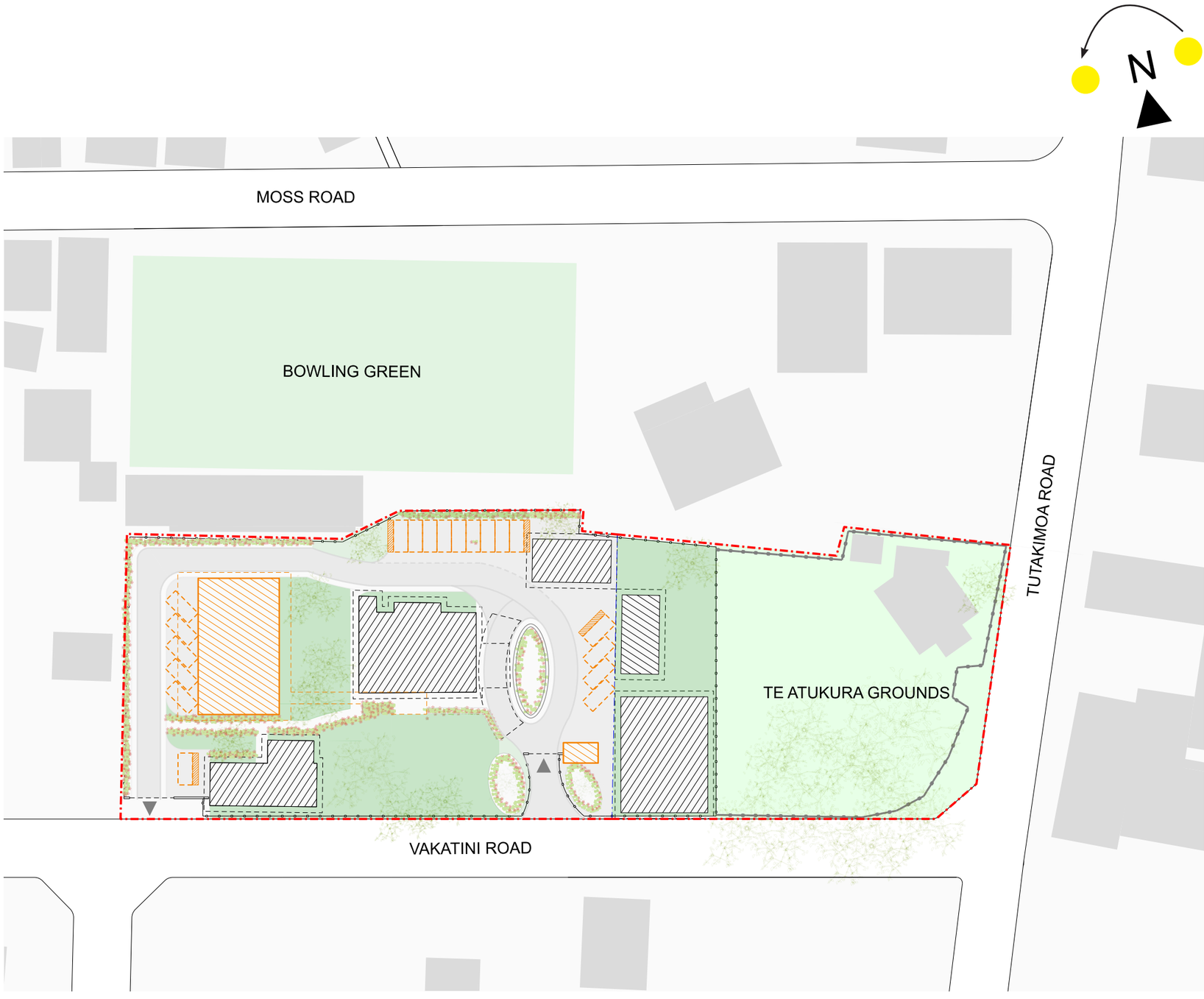
**- Building Placement**

Offsetting the building from the North-East boundary lessens the impact of the new building on the existing Bowling Club building. It also avoids bisecting the new green; pushing the circulation route to the perimeter.

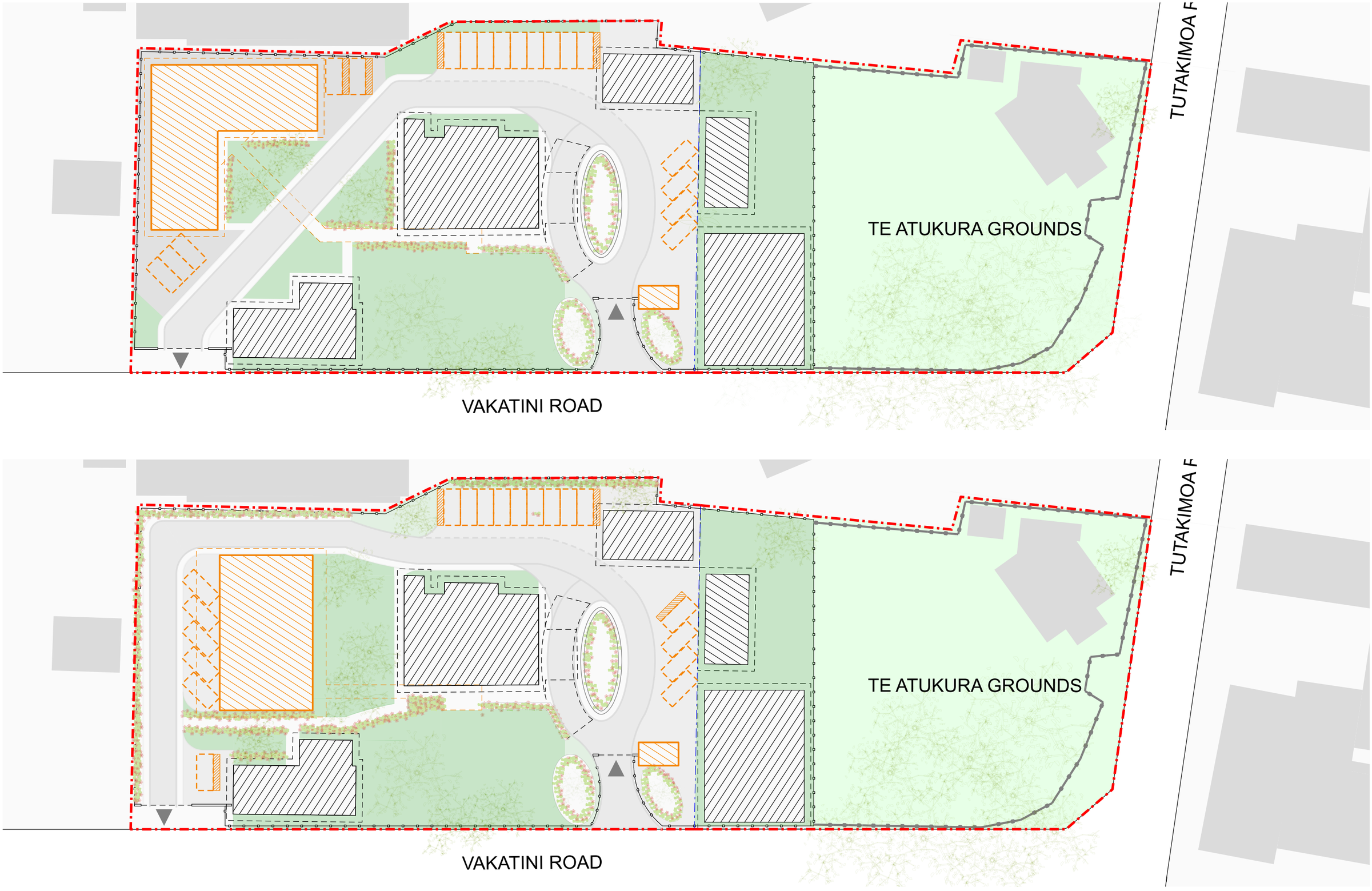
This approach also has townscape, security and construction benefits - removing the need for sensitive public-facing facade treatments and access issues resulting from building up to the boundary and restricted access around the building.

**- Covered Link for PM**

The new building faces the existing OPM building and offers a number of opportunities for a covered link between the offices. Unlike other options, this route would not cross the circulation route

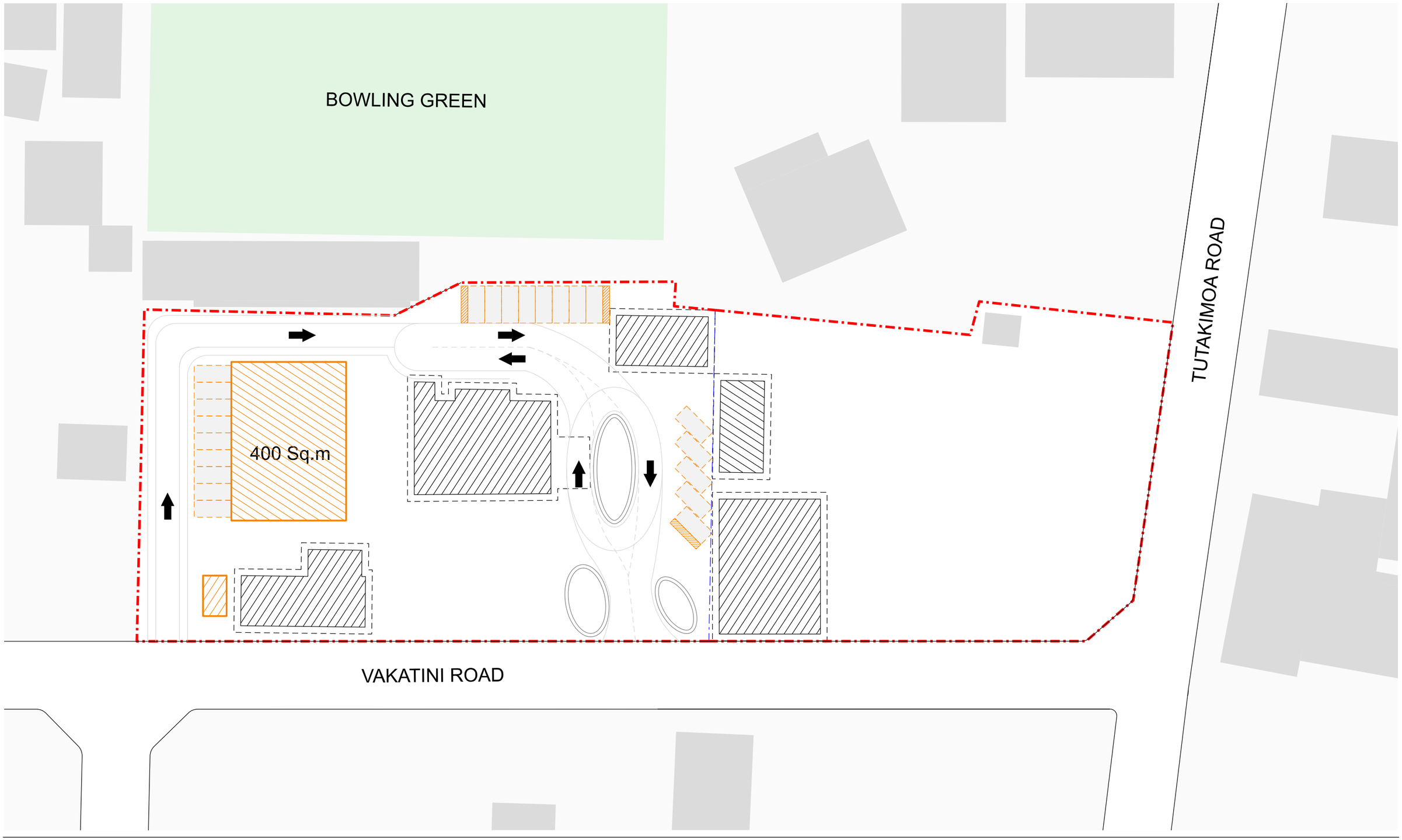


# Recommendation



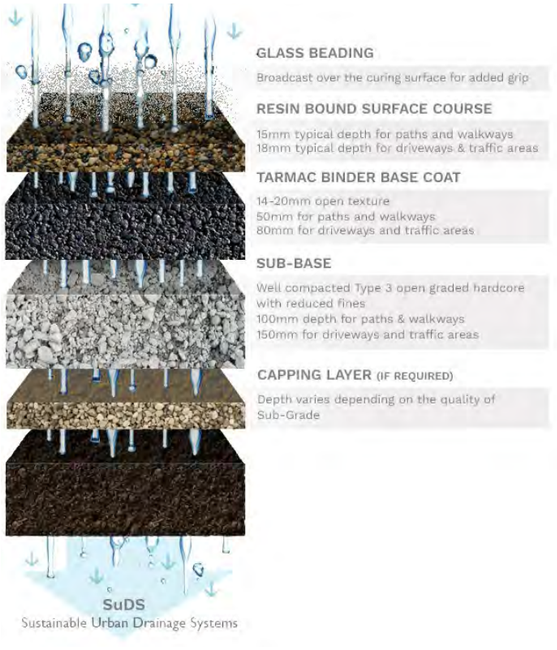
# Selected Option

## Option to be Taken Forward Following Consultation



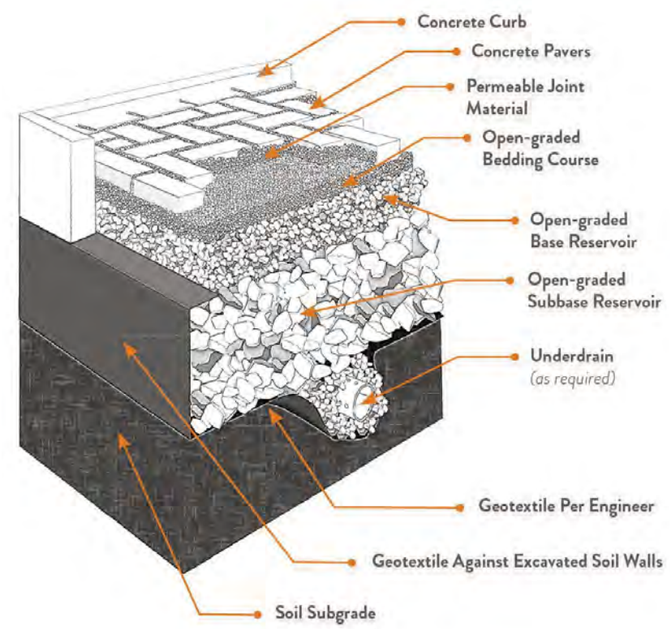
# Design Development

## Flood Strategy - Principles
## Permeable Surfaces




**^ Typical Resin Bound Gravel Build-up**

**ᵛ Typical Permeable Paver Build-up**




**Permeable Pavers**

+ Pavers made with larger aggregate to allow water percolation. Porous joints to increase absorption into sub-base reservoir

+ Allow for a more 'traditional' look and can be laid in various patterns

+Available in lighter colours to reduce heating effect

- Joints may become clogged and require regular maintenance

**Resin Bound Gravel**

+ Can be used for road surfaces. Typically lighter in colour than standard asphalt

+ SUDS compliant

+ Weed and slip resistant

- Not suited to heavy vehicles (above 7.5 tonnes)

**Interlocking Pavers (grass block pavers)**

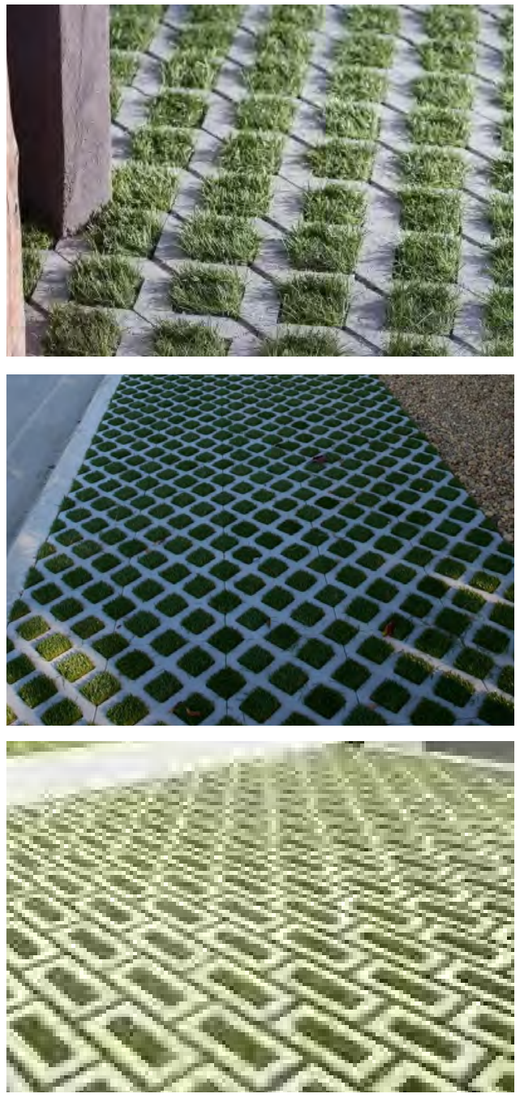
+ Improves the aesthetic quality of footpaths

+ Maximum Permeability

+ Cooling effect of vegetation

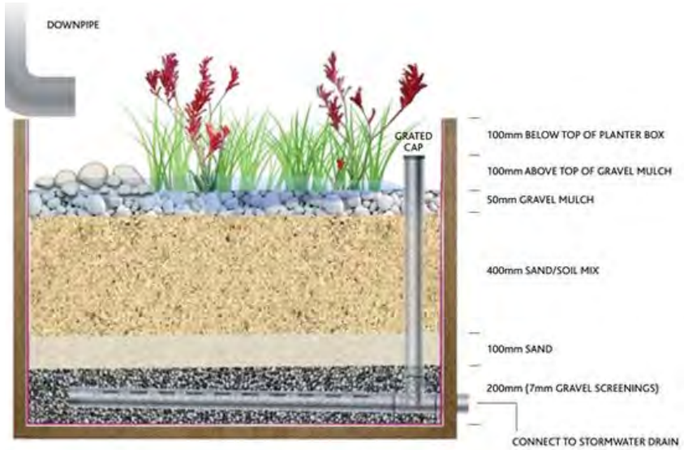
- Require maintenance (mowing)

- Less suited to people with reduced mobility

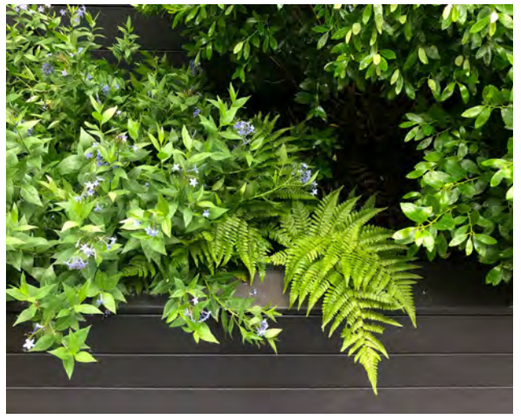


# Design Development

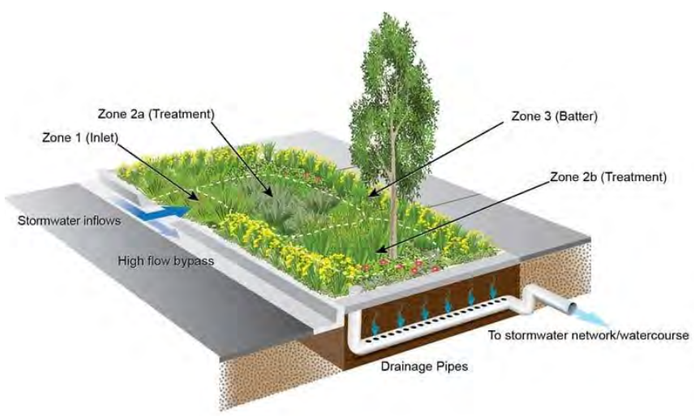
## Flood Strategy - Principles
## Raingardens & Bioswales




**^ Typical Raingarden Planter**



**v Typical Kerbside Bioswale**





# Design Development

## Flood Strategy - Principles

**Prevention**

- Addition of new storm water gullies (swales) to Vakatini Road to divert rainwater runoff from back road away from site (clean, maintain, widen, deepen)

- Berms (ramps) on entrances to site to raise level against back road to further reduce risk of water ingress from back road onto site

- Wall design to act as a fixed flood defence barrier to South. Solid fence base, combined with ramped entrances helps to reduce storm water entering site.

- Wall base permeated to the North to allow natural egress of water from site. Flow rate and water volumes TBA. Structural design of wall to account for weight of water

- Connection to drainage to North via gullies alongside new roads. Falls generally towards Northern perimeter and away from building

- Installation of guttering and downpipes to all buildings to channel path of water towards attenuation points and onwards to main drainage channels to North and South of site

**Attenuation**

- Permeable road and footpath surfaces and sub-base where possible (e.g. resin bonded gravel)

- Rainwater harvesting to reduce quantity of water on site during rainfall events

- Implementation of rain gardens where appropriate (to be extended following relocation of remaining departments)

**Mitigation**

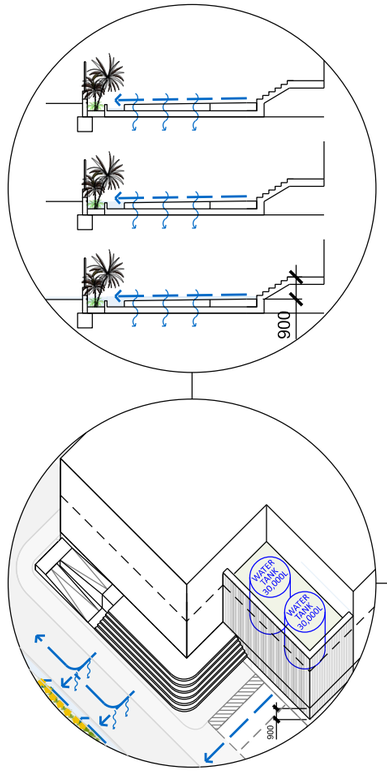
- New building to have a raised ground floor ~900mm above existing ground level

- Raised roads and footpaths to ensure access even in extreme weather events. This approach also allows green and other soft landscape features to serve as stores during extreme weather

- Critical infrastructure (cabling) in waterproof ducts or suspended above flood level

- Generator platform and rainwater tanks to be raised/housed above flood level (requirements TBC)

- Critical functions (National Security, EMCI) accommodated at first floor level. Emergency provisions (food, medical and PPE) to be kept in dry stores. Sleeping facilities provided where possible




- Rainwater harvesting to service maximum practicable quotient of new buildings water requirements - improving sustainability credentials and adding to water attenuation capacity of site

- New building elevated above peak flood line - to account for extreme weather events and the effects of climate change over the lifespan of the building

- Gullies (swales) to outer edges of new road to divert rainwater. Roads to be raised, with falls towards new gullies. Perimeter planting to increase uptake of surface water

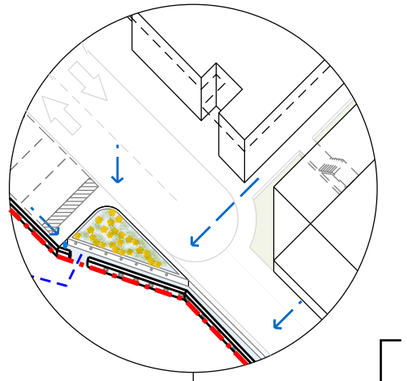
- Permeable/semi-permeable road and footpath surfaces where possible

- Potential for roads and paths to be raised above soft landscape level to allow for greater rainwater attenuation on site

- Rain-garden could be implemented to increase evapotranspiration and further increase attenuation on site

- Road and footpath falls generally towards North of site. North wall to include channels through base to allow for suitable water egress

- Overflow from soft landscaping and rain-gardens to discharge to drainage channel (suitability TBA)





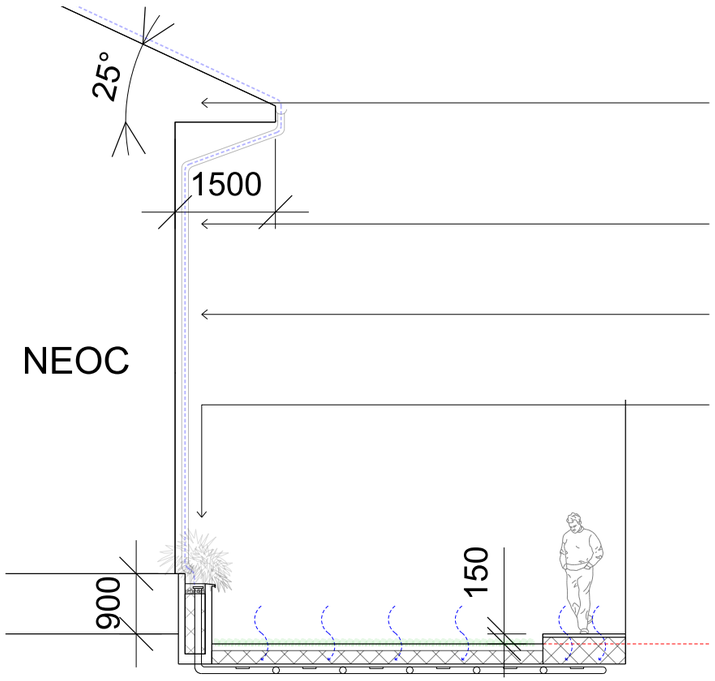

- Replacement and additional planting to compensate loss of mature tree to West of OPM building

- Berms (ramps) to entrance to elevate gate above floodline in order to exclude runoff from backroad

- Condition of existing gullies along Vakatini Road TBA. Widening/ deepening, cleaning and maintenance desirable

# Design Development

## Flood Strategy - Principles (Cont'd)




Shallow roof slope to reduce overall height of building and to slow velocity of water.
Wide gutters to increase catchment of rainwater in extreme rainfall events

Downpipes to be co-ordinated with facade - consideration given to integrating downpipes into cladding zone with suitable inspection hatches. TBC

Wide eaves ~1500mm to shed rainwater from facade, shade first floor windows, reduce risk of water ingress and prolong building life

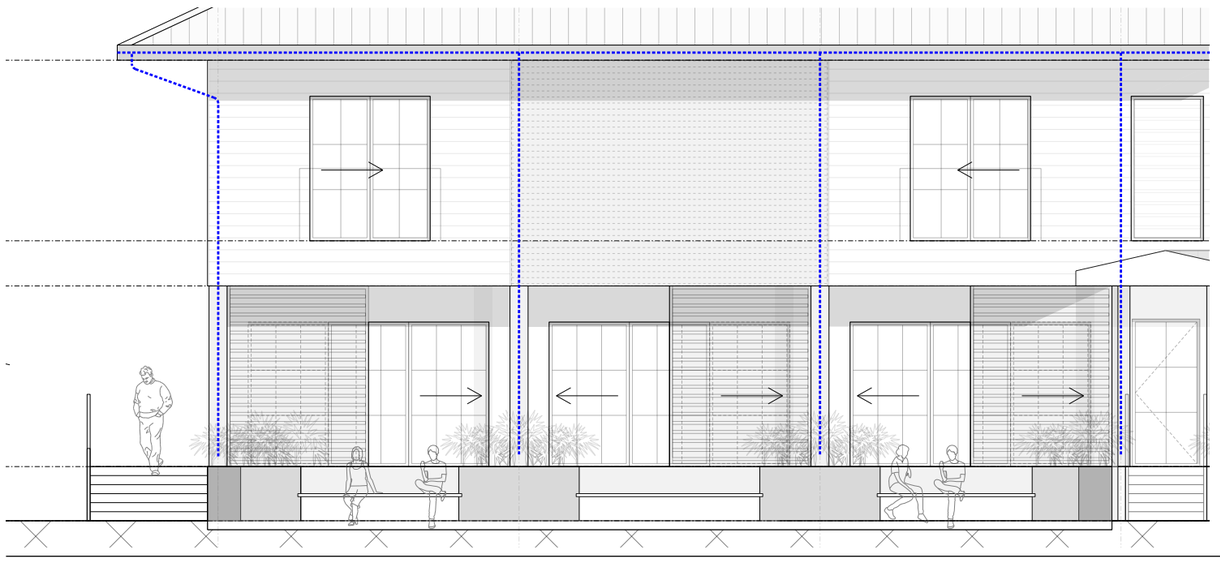
Green-facing edge of raingarden planters to be lower than building-side to ensure overflow away from building in extreme events
In normal events, overflow pipe to divert excess water to drainage system/groundwater (TBC)

Average existing ground level

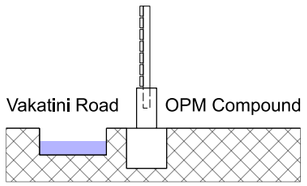
Permeable footpath finish and subbase
French drain under green and footpath to divert water to perimeter gullies and bioswales before discharging to existing drainage channel to North*

*subject to assessment of soil conditions and water table in the next stage. Allowing surface water to percolate back into groundwater may be appropriate. Suitability of drainage channel to North TBA

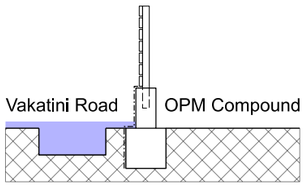
**Raingarden planters, guttering and downpipes**



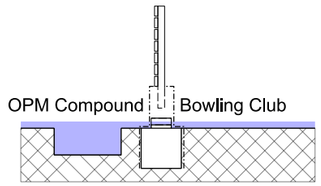
**Perimeter fencing**



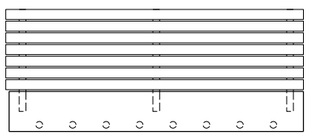

Typical rainfall event
- Proposed new gully to Vakatini road to divert run-off from back road; preventing it from entering the site




Heavy rainfall event
- Concrete base of new fence to serve as a barrier to floodwaters entering the site from Vakatini Road. Ramped entrances to prevent water ingress at gates

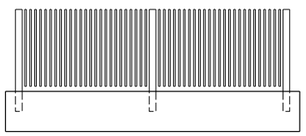



Heavy rainfall event
- Permeated concrete base to Northern (Bowling Club) perimeter of site to ensure free egress of floodwaters in extreme weather

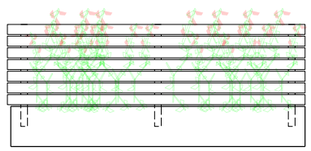


Proposed fence type - Concrete base with horizontal timber boarding over

* Permeated base where required



Preferred fence type - Concrete base with vertical, black-painted metal railings over to increase longevity and reduce ease of climbing



Possibility to soften visual appearance of fence with defensive planting (attractive, thorny vines e.g. Bougainvillea, or similar native TBC)

# Design Development

## Flood Strategy - MSL & Flood Data (Vaikapuangi Development)

The OPM site is low-lying, with spot heights taken in 2018 indicating a range of 2.31m (low point) to 2.85m (high point) above Mean Sea Level (MSL).

There is very limited information available to support a flood strategy on the site. However, in the absence of reliable information for the OPM site, design levels recommended for the Vaikapuangi Development are taken as a guide. These draw upon data collected by Matt Blacka in 2019, prescribing the recommended design levels shown (right)

**Plotted alongside the proposed levels on the OPM site, these values would look as shown.**

The concept design proposes raising the new roads and paths to a level of 3.00m above MSL, which would place them above the level of current 50-year flood events. Without raising the ground to this level, the site would be heavily affected by such events. Therefore, investment in this made ground appears to be worthwhile. This change should improve access to and from the new NEOC in moderate-to-severe weather events. Made ground added to the site to raise levels should be free-draining to help improve conditions further.

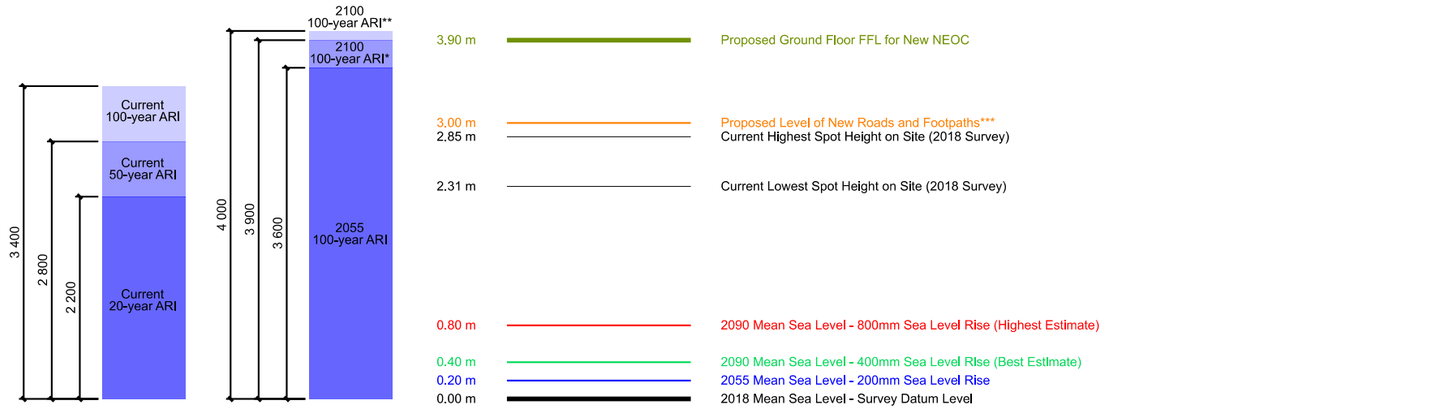
Current 100-year events would overwhelm the new roads and paths, with surface flood waters likely reaching ~400mm above the road finishes. In these events, access to and from the site will be impacted, but the ground floor of the new NEOC would remain above the flood water.

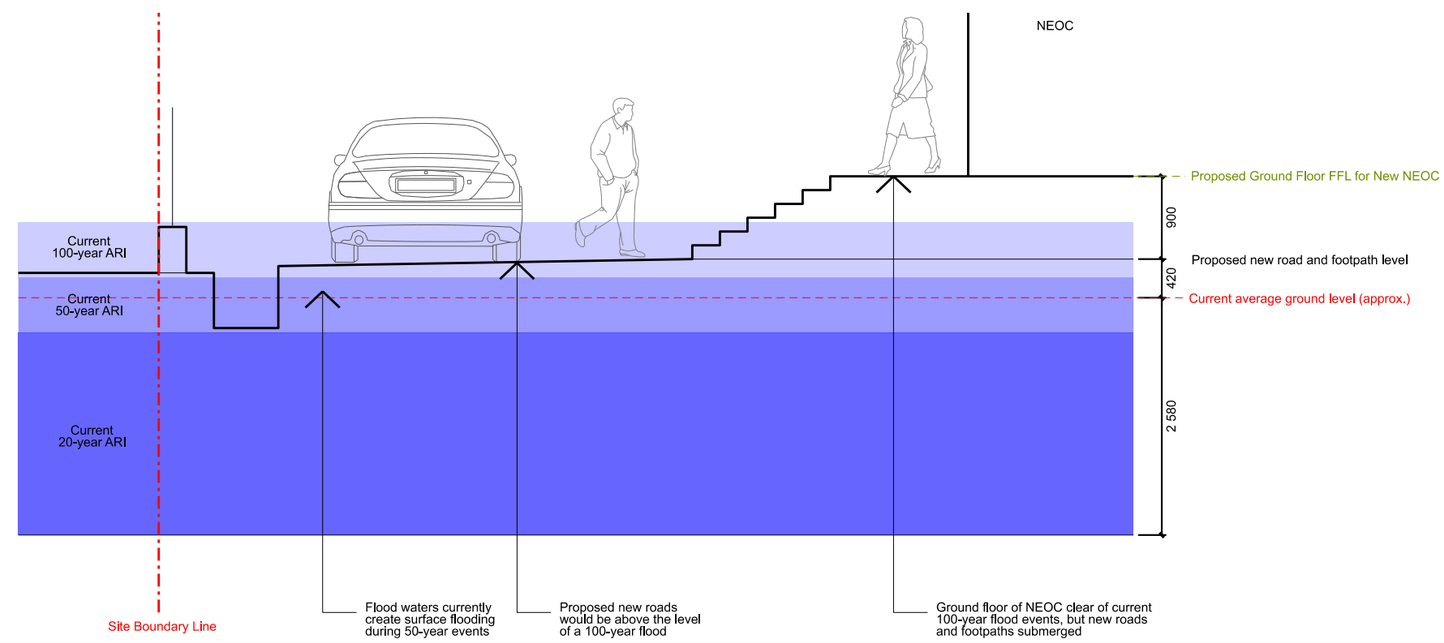
Typically, flood waters of this magnitude subside within a few hours, but some disruption to activities is to be expected.

The ground floor of the new NEOC would remain above the flood line for 100-year events in 2055 and 2100 (likely emissions scenario). Only flood waters resulting from a 100-year event based on the worst-case emissions scenario in 2100 would reach beyond the ground floor of the new NEOC. This is beyond the expected lifespan of the facility.

Given that the most sensitive functions will be housed on the first floor, important documents and equipment will be above the flood line in all cases. WC's, a kitchen (with ration packs, PPE, bottled water and first aid kits in dry stores) and sleeping quarters are available at first floor level, so there should be sufficiently few instances where essential EMCI and National Security Operations are unable to continue as a result of flooding caused by heavy rainfall.

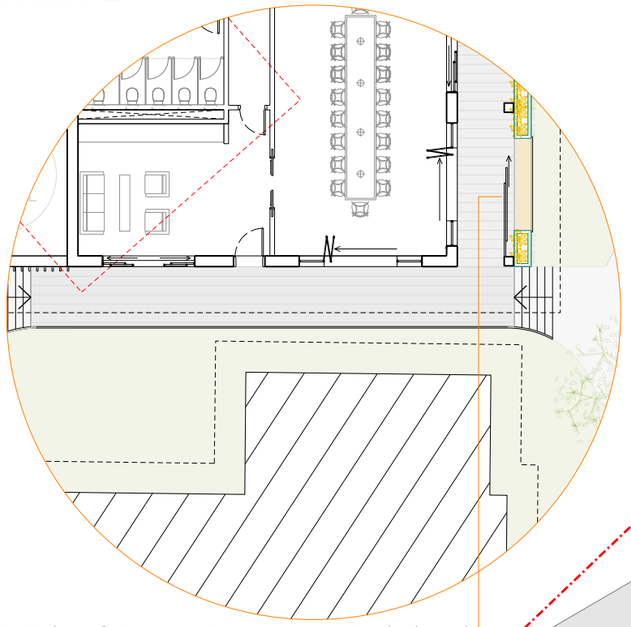
| | 20 Year ARI | 50 Year ARI | 100 Year ARI | 100 Year ARI (2055, 0.2 m SLR) | 100 Year ARI (2090, 0.4 m SLR) | 100 Year ARI (2090, 0.8 m SLR) |
|---|---|---|---|---|---|---|
| Wave setup level in lagoon (m MSL) | 2.2 | 2.7 | 2.9 | 3 | 3.2 | 3.4 |
| 1% surf beat level in lagoon (m MSL) | 3.0 | 3.7 | 4 | 4.1 | 4.1 | 4.4 |
| Min. design inundation level at site (m MSL) | 2.2 | 2.8 | 3.4 | 3.6 | 3.9 | 4 |
| Min. design inundation depth at site (m) | 0 | 0.6 | 1.2 | 1.4 | 1.7 | 1.8 |



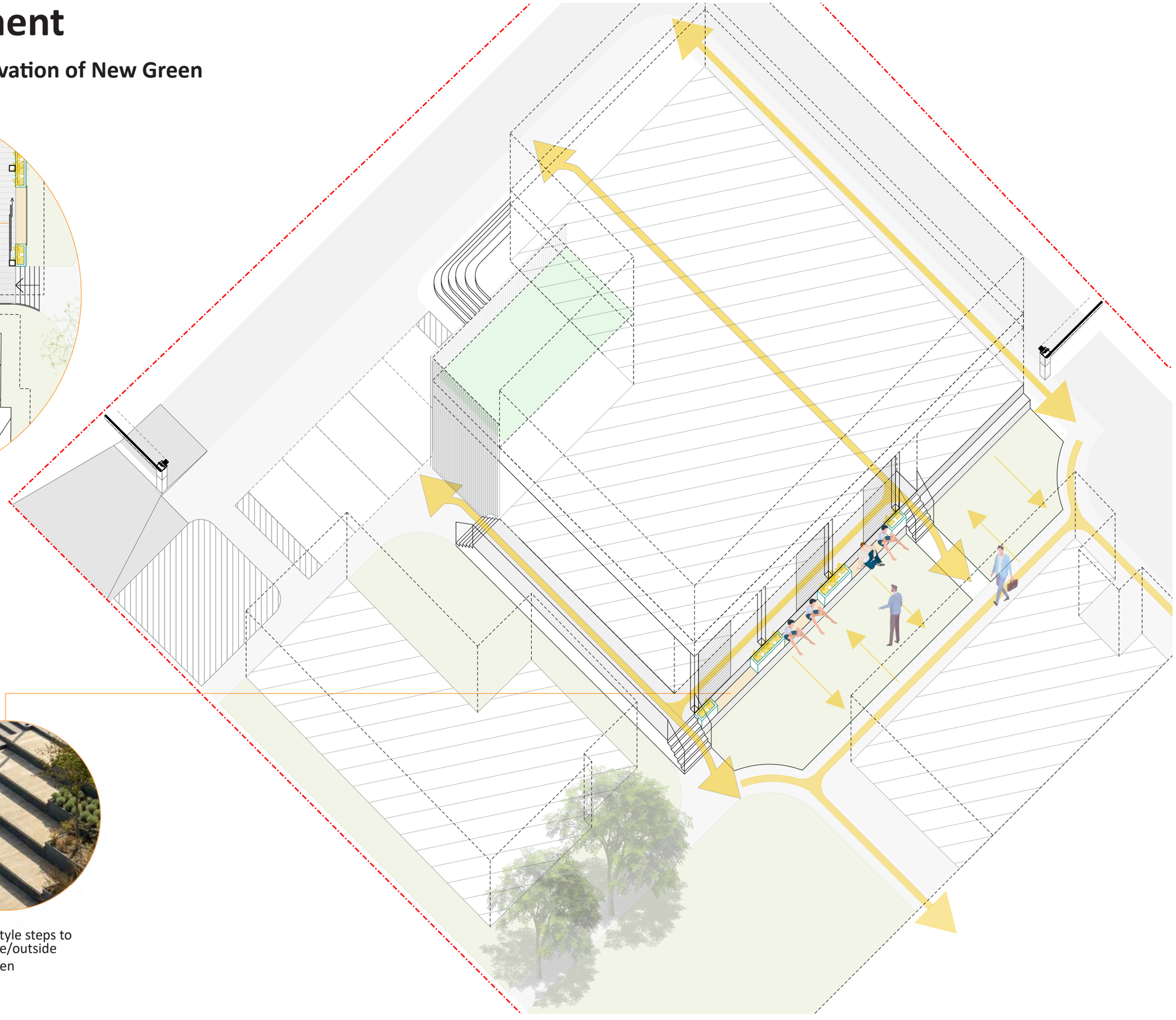
# Design Development

## Building Permeability and Activation of New Green Phase 1



^ Kitchen & Training Room open onto deck and activate greens to East and South of new building.

Increase permeability to the public ground floor functions makes the building feel more inclusive, softens its effect on the OPM heritage building and encourages dialogue between departments



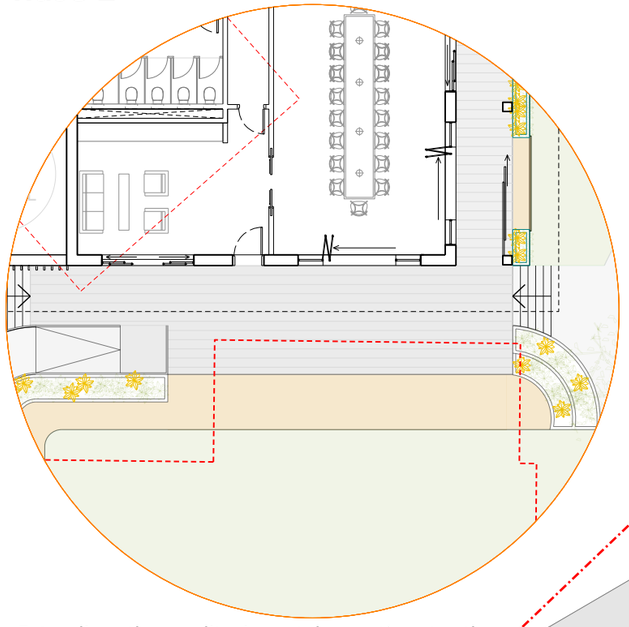
^ Sliding screens to covered deck to create semi-enclosed, ventilated & shaded space along walkway



^ 'Auditorium' style steps to encourage inside/outside activities on green

# Design Development

## Building Permeability and Activation of New Green Phase 2



^ Extending the auditorium-style seating to the landscape to the South of the new NEOC building helps to break down inside/outside hierarchies and creates opportunities for engagement with OPM and the general public.

The green is partially shaded by the building, but additional shade structures may be required.

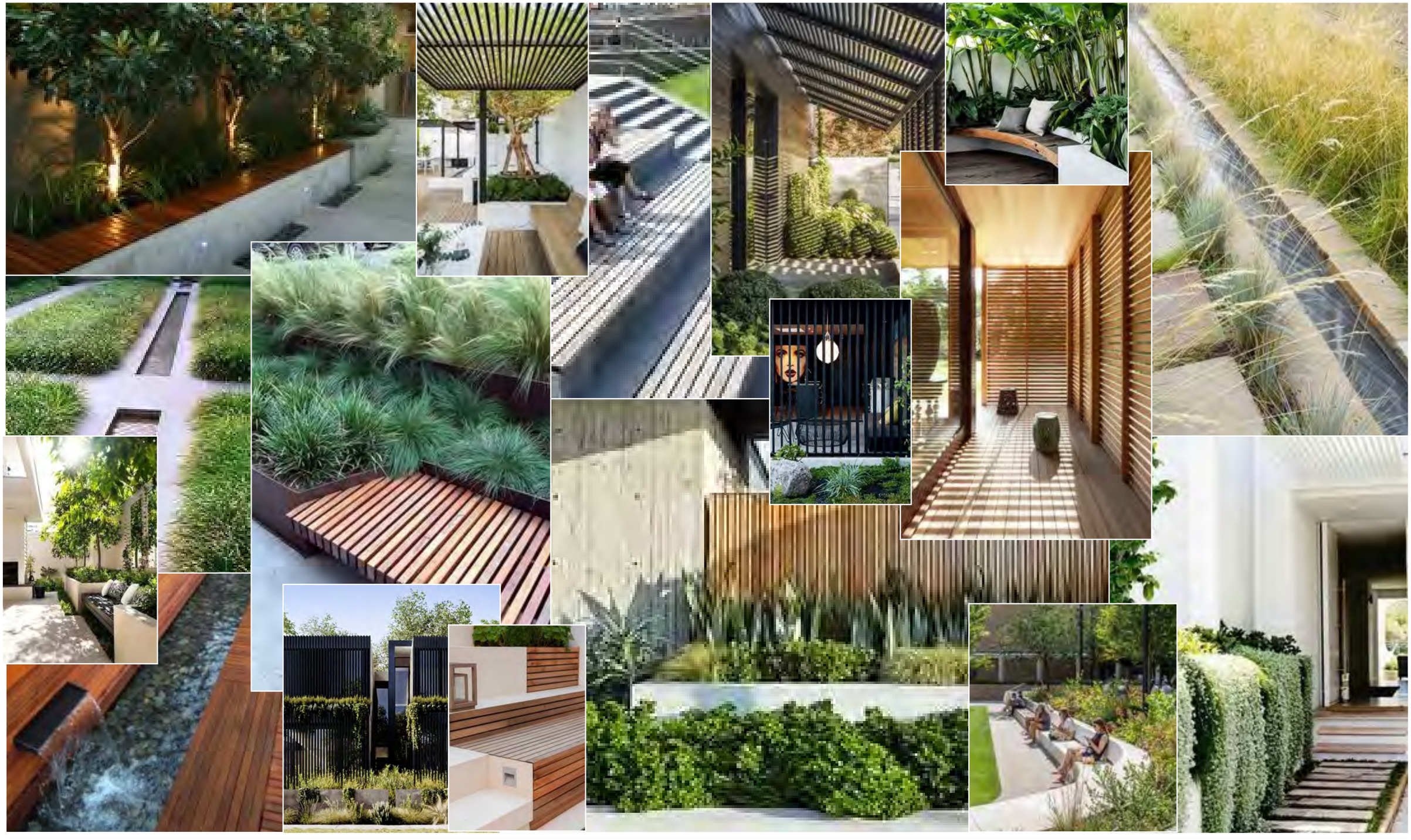
The addition of another ramp improves the accessibility of the building - giving better connections for wheelchair users to the surrounding landscape

^ Deck to be extended and auditorium-style seating added to activate new green to South

^ New green to be used for public events, training, and cross-over activities between NEOC and OPM

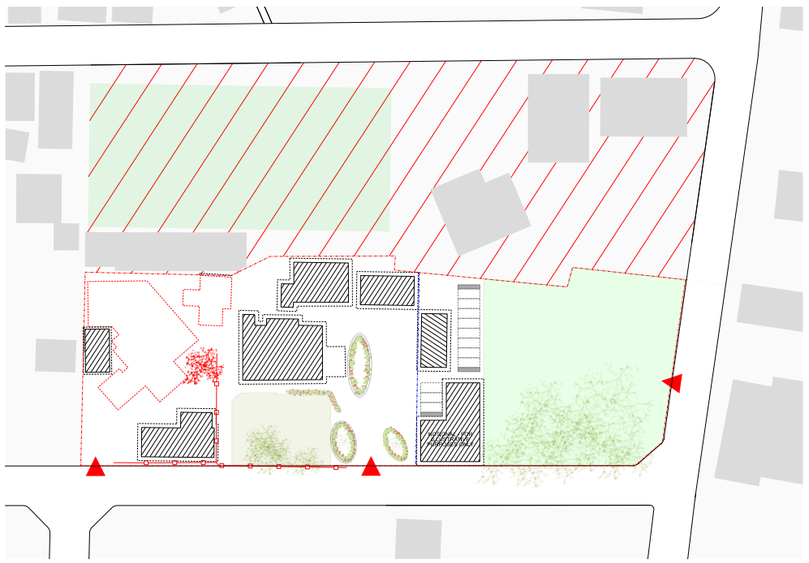
# Design Development

## Mood Board
## Landscape Design



# Design Development

## Construction Sequence



Old Pa Enua building demolished prior to commencement

Existing Deputy PM building staff relocated and old building demolished

Existing tree to East of OPM removed/relocated

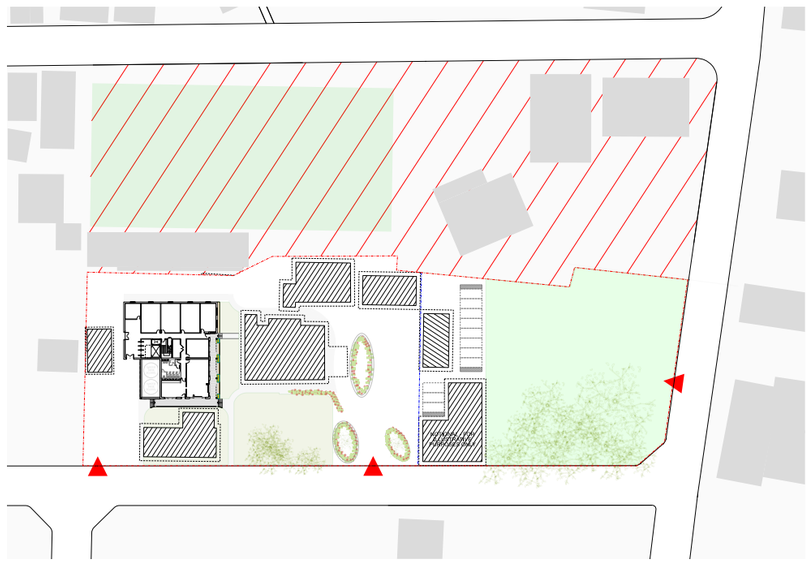
Existing partial fence removed

v

Existing NS & EMCI offices demolished

Entrance steps and ramps constructed and main entrance made operational

New roads, paths & parking constructed. Vehicle control gates installed



EMCI, NS & Chief of Staff remain in place whilst new building is constructed

South-Western entrance used for construction access

Temporary parking on Te Atukura grounds, if necessary

East entrance to new building used whilst old EMCI office is demolished

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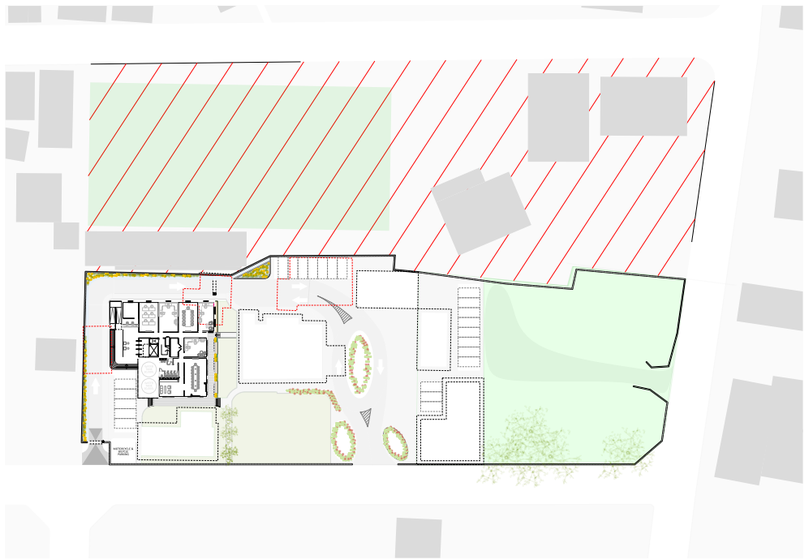
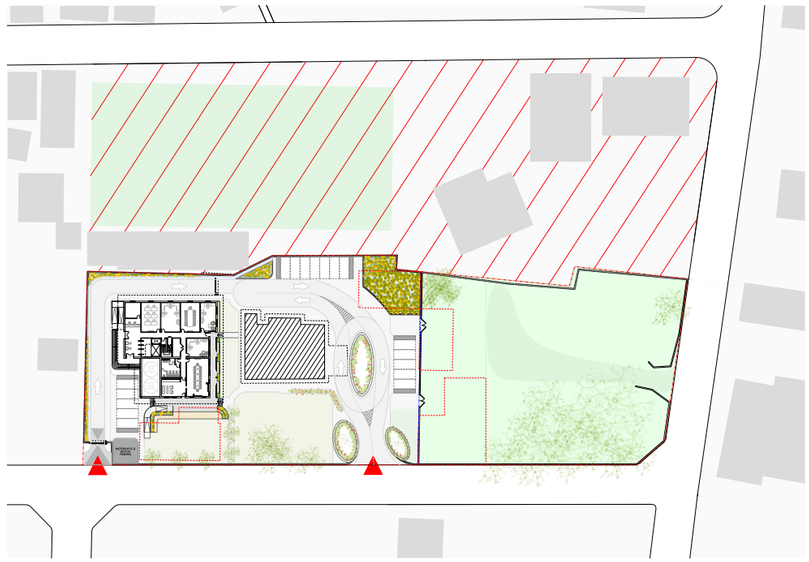
Climate Change, DPM, ICT & New Pa Enua relocated to new complex

Landscaping to new Southern green completed

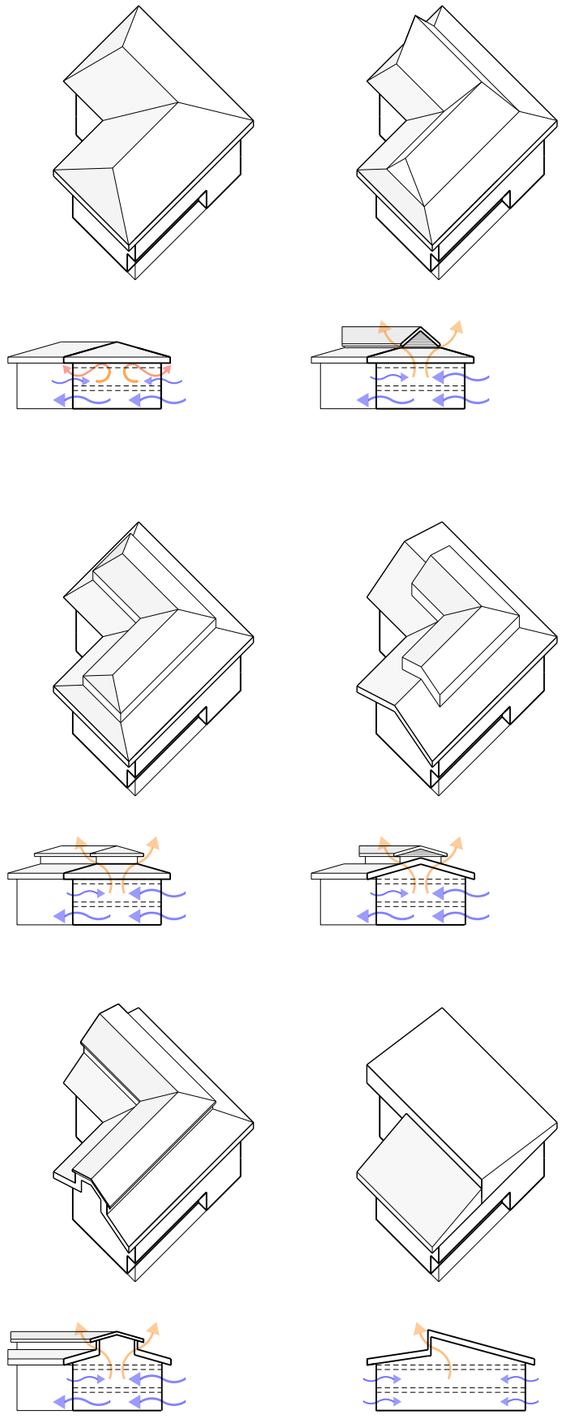
Te Atukura Grounds restored to original lease boundary





# Design Development

## Ventilated Roof Forms Study



# Design Development

## Mood Board
## 'Colonial'-style design aesthetic

# Concept Proposal - Rev. 01

## East & West Elevations

**East Elevation**

The East elevation faces onto the new green between the existing OPM building and the new NEOC.

Auditorium style seating and raised planters for rainwater attenuation help to activate the green and increase visual amenity.

The building overhang serves to shade the training room area and improve circulation around the building perimeter - linking it with the central corridor and increasing permeability. Sliding screens allow this space to be shut off as a indoor/outdoor passively ventilated space, or opened up onto the green for outdoor training activities.

The active green increases crossover between NEOC and OPM functions; allowing for greater collaboration between departments. The green is shaded by the existing OPM building in the morning and the NEOC in the evenings.

It is envisaged that the new NEOC will be clad with composite weatherboards for ease of maintenance and to reference the heritage building. The roof form will be a traditional tropical ventilated roof, punctuated by gabled elements to break up the scale.

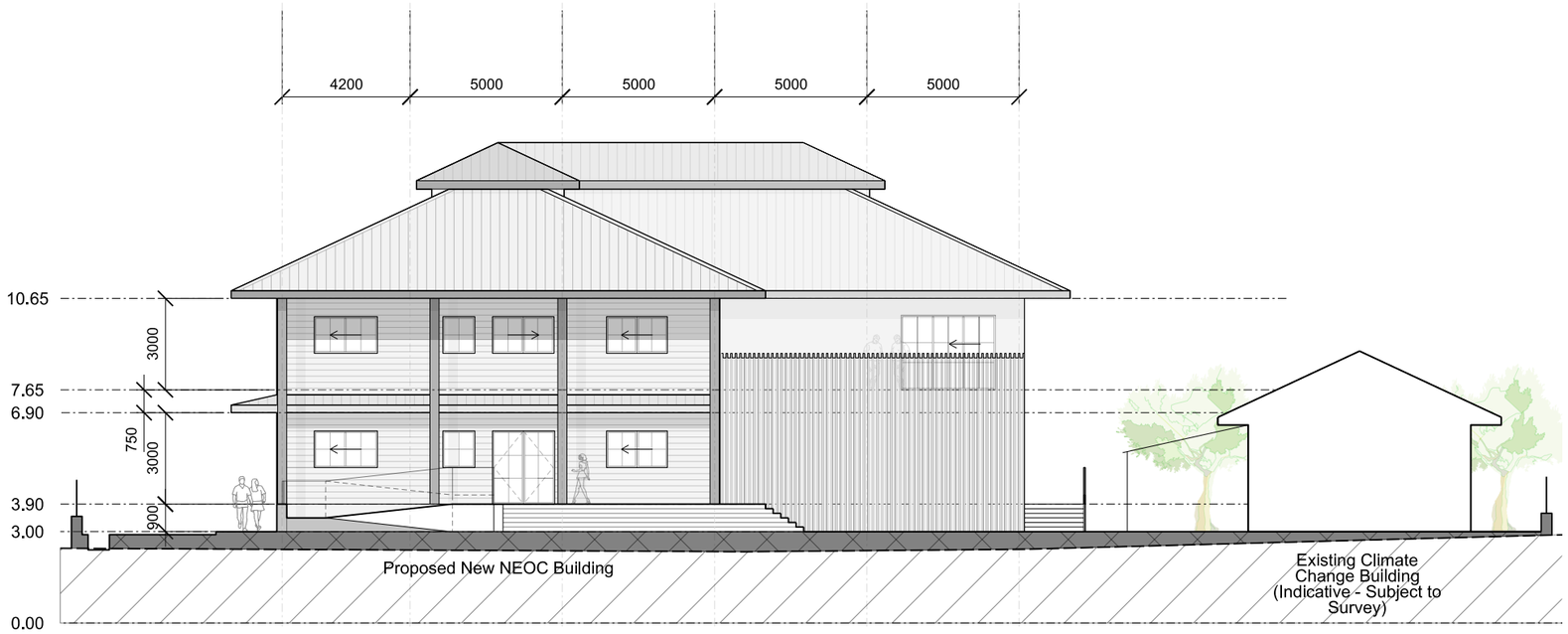

**East Elevation**

**West Elevation**

The west elevation faces onto the new perimeter road and offers both disabled and stepped access. The entrance is marked by a large roof overhand and double-height columns.

The rainwater tanks (and additional plant (TBC)) are housed within a more contemporary natural-timber enclosure. The vertical timbers form the balustrade to the terrace above,]. The terrace is for use by National Security and EMCI staff - allowing for outdoor break-out space without having to leave the secure zone of the building.

Attention is paid to shading and window sizes on the west elevation which to reduce the effects of the sun through the hotter hours of the afternoon




**West Elevation**

# Concept Proposal - Rev. 01

## North & South Elevations

**South Elevation**

The South elevation is less impacted by the sun and can benefit from daylight without excessive solar gain throughout the day. Window openings are larger on this elevation, but passive ventilation is still provided through the use of sliding and bi-folding windows and doors.

The training room opens out onto the access deck. This area will be further activated in Phase 2; following the demolition of the Climate Change building.

National Security and EMCI staff are afforded a view of the visitor entrance, main building entrance and (future) new green to the south. This helps increase oversight at the compound.

In addition to small gabled elements, areas of render could be introduced to break up the scale of the building

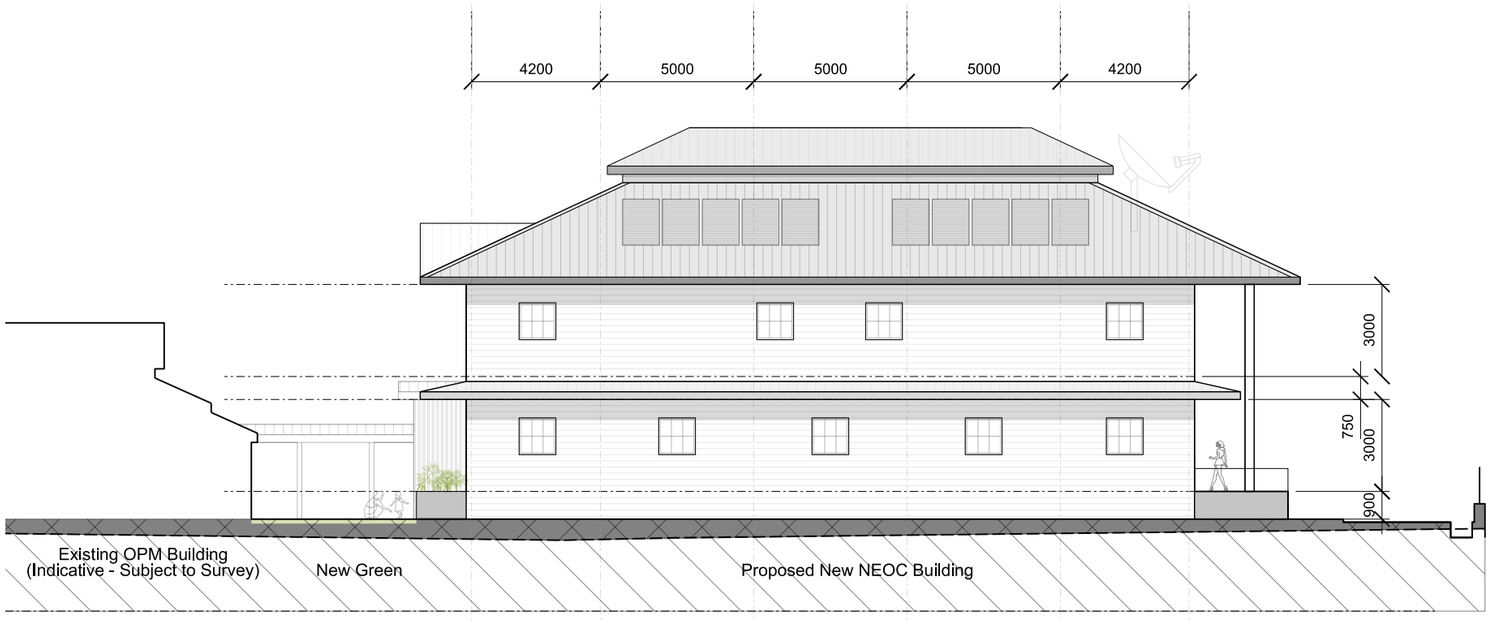

**South Elevation**

**North Elevation**

The North elevation faces the bowls club and is the least prominent elevation. Windows are smaller on this elevation to limit solar gain from the sunniest aspect of the building. The first floor shade element also protects the pedestrian concourse around the building from rain.

There is an opportunity to install solar PV and thermal (hot water) panels on the North-facing roof to increase renewable energy supply and reduce the power demands of the building. This may be supported by backup generators in the loft space (subject to specification).

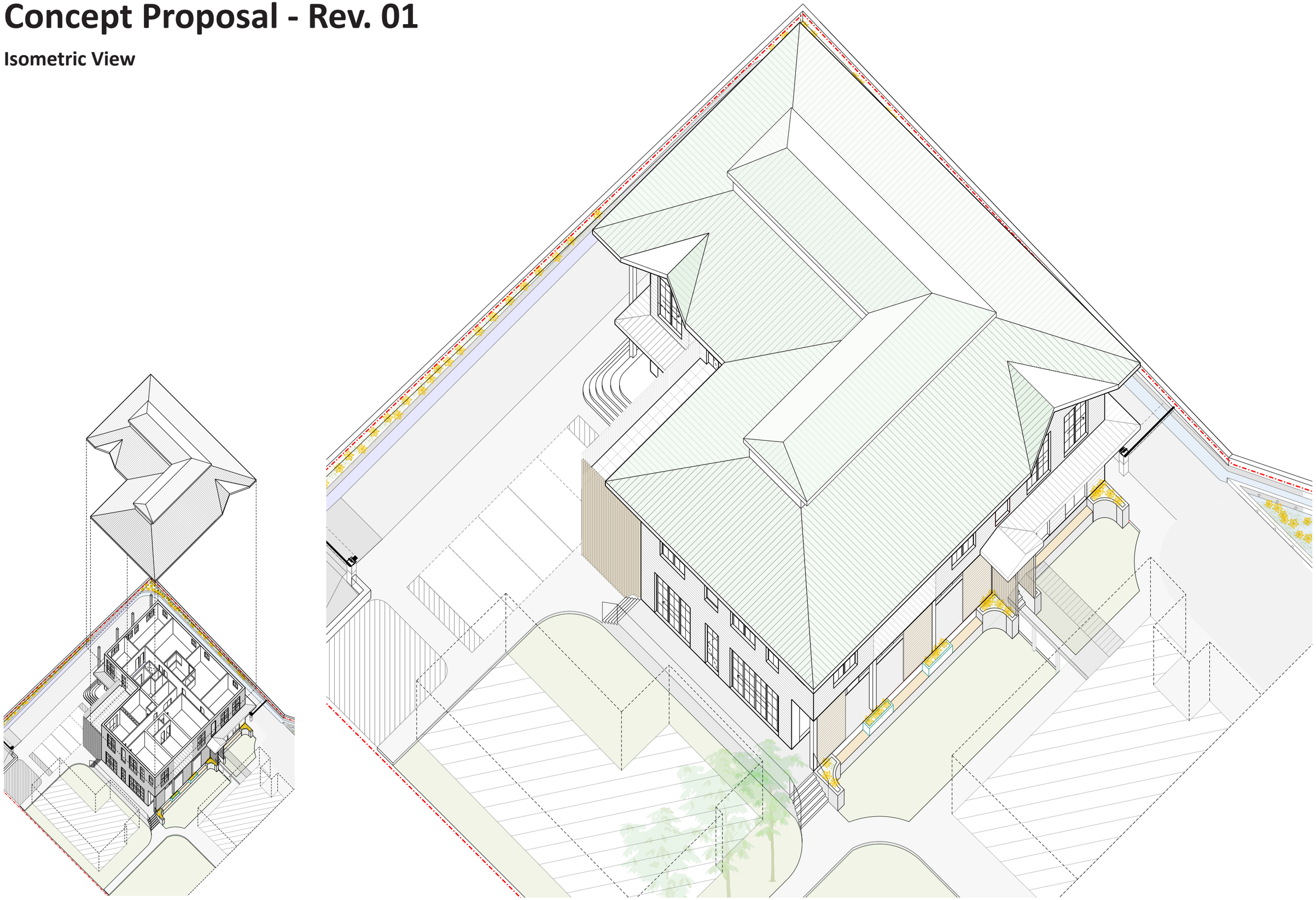
Communications satellites may also be mounted on this part of the roof, making them less prominent from the entrance.




**North Elevation**

# Concept Proposal - Rev. 01

## Isometric View



# Notes for Schematic & Detailed Design Phases

## Considerations Going Forward

**- Facade Treatment**

This document presents a detailed look at the design process and how specific design choices were made. This process was led by practical considerations relating to space allowances, security concerns and the way the building sits in, and relates to, its surroundings and landscape.

However, choices relating to materiality (proposed white composite (fibre cement) weatherboard and render) are driven by a desire to create a sympathetic response to the OPM heritage building. These decisions can be confirmed through consultation and will also be subject to availability of materials and labour, as well as overall costs. For that reason, it is possible that substitutions will be made. Such substitutions may be appropriate on the assumption that they conform to the performance specifications set out by the NZ guidance documents for National Security functions (awaiting receipt), the building code and cyclone resistance requirements. All systems should be approved by, and constructed in accordance with, manufacturers' details.

Selected systems should achieve suitable warranties to suit the desired building life and provision should be made for inspection and maintenance over the life of the building.

**- External Wall Construction**

The design assumes concrete frame and concrete slab construction in order to meet fire and acoustic performance requirements. This approach also gives flexibility to the facade in terms of openings, and allows for the longer spans which may be required in order to keep the Training Room free of columns.

Masonry infill is recommended in order to increase thermal mass - reducing energy demands for cooling; as well as maintaining acoustic and fire performance. The concept design proposes a combination of insulated render finish and composite (fibre cement) weatherboard cladding. Attention should be paid to deflection heads and movement joints, which will need to be coordinated with the facade.

Penetrations through the slab will need to be coordinated with the M&E engineer in the next stage.

**- Internal Wall Construction**

Internal wall performance requirements vary across the building. A nominal 150mm has been allowed for most internal walls to account for wider studs to achieve the 3000mm structural floor to structural ceiling dimension proposed.

Greater build-ups are shown in areas which require special attention - such as the perimeter walls of the SCIF and the walls between Operation and Command Rooms.

In the case of the SCIF, walls should be constructed in line with the relevant NZ guidance documents (pending receipt), in collaboration with National Security advisors and certified by relevant bodies (TEMPEST Certification or similar). Perimeter walls of the SCIF are intended to prevent electronic or radio emanations to the outside through shielding, filtering and masking. This requires specialist input to route services into and out of the SCIF. Wall performance must be maintained around penetrations (doors, windows, services etc.) as well as above any suspended ceilings and below any raised floors.

Comprehensive guidelines relating to SCIFs in the US are given in Appendix 6. These will be superseded by NZ guidelines upon receipt.

For Operation and Command Rooms (and any other rooms with special acoustic requirements), twin frame acoustic wall construction similar to the example shown in Appendix 5 is recommended. These build-ups can be discussed and refined in the next stage, where detailed performance criteria can be set. At this stage, a 'best practice' approach is shown.

The escape route - comprising internal corridors and the stair core - must maintain a minimum 60minutes fire integrity, in line with the Cook Islands Building Code. This includes doors, internal windows and any other penetrations. Fire collars will be required for any services penetrating these walls.

**- Sustainability**

**Building Orientation:** Attention has been paid to prevailing wind and sun path throughout the concept design stage.

The existing OPM building provides protection from the morning sun for the Eastern facade, and further cooling is achieved through the implementation of planting on the new green. If required, a more comprehensive planting strategy could be developed in the next stage to include some larger trees for additional shading to this facade. Any such proposals should consider the impact of root systems on foundations, the likely spread of the tree canopy and its effect on the OPM and NEOC façades and, in the case of taller trees, the impact of leaf fall on gutters and paths.

The OPM building and new green are shaded by the NEOC in the evenings.

The larger areas of glazing - such as that proposed for the Training Room - are shaded by the building overhang. Ground floor windows on the Eastern, Northern and Western façades are shaded by the canopy that wraps the building. First floor windows are shaded by the generous eaves overhangs.

The concept design proposes that all windows are fitted with internal sliding louvre screens. These may have integrated insect mesh.

Whilst window sizes are reduced on the Northern facade, consideration may be given to additional awnings over first floor windows, should they be required. This will further reduce the effects of the midday sun during the summer months.

**Ventilation:** All windows are operable, with sliding recommended throughout to prevent damage by strong winds. It is possible to leave windows open and sliding louvres shut in order to reduce glare whilst benefiting from increased ventilation and daylight.

The roof lantern is proposed to increase ventilation and purge hot air through the top of the building. This will be beneficial given that the majority of plant is likely to be accommodated in the loft space. Vents can be incorporated into the ceilings of offices and corridors below to allow for greater purge ventilation to these spaces.

Depending on plant and servicing requirements, careful coordination with the central corridors could be explored in the next stage in order to bring daylight and enhanced ventilation to the middle of the building.

**Energy supply:** Given the nature of the development, continuous, uninterrupted energy supply must be maintained at all times. However, for day-to-day operation, energy supplied by PV's on the North slope of the roof should be maximised. This will reduce energy demands put on the grid and help towards the Cook Islands' wider ambition of 100% renewable energy by 2025. Attention should be paid to the installation of these PV's to ensure fixings and groundings can withstand a Cat.5 cyclone. Maintenance will be required in line with manufacturers' instructions to ensure optimal performance. Consideration should be given to a feed-in system that increases supply back to the grid. Battery storage for surplus energy should also be considered in order to enhance possibilities for a 24hour renewable supply.

Back-up generation may take the form of diesel generators, which should be located on a platform well above the likely maximum flood line, for use in emergencies. The loft may be a suitable location. Hatches can be provided along the central corridor. This is subject to recommendations and approval from specialist M&E contractors who have experience of secure government facilities.

**Energy Demand:** Low energy appliances and fittings should be installed throughout and the focus on passive ventilation and daylighting should be maintained through Schematic and Detailed Design phases.

**Green space and permeable surfaces**

The provision of a new Eastern Green in Phase 1 and a potential Southern Green in Phase 2 is central to the concept design. As well as providing these spaces, attention is paid to their activation; ensuring that they relate well to the building and are likely to be used effectively. The Eastern Green will provide a valuable buffer to the OPM heritage building, improving its setting. Perimeter seating means the green can be used for outside discussions, debates, lectures, presentations and events. This may encourage dialogue between departments.

The space will be useful for staff break-out; giving a shaded external space for lunch and breaks during the work day.

# Notes for Schematic & Detailed Design Phases

## Considerations Going Forward

Juliet-style sliding windows face the green, giving its occupants a pleasant outlook. Aside from this, green spaces help mitigate flood risk by allowing water to percolate back into ground water. Raised roads and paths surrounding them will help ensure access to the building is maintained during moderate rainfall events when the greens become waterlogged.

Where possible, permeable road and footpath surfaces should be used. This will limit the impact of surface-water runoff into watercourses and help to prevent downstream issues (overwhelming watercourses during heavy rain events). Permeable surfaces allow water to filter through to groundwater. Installation of French drains (or at the very least, falls in the direction of the new gullies) will slow runoff whilst ensuring stormwater makes its way off site to prevent flooding in heavy rainfall events. Permeable surface options are shown in this document and should be selected in line with suitability, budget and specialist installation requirements.

Permeable surfaces allow the development to align with SUDS and LIUDD principles, whilst the provision of green space increases well-being scores in accordance with Te Ara Akapapa'anga Nui NSDA 2020+

**Water & Flooding**

The low-lying site presents a significant flood risk. Adding further hard surfaces, such as roads, paths, and roofs increases the volume of water expected to be mitigated by a reduced area of green space. For this reason, the formation of new greens and installation of permeable surfaces is maximised. However, the addition of a large new facility inevitably increases the volumes of rainwater to be managed on site. The effects of this can be lessened by collecting the maximum possible quantity from rooftops.

The concept design indicates a 30,000 litre tank, which would comfortably meet the needs of the facility, visitors, training events and irrigation of the surrounding landscape under normal conditions. This will go some way towards an ambition to meet 100% of water demand on site through rainwater harvesting. In the next stage, locations and types of pumps and filters should be established. Additional plant and refuse storage may be required within the enclosure indicated for rainwater tanks, so it is possible that the overall practicable quantity to be collected will reduce. Access hatches are required to maintain any plant and rainwater tanks within the enclosure.

Rainwater should be supported by connections to the town supply, but the point at which this top-up to the tanks occurs should be limited to ensure maximum use of water collected on site.

If possible, all appliances should have a 5-star water efficiency rating.

Where possible, hot water should be accommodated by solar thermal tanks on the North face of the roof.

Gullies are proposed to the perimeter of the site, as indicated on the concept plans. These should be of appropriate width and depth to handle the volumes of stormwater anticipated on site. It is important that these are maintained and kept free of debris, leaves and sediment to ensure capacity is maintained.

It may be appropriate to cover the new gullies to prevent accidental falls by pedestrians and vehicles. In this case, any covers should be rated for vehicular traffic. Covers would also reduce the risk of leaf-fall and other items clogging the gullies.

The proposed gully to the South, along the back road, requires consent, and can be investigated in the Schematic stage. Likewise, connections into, and suitability of, the existing water course to the North should be explored in the next stage. In the event that these options cannot be achieved, upgrades will be required to the proposed perimeter gullies and further attenuation will be required. It may be that water is diverted to an attenuation point on the existing Te Atukura Grounds, which can also be utilised by future developments on the grounds.

The integration of raingarden planters and bioswales strategically across the site is intended to slow the release of stormwater into watercourses and provide more on-site storage for surplus water. Strategic planting will increase evapotranspiration. When specifying plants, it is important to ensure they are tolerant of waterlogged conditions. Planters should be topped by shingle to prevent staining by soils splashing out of the planters and to reduce the prevalence of mosquitoes on site. Bioswales are located away from communal areas to further reduce public health risks associated with mosquitoes and standing water. Overflows from the top of planters prevent water running over the edges of the planters and shortening the life of finishes. Installation of French drains is subject to exploration of ground conditions - drains must be installed above the ordinary water table, but deep enough to prevent damage by vehicles and pedestrians, or other loads imposed on the ground.

As well as forming part of a flood strategy across the site, these small areas of planting and wetland can provide a valuable refuge for wildlife and enhance biodiversity on the site. For this reason, native plants are preferred where possible.

The flood strategy aims to reduce flood risk in the following key ways:

- Prevent stormwaters from entering the site from the back road through the addition of a new rainwater gully and the use of the solid fence base and ramped entrances as a barrier

- Attenuate water on site using raingardens and bioswales, as well as significant rainwater harvesting

- Limit impermeable surfaces through careful road and footpath material selection

- Divert rainwater with appropriate (min 1:60) falls towards new gullies

- Possible installation of French drains

Although this strategy will go some way to reducing risk, the low-lying nature of the site means that risk cannot be removed altogether without a much more extensive engineered solution. To account for this, the building is elevated by ~900mm from the highest existing point on the site. It is proposed that levels across the site are brought up using aggregate and topsoil where required to provide a free-draining new layer and elevate the site higher above the water table. In exceptional rainfall events where the site does become flooded, the 900mm elevation should preserve sensitive materials and ensure the safety of the buildings' occupants and equipment. In addition, the most sensitive functions are stacked on the first floor - well above the likely flood level of even the most serious event.

**Recycling & Waste Management**

A bin store could be located within the wider site, or within the enclosure earmarked for rainwater tanks and additional plant, as required. This is something to be established in the next stage. Bins should be vermin-proof and their enclosure should be made of fire-resisting material to prevent fire spread in the event of fires. Recycling should be encouraged, with separate bins available within offices. Waste should be removed from offices daily and placed in outside bins by cleaning staff. Bin collections are typically weekly. The route from the bin store to the main road should be as unobstructed as possible.

**- Plant, Mechanical & Electrical**

An M&E engineer should be appointed in the next stage to work with key stakeholders and CIIC to agree heating, cooling and ventilation strategies for the building, as well as offering advice on meeting the exacting demands of National Security functions, the handling of sensitive information and the SCIF.

Electrical and mechanical services are likely to run through ceiling and floor voids created by raised floors and suspended ceilings. For this reason, generous floor-floor dimensions have been allowed. Vertical risers have been indicated to allow for easier routing and maintenance of services. These can be divided up in line with M&E recommendations. Fire integrity to these risers must be considered in their construction.

Rainwater tanks are located on a raised platform within a timber enclosure. If required, a portion of this space can be allocated to plant. It is anticipated that the remainder will be located in the loft space and accessed via access hatches above the corridor. Electrical and mechanical cupboards have been indicated to account for any on-floor plant required. This will be specified in the next stage as part of a detailed strategy.

**- Fire**

Compliance with the Cook Islands Building Code and other relevant documents must be maintained as the design develops. Currently, the building is designed with only one escape route via a central stair core. This is an element worthy of discussion as fire safety must be weighed against building security - additional escape stairs will increase the vulnerability to the secure functions at first floor level. To mitigate, and to account for the

# Notes for Schematic & Detailed Design Phases

## Considerations Going Forward

disastrous effects of fire on sensitive materials contained within the facility, sprinklers are advised throughout.

When locating the building, attention was paid to the ability for fire appliances to substantially access the facade. New roads are designed to be adequate for fire and other emergency vehicles to circulate and must, therefore, be kept free of parked vehicles at all times. Fire-fighters are able to tackle fires both from the roads to the North and West, as well as from the greens to the South and East. This represents a significant improvement from the previous building location, where fire-fighters would struggle to access the majority of the building owing to its location immediately adjacent to the site perimeter and the inadequacy of the road width allowed between the previously-proposed location and the existing facade of the OPM building.

Whilst the security of the building is paramount, the safety of its occupants must supersede this requirement in some instances. This means that in the event of a fire, access-controlled doors at the top and bottom of the stairs should default to unlock when fire alarms sound or power supply is lost. Advice for emergency egress from the SCIF must be discussed with a specialist.

- **Accessibility**

Consideration should be given to building users with additional needs. The concept design allows for an entrance ramp with a gradient not greater than 1:12, whilst internal corridors and external footpaths all exceed minimum widths for wheelchair access. The goods lift is designed to assist people with reduced mobility to access the upper storey of the building. In the event of a fire, a refuge is provided within the 60-minute fire-resisting enclosure of the stairs. Unless a specialist fire fighting lift is specified, the lift should not be used in the event of a fire.

Disabled parking spaces are provided around the site; these should remain in locations adjacent to ramps and entrances to ensure easy circulation for people with additional needs.

Whilst attention is typically given to building users with mobility issues, other specialist needs should also be considered. Signage must be clear and notices provided in both plain English and Cook Islands Maori so that all groups feel included.

Wayfinding around the site should be easy for all users both inside the building and around the site. The site arrangement is such that the entrance to the new NEOC is obvious from the visitor entrance. Once at reception, visitors are directed to their destinations by reception staff. Sightlines through the central corridor onwards to the OPM building facilitate this.

Disabled toilets and showers are proposed and should be retained as the design develops. Provision of showers also encourages cycling to work.

- **Parking**

Parking on site is limited. During special events it may be possible to make use of Te Atukura Grounds for surge capacity.

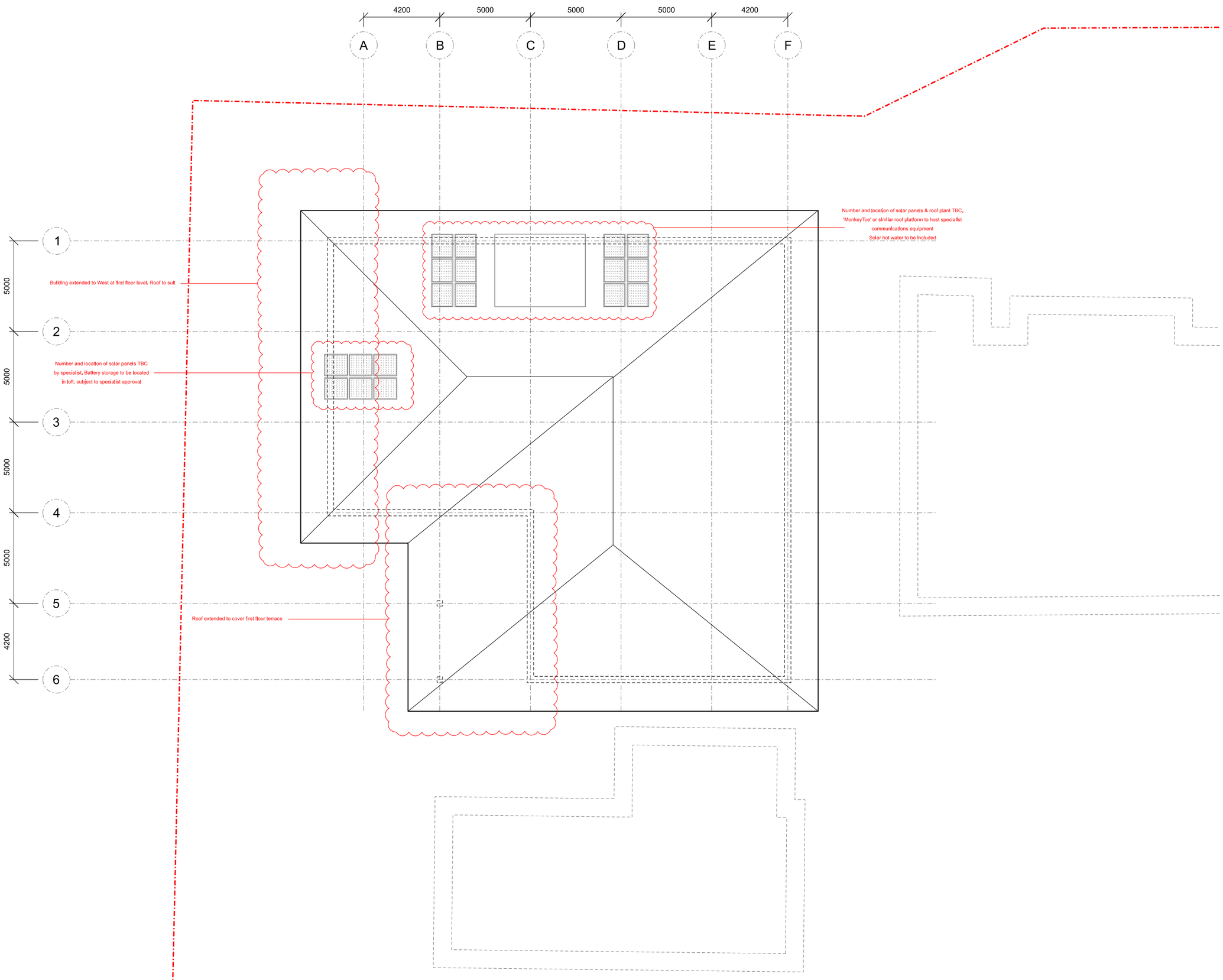
In normal operation of the NEOC, cycling to work and ride sharing should be encouraged. An area is indicated for motorcycle and bicycle parking - this should be accompanied by secure racks to lock bikes. Consideration should also be given to the provision of a covered structure in this location to keep bikes dry.

# Concept Proposal - Rev. 02

**Final Issue Drawings for Concept Stage**

Stage

# CONCEPT




N

1 2 3 4 5 6 7 8

METRES (1:100)

NOTES:

- All dimensions to be checked on site. Any discrepancies to be reported to CIIC
- Concept drawings are to communicate design intent only. Drawings are not for construction
- Levels are based on survey datum levels (MSL). All levels to be checked on site
- Structural setting out for illustrative purposes only. All structural elements to be confirmed by SE
- Existing building positions based on previous survey information. Updated survey required
- Varification of plant strategy required. Detailed specification to be discussed with Client and strategy developed alongside M&E engineer
- Security requirements to be confirmed by Specialist
- Fire escape strategy to be developed with, and approved by, qualified Fire Engineer

| Rev. | Date | Description |
|---|---|---|
| 02 | 17.02.2023 | Updated to client comments |
| 01 | 23.09.2022 | Updated to client comments |
| 00 | 07.07.2022 | FIRST ISSUED |

Client
CIIC

Site
OPM COMPOUND, RAROTONGA

Description
PROPOSED NEW NEOC AND ASSOCIATED WORKS

Drawing Name
ROOF PLAN
AS PROPOSED

| Scale | Drawn By | Date |
|---|---|---|
| 1:100 @ A1 | LS | July 2022 |

| Job No. | Drawing No. | Rev. |
|---|---|---|
| 22-001 | 102 | 02 |

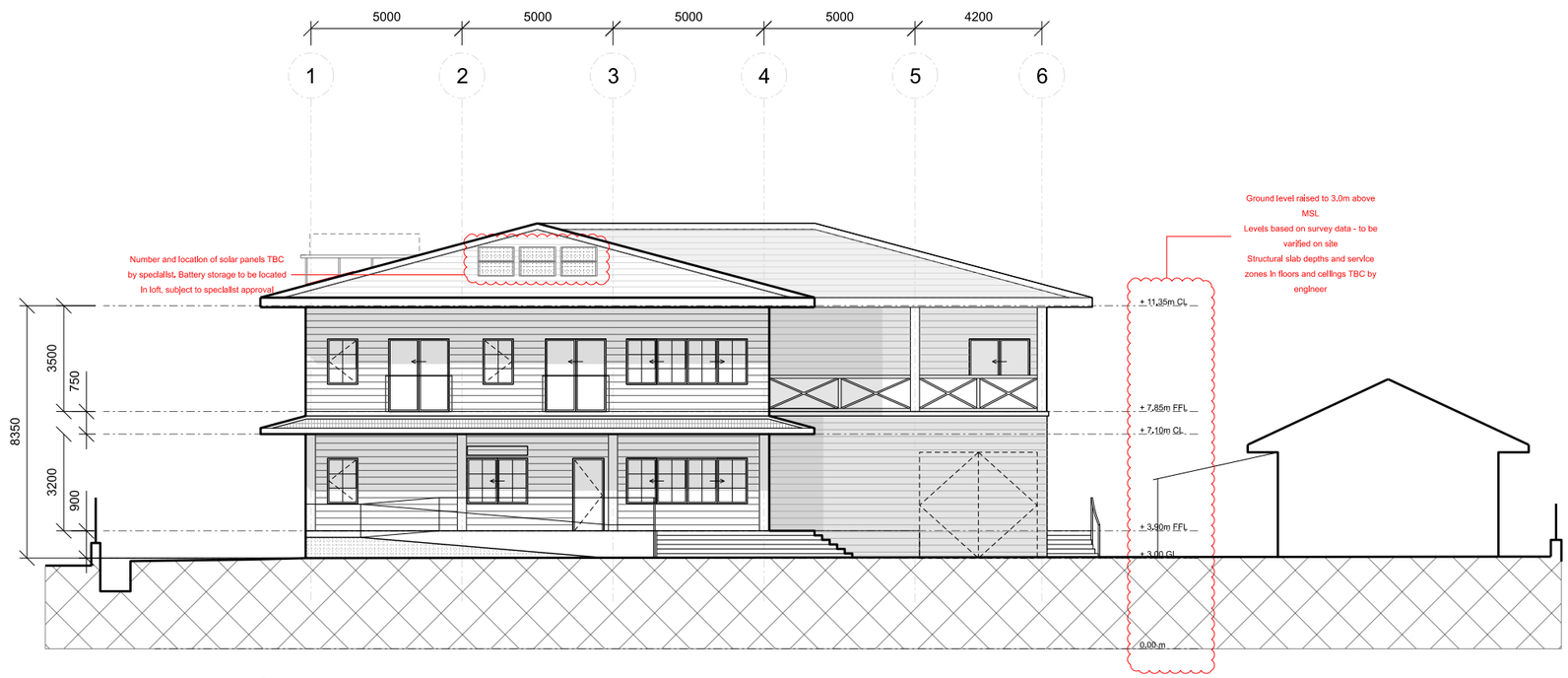
Stage

# CONCEPT

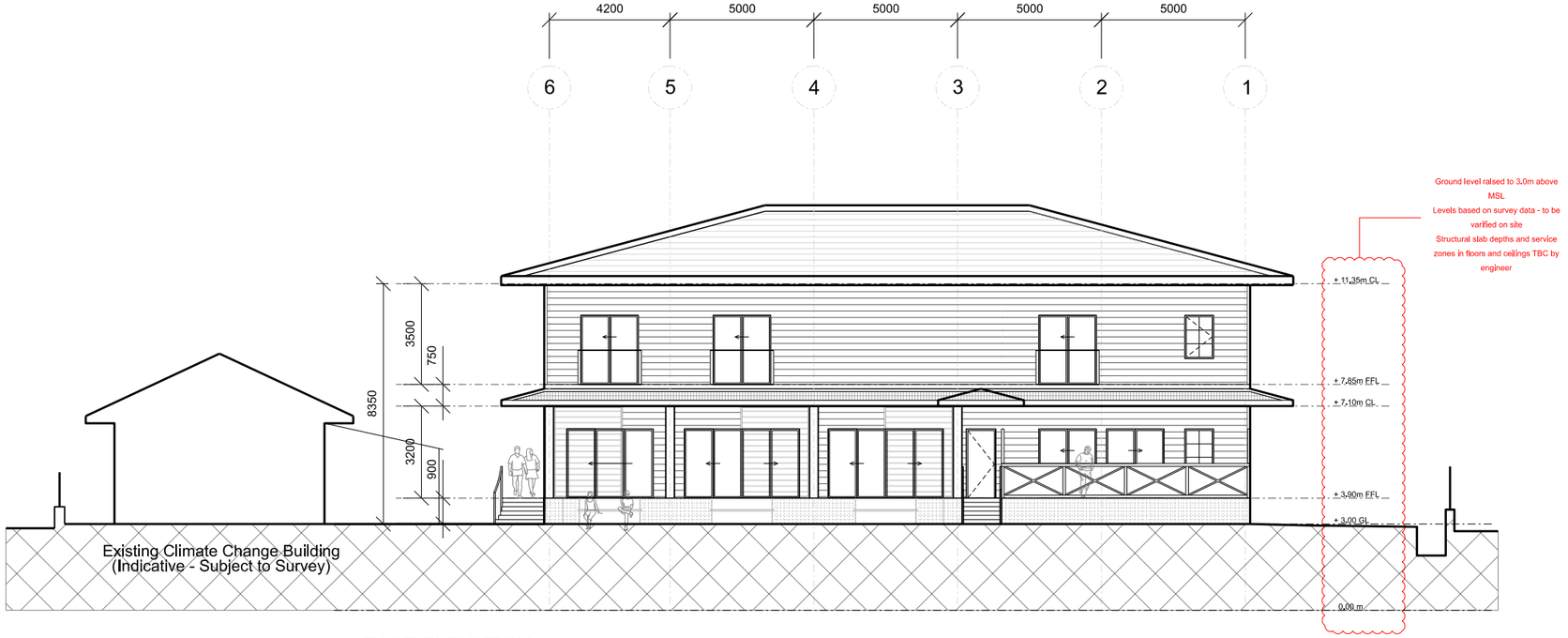
N

1 2 3 4 5 6 7 8

METRES (1:100)




WEST ELEVATION




EAST ELEVATION

NOTES:

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|---|---|---|
| 02 | 17.02.2023 | Updated to client comments |
| 01 | 23.09.2022 | Updated to client comments |
| 00 | 07.07.2022 | FIRST ISSUED |

Client

CIIC

Site

OPM COMPOUND, RAROTONGA

Description

PROPOSED NEW NEOC AND ASSOCIATED WORKS

Drawing Name

WEST & EAST ELEVATIONS
AS PROPOSED

| Scale | Drawn By | Date |
|---|---|---|
| 1:100 @ A1 | LS | July 2022 |

| Job No. | Drawing No. | Rev. |
|---|---|---|
| 22-001 | 200 | 02 |

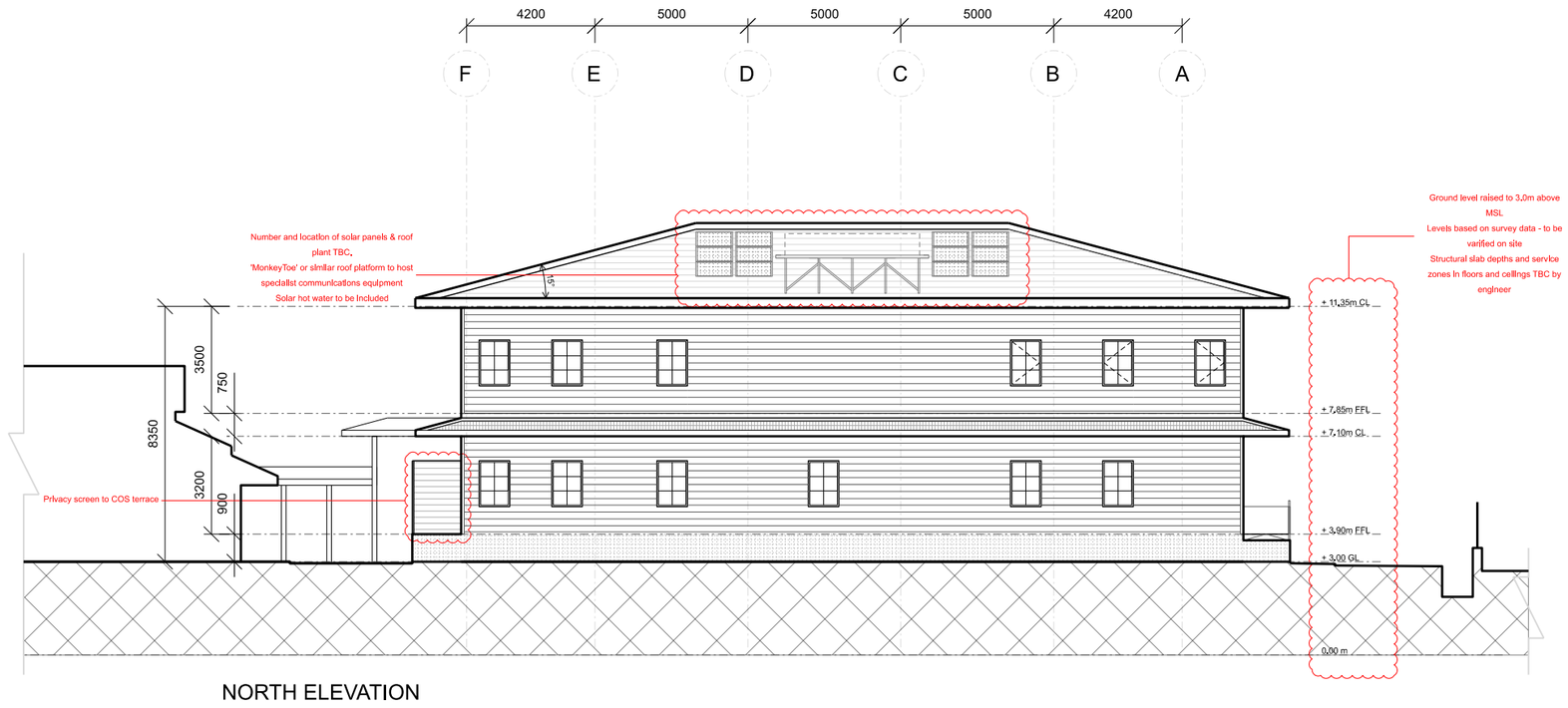
Stage

# CONCEPT

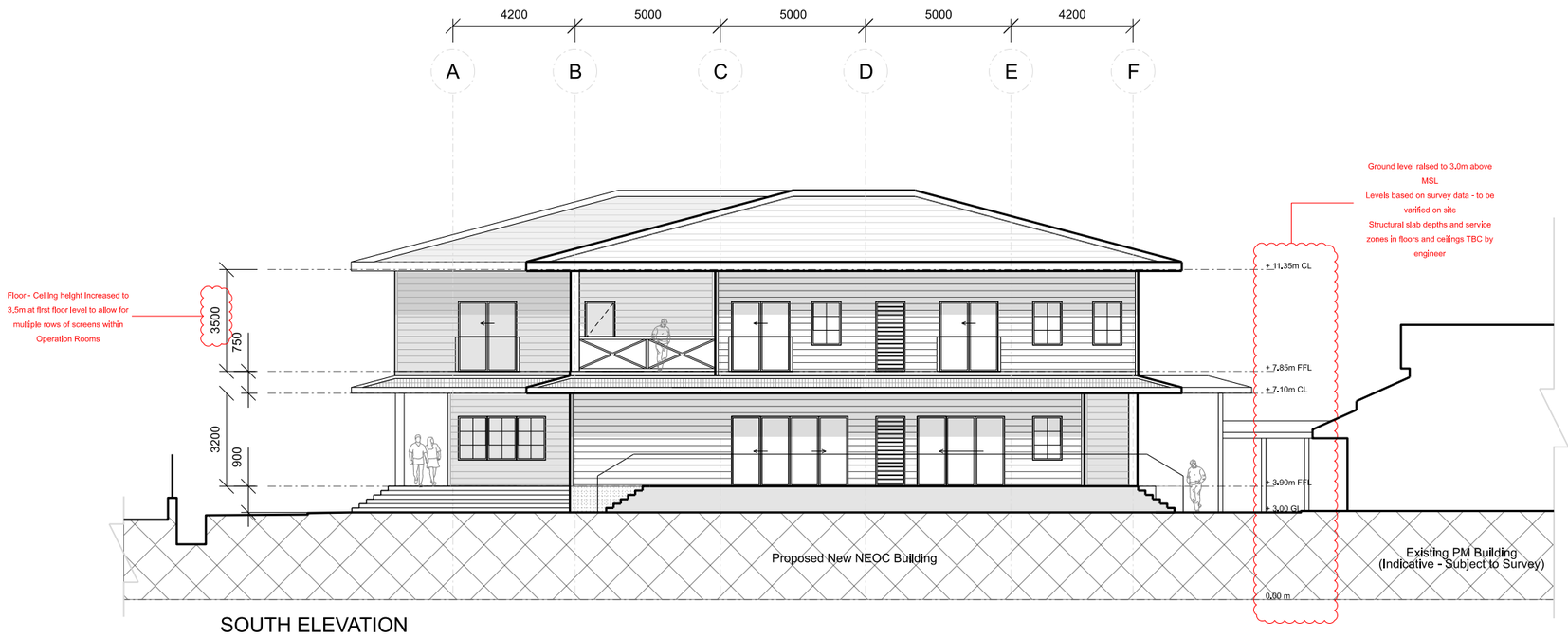
N

1 2 3 4 5 6 7 8

METRES (1:100)




NORTH ELEVATION




SOUTH ELEVATION

NOTES:

- All dimensions to be checked on site. Any discrepancies to be reported to CIIC
- Concept drawings are to communicate design intent only. Drawings are not for construction
- Levels are based on survey datum levels (MSL). All levels to be checked on site
- Structural setting out for illustrative purposes only. All structural elements to be confirmed by SE
- Existing building positions based on previous survey information. Updated survey required
- Varification of plant strategy required. Detailed specification to be discussed with Client and strategy developed alongside M&E engineer
- Security requirements to be confirmed by Specialist
- Fire escape strategy to be developed with, and approved by, qualified Fire Engineer

| Rev. | Date | Description |
|---|---|---|
| 02 | 17.02.2023 | Updated to client comments |
| 01 | 23.09.2022 | Updated to client comments |
| 00 | 07.07.2022 | FIRST ISSUED |

Client

CIIC

Site

OPM COMPOUND, RAROTONGA

Description

PROPOSED NEW NEOC AND ASSOCIATED WORKS

Drawing Name

NORTH & SOUTH ELEVATIONS
AS PROPOSED

| Scale | Drawn By | Date |
|---|---|---|
| 1:100 @ A1 | LS | July 2022 |

| Job No. | Drawing No. | Rev. |
|---|---|---|
| 22-001 | 201 | 02 |

# Appendices

# Appendix 1

## Aerial Photo of OPM Compound & Wider Context

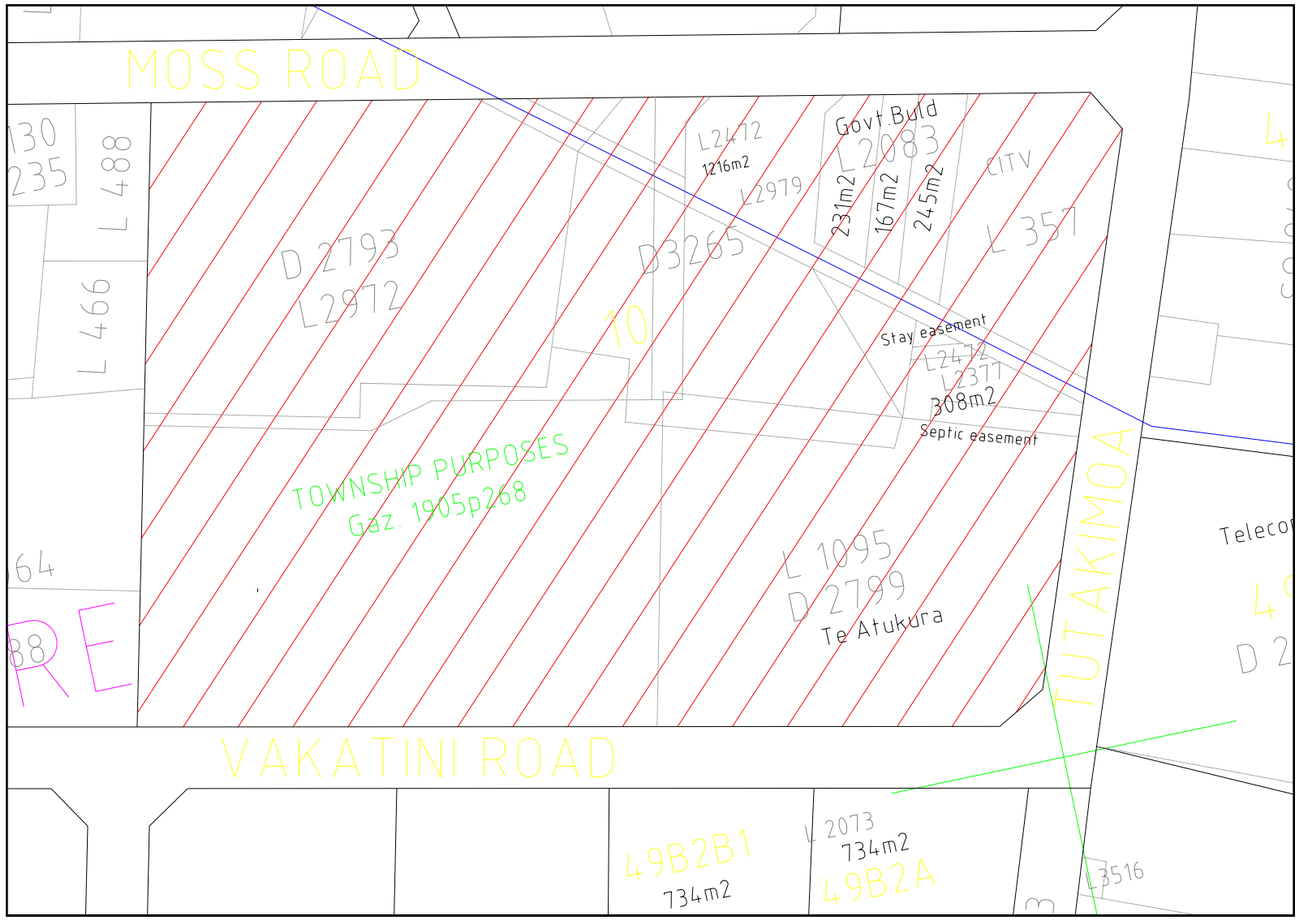
**Rarotonga** | Map from August 18, 2021

Powered by DroneDeploy

15m 30m
50ft 100ft

# Appendix 2

**RaroCAD Extract**




Suitability of drainage channel to be assessed

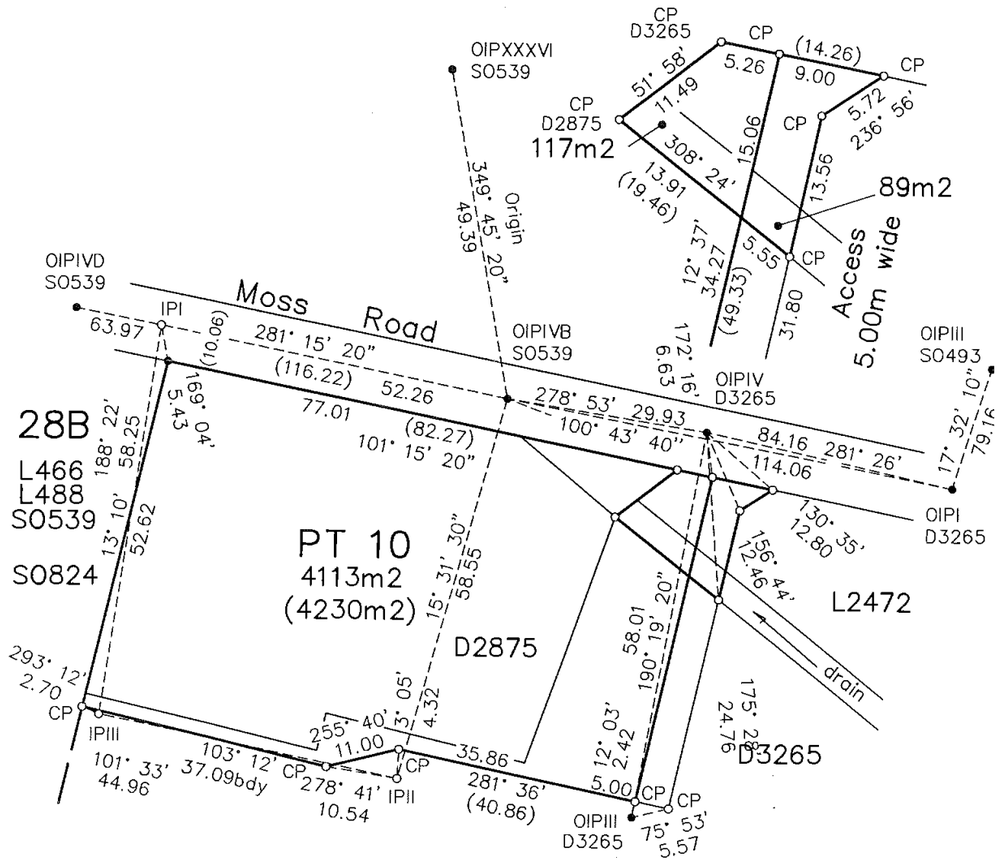
# Appendix 3

## Title Information - Adjacent Site and Drainage Channel
## Received from Survey Department 2022-06-24

DEPARTMENT OF SURVEY

Land TUTAKIMOA PT SEC 10 L. DIAGRAM No: 2972

Tapere TUTAKIMOA District AVARUA Island: RAROTONGA




PT 10
S0539

LMS REF: 08/54

Surveyed By: W Samuel Date: 26. 3. 08 Scale: 1: 750

Field Book No: 416 Page 28 Plan No: Drawn By K Tiro Date 2. 4. 08

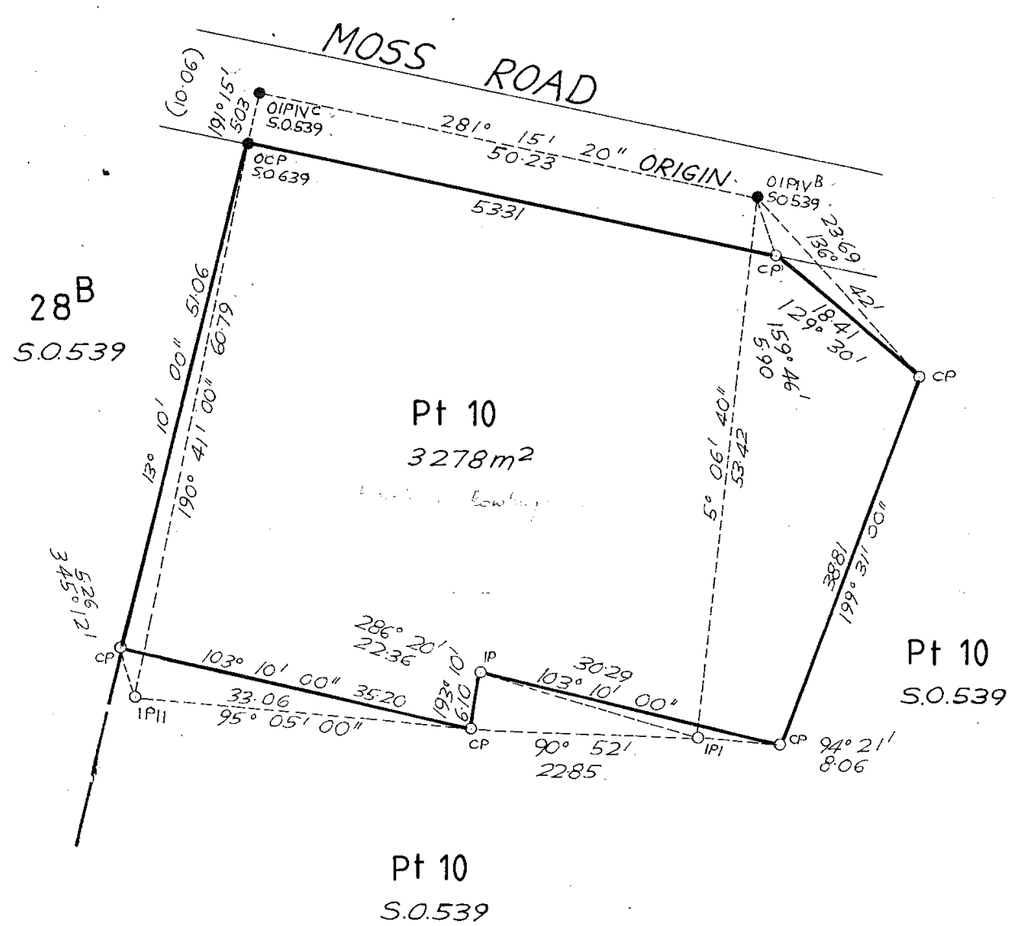
Checked and Recorded: Draughtsman Date 8.5.08

Approved as to Survey: Chief Surveyor Date

SURVEY DEPARTMENT

Land: Tutakimoa Pt 10 DIAGRAM No.: 2875

Tapere Tutakimoa District: Avarua Island: Rarotonga




Pt 10
S.0.539

S.0.539
D.2793

Inst Sht 1687
Comps Bk 211 p 40

# Appendix 4

## Example Platform Goods Lift





## POWERFUL & VERSATILE GOODS LIFT

As one of the largest and most powerful models in the Cibes Lift UK wide range, the A8000 goods lift is the perfect solution for the transportation of heavy loads between floors. Flexible and robust, it can travel up to a maximum height of 13m with up to 6 landing doors on any of the 3 non-machine sides. Suitable for use on commercial buildings, sporting arenas, factories, warehouses and restaurants due to its versatility.

### GOODS LIFT CIBES A8000 (1000 KG)

**All-inclusive lift concept**

Cibes 0800 085 0269

**Minimal structural impact**

**Installation in 4-5 days**

### GET IN TOUCH

ou have questions about any lift on our site, specific lift requirements or queries about bespoke s, please call 0800 085 0269.

Request free info pack.


### SPACE-SAVING GOODS LIFT