NAPIER
CITY COUNCIL
Te Kaunihera o Ahuriri

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ORDINARY MEETING OF COUNCIL

Open Attachments (Under separate cover 1)

Meeting Date:	Thursday 1 February 2024
Time:	9.30am
Venue:	Large Exhibition Hall War Memorial Centre Marine Parade Napier

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Boffa Miskell
WITH ISRAEL BIRCH

TE AKA

LANDSCAPE REPORT - PRELIMINARY DESIGN

PREPARED FOR NAPIER CITY COUNCIL
JANUARY 2024

PROJECT TEAM

athfield architects limited
athfield architects limited
athfield
with Israel Birch

Beca

Dunning Thornton consultants

DOCUMENT QUALITY ASSURANCE

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Boffa Miskell, 2024. *TE AKA LANDSCAPE REPORT* - PRELIMINARY DESIGN
Prepared for NAPIER CITY COUNCIL.

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Cover photograph: Ahuriri © Napier City Council

TE AKA

He hononga tapu a Te Aka i waenga i a Papatūānuku me Ranginui.

Koia ko te hononga i te takiwā hiranga o runga ki te takiwā ōkiko o raro. He mea whakaatu te pae o runga i te moemoeā, te whakaāio wairua, me te mātauranga, ā, hei tā te pae o raro ko te pūahoaho, te kōrerorero, me te auahatanga.

He wāhi e kitea ana ngā tūnekenekehanga a Ahuriri, i hīia rā e Rūaumoko te whenua i te moana. Ka puta ko te ngahere o Tangaroa, ka whakaarihia he waka huia hei pupuru, hei whakahaumaru hoki i ngā taonga i te pae tiketike rawa.

He wāhi tākaro hoki a Te Aka mā te hinengaro, te tinana, te wairua me te whānau. He whakarite hoki i te whiri i ngā aho rau o te mātauranga i waihangahia mai ai i te wairua o te mahi ngātahi.

Nā ēnei whakaaro me ēnei ariā katoa ka hua mai ai a Te Aka, ā, ka kitea i tana whakahoahoatanga mai.

Te Aka is the sacred connection between Papatūānuku and Ranginui.

It is the link between the space of excellence above and the space of physical manifestation below. The upper level represents dreaming, meditation, and knowledge and the lower level represents clarity, conversation, and creativity.

Ahuriri (Napier) is a site of movement, where Rūaumoko uplifted whenua from the ocean. The forest of Tangaroa appeared and presented a waka huia where taonga are stored and protected at the highest level.

Te Aka is also a playground for the hinengaro (mind), tinana (body), wairua (spirit), and whānau (family). It is a metaphor for weaving together the multiple threads of knowledge that is built on the spirit of collaboration.

Te Aka is based on these concepts and elements and this will be reflected in its design.

CONTENTS

INTRODUCTION

BACKGROUND

This report builds upon an existing foundation of documents and plans that set the strategic vision for the Precinct. These include:

Napier Libraries Strategy
2018

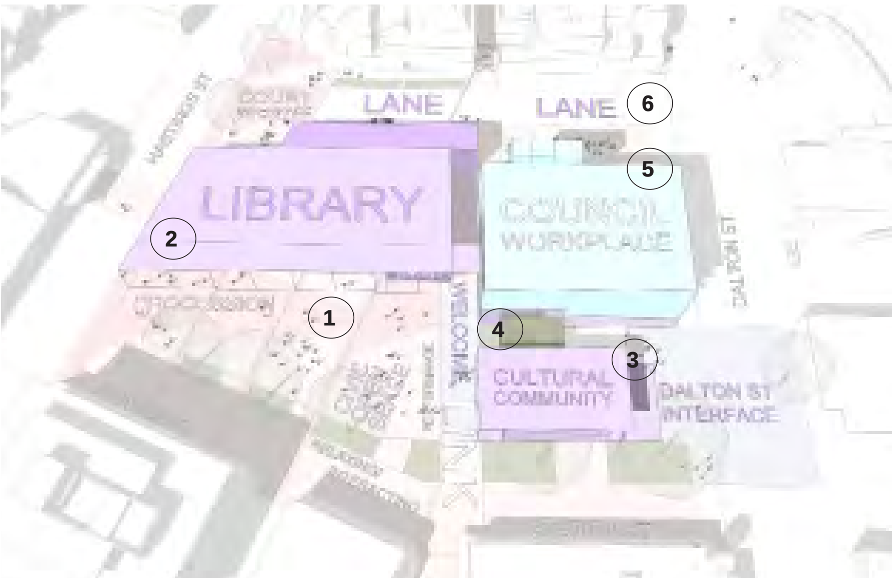
Civic Precinct Framework
2020

Ahuriri Napier Library and Civic Area Plan
2021

Station Street Facility Design Brief
2022

Napier Library Business Case
2022

Of particular influence to the site design is the *Ahuriri Napier Library and Civic Area Plan 2021*, which established the spatial framework for the public space, including connections to the surrounding context and opportunities for activities/ programming. The landscape concept uses this framework as a starting point for the concept design phase.



Extract from the Ahiriri/Napier Library Area Plan 2021
Boffa Miskell + Athfield Architects + Jacob Scott

SCOPE OF THIS REPORT

This report is supplementary to the overall Te Aka Concept Design Report (Athfield Architects) and it is helpful to be read in conjunction. The overall report containes a comprehensive summary background to the project, the design process, the wider site context and the architectural proposal.

This report focuses on the external spaces, in particular:

- Developing and integrating the site layout with the current context and proposed buildings.
- Developing the cultural narrative and expressing how this influences the design of the landscape.
- Progressing the site design in response to considerations bought forward by the wānanga participants, design team and community.
- Adding definition to the scope of the public realm and approach to funding.
- Setting up a strategy for the layers of the landscape design, including planting, water, access, events, materiality and other functional requirements.

Te Aka Concept Design Report 2023
Athfield Architects + Boffa Miskell + Israel Birch + Beca + Dunning Thornton

COLLABORATION

The landscape concept has been developed through a co-design process, based around a series of wānanga hosted by Mana Whenua partners in marae across Ahuriri. Through this process, the name Te Aka was gifted to the project, becoming both the project name and the foundational concept.

The team has worked together to shape the site concept with particular acknowledgement to Napier City Council, Athfield Architects, Israel Birch and the Mana Whenua Design Team.

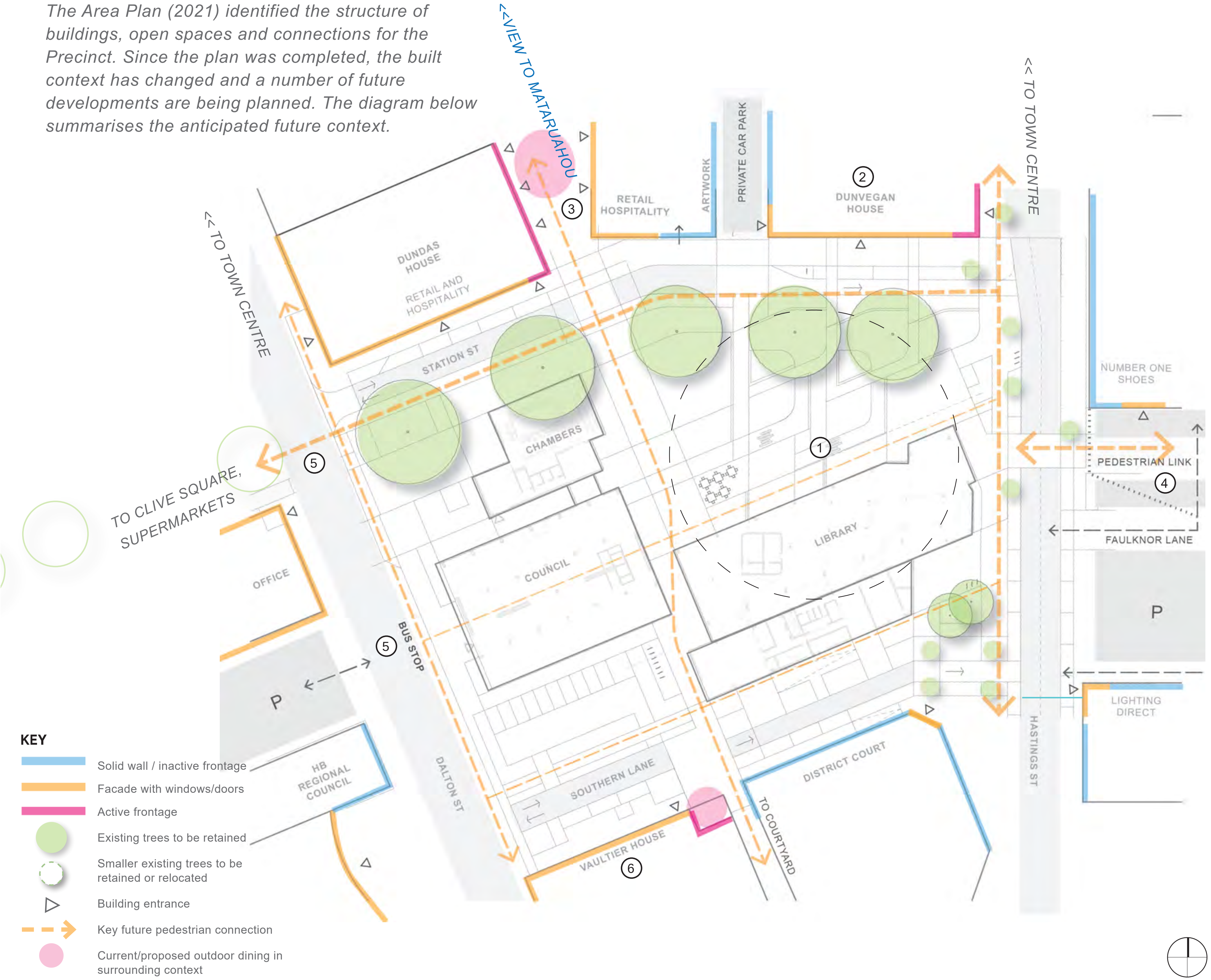
Wānanga Participants

Mayor Kirsten Wise
Deputy Mayor Annette Brosnan
Councillor Ronda Chrystal
Hilary Prentice
Beverly Kemp-Harmer
Tipene Cottrell
Morehu Te Tomo
Te Kaha Hawaikirangi
Alix Burke
Anna Nottage
Anne Bradbury
Caroline Thomson
Chad Tareha
Kate Ivicheva
Nicola Saunders
Keely Nye
Steve Gregory
Jon Rennie
Stuart Lyons
Byron Roff
Darran Gillies
Israel Birch
Ari Stevens
Jonie Molloy
Michele Grigg
Jenny Pearce - CAB
Johanna Rogers
Michael Gilbertson
Richard Van Looy
Jessica Ellerm
Janey Sene
Georgina King
Marc Baily
Ethan Duff
Megan Walker
Alister Eady
Sue Sutherland
Councillors
ELT members
(War Memorial Hall workshop)

INTRODUCTION

A CHANGING CONTEXT

The Area Plan (2021) identified the structure of buildings, open spaces and connections for the Precinct. Since the plan was completed, the built context has changed and a number of future developments are being planned. The diagram below summarises the anticipated future context.



RECENT AND POTENTIAL CHANGES TO CONTEXT

1. The site for the Te Aka Library and public space has been cleared of the previous Council Civic Building.

2. With the reworking of Station Street there is potential for the redevelopment of Dunvegan House, which would be recommended to include ground floor commercial and active frontage. The ground floor and street levels may be able to enable a more accessible and interactive relationship.

3. Works have been completed to improve pedestrian connectivity to Dickens Street.

   The potential remains for further upgrades to encourage people to spend time in this space and support outdoor dining.

4. An important linkage to the sea and waterfront has been opened up, widening an otherwise unclear connection. The relationship of future new buildings to the realised open space and lane connection here requires deliberate design responses to gain the significant potential benefits for public life and business vitality.

5. There is potential for a northbound bus stop on Dalton St and upgrade of bus infrastructure. To be confirmed through future stages.

6. Redevelopment of Vaultier House has been proposed. Early concepts indicate a more welcoming northern frontage, outdoor dining, balconies, and an upgrade to the central courtyard and pedestrian link.

LANDSCAPE CONTEXT

LANDSCAPE CHANGE OVER TIME

The landscape of Ahuriri has seen considerable change over the last 100 -years. Ahuriri was a watery landscape, a large tidal lagoon with islands and waterways, known as Te Whanganui-a-Otorū. It was protected from the ocean by a long shingle spit.

In 1931, the earthquake lifted the lagoon, draining the water and exposing the floor. Further reclamation including the excavation of Pukemokimoki created the land on which Napier city was built.

SOURCE: NATIONAL LIBRARY NZ

CONCEPTUAL SECTION THROUGH TE AKA SITE

The level change is prominent in the Te Aka site today, with the east of the site raised on the shingle spit, then falling towards the west. The design will draw influence from the underlying landscape.

1840's Ahuriri Plains and Harbour, before and after the earthquake

SOURCE: NAPIERLIBRARIES.CO,NZ

Early 1900's, Pukemokimoki Hill excavation

SOURCE: NAPIERLIBRARIES.CO.NZ

Te Whanganui-o-Orotū was an abundant source of natural resources and central to tangata whenua life.

LANDSCAPE CONTEXT

NATURAL CHARACTER

> *More than most places, Napier is a negotiation between land and sea.*
> *Mataruahou / Napier Hill is the 'blip' in the otherwise smooth sweep of Hawke Bay.*
> *It is an outcrop of hard rock that anchors the shingle spits.*
> *Mataruahou is the feature around which the coastline and city coalesced.*
> *It is the reason Napier is where it is.*
> *Te Whanganui-ā-Orotū is the other seminal natural feature.*
> *It is the former lagoon trapped between the shingle spits and the western hills.*
> *Extract from the NCC Napier Landscape Study 2019*

Mataruahou
Named through the story of chief Tu Ahuriri looking down and seeing his mata (face) reflected in the water.

TE WHANGANUI-Ā-OROTŪ

Calm
Reflective
Sheltered

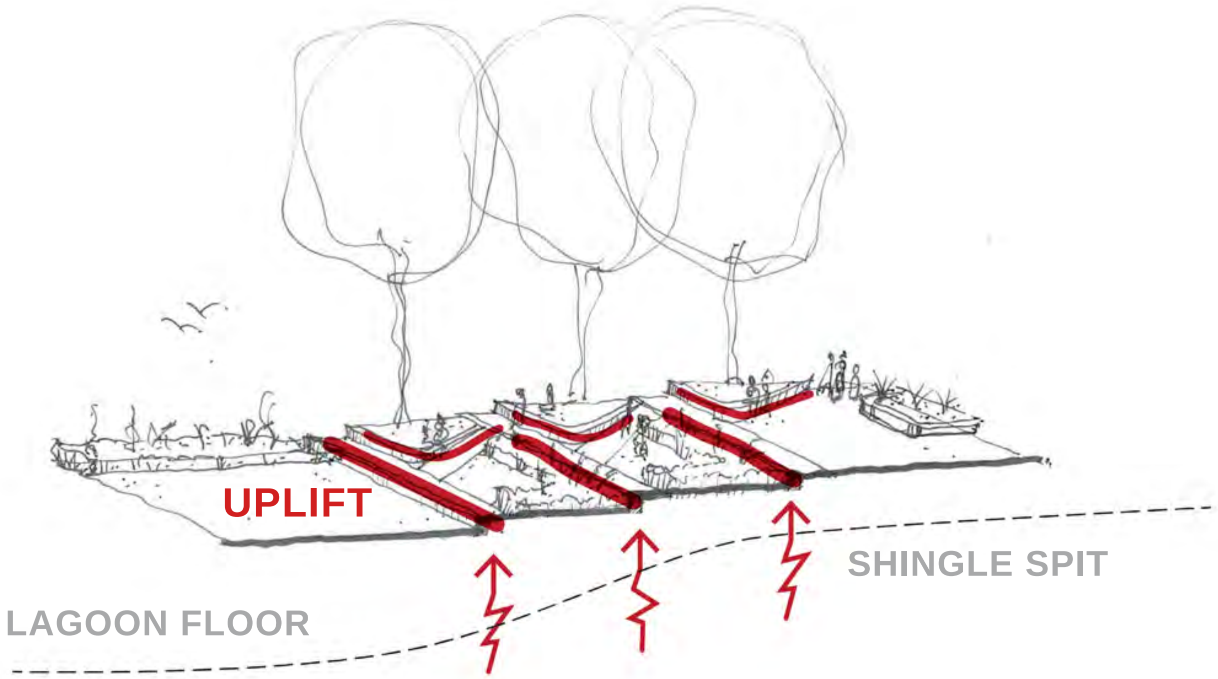
TO MOANANUI-A-KIWA

Exposed
Shingle
Wave forms

LANDSCAPE CONCEPT

KEY IDEAS

There are four foundational concepts that have been developed in collaboration with mana whenua which will shape the landscape design.
The concepts are interwoven and build upon each other.



RŪAUMOKO

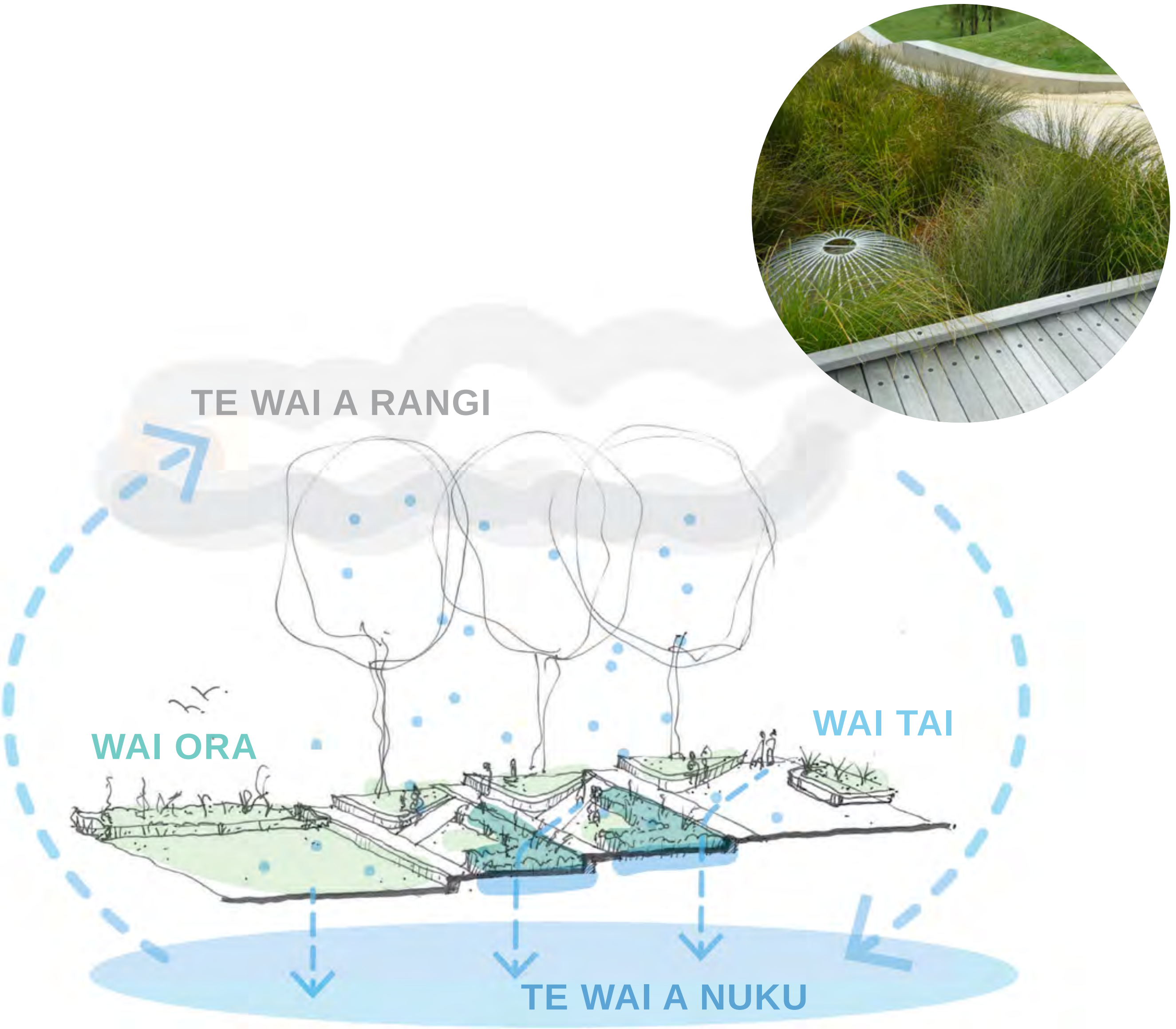
Reveal the story of the earthquake uplift - Rūaumoko as the creator of land.
Expression of natural topography - the change in level from the shingle spit to the lagoon floor, which was raised to become inhabitable land.

TE NGĀHERE O TANGAROA

Express the forest of Tangaroa, the diversity of life that flourishes on the land that once lay under the water.
The character of two ecosystems shaped by contrasting environments, the coastal edge, rough and exposed with salt laden winds, and the sheltered, abundant landscape of Te Whanganui-o-Orotū.

LANDSCAPE CONCEPT

KEY IDEAS



WAI

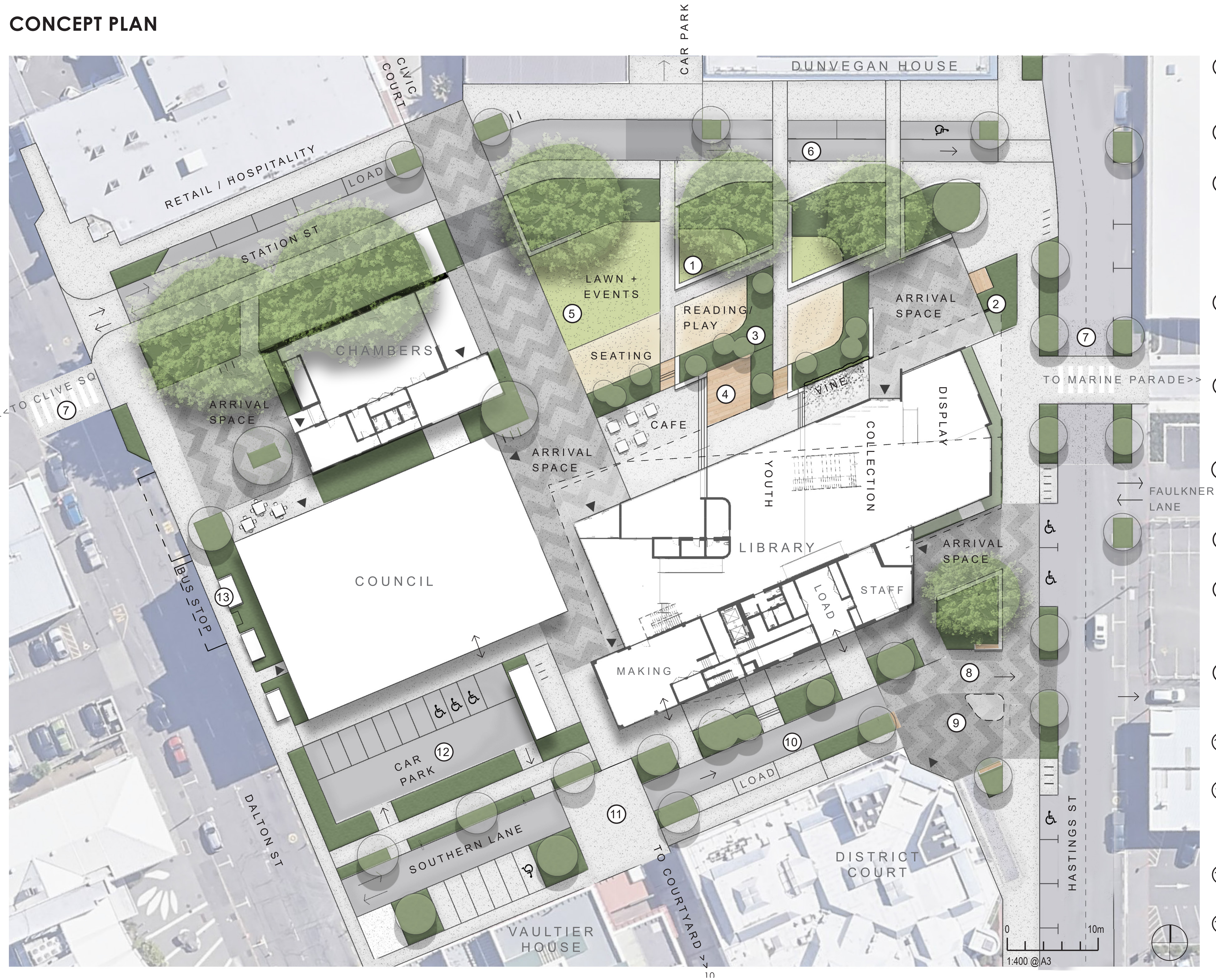
Celebrate water as it moves through different forms,
Te Wai-a-Rangi and Te Wai-a-Nuku.
Wai-tai - the saline water of the Te Moananui-a-Kiwa.
Wai-ora - the reflective 'living' water of Te Whanganui-a-Orotū that supports abundant life.
Protect, cleanse and reveal the water in the landscape.

TE AKA

A journey of learning - a landscape that encourages discovery and exploration, embedded with meaning, to tell stories about people and place.
Create space that invite the whole community to meet and spend time, kōrero, wānanga, play and connect.

LANDSCAPE CONCEPT

CONCEPT PLAN



1. Terraced lawn spaces with walls that express Rūaumoko and the uplift of Te Whanganui-ā-Orotu
2. Artwork/pou connecting from the canopy to the ground.
3. Raingardens that form protected spaces to spend time in - ‘raised beaches’, connecting to the narrative of Rūaumoko. Opportunity for a youth-focused, playful landscape.
4. Terracing that follows level changes within building to allow activity from within the building to flow outside.
5. Large lawn area with seating to support community events. A mix of hard and soft surfaces to be usable year-round.
6. Upgrade to Station St to improve pedestrian access and provide flexibility for events.
7. Improve pedestrian connections over Dalton St and Hastings St.
8. Integrate Court and Library with a welcoming public space that provides definition between functions.
9. Court arrival space. Paved space with clear sight lines, seating and sculptural element.
10. Connect laneway to Hastings St for service access to Library.
11. Provide pedestrian connection north-south across the precinct, connecting to the town centre through Civic Court.
12. Priority parking zone, eg accessible / family / older people.
13. Bus stop refurbishment. Form and location to be developed in conjunction with Council building.

LANDSCAPE CONCEPT

SPACES AND CONNECTIONS

The site is arranged as a collection of spaces and connections that work together to provide for a range of activities. Through size, composition, materials and elements, the spaces signal how they can be used. Movement to and through these spaces is considered as part of a pathway hierarchy, helping people to intuitively interact with the space.

LANDSCAPE CONCEPT

INTEGRATING STREETS

Conceptually extending the public space of Te Aka to include Station Street, to create a slow-speed, people friendly environment.

LANDSCAPE CONCEPT

MATERIAL CHARACTER

Quality materials will to reflect the natural environment and allow for artistic expression.

LANDSCAPE CONCEPT

MATERIAL CHARACTER



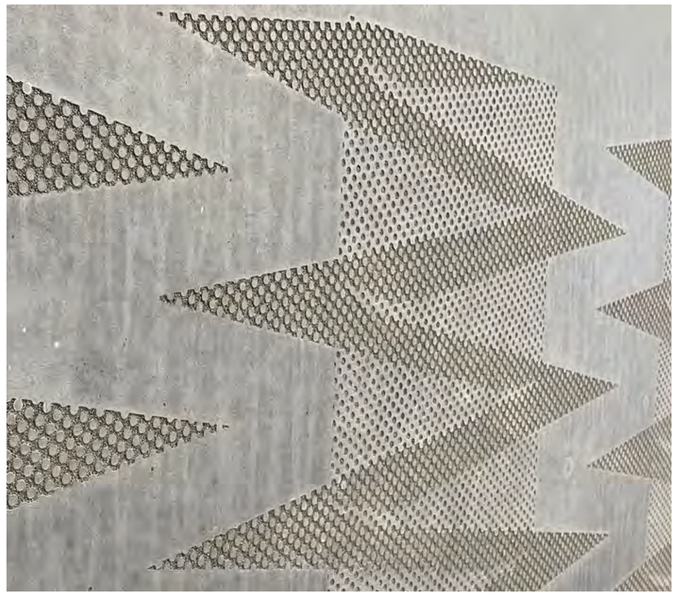
Feature elements such as sittable walls, raingardens, climbing vines, stepping stones will create opportunities to express the story of the landscape and influence of water.


LANDSCAPE CONCEPT

ACTIVATION AND EXPRESSION




Comfortable, flexible spaces with opportunities for artistic expression. A playful landscape invites the whole community, particularly young people, to feel a sense of belonging, to meet, relax and spend time as part of positive public life.



LANDSCAPE CONCEPT

OPPORTUNITIES FOR ARTWORKS

Working in collaboration with mana whenua artists, there are a number of opportunities across the site to integrate artwork that helps to tell the story of Te Aka.

Standalone artworks

1. Iconic "pou" artwork. Front left corner of the building.
2. Meeting space. Vapour blasted artwork by the pou on the ground to signify a meeting point. Possibly a representation of the kaitiaki, Moremore.
3. Climbing vine along the northern frontage - form of supporting structure/wires.
4. A layer of urban play – spaces and elements encourage playful learning, discovery and interaction and tell a story of place.
5. Terrace walls – form/finish to express Rūaumoko.
6. Paving - opportunity to work with the design of the paving to enhance the narrative.
7. Sculpture at entrance to the District Court

Site wide opportunities

Landscape ground. Vapour blasted representations of whakapapa of the site, and past activities such as collecting kai.

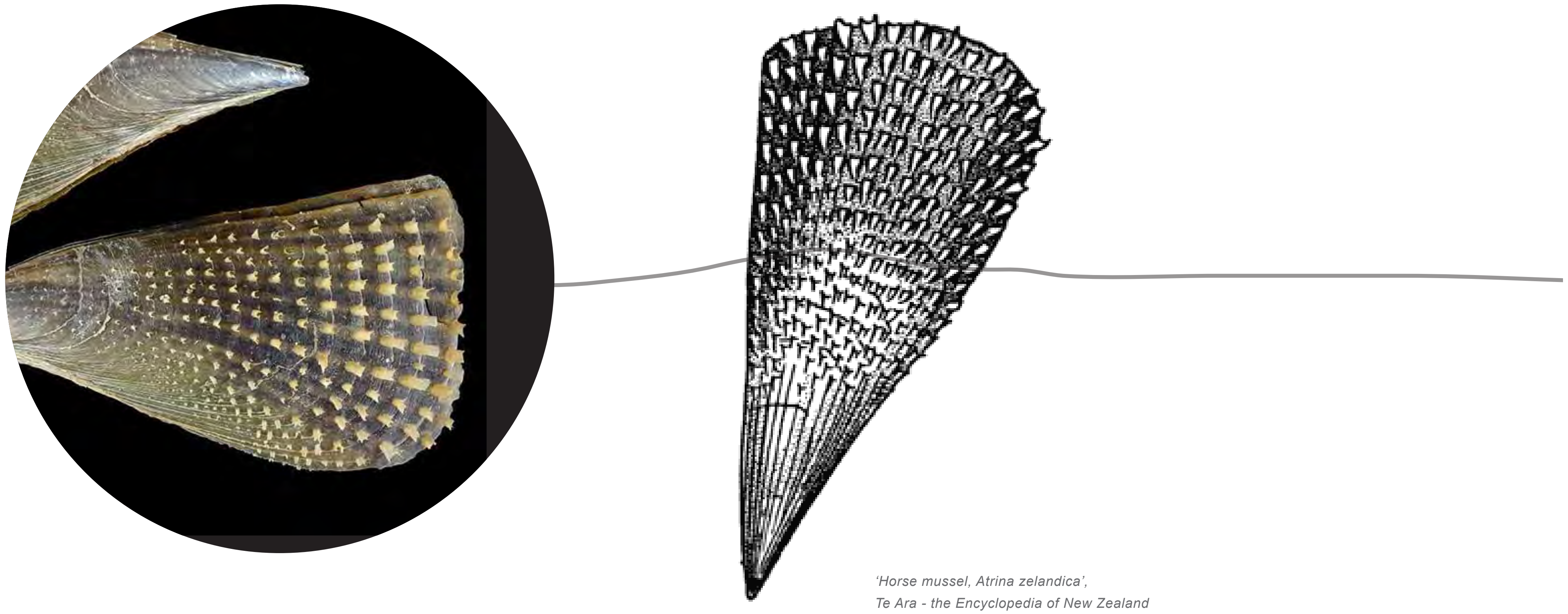
Enhance the planting, seating and whenua to represent Papatūānuku, Rūaumoko, and wai.

Light – feature lighting to help to tell a story.

LANDSCAPE CONCEPT

DESIGN CUES - AHURIRI LAGOON UPLIFT

When the lagoon bed was lifted, a field of horse mussel shells were exposed - a unique moment in the landscape history of Ahuriri and potential design cue.



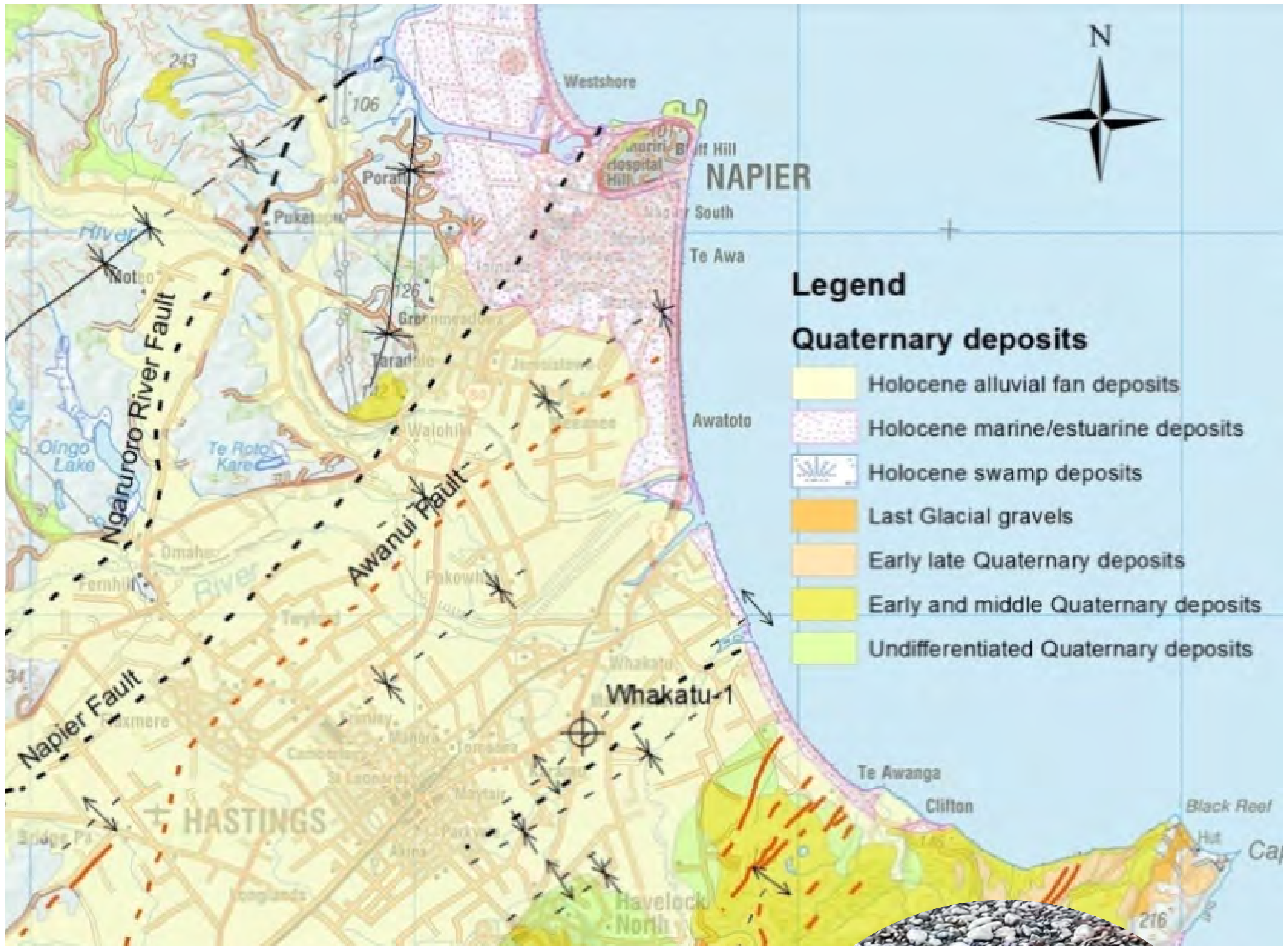
'Horse mussel, Atrina zelandica',
Te Ara - the Encyclopedia of New Zealand

LANDSCAPE CONCEPT

DESIGN CUES - GEOLOGY

*Mataruahou is a Limestone outcrop,
formed from the calcium deposits of marine life.*

Slip at Bluff Hill - 1931
Source: National Library of New Zealand
URL: https://natlib.govt.nz/records/22304187



*Most of the Heretaunga Plains are covered by a layer
of rounded, greywacke gravels deposited by rivers.*

Source: GNS, Lee et.al. 2011

*Limestone extracted from the Napier Port revetment wall,
used to form artificial reef near Pania reef.
Image scource: RNZ.co.nz*

*A layer of limestone underlies the Heretaunga Plains,
3-500m deep and several hundred meters thick.
It is creamy coloured and contains many layers
of shell fragments.*

GNS, Lee et.al. 2011

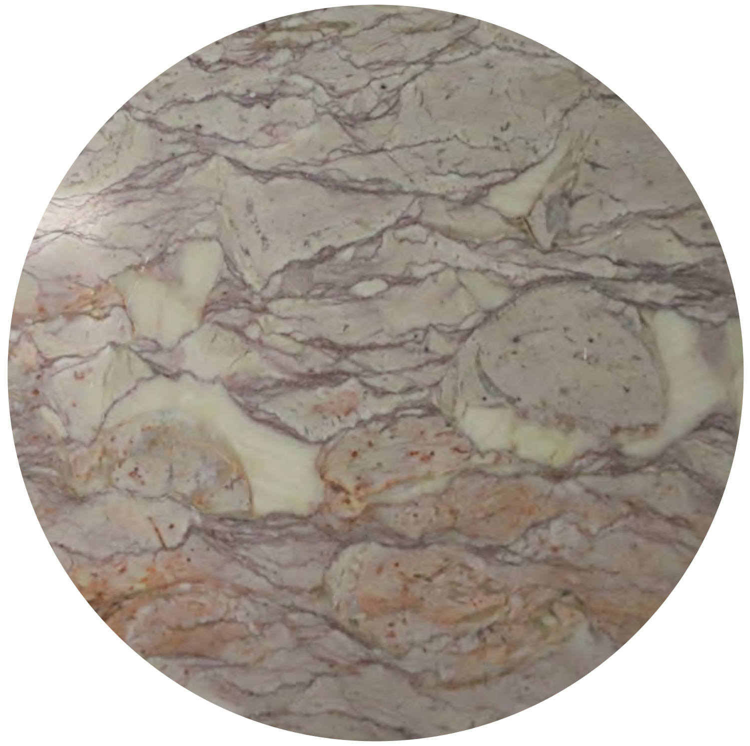
LANDSCAPE CONCEPT

DESIGN CUES - ACKNOWLEDGE ART DECO

*Napier is synonymous with Art Deco, characterised by strong geometric patterns and clean shapes.
It is important to acknowledge this context and respond with sensitivity, while taking a modern approach.*

Seashells were a common influence

Deep embossing casts shadows to emphasise patterns.



Repetition is celebrated, using line to give a sense of movement.

*ASB and Kidson's Buildings
Napier*

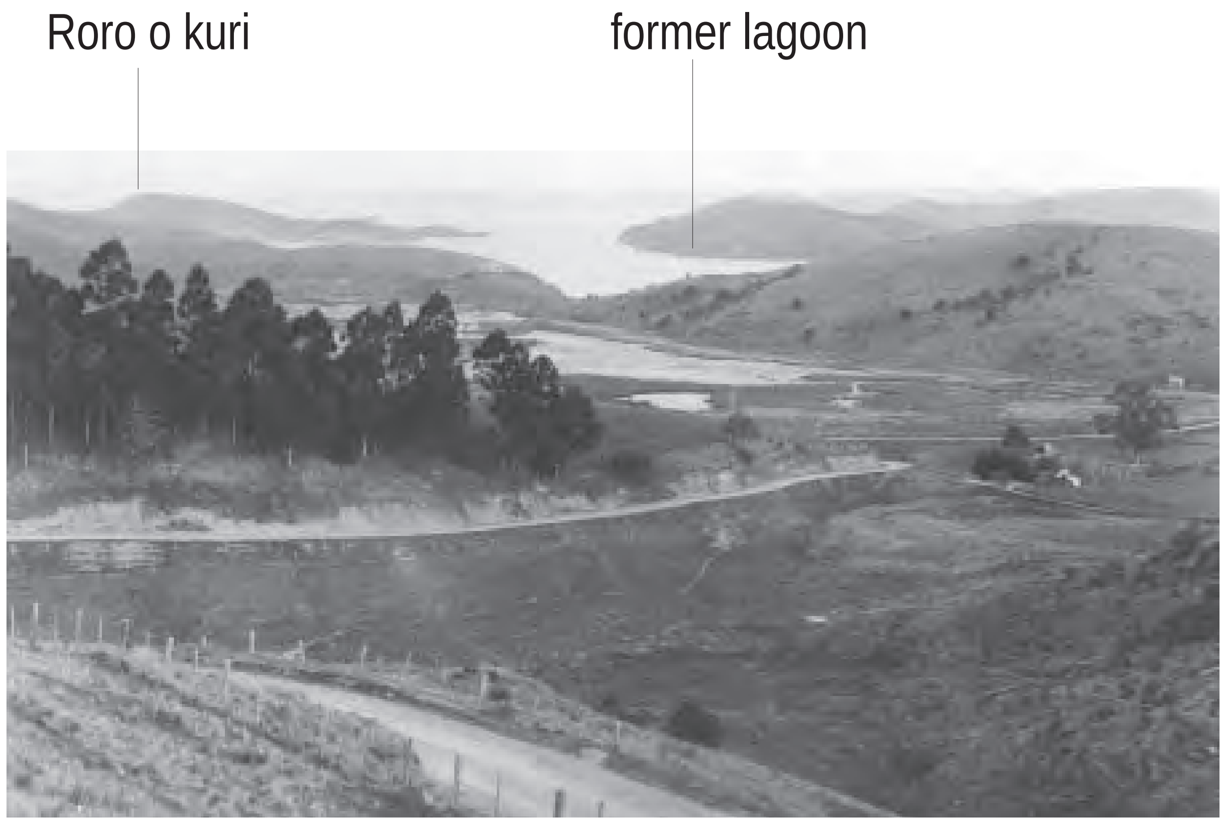
Materials used in Art Deco were unusually varied, mixing synthetic and natural, including concrete, plastic, with stone to give a feeling of luxury.

*Stone wall from the now demolished
Napier Council Building*

LANDSCAPE CONCEPT

DESIGN CUES - REMNANT BAYS

When the lagoon was lifted, the water receded from beaches, and islands became hills. These landforms are culturally significant and can be seen today.



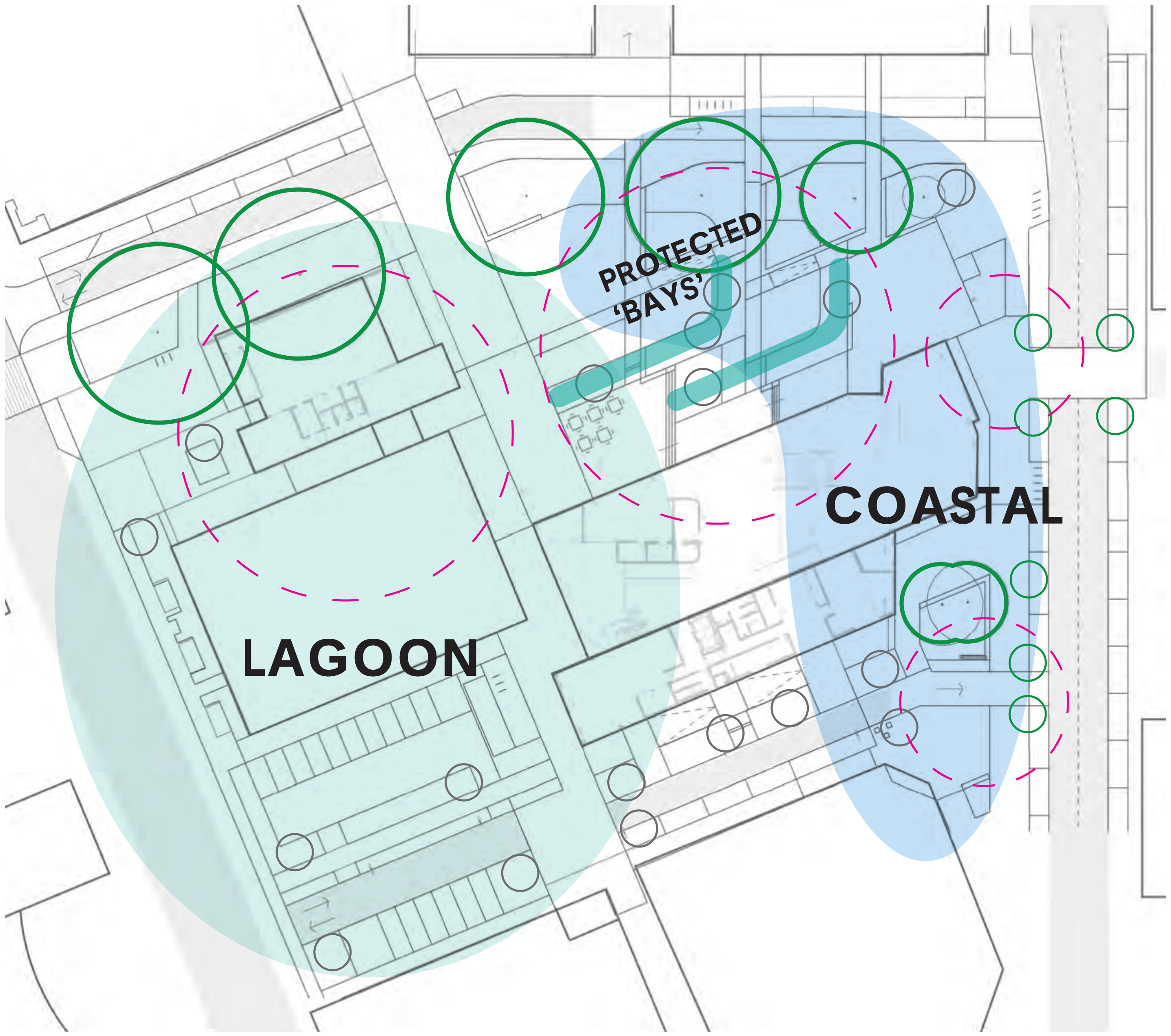
Roro-o-Kuri - an island in Te Whanganui-o-Orotū that was "shaped like an Octopus" forming protective bays.

Napier Landscape Study, NCC

Wīwī is a native reed that can be seen in the present day tracing the historic beaches, including at Roro-o-Kuri Island.

LANDSCAPE CONCEPT

RĀKAU / TREES AND PLANTS



Planting is designed to reflect the natural environment of Ahuriri and express the transition from the coastal environment to the lagoon. Curved raingardens tucked into terraces are planted with species that naturally occur around Ahuriri, tracing where bays of Te-Whanganui-a-Orotū once lay, creating protected spaces while capturing water from surrounding surfaces.

Plants will be eco-sourced from the local area and chosen for their ability to survive with minimal maintenance, and without irrigation where possible.

COASTAL

Plants that are naturally found along the coastline, tolerant of salt laden winds, drought and exposure.

LAGOON

Plants that are naturally found in and around Te Whanganui-a-Orotū where fresh and salt water mixes to form a unique environment.

PROTECTED BAYS

Conceptual shorelines fringed with native reeds that create pockets of space to spend time in.

PLANTS OF SPECIAL SIGNIFICANCE

A selection of rākau / plants and trees will be included for their particular significance to mana whenua.
To be located in prominent locations across the site.

TREES

Existing trees to be retained.
The future of the large Plane trees on Station Street are intended to be retained in the first instance. Removal will require a decision informed by their status in the District Plan, their health, known issues with pest pird species, and fit with cultural values.

The large Pohutukawa outside the Court will be retained, while smaller native trees will retained if possible or relocated if they area affected by the site design.

Native trees will be distributed across the site to provide vertical structure and shade and support biodiversity.

LANDSCAPE CONCEPT

RĀKAU / TREES AND PLANTS

Trees have been identified by mana whenua as having special meaning. These will be featured in prominent locations to strengthen the expression of local identity and connection to Ahuriri.

Northern rātā
Metrosideros robusta

The bark is used for its healing properties.

Totara
Podocarpus totara

Used for waka building and the fruit is a source of kai for manu.

Tī Kouka
Cordyline australis

A part of the story of how Tūtaekurī was named, when people from Ngāti Kahungunu were travelling though, eating shoots of the Tī kouka due to hunger. Hikawera, their cousin invited them to invited them to Te Umukuri and sacrificed kuri (dogs) to feed them.

Mahoe
Melicytus ramiflorus

A source of kai for manu.
Used in stories of Māui as one of the rākau used to start fires, along with pukatea, Kai kamako, tōtara, and patate

Karaka
Corynocarpus laevigatus

Leaves used for rongoā / traditional medicine.

Acknowledgement to Tipene Cottrell for mātaruanga Māori around local plant species and their significance

LANDSCAPE CONCEPT

RĀKAU / TREES AND PLANTS

A selection of plants have been identified by mana whenua as having special significance for their traditional uses or connection to place. Seeds will be sourced locally where possible.

Wiwi
Juncus edgariae

Seen throughout Te Whanganui-a-Orotu estuary. Grows in areas where beaches used to be, such as the old Roro-o-Kuri Island, telling a story of the past landscape.

Mokimoki
Microsorum scandens

Prized for its sweet scent that was used to make fragrant oil. The plant which the hill Pukemokimoki was named after, which was quarried as fill to reclaim land around Ahuriri.

Hue
Lagenaria siceraria

A gourd that is hollowed, dried and used to collect kai and wai. Representative of the concept of Te Aka.

Puawhananga
Clematis paniculata

Used for healing and a vine representative of the concept of Te Aka.

Kareao
Ripogonum scandens

Used for making hīnaki. Representative of mahi toi - creative activities that will take place at Te Aka. Young tender shoots were also a source of kai.

Akepiro
Olearia Gardneri

Now rare in the region and would be significant to revitalise in the city.

Kawakawa
Macropiper excelsum

Used for healing, physically and spiritually.

Pīngao
Ficinia spiralis

Naturally creates sand dunes. Bright orange leaves are used for weaving, a valuable resource.Pīngao is part of a story where she began life as seaweed in the ocean then when she saw the handsome Toetoe, she crawled up onto the dunes to meet him.

Toetoekakahoroa
Cortideria fluvida

Toetoe, used in turapa panels - a graceful plant that is part of the love story with Pīngao.

Acknowledgement to Tipene Cottrell for mātaruanga Māori around local plant species and their significance

LANDSCAPE CONCEPT

RĀKAU / TREES AND PLANTS

Planting helps us to intuitively understand where we are in the world.
The planting on site will be selected from communities that would have occurred naturally in the area, from the exposed coastal dune environment to the sheltered lagoon.

Tukauki
Libertia grandiflora

Pepepe
Machaerina sinclairii

Nīkau
Rhopalostylis sapida

Rengarenga
Arthropodium cirratum

Coastal Shrub Daisy
Oleria solandri

Sand Coprosma
Coprosma acerosa

Kawaowao
Microsorum pustulatum

Taupata
Coprosma repens

Wiwi
Juncus edgariae

Toetoe
Cortaderia fulvida

Pohuehue
Muehlenbeckia complexa

Pīngao
Ficinia spiralis

Climbing rātā
Metrosideros perforata

Pukio
Carex virgata

Oioi
Apodasmia similis

Wharariki
Phormium cookianum

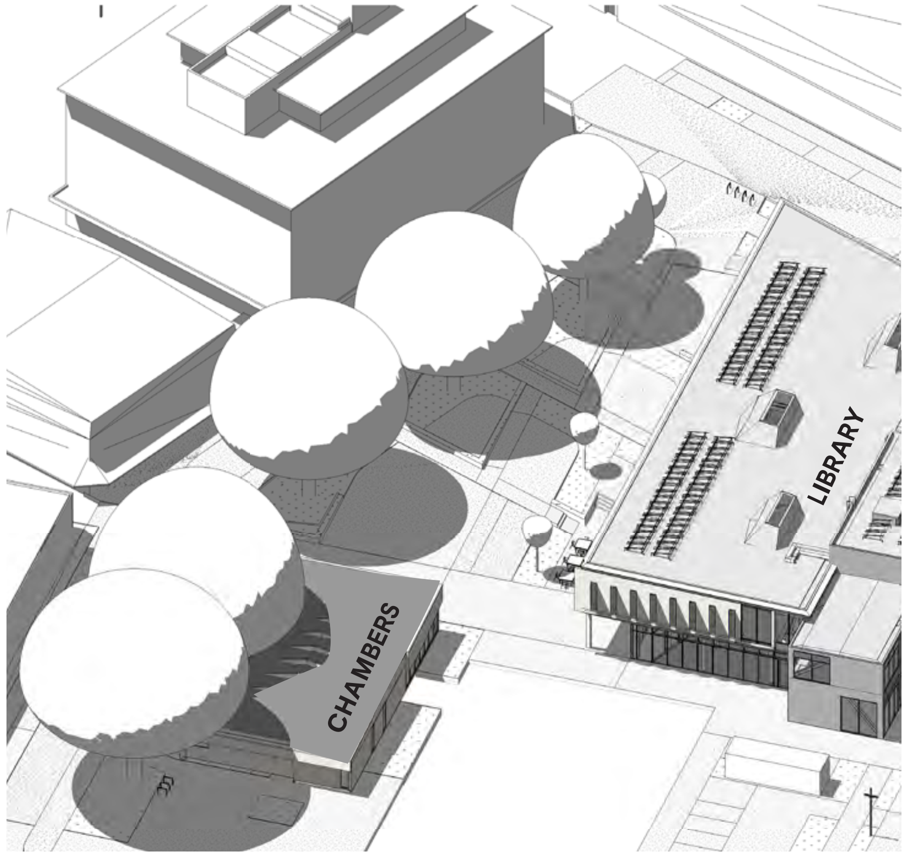
Kākābeak
Clianthus puniceus

Wī
Poa cita

LAGOON ←→ COASTAL

LANDSCAPE CONCEPT

INDICATIVE SHADING FROM EXISTING TREES

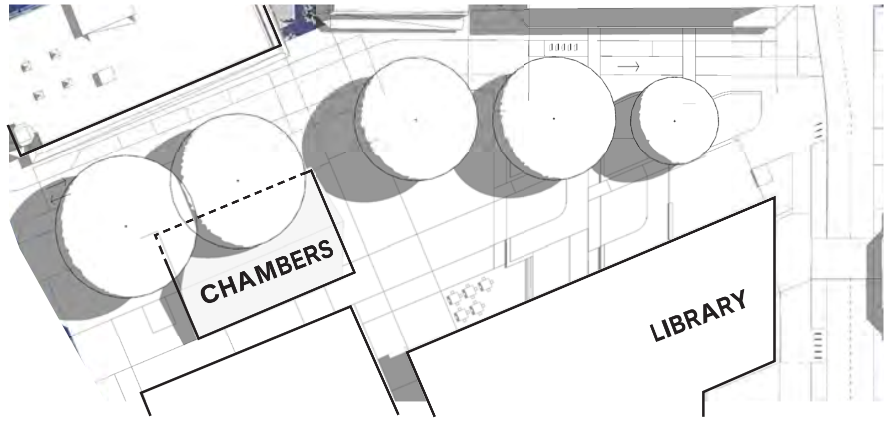


1ST OF FEBRUARY @ 1PM

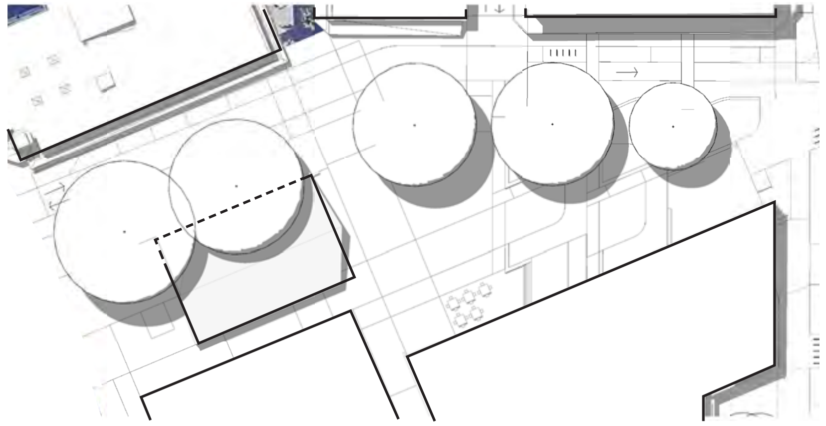
PEAK OF SUMMER

The large plane trees on Station St provide shade during the hotter months. The view above shows an indicative shadow length at lunchtime in February.

The lawn spaces are in shade, while the cafe and outdoor reading spaces are in the sun. Localised planting will provide options to be in the sun or shade.



10AM



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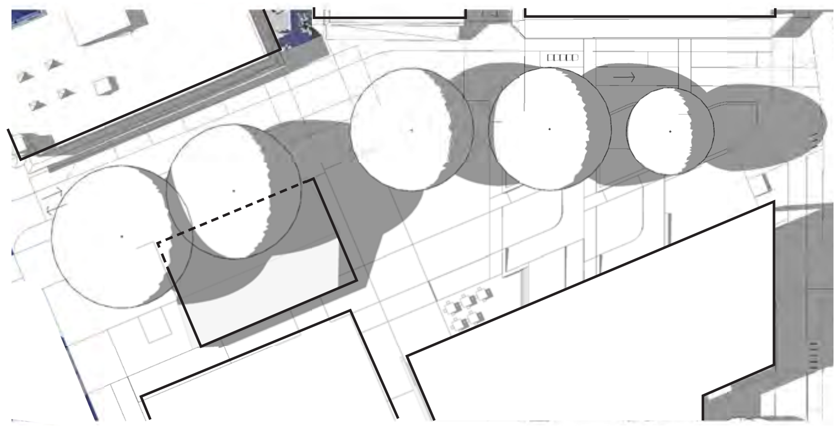
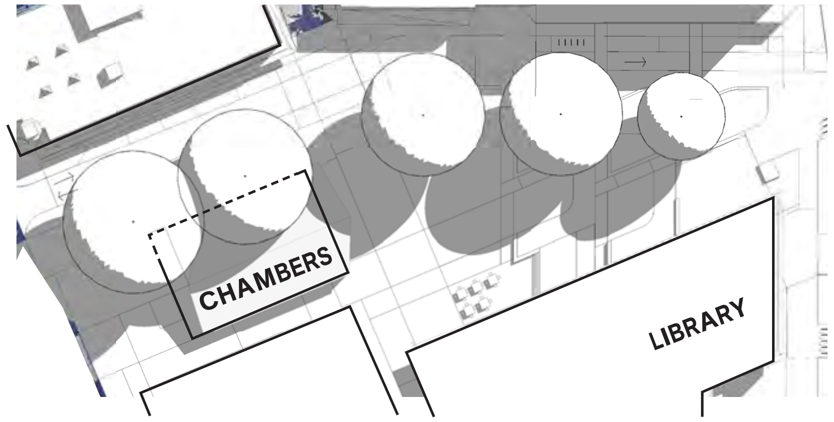


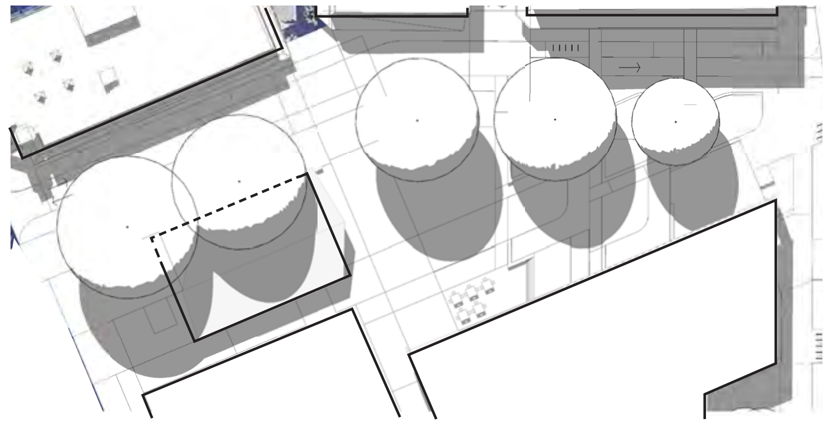
4PM

SUMMER SOLSITICE - DEC 21

The longest day of the year and the site is mostly in sun, apart from directly underneath the trees.



10AM



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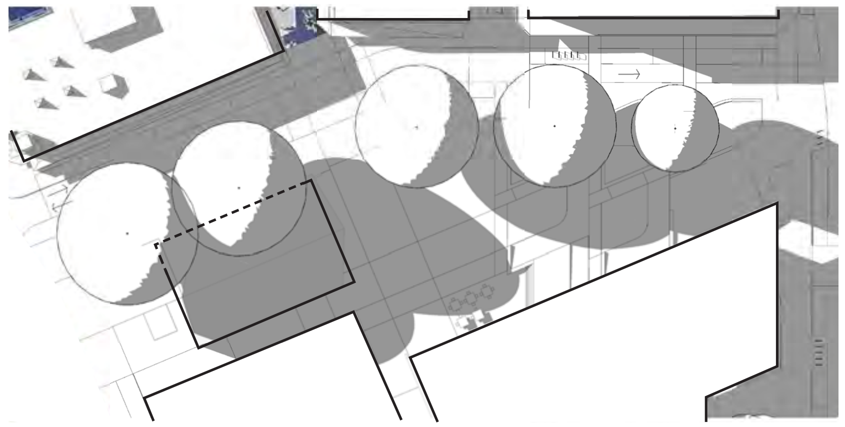


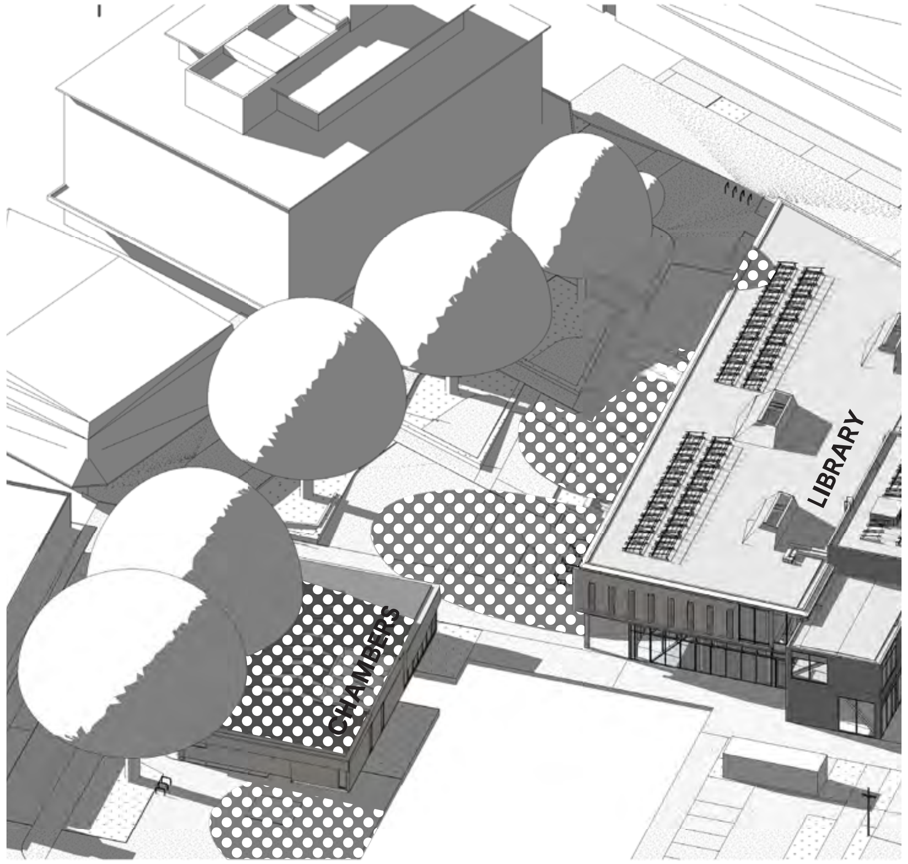
4PM

AUTUMN EQUINOX - MARCH 23

Shading moves across the site during the day, with the spaces directly in front of the Library remain in sun.

LANDSCAPE CONCEPT

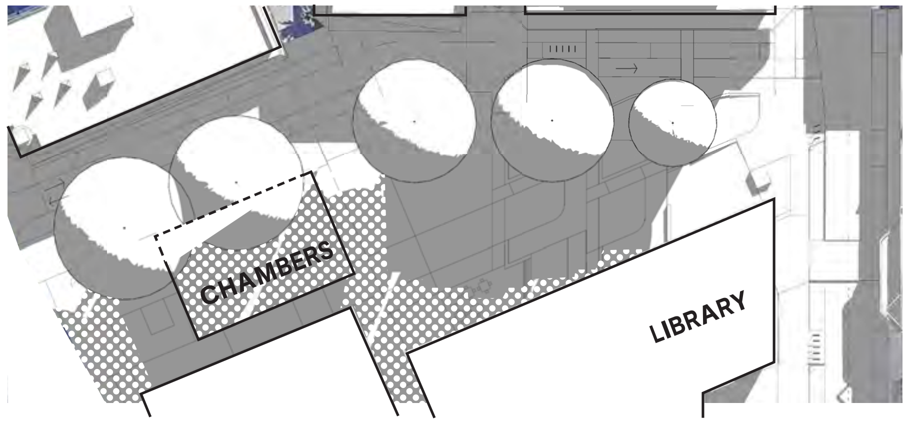
INDICATIVE SHADING FROM EXISTING TREES



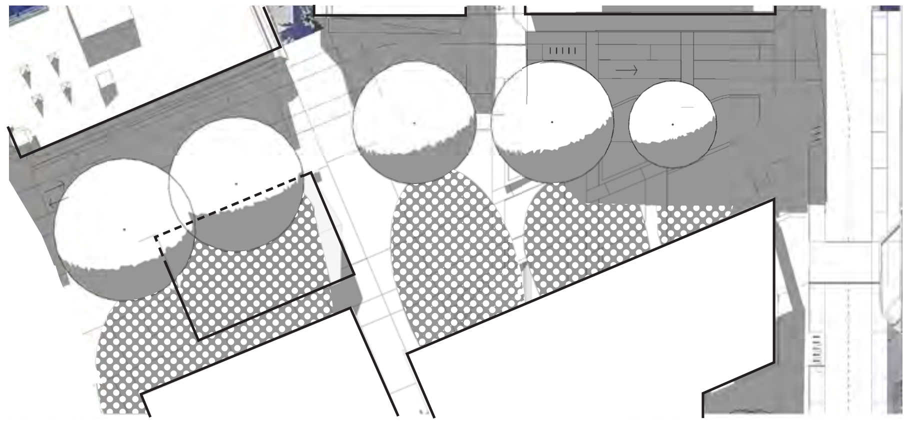
1ST OF JULY @ 1PM

MID WINTER

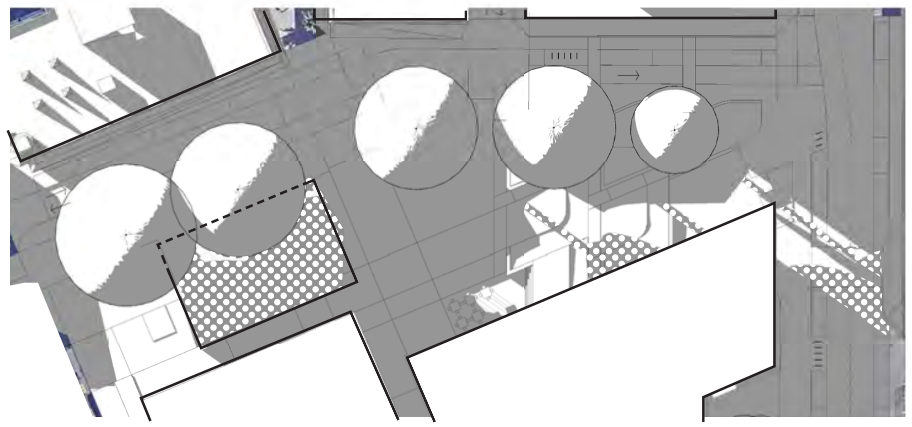
During Autumn/Winter shadows are longer, however the trees will not have leaves, letting light and warmth into the public space. The hatched area shows shadows cast by tree branches.



10AM



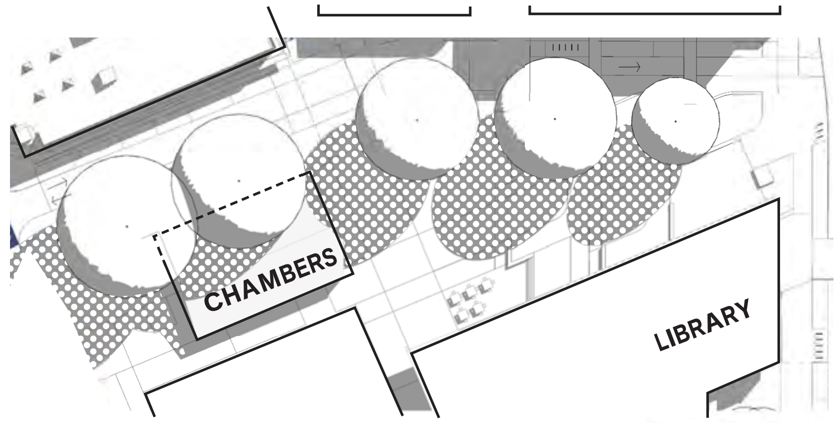
1PM



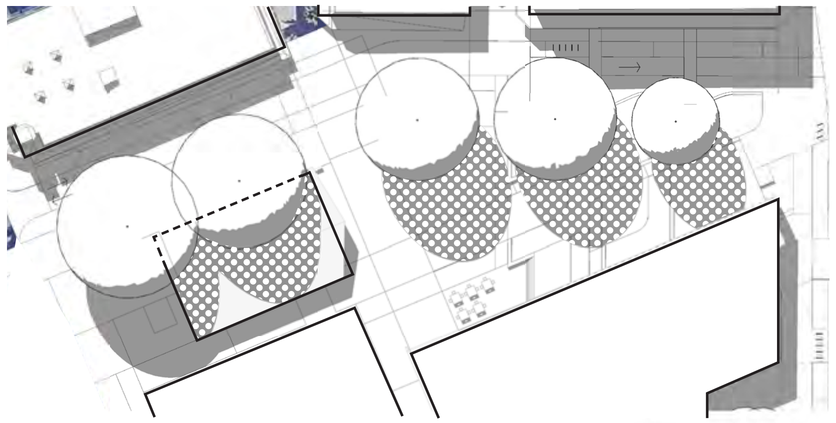
4PM

WINTER SOLSITICE - JUNE 21

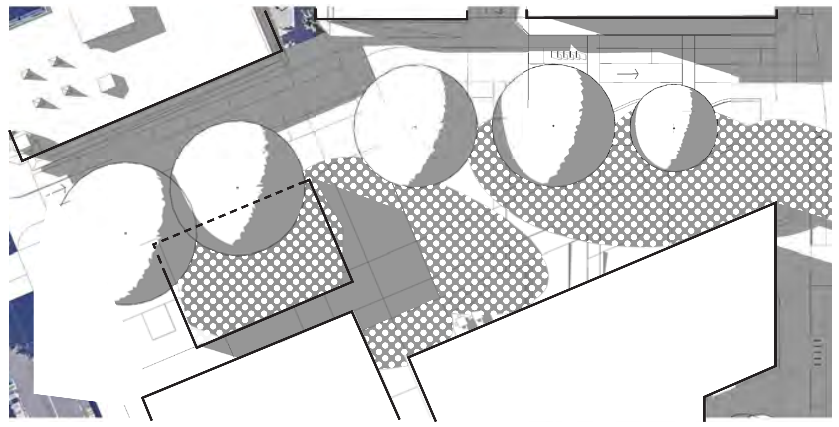
The shortest day and the site is mostly in in the shade from surrounding buildings. During the middle of the day, filtered light through the bare branches of the trees will reach most of the public space.



10AM



1PM



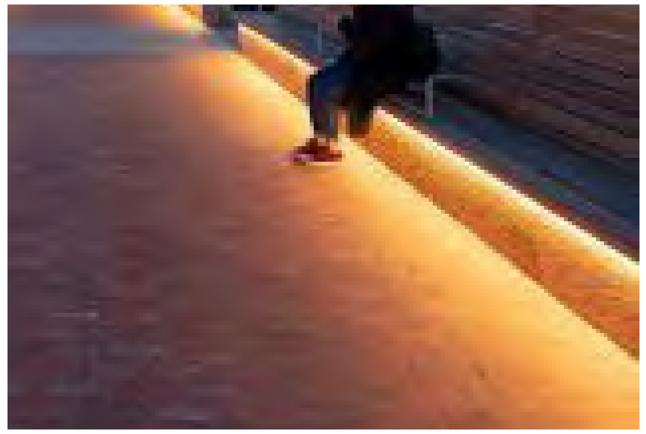
4PM

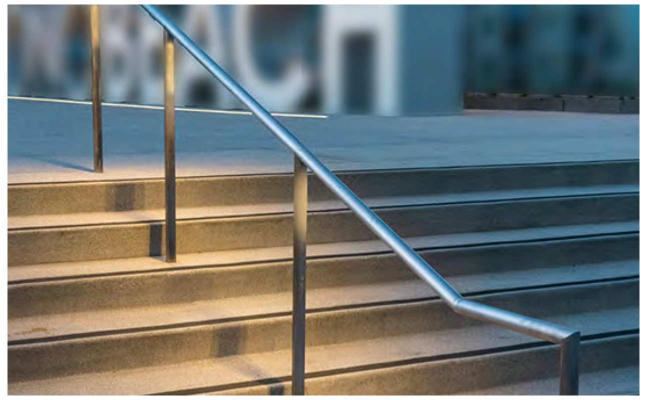
SPRING EQUINOX - SEPT 21

Filtereed light through mostly bare branches moves across the site with minimal shading from surrounding buildings. The spaces directly in front of the Library remaining in the sun.

LANDSCAPE STRATEGY

LIGHTING





The lighting strategy will focus on creating a warm, inviting atmosphere to encourage people to use the space during the evening, and support safety later at night.
Highlighting special elements, such as the terraces and low walls will strengthen the expression of the cultural narrative and create visual interest.
Soft, indirect light, with a warm white colour will be reflect from the the facade and large trees on Station St, creating an ambient glow, with minimal glare, creating a comfortable atmosphere, while ensuring people can be clearly seen.
Entrances and pathways will be lit to a higher level to help people move confidently through the space at night.

KEY

- Highlight entrances
- Ambient glow from building
- Street lighting (beyond scope)
- Linear light on walls and steps
- Handrail lighting
- Tree canopy illumination
  Focus beam to minimise spill
- Sculpture feature lighting
- Light pole

LANDSCAPE STRATEGY

MATERIAL DISTRIBUTION








A range of hard surfaces will be used depending on the role of the space.

Materials of higher value will be focused around main entrances and gathering spaces, to elevate their significance, while robust, attractive materials will be used in the wider site, helping to support wayfinding and vehicle access.

Hard materials are kept to a minimum to be sensitive to environmental impact and cost.

KEY

TYPE 1	Natural stone unit paving.
TYPE 2	Insitu concrete with integral colour and a range of finishes, including exposed and honed.
TYPE 3	Mixed surfacing to make comfortable, useable spaces. eg lime chip / softfall / lawn.
TYPE 4	Asphalt / trafficable surface.

LANDSCAPE STRATEGY

ACTIVATION AND EVENTS

Recognising the role of Te Aka as the heart of democratic process and community life, the external spaces are designed to host a wide range of events and gatherings. From smaller casual groups to from large demonstrations or community events.

Spaces are designed to be flexible, providing for standing, sitting, food carts, a stage or spill out from the maker space within the Library.

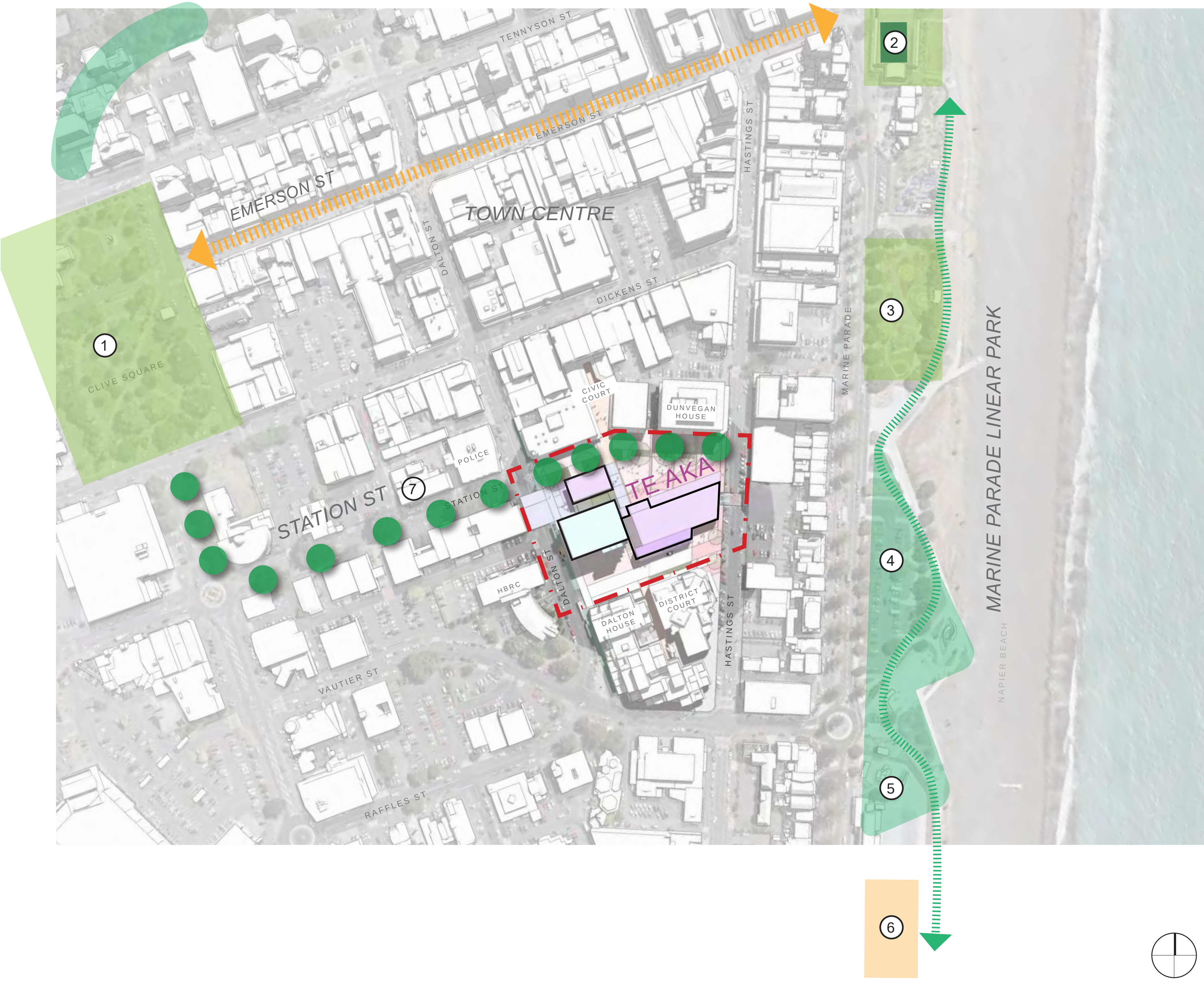
KEY

- Standing
- Sitting
- Outdoor dining
- Food carts / stalls
- Spill out space

LANDSCAPE STRATEGY

OPEN SPACE PROVISION

There are a range of open spaces in proximity to Te Aka that provide for both active and passive recreation. Te Aka has the potential to compliment, rather than duplicate existing open spaces, anchoring the south of the town centre.



EXISTING OPEN SPACES

1. CLIVE SQUARE
   Passive open space with planting and trees.
2. SOUNDSHELL
   Stage with a formal green lawn for performances.
3. SUNKEN GARDENS
   Passive open space with planting and trees.
4. MARINE PARADE
   An active, linear park that encourages a playful journey along the waterfront. The space contains waterplay, skateable features, basketball courts. Skating and basketball is particularly popular with young men.
5. SKATE PARK
   A formal skate park with grandstand.
6. PLAYGROUND + JUNIOR BIKE TRACK
   A traditional playground with equipment that is designed for 6-12 year olds.
7. STATION ST
   A green buffer with mature trees, holding the town centre.

How Te Aka could compliment existing open spaces:

- An urban public space that can provide flexibility for events, hosted by the community and/or Library, supported by the surrounding buildings. Most public spaces in Napier do not have a direct relationship with surrounding buildings to support activation.
- A space that is relatively protected from the elements, and that can be experienced from within a building, where people can enjoy a green outlook in all weather.
- Playful spaces, different to a typical playground, where young people feel welcome, safe and a sense of belonging - in particular young women who are not currently well provided for.
- Provide an anchor destination as part of the 'green frame' that holds the Town Centre.

LANDSCAPE STRATEGY

STORMWATER

A 'water sensitive design' approach will be taken to cleanse stormwater through planted 'raingardens' that remove pollutants before entering the wider system.

To help minimise flooding, 'passive gardens' will capture stormwater to act as 'sponges' to reduce the volume of water leaving the site in storm events.

The ground will be sloped toward the wider street network to create 'overland flow paths' that will direct water away from buidlings in a storm event or if pipes become blocked.

KEY

Rain gardens
Remove pollutants from trafficable surfaces

Passive gardens
Capture water from adjacent surfaces to reduce irrigation.

Overland flow
If pipe network reaches capacity during storm events

Potential for water detention concealed beneath lawn

* Hastings and Dalton Streets have potential to upgrade to a water sensitive approach.

IRRIGATION

Napier can experience drought conditions, which may become more pronounced with climate change. Plants will be selected to be drought tolerant, however irrigation will also be installed in gardens that are likely to become very dry, enabling water to be provided if it is needed, particuarly to raised garden beds that do not receive water run-off from surrounding surfaces.

The supply will be from a roof-water collection tank, that can store non-drinkable water for when it is needed. Moisture sensors will ensure water is used sparingly.

KEY

Garden bed with drip line

Lawn with pop-up sprinklers

Rainwater collection tank

LANDSCAPE STRATEGY

ACCESSIBILITY

A Universal Design approach is taken to make it easy for people of all ages and physical abilities to move through the site using the same route where possible.

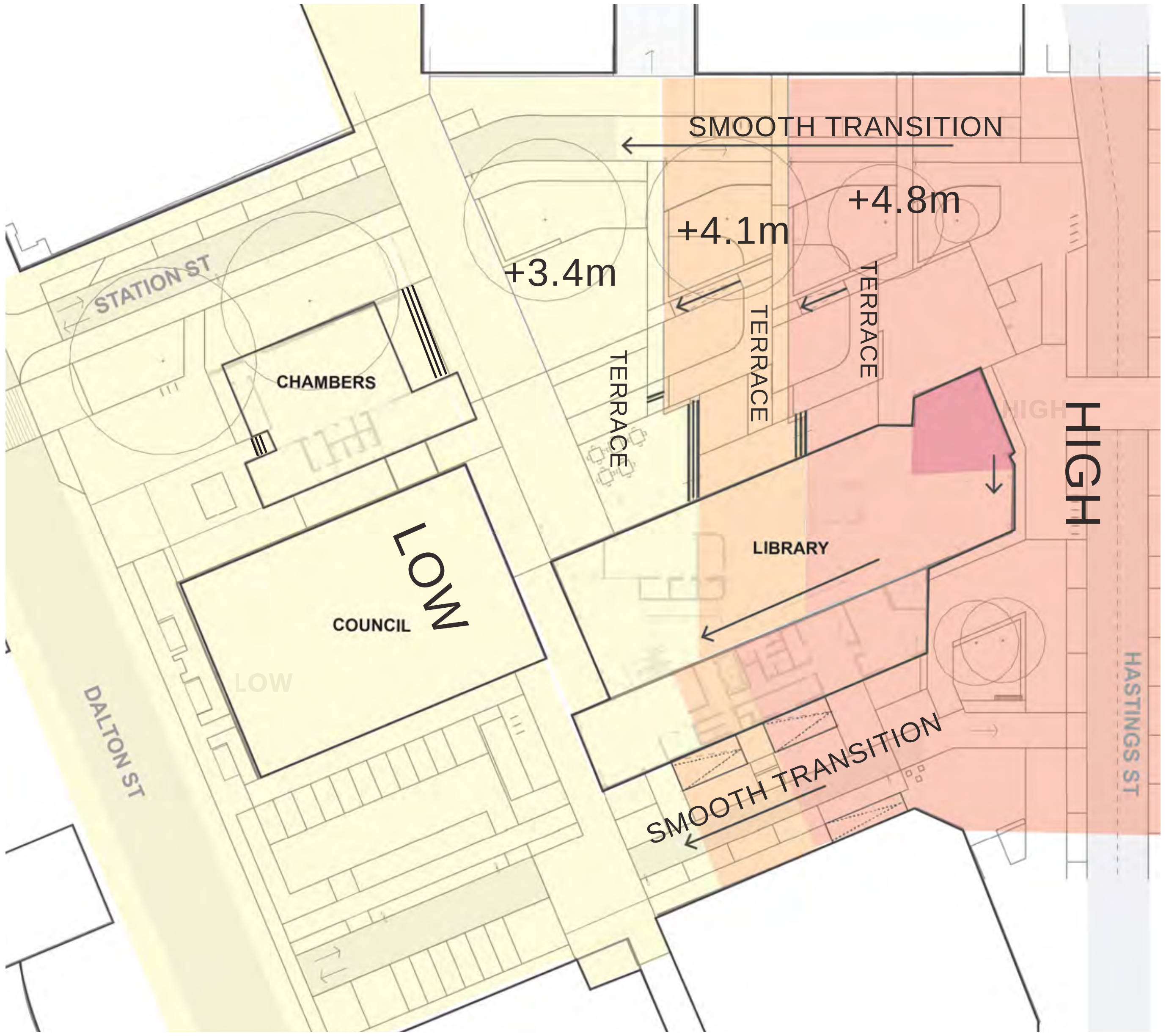
Sloped pathways lead to all doors and a number of route options are provided.

Cycle parking is distributed around the site near main entrances, recognising the role of cycling in improving access options.

KEY

- Main arrival spaces
- Path without steps
- Steps
- Accessible car parks
- Cycle parking

LEVELS AND TERRACING



Terraces step with the natural contour of the site to reflect the underlying shingle spit landform and create opportunities for seating and gathering.

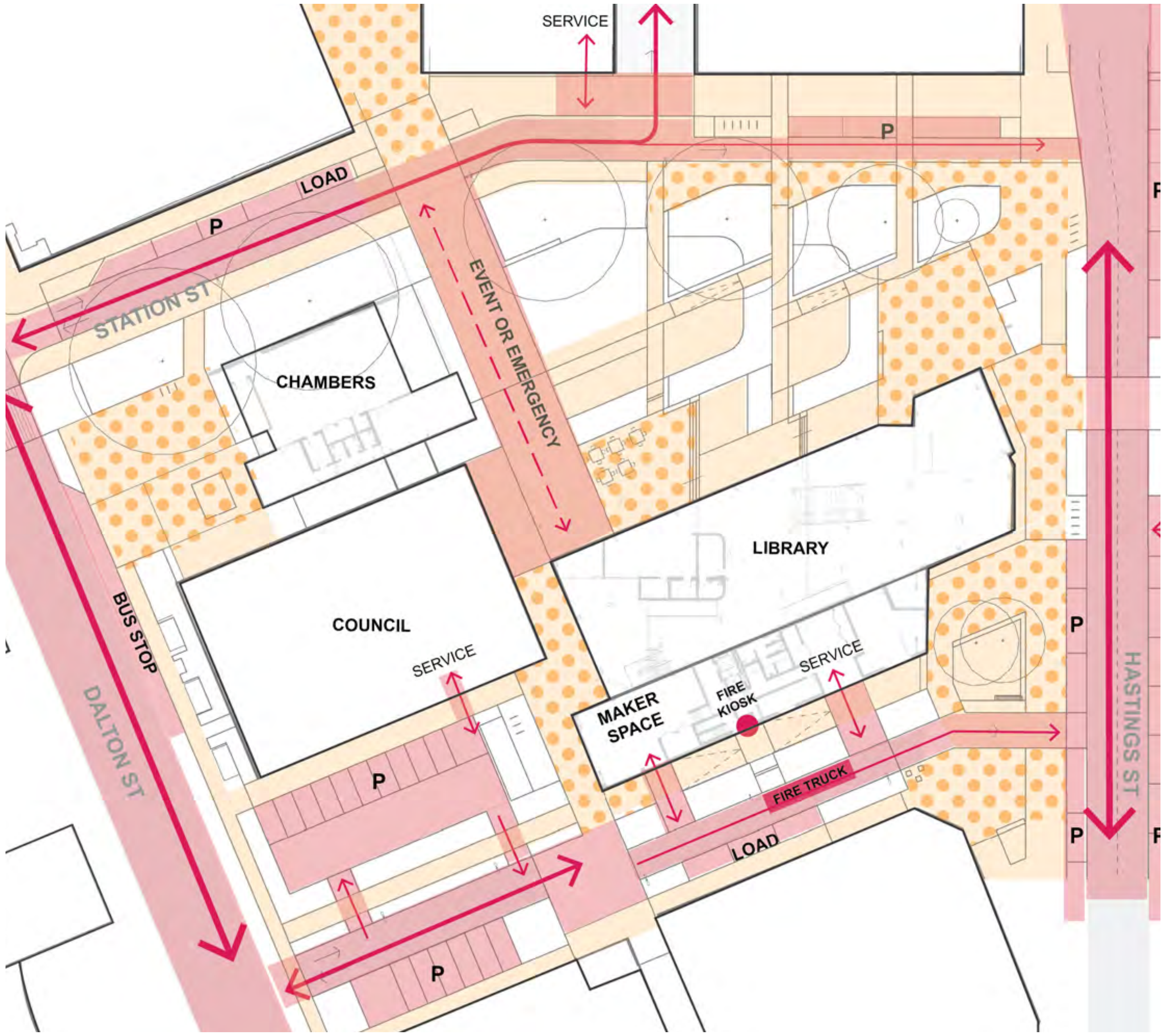
Terraces are drawn through the building to unify the ground plane between inside and outside.

KEY

- HIGHEST LEVEL
- +700mm terrace
- +700mm terrace
- LOWEST LEVEL
- STEPS

LANDSCAPE STRATEGY

VEHICLES AND SERVICING



Vehicles can access alongside all buildings for servicing. To the south is a pedestrian friendly, slow speed lane, while Station St supports low volume, one-way vehicle access, helping to integrate Te Aka with the northern side existing buildings.

Events set up vehicles and emergency vehicles can enter the public space temporarily if needed. There is a convenient bus stop on Dalton St with direct access through Council building to the Library. Parking is prioritised for accessibility, drop-off and loading, with on-street parking provided on Hastings and Dalton Streets, and in the surrounding area.

KEY

- Vehicle access
- Pedestrian only
- Occaisional light vehicle/maintenance
- Space for fire appliance
- Direction of travel

About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Auckland, Hamilton, Tauranga, Wellington, Christchurch, Dunedin and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

www.boffamiskell.co.nz

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23.04
TE AKA

Beca
Dunning Thornton consultants
Boffa Miskell
athfield architects limited
with Israel Birch

Preliminary Design Report
Version 1
19th January 2024

athfieldarchitects.co.nz

105 Amritsar Street
Wellington 6035
PO Box 3364
Wellington 6140
New Zealand
Tel 64 4 499 1727

TE AKA

He hononga tapu a Te Aka i waenga i a Papatūānuku me Ranginui.

Koia ko te hononga i te takiwā hiranga o runga ki te takiwā ōkiko o raro. He mea whakaatu te pae o runga i te moemoeā, te whakaāio wairua, me te mātauranga, ā, hei tā te pae o raro ko te pūahoaho, te kōrerorero, me te auahatanga.

He wāhi e kitea ana ngā tūnekenekehanga a Ahuriri, i hīia rā e Rūaumoko te whenua i te moana. Ka puta ko te ngahere o Tangaroa, ka whakaarihia he waka huia hei pupuru, hei whakahaumaru hoki i ngā taonga i te pae tiketike rawa.

He wāhi tākaro hoki a Te Aka mā te hinengaro, te tinana, te wairua me te whānau. He whakarite hoki i te whiri i ngā aho rau o te mātauranga i waihangahia mai ai i te wairua o te mahi ngātahi.

Nā ēnei whakaaro me ēnei ariā katoa ka hua mai ai a Te Aka, ā, ka kitea i tana whakahoahoatanga mai.

TE AKA

Te Aka is the sacred connection between Papatūānuku and Ranginui.

It is the link between the space of excellence above and the space of physical manifestation below. The upper level represents dreaming, meditation, and knowledge and the lower level represents clarity, conversation, and creativity.

Ahuriri (Napier) is a site of movement, where Rūaumoko uplifted whenua from the ocean. The forest of Tangaroa appeared and presented a waka huia where taonga are stored and protected at the highest level.

Te Aka is also a playground for the hinengaro (mind), tinana (body), wairua (spirit), and whānau (family). It is a metaphor for weaving together the multiple threads of knowledge that is built on the spirit of collaboration.

Te Aka is based on these concepts and elements and this will be reflected in its design.

CONTENTS

Fig 1 Te Aka aerial view (looking south- east). Note the CAB (existing Library Tower) is out of scope. Indicative future design shown

1.0 INTRODUCTION
EXECUTIVE SUMMARY

Te Aka
Preliminary Design Report
Version 1
19th January 2024

This Preliminary Design Report outlines the integrated Preliminary Design Proposal and summarises the project background and design process. This report includes background from the concept design and is supported by separate Structural, Building Services/ Environmental Sustainability, and Landscape Architecture Preliminary Design Documents appended to this report.

Through a series of Wānanga hosted by Mana Whenua partners in local Marae this co-design process built upon the previous Civic Precinct Master-Planning and Library Briefing works (2018-2022) to establish a strong and locally specific cultural foundation and the naming of the project – **Te Aka.** This was then developed collaboratively and iteratively towards an integrated concept design for buildings and landscape that comprise the Te Aka Project.

Vision
Te Aka will be a place where visitors and the people of Napier / Ahuriri and surrounding areas can relax, learn, play, work, engage and connect.

The desire is for Napier's Library and Civic Area to create energy in what is now a quiet and struggling part of the city. It will help to stimulate economic activity and encourage growth and confidence in new businesses.

Te Aka is the first step on this journey that will significantly impact and benefit current and future generations. The facility will set the benchmark for future development in both the Library and Civic Area and wider Napier / Ahuriri.

Brief
The Preliminary Design described in this document is based upon the Station Street Facility Stage 1 Design Brief which describes the requirements and schedule of accommodation for:

1. Civic Open Space
2. Library / Community Building
3. Cultural / Community Hub
4. Council Community Interface Services & Democratic Services
5. Civic Lane

Te Aka is founded on key documents and plans that outline the strategic vision for Ahuriri / Napier. The key documents are summarised below.

- Napier Library Strategy (2018)
- Civic Precinct Framework (2020)
- Ahuriri/ Napier Library and Civic Area Plan (2021)
- Napier Library Business Case (2022)
- Station Street Facility: Stage 1 – Design Brief (2022)

It is anticipated that the project will be complemented by Stage 2 ("LCAP 2"), a Council Administration Building, located on the site of the existing former library tower. The Stage 2 scope is excluded from this document, but where applicable the assumptions of how Stage 1 will interface with Stage 2 are stated.

Concept Design Process
The iterative wānanga design process has included:
- Listening to mana whenua, stakeholders, councillors and the future users of the facility and public realm,
- Looking at the environmental, built, social, and economic context of Ahuriri,
- Testing design options of the building and public spaces with NCC, mana whenua and stakeholders,
- Engaging with Te Mānukanuka o te Iwi and People's Panel to receive feedback on the design ideas,
- Reviewing the feedback, identifying, and addressing key themes and issues raised; and
- Proposing the concept design

The input from mana whenua has been fundamental to the design principles and key design moves including:

- Gifting of the project name Te Aka and the cultural foundation
- Selection of native plants
- Mahi toi opportunities
- Key design moves (refer cultural foundation diagram)
- Critical input and feedback on the design

Preliminary Design Process
The Preliminary Design process focussed broadly on the following aspects:
- Stakeholder Engagement
- External Review (Reference Advisary Group)
- Safety in Design
- Consultant Design Development including the co-ordination of Architecture, Landscape, Mahi Toi, Structure, Fire, Acoustics, ESD, and Building Services
- Operational Service Model
- Accessibility Audit
- CPTED Review

Cultural Foundation
The cultural foundation builds apon the name Te Aka, that has been gifted to the project. From this, a cultural narrative has been developed in partnership with Mana Whenua. This narrative describes what is unique about the place and the people, and the stories important to the Whenua. The cultural narrative has been woven through the Concept Design and highlights opportunities for Mahi Toi. It places the design firmly into the whenua of the place and is articulated into the surrounding public realm through the proposed landscape design.

Context
Te Aka is central to Ahuriri and uniquely situated to reveal, respond to, and draw its form and identity from aspects of the region's rich history. This includes the sites proximity to historical movements and arrivals, to landforms and ecologies between estuary and ocean, and to the existing buildings and landscapes. Te Aka brings the opportunity to evolve the architecture of the city in response to both historical and contemporary influences and activities.

Te Aka is keyed into its Napier City and waterfront context by a number of existing and improved interfaces and connecting streets and lanes.

Design
Te Aka Design has been conceived as a series of additive layers, or 'Key Moves' from the ground up. These include:
- Two buildings – the Library and Chambers
- The Library is two levels. The lower level is conceived as an extension of the public realm. A space for making, dialogue, exchange, gathering, creativity, display and events.
- The upper level is a space for dreaming and knowledge collection. It is the space where most of the collection will be housed.
- There are three primary entries into the Library, adopting the idea that there is 'no wrong door'
- Staff, BOH, core, and building services have been consolidated into an area called the 'backpack' along the southern lane. This allows for a dynamic open space to the north with morning and afternoon sun supporting a range of activities throughout the day.
- Chambers – The primary democratic space in Ahuriri / Napier and a place for local and regional political issues to be debated and determined. When not in formal use, it will be a room available to the community.
- The stage 1 public realm is composed of two parts – the Civic Open space to the north and the Civic Lane to the south. The Civic Open space is broken up into a series of terraces, providing a range of spaces for native planting, rain gardens, gathering and events.
- The lane is the primary service point for the library vehicle, emergency services and pedestrian friendly link between Dalton and Hastings Street.
- The Library and Council Chambers will be a Greenstar 5-star rated (based on the NZGBC Design and As-Built rating tool – version 1.1) facility as well as achieving operational carbon neutrality.

The intention is that the proposed Preliminary Design will be taken through to subsequent design stages and developed in greater detail, for consenting, tender and construction.

1.0 PROJECT TEAM

Project Team

Client	**Napier City Council**
Project Manager	**The Building Intelligence Group**
Architect	**Athfield Architects Limited**
Landscape Architect	**Boffa Miskell**
Mana Whenua Design Lead	**Israel Birch**
Structure	**Dunning Thornton Consultants**
Building Services	**Beca**
Environmental	**Beca**
Fire	**Beca**
Geotech	**Beca**
Civil	**Beca**
Cost Consultant	**WT Partnership**
Acoustic	**Marshall Day**

Wānanga Participants

Mayor Kirsten Wise
Deputy Mayor Annette Brosnan
Councillor Ronda Chrystal
Hilary Prentice
Beverly Kemp-Harmer
Tipene Cottrell
Morehu Te Tomo
Te Kaha Hawaikirangi
Alix Burke
Anna Nottage
Anne Bradbury
Caroline Thomson
Chad Tareha
Kate Ivicheva
Nicola Saunders
Keely Nye
Steve Gregory
Jon Rennie
Stuart Lyons
Byron Roff

Darran Gillies
Israel Birch
Ari Stevens
Jonie Molloy
Michele Grigg
John Hardwick-Smith
Jenny Pearce - CAB
Johanna Rogers
Michael Gilbertson
Richard Van Looy
Jessica Ellerm
Janey Sene
Georgina King
Marc Baily
Ethan Duff
Megan Walker
Alister Eady
Sue Sutherland

Councillors
ELT members
(War Memorial Hall workshop)

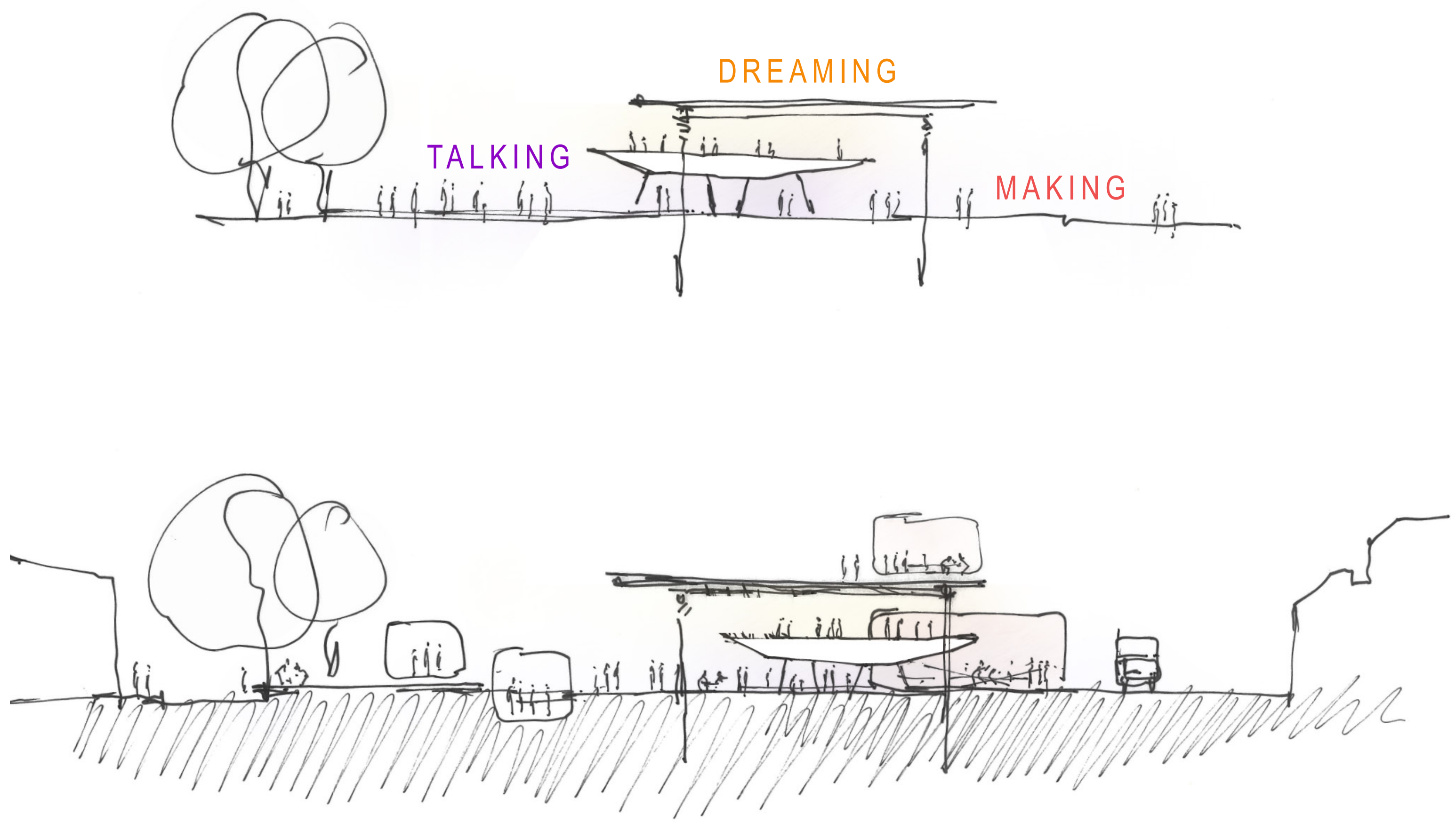

Fig 2. *Initial concept sections highlighting key design moves - a landscape that extends through the building, a platform suspended above the ground, and a simple roof.*

1.0 INTRODUCTION

Introduction

In February 2023, Athfield Architects Limited, along with Dunning Thornton Consultants, BECA, and Boffa Miskell, were appointed by Napier City Council as the preferred Design Consultants for the design and delivery of the Station Street Community Facility and Public Realm Project in Napier. This team, in collaboration with Mana Whenua Design lead, Israel Birch, developed the Concept Design outlined within this report, through a co-design process involving multiple stakeholders. Early in this process, the project was gifted the name **Te Aka**.

This Preliminary Design Report outlines the integrated Preliminary Design Proposal and summarises the project background and design process. This report includes background from the concept design and is supported by separate Structural, Building Services/ Environmental Sustainability, and Landscape Architecture Preliminary Design Documents appended to this report.

Through a series of Wānanga hosted by Mana Whenua partners in local Marae this co-design process built upon the previous Civic Precinct Master-Planning and Library Briefing works (2018-2022) to establish a strong and locally specific cultural foundation. This was then developed collaboratively and iteratively towards an integrated concept design for buildings and landscape that comprise the Te Aka Project.

Prelimary Design

This report is structured into four sections and builds from the discussions/ presentations held throughout the Design process with Mana Whenua, project stakeholders, Te Mānukanuka o te Iwi, People's Panel, Reference Advisary Group and Councillors.

1.0 Introduction – This introduces the project, including a summary of the project background, process and Preliminary Design outcomes.

2.0 Context – This summarises aspects of context unique to the people and place of Napier that have informed the Preliminary Design.

3.0 Preliminary Design – This summarises the design rationale and describes the proposed preliminary design for the key components of **Te Aka** - the library, civic chambers facility and public realm within the context of Napier/ Ahuriri.

4.0 Appendix – This captures relevant background information/ documentation including more detailed description of aspects such as concepts for the public realm, structural design, building services and sustainable features in a series of separate reports.

See below for appended documents:

- *Architectural Preliminary Design Drawings*
- *Architectural Preliminary Outline Specification*
- *Landscape Preliminary Design Report*
- *Building Services Preliminary Design Report*
- *Environmentally Sustainable Preliminary Design Report*
- *Structural Preliminary Design Report*
- *Structural Preliminary Design Drawings*

Fig 3. *View from Station Street (looking south at the Public Realm and Library building).*

Fig 4. *View of the ground floor interior from the collection display terrace (looking west towards the bleacher stair).*

1.0 INTRODUCTION
DESIGN BRIEF

Background

In 2017, a seismic assessment of the Council Library and Civic Administration buildings on Station Street determined the buildings to be earthquake prone. As a result, Council and Library Services have been relocated to alternative buildings within the CBD.

In 2020, Napier City Council published the Civic Precinct Framework, outlining the vision and supporting principles for redeveloping the Civic Precinct and informed the basis for the Ahuriri/ Napier Library and Civic Area Plan (2021).

In 2022, the Stage 1 Design brief for the Station Street Facility was completed, outlining building programme, spatial requirements, and schedule of accommodation, building on broader objectives and aspirations for the precinct. The Design Brief and associated Business Case forms the basis for the Preliminary Design outlined in this report.

Design Brief

The Library and Civic Area Plan integrates new and existing buildings with open space to provide for a range of overlapping Civic, Community and Cultural functions and activities. The Plan proposes a staging approach for the implementation of the Library, Community and Council Facilities.

The Preliminary Design described in this document is based upon the Station Street Facility Stage 1 Design Brief which describes the requirements and schedule of accommodation for:

1. Civic Open Space
2. Library / Community Building
3. Cultural / Community Hub
4. Council Community Interface Services & Democratic Services
5. Civic Lane

It is anticipated that the project will be complemented by Stage 2 (“LCAP 2”), a Council Administration Building, located on the site of the existing former library tower. In parallel with the Concept design, separate due diligence is being undertaken to determine the detailed brief, design approach, construction and delivery methodology of this separate project. The Stage 2 scope is excluded from this document, but where applicable the assumptions of how Stage 1 will interface with Stage 2 are stated.

The Stage 1 design brief specifies an overall GFA of 3860m^2 with 3455m^2 of this area for library collection, community events, community innovation space, library staff, democratic facilities, and a café across two buildings - the Library and Civic Chambers.

In the process of developing the Preliminary Design it has been agreed that some areas are better located (for functional and adjacency to Council Services) within the Civic Administration Building (Stage 2). These include: End of trip, mayoral suite and council services (GFA of 405m^2).

Concept Design Validation

The concept design was presented to NCC Councillors on the 12th of October 2023 and given approval to proceed to the end of Preliminary Design based on the Design Brief and assumptions noted above.

Preliminary Design development focussed broadly on the following aspects:

- Co-ordination of Architecture, Landscape, Mahi Toi, Structure, Fire, Acoustics, ESD, and Building Services
- Library and Chambers facade development
- Refinement of Library and Chambers floor plans
- Interior test fit out of the Library

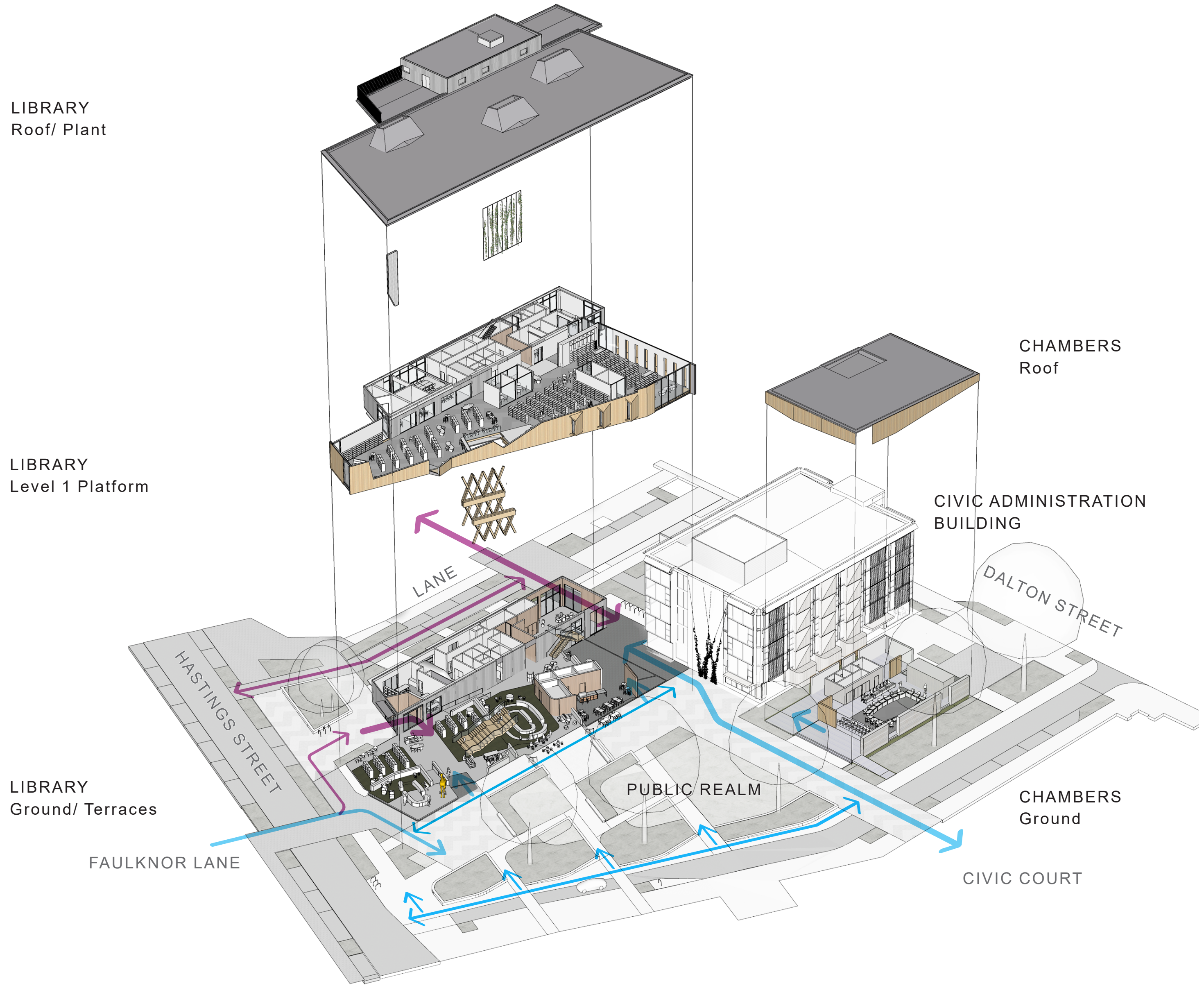

Fig 5. *Exploded Axonometric of the Library, Civic Chambers and Public Realm. Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

1.0 INTRODUCTION
DESIGN CONTEXT

Boffa Miskell
Beca
Dunning Thornton consultants

Te Aka
Preliminary Design Report
Version 1
19th January 2024

architects limited athfield architects limited athfield
with Israel Birch

Design Context

The vision for Te Aka is founded on key documents and plans that outline the strategic vision for Ahuriri / Napier. The key documents are summarised below.

Fig 6. Napier Library Strategies 2018

Napier Library Strategies 2018
Napier City Council

The 'Napier Library Strategy' Document 2018 was developed with extensive community engagement and Stakeholder input. This document distilled wide ranging feedback towards a number of key themes:

- Enabling access;
- Space for All;
- Knowledge Advocates;
- Community collaborators; and
- Sustainable futures

The Library Strategy is supported by more detailed work that has been undertaken by Napier Libraries in parallel with the design brief process. These include:

- Station Street Facility Services and Partnership Principles
- Customer Service User Experience
- Collection Policy

Fig 7. Civic Precinct Framework 2020

Civic Precinct Framework 2020
Napier City Council

In 2020 Council published the Civic Precinct Framework to articulate Council's position in relation to the future of the area. The Civic Precinct Framework and this Detailed Design Brief has taken a lead from the framework vision, themes, values and principles.

The Precinct Framework in turn references the City Vision Framework which provides for the spatial scale linkages of the civic precinct within the overarching vision for Napier City has a whole which are:

- Putting people first
- Open for business
- A port and coastal city
- Our people, our stories
- Ecological excellence
- Pedal power

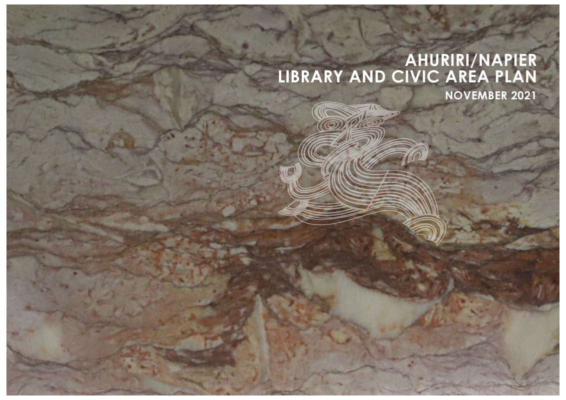

Fig 8. Ahuriri Napier Library and Civic Area Plan 2021

Ahuriri Napier Library and Civic Area Plan 2021
Boffa Miskell + Athfield Architects + Jacob Scott

The Ahuriri / Napier Library and Civic Area Plan provides a high level spatial plan for re-accommodating the main library, community, Council administration, and public open space within a vibrant Ahuriri 'Civic Precinct' at the Napier City Council's Station Street site.

The purpose of the Plan is to provide strategic direction for the design and implementation of civic spaces and buildings that will follow. Taking account of the existing site attributes, the Plan outlines an approach to the configuration and inter-relationships of new civic spaces, buildings, and activities on site.

The Library and Civic Area Plan integrates new and existing buildings with open space to provide for a range of overlapping Civic, Community and Cultural functions and activities. This includes:

1. Civic Open Space
2. Library/Community Building
3. Cultural / Community Hub
4. Council Community Interface Services
5. Civic Administration Building
6. Civic Lane

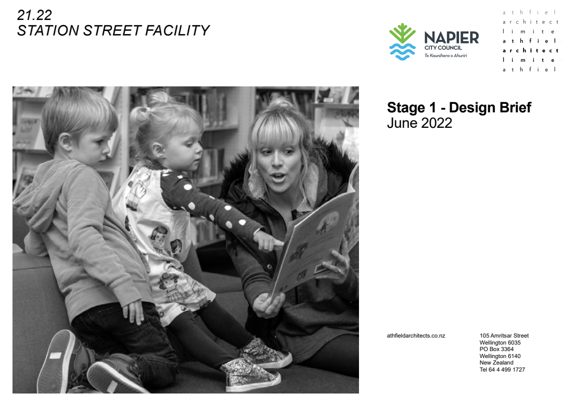

Fig 9. Station Street Facility Design Brief 2022

Station Street Facility Design Brief 2022
Athfield Architects + Napier City Council

The Design Brief builds from the preceding documents and plans. It is founded on the Napier Libraries Strategy – to be the best Public Library Service in New Zealand. The programme, spatial requirements and schedule of accommodation to achieve this are described in this brief and provided a basis for the commencement of the Concept Design.

Fig 10. Napier Library Business Case 2022

Napier Library Business Case 2022
Future Napier Committee + Napier City Council

The Business Case used the Treasury Better Business Case Model to assess the economic and social case for the facility.

1.0 INTRODUCTION
CONCEPT DESIGN PROCESS

Concept Design Process

Mana Whenua have been engaged with the project since the Masterplanning stage and a Co-Design approach was tentatively developed as NCC progressed through the subsequent project stages and gateways.

Working with Te Waka Rangapū and with Mana Whenua the role of a Mana Whenua Design Lead was created to support the success of the co-design process at the start of Concept Design.

With a desire to work in partnership, expressed by both Council and Mana Whenua and with the development of a co-design process through the the appointment of a Mana Whenua Design Lead, there has been an open and productive dialogue developed through all elements of the process. The ensuing cultural narrative for the project has set the foundations of the concept from the ground up and seen it weave through the whole design process.

The Team followed a wānanga process, and had the privilege of being hosted at Wharerangi Marae, Pukemokimoki Marae, Waiohiki Marae and the Napier War Memorial Centre. These involved key inputs and insights from the following:

- Representatives from Mana Whenua as Council partners,
- Elected members of Council
- Council technical specialists/ stakeholders
- Design team specialists

The iterative wānanga process has included:

- Listening to mana whenua, stakeholders, councillors and the future users of the facility and public realm,
- Looking at the environmental, built, social, and economic context of Ahuriri,
- Testing design options of the building and public spaces with NCC, mana whenua and stakeholders,
- Engaging with Te Mānukanuka o te Iwi and People's Panel to receive feedback on the design ideas,
- Reviewing the feedback, identifying, and addressing key themes and issues raised; and
- Proposing the concept design

The diagram adjacent illustrates the journey of the design kaupapa through the wānanga and, how through each step, the designs for Te Aka and the wider precinct have evolved through those hui.

During this engagement, aspirations have been validated and the key attributes of the spaces defined. In some areas it has become apparent that design testing and/or further community engagement will be required through subsequent stages.

The input from mana whenua has been fundamental to the concept design principles and key design moves including:

- Gifting of the project name Te Aka and the cultural foundation
- Selection of native plants
- Mahi toi opportunities
- Key design moves (refer cultural foundation diagram)
- Critical feedback on the design

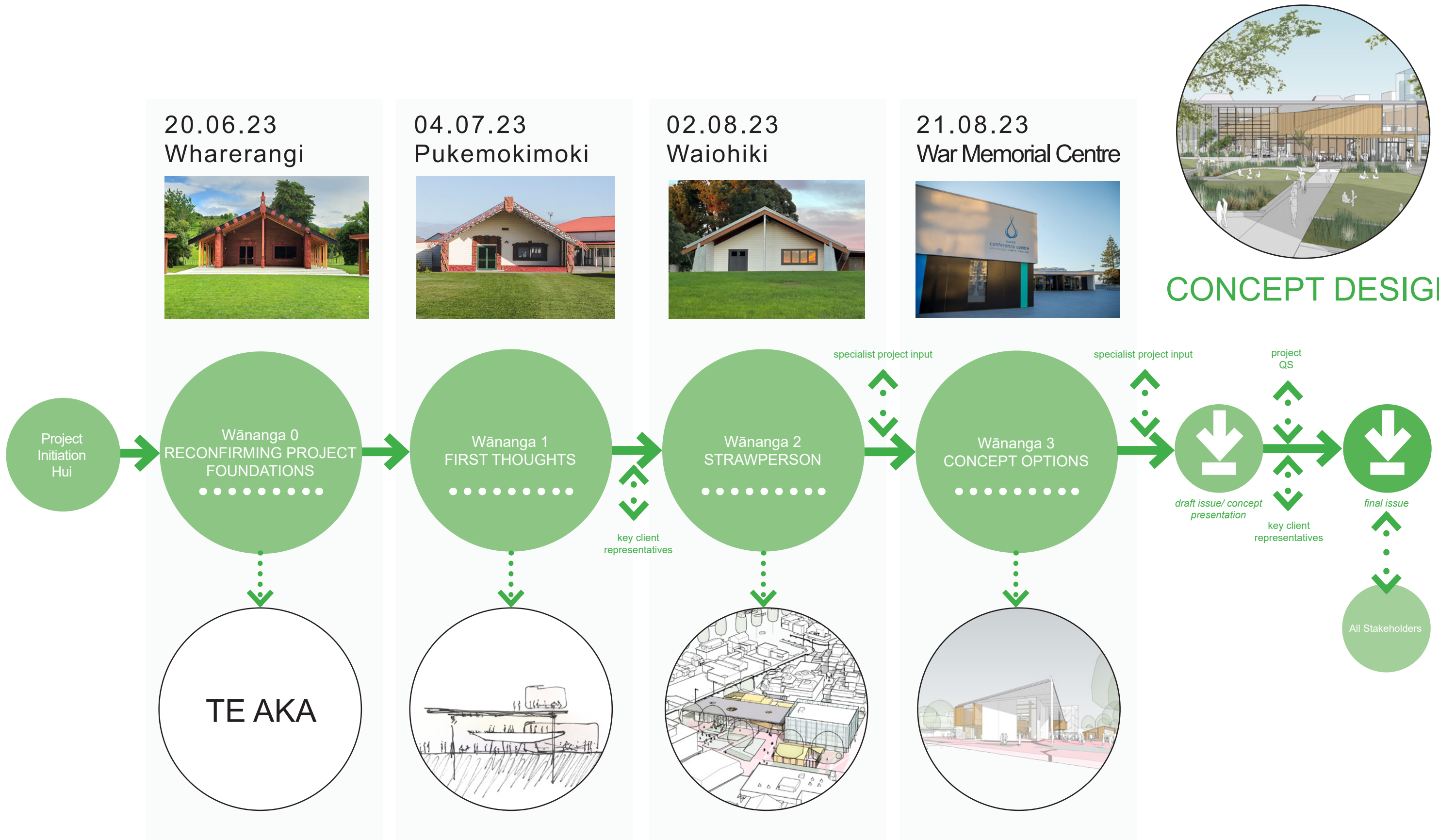

Fig 11. *Diagram of the co-design wānanga process.*

Fig 12. *Wānanga 1 drawing session at Pukemokimoki Marae*
Fig 13. *Wānanga 1 Presenation at Pukemokimoki Marae*

1.0 INTRODUCTION
PRELIMINARY DESIGN PROCESS

Stakeholder Engagement

A series of staff/ stakeholder engagement sessions were held through-out Preliminary Design to review aspects of the concept design and provide input into the following areas for design development.

- Building and Asset Management
- Library and Customer Service Operations
- IT and Communications
- Waste management
- Events
- Roading and Parks
- Civic Chambers

Consultation with NCC and stakeholders will continue through Developed and Detailed Design stages.

Reference Advisory Group

The concept design was presented to a Reference Advisory Group (a selected panel of experts in the field of Libraries, Mahi Toi and Te ao Maori) - on the 8th of November 2023.

Feedback from the design review has been compiled into a report and presented to NCC for consideration and input into the design and operation of Te Aka.

Safety in Design Workshop

A Safety in Design Workshop was held on the 8th of December 2023 and attended by representatives from NCC and the design team. Identified risks and responses will be monitored and reviewed through subsequent design stages.

Consultant Design Development

Following the completion of Concept Design, the design team re-mobilised on the 16th of October 2023 to commence Preliminary Design. Design and coordination meetings were held regularly with all disciplines. Consultant Preliminary Design reports are attached separately. Preliminary Design development broadly covered the following areas:

- Structural: development of mass timber and steel ‘backpack’ structural system, bracing strategy and articulation, shallow foundation system
- Landscape: Interfaces with buildings and road reserve, co-ordination of external services, refinement of relative levels, Mahi Toi integration, plant selections.
- Mana Whenua Design Lead: Mahi Toi advancement (design integration, artwork opportunities, cultural narrative).
- Mechanical: Development and co-ordination of HVAC strategy (natural ventilation requirements, plant options, thermal envelope)
- ESD: Greenstar monitoring and guidance, performance modelling (thermal comfort, energy efficiency), Climate Risk Identification Workshop
- Fire: Development of performance based design methodology, Fire specific design input/ guidance (escape paths, occupancy loads, sprinklers, fire protection requirements).
- Electrical: Power and data reticulation, lighting strategy
- Plumbing and Drainage
- Civil: Stormwater treatment and attenuation strategy
- Acoustics: Performance criteria, wall/ floor build ups.
- Quantity Surveyor: Preliminary cost estimate and cost specific design input

Preliminary Design Progress Presentation

A Preliminary Design progress update was presented to Councillors on the 7th of December 2023. The presentation focused on the following aspects:

- Mahi Toi update
- Landscape Plan update
- Refinements to the Library floor plans
- Library test-fit plans
- Refinements to the Council Chambers floor plan

Operational Service Model

Development of the operational service model for Te Aka is being developed separately to the Preliminary Design Report.

It has been developed in collaboration with staff from libraries, council customer services, governance, and Te Waka Rangapū who participated in two workshops during August 2023. Feedback will be incorporated in subsequent design stages.

Accessibility Audit

An accessibility audit of the concept design for Te Aka was carried out by Barrier Free. A report has been prepared reviewing external and internal access routes and providing guidance to the design team for following design stages.

CPTED Review

A CPTED review for Te Aka has been carried out through Preliminary Design. A report will be prepared to provide guidance/ recommendations to NCC and the design team for incorporation in future stages.

1.0 INTRODUCTION
TAONGA TUKU IHO/ CULTURAL NARRATIVE

Boffa Miskell Beca Dunning Thornton consultants

Te Aka
Preliminary Design Report
Version 1
19th January 2024

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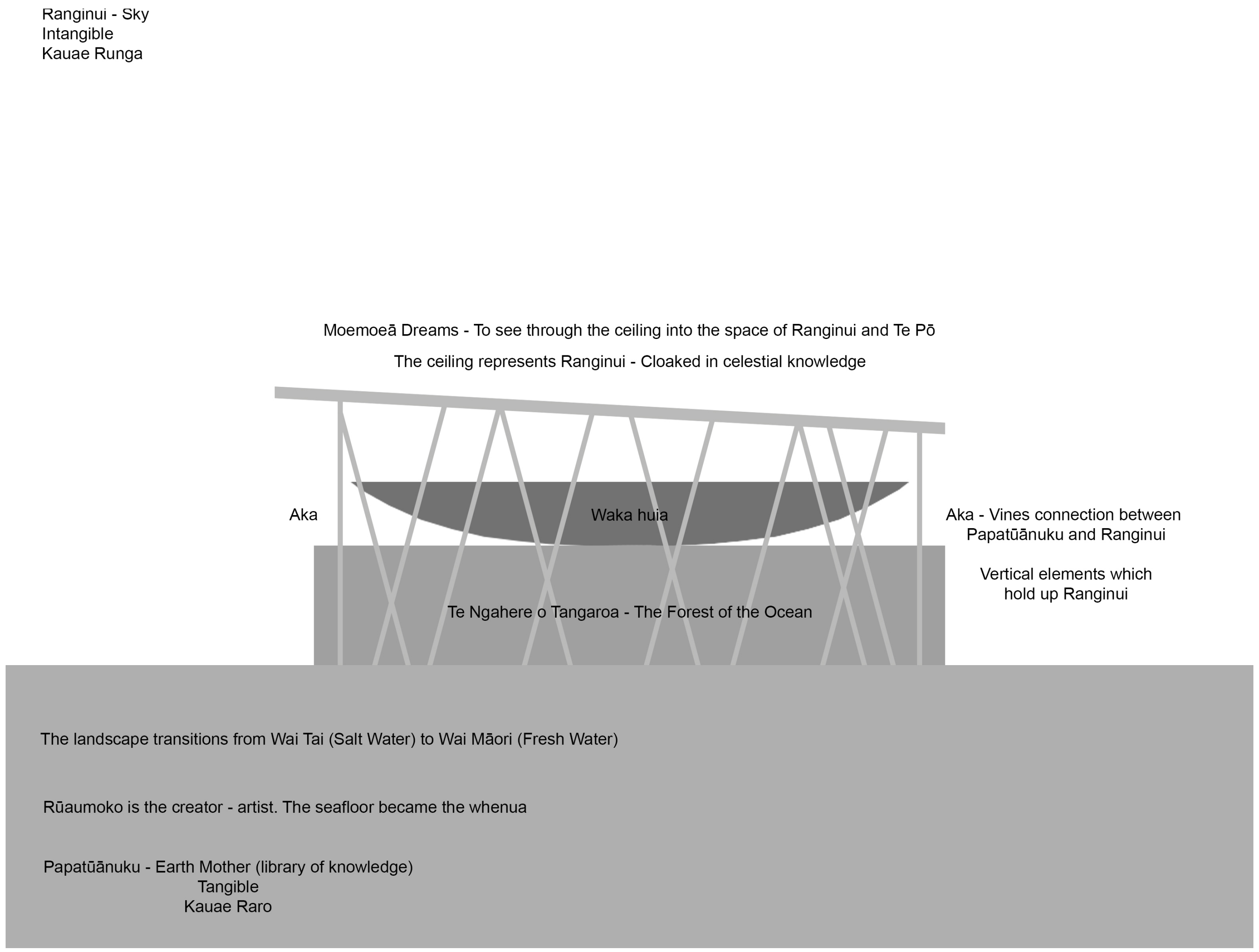

Fig 17. *Cultural Foundation Diagram by Israel Birch.*

Taonga Tuku Iho/ Cultural Narrative

Woven through the Concept Design is the Cultural Narrative, that builds from the gifted name for the project, **Te Aka**. Developed in partnership with Mana Whenua, it acts as a foundation in describing what is unique about the place, the people and the stories that make up the whenua. The building of a Cultural Narrative has been an integral part of this concept design process and weaved throughout the document, highlighting opportunities for Mahi Toi. The Concept Design firmly places the design into the whenua of the place and is articulated into the surrounding public realm through landscape architecture.

TE AKA

He hononga tapu a Te Aka i waenga i a Papatūānuku me Ranginui.

Koia ko te hononga i te takiwā hiranga o runga ki te takiwā ōkiko o raro. He mea whakaatu te pae o runga i te moemoeā, te whakaāio wairua, me te mātauranga, ā, hei tā te pae o raro ko te pūahoaho, te kōrerorero, me te auahatanga.

He wāhi e kitea ana ngā tūnekenekehanga a Ahuriri, i hīia rā e Rūaumoko te whenua i te moana. Ka puta ko te ngahere o Tangaroa, ka whakaarihia he waka huia hei pupuru, hei whakahaumaru hoki i ngā taonga i te pae tiketike rawa.

He wāhi tākaro hoki a Te Aka mā te hinengaro, te tinana, te wairua me te whānau. He whakarite hoki i te whiri i ngā aho rau o te mātauranga i waihangahia mai ai i te wairua o te mahi ngātahi.

Nā ēnei whakaaro me ēnei ariā katoa ka hua mai ai a Te Aka, ā, ka kitea i tana whakahoahoatanga mai.

TE AKA

Te Aka is the sacred connection between Papatūānuku and Ranginui.

It is the link between the space of excellence above and the space of physical manifestation below. The upper level represents dreaming, meditation, and knowledge and the lower level represents clarity, conversation, and creativity.

Ahuriri (Napier) is a site of movement, where Rūaumoko uplifted whenua from the ocean. The forest of Tangaroa appeared and presented a waka huia where taonga are stored and protected at the highest level.

Te Aka is also a playground for the hinengaro (mind), tinana (body), wairua (spirit), and whānau (family). It is a metaphor for weaving together the multiple threads of knowledge that is built on the spirit of collaboration.

Te Aka is based on these concepts and elements and this will be reflected in its design.

2.0. CONTEXT
THE BIG PICTURE

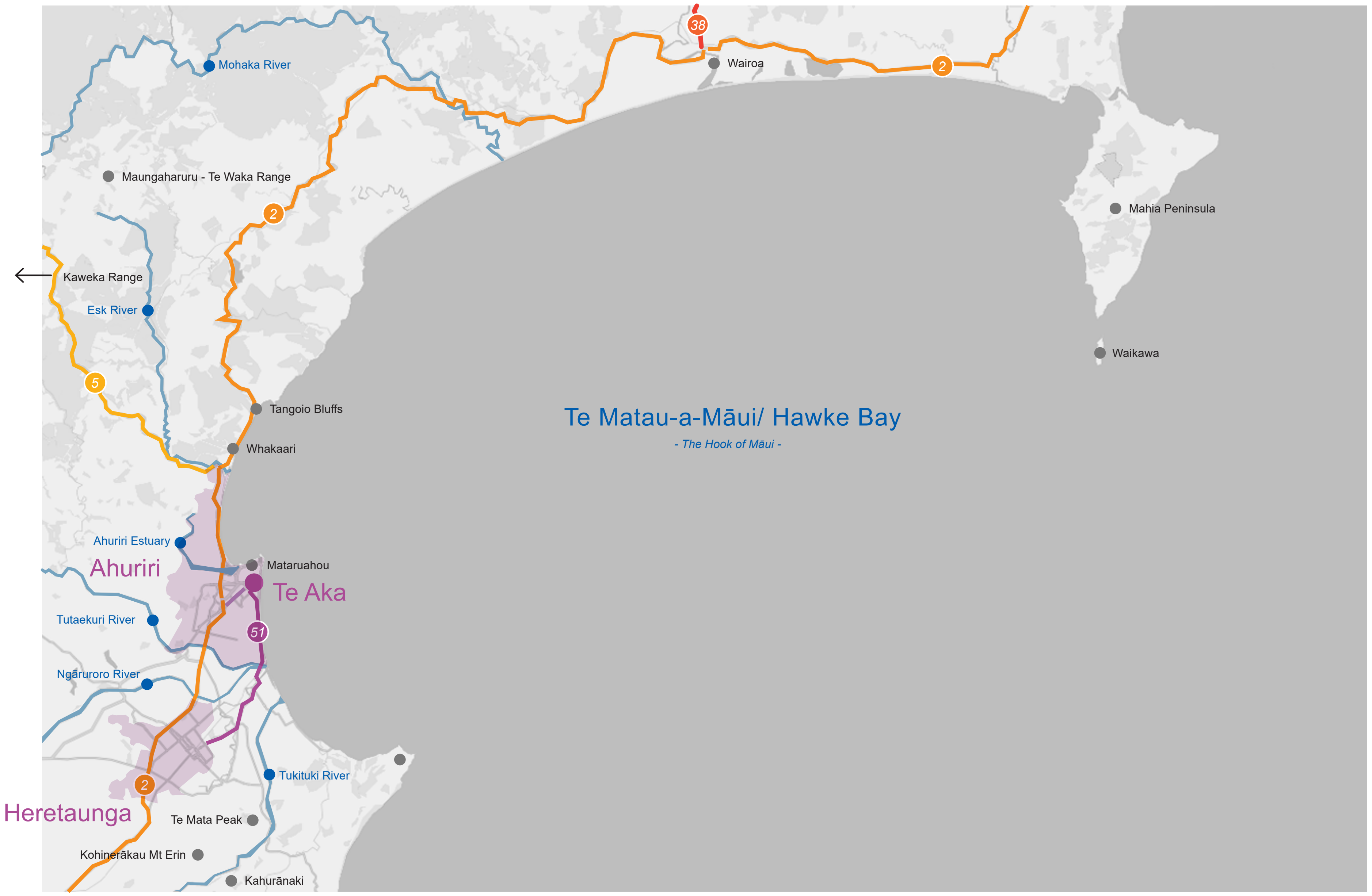

Fig 18. *Aerial of map of Hawke Bay/ Te Matau-a-Maui.*

Fig 19. *Precedent images highlighting the qualities of Ahuriri's coastal landscape, transitioning from fresh water (estuary/ river/ wetland) to salt water (ocean).*

The Big Picture

Ahuriri/ Napier is a port city situated on the east coast of the North Island, bounded by Hawke Bay/ Te Matau-a-Māui to the east, and Kaweka Range to the west. The region has a rich history through both pre and post-European settlement. The underlying form of the land and climate in relation to The Kaweka range and Te Matua-a-Maui and inland estuaries, the history of water-based arrivals and movements, and the history of seismic uplift and its implications on land use have all shaped the unique culture, form and identity of the place today.

- Te Aka is central to Ahuriri and uniquely situated to reveal, respond to, and draw its form and identity from aspects of this rich history:
- Its proximity to both the historical inland 'water highway' and current State Highway and Bus terminus connects it to a history of local and regional movements and arrivals, extending its presence, and accessibility to both local and regional visitors, enlivening threshold spaces and hosting opportunities. Identity and layers of design expression can be informed by narratives from this history of movement and regional influence.
- Its situation on the inland side of the historical gravel spit separating the ocean from the estuary offers unique opportunity to recall and interpret landform and ecologies between estuary and ocean. It also offers opportunity to support visual and physical connection between the ocean (and to Te Matua-a-Maui) and Central Napier City, while also raising profile and awareness towards the broader inland ranges. Te Aka can help reveal these connections and orientate people in relation to them. Additionally, the history of broader navigation (via modern day port and historical ocean waka) offers narratives of celestial orientation, and design expression and access to the night sky.
- Anchoring one corner of Central Napier, Te Aka has the ability to draw from and catalyse city activity and movements. The site incorporates important approaches and extended connections to the north, east and west. The design of the landscape and buildings can leverage these multiple interfaces, providing for a range of different interface opportunities and extending civic presence well into the city.
- The site's micro-climate of shelter from prevailing sea breeze, within the broader (historically) sunny climate of the Hawkes Bay offers opportunity for integrated sheltered spaces inside and outside buildings, and reference to both the historical ecologies as well as more recent agricultural landscapes of vines, wines and terraces.
- Te Aka's context within Napier's predominantly Deco city scape offers opportunity for Te Aka to both complement and evolve the architecture of the city in response to both historical and contemporary influences and activities.

2.0. CONTEXT
PRE-QUAKE LANDSCAPE

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Fig 20. *Aerial of Napier and wider context overlaid with the1865 Ahuriri Lagoon and Waterways (NTS)*

Te Whanganui-a-Orotū / Napier

1865 Ahuriri Lagoon and Waterways

Fig 21. *1840's Ahuriri Plains and Habour*

Fig 22. *Early 1900's, Pukemokimoki Hill Excavation*

Pre-Quake Landscape

The Ahuriri landscape has undergone massive change- both as a result of the 1931 earthquake, but also by large scale human interventions in redirecting waterways, reclaiming land, and the construction of the city of today.

The site of Te Aka was itself once 'wet' on the banks of the historical gravel bank separating ocean from estuary.

- 1931 earthquake lifted the lagoon.
- Further Land reclamation includes excavation of Pukemokimoki Hill to shape the land which Napier City has been built on.

2.0. CONTEXT
BUILT CONTEXT

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Built Context

The Ahuriri region today has a rich and diverse, but unique modified rural and urban landscape and built environment. It reflects the climate, landscape, and range of activities unique to the area. And it reflects a particular approach to expressing, shaping and using space between landscape and buildings. While much of the architecture of 'modern' Napier City reflects the Deco style informed by the era in which much of it was built, even this is diverse and locally 'evolved'.

Te Aka recognises the breadth of this context and draws upon a range of local conditions that inform the design. These include:

- Clusters of buildings integrated within (often rural) landscapes
- Celebrated sheltered threshold spaces/ verandahs between buildings and landscapes
- Celebrated 'window boxes' and shop fronts to the street.
- Celebrated articulated skylights in special rooms.
- Celebrated double height spaces with articulated structures and intensely focused skylights
- Bold and innovative integration of mahi toi works into both historical Deco fabric and 'traditional' whare.
- Complementary juxtapositions of architectural ages, styles and materials.
- Unique craftmanship.
- Terraced landscapes for both utility and recreational activities
- Landscapes of linear supported vines integrated with hosting/ performance spaces

The Preliminary Design incorporates and develops themes informed by these local conditions.

Fig 24. *Vinci's Pizza Store, Napier South*

Fig 23. *Te Mata Estate, Havelock North*

Fig 25. *Black Barn Vineyards, Havelock North*

Fig 26. *Art Deco ASB Bank Building, Napier South*

Fig 27. *Ātea A Rangi, Awatoto*

Fig 28. *Central Fire Station Restaurant, Napier South*

Fig 29. *Art Deco Radio Station Building, Napier South*

Fig 32. *Art Deco ASB Bank Building, Napier South*

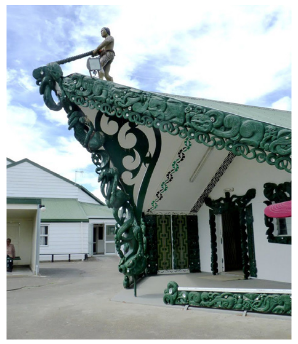

Fig 30. *Matahiwi Marae, Clive*

Fig 31. *Napier Art Deco Bus*

2.0. CONTEXT
CIVIC PRECINCT

Fig 33. *Aerial plan locating Te Aka in the context of the city centre and waterfront.*

The Civic Precinct

The Te Aka Project encompasses the Civic Precinct site including the existing 'Library Tower' building and the previous Council Chambers building (now demolished). The focus area includes the surrounding streets to ensure integration within the immediate city context.

The site is situated at the southern apex of the 'triangle' defining the centre of Napier City. It is a block back from Marine Parade.

The site is bounded by a number of Central and Local Government agencies, including:

- Hawkes Bay Regional Council Building and the Police Station to the West
- The District Court and Dalton House (soon to house Te Whatu Ora) to the South
- Napier City Council Services/ workplace in Dunvegan House to the north.

2.0. CONTEXT
URBAN STRUCTURE AND MOVEMENTS

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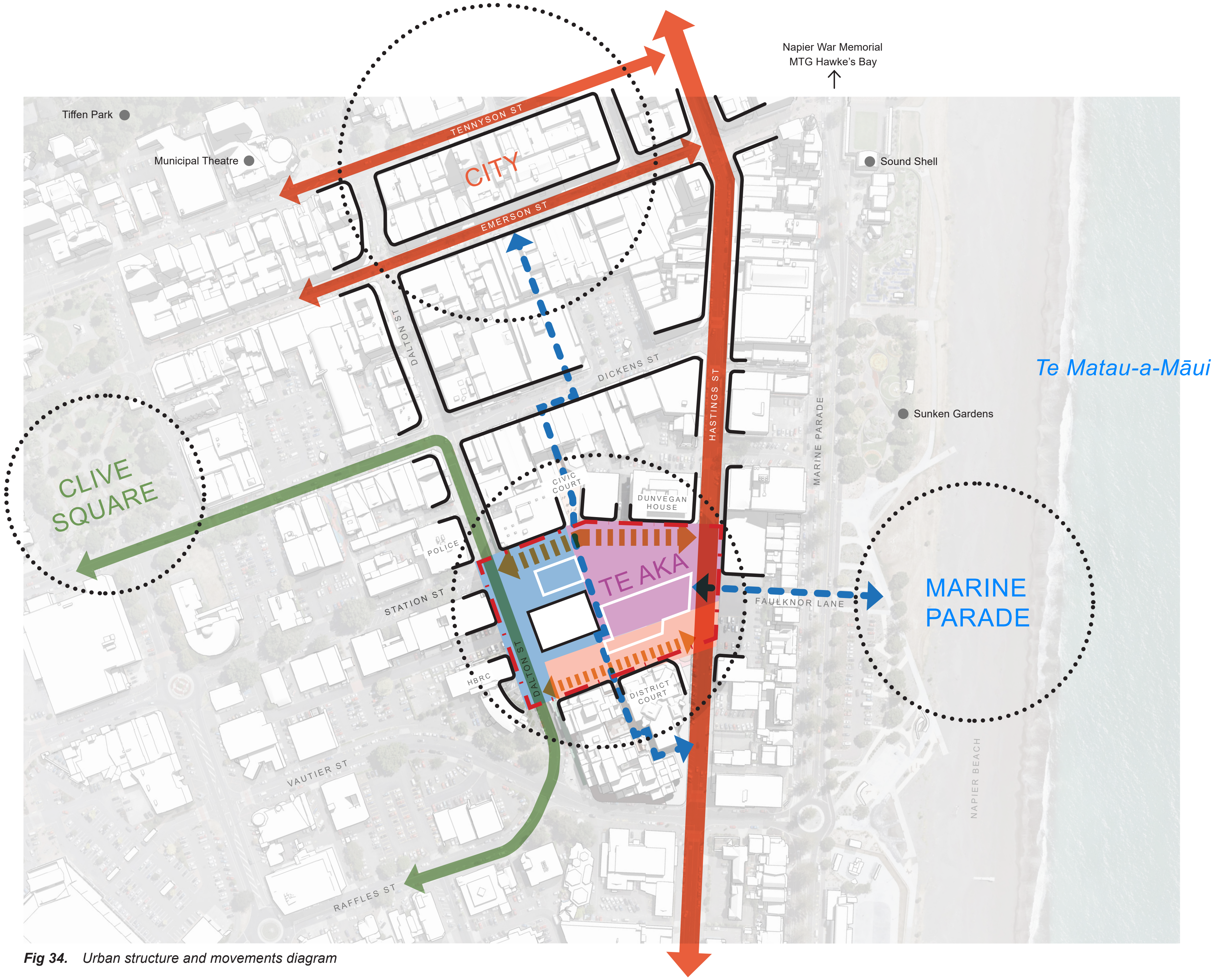


Fig 34. Urban structure and movements diagram

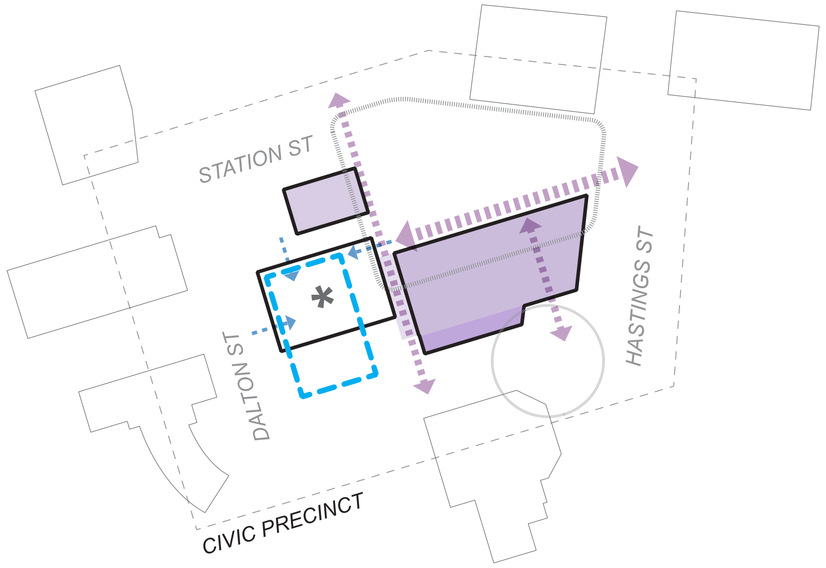
Urban Structure and Movements

Te Aka is keyed into its Napier City context by a number of existing and improved interfaces and connecting streets and lanes. These include:

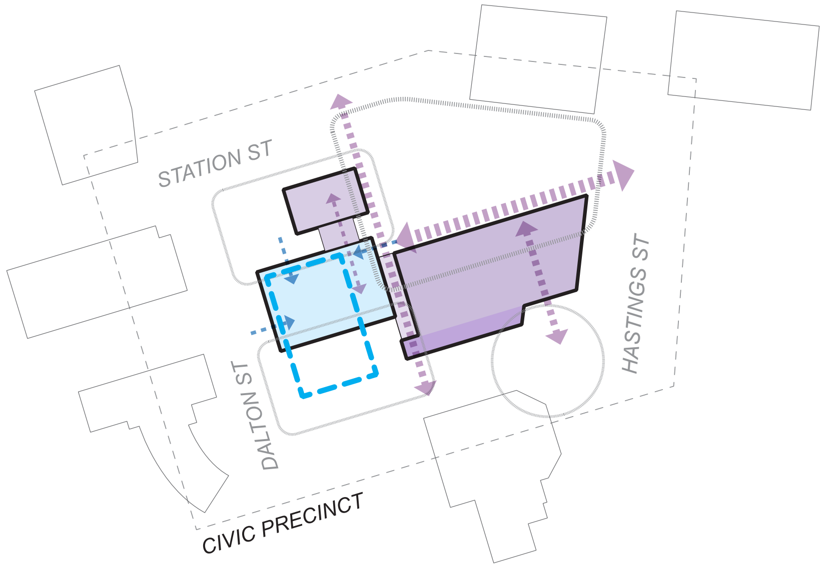
- Pedestrian connection to Marine Parade and the Ocean via Faulknor Lane.
- Mixed mode connection to Central City (Tennyson/ Emerson Streets) and North Ocean front via Hastings Street.
- Mixed Mode (including bus) connection to Central City/ Clive Square via Dalton Street
- North/south pedestrian connection link through Civic Court and City Centre via lanes.
- Improved bus interface on Dalton Street
- Improved mixed use functionality to Station Street – slow vehicle movement, improved pedestrian movement and access to public realm.
- Active frontage/ improved interface to Hastings Street
- New 'Southern Lane' connecting Dalton and Hastings Street for servicing/ improved pedestrian access.

These aspects have been developed through the Preliminary Design process, with engagement and input from NCC traffic planning, Urban Design, and discussion with neighbours.

2.0. CONTEXT
CIVIC ADMINISTRATION BUILDING



BASE SCENARIO
COMPLEMENTARY



FUTURE SCENARIO
INTEGRATED

Civic Administration Building

The Civic Precinct Master Plan identified the value in integrating the Council Civic Administration Services along with the Library within the Civic Precinct.

Key benefits of this approach include:
- Developing a critical mass of ‘Civic’ presence and activity within the Civic Precinct.
- Optimising synergies between both Civic/ community service and activities/ programmes/ events
- Convenient ‘one stop shop’ for public to access civic and community spaces, amenities, and activities.
- Optimising opportunity for efficiencies/ return on investment through shared infrastructure- minimising duplication of spaces and management, staffing and maintenance.

While it was acknowledged this could be achieved in a number of ways, the preferred direction indicated in the Library and Civic Area Plan was to use the existing Library tower site - either within a re-strengthened Library Tower Building (the preferred option if feasible), or in a new building on the same site.

In parallel with Te Aka Preliminary Design, NCC have undertaken a detailed review of the feasibility of redeveloping the Library Tower for this purpose. The outcomes of this feasibility support the viability of a re-strengthened/ refurbished Library Tower Building (currently called LCAP 2 or CAB building).

Te Aka Preliminary Design has recognised the value of this integration and assumed the potential for integration with at least Ground Floor Council Service Centre functions, within either the existing (refurbished) building footprint, or a new footprint (refer diagram of options showing potential alternative footprints). But it has also assumed, that in the meantime, the Library and the Chambers can operate independently of this integration.

Separate on-going Concept Design on the Library Tower Building re-development is investigating the potential synergies of an integrated development.

3.0 PRELIMINARY DESIGN
KEY MOVES

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Key Moves

Te Aka Design has been conceived as a series of additive layers, or 'Key Moves' from the ground up.

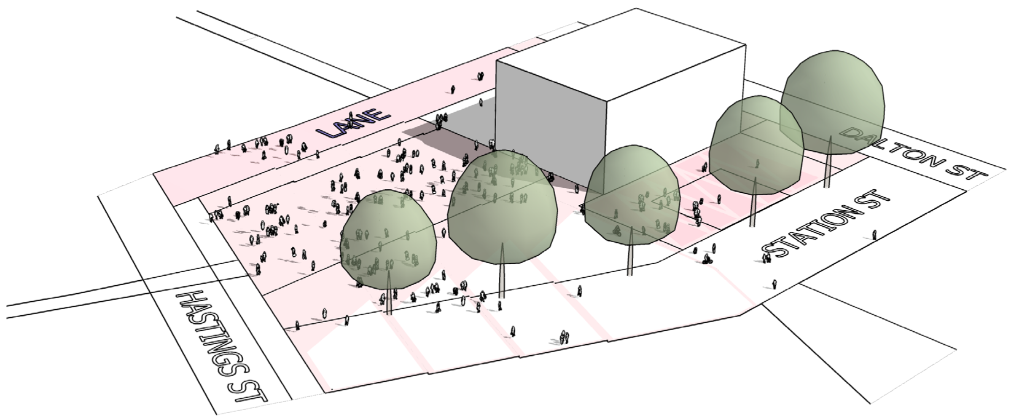

Fig 36. *1. Terraces / Landscape*

- Existing site slopes down from Hastings Street to Civic Court by approx 1.5m
- Express the natural slope by creating a series of terraces that extend from the landscape and into the building
- Existing London plane trees retained
- Re-establish southern lane connecting Hastings Street to Dalton Street

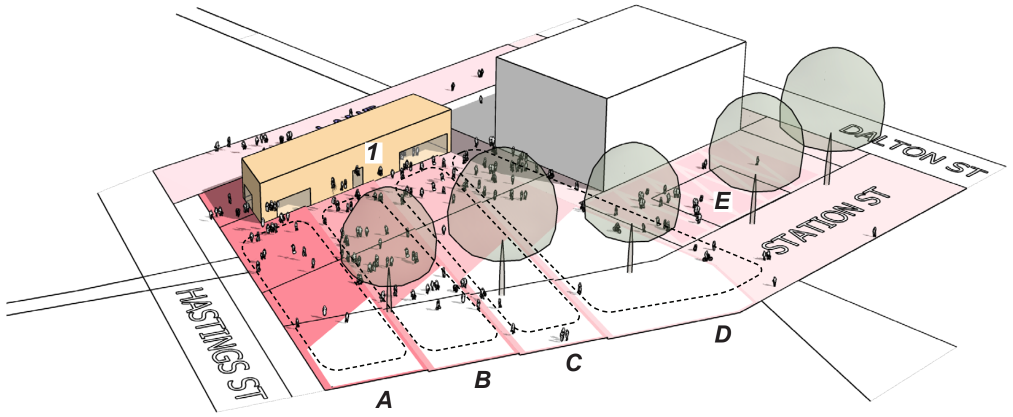

Fig 37. *2. Backpack / Activity*

- Staff, back of house, core and building services consolidated along southern lane.
- Terraces used to define different zones/ areas of activity

1.
Staff
Back of House
Making
Core
Services

A. *Collection Display*
B. *New Collection*
C. *Kids / Whanau*
D. *Making / Event*
E. *Chambers*

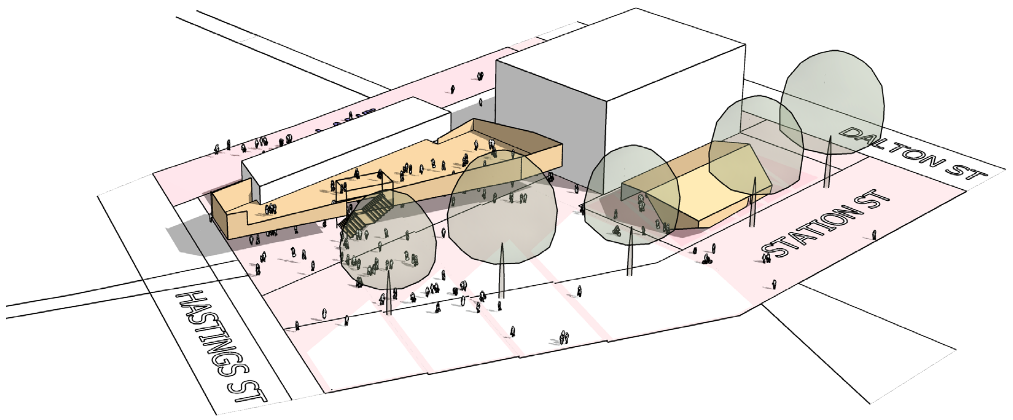

Fig 38. *3. Elevated Platform + Chambers*

- Elevating precious taonga off the ground
- Defining a space that is about dreaming/ knowledge collection
- Chambers grounded in the landscape – connected to the whenua
- Potential for Chambers to be used as a community room when not in formal use as a Civic Chambers

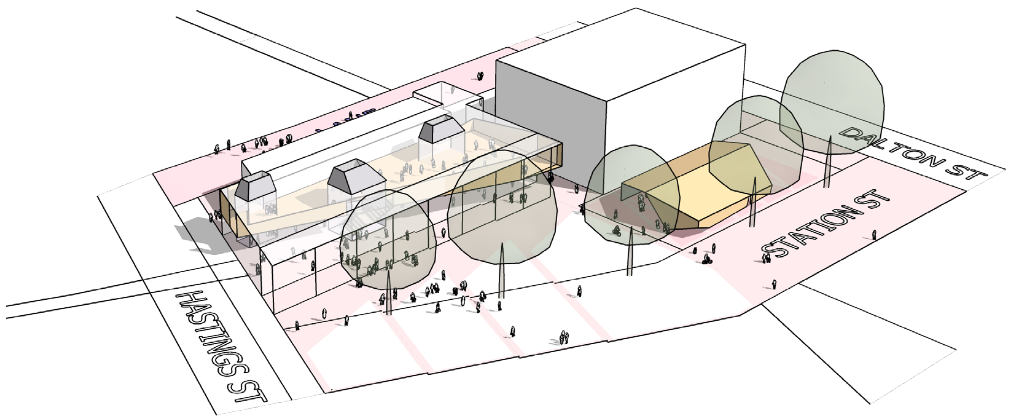

Fig 39. *4. Skylight / Simple Roof*

- Skylights to bring light to deeper parts of the building.
- Connection to the sky and notion of three baskets of knowledge
- Simple roof to accentuate the expression of the platform below

3.0 PRELIMINARY DESIGN
OVERVIEW

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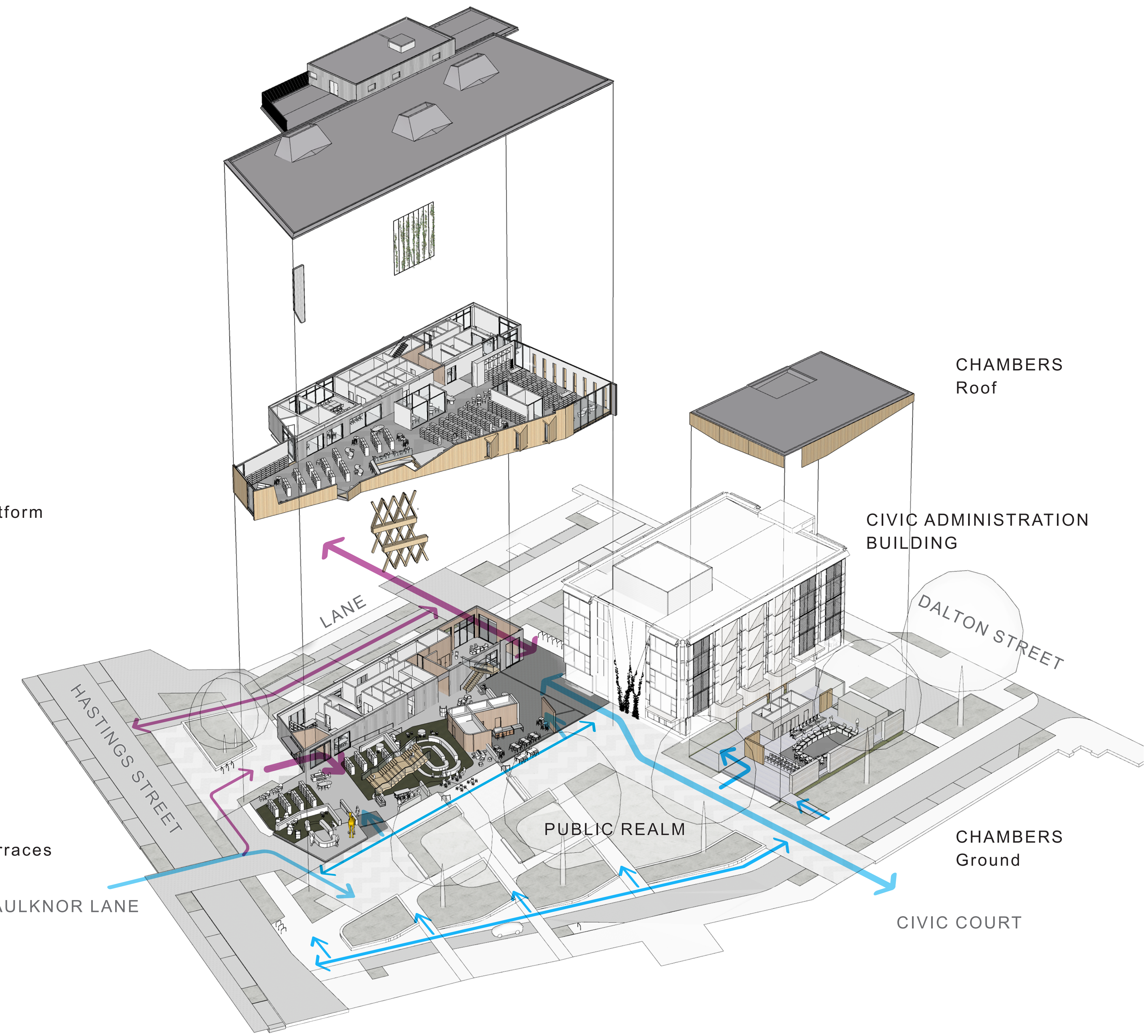

Fig 40. *Exploded Axonometric of the Library, Civic Chambers and Public Realm. Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

Preliminary Design Overview

Te Aka Design has been conceived as a series of additive layers, or 'Key Moves' from the ground up. These include:

- Two buildings – the Library and Chambers
- The Library is two levels. The lower level is conceived as an extension of the public realm. A space for making, dialogue, exchange, gathering, creativity, display and events.
- The upper level is a space for dreaming and knowledge collection. It is the space where most of the collection will be housed.
- There are three primary entries into the Library, adopting the idea that there is 'no wrong door'
- Staff, BOH, core, and building services have been consolidated into an area called the 'backpack' along the southern lane. This allows for a dynamic open space to the north with morning and afternoon sun supporting a range of activities throughout the day.
- Chambers – The primary democratic space in Ahuriri / Napier and a place for local and regional political issues to be debated and determined. When not in formal use, it will be a room available to the community.
- The stage 1 public realm is composed of two parts – the Civic Open space to the north and the Civic Lane to the south. The Civic Open space is broken up into a series of terraces, providing a range of spaces for native planting, rain gardens, gathering and events.
- The lane is the primary service point for the library vehicle, emergency services and pedestrian friendly link between Dalton and Hastings Street.
- The Library and Council Chambers will be a Greenstar 5-star rated (based on the NZGBC Design and As-Built rating tool – version 1.1) facility as well as achieving operational carbon neutrality.

3.0 PRELIMINARY DESIGN
FLOOR PLANS

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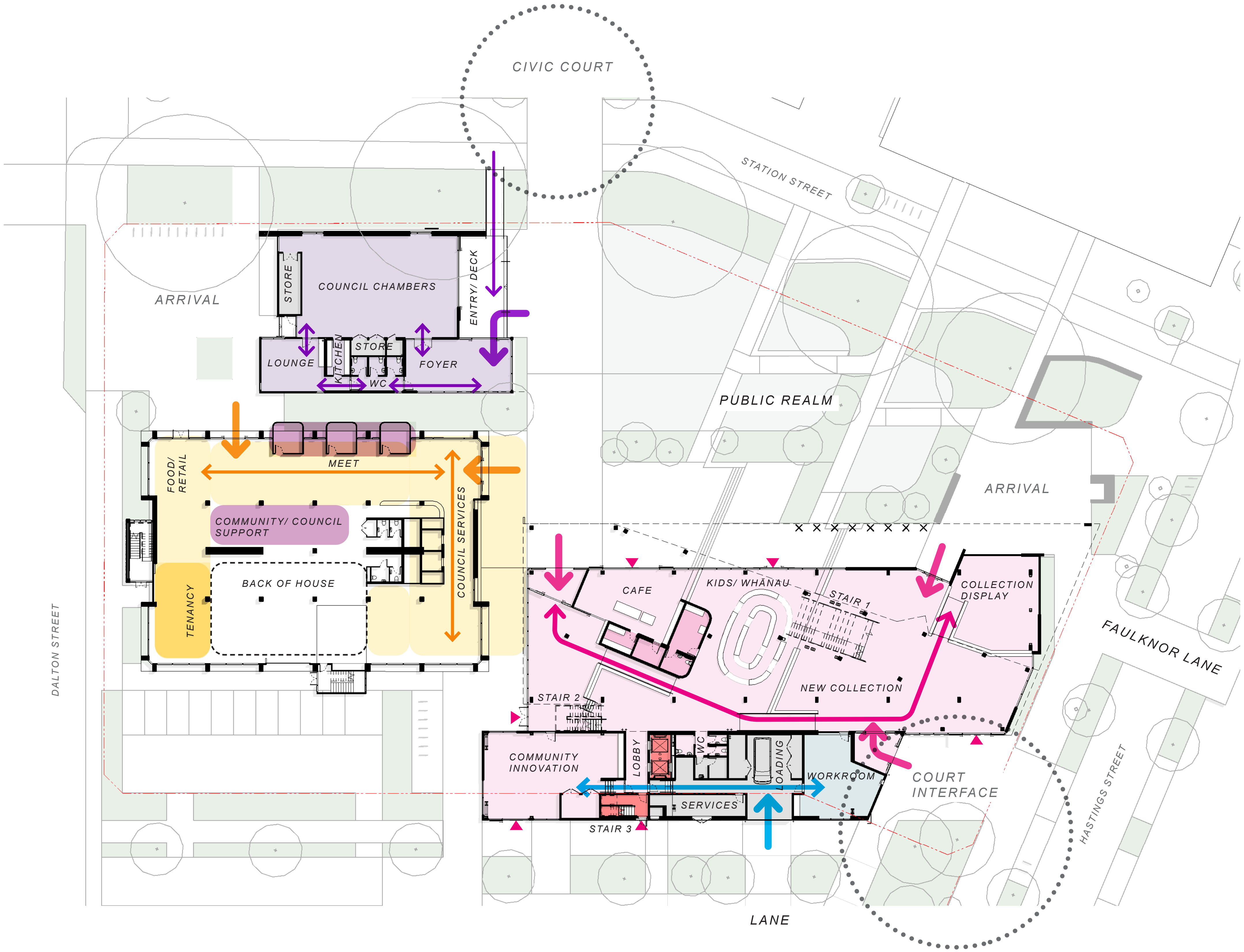

Fig 41. ***Ground Floor Plan*** *- This plan shows the distribution of the programme on the ground floor when the Chambers is being used by Council. The anticipated interface with, and integration of, the ground floor of Civic Administration Building is also indicated. Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

Ground Floor

The library is split over two levels. The lower floor level is made up of four terraces - with internal stair and ramp access between each terrace. It contains much of the 'active' programme including a cafe, kids area, new collection, collection display, workroom and community innovation space.

The Chambers is a single level structure. It also contains a lounge for Councillors, kitchennette and WC's, with provision for a future connection into the Civic Administration Building.

The plan shows the distribution of programme on the ground floor when the Chambers is being used by Council (refer purple area). The anticipated interface with, and integration of, the ground floor of Civic Administration Building is also indicated.

Both buildings are integrated seamlessly into the public realm – a gently terraced landscape framed by the significant London Plane Trees to the North and neighbouring buildings - defining key external spaces: Arrival, Civic East, Civic West, The Southern Lane, the Court interface; along with Station Street, Civic Court and Faulknor Lane beyond.

KEY

- Vehicle access for loading
- Library entry
- Council Meeting entry
- Indicative CAB entry
- Library circulation
- Primary BOH circulation
- Councillor/ Council Workshop access
- Indicative CAB circulation

3.0 PRELIMINARY DESIGN
FLOOR PLANS

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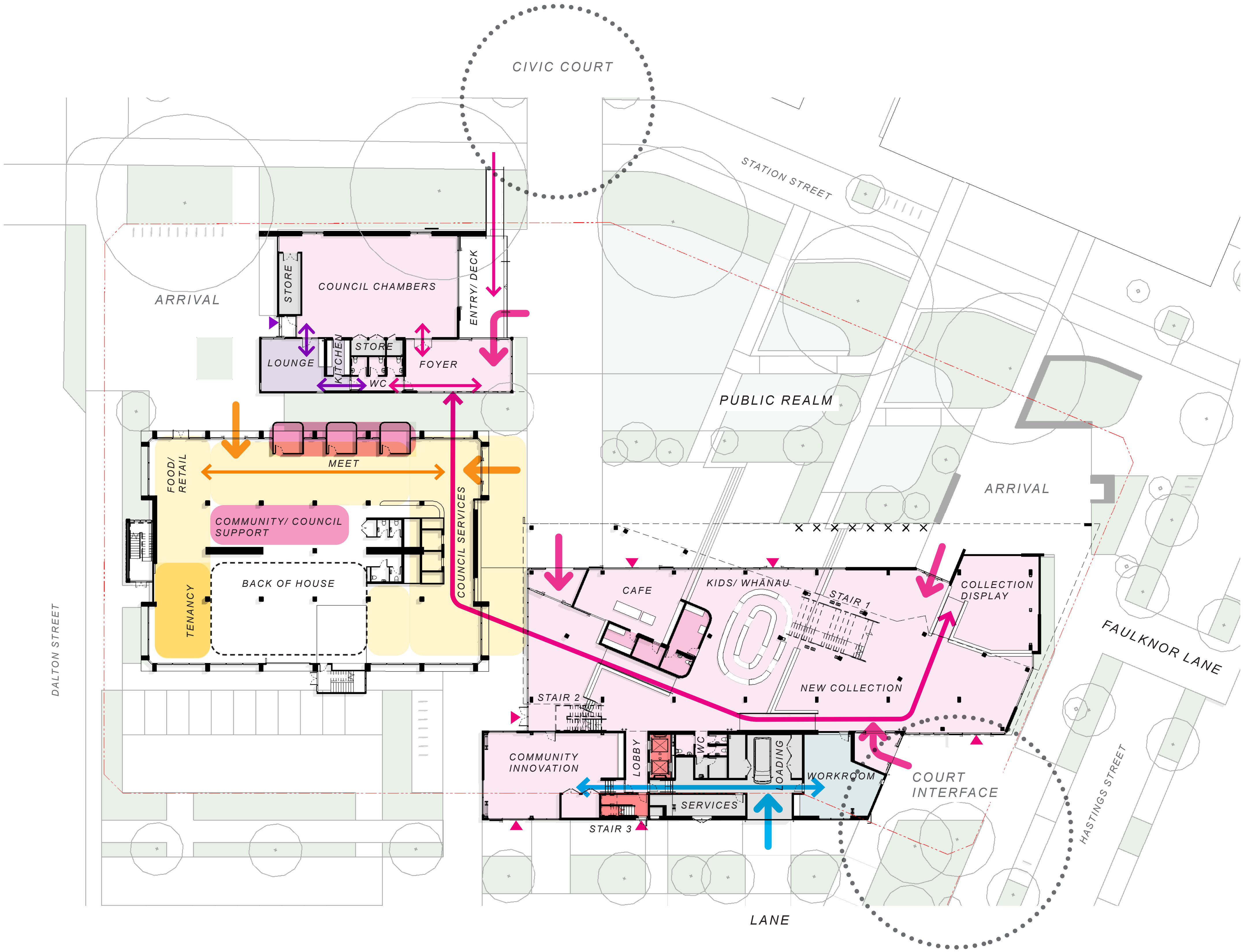

Ground Floor

This plan shows the distribution of the programme on ground floor when the Chambers is being used as a Community Room (refer pink areas) by the general public and/ or the library (when not required for Council use). The anticipated interface with, and integration of, the ground floor of Civic Administration Building is also indicated in this scenario.

KEY

- Vehicle access for loading
- Library/ Community entry
- Indicative CAB entry
- Library/ Community circulation
- Primary BOH circulation
- Councillor access
- Indicative CAB circulation

*Fig 42. **Ground Floor Plan** - This plan shows the distribution of the programme on the ground floor when the Chambers is being used as a Community Room by the general public and / or the library. Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

3.0 PRELIMINARY DESIGN
FLOOR PLANS

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19th January 2024

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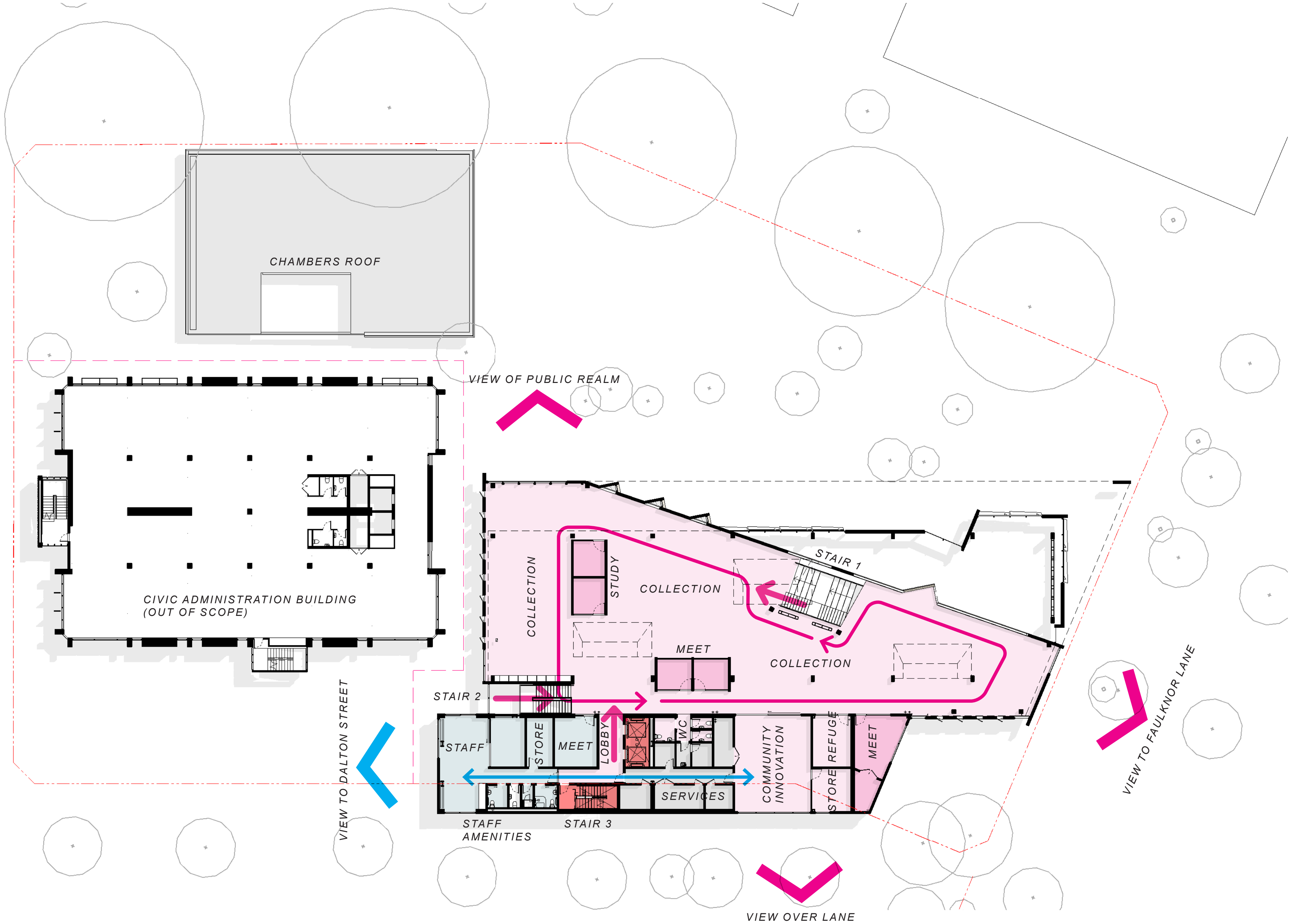
with Israel Birch



Level 1
The upper level contains majority of the collection, with views to the Public Realm, Lane, Marine Parade and Faulknor Lane. Level 1 also contains staff breakout, community innovation space, meeting rooms and study space.

Fig 43. ***Level 1 Plan*** *- This plan shows the distribution of the programme on the first floor, where most of the collection will be housed. Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

3.0 PRELIMINARY DESIGN
FLOOR PLANS

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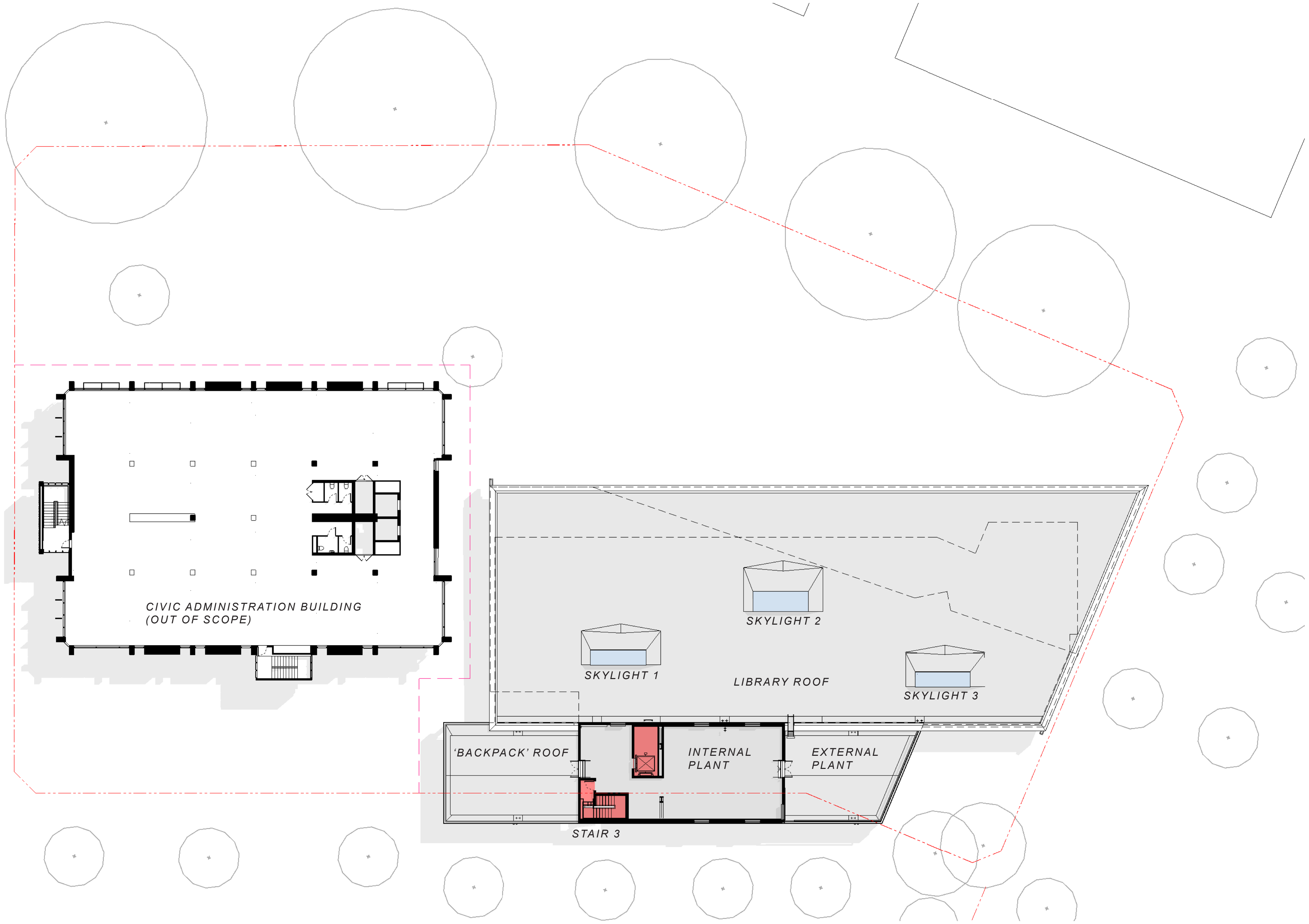

Level 2

The 'backpack' has a second upper level that is not publicly accessible. It contains the plant that services the building

Fig 44. Level 2 Plan *- This plan indicates the internal plant and external plant areas as well as the three skylights providing natural light to deeper parts of the level 1 collection space. Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

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LIBRARY SECTIONS

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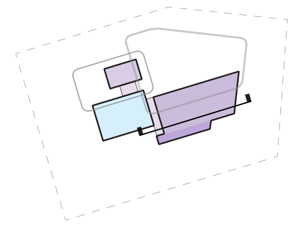
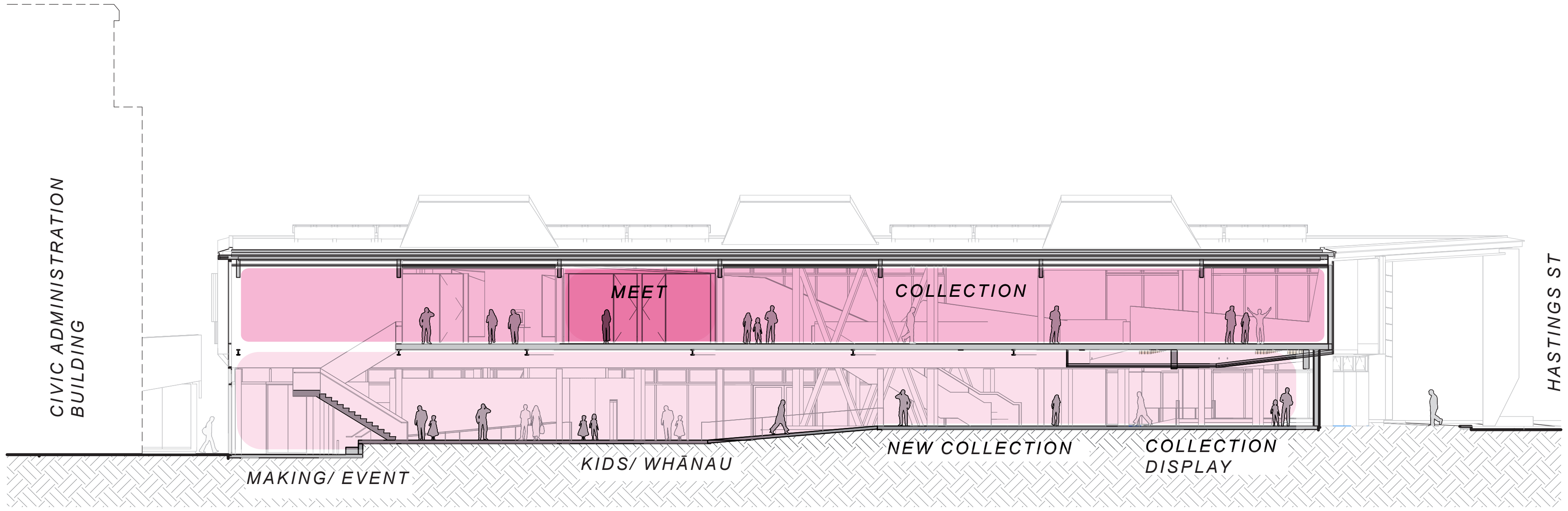


KEY PLAN



Long Section - Library Building
This sectional drawing cuts through the length of the library looking north. At the lower level is a stepped terrace space for making, dialogue, exchange, gathering, creativity, display and events. On the upper level is an elevated space for 'dreaming' and knowledge collection. This is where most of the collection will be housed. Over the top is a simple roof with skylights connecting to the sky and bringing natural light deep into the plan.

Fig 45. *Long section through the library building (looking north) with Hastings Street to the far right, and the Civic Administration Building (shown dashed) to the left.*

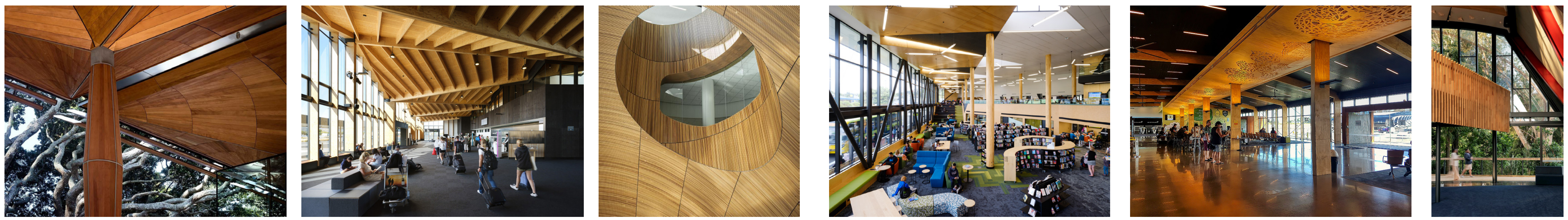


Fig 46. *Precedent images of the anticipated materiality provided by the mass timber structure*

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LIBRARY SECTIONS

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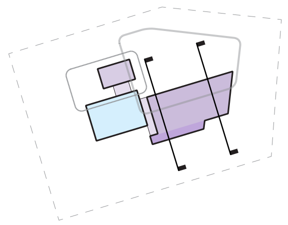

KEY PLAN

Cross Sections - Library Building
These sectional drawings cut through the shorter dimension of the library (looking east).

The structure of the northern portion of the building is mass timber and will be 'on show', while the 'backpack' to the south is a simple steel structure, generally covered by linings. The 'backpack' provides the majority of the seismic bracing for the building.

The left-hand section describes the level 1 floor at its widest, showing the acoustic separation between floors, the enclosed spaces within the backpack and the connection of the ground floor to the terraces to the north and the lane to the south.

The right-hand section is closer to Hastings Street, showing the new collection area on ground floor, below the collection and the double height collection display area.

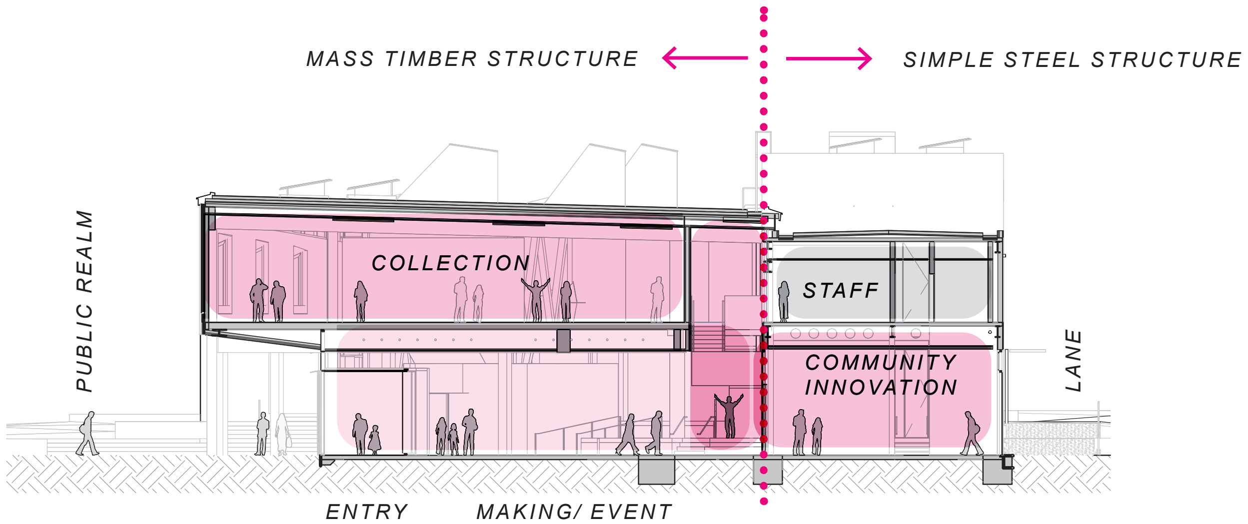

Fig 48. Cross section through the library building near the north- western entry (looking east) with the Public Realm to the left of the building and the southern Lane to the right.

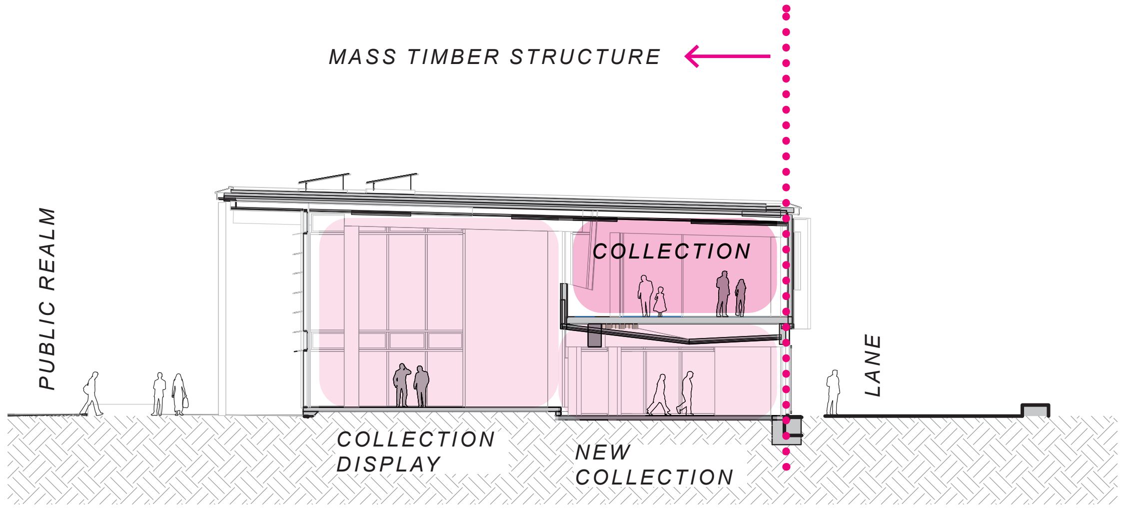

Fig 49. Cross section through the library's collection display area (looking east) with the Public Realm to the left of the building and the southern Lane to the right.

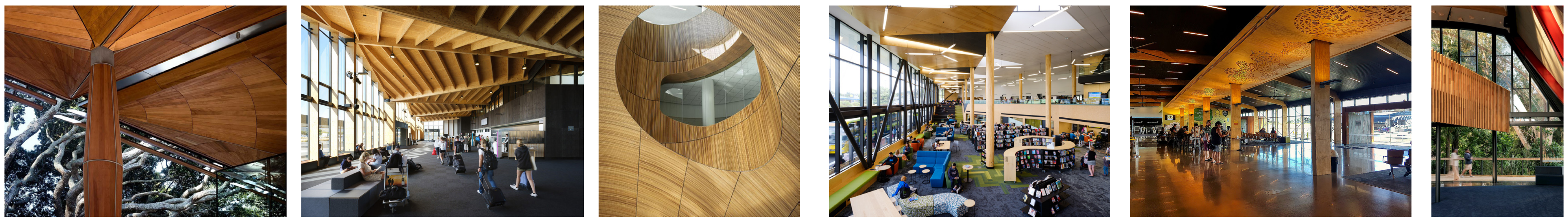

Fig 47. Precedent images of the anticipated materiality provided by the mass timber structure

3.0 PRELIMINARY DESIGN
LIBRARY ELEVATIONS

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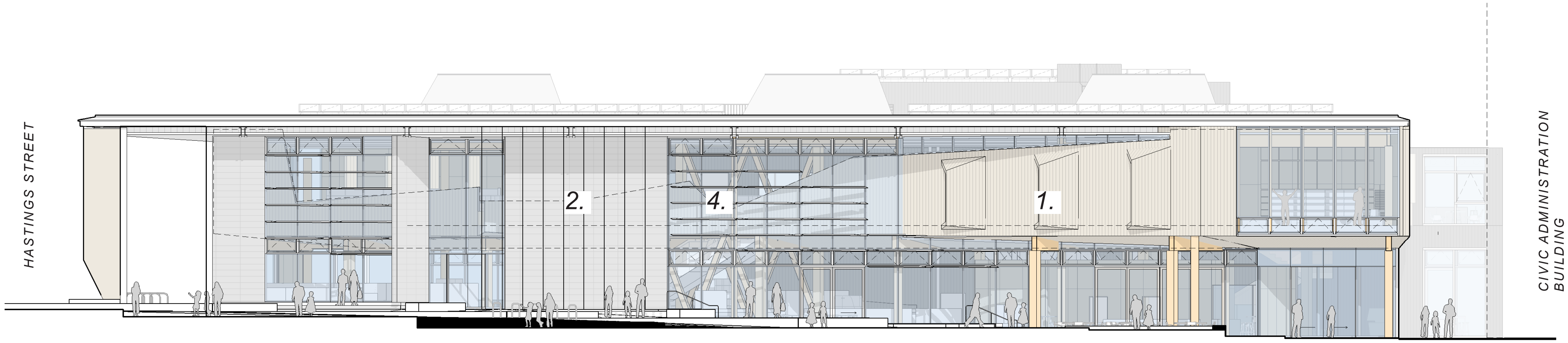


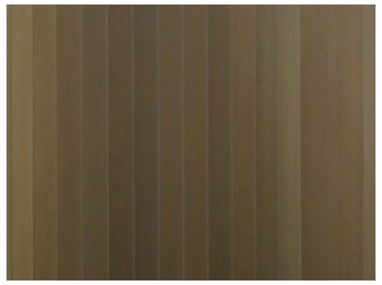
Fig 50. *North Elevation of the Library from the Public Realm with Hastings Street to the left and the CIvic Administration*

Fig 51. *South Elevation of the Library from the southern Lane with Hastings Street to the right and the CIvic Administration Building to*

1. TIMBER

2. PROFILED TERRACOTTA

3. ALUMINIUM CASSETTE



4. LOUVRES

Fig 52. *'Look and Feel' precedent images of the anticipated facade materials.*

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LIBRARY ELEVATIONS

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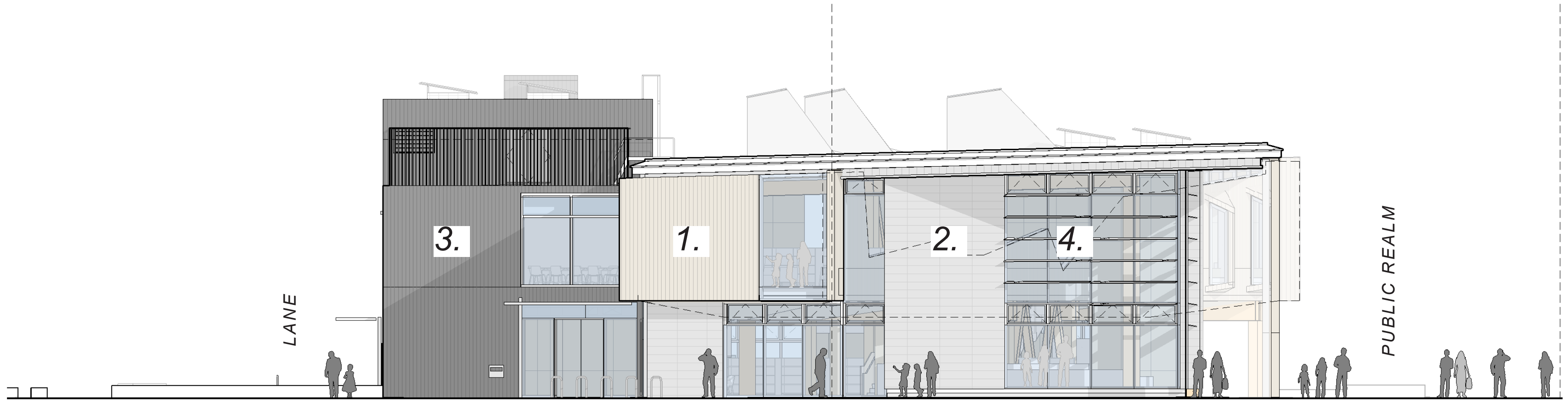


Fig 55. *North Elevation of the Library from Hastings Street (Civic Administration Building shown dashed for clarity)*

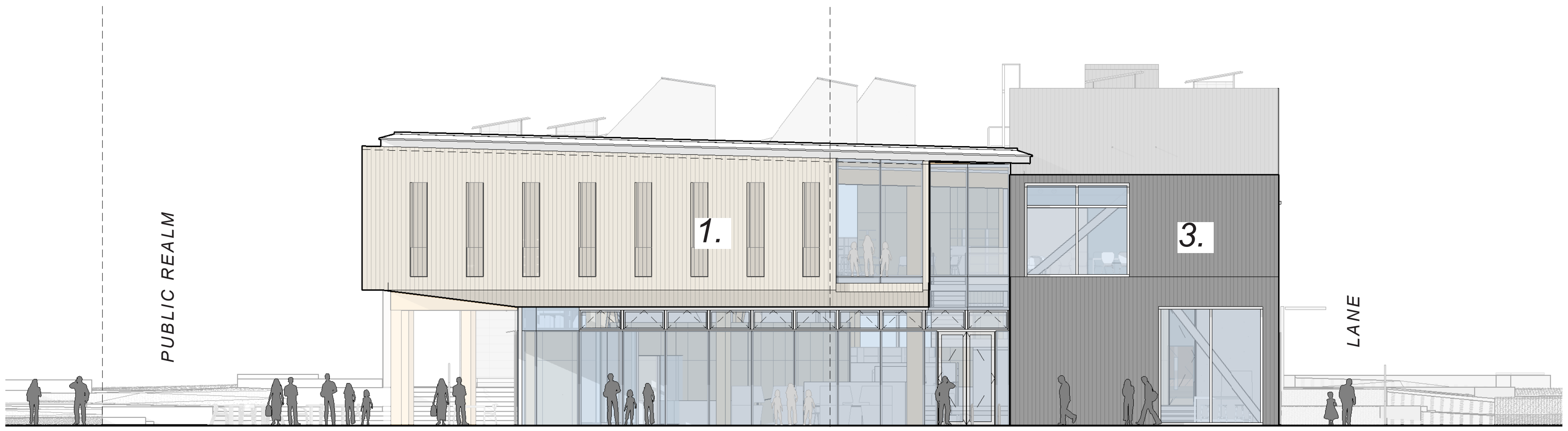
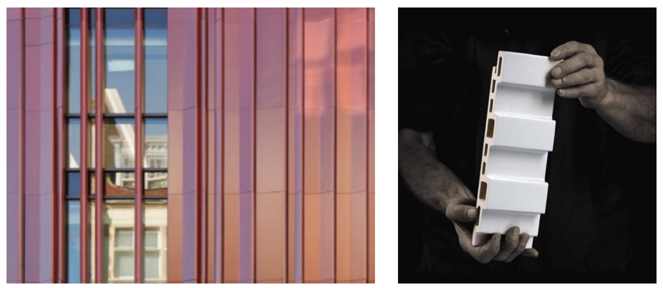


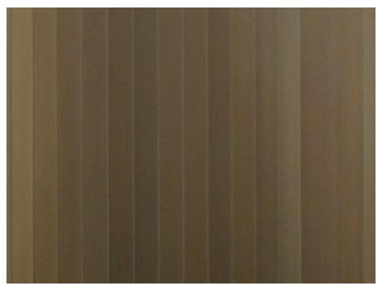
Fig 56. *West Elevation of the Library (Civic Administration Building shown dashed for clarity)*

1. TIMBER

2. PROFILED TERRACOTTA



3. ALUMINIUM CASSETTE



4. LOUVRES

Fig 54. *'Look and Feel' precedent images of the anticipated facade materials.*

3.0 PRELIMINARY DESIGN
MAHI TOI

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The following are list of opportunities for integrated Mahi Toi as the design develops:

Papatūānuku - Outdoor space
1. Celebrated corner “pou” artwork supporting northeast corner of the roof.
2. Design in the ground surface finish to signify a meeting point. Potentially a representation of the kaitiaki, Moremore.
3. Hard landscape:
   - Stencilled grit/water blasted representations of whakapapa of the site, and past activities such as collecting kai.
   - Terrace walls – form/finish to express Rūaumoko.
   - Lighting – integration of feature lighting to help to tell a story.
   - Urban play – spaces and elements to encourage playful learning, discovery and interaction.
   - Paving design to enhance the narrative
4. Soft landscape:
   - Enhancements to the planting, seating and whenua to represent Papatūānuku, Rūaumoko, and wai.
   - Climbing vine - along the northern frontage on knotted support wire.

Te Ngahere o Tangaroa - Ground floor
5. Entrance Carvings.
6. Window vinyl or ceramic frit artwork along the side on the building. This work could also wrap around other areas of the first floor.
7. Work with design team to enhance interior design. Vinyl, autex, carpet and other finishes.
8. Childrens area joinery and finishes.
9. Stairs - Poutama. Vertical Aka structure connected between Papatūānuku and Ranginui.

Waka huia - First floor
10. Waka huia. The exterior of the waka huia.
11. Windows at both ends of the waka huia.
12. Interior of waka huia.

Ranginui - Ceiling
13. Celestial star map on the ceiling.
14. Ngā Kete o Te Wānanga - The Baskets of Knowledge represented by the three skylights.

Other opportunities
Artwork made for the space.
Artwork made for landscape.
Potential Toimairangi Art School or EIT Visual Arts Department collaboration.
Potential collaboration with a mana whenua artist for lighting.

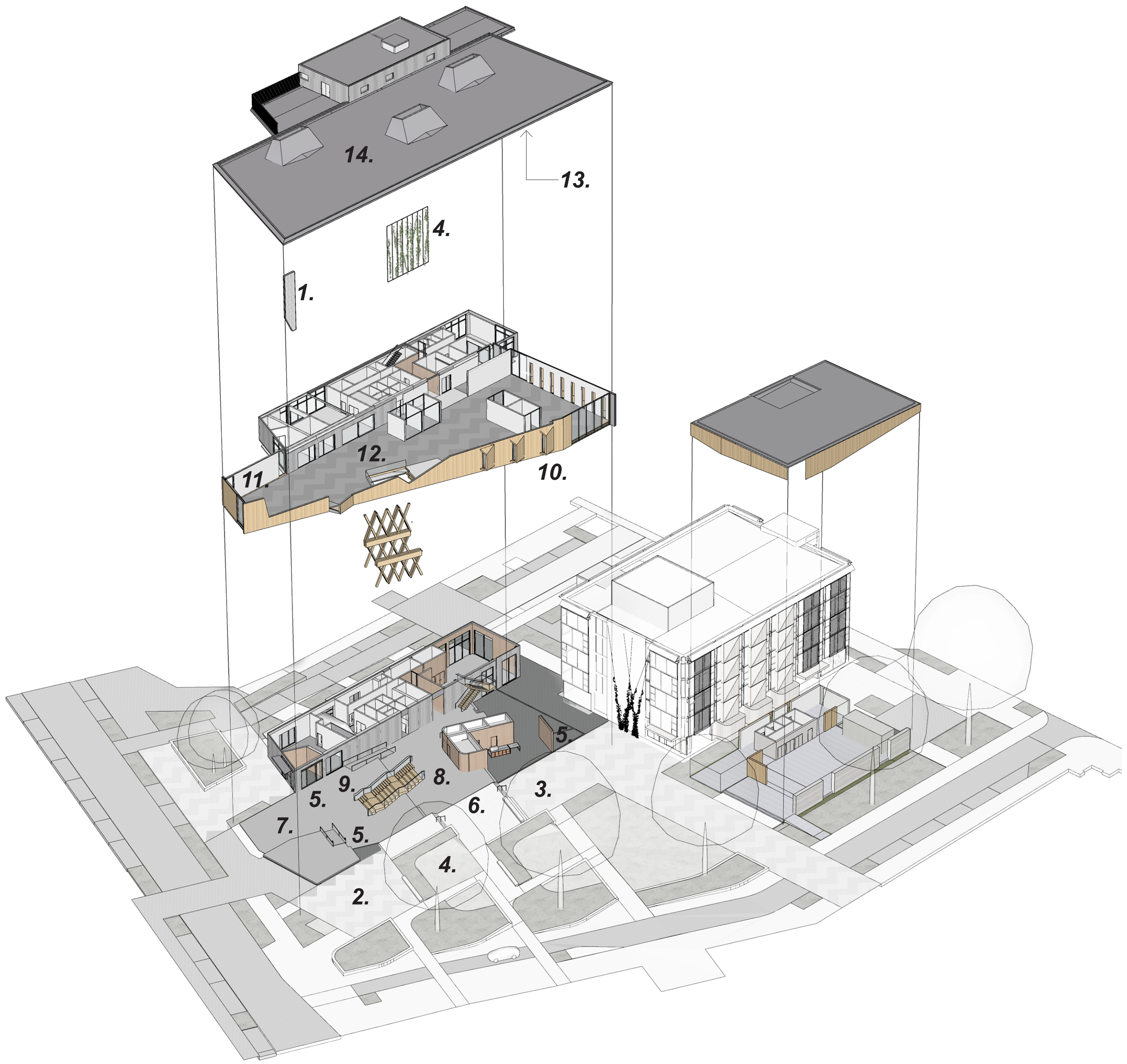
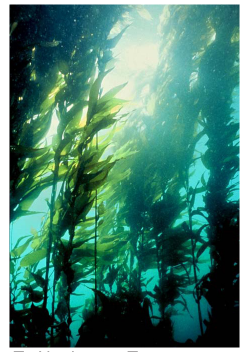
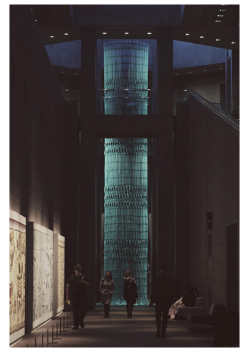


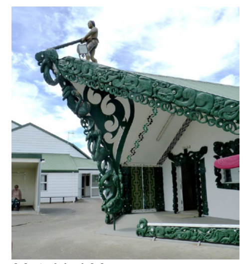
Fig 57. Exploded Axonometric overview highlighting mahi toi opportunities. Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.


Te Ngahere o Tangaroa


AKA by Mata Aho Collective


Waka Huia/ Wharekura


He Raukura, Matthew McIntyre Wilson, Waitohi


Matahiwi Marae

3.0 PRELIMINARY DESIGN
BUILDING SERVICES

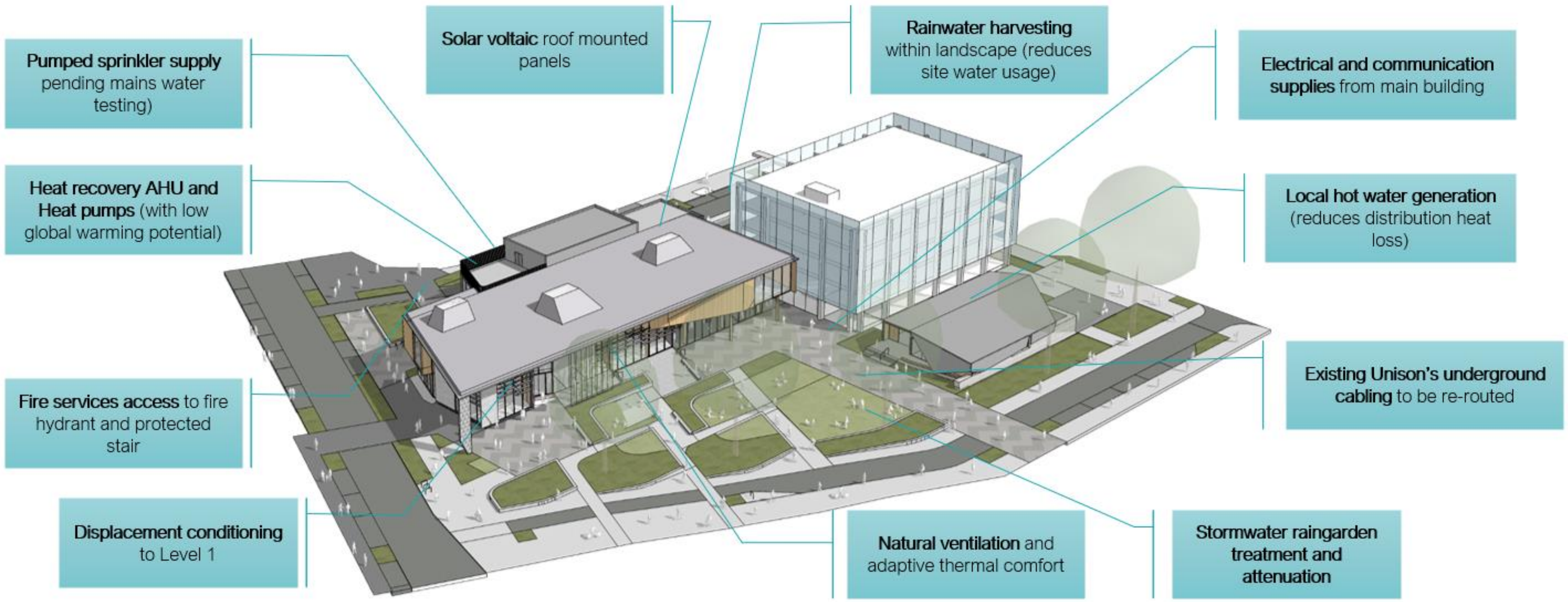


Fig 58. *A broad overview of the proposed building services strategy*

Building Services

The adjacent diagram broadly summarises the building services of the facility, the full Services Features report (BECA) is included in the appendicies.

3.0 PRELIMINARY DESIGN
SUSTAINABLE FEATURES

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Lower Energy

- 30-55kWp solar PV array
- All electric heating and cooling systems
- Efficient LED lighting with energy saving controls.
- Net Zero operational Carbon target

Comfortable and enjoyable spaces

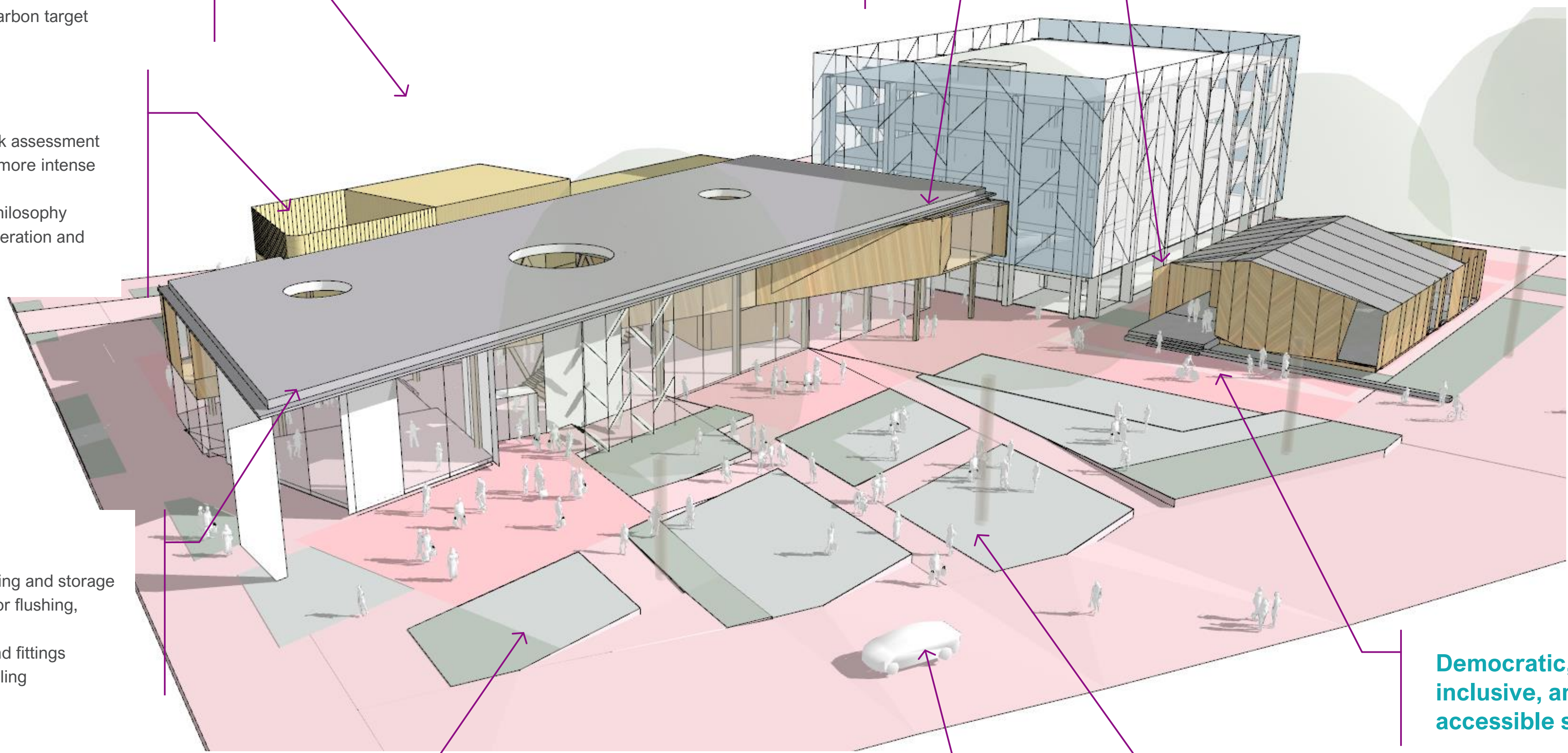
- Daylighting, acoustics, and thermal comfort to Green Star Principles
- Opening windows and access to the Atea

Responsible materials

- Low Volatile Organic Compound and formaldehyde materials
- Eco-certified building products
- Limited use of PVC, limited to best-practice PVC products

Resilient design

- Undertaking climate risk assessment
- Designed to cope with more intense climate conditions.
- Low damage design philosophy
- Designed for easier operation and maintenance.



Water efficient

10KL of rainwater harvesting and storage from the main roof used for flushing, irrigation and washdown.
Water efficient tapware and fittings
No active evaporative cooling

Democratic, inclusive, and accessible spaces

Fewer emissions and improved site ecology

- Low impact refrigerants with reduced charge
- Reduced stormwater runoff through raingarden detention
- Stormwater treatment through natural systems
- Improved public realm and activation of public space through rain gardens and native planting

Low carbon transport

- Secure bike parking for staff
- Showers, lockers, and drying facilities
- Local public transport stops
- Visitor bike parks

Lower carbon design

- Mass-timber framing and structure
- Lower carbon concrete and steel
- Targeting 15% reduction in upfront carbon
- No fossil fuels onsite

Fig 59. *A broad overview of the proposed sustainable features*

Sustainable Features

The Library and Council Chambers will be a Greenstar 5-star rated (based on the NZGBC Design and As-Built rating tool – version 1.1) facility as well as achieving operational carbon neutrality.

The adjacent diagram broadly summarises the sustainable features of the design, the full Sustainability Features report (BECA) is included in the appendicies.

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LIBRARY EXTERIOR VIEWS

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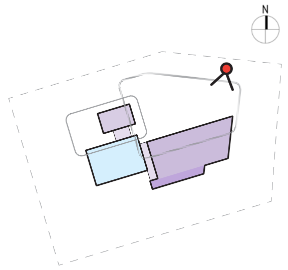

KEY PLAN

Fig 60. *Station Street approach (looking south). Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

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LIBRARY EXTERIOR VIEWS

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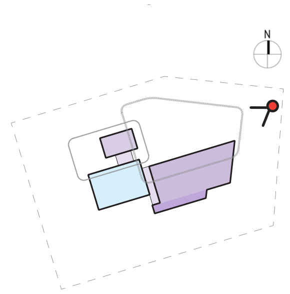

KEY PLAN

Fig 61. *Hastings Street approach (looking south-west).*

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LIBRARY EXTERIOR VIEWS

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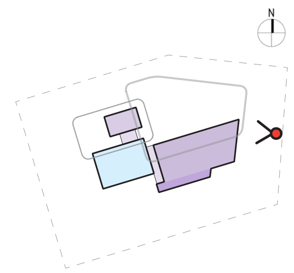

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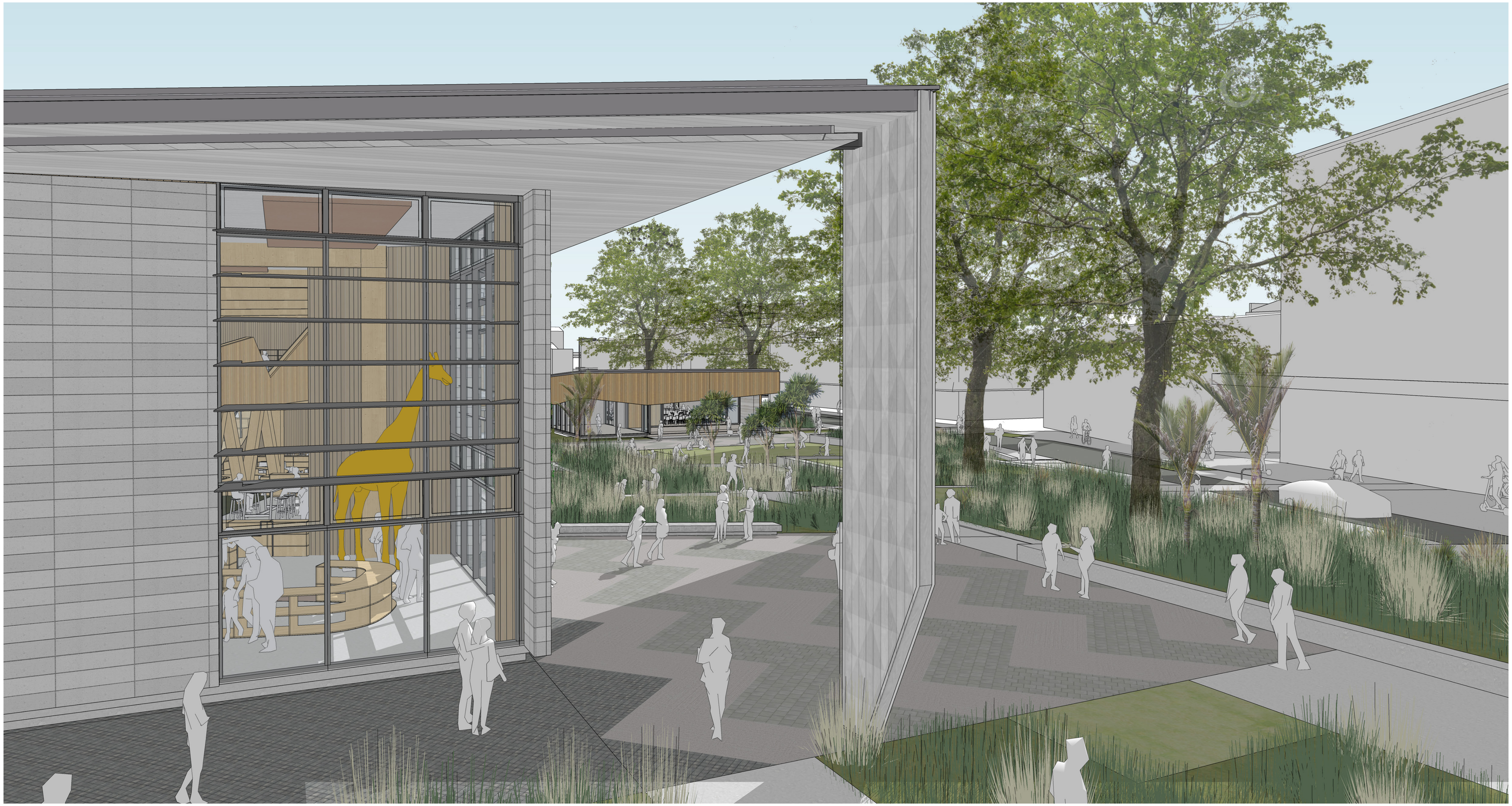

Fig 62. *Elevated view from Hastings Street (looking west at the 'pou'/ prow, collection display window and Chambers beyond)*

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LIBRARY TEST FIT PLANS

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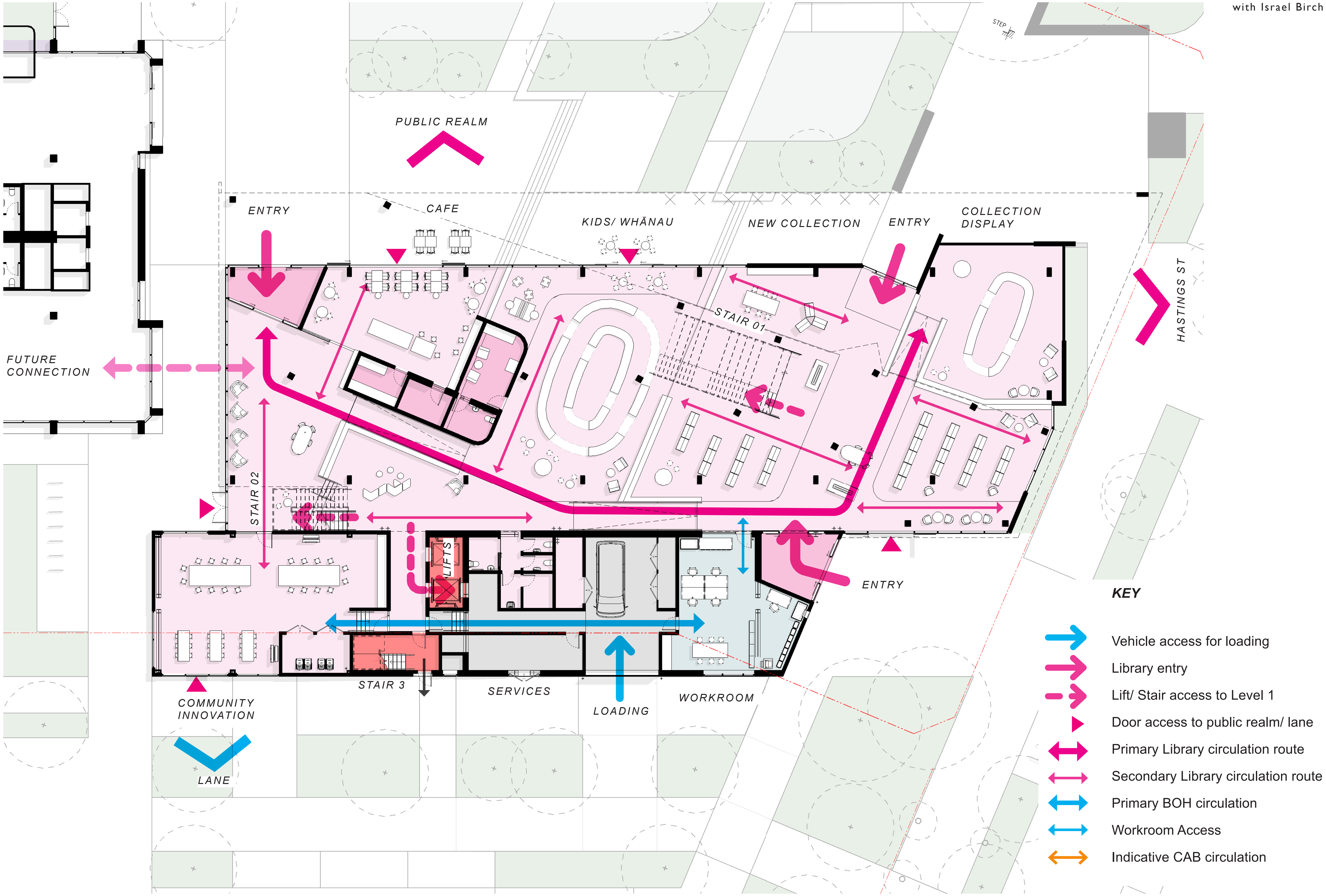

Fig 63. ***Ground Floor Test Fit Plan*** *indicating building entries, room access, circulation and indicative shelving/ furniture arrangement*

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LIBRARY TEST FIT PLANS

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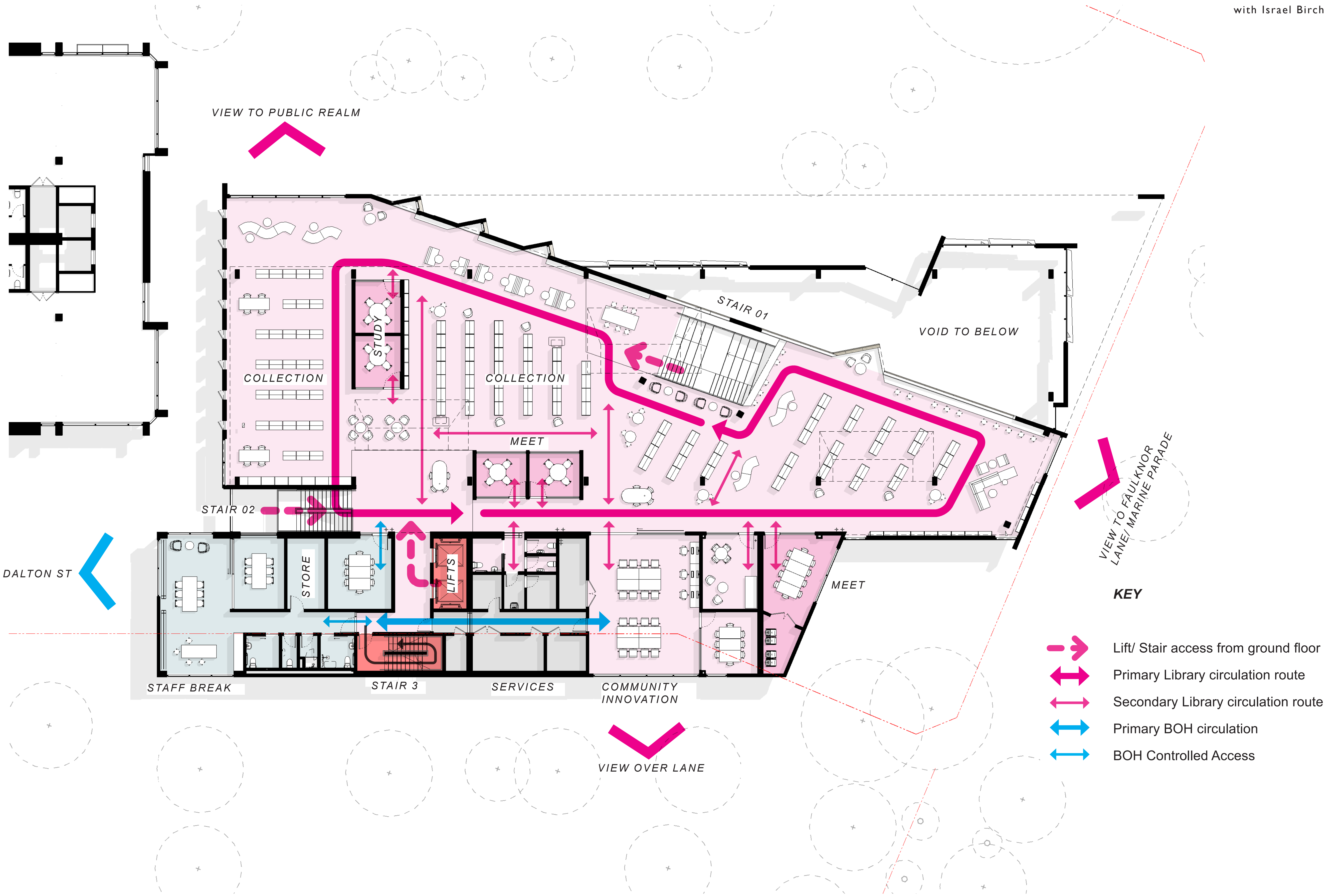

Fig 64. ***Level 1 Test Fit Plan*** *indicating stair access, room access, circulation and indicative shelving/ furniture arrangement.*

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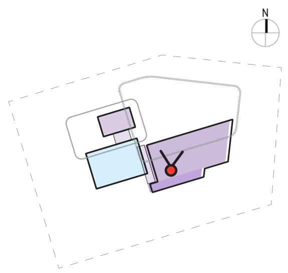
LIBRARY INTERIOR VIEWS



KEY PLAN

Fig 65. *View of the ground floor interior (looking north towards the cafe tenancy).*

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LIBRARY INTERIOR VIEWS

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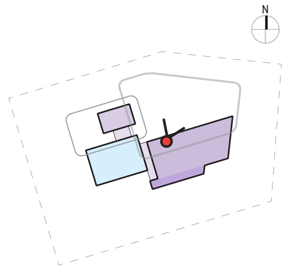

KEY PLAN

Fig 66. *View of the ground floor cafe interior (looking north-east at the Public Realm). Note: Furniture selection/ layout is indicative and will be developed in later design stages.*

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LIBRARY INTERIOR VIEWS

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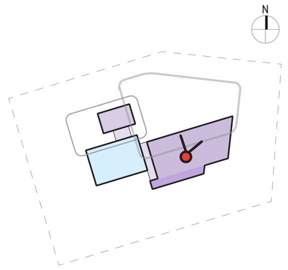

KEY PLAN

Fig 67. *View of the ground floor kids area (looking north towards the Public Realm). Note: Furniture selection is indicative and will be developed in later design stages.*

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LIBRARY INTERIOR VIEWS

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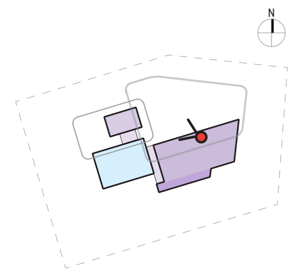

KEY PLAN

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Fig 68. *View of the ground floor kids area (looking north-west towards the Civic Chambers). Note: Furniture selection is indicative and will be developed in later design stages.*

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LIBRARY INTERIOR VIEWS

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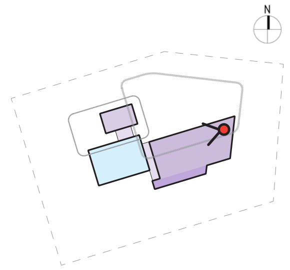

KEY PLAN

Fig 69. *View of the ground floor interior from the collection display terrace (looking west toward the bleacher stair). Note: Furniture selection/ layout is indicative and will be developed in later design stages.*

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LIBRARY INTERIOR VIEWS

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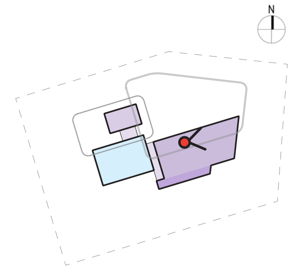

KEY PLAN

Fig 70. *View of the level 1 interior (looking east over the bleacher stair and the central skylight above). Note: Furniture selection/ layout is indicative and will be developed in later design stages.*

3.0 PRELIMINARY DESIGN
CIVIC CHAMBERS OVERVIEW

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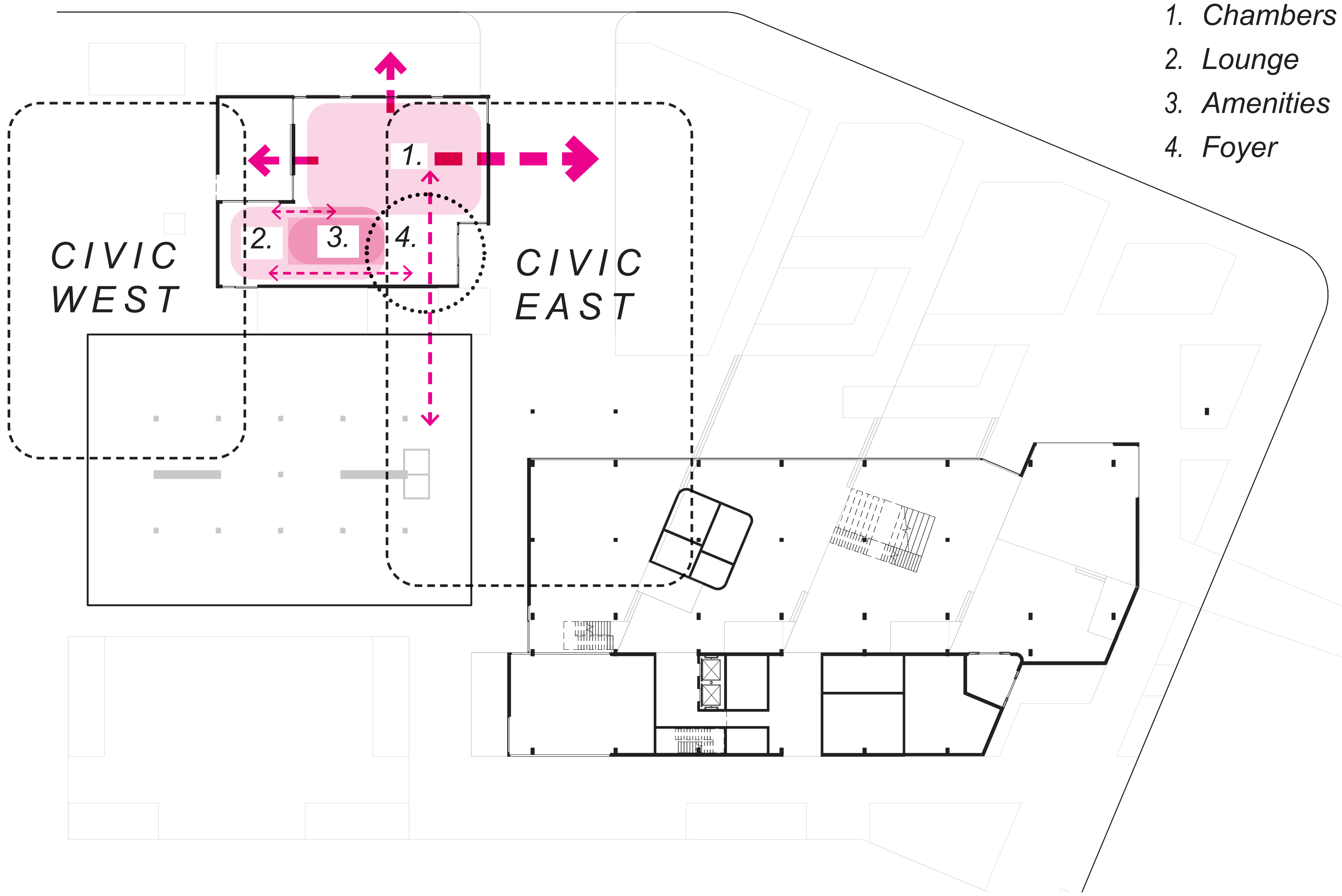

Fig 71. Plan diagram of the of proposed Chambers building, highlighting key interfaces with the Publlic Realm and Civic Administration Building.

Civic Chambers Overview

The 2022 Design brief articulates the aspirations and attributes of the Council Chambers, summarised here:

Aspirations:
- The Council Chambers will be the primary democratic space in Ahuriri / Napier
- A place for local and regional political issues to be robustly debated and determined.
- Also intended to be used by the Hawkes Bay Regional Council.
- A ceremonial space for Civic Events, Investitures and celebrations.
- At other times the Chambers will be a “Community Room” – a large meeting space, a study space, an extension of the library lounge and as a space for community use, 'misuse', events and performances.

Attributes:
- On occasion the activities must be private and the provision to enable ‘privacy in a public space’.
- Flexibility of focus – on occasion it is not appropriate for people to ‘spiritually leave the room’ and control of visibility out (as well as in) should be provided.
- Designed to receive pōwhiri
- Visual and physical connection to the outside and the natural environment
- An entry oriented to the east, facing the rising sun has value and may support formal events and approach

Through the Concept Design process, the size, location and architecture of the Chambers has been tested (refer appendices for option summary). This process has endorsed the location proposed in the Civic Plan - for the Chambers to be on the ‘floor’ of the city – a free standing building with a separate identity from the library.

In this location the ‘tensions’ of political discourse from the library space are separated and the Chambers are visible, accessible and connected to:

- The Civic Public Realm open space
- The Council Service Centre / Civic Administration Building
- The external Ground/ Landscape
- The Chambers
- Helps define and activate Civic Public Space
- Consolidates and connects ‘Democracy’ with primary Council Service Floor
- Has a presence and address on multiple sides
- The process of ‘Democracy’ is visible and accessible to public

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CIVIC CHAMBERS FEATURES

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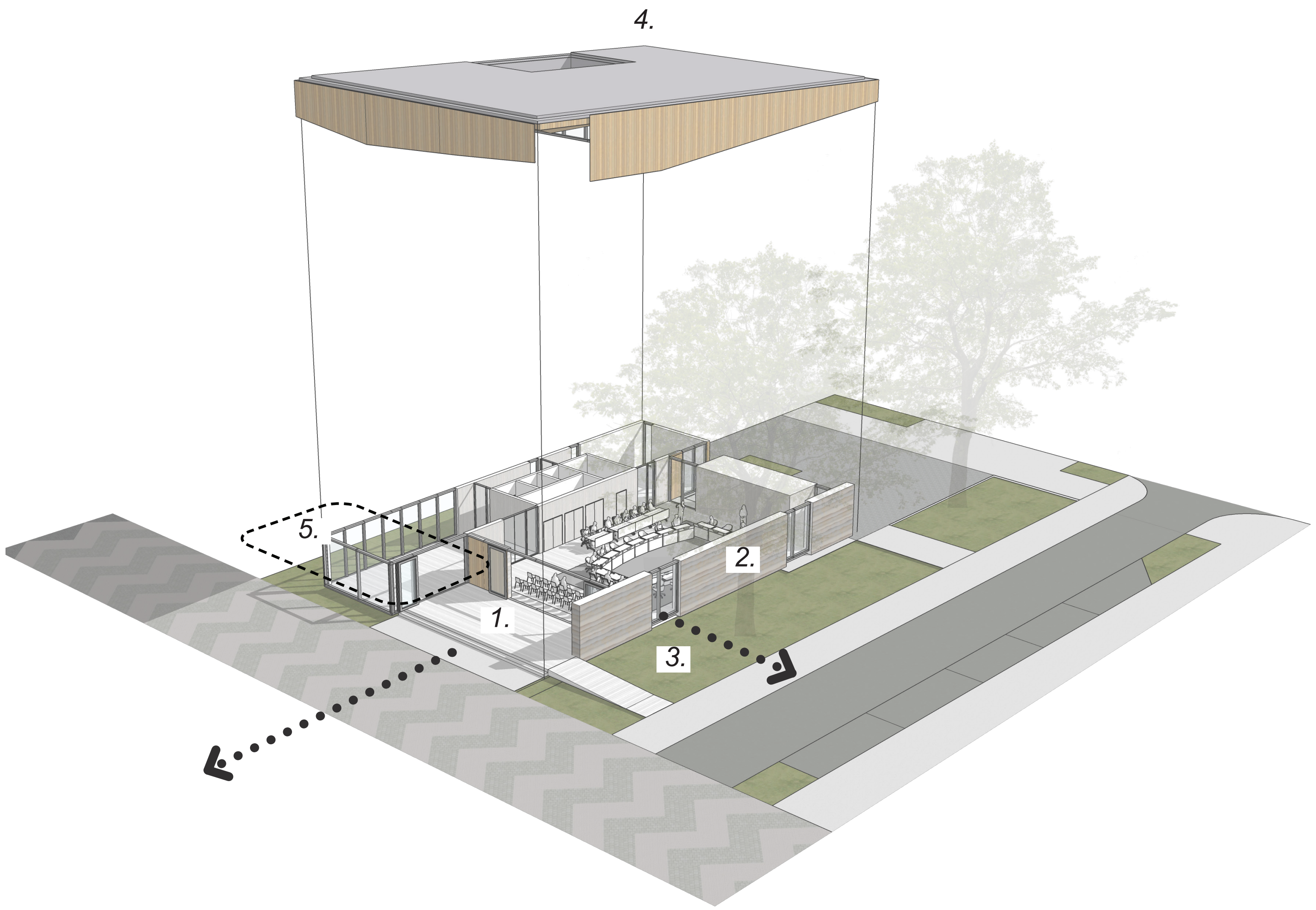

Fig 72. *Exploded axonometric of the chambers building with references to the key design moves.*

Civic Chambers Features

The Chambers will be the primary democratic space in Ahuriri / Napier and a place for local and regional political issues to be debated and determined. When not in formal use, it will be a room available to the community.

The Chambers design has been conceived as a series of additive layers, or 'Key Moves'

1. *Entry/ deck threshold to public realm (with ability to screen during council meetings)*
2. *Podium/ base hunkered in the landscape*
3. *Landscape buffer (for visual outlook/ privacy)*
4. *'Wrapping' roof form*
5. *Future foyer extension to Civic Administration Building*

These aspects have been developed following a review of the Chambers concept plan which was presented at a Council Workshop on the 7th of December and focussed on the following aspects:

- Interface with the landscape/ public realm (privacy/ visual outlook)
- Functionality of the Foyer/ entry experience
- Integration with CAB building

Design development and co-ordination with stakeholders, Landscape, Mahi Toi, Structure, Building Services, ESD, Fire, Acoustics and the CAB design team will continue through Developed Design.

3.0 PRELIMINARY DESIGN
CIVIC CHAMBERS FEATURES

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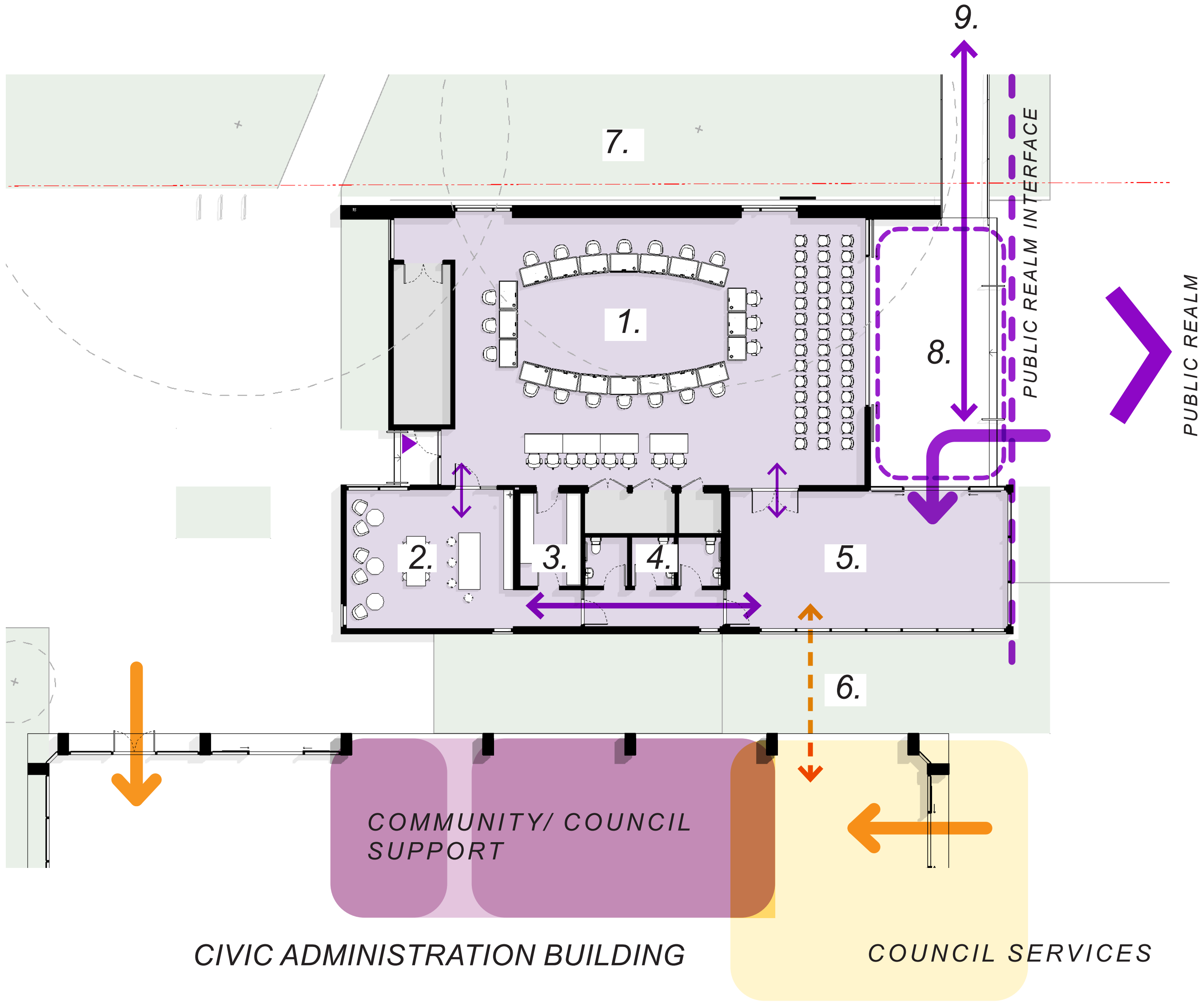

Fig 73.*Civic Chambers floor plan during a chambers event.*

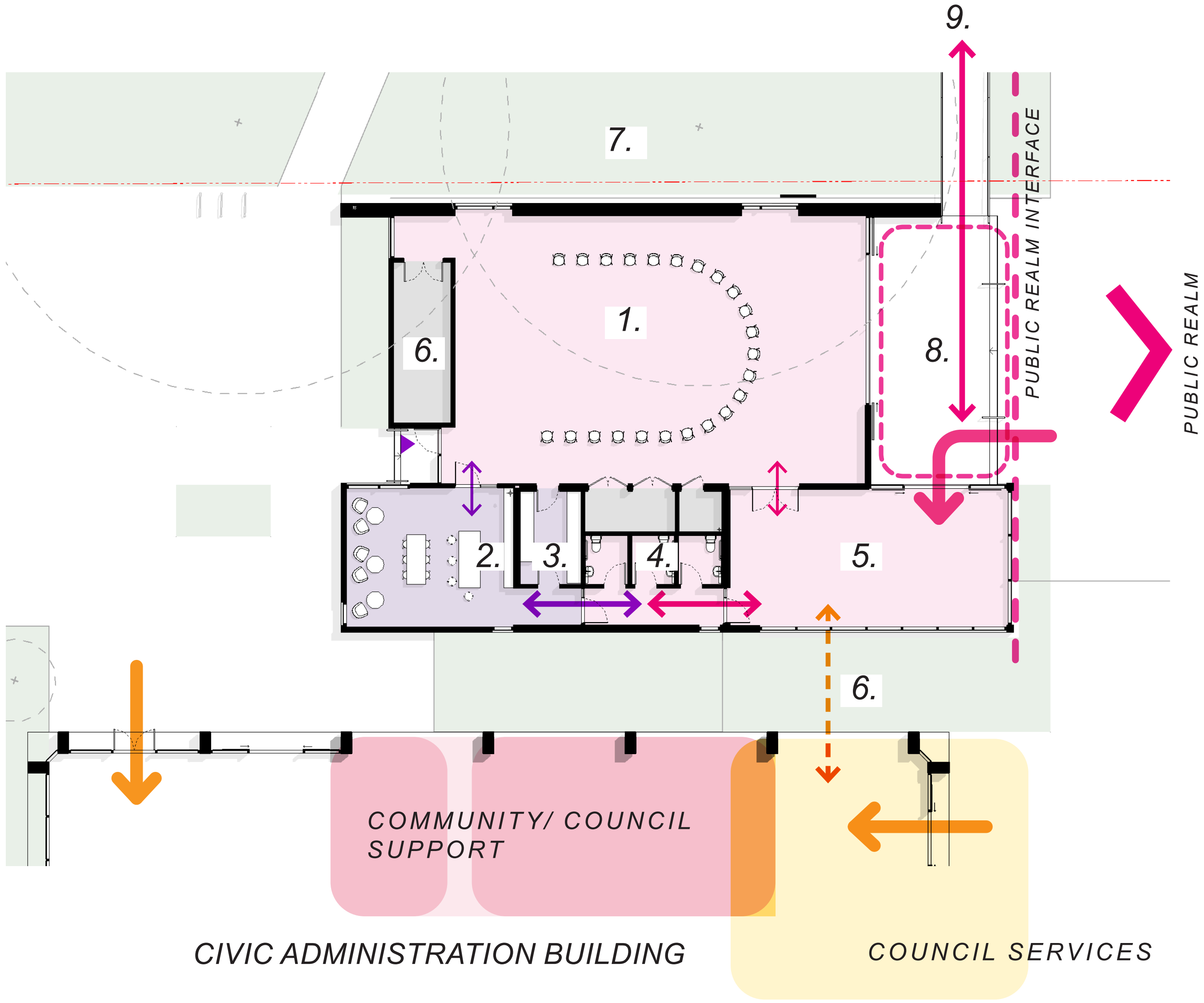

Fig 74.*Civic Chambers floor plan during a community event (no council event scheduled).*

FLOOR PLAN KEY:

Accessible to Library/ Community (no council event scheduled)
Controlled access for Council Events
Council Services

1. *Civic Chambers (controlled access)*
2. *Councillors Lounge (controlled access)*
3. *Kitchen (controlled access)*
4. *Utilities (controlled lobby)*
5. *Foyer*
6. *Potential Foyer Extension to Civic Administration Building*
7. *Landscape buffer (for visual outlook/ privacy)*
8. *Entry deck/ threshold from the public realm. Ability to screen during an event.*
9. *Ramp access from Station Street*

Civic Chambers Plan

This top left plan shows the distribution of the programme on the ground floor when the Chambers is being used by Council. The anticipated interface with, and integration of, the ground floor of Civic Administration Building is also indicated.

The top right plan shows the distribution of the programme on the ground floor when the Chambers is being used as a Community Room by the general public and / or the library.

3.0 PRELIMINARY DESIGN
CIVIC CHAMBERS SECTIONS

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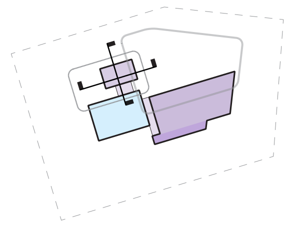
KEY PLAN

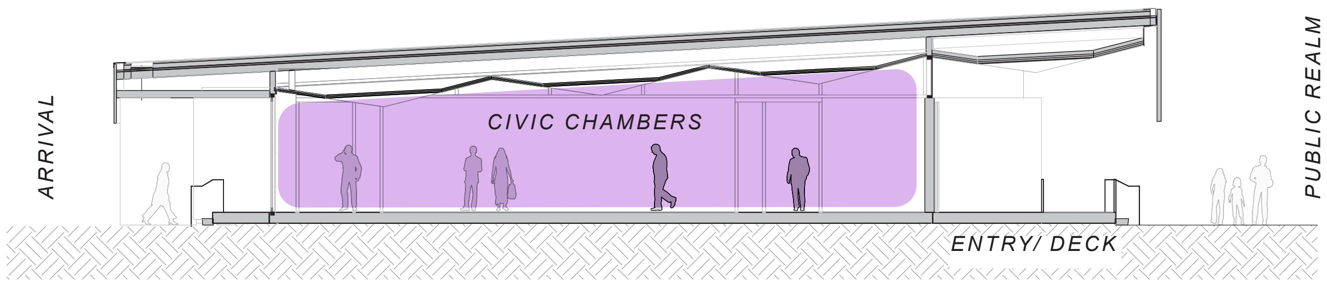

Fig 75. Long section through the Chambers (looking north) with Dalton Street to the far left and the public realm to the right.

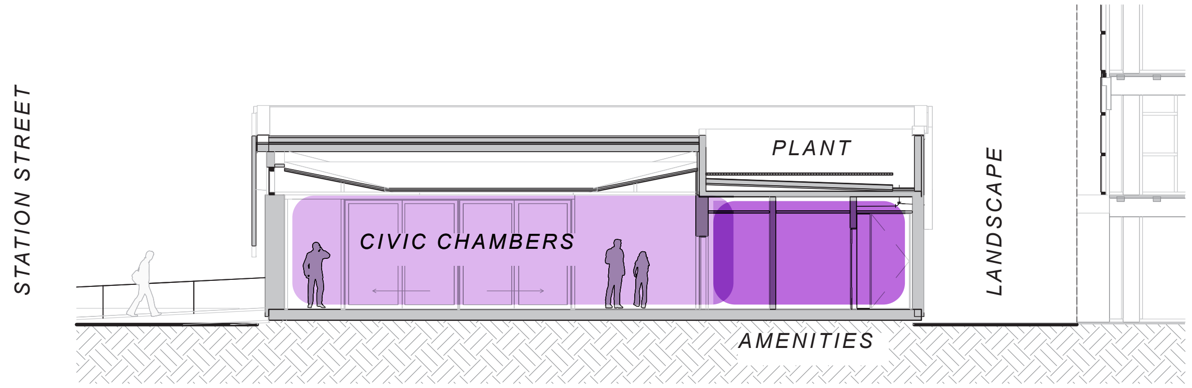

Fig 77. Cross section through the Chambers (looking east) with Station Street to the left and the Civic Administration Building to the right

Fig 76. 'Look and Feel' precedent images of the anticipated Chambers interior.

3.0 PRELIMINARY DESIGN
CIVIC CHAMBERS ELEVATIONS

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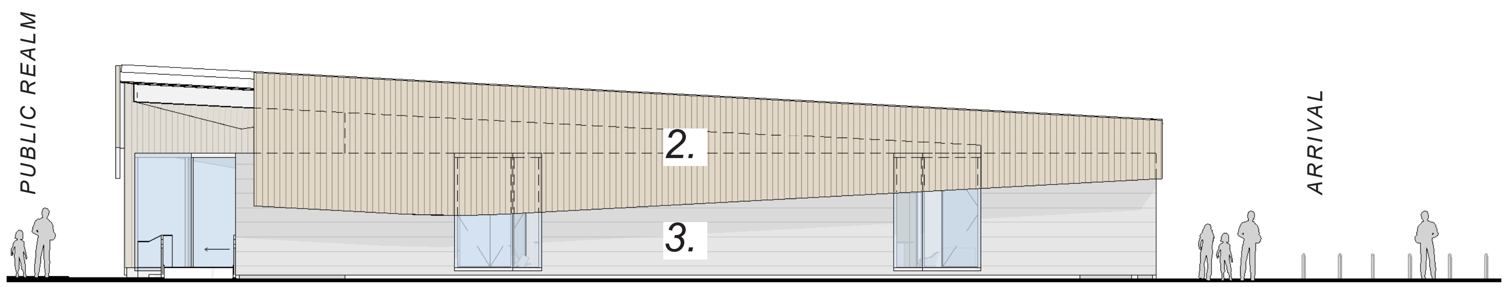

Fig 79. *North Elevation of the Chambers*

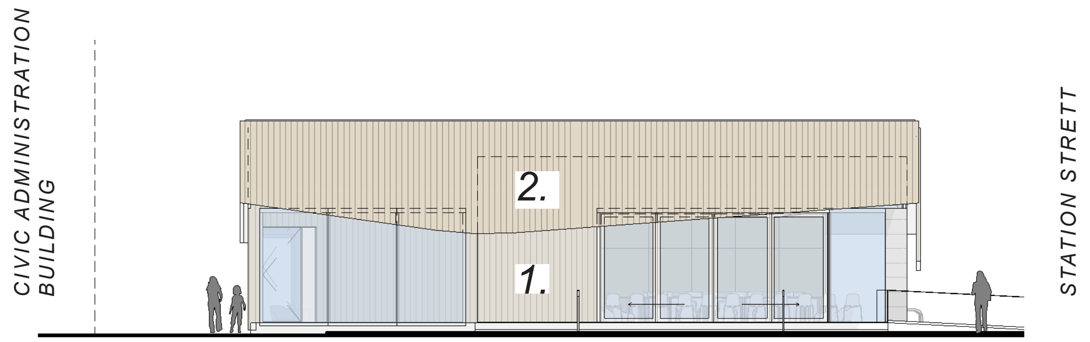

Fig 81. *East Elevation of the Chambers*

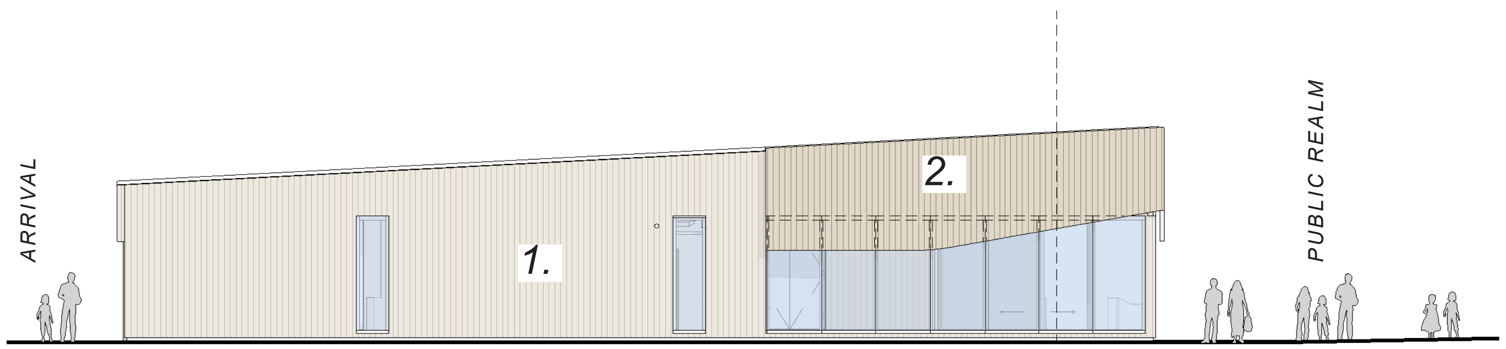

Fig 80. *South Elevation of the Chambers*

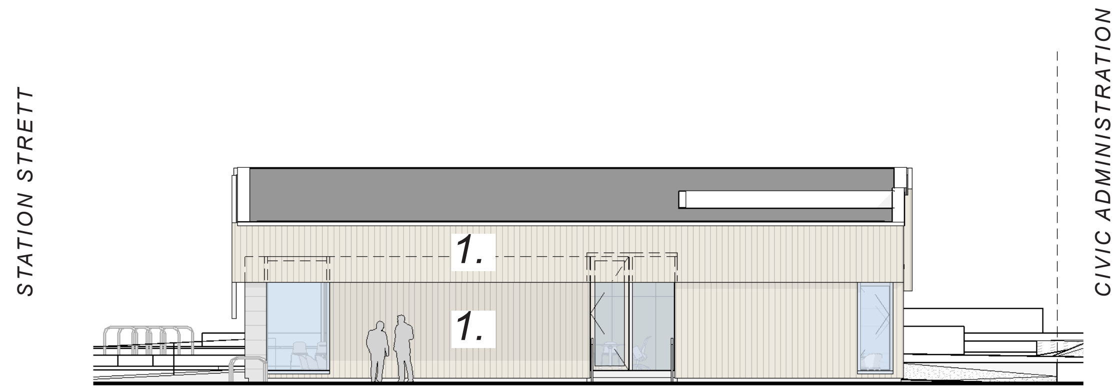

Fig 82. *West Elevation of the Chambers*

1. TIMBER

2. TIMBER SCREEN

3. RAMMED EARTH VENEER

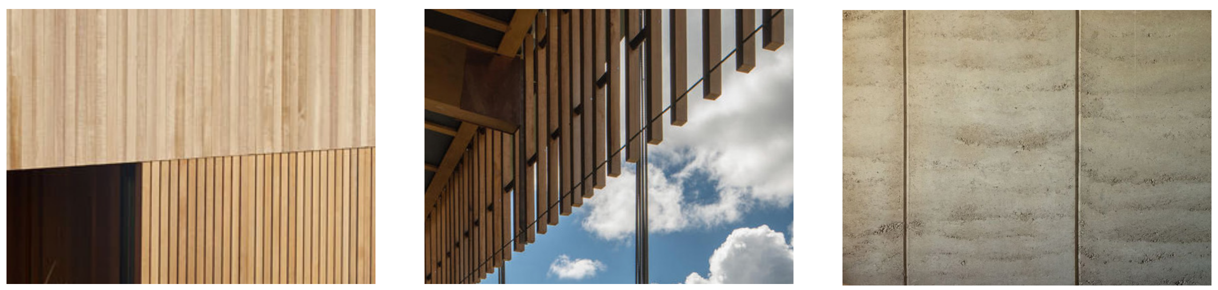

Fig 78. *'Look and Feel' precedent images of the anticipated facade materials.*

3.0 PRELIMINARY DESIGN
CIVIC CHAMBERS INTERIOR VIEWS

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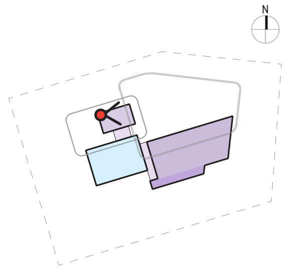
19th January 2024

architects limited athfield architects limited athfield with Israel Birch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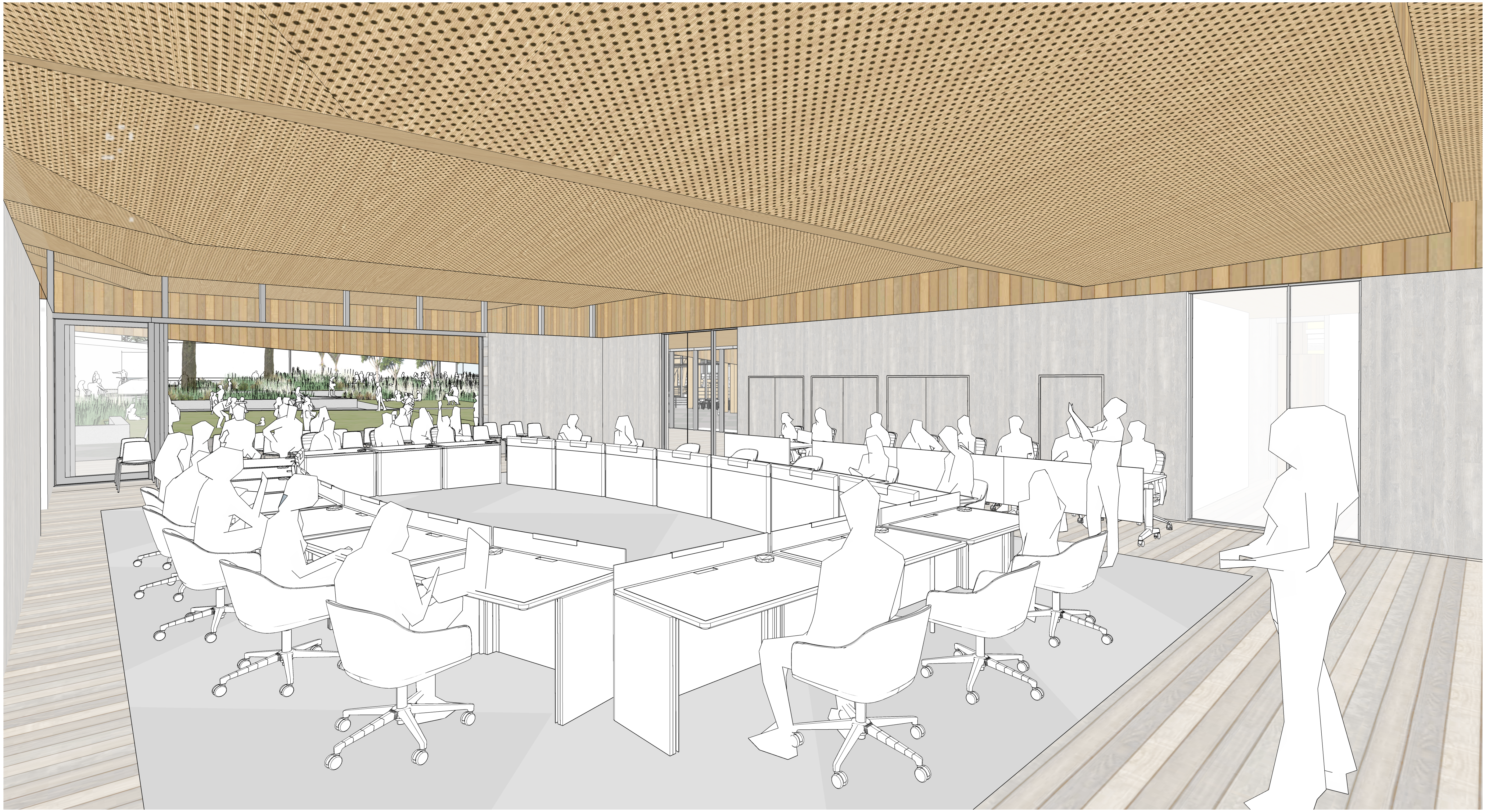

Fig 83. *Indicative view of the Civic Chambers during a Council Event (looking east at the Public Realm beyond). Note: Screen to the Public Realm (for events requiring privacy) not currently shown.*

3.0 PRELIMINARY DESIGN
CIVIC CHAMBERS INTERIOR VIEWS

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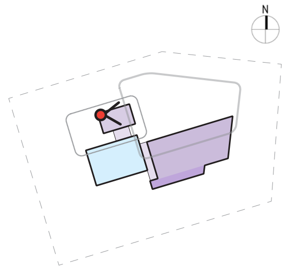
architects limited athfield architects limited athfield
with Israel Birch



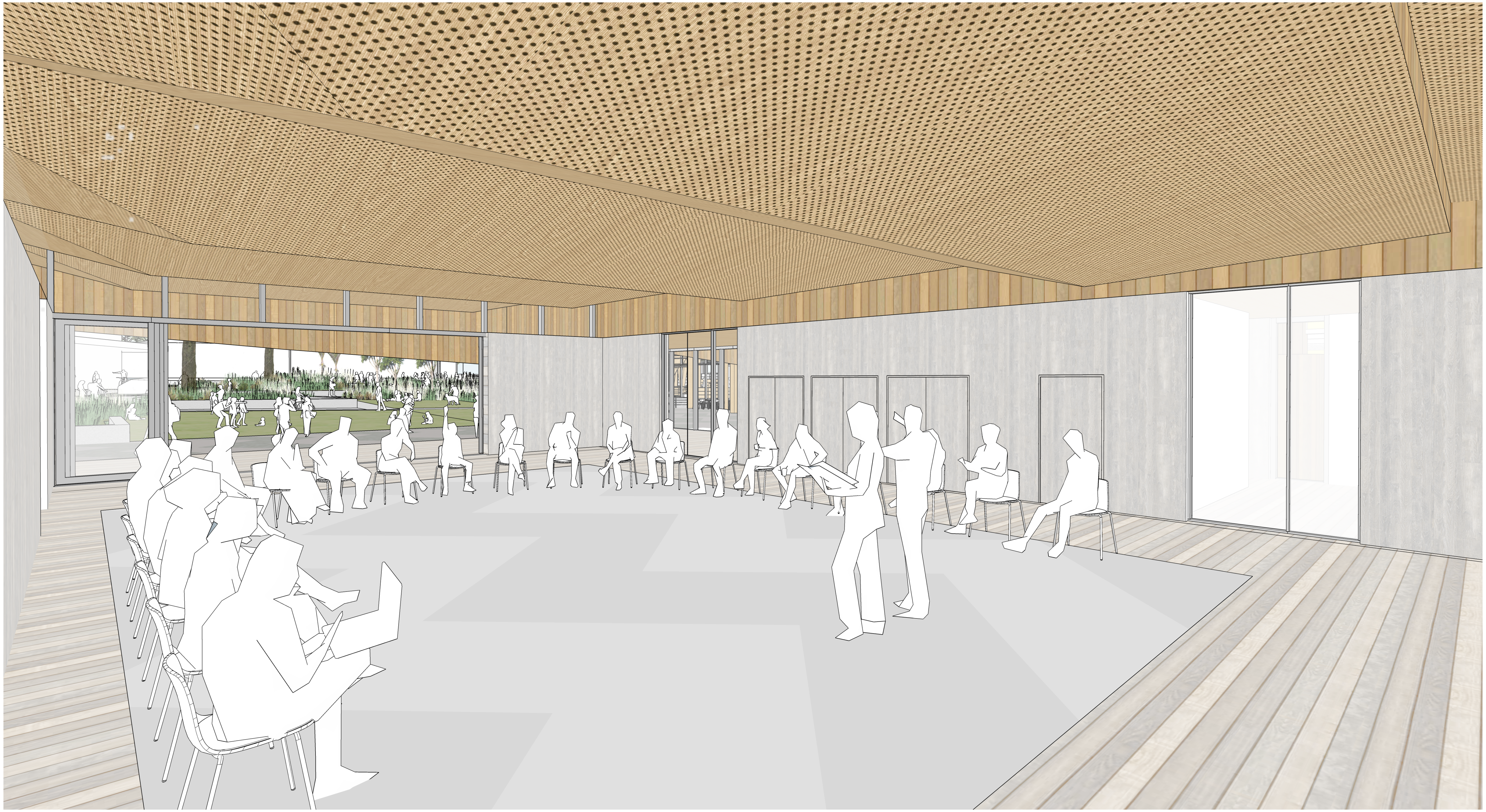


Fig 84. *Indicative view of the Civic Chambers during a Community Event (looking east at the Public Realm beyond). Note: Furniture selection/ layout is indicative.*

3.0 PRELIMINARY DESIGN
CIVIC CHAMBERS EXTERIOR VIEW

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Preliminary Design Report
Version 1
19th January 2024

Bofia Miskell · Beca · Dunning Thornton consultants · athfield architects limited with Israel Birch

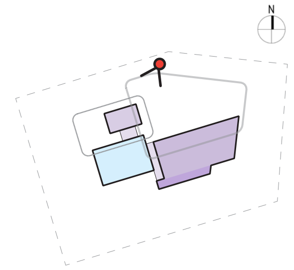
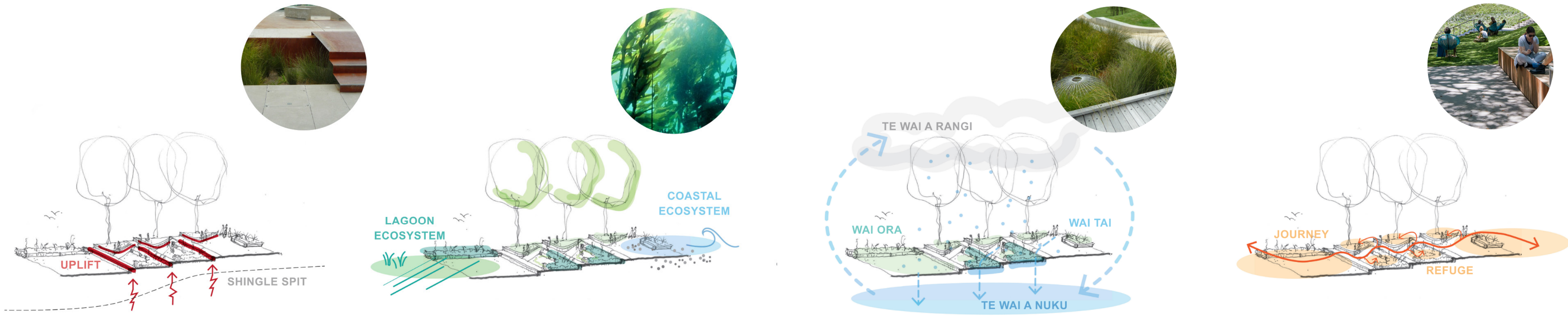


Fig 85. *View of the Chambers exterior from Station Street (looking south-west). Note the CAB (existing Library Tower) is out of scope. Indicative future design shown.*

3.0 PRELIMINARY DESIGN
PUBLIC REALM KEY MOVES



RŪAUMOKO
Reveal the story earthquake uplift, Rūaumoko as the creator of land. Expression of natural topography - the change in level across the site as it transitions down from the shingle spit.

TE NGĀHERE O TANGAROA
Express the forest of Tangaroa, the raised sea floor. The variation in ecosystems influenced by the environment - from the coastal edge, rough and exposed with salt laden winds, to the sheltered, protected Te Whanganui-o-Orotū.

WAI
Protect and cleanse water, make visible the water cycle. Express the different forms, the interconnection between land, sea and sky.
Te Wai-a-Rangi and Te Wai-a-Nuku.
Wai-tai - the saline environment of the ocean.
Wai-ora - the living water of Te Whanganui-o-Orotū that supports abundant life.

TE AKA
A journey of learning - a landscape that encourages discovery, exploration - embedded with meaning.
Pockets of space that enrcourage people to spend time, kōrero, wānanga, to meet, connect and share stories.

Fig 86. *A series of landscape design sketches describing the key moves that inform the Public Realm. Refer to the landscape Preliminary Design report for further details.*

3.0 PRELIMINARY DESIGN
LANDSCAPE PLAN

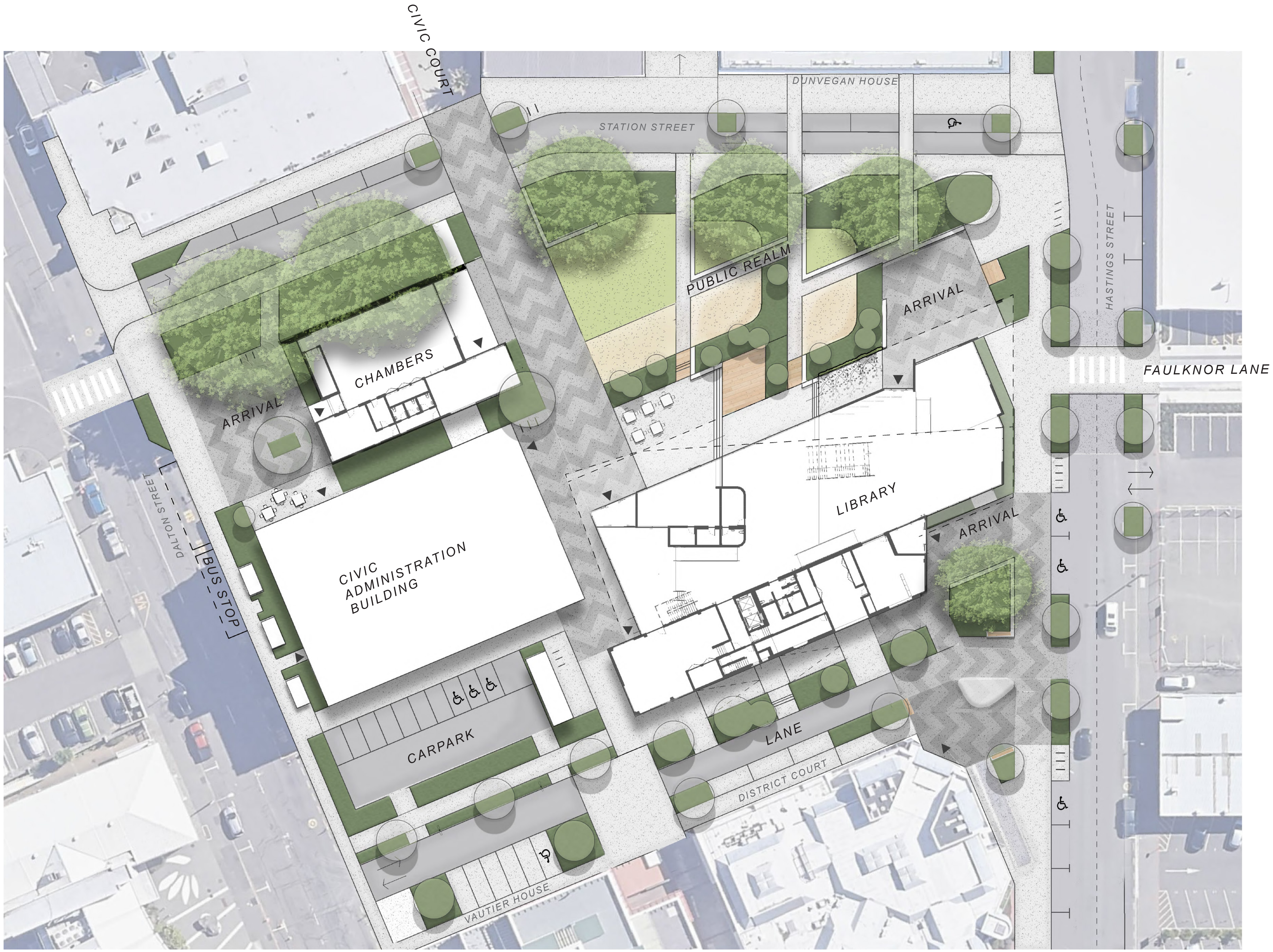


***Fig 87. Proposed Landscape Plan**. Refer to the Landscape Preliminary Design report for further details/ attributes.*

3.0 PRELIMINARY DESIGN
ACCESSIBILITY & SERVICING

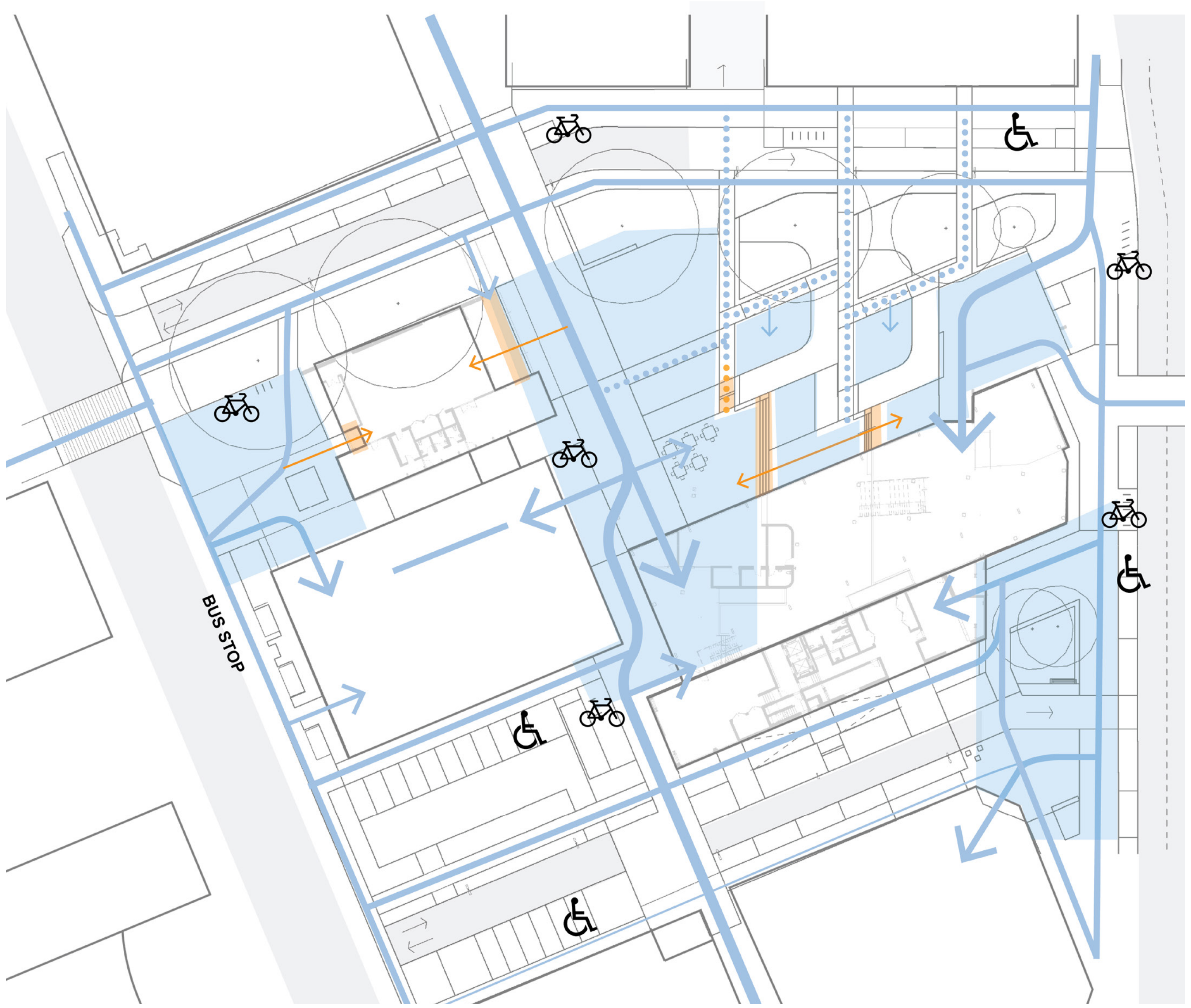


Fig 88. **Accessiblity Strategy Diagram**. *Refer to the Landscape Preliminary Design report for further details.*

KEY

- Main arrival spaces
- Path without steps
- Steps
- Accessible car parks
- Cycle parking

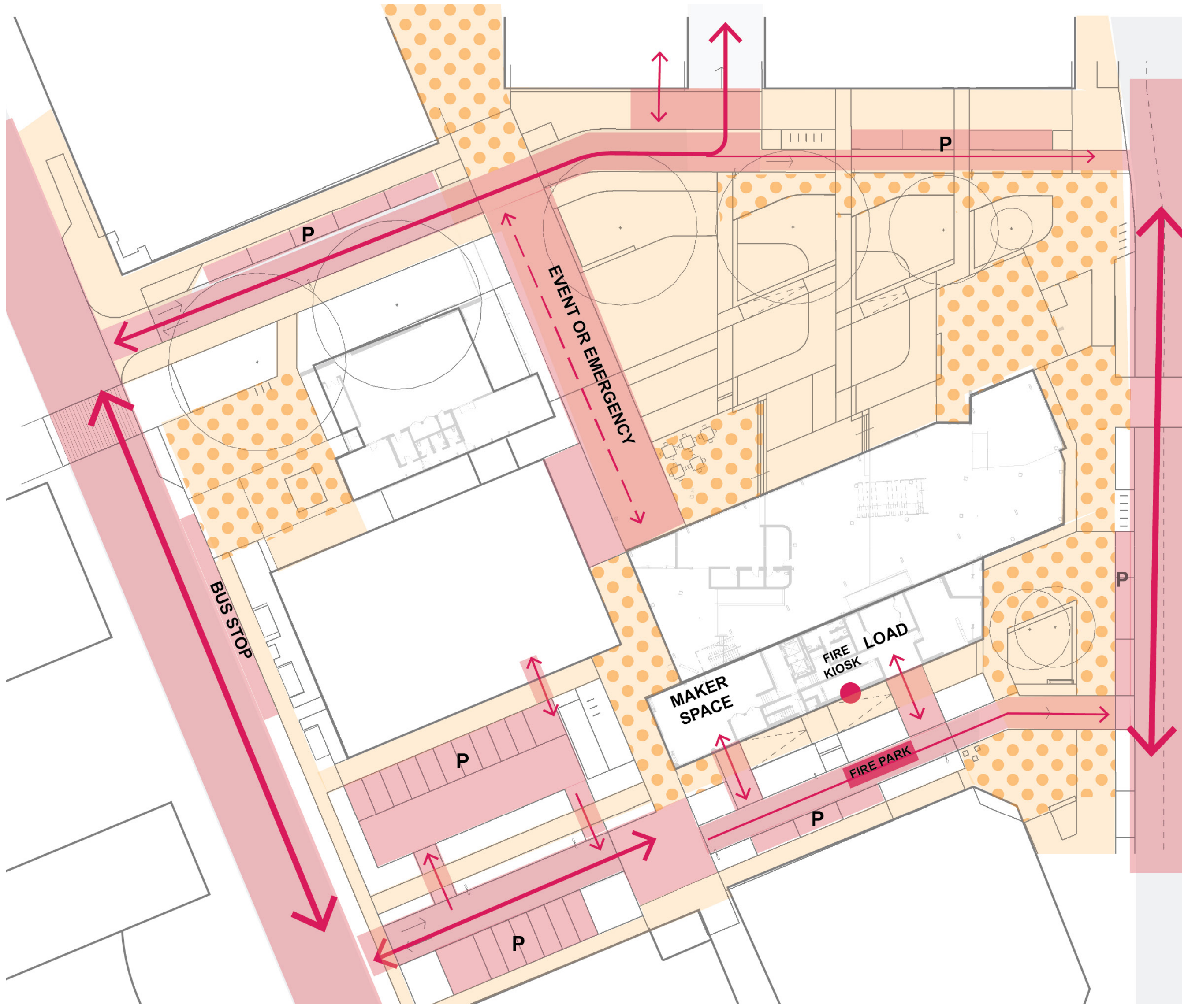


Fig 89. **Vehicle Access/ Circulation Strategy Diagram**. *Refer to the Landscape Preliminary Design report for further details.*

KEY

- Vehicle Access
- Occassional Light Vehicle Access
- Pedestrian Space
- Direction of Travel

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Athfield Architects Limited
January 2024

MARSHALL DAY Acoustics

TE AKA
PRELIMINARY DESIGN

Rp 001 20230998 | 17 January 2024

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Attention:

Report No.: **Rp 001 20230998**

Document control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Approved	-	-	17/01/2024	Shaun King	Javier Sanz

TABLE OF CONTENTS

1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged by Napier City Council to provide acoustic design advice for the Te Aka library project. It is located in central Napier at 231 Hastings Street.

The projects consist of a 2-level library building with a café, collection areas, community spaces, meeting rooms and back of house spaces. The project also includes a separate Civic Chambers building with a council chamber and lounge.

In this report, we detail our proposed acoustic design criteria, highlight important acoustical design elements and provide advice to enable compliance with the design criteria where necessary. Our report is based on the 100% preliminary design documentation..

Appendix A explains acoustic terminology used throughout this report.

2.0 PRIMARY ACOUSTIC CONSIDERATIONS

There are several key acoustic aspects which are important for achieving successful acoustic outcomes. These aspects are as follows:

- *Sound insulation design*

  It is important that sufficient levels of airborne and impact sound insulation are achieved between adjacent enclosed spaces in order to prevent disturbance and privacy.

  Adequate external sound insulation is also important to control noise ingress into sensitive spaces.

- *Reverberation control*

  Absorptive finishes are needed to reduce reverberation within rooms, which improves comfort and reduces noise build-up. This is important because noise build-up in active areas can impede communication. The ability to interpret speech with people can be affected in noisy environments.

- *Mechanical services noise design*

  It is important that background noise levels generated by mechanical services are not too high or too low. Background noise levels that are too high can be disturbing, effect concentration, speech intelligibility and sleep quality. Background noise levels that are too low will reduce the acoustic privacy between spaces making it easier to hear adjacent activities.

3.0 DESIGN CRITERIA

The acoustic design criteria and our recommendations for library and civic buildings are discussed in this section. In addition, the project is aiming to achieve Green Star accreditation. The project is targeting all three acoustic points in the Green Star – Design & As Built NZ tool v1.1.

One point is available for each of the following:

10.1 Internal Noise Levels

10.2 Reverberation

10.3 Acoustic Separation

These are discussed in further detail below.

3.1 Internal noise levels

The Green Star rating tool 10.1 states the following;

One (1) point is awarded where project teams demonstrate that internal ambient noise levels in the nominated areas are no more than 5 dB(A) above the lower figure in the range recommended in Table 1 of AS/NZS 2107:2016.

The noise measurement and documentation must be provided by a qualified acoustic consultant and in accordance with AS/NZS 2107:2016. Noise measurement must account for all internal and external noise including noise arising from building services equipment, noise emission from outdoor sources such as traffic, and (where known) noise from industrial process. Occupancy noise is excluded.

The relevant mechanical services noise criteria from AS/NZS 2107 are provided in Table 1.

3.2 Reverberation

The Green Star rating tool 10.2 states the following;

One (1) point is awarded where the reverberation time in the nominated area is below the maximum stated in the 'Recommended Reverberation Time' provided in Table 1 of AS/NZS 2107:2016.

The relevant reverberation time criteria from AS/NZS 2107 are provided in Table 1.

3.3 Internal sound insulation

The Green Star rating tool 10.3 has three ways (10.3A, B & C) to achieve the one point. We recommend that the project adopt 10.3A.

The partition between the spaces should be constructed to achieve a weighted sound reduction index (R_w) of:

- *At least 45; for all partitions which are;*
  - *Fixed without a door; and/or*
  - *Glazed Partitions without a door**
- *At least 40, for all partitions fronting a room (from an open plan area);*
- *At least 35 (in composite with a door and partition) for all partition types that contain a door; and*
- *At least 50 through floors between occupied spaces.*

** The acoustic consultant can use their discretion to determine whether an R_w of 35 or 45 is more applicable when using glazed partitions. The selected Weighted Sound Reduction index must be justified in terms of adjoining space use, required level of noise sensitivity between spaces and any other aspects which would help to achieve acoustic separation.*

In New Zealand it is common to use ASTM terminology (STC and IIC) when discussing internal sound insulation. However, the Green Star tool uses ISO terminology (R_w and $L_{n,w}$). These descriptors are generally equivalent. For simplicity, we have mostly adopted ASTM (STC and IIC) terminology throughout this report.

3.3.1 STC & IIC ratings

Our recommended STC ratings are provided in mark-ups in Section 6.4.2. An on-site relaxation of 5 decibels should be allowed.

Wall constructions are discussed in Section Section 6.2.

The Green Star tool doesn't provide an impact noise criterion for floors. We recommend that the floor design targets IIC 50.

3.4 Rain noise

We recommend that rain noise in the library building not exceed 50 dB L_{Aeq}. In the chambers building (assuming the building has a speech amplification system) we recommend that rain noise not exceed 45 dB L_{Aeq}.

The rain noise levels are based on a rainfall rate of 25 mm/h. This rainfall rate occurs for an average of 5 min per month in Napier.

3.5 Environmental noise emissions

The site is zoned Fringe Commercial in the Napier Operative District Plan. The properties to the east, west and south are also zoned Fringe Commercial. The properties to the north are zoned Inner City Commercial.

Rule 17.17.a of the Napier Operative District Plan sets out the following noise limits.

0700 to 2200 hours 60 dB L_{Aeq}

2200 to 0700 hours 50 dB L_{Aeq} and 80 dB L_{AFmax}

The noise limits above apply at any point beyond the site boundary.

In the Napier Proposed District Plan the site is zoned City Centre. The proposed plan has identical noise limits to the operative plan.

3.6 Façade sound insulation

The operative (Rule 17.17.d) and proposed (Noise-R9A) district plans have façade sound insulation requirements (approximately 30 dB across the façade).

The façade sound insulation requirements apply to 'noise sensitive activities'. The wording from the proposed district plan is as follows:

> *Any use of land and/or buildings which is likely to be susceptible to the effects of noise emitted from nearby land uses in the course of their legitimate operation and functioning; and for the purposes of this plan, includes day care centres, education facilities (but not any trade training or other industry-related educational facility), health care centres, hospitality activities, office accommodation, places of assembly, residential activities, retirement complexes, travellers' accommodation, and camping grounds.*

It is unclear if a library would be considered by Council a 'noise sensitive activity', but we suggest that it is likely.

To comply with these rules, it will not be possible to use mixed mode ventilation. However, we consider there to be a good argument for not complying with this Rule.

This is a **significant risk** to the projects ventilation strategy and should be considered in early in the next design phase.

Table 1: Acoustic Design Criteria

Space	AS/NZS 2107 Space	Internal Noise Level dB L_{Aeq}	Reverberation Time Seconds
Café	Restaurants and cafeterias – coffee shops	40 – 45	< 1.0
Collection	Libraries – Reading areas	40 – 45	0.4 – 0.6
Council chambers	Council chambers – without speech amplification Council chamber – with speech amplification	30 – 35 35 – 40	< 0.9
Community Innovation	Libraries – Workshop areas	45 – 50	0.4 – 0.6
Workroom	Libraries – Workshop areas	45 – 50	0.4 – 0.6
Study	Office buildings – Meeting room	45 – 50	< 0.6
Meet	Office buildings – Meeting room	45 – 50	< 0.6
Outreach	Office buildings – Meeting room	45 – 50	< 0.6
Staff	Libraries - Administrative office spaces	40 – 45	0.6 – 0.8
Break & Councilors Lounge	Office buildings – Cafeterias	45 – 50	< 1.0
WC's and Parent	Office buildings – Toilets	45 – 50	n/a

4.0 SURROUNDING NOISE ENVIRONMENT

Due to our engagement late in preliminary design we haven't had a chance to visit site. We will do this early in developed design.

We expect that noise levels on-site will be moderate and controlled by traffic along Hastings Street.

5.0 FAÇADE CONSTRUCTION

5.1 External noise ingress

We understand that mixed mode ventilation is proposed. When in natural ventilation mode the openings in the façade will control the external sound insulation performance.

The typical level of façade sound insulation will be 10 -15 decibels. Therefore, to achieve a noise level of 45 dB L_{Aeq} or less in the collection areas, the external noise level will need to be no more than 55 – 60 dB L_{Aeq}.

We will confirm if compliance with the Green Star criteria (point 10.1) in natural ventilation mode is possible during develop design.

5.2 Roof / rain noise

The proposed library roof is Rooflogic Ultratherm Extreme Fibretite warm roof system with 10mm RL roofboard HD over 120mm PIR insulation on 210mm CLT. This system will readily achieve the rain noise criterion.

The proposed chambers roof is Rooflogic Ultratherm MSR warm roof system with the acoustic board. The ceiling is perforated Decortech panel. This system is predicted to exceed the rain noise criterion. We recommend allowing for two layers of the acoustic board within the roof build-up and Autex AAB 48-50 backing on the Decortech panels.

6.0 INTERNAL SOUND INSULATION

6.1 Floor/ceiling

The level 1 floor is a mixture of 294mm thick CLT and 150mm Comflor80. Both systems achieve STC 50, but to achieve IIC 50 consideration to floor finishes and ceilings will be needed.

The level 1 floor finishes include carpet tiles, rubber and timber flooring. There is limited test data available for these products on a CLT structure. We recommend allowing for a high quality underlay.

The ground floor ceiling is a combination of the following

- Feature timber shiplap ceiling (C01)
- Decortech perforated timber panels (C02)
- 2 layers of 25mm Quietspace with a Vertiface facing on 50mm timber battens on plasterboard (C03)

To ensure suitable impact sound insulation, we recommend that the backing on the Decortech panels and timber ceiling be Autex AAB 48-50 or equivalent (see Section 7.1). We note that there is an area of exposed CLT on the ground floor between gridlines 4 and 5. Airborne and impact sound insulation performance in this zone will be lower. We consider this acceptable as it is a circulation space and near the open stair void on gridline C.

6.2 Walls

Our recommended STC ratings are shown in the mark-ups in Section 6.2.4. Our recommended wall constructions are provided in Tables 2 – 4. The STC ratings are round values based on typical wall constructions and materials. The STC ratings of specific wall systems may therefore vary slightly from those listed below.

6.2.1 Wall heights

We recommend that all acoustically rated walls are constructed full height. For the Meet and Study spaces on Level 1 a 'lid' construction would be a suitable alternative to full height walls. We recommend that the lid be constructed as follows:

- 2x13mm high-density plasterboard or 2x17mm Plywood
- Minimum 90mm ceiling cavity with fibrous insulation blanket
- Perforated plasterboard ceiling

Table 2: STC 40 Wall Construction Options

Lining[2]	Studwork + Cavity Absorption[1]	Lining[2]
Timber Stud		
2x13 mm standard plasterboard	90 mm timber stud	1x13 mm standard plasterboard
1x13 mm high-density plasterboard	90 mm timber stud	1x13 mm high-density plasterboard
Glazing (STC 38)		
10.76 mm Acoustic Laminate	(single glazing)	

1 All constructions to have absorptive blanket within the cavity (fibreglass or polyester)

2 Refer to Appendix B for range of suitable plasterboard products

Table 3:STC 45 Wall Construction Options

Lining[2]	Studwork + Cavity Absorption[1]	Lining[2]
Timber Stud		
2x13 mm high-density plasterboard	90 mm timber stud	1x13 mm high-density plasterboard
2x13 mm standard plasterboard	90 mm timber stud	2x13 mm standard plasterboard
1x13 mm standard plasterboard	Double timber studs forming a minimum 205 mm cavity with a minimum 25 mm gap between	1x13 mm standard plasterboard
Glazing (STC 45)		
8.38mm laminated glass	50mm airspace	8.38mm laminated glass

1 All constructions to have minimum 90 mm thick absorptive blanket within the cavity (fibreglass or polyester)

2 Refer to Appendix B for range of suitable plasterboard products

Table 4: STC 50 Wall Construction Options

Lining[2]	Studwork + Cavity Absorption[1]	Lining[2]
Timber Stud		
2x13 mm high-density plasterboard	90 mm timber stud	2x13 mm high-density plasterboard
1x13 mm standard plasterboard	Double timber studs forming a minimum 205 mm cavity with a minimum 25 mm gap between	1x13 mm standard plasterboard

1 All constructions to have minimum 90 mm thick absorptive blanket within the cavity (fibreglass or polyester)

2 Refer to Appendix B for range of suitable plasterboard products

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6.2.2 Electrical fittings

Back to back electrical fittings are not recommended in walls ≥ STC 45. We recommend one of the following:

- Install boxes on opposite sides of the wall a minimum of 550mm apart (centre to centre) and the cavity must have an absorptive blanket.
- Ensure that there is a stud between boxes on opposites sides of the wall and both sides of the cavity must be acoustically lined.

Figure 1: Acceptable placement of power or GPO boxes

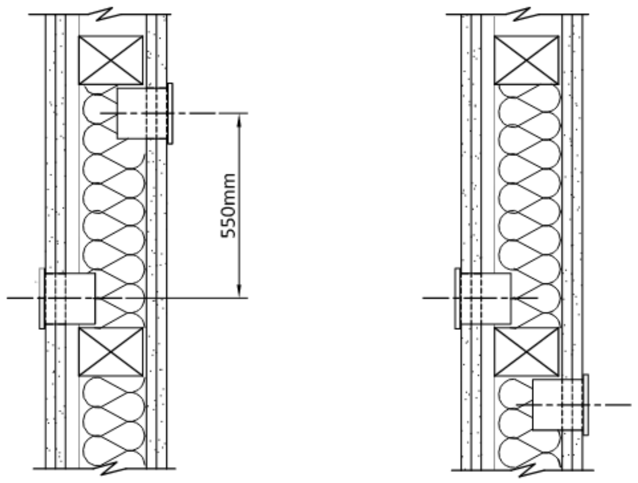
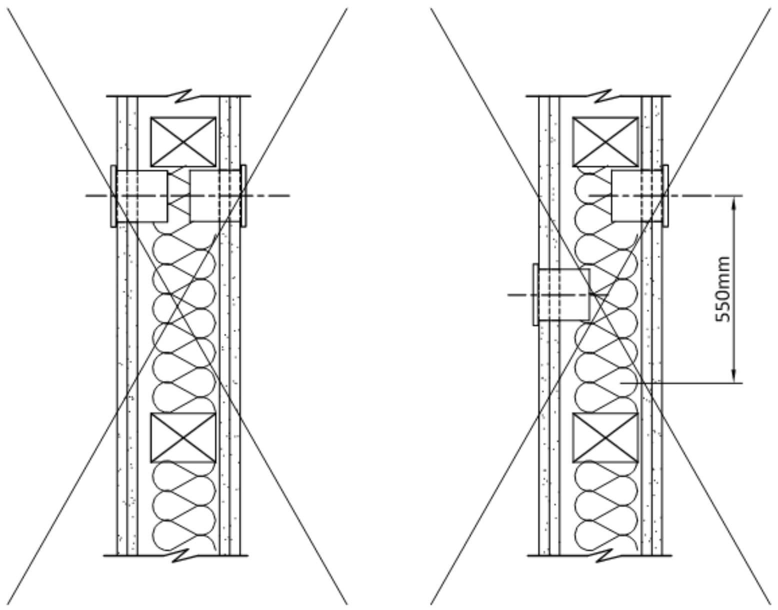


Figure 2: Unacceptable placement of power or GPO boxes



6.2.3 Studwork spacing in single stud walls

Studwork spacing of minimum 600 mm centres are required to achieve the noted acoustic performance. Smaller stud spacings will significantly reduce the sound insulation performance. If stud centres below 600mm is required, the following options should be explored to retain desired acoustic ratings.

1. Double up studs (i.e. 90x45x2) and keep 600mm centre spacing, or
2. Use a Rondo 310 or 45x45mm timber batten at 600mm vertical spacing on one side of the wall, or
3. Use larger stud sizes (e.g. 140mm) if this enables 600mm centre stud spacing

6.2.4 STC mark-ups

Figure 3: Cambers building STC ratings

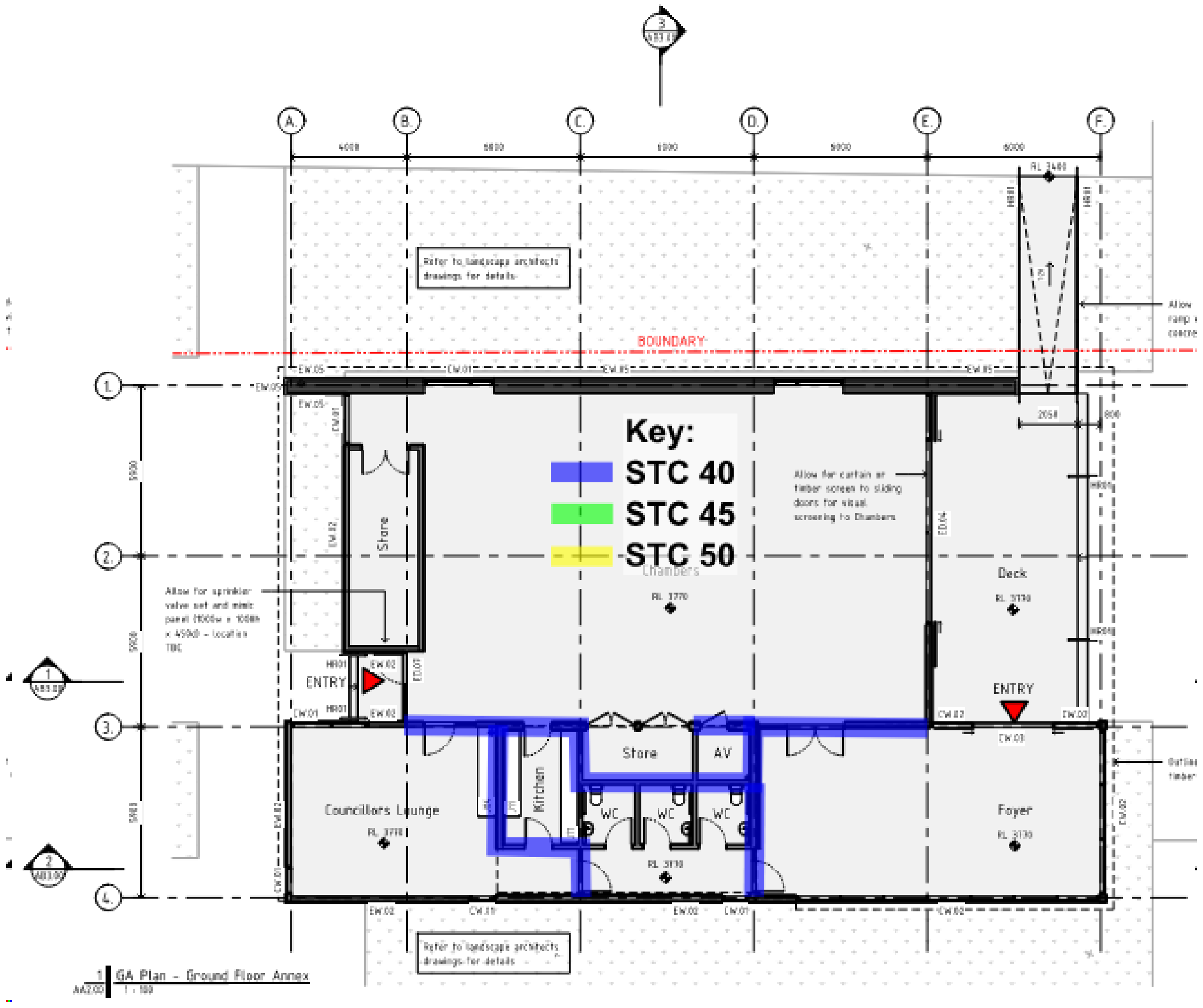


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Figure 4: Library ground floor STC ratings

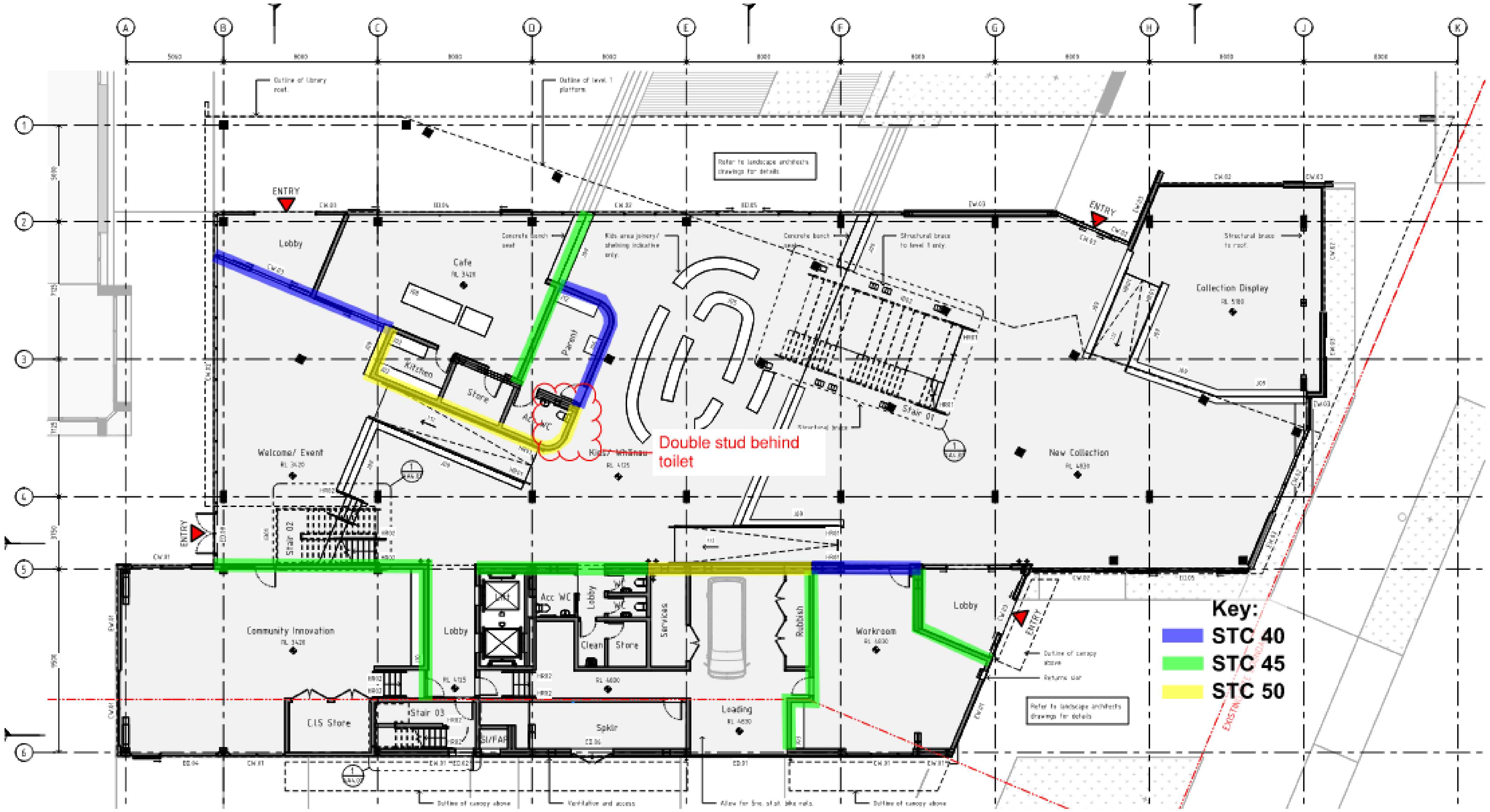
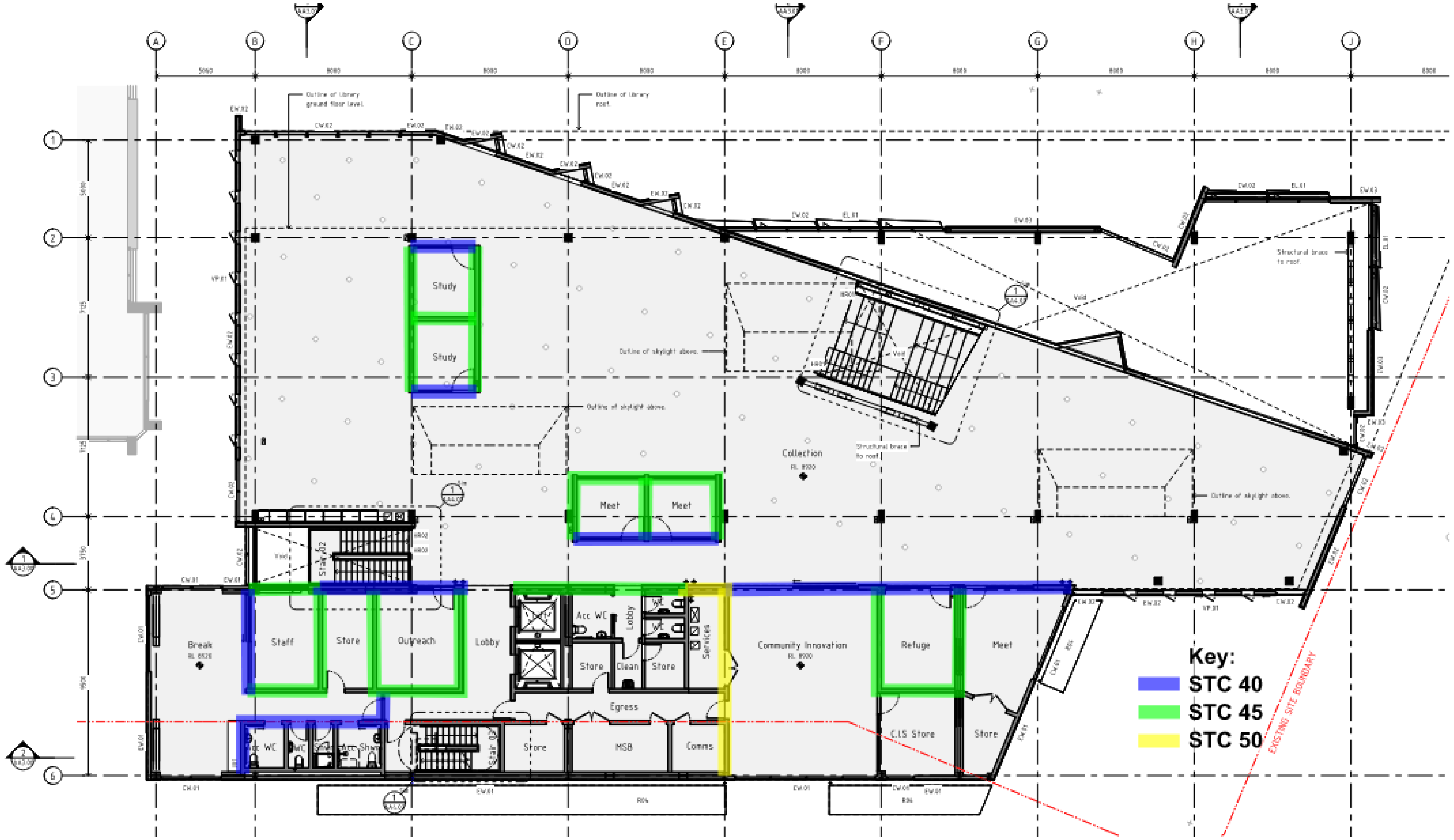


Figure 5: Library level 1 STC ratings



6.3 Doors

Generally, we recommend a minimum STC 30 rating for all doors in acoustic partitions. A STC 30 door is:

- Solid core construction
  - minimum 24 kg/m^2 (timber, MDF, etc.), or
  - 10.38 mm laminate glass
- With compression seals to the head, threshold and jambs

Higher performance doors STC 40+ may be required to some plantrooms depending on equipment selections.

Ventilation grilles (for mechanical services) in doors undermines the sound insulation performance of the door. So acoustically rated doors (STC 30+) cannot have grilles.

Frameless glass doors do not seal and lead to acoustic issues. We recommend that these are avoided.

Table 5 summarises our recommended seals. We have divided our recommendations into typical and high quality. Our “high quality” systems have fully adjustable seals which for greater flexibility on site. The “typical” systems are not adjustable so rely on correct installation.

The location of doors is also important to preserve sound insulation. We recommend that you locate doors as far away as possible (Figure 6).In the left diagram of Figure 6 the doors are close together, leading to sound transfer between rooms. We recommend that you separate doors like either the centre or right arrangement. This occurs on the level 1 between the meet spaces (Figure 7).

Figure 6: Door Arrangements

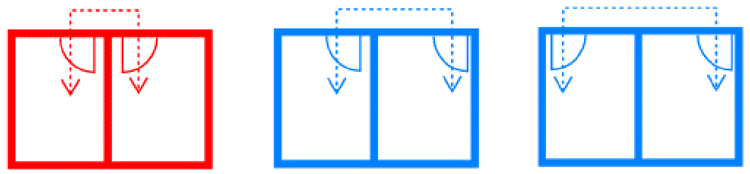


Figure 7: Meet rooms doors that we recommend be separated

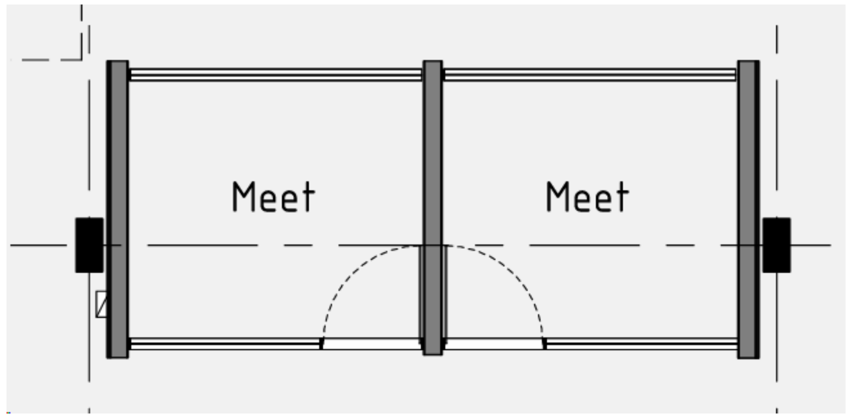


Table 5: Door Seals

	Head and Jambs seals	Threshold Seals	Meeting Stile Seals (double leaf doors)	
High Quality	Kilargo IS7095si Raven RP24	Kilargo IS8020si Raven RP38, RP70 Lorient LA S8006 si, LAS8007 si, or LAS8009 si	Rebated	Kilargo IS7071si (double row) or IS7060si Raven RP71Si (double row) or RP16Si
			Magnetic	Kilargo IS6020 Raven RP65
Typical	Kilargo IS1212, or IS1515 Lorient LA S1212, or LA S1515 Raven RP10, RP47si, RP120 or RP150 Schlegel Aquamac AQ 21, AQ 124, or AQ 836	Kilargo IS8020si Raven RP38, RP70 Lorient LA S8006 si, LAS8007 si, or LAS8009 si	Butted	Kilargo IS7071si (double row) or IS7060si Lorient LA S7004 si Raven RP71Si (double row) or RP16Si

Table 6: Sliding Door Seals

Head and Jambs seals	Threshold Seals	Meeting Stile Seals	
2 lines of fin seals or brush seals incorporating a silicone or rubber fin Raven RP73	Kilargo IS3022si Raven RP129si 2 lines of Kilargo IS3080si 2 lines of Raven RP51F, RP17 B. RP56, or RP71Si	Magnetic	Kilargo IS6020 Raven RP65
		Friction	Kilargo IS7071si (double row) Raven RP73 or RP71Si (double row)

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6.4 Junctions and penetrations

6.4.1 Sealant

All partitioning junctions should be well sealed to the abutting structure with a non-hardening flexible sealant. An approved sealant list is contained in Appendix C.

6.4.2 Sealing penetrations

All penetrations through building elements with an STC rating must not degrade the acoustic performance.

All pipe and duct penetrations through floors, walls, ceilings and roofs must be treated so that there is no direct physical connection between the pipes or ducts and the surrounding structure.

Penetrations shall be oversized to allow a small amount of movement, and the surrounding gap between the service and the structure sealed airtight with an approved flexible, non-setting sealant. Table 7 provides methods of sealing depending on the wall type and clearance between the penetration and service.

Where foam backing rods are used they shall be closed cell polyethylene suitable for use as a backing rod for non-setting sealant. Refer Appendix D for acoustic penetration details.

Table 7: Sealing penetrations

Penetration clearance	Wall type	Method of sealing
< 5 mm	Masonry or framed plasterboard	Seal completely across gap with non-setting sealant
5 mm – 10 mm	Masonry	Place a foam backing rod in gap between wall and service and seal across gap up to rod with non-setting sealant
	Framed plasterboard	Reduce the gap to 5 mm using a 20 mm thick timber beading strip and seal the remaining 5 mm gap using a non-setting sealant (the timber beading strip should be sealed to the wall either by gluing or smearing a bead of sealant before nailing)
10 mm – 20 mm	Masonry	Pack gap between service and penetration tightly with thermal grade fibreglass and fit a 20 mm thick timber beading strip leaving a 5 mm gap to be sealed with a non-setting sealant
	Framed plasterboard	Reduce the gap to 5 mm using a 20 mm thick timber beading strip and seal this remaining gap using a non-setting sealant (the timber beading strip should be sealed to the wall either by gluing or laying a bead of sealant before fixing)
> 20 mm	Masonry (flexibility required)	Grout penetration to within 20 mm of service, pack remaining gap tightly with thermal grade fibreglass and fit a 20 mm thick timber beading strip leaving a 5 mm gap to be sealed with a non-setting sealant
	Masonry (flexibility not required)	Completely grout the penetration
	Framed plasterboard	Reduce the gap to 5 mm using a collar of plasterboard of the same thickness as the wall and seal this remaining gap with a non-setting sealant

7.0 REVERBERATION CONTROL

7.1 Collection spaces, Kids/Whānau area, Café and Welcome/Event

We recommend these spaces have a ceiling with an average performance of NRC 0.7 across the full ceiling area.

The collection spaces and the Kids/Whanau area have the following ceiling types.

- Feature timber shiplap ceiling (C01)
- Decortech custom design perforated timber panels (C02)
- 2 layers of 25mm Quietspace with a Vertiface facing on 50mm timber battens on plasterboard (C03)

For the shiplap ceiling (C01) we recommend introducing a gap between the timber boards to provide acoustic absorption. We recommend sizing the gap to achieve 10% open area. Autex AAB 48-50 should be installed behind the timber boards.

For the Decortech ceiling (C02), the acoustic performance will be highly dependent on the perforation pattern adopted. We recommend targeting 15-20% open area. We will review this as the design progresses. Autex AAB 48-50 should be installed behind the Decortech panels.

The Quietspace ceiling will achieve NRC 1.0 and is consider suitable.

If our above recommendations for the shiplap and Decortech ceilings can be achieved, no acoustic wall finishes will be needed for these spaces.

7.2 Ground floor Community Innovation

This space has a full coverage ceiling consisting of 2 layers of 25mm Quietspace with a Vertiface facing on 50mm timber battens on plasterboard (C03). This will achieve NRC 1.0 and is considered appropriate.

Depending on the level of furnishing in this space, acoustic wall finishes may be needed to achieve the Green Star reverberation criterion.

At this stage, we recommend allowing for wall finishes covering 15% of the floor area. We will review this as the design progresses. Suitable products are provided in Table 8 and we are happy to review alternatives.

7.3 Workroom

The preliminary design shows a Rigitone perforated plasterboard ceiling in this space. We recommend selecting a system with a performance of at least NRC 0.7 (e.g. Rigitone Matrix or Astral)..

Depending on the level of furnishing in this space, acoustic wall finishes may be needed to achieve the Green Star reverberation criterion. We have assumed that a robust wall finish would be required for this space, therefore a finish such as perforated plywood (15-20% open area) would be needed.

At this stage, we recommend allowing for wall finishes covering 15% of the floor area. We will review this as the design progresses.

7.4 Study and Meet spaces

The study and meet spaces are proposed to have Rigitone perforated plasterboard ceilings. We recommend selecting a system with a performance of at least NRC 0.7 (e.g. Rigitone Matrix or Astral).

Additionally, we recommend that these spaces have $2m^2$ of acoustic wall panel. Suitable products are provided in Table 8 and we are happy to review alternatives.

Table 8: Direct Fix Wall Products

Manufacturer	Product	NRC*	Distributor
Asona	Fabwall 25	0.85	Asona.co.nz
Autex	Composition 12 mm	0.4	autexglobal.com/nz
	Cube 12mm	0.45	
	Cube 24mm	0.7	
	Quietspace 25 mm	0.85	
Instyle	Ecoustic (13.5 mm)	0.5	instyle.com.au
	Ecoustic (25 mm)	0.85	
T&R Systems	Focus (12 mm)	0.4	tris.co.nz
	Focus (24 mm)	0.65	

* NRC performance for direct fix products

7.5 First floor Community Innovation

The preliminary design shows a Rigitone perforated plasterboard ceiling in this space. We recommend selecting a system with a performance of at least NRC 0.7 (e.g. Rigitone Matrix or Astral).

Depending on the level of furnishing in this space, acoustic wall finishes may be needed to achieve the Green Star reverberation criterion.

At this stage, we recommend allowing for wall finishes covering 15% of the floor area. We will review this as the design progresses. Suitable products are provided in Table 8 and we are happy to review alternatives.

7.6 Break, Staff and Outreach

The preliminary design shows a Rigitone perforated plasterboard ceiling in these spaces. We recommend selecting a system with a performance of at least NRC 0.7 (e.g. Rigitone Matrix or Astral).

No acoustic wall finishes are necessary in these spaces.

7.7 Councillors Lounge

The councillors lounge has a plasterboard ceiling. This space will not meet the Green Star criterion without some absorptive finishes. We recommend changing the ceiling to perforated plasterboard or adding $20m^2$ of NRC 0.7+ and 25mm thick wall treatment. See Table 8 for suitable products.

MARSHALL DAY Acoustics

7.8 Chambers

The Chambers has a Decortech ceiling (C02). The acoustic performance will be highly dependent on the perforation pattern adopted. We recommend targeting 15-20% open area. We will review this as the design progresses. Autex AAB 48-50 should be installed behind the Decortech panels.

The drawings note a curtain to the external wall on gridline E. We recommend that this be selected to be an acoustic curtain. With an acoustic curtain no other acoustic wall finishes are needed. A range of suitable acoustic curtains are provided in Table 9.

Table 9: Acoustic curtains

Brand	Product(s)	Manufacturer stated performances *
Annette Douglas Textiles	Streamer pro Streamer classic Sound dimmer Liquid classic	a_w 0.50 – 0.80
Gerriets	Absorber CS Absorber Light etc.	a_w 0.55 – 0.90
Materialised	Hush Light Reduction Drapery Hush Sheer Drapery Hush Sheer Blinds	NRC 0.55 – 0.70
Vescom	Formoza Corisca Ellis Elara	a_w 0.50 – 0.80

* Two measurement metrics are shown, NRC and a_w. These are determined by the testing standard used by the manufacturer. You can generally think of NRC and a_w being the same. The higher the number, the more absorption with 1 being the highest.

8.0 MECHANICAL SERVICES NOISE

The following sections provide guidelines necessary to ensure that appropriate acoustical design criteria can be achieved within the building. The recommendations in this report are made prior to receiving any selections from the mechanical engineer. As such, they are very general and may need to be customised.

8.1 Fans

It is recommended that 2 pole fans are avoided as our experience would indicate that these fans can be particularly tonal. There is a high risk of structure borne noise transmission which may cause issues in other locations.

We recommend allowing for attenuation on the high level exhaust fans. We will confirm the exact mitigation required once selections have been provided, but at this stage we recommend allowing for a 1D circular attenuator (fan attached).

8.2 FCUs

We recommend the following treatment be allowed for on the FCUs.

- 25mm internal insulation on the supply
- 50mm internally lined return plenums with a side intake
- 8 kg/m^2 mass loaded vinyl lagging

Supply and return attenuators might be required in some units depending on the duty of the FCU and location.

We will review this mitigation as the design progresses.

8.3 AHUs

The preliminary design for the library shows attenuators on the supply, return, intake and exhaust of the AHUs. This is considered appropriate, and we will review and provide an attenuator selection once the AHU selection has been made.

The AHU for the Chambers doesn't show attenuators. It is likely that this AHU will require attenuators due to the acoustically sensitive nature of the Chambers building.

8.4 Flexible Duct

Where specified for noise control purposes, flexible duct must be of the perforated acoustic type such as:

- Westaflex Greenduct (Perforated, Acoustic RM 1.25 insulation)
- UNILOK FR1 Acoustic Duct
- Holyoake perforated Spiroset
- or similar

8.5 Duct Air Velocities

Noise generated by air movement in ducts and through duct fittings is a major contributor to the mechanical system noise level. The acceptable level of flow generated noise is dependent on the design criterion of the space being served by the mechanical system.

To control turbulence and airflow generated noise to sensitive spaces, the duct velocities detailed in should not be exceeded.

Table 10: Duct velocity limits, m/s

Design Criteria	Run-Out Duct: Duct within 5 duct diameters of a grille/diffuser		Branch Duct: Ducts connected directly to Run-Out Ducting	Main Duct: Ducts preceding a Branch Duct within the air-conditioned space	Main Riser: Ducts not in the air-conditioned space
	Flexible Duct[1]	Metal Duct			
55 dB L_{Aeq}	4.5	6.0	7.5	10.0	15.0
50 dB L_{Aeq}	3.5	5.0	6.5	8.5	13.0
45 dB L_{Aeq}	3.0	4.0	5.5	7.5	11.0
40 dB L_{Aeq}	2.5	3.5	4.5	6.0	9.5

1 Caution must be exercised when installing flexible duct to ensure that airflow generated noise does not occur due to airflow restrictions.

8.1 Vibration Isolation

Any rotating item of equipment and **any connected pipework** within the plantroom will require suitable vibration isolation mounts or hangers, most likely in the form of springs.

A flexible duct connection must be provided between each fan or AHU and any connected ductwork.

Note that depending on the location of certain equipment, concrete or steel frame inertia bases would be required. The structural engineering should consider the additional load these bases would place on the building structure to ensure that slab design incorporates these additional loads.

APPENDIX A GLOSSARY OF TERMINOLOGY

A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
$L_{Aeq (t)}$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
PR	Privacy Rating An indicator of the privacy expected between two spaces based on the sound insulation of the intermediate partition and the background noise level in the receiving space.
RT or T_{60}	Reverberation Time The time (in seconds) taken for the sound pressure level generated by a particular noise incident to decay by 60 decibels following the conclusion of the noise event (hence T_{60} abbreviation). Reverberation Time is used for assessing the acoustic qualities of a space, describing how quickly sound decays within a space. The reverberation time is related to the room volume and total absorption.
STC	Sound Transmission Class A single number system for quantifying the transmission loss through a building element. STC is based upon typical speech and domestic noises, and thus is most applicable to these areas. STC of a building element is measured in approved testing laboratories under ideal conditions.
IIC	Impact Insulation Class A single number system for quantifying the transmission loss due to impact noise produced by a standard “Tapper Machine” through a building element.
NRC	Noise Reduction Coefficient A single number rating between 0 and 1 of the ability of a material to absorb sound. It is the average of the absorption coefficients in the 250-2000Hz octave bands rounded to the nearest 0.05. The larger the number, the more absorptive the material.
CAC	Ceiling Attenuation Class A measure for rating the airborne sound insulation performance of a ceiling system between adjacent enclosed spaces, such as offices where the dividing wall does not penetrate the ceiling cavity.
PPV	Peak Particle Velocity For Peak Particle Velocity (PPV) is the measure of the vibration aptitude, zero to maximum. Used for building structural damage assessment.

APPENDIX B SUITABLE PLASTERBOARD OPTIONS

Plasterboard Descriptor	Suitable Products by Manufacturer			
	GIB	USG Boral	Elephant	Gyprock
10 mm standard > 630 kg/m^3	10 mm Standard 10 mm Fyreline 10 mm Aqualine 10 mm Ultraline	10 mm Sheetrock 10 mm Wetstop	10 mm Standard-Plus	2 x 6.5 mm Flexible 10 mm Aquachek
13 mm standard > 630 kg/m^3	13 mm Standard 13 mm Fyreline 13 mm Aqualine 13 mm Superline 13 mm Toughline 13 mm Ultraline 10 mm Noiseline	13 mm Sheetrock 13 mm Firestop 13 mm Wetstop 13 mm Multistop 10 mm Fibrerock 10 mm Soundstop	13 mm Standard-Plus 10 mm Multiboard 13 mm Multiboard 10 mm Aquaboard 13 mm Aquaboard	2 x 6.5 mm Flexible 13 mm Standard 13 mm Aquachek 13 mm Impactchek 13 mm Fyrchek 13 mm Fyrchek MR 10 mm Soundchek 10 mm Superchek
13 mm high-density > 920 kg/m^3	13 mm Noiseline 16 mm Fyreline	13 mm Soundstop 16 mm Firestop 13 mm Fibrerock	16 mm Multiboard	3 x 6.5 mm Flexible 13 mm Soundchek 16 mm Fyrchek 16 mm Fyrchek MR

Note: The Plasterboard Descriptor nominates a minimum thickness and density. However, different thicknesses/densities of plasterboard would be suitable, as indicated above.

- Thinner boards would have a higher density than the minimum requirement.

- Thicker boards would have a lower density than the minimum requirement.

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APPENDIX C ACOUSTIC SEALANTS

C1 Sealant Selection

Where sealants are used for acoustic purposes, it is essential that they retain adequate flexibility over the reasonable life of the building, to ensure that cracking and delamination does not occur, which will compromise the acoustic performance of the seal.

If the contractor wishes to use a sealant that is not on these lists, it must first be approved by the acoustic consultant.

When selecting a sealant, consider the following:

- It should not be porous
- It should not set rigidly and should allow joint movement of at least 25 % for high movement joints and 15 % for low movement joints when cured
- It should not shrink by more than 10 – 15% when it dries
- It will easily flow into gaps of 3 – 10 mm width
- For wider gaps, it may need a backing rod
- Its density should be similar to the lining materials
- It will adhere to a damp substrate, preferably without needing a primer

C2 High Movement Joints Sealants

Sealants used for high movement joints, such as seismic joints, window glazing, curtain walling and active services penetrations – mechanical ducts, plumbing, etc – must have a joint movement capability of either:

- ± 25 % of the original joint width or
- a Hardness Shore A of 30 or less

Sealants that would be suitable for all movement joints are listed Table 11.

Table 11: Suitable Sealants for all movement joints

Supplier	Sealant	Movement (%)	Hardness Shore A	Materials to be sealed
Bostick	Fireban One	± 25	30	Masonry, metal, ceramics, wood, most plastics, FC sheet, plasterboard
	Fire Tech Firecaulk	± 25		Concrete, precast panels, block and brick work, drywall systems, electrical cables and pipe penetrations
	Seal-N-Flex 1	± 50	30	Masonry, metal, ceramics, wood, most plastics, FC sheet, plasterboard
Selleys	Glass	± 25	-	Glass, aluminium, stainless steel, many plastics including polystyrene, most woods
	Roof and gutter	± 25	-	Metals, inc galvanised
	Brick and concrete	± 25	-	Masonry, plasterboard
Dow Corning	Dowsil 732	-	30	Most metals (ungalvanised), glass, most woods, ceramic, fibre, most plastics
	Dowsil 739	-	25	Most metals (ungalvanised), glass, most woods, ceramic, most plastics, masonry
Fosroc	Flamex PU	± 25	-	Concrete, brick, masonry, pre-cast panels, plasterboard, fibre cement, windows, doors
	Hilastic 88	± 25	-	Roof and wall sheets, guttering and downpipes, sheet metal
Gib	Fire Soundseal	± 25	-	Plasterboard, painted surfaces, timber, architraves and ceramic tiles
FirePro	M708 Fireban	± 25	-	Concrete, brick, plasterboard, glass, most woods, most plastics, most metals
Sika	Sikaflex-400 Fire	± 25	-	Porous and non-porous substrates
	Sikaflex Construction AP	± 25	-	Concrete and masonry

C3 Low Movement Joint Sealants

For low movement joints, such as perimeter sealing of masonry/plasterboard partitions or passive services penetrations – electrical cabling, fire sprinklers, etc a lower joint movement capability of ±15 % of the original joint width would be acceptable.

Table 12 provides additional sealants that would be suitable for low movement joints.

Table 12: Suitable sealants for low movement joints

Supplier	Sealant	Movement (%)	Hardness Shore A	Materials to be sealed
FirePro	M706	± 20	25 - 35	Concrete floors and concrete block walls, plasterboard, Hebel walls and brickwork. Also for sealing gaps around cables, metal pipes, conduits, busways and ducts that penetrate fire rated walls.
	M707	± 20		Concrete, brick, plasterboard, glass, most woods, most plastics, most metals
	M752 Aquathane	± 20		Concrete precast panels, blockwork, brickwork, and timber / steel joints
Firetherm	Intumastic	± 15		
Fosroc	Flamex XT	± 20	31	Concrete, timber, masonry, aluminium, metal and ceramics
	Nitroseal MS400	± 20	42	Concrete, timber, masonry, aluminium, metal and ceramics
H.B. Fuller	FireSound	±20		Pre-cast concrete panels, block work and brickwork. Also suitable for filling gaps around cables, metal pipes, conduits, busways and ducts that penetrate walls, floors and ceilings
Hilti	CP 606	± 16.5		Masonry, concrete, drywall and metal
Holdfast	Soudaseal 270HS	± 20	68 ± 5	Metals and plastics
Promat	Promaseal-A Acrylic Sealant	± 15	50	
Sika	Firerate	± 20		Porous and non-porous substrates

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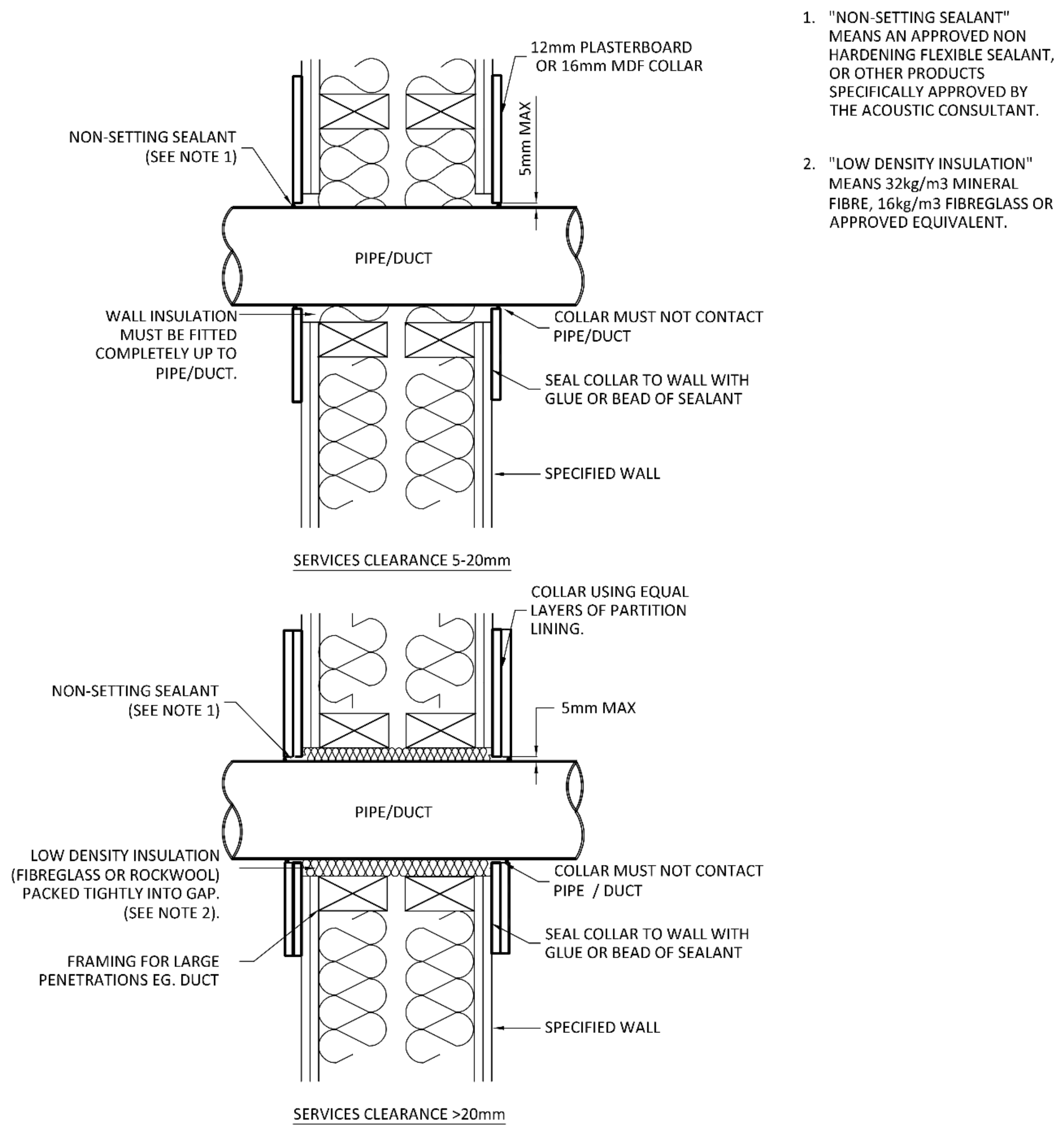
APPENDIX D PENETRATION AND SEALING DETAILS



MARSHALL DAY Acoustics	PENETRATION SEALING - LIGHT WEIGHT PARTITIONS		MDA-MEC-PEN-001 REVISION: C

1. "NON - SETTING SEALANT" MEANS AN APPROVED NON HARDENING FLEXIBLE SEALANT, OR OTHER PRODUCT SPECIFICALLY APPROVED BY THE ACOUSTIC CONSULTANT.

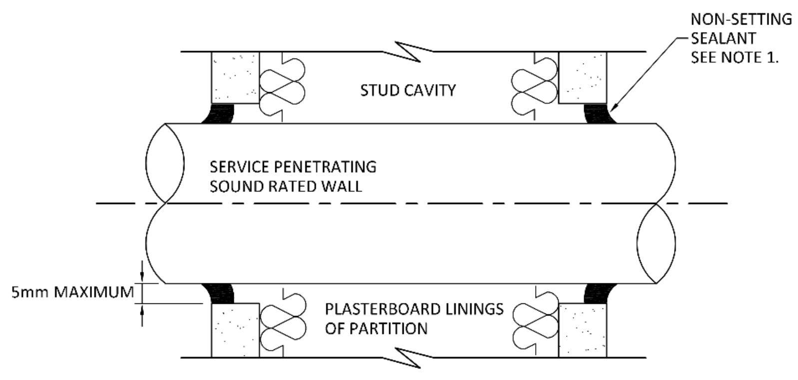


FIG 1a SEALING PENETRATIONS THROUGH MASONRY OR LIGHTWEIGHT WALLS (<5mm CLEARANCE)

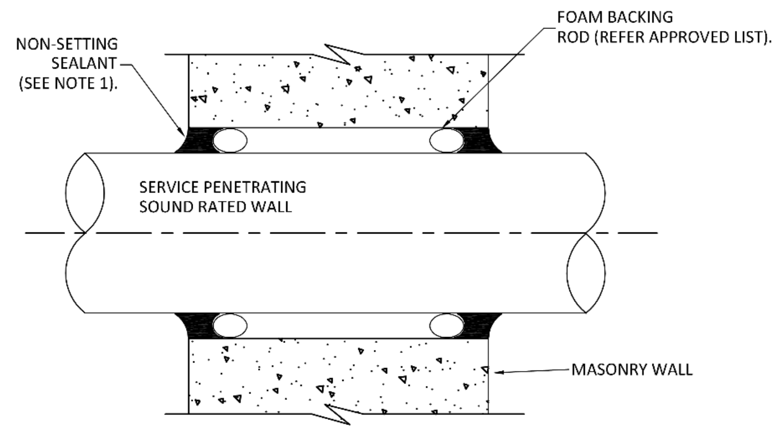
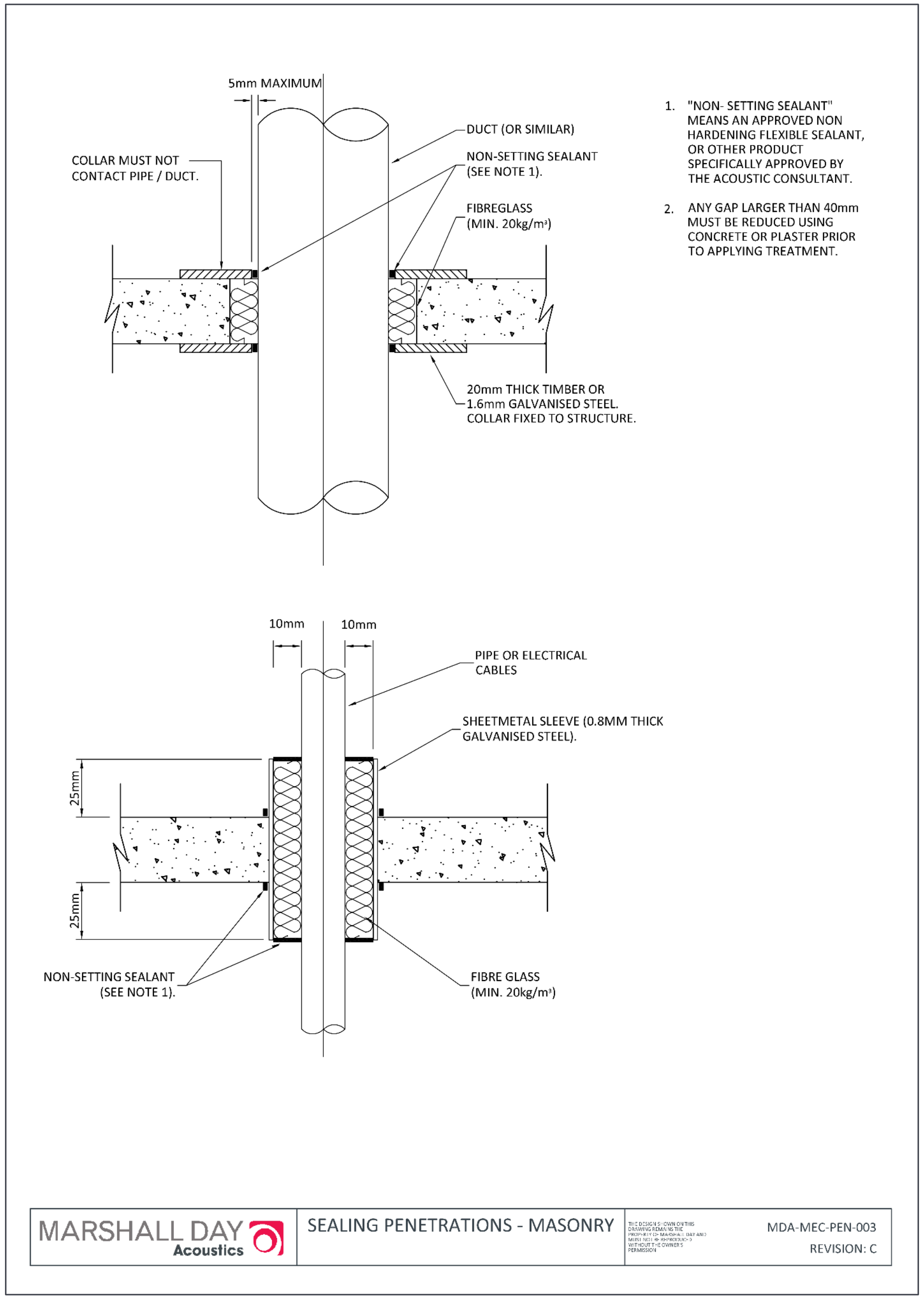
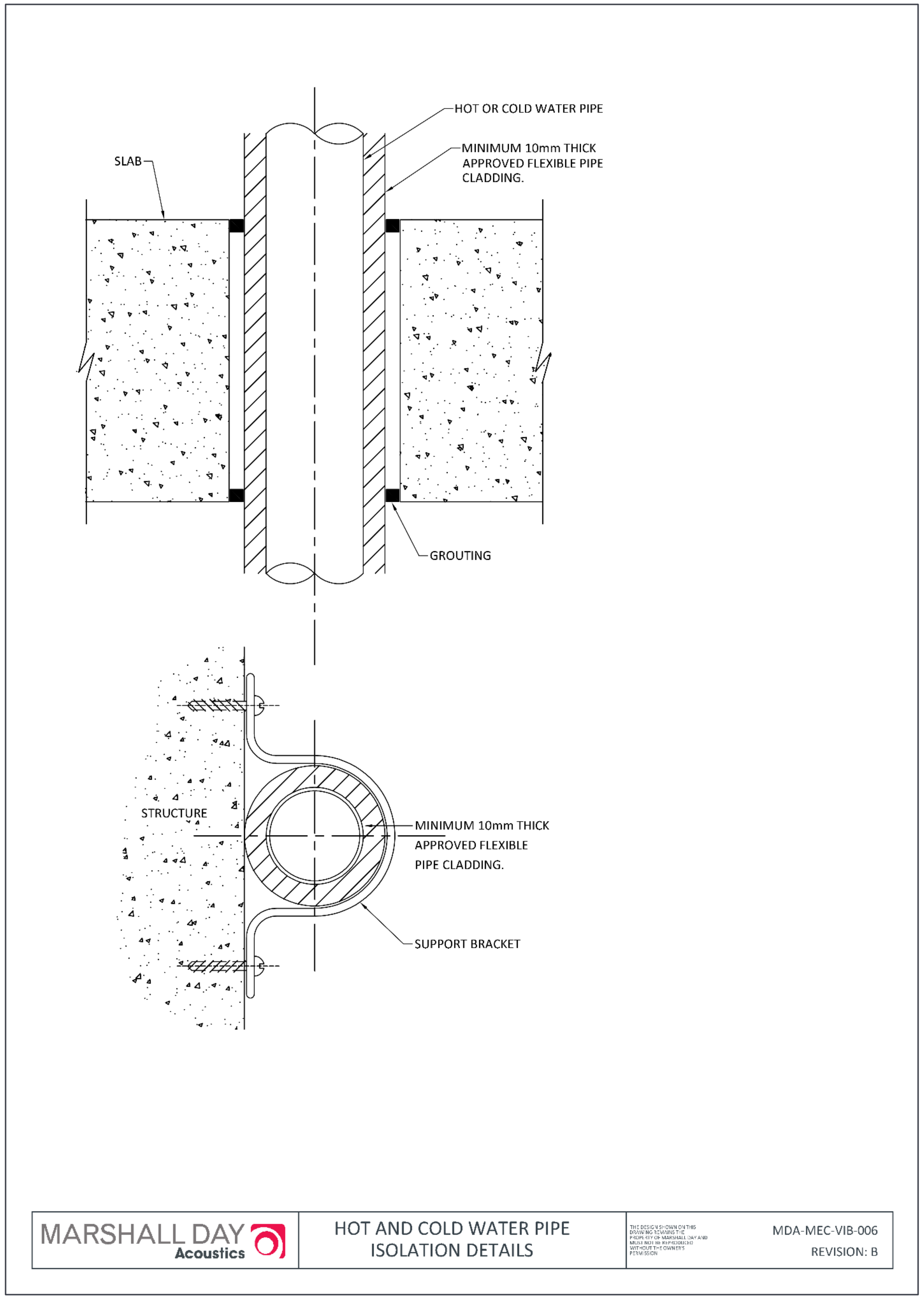


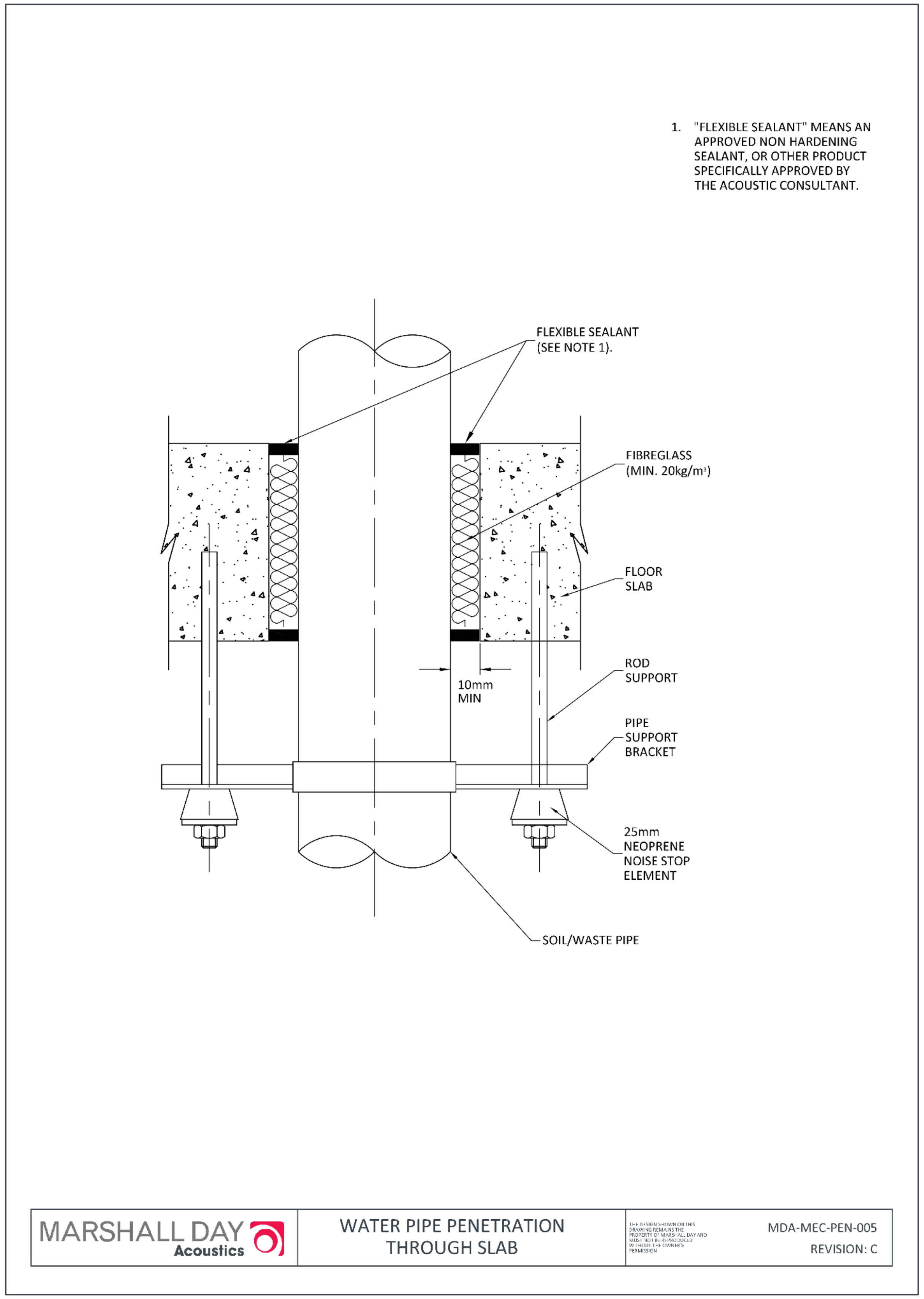
FIG 1b SEALING PENETRATIONS THROUGH MASONRY WALLS (5-10mm CLEARANCE)

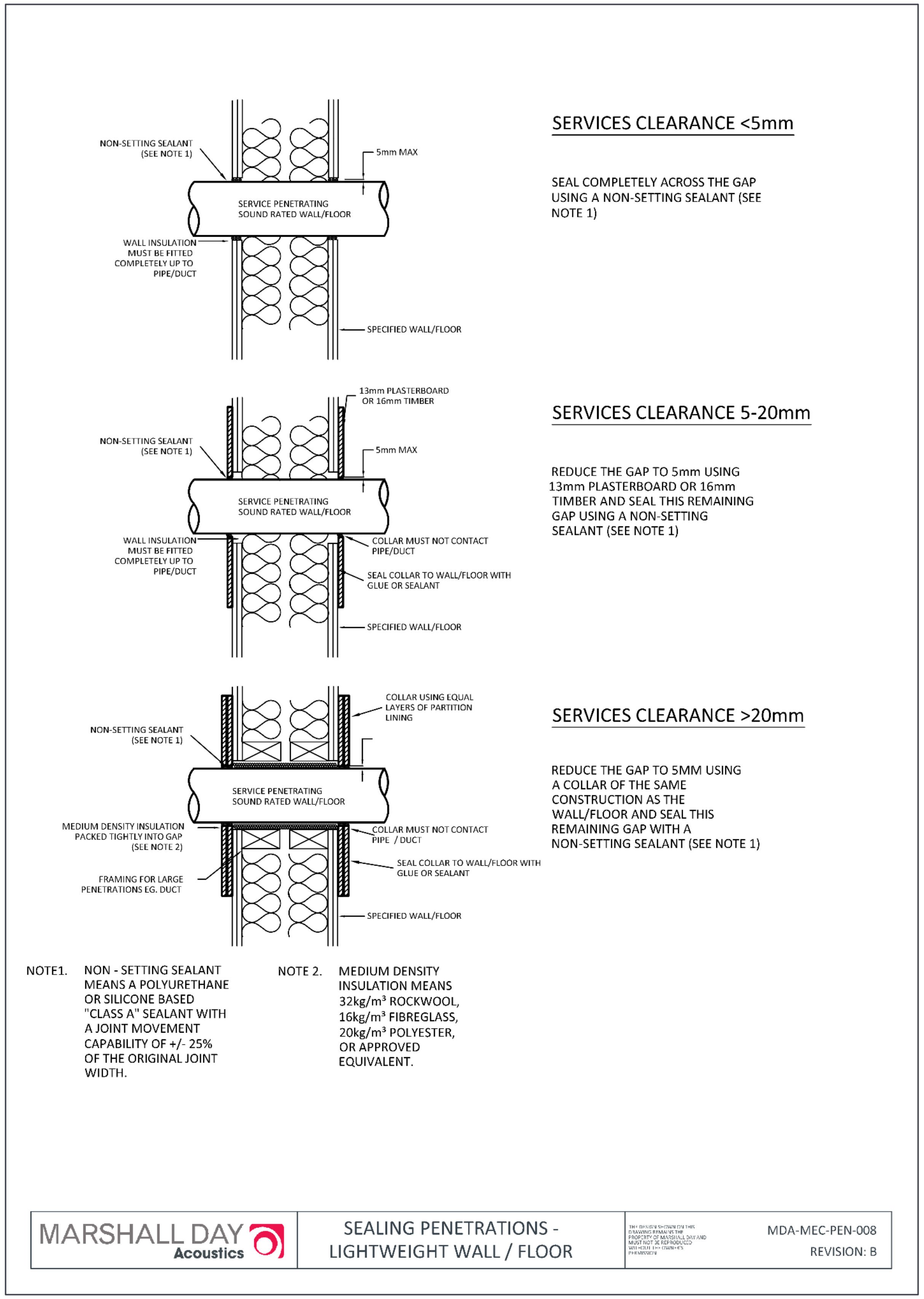
MARSHALL DAY Acoustics	SEALING PENETRATIONS		MDA-MEC-PEN-002 REVISION: D

MARSHALL DAY Acoustics

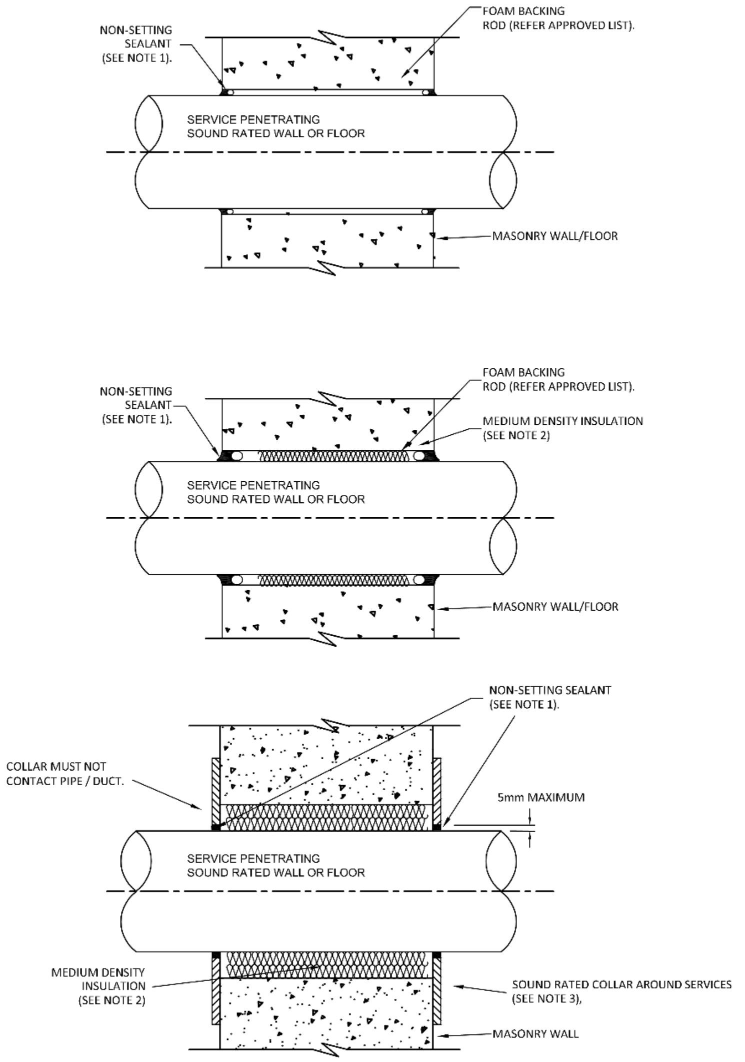





1. "FLEXIBLE SEALANT" MEANS AN APPROVED NON HARDENING SEALANT, OR OTHER PRODUCT SPECIFICALLY APPROVED BY THE ACOUSTIC CONSULTANT.
FLEXIBLE SEALANT (SEE NOTE 1).
FIBREGLASS (MIN. 20kg/m³)
FLOOR SLAB
ROD SUPPORT
10mm MIN
PIPE SUPPORT BRACKET
25mm NEOPRENE NOISE STOP ELEMENT
SOIL/WASTE PIPE
MARSHALL DAY Acoustics
WATER PIPE PENETRATION THROUGH SLAB
MDA-MEC-PEN-005
REVISION: C


SERVICES CLEARANCE <5mm
NON-SETTING SEALANT (SEE NOTE 1)
5mm MAX
SERVICE PENETRATING SOUND RATED WALL/FLOOR
WALL INSULATION MUST BE FITTED COMPLETELY UP TO PIPE/DUCT
SPECIFIED WALL/FLOOR
SEAL COMPLETELY ACROSS THE GAP USING A NON-SETTING SEALANT (SEE NOTE 1)
SERVICES CLEARANCE 5-20mm
13mm PLASTERBOARD OR 16mm TIMBER
COLLAR MUST NOT CONTACT PIPE/DUCT
SEAL COLLAR TO WALL/FLOOR WITH GLUE OR SEALANT
REDUCE THE GAP TO 5mm USING 13mm PLASTERBOARD OR 16mm TIMBER AND SEAL THIS REMAINING GAP USING A NON-SETTING SEALANT (SEE NOTE 1)
SERVICES CLEARANCE >20mm
COLLAR USING EQUAL LAYERS OF PARTITION LINING
MEDIUM DENSITY INSULATION PACKED TIGHTLY INTO GAP (SEE NOTE 2)
FRAMING FOR LARGE PENETRATIONS EG. DUCT
REDUCE THE GAP TO 5MM USING A COLLAR OF THE SAME CONSTRUCTION AS THE WALL/FLOOR AND SEAL THIS REMAINING GAP WITH A NON-SETTING SEALANT (SEE NOTE 1)
NOTE1. NON - SETTING SEALANT MEANS A POLYURETHANE OR SILICONE BASED "CLASS A" SEALANT WITH A JOINT MOVEMENT CAPABILITY OF +/- 25% OF THE ORIGINAL JOINT WIDTH.
NOTE 2. MEDIUM DENSITY INSULATION MEANS 32kg/m³ ROCKWOOL, 16kg/m³ FIBREGLASS, 20kg/m³ POLYESTER, OR APPROVED EQUIVALENT.
MARSHALL DAY Acoustics
SEALING PENETRATIONS - LIGHTWEIGHT WALL / FLOOR
MDA-MEC-PEN-008
REVISION: B

MARSHALL DAY Acoustics



NOTE1. NON - SETTING SEALANT MEANS A POLYURETHANE OR SILICONE BASED "CLASS A" SEALANT WITH A JOINT MOVEMENT CAPABILITY OF +/- 25% OF THE ORIGINAL JOINT WIDTH.

NOTE 2. MEDIUM DENSITY INSULATION MEANS 32kg/m³ ROCKWOOL, 16kg/m³ FIBREGLASS, 20kg/m³ POLYESTER, OR APPROVED EQUIVALENT.

NOTE 3. COLLAR TO HAVE A MINIMUM MASS OF 12kg/m², SUCH AS: 16mm FR PLASTERBOARD, 25mm PLYWOOD, 1.6mm SHEET STEEL, OR APPROVED EQUIVALENT.

MARSHALL DAY Acoustics	SEALING PENETRATIONS - MASONRY WALL / FLOOR	MDA-MEC-PEN-009 REVISION: B

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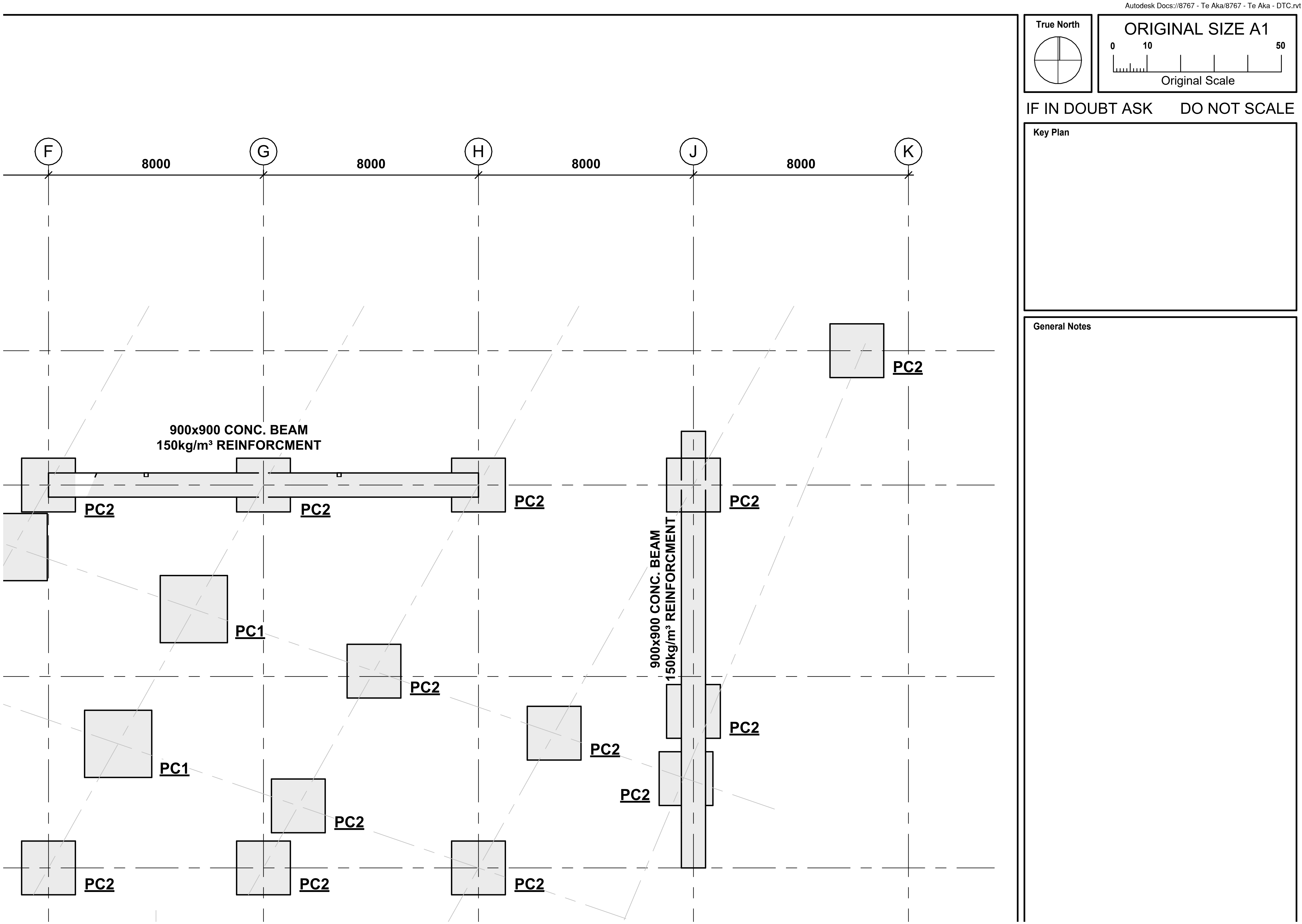
Autodesk Docs://8767 - Te Aka/8767 - Te Aka - DTC.rvt
True North
ORIGINAL SIZE A1
0
10
50
Original Scale
IF IN DOUBT ASK
DO NOT SCALE
Key Plan
General Notes
F
G
H
J
K
8000
8000
8000
8000
900x900 CONC. BEAM
150kg/m³ REINFORCMENT
900x900 CONC. BEAM
150kg/m³ REINFORCMENT
PC1
PC1
PC2

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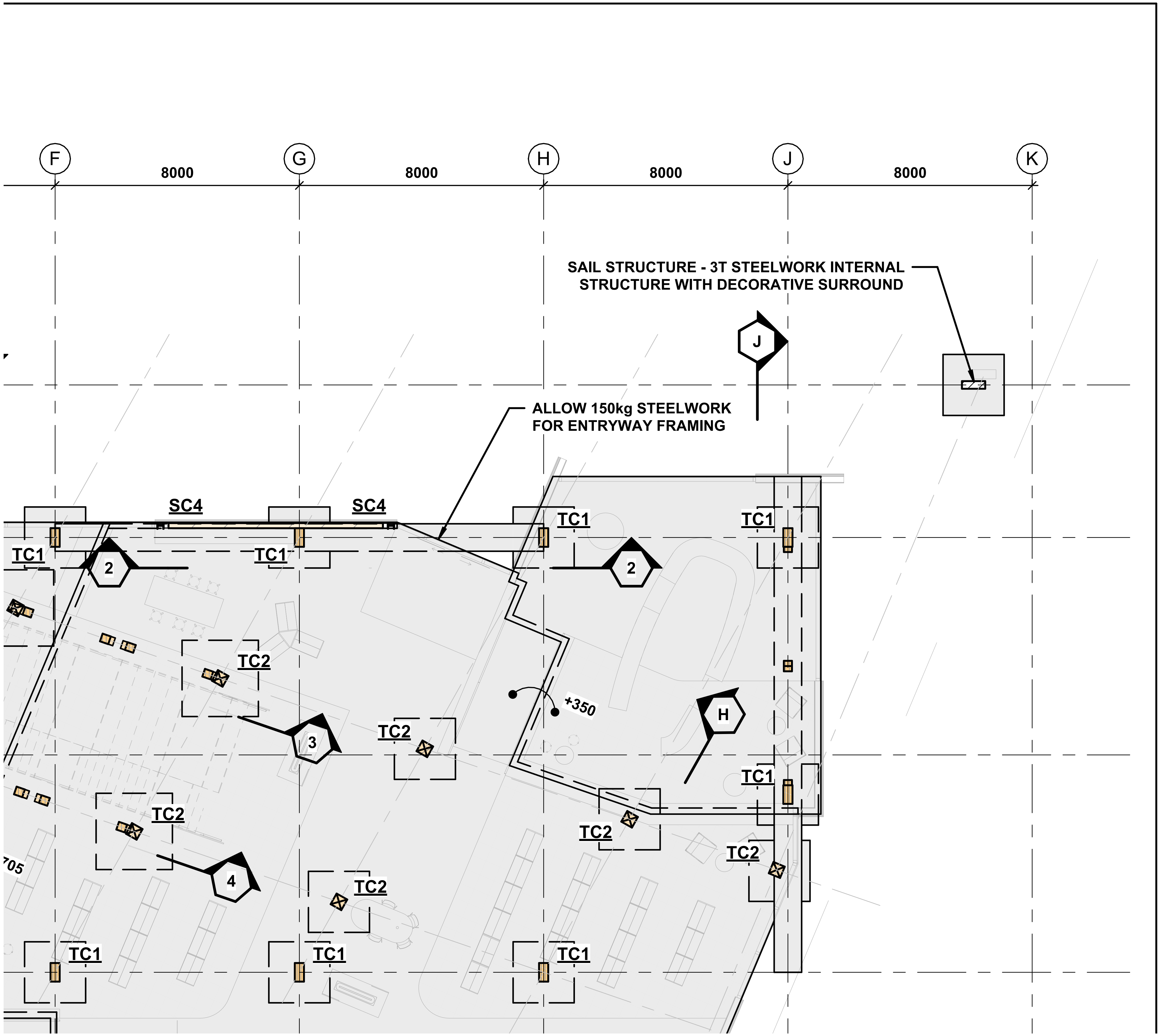


True North

ORIGINAL SIZE A1

0 10 50

Original Scale

IF IN DOUBT ASK DO NOT SCALE

Key Plan

General Notes

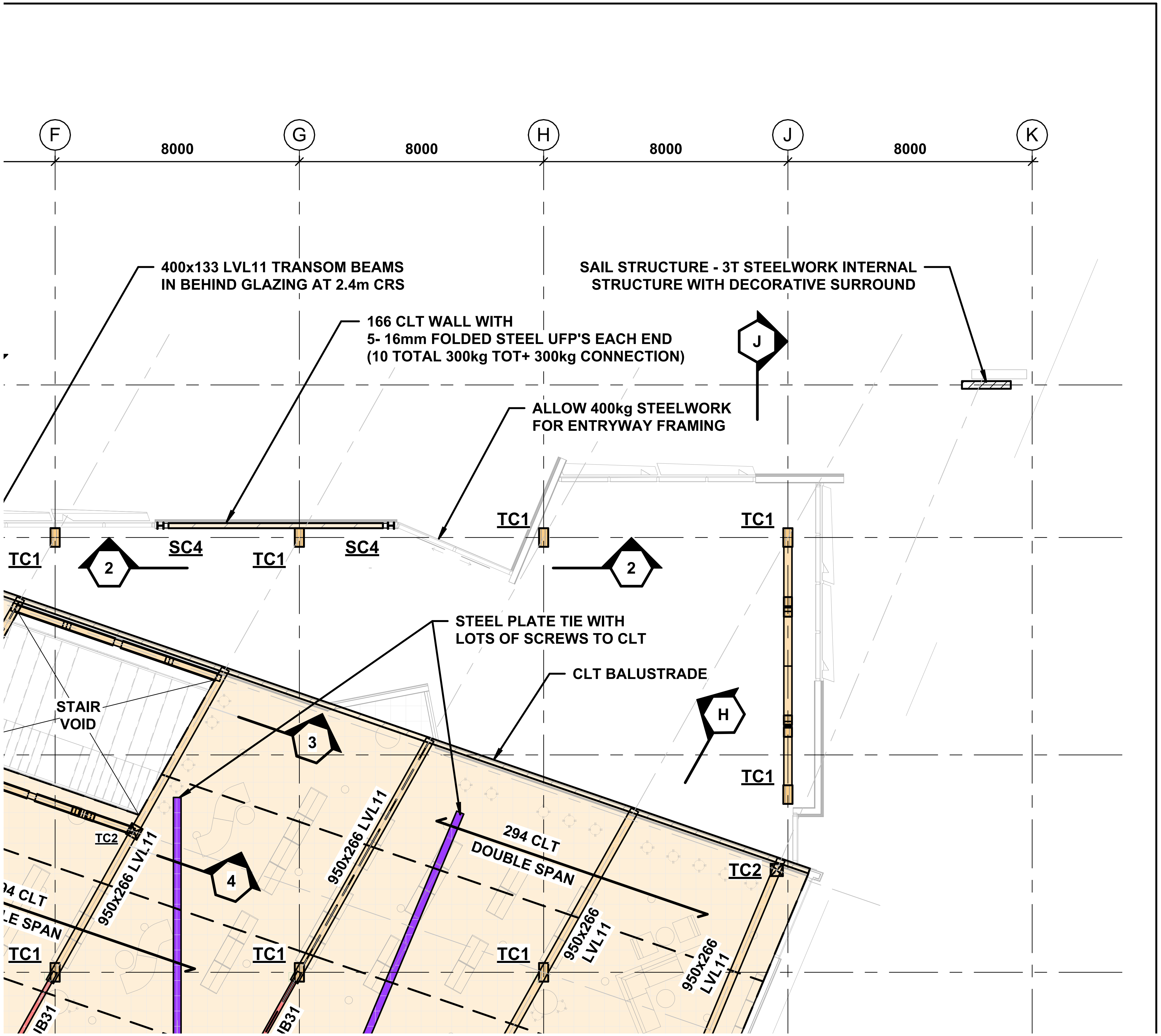
TIMBER COLUMN SCHEDULE	
TYPE MARK	COLUMN SIZE
TC1	610x300 LVL11
TC2	400x400 GL8
TC3	178x170 LVL13

STEEL COLUMN SCHEDULE	
TYPE MARK	COLUMN SIZE
SC1	310UC158
SC2	310UC118
SC3	250UC89
SC4	200UC60

LEGEND

- BRACING FRAME
- MOMENT FRAME
- PRIMARY GRAVITY

Autodesk Docs://8767 - Te Aka/8767 - Te Aka - DTC.rvt



True North

ORIGINAL SIZE A1

0 10 50

Original Scale

IF IN DOUBT ASK DO NOT SCALE

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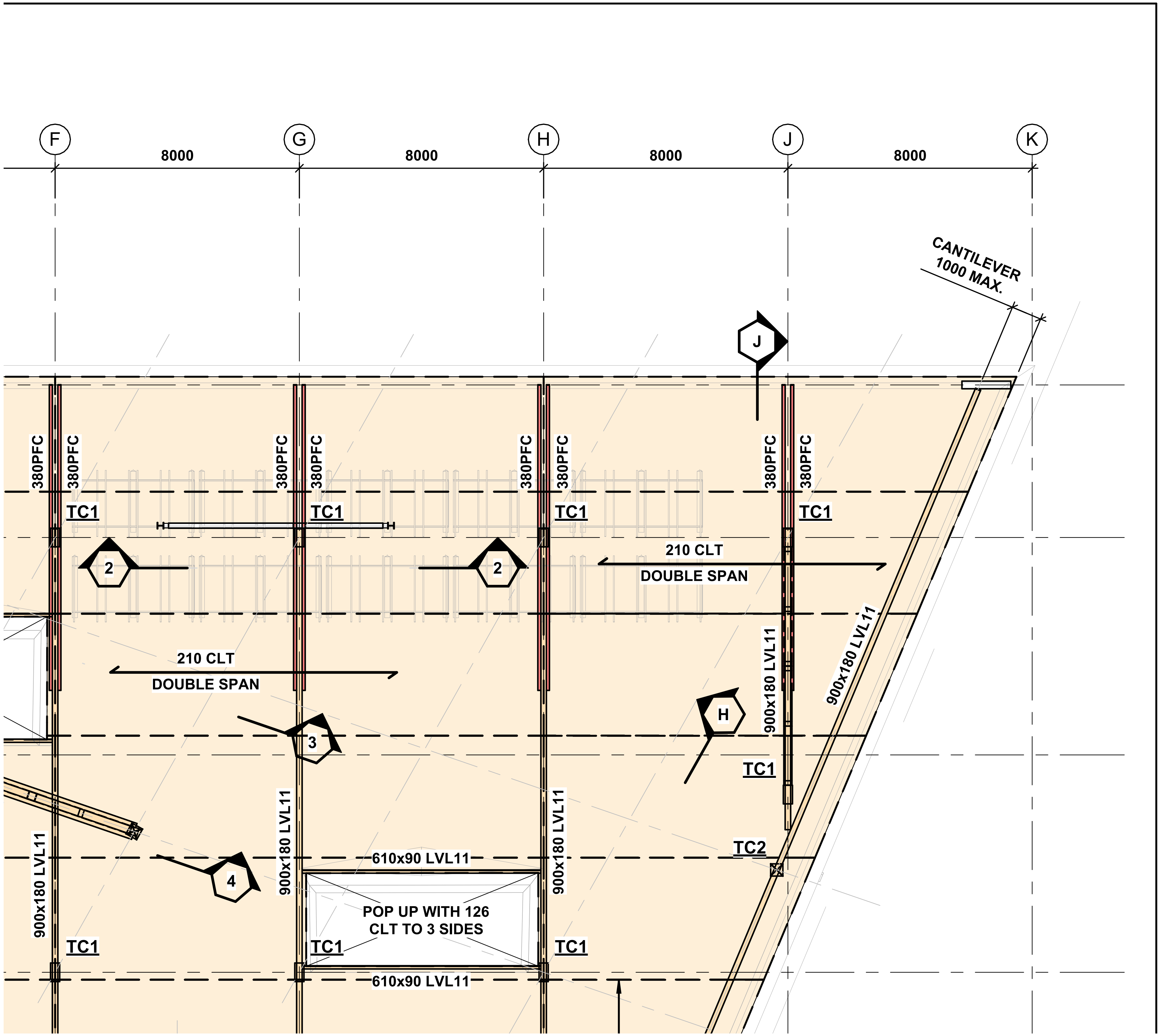

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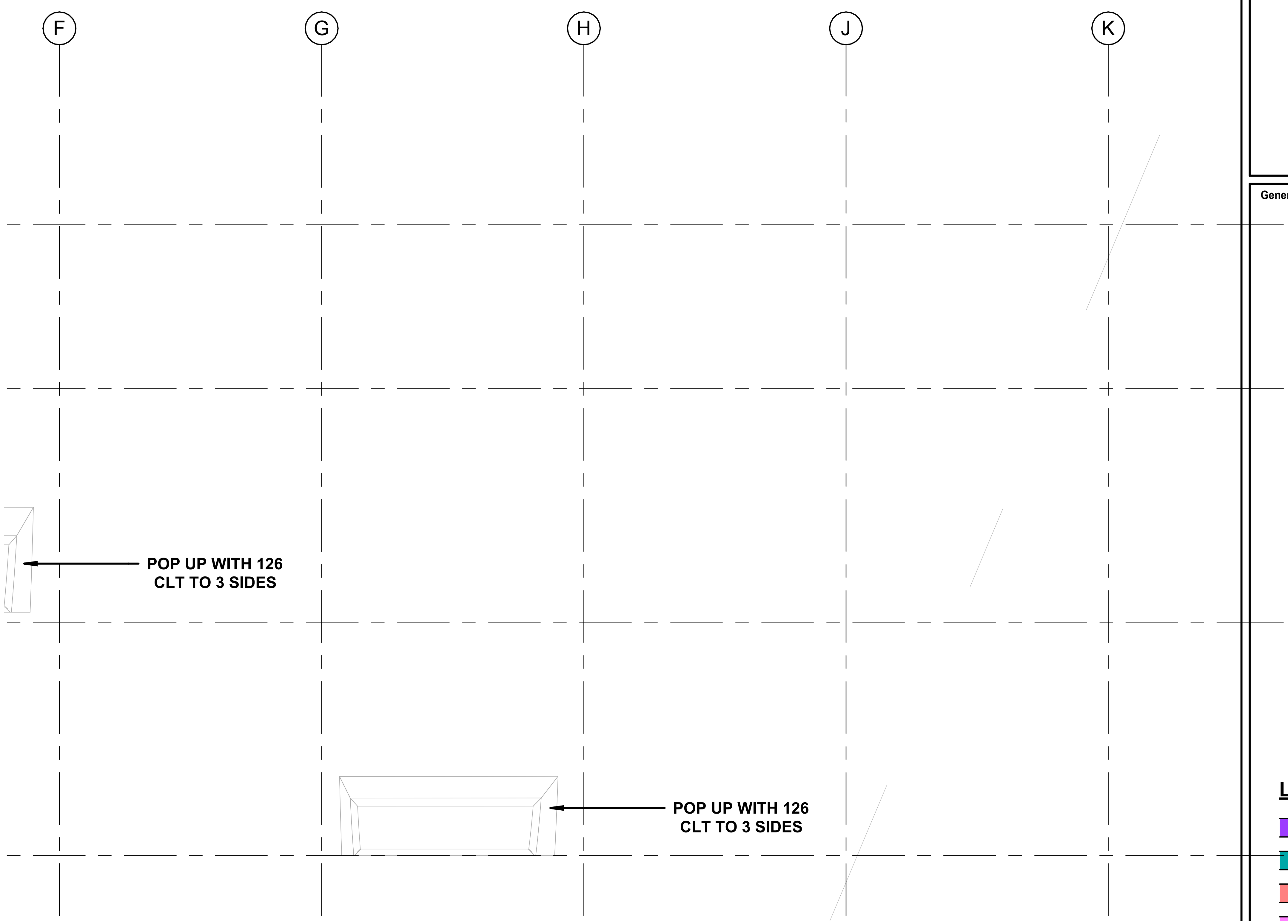

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Original Scale

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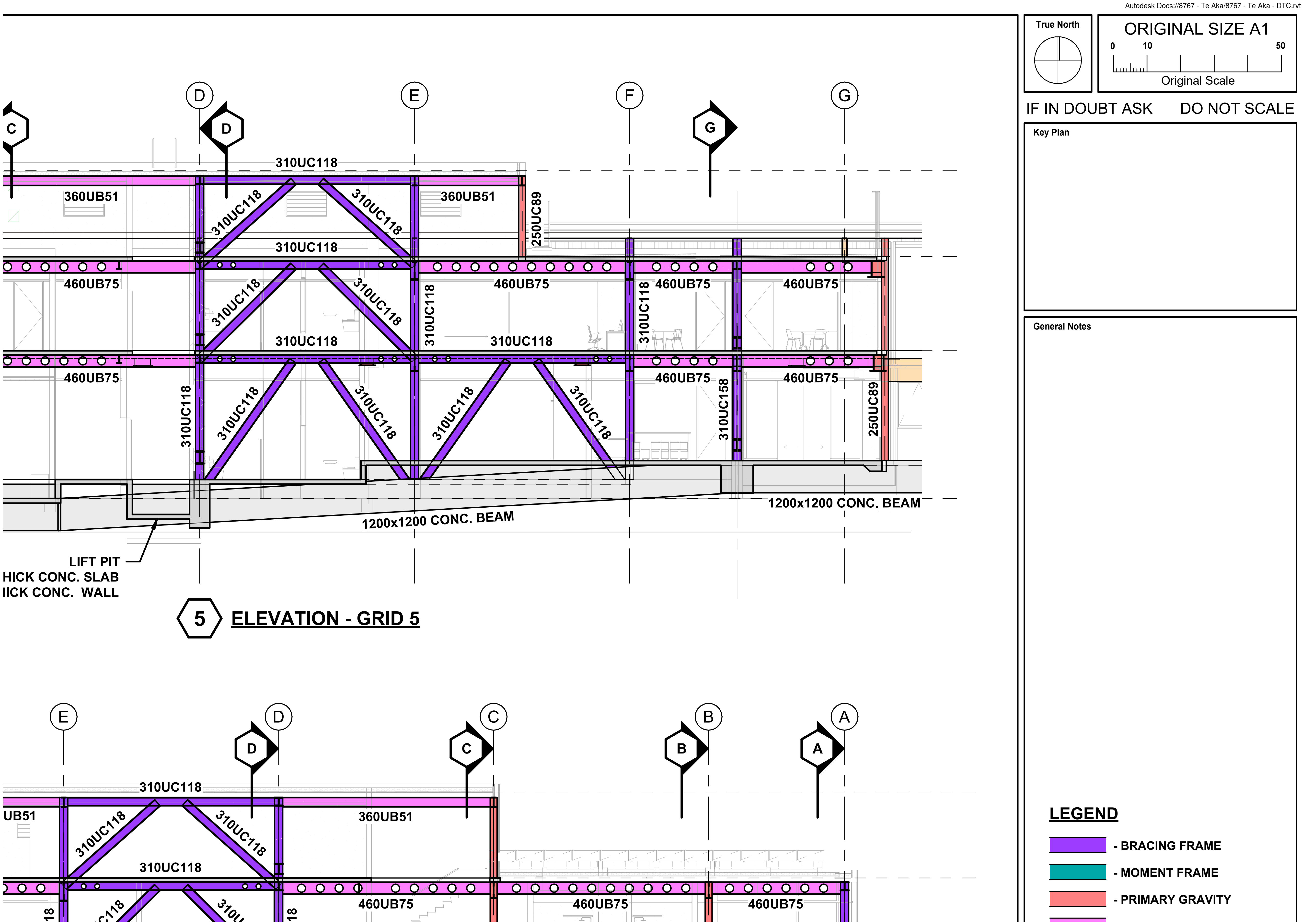
- PRIMARY GRAVITY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10
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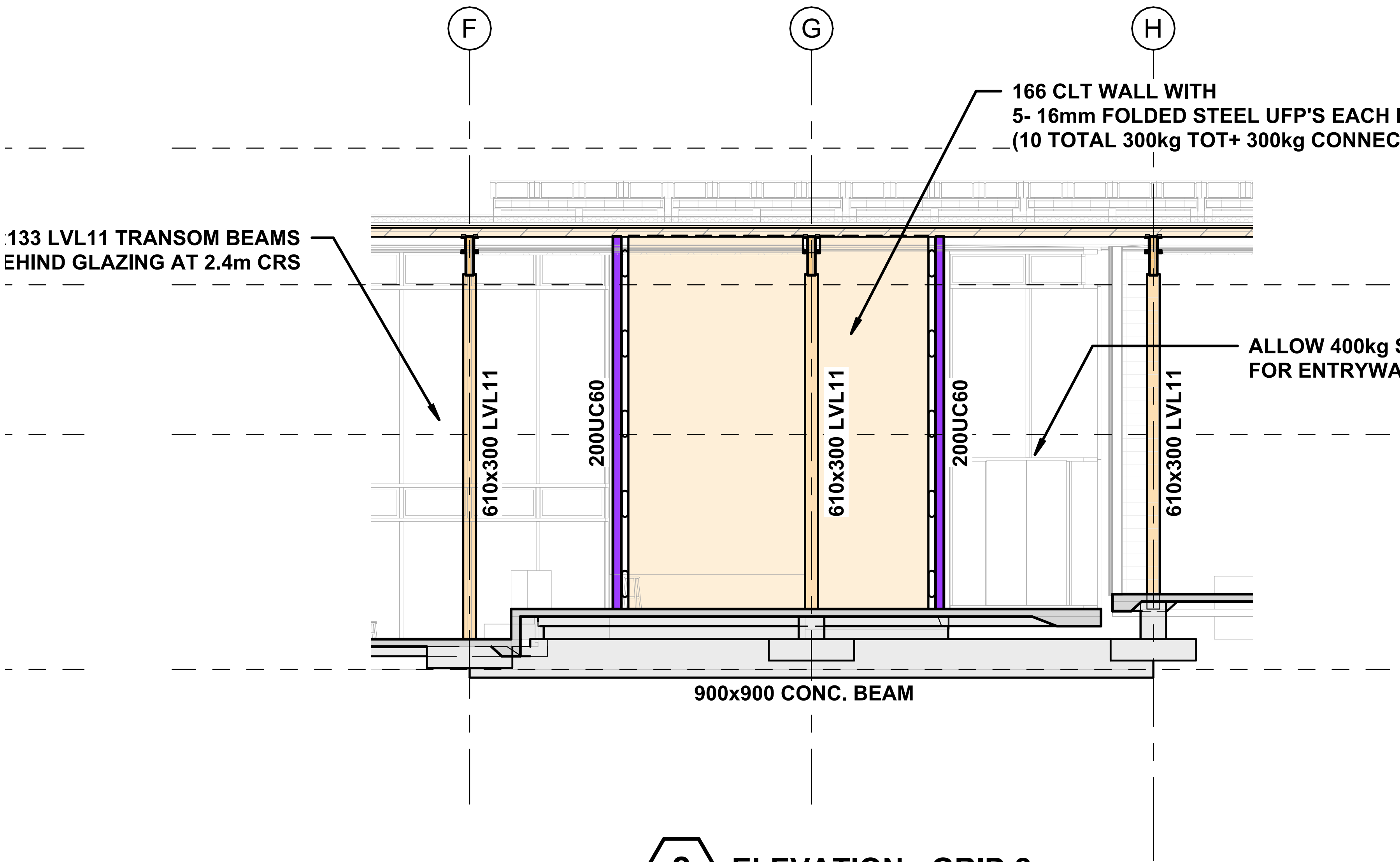
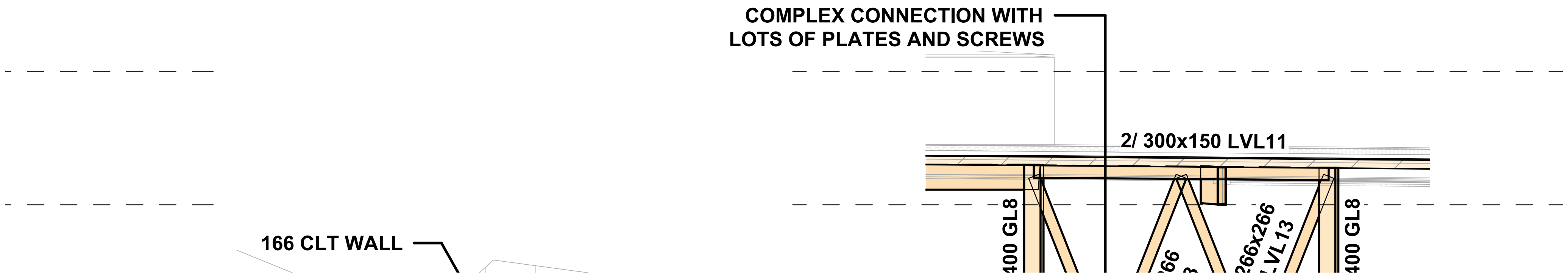
Key Plan
General Notes
LEGEND
- BRACING FRAME
- MOMENT FRAME
- PRIMARY GRAVITY
D
E
F
G
C
310UC118
360UB51
250UC89
460UB75
310UC158
1200x1200 CONC. BEAM
LIFT PIT
HICK CONC. SLAB
IICK CONC. WALL
5
ELEVATION - GRID 5
B
A
UB51

Autodesk Docs://8767 - Te Aka/8767 - Te Aka - DTC.rvt



2 **ELEVATION - GRID 2**



True North

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General Notes

Structural Engineers

Te Aka
Preliminary Design Report

Job number: 8767

Report prepared by: MK

Report reviewed by: RHB

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Dunning Thornton consultants

Structural Engineers

Te Aka
Preliminary Design Report

Contents

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Structural Engineers

Report Rev A 22/12/2023- RHB

This report has been prepared for Athfield Architects Limited to communicate the structural design of the Te Aka structure. It shall not be used by others or for alternate purposes without the approval of Dunning Thornton Consultants Ltd.

1 General

1.1 Objective

The report is intended to provide a summary of the Preliminary Design of the structure of the Proposed Library Development at 22 Station Street, Napier. This report is intended to provide Preliminary Structural Design information for pricing and feasibility purposes. It also outlines design loading, structural modelling assumptions, material properties, foundation requirements and design standards.

The structural design is to CIC Guidelines “Preliminary Design” level.

1.2 Scope

The scope is in accordance with the Design Brief and Conditions of Engagement. In general terms, this is the structural design of the two-and-a-half-storey library building, Te Aka.

1.3 Means of Compliance

The design of the building is in compliance with the New Zealand Building Code (NZBC), section B1.

The following standards have been used:

- AS/NZS1170:2001
- NZS3101:2006
- NZS3404:1997
- NZS3603:1993

1.4 Alternative Solutions

Alternative solutions to the NZBC may be required for modern timber and screw technologies (dependent on the citation of the updated NZ timber design standards AS/NZS 1720). DTC propose engaging a Structural Peer Reviewer in Developed Design to limit compliance risk of the project.

2 Structural System

2.1 General

The building is a two-storey library building with an area of approximately 1,600m^2 on plan. This building is divided into two areas: the main library and the ‘backpack’. The main library (1140m^2 on plan) will be constructed of predominantly timber. The backpack (450m^2) will be of steel construction.

The design life of the building is 50 years.

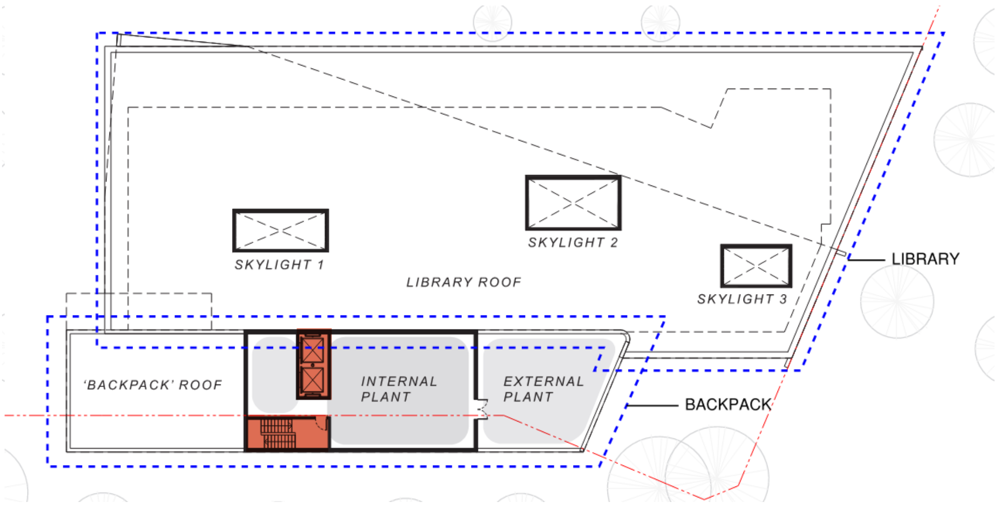


Figure 2.1 – Library and backpack area

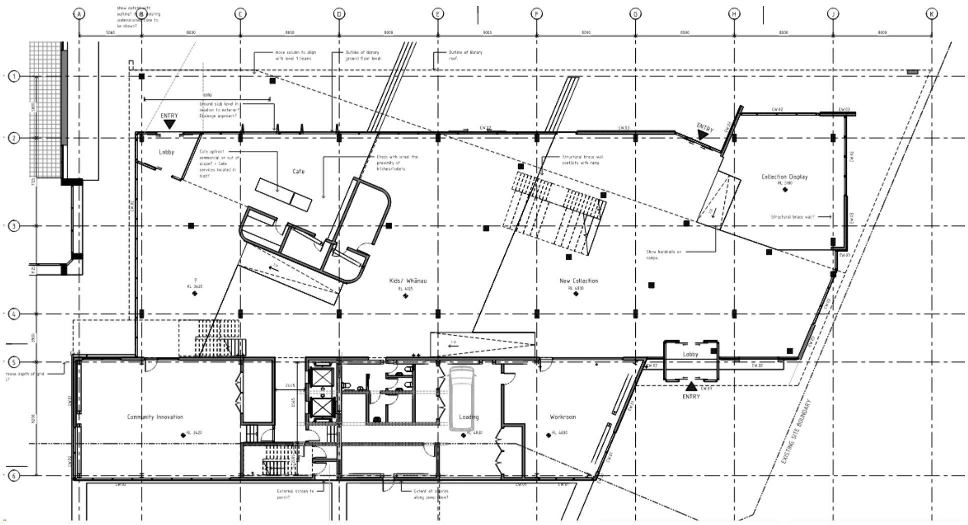


Figure 2.2 – Ground Floor plan

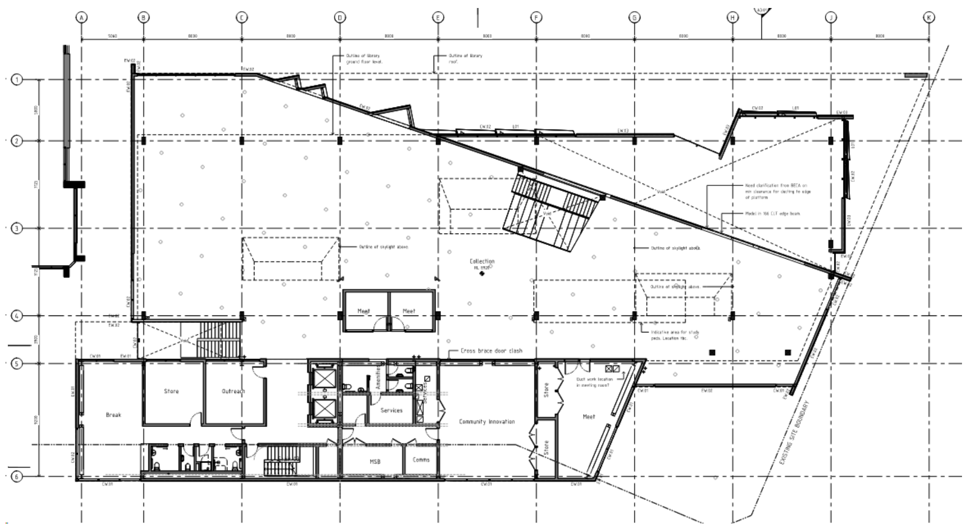


Figure 2.3 – Level 1 and Mezzanine Plan

2.2 Gravity Structure

The library gravity structure consists of 5-layer CLT panels at the roof level and 7-layer CLT panels at the mezzanine floor level, supported on LVL beams at their respective levels. Glulam and LVL columns provide support to the LVL beams, and these are supported on shallow pad foundations. The columns which support both the mezzanine and the roof are intended to stop and start at the mezzanine level.

The backpack consists of reinforced concrete slab on steel decking supported on a series of steel beams and columns founded on reinforced concrete ground beams. A partial footprint plant room, situated on the backpack roof, is constructed from steel framing with lightweight DHS purlins.

The ground floor comprises a 175mm thick slab on grade, which steps in level as the floor levels change.

2.3 Lateral Load Resisting Structure

The primary lateral load resisting system in both the transverse and longitudinal directions primarily consists of steel eccentrically braced frames (EBF) located in the backpack. The design of this bracing type is covered by the Verification Method 1 of Clause B1(structure) the New Zealand Building Code. The bracing element in this building are proposed to be detailed for full ductility (μ=6.0), though the design ductility will be closer to limited ductility (3.0-4.0). This means that seismic energy is dissipated in the frames. No structural damage in a serviceability limit state event (SLS = 1/25 year) and potential for repairable damage in an ultimate limit state event (ULS=1/500year).

To brace the north edge of the building, and torsion, additional timber bracing elements will be provided in the main library area. These would include steel energy dissipating devices which could be replaced after a significant earthquake.

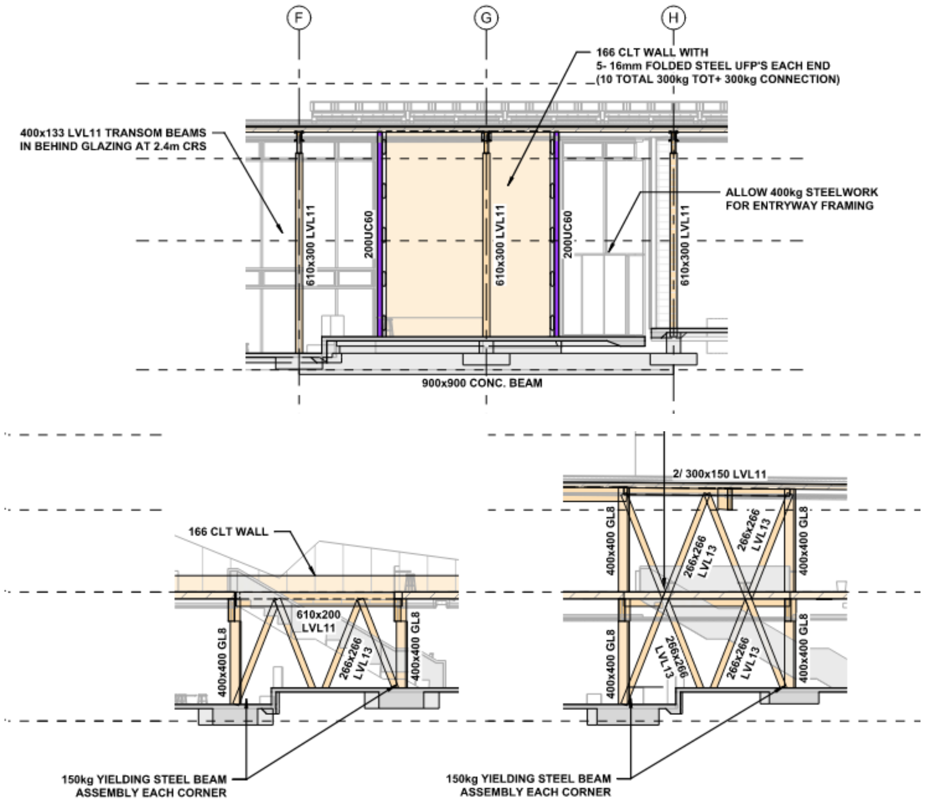


Figure 2.4 – Timber Bracing Elements

The CLT roof and floor panels have been designed to form a diaphragm, along with steel tie plates to distribute load to the EBFs in the backpack. Panel to panel connections are formed with screwed lap joints designed for shear loads. Steel ties across the floor plate and steel beams transfer loads from the mezzanine diaphragm to the EBF in the backpack.

The reinforced concrete slab in the backpack provides diaphragm action at each level to distribute lateral loads to the EBFs. This is designed to heavily supplement the CLT diaphragm using drag ties on grid.

The majority of the transverse bracing of the structure is done by the backpack, so significant overturning forces are concentrated here. At the outside edge against the laneway, the weight on the outer columns is substantially less than the weight braced, meaning this corner will tend to lift in a seismic event. The shallow foundation system to hold this weight down is fairly extensive and will project into the laneway.

3 Soil Conditions

3.1 Description of Site Soil Conditions

Geotechnical Engineering services for the project are provided by Beca. Geotechnical investigation indicates the site is underlain by fine to medium gravels with some sand proved to a maximum depth of 15m below existing ground level.

Groundwater was encountered between 2.5m and 3.5m below existing ground level. The site is approximately 200m west of the foreshore. Given the site's proximity to the foreshore, tidal effects are likely to cause fluctuations in groundwater levels.

Beca have recommended shallow foundations for the project generally. We understand liquefaction risk is low, though a layer of softer marine deposits under the alluvium may soften with significant seismic shaking. In the Concept Design, a bored concrete pile option was provided as an alternative to the shallow foundation system mentioned in 2.3 above, however, we believe this was not cost effective due to mobilisation costs.

We have not received a Preliminary Design Report from Beca, however, we understand they have reviewed the Tonkin and Taylor Geotechnical Report for the next door building dated May 2017. They have recommended we use bearing capacities from this report.

3.2 Foundation Design Parameters

Sizing of the foundation pads and beams were based on number in the 2017 Geotechnical Report by Tonkin and Taylor for the Library, Civic Admin/Council Chamber Buildings. This was based on 2 boreholes and 3 SPs across the site. A further borehole has been proposed for the North side of the site. Shear wave velocity testing may be done as part of this.

3.3 Façade

The façade is to be designed to comply with wind loading from NZS1170.2 and seismic movement allowances. EBF frames mean normal movement allowances for conventional construction apply. Note typical large spans for facades (refer structural input to AAL façade specification) expected from façade curtain wall panels except where this exceeds normal practical sizes – in these cases additional transoms have been allowed for on the structural documentation.

3.4 Services/Ceilings

Services/Ceilings are to be braced to the requirements of NZS4219 and AS/NZS2785 respectively. These will generally be braced of the underside of the floor and supporting beams. In areas where there are ceilings >0.8m below the primary structure an allowance for additional secondary structure (structural steel frames) should be made.

4 Design Actions

4.1 General

For the purposes of consideration of loading, this building is Importance Level 2 in accordance with AS/NZS 1170.0:2002.

4.2 Imposed Loads

4.2.1 Vertical Loads

The table below summarizes all vertical loads including both superimposed dead and live loads. Imposed loads are generally in accordance with AS NZS 1170.1:2002.

In all cases, a minimum superimposed dead load of 0.25 kPa is applied.

Level / Area	Occupancy / Use	Live Load	Superimposed Load
Ground - Library	E / G	5kPa 31kN	0.25kPa
Ground - Backpack	B / G	3kPa typically 5kPa in loading dock 31kN	0.25kPa
Mezzanine - Library	E	4kPa (ψ_E = 0.6) 4.5kN	1kPa (1.2kPa Peak); No raised floor
Level 1 - Backpack	B	3kPa 2.7kN	0.75kPa
Roof - Library	R2	0.25kPa	0.25kPa
Roof - Backpack	R2	0.25kPa	0.5kPa
Plant - Backpack	E	5kPa (ψ_E = 0.6) 4.5kN	0.75kPa

4.2.2 Barriers and Balustrades

The following loads apply for all barriers and handrails.

Level/area	Top Edge			Infill	
	Horizontal	Vertical	Inwards, outwards, or downwards	Horizontal	Any direction
	kN/m	kN/m	kN	kPa	kN
Mezzanine	0.75	0.75	0.6	1.0	0.5

Wind Loads

Wind loads have been calculated in accordance with AS/NZS1170.2:2021.

Parameter	NZS 1170.2:2021
Importance Level	IL2
Regional Wind Speed, V_R	45m/s
Wind Direction Multiplier, M_d	0.8 to 1.0
Terrain / Height Multiplier, $M_{z,cat}$	0.83 to 0.92
Shielding Multiplier, M_s	1.0
Topographic Multiplier, M_t	1.0
Design Wind Speed, V_{des}	
From North	39.3m/s
From East	33.1m/s
From South	39.3m/s
From West	41.4m/s

4.3 Snow and Ice Loads

The building is in Region N1, and the elevation is 4m above sea level. Snow and ice are not significant loads for this building.

4.4 Seismic Loads

4.4.1 Site Parameters

Site Parameter	Value
Importance Level	IL2
Return Period Factor, R_U	1
Site Subsoil Class	D
Zone Factor, Z	0.38
Proximity to Fault	> 20km
N(T,D)	1.0

4.4.2 Analysis Methodology

The seismic analysis has been completed in accordance with AS/NZS 1170.5:2002, using the equivalent static analysis method.

Design Spectra are in accordance with AS/NZS 1170.5:2002 for site subsoil class D.

For the purposes of the analysis, the project x and y directions are considered to be the project north and east directions respectively.

4.4.3 Seismic Load Coefficient

Parameter	Value
T_1	0.4s
$C_h(T)$	3.0g
μ	3.0 (Maximum allowable code value = 6.0)
S_p	0.7
$C_d(T)$	0.37g

4.5 Construction Loads

The ComFlor decking is designed to be propped during construction along with propping to the steel beams.

The design of the temporary props for the floor slab and beams, as well as formwork and falsework, is the responsibility of the Contractor. The design of lifting inserts and the lifting methodology is the responsibility of the Contractor.

4.6 Special Load Cases

To be reviewed as work proceeds - typically will be as a result of construction requirements.

5 Serviceability Criteria

5.1 Seismic Deflections

Type of Analysis: Equivalent static analysis

Maximum Allowable: ULS inter-storey drift are not to exceed 2.5% of the inter-storey height.

5.2 Wind Deflections

Particular elements are designed to the recommended serviceability deflection limits of AS/NZS 1170.0:2002, Table C1.

5.3 Gravity Deflections

Structural elements are designed to the recommended serviceability deflection limits of AS/NZS 1170.0:2002, Table C1.

5.4 Floor Vibration

Lightweight floor structures are susceptible to the perception of vibration induced by people walking on them. The concept design has been benchmarked against guidance documents to assess the potential vibration. The floor vibration performance has been benchmarked against published CLT span tables and using the analogous AISC DG 11 methodology for steel floors, to analyse the floor and beam system as a whole. Based on the 8.0m grid, the 294mm thick CLT floor is vibration governed.

5.5 Shrinkage and Creep Constants

The effects of shrinkage and in creep in timber have been accounted for by multiplying the dead and sustained live load deflections by the factor k_2, where $k_2 = 2$ in accordance with NZS 3603:1993.

6 Design for Durability

6.1 Design Life

All structural elements to have 50 years design life.

Note: Non-structural elements and cladding specification are not covered by this report.

6.2 Durability Provisions

Durability provisions are achieved by:

Acceptable Solutions B2/AS1

- Reinforced Concrete: MZS 3101:2006 Part 1 Section 5 is an acceptable solution for durability with durability requirement met through covers equal to or in excess of the requirements of the standard.
- Timber: NZS602:2003Part 1 is an acceptable solution for meeting durability through treatment in accordance with the standard
- Structural Steel: Protection is provided through surface treatment in accordance with TS 3404:2018

6.3 Maintenance Requirements

Maintenance requirements for steel protective coating systems to be as per TS 3404:2018.

7 Fire Resistance Ratings

The preliminary design has been prepared assuming a fire-rating requirement of 30/30/30 based on advice from the fire engineer. A higher fire-rating requirement may require an increase in member size and significant changes to the connection detail. A fire rating of greater than approximately 40 minutes would necessitate significant redesign.

Fire rating of the gravity structure is provided through 'char' using AS NZS 1720.4:2019. This char protects the interior wood allowing it to support the required live loads in the fire condition. CLT floors need to achieve an integrity rating as well as a structural rating. This is achieved through screw clamping and glue sealing of the joints. Fixings in timber beams and columns will typically be rebated into the timber with glued timber dowels to provide protection.

All steelwork is assumed to be protected with a plasterboard-based fire rated system at this stage.

8 Software

The following computer applications have been used:

Analysis Type	Software Used
2D frame analysis	Space Gass 14.11
ComFlor composite floor deck	ComFlor S&T
Member capacity	MemDes

9 Proprietary Systems

The following proprietary elements are included in the project:

- Timber connectors – Rothoblaas / Spax
- Steel tray composite flooring - ComFlor

- Cold formed DHS purlins

10 Construction Monitoring

10.1 Construction Monitoring

The design is based on the verification of specific design aspects of the construction by a suitably qualified Chartered Professional Engineer in accordance with ACENZ/IPENZ level CM3.

CONSTRUCTION MONITORING SERVICE		
LEVEL	**REVIEW**	**COMMENT**
CM3	Review, to an extent agreed with the client, random samples of important work procedures, for compliance with the requirements of the plans and specifications and review important completed work prior to enclosure or on completion as appropriate. Be available to provide the constructor with technical interpretation of the plans and specifications.	This level of service is appropriate for medium sized projects of a routine nature being undertaken by an experienced constructor when a normal risk of non-compliance is acceptable.

10.2 Soil Testing and Verification

Visual inspection of excavation as work proceeds. This may include the removal and filling of soft spots with compacted hardfill prior to shallow foundations.

10.3 Materials Testing

The scheme shown utilises U-Shaped Flexural Plate (UFP) coupled timber shear walls. These are bespoke devices and need to be tested for Compliance. Prior to manufacture, 2 full scale UFP prototype specimens, constructed in accordance with the drawings, shall be tested in an approved lab. Approval process as follows:

1. Contractor shall submit mill certificate for G300 L15 plate intended to be used. Tensile and Charpy tests shall be conducted on samples of the plate material if the steel is not ACRS approved, and approved by the Engineer prior to prototype manufacture to ensure compliance with the specification.
2. Following satisfactory completion of the above, 2 number prototype UFPs shall be manufactured and tested in an approved lab. Each UFP shall be tested to 25 cycles at a stroke of 50mm, then 10 cycles at a stroke of 100mm. Force displacement loops shall be recorded and submitted to the Engineer for review. If any failures occur during the aforementioned tests, these shall be recorded and the Engineer notified.
3. Once testing has been satisfactorily completed, production UFPs may be manufactured using the same process as for the prototypes. DTC reserve the right to request sample production testing of UFPs if potential problems have been identified in the prototype tests.
4. Prototypes shall not be used in the building.
5. Production devices are to be manufactured from the same plate using the same construction methodology as the prototype devices.

11 Outline Specification

Concrete:	All concrete is 30MPa. Concrete to be a low carbon mix to satisfy Greenstar requirements

Reinforcing:	- All Reinforcing is Pacific Steel G500MA
	- All slabs on grade to have SE82 mesh plus 5kg/m2
ComFlor:	- 1.2mm ComFlor SR w SE82 mesh + 4kg/m2 reinforcing UNO
Steelwork:	- Steelwork fabricated by SCNZ SFC fabricator
	- All steelwork from ACRS accredited Mill
	- Rolled sections 300S0
	- Welded Sections from 300L15 plate
	- All Steel beams – 19x135 Nelson Studs 300crs.
	- Interior Steelwork: Epoxy Primer + Topcoats as required.
	- Exterior Steelwork: ZA Spray + epoxy wash/prime + Urethane Topcoat
	- All beams 60min intumescent coating
Timber:	Primary Structure (eg floor beams) to be LVL 13. Secondary Structure to be LVL 11 (eg mullions and roof beams). An allowance for moisture protection during construction should be provided.

12 Change Summary:

Changes relative to Concept and 50% Preliminary Design:

1. 2-number columns and foundations have been added to the North West façade for better architectural/ structural integration of the tapered building edge. Similarly, the last beam in this area is now intended to be fire rated steel to keep the taper.
2. The floor edge in the same area is now supported on hangers to a large beam at roof level
3. Beams have been increased from 850mm deep to 950mm deep. The structural minimum is still 850mm, however they have been increased to have a deeper ceiling void to fit services. There may be scope to optimise this.
4. Some K frames in the BOH have increased in weight to run up to the higher back of house roof.
5. Foundation beams have been added to braces along both the North and East facades.
6. ‘Te Aka’ Fancy Braces are now a single line of braces without crossed latticing. This increases the thickness of central braces. The connections of these will also take more load, therefore will be tricky to fabricate, with lots of screws/ steel plates.

Beca

Te Aka

Environmentally Sustainable Design Report - Preliminary Design

Prepared for Athfield Architects Limited and Napier City Council
Prepared by Beca Limited

21 December 2023

Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
A	Ethan Duff	Concept Design	8th September 2023
B	Ethan Duff	Preliminary Design	21st December 2023

Document Acceptance

Action	Name	Signed	Date
Prepared by	Ethan Duff		21st December 2023
Reviewed by	Ben Masters		21st December 2023
Approved by	Matt Sanders		21st December 2023
on behalf of	Beca Limited		

Executive summary

Environmentally Sustainable Design Framework Update

The Environmentally Sustainable Design Framework (see Beca ESD concept report) includes the design approaches and performance targets which have been adopted for the project. These are monitored and updated throughout the design process. Currently only the daylighting and thermal comfort design target is deemed to be at risk due to the potential for low-angle winter glare. Refer to Section 1.1 for a detailed summary.

Green Star Update

Targeting formal Green Star 5-Star certification has been confirmed as a key project sustainability outcome which represents New Zealand Excellence in sustainable design.

While Green Star has been nominated as a cornerstone of the sustainability outcomes for the project, we recognise that the sustainability goals of the project extend beyond Green Star, and in many cases reach further than the Green Star tool.

The project is in the process of being registered with the NZGBC, with all necessary documentation being submitted. The project is only deemed registered upon the fee payment by NCC.

A 5 Star Pathway review has been undertaken against the current Green Star Design and As Built v1.1 tool. Refer to Section 2 for an overview of Green Star and at-risk points, and Appendix B for a detailed summary of all targeted points.

Currently 71 points (of a required 60) are within reach for the project, indicating that there may be some scope for rationalising the points down to the recommended 66 points should any prove costly.

Net Zero Operational Carbon Update

Net zero operational carbon was identified as a key performance measure to demonstrate ongoing environmental performance after the project has been completed. Achievement of a Net Zero Buildings certification is targeted in addition to Green Star to validate performance. Further review will occur at the Developed Design stage.

Thermal Comfort Assessment

Section 4 discusses the building envelope strategy and thermal comfort metrics. Envelope modelling for the Athfield Architecture 50% Preliminary Design set was used to assess thermal comfort in the spaces, with a focus on the Main Library areas which are naturally ventilated.

Summer overheating is expected to be within the design conditions set by the Mechanical engineer, and within the thermal comfort metrics. Winter comfort is slightly out of range (i.e. too cold) due to the extent of cool glass in the space on winter mornings and the lower overall radiant temperatures. This is exacerbated by a cooler heating setpoint of 20°C and assumed low levels of physical activity by visitors (i.e. sitting reading). These elements are not significant causes for concern and should not impact the thermal envelope design significantly. Small changes to the design are noted below and expanded on in Section 4.6

Items to be addressed at Developed Design

- Slab insulation detailing
- Heating setpoint
- Maintaining a higher radiant temperature in winter.

Daylighting assessment

Section 5 discusses the daylighting strategy and comfort metrics. Daylight modelling for the Athfield Architecture 50% Preliminary Design set was used to assess daylighting extent and glare risk in the primary area spaces, with a focus on the Main Library areas which are naturally ventilated.

The analysis identified that glare is a major risk, primarily due to low angle winter sun. In addition, the skylights cause significant glare on level 1. The currently selected glass is very light in appearance which means more sunlight is admitted into the space, which will cause discomfort for occupants.

We recommend blinds in combination with darker glass are used to mitigate the impacts of glare.

Upfront Carbon Analysis

Green Star projects targeting 5 Star certification must demonstrate minimum 10% less upfront embodied carbon, than a “Standard Practice” reference building. This is a conditional requirement of Green Star, however we recommend a 15% reduction. Beca has communicated these requirements to Athfield Architects and Dunning Thornton Consulting structural engineers as the key influencers of embodied carbon.

Our upfront carbon analysis indicates an estimated ~14% reduction when compared to standard practice (with a tolerance of ±50%), with further savings that could be made in reinforcing and structural steel elements. Refer to Appendix A for a detailed summary.

Climate Change Adaptation Plan

A climate impact assessment (as part of Green Star Credit 3.1) has been completed. This assesses the likely climate impacts onsite and provides an overview of the potential risks associated with the design as it currently stands.

The next stage of the CCAP is for NCC to finalise the consequence ratings for the identified risks, and for the design team to address any high and extreme rsiks in the following design stages.

Refer to Appendix D for further information.

Next steps

Green Star

- Green Star workshop with wider design team to agree and finalise credits to adopted.
- Green Star design elements to be incorporated into the design.
- Design team to respond to Green Star Responsibilities Matrix

Net Zero Operations & energy assessment

- NCC to confirm sustainability approach and Net Zero certification adoption with Beca.
- NCC and Beca to further review the library operations and expectations around opening hours etc.
- **NCC to confirm the Net Zero Buildings certification is the desired pathway to certifying the operational net-zero carbon aspiration.**
- Beca to engage with NZGBC to develop appropriate benchmark buildings.
- Computer modelling to confirm operational carbobn performance is on-track

Façade modelling

- Beca and Athfields to discuss additional daylighting strategies
- Athfields to incorporate recommendations

Sustainable Features Summary

Lower Energy

- 30-55kWp solar PV array
- All electric heating and cooling systems
- Efficient LED lighting with energy saving controls.
- Net Zero operational Carbon target

Comfortable and enjoyable spaces

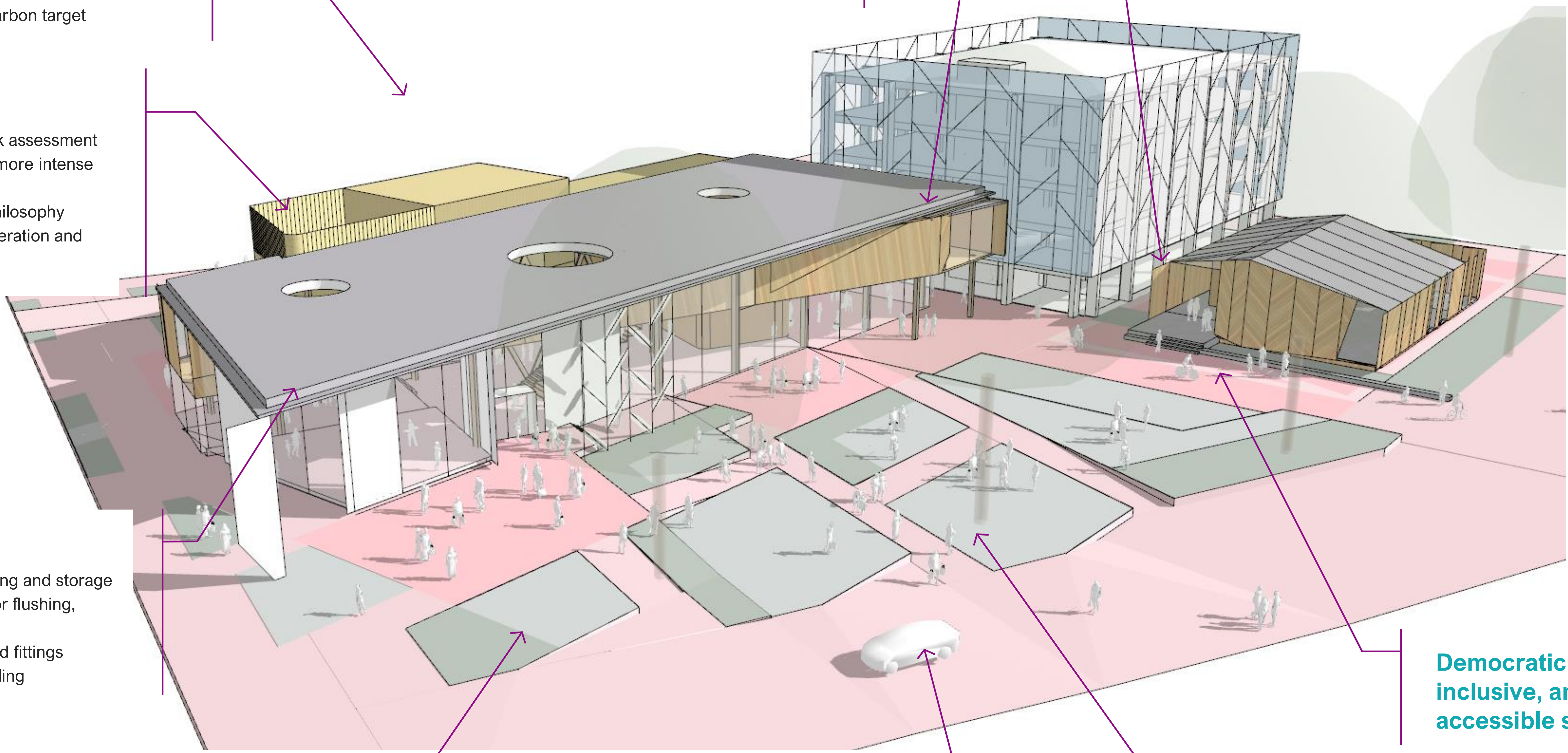
- Daylighting, acoustics, and thermal comfort to Green Star Principles
- Opening windows and access to the Atea

Responsible materials

- Low Volatile Organic Compound and formaldehyde materials
- Eco-certified building products
- Limited use of PVC, limited to best-practice PVC products

Resilient design

- Undertaking climate risk assessment
- Designed to cope with more intense climate conditions.
- Low damage design philosophy
- Designed for easier operation and maintenance.



Water efficient

- 10KL of rainwater harvesting and storage from the main roof used for flushing, irrigation and washdown.
- Water efficient tapware and fittings
- No active evaporative cooling

Democratic, inclusive, and accessible spaces

Fewer emissions and improved site ecology

- Low impact refrigerants with reduced charge
- Reduced stormwater runoff through raingarden detention
- Stormwater treatment through natural systems
- Improved public realm and activation of public space through rain gardens and native planting

Low carbon transport

- Secure bike parking for staff
- Showers, lockers, and drying facilities
- Local public transport stops
- Visitor bike parks

Lower carbon design

- Mass-timber framing and structure
- Lower carbon concrete and steel
- Targeting 15% reduction in upfront carbon
- No fossil fuels onsite

1 Introduction

Beca Limited (Beca) has prepared this Preliminary Design report for Napier City Council (NCC) as part of the Napier Library & Community Services Facility – Te Aka.

This report focusses primarily on environmental aspects of sustainability and environmentally sustainable design (ESD). Sustainability is a wide-ranging subject with many aspects outside of the scope of this report (i.e., particular social/cultural/community aspects, cost aspects, durability, longevity, futureproofing, etc). While these are no less important in the context of LCAP 1, we limit our commentary to building and design related matters only. We will seek to integrate these aspects in the design where feasible and where they add value for NCC. Our scope covers:

- ESD briefing development and monitoring.
- Green Star Accredited Professional role
- General ESD advice, including upfront carbon assessment and Climate change Impact Assessment.
- Building envelope performance modelling and review.

The purpose of this report is to respond to the project sustainability brief (refer Beca ESD concept Report) and provide reporting for Environmentally Sustainable Design (ESD) elements. This report outlines the following:

- Update on key design and performance targets
- Green Star Points update
- Net Zero Buildings update
- Building Enveloped Performance strategy update
- Proposed ESD implementation plan to target positive outcomes throughout the future project stages
- Appendices:
    - Upfront Carbon assessment
    - Solar photovoltaic analysis
    - Climate Change assessment

1.1 Environmentally Sustainable Design & Performance Framework Update

The adopted design and performance targets are listed in the below table. The formal adoption of these targets will increase the overall success of the environmental performance outcomes. These often overlap with Green Star (discussed in Section 2), however these expand beyond the general scope of Green Star and are specific to Napier City Library.

The following proposed targets should be re-assessed through the various stages of design to determine their alignment with overall project objectives. Adjustments to these targets may also be made in response to project implementation costs and design constraints that are identified throughout the process. However, we suggest that the project team report on each measure at the appropriate design stages.

At this stage these targets have been proposed based on the following:

- Relevant national and international benchmarking data
- Relevant project experience and understanding of local climatic information.
- Alignment with other recent New Zealand developments

On track

Further refinement needed at following design stage

Not on-track / not included

Environmental Sustainability Attribute	Design & Performance Targets	Design Tracking
Certifications	• Green Star -5Star Design and As-Built v1.1 • Net Zero Buildings Certification (pending)	On track. Refer Sections 2 & 3
Comfort, Health and Wellbeing	**Thermal comfort** • Achieve a ASHRAE Standard 55 +/-0.5 PMV for 98% of occupied hours for 95% of all primary and secondary spaces (in line with Green Star)	Further refinement required. Refer Section 4
	Air Quality • Target maximum 800ppm CO2 concentration during occupied hours in all primary and secondary spaces (air quality). This will typically require a greater number of air changes than that required by building code. • Minimise VOC (volatile organic compound) concentrations within the building through selection of healthier materials. • Minimise Formaldehyde concentrations within the building through selection of healthier products.	Included in Design. Further refinement required in Developed Design
	Acoustics • Achieve recommended design acoustic performance sound levels and reverberation times to align with AS/NZS 2107:2016	Acoustician engaged
	Visual comfort • Achieve a Useful Daylight Illuminance of UDI of 160>2500 lux for 80% of the year for all primary spaces and all façade adjacent secondary spaces to limit dependence on electric lighting. • Achieve an Annual Sunlight Exposure (ASE) of no more than 1000lux for 250hrs of the year for all primary spaces to reduce the impact of glare on occupants and mitigate the use of blinds for reducing discomfort. • Achieve a Spatial Daylight Autonomy (sDA) of 160lux for 80% of hours between 8am-6pm in all primary spaces to admit enough daylight to offset the need for electric lighting. • Reduce glare with low UGR (<19) luminaires in all primary and secondary spaces, as well as any public lobby areas. • Where appropriate for space usage and space planning, provide connection with the outside via windows or rooflights/skylights.	Further refinement required. Refer Section 5. Glare (ASE) remains a risk.
	Design for accessibility and inclusion • Engage a specialist design consultant to undertake a needs analysis and design review of the building for people with health conditions, impairments, other physical needs, and sensitivities (such as those with autism).	BeLab expected to be engaged to undertake accessibility report.

Environmental Sustainability Attribute	Design & Performance Targets	Design Tracking
Energy & Emissions	**On-site Renewable Energy Generation** • Minimum 10% of annual energy consumption generated onsite (Feasibility of Net Zero Energy to be reviewed during preliminary design stage) – minimum 30kWp, currently 55kWp	On Track. Refer Appendix C
	Operational Energy Energy performance target to be established based on energy modelling during Preliminary design and anticipated usage profiles (Excluding benefit from on-site renewable energy generation) • 80kWh/m^2/yr energy consumption (Excluding benefits from Solar PV) • 70kWh/m^2/yr energy consumption (including benefits from Solar PV)	On Track. Refer Section 3
	Operational Carbon (Life Cycle stage B6)[1] Operate at Net Zero Carbon by 2030. • *10.06 kgCO_2-e/m^2.yr (Excluding benefit from on-site renewable energy generation) • *8.73 kgCO_2-e/m^2.yr (Including benefit from on-site renewable energy generation)	To be reviewed at Developed Design.
	Upfront Embodied Carbon (Life Cycle stages A1-A5)[1] To be developed from concept design: • 15% less than a reference building covering substructure, superstructure, envelope, warm shell fit out items, building services (excluding external areas)	Current estimate is a 14% reduction. Refer Appendix A
Water Efficiency and Conservation	• Target 40% reduction in potable water use via harvested/recycled water compared to a reference building using conventional fittings/fixtures • Peak stormwater discharge to be no higher compared to existing site prior to development while taking account of future climate change scenarios and increased rainfall • 100% of all stormwater discharged from site meets specified pollution reduction targets and filtration is provided via natural mean	42% estimated reduction per Green Star Credit 18.0 calculator
Materials & Waste	Develop a Waste Management Plan to divert as much construction waste as possible from landfill. Target 70% diversion measured by weight OR achieve waste rates no higher than 15kg/m^2 of GFA	TBC as part of Contractor procurement
Transport	Provide low-carbon Transport options to patrons and staff including: • Safe and secure Bike parking for 20% of staff and 'regular' occupants (e.g. café staff and regular visitors to the library such as innovation space teachers and staff – assumed to be up to 30 people) • Provide showers, lockers and drying facilities to the above • Provide visitor bike parking at key public entrances for a range of bike types • Provide a combination of drop-off zones, bus stops, and fuel efficient vehicle parks for visitors.	10% of staff only. Bike park integration to be reviewed within LCAP 2
Local emissions	• Avoidance of on-site fossil fuel energy sources • Avoidance of any negative environmental or ecological impacts to neighbouring sites • Low Global Warming Impact refrigerants to be specified with minimal charge wherever possible	On track
Landscaping, Plants and Site Ecology	• Enhance the post-construction ecological value of the site compared to pre-construction via vegetation and native planting. • Review options for external thermal comfort conditions and design interventions in the civic square (UTCI or PET metrics) to evaluate exterior conditions for year-round occupation.	On track

*[1] Operational carbon assumes a kgCO2-e per kWh of 0.1258 (per 2021 annual purchased + transport emissions factor from 'Te ine tukunga: He tohutohu pakihi Measuring emissions: A guide for organisations: 2023 emission factors summary'.) *Carbon emissions targets are highly dependent on final materials selections and sizing of the superstructure, building services design etc.*

All carbon and energy targets (operational, upfront, and whole of life are placeholder values until further analysis can be completed).

2 Green star Update

Achieving a minimum 5 Star Green Star certification is listed as a must-achieve for the Library Building.

2.1 Registration Status

Spatial differentiation and project boundaries

As Green Star requires certified buildings to be distinct, there will need to be clear boundaries between the certified and non-certified buildings.

Currently the main library and Atea are included within the registration area, meaning only these areas will need to comply with, and be certified to the Green Star standard.

The Annex / Chamber building is not within Green Star certification scope. There are two options for the Annex:

1. Align with Green Star principles and criteria, but do not target formal registration – this saves fees and consultancy costs – **Option being proposed by Beca ESD**
2. Certify as a separate building and formally certify. Note this would incur additional registration fee.

This assumes that the Annex will be built to Green Star requirements regardless of registration to ensure design consistency and quality between the two buildings. We believe this helps to reduce design complexity and reduces confusion for the contractor.

The Green Star boundaries are assumed to be per Figure 1. Within the yellow area is the proposed Green Star boundary. The blue boundary, again an assumed boundary, would be out of scope for the Te Aka project as a whole. The green area is the broader streetscape which may influence some Green Star points such as stormwater, ecology, and transport credits. It has been included as the client, NCC, has some influence over these areas. We also note that the main building is sited beyond the title boundary currently, particularly to the southern laneway.

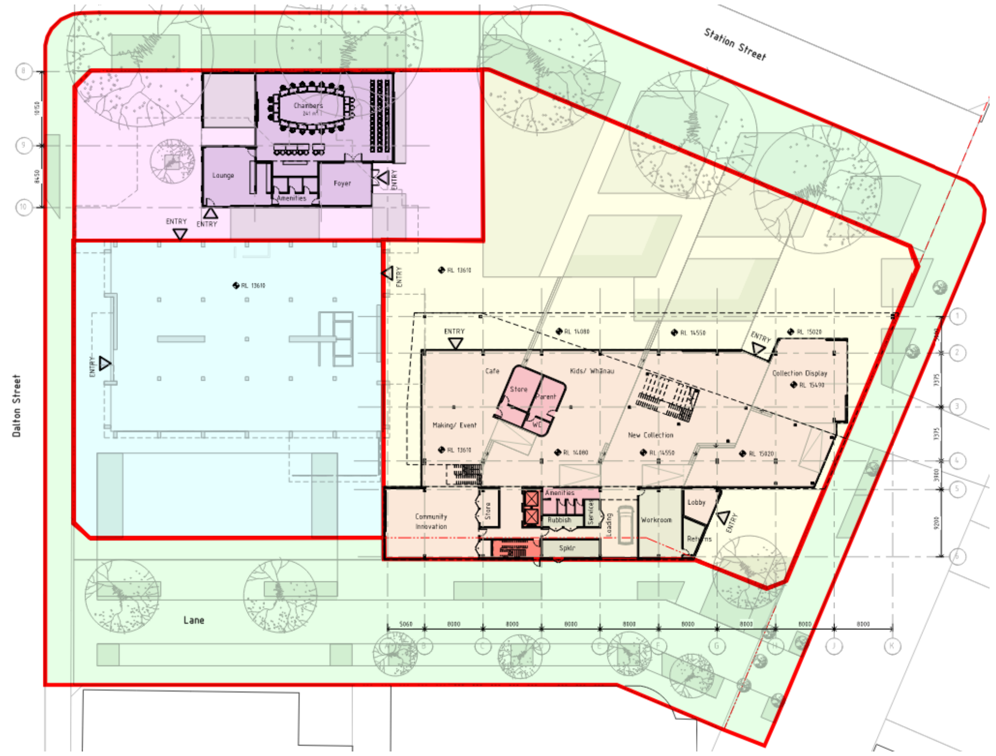


Figure 1 - Green Star area boundaries

Possible Green Star Boundary for LCAP 1
Possible LCAP 2 Boundary (flexible and TBD by NCC)
Possible Annex Boundary for LCAP 1
Possible Streetscape boundary (flexible and TBD by NCC)

To meet the Spatial Differentiation criterion, a project must be clearly distinct. Only distinct projects are eligible for assessment; project components are not eligible.

Sub tenancies are considered part of the fitout and cannot be excluded from the rating, therefore any café or similar tenancies must also comply.

Registration Status

The project has been initially registered with the NZGBC. It is expected that this registration should therefore sit within the 2023 calendar year, meaning that the project only needs to achieve a 10% upfront carbon reduction. Fees must be paid by January 31st 2024 to secure this.

Green Star requires a single registration cost per the table below. This covers both Design Review Rating and As-Built Certification, as well as four Technical Clarifications. Fees can be reduced if NCC become NZGBC dues paying members – NCC have indicated that they will register as members in order to receive the discount.

Design & As Built Project Value ($)	Members fees 2023-2024 ($)	Non-member 2023-2024 ($)
30M – <60M	36,300	51,300

Further costs are possible but are untypical. Fees are updated annually (typical) and can be found on the NZGBC website.

2.2 Green Star v1.1 Conditional Requirements

Green Star v1.1 includes the following mandatory requirements that any project much achieve in order to target 5-star certification:

Green Star Credit	Conditional Requirement	Status
Credit 2: Commissioning and Tuning	The building must set environmental performance targets, complete comprehensive commissioning, and complete post-occupancy building tuning.	✓ Within scope
Credit 3: Adaptation and Resilience	Project teams must complete a climate change pre-screening checklist and communicate the building's exposure to climate change hazards, and any identified risks to the client/building owner.	On track
Credit 15: Greenhouse Gas Emissions	Project teams must demonstrate that the operational greenhouse gas (GHG) emissions from the Proposed Building are at least 30% less (5 Star) than those of a Reference Building. Project teams must also demonstrate that they have limited direct fossil fuel sources. The Proposed Building shall have no greater than 10% (5 Star) of its annual GHG emissions from direct fossil fuel use on site.	✓
Credit 19: Life Cycle Impacts	A minimum reduction in upfront carbon emissions of 10% is required to achieve 5 Star Green Star rating.	On track

Green Star Credit	Conditional Requirement	Status
Credit 24: Sustainable Sites	To achieve a certified rating the project must not be located on a site of high ecological value and must not convert or otherwise prevent the use of highly productive land for agricultural purposes	Achieved

2.3 Upfront Carbon Conditional Requirement

A New conditional requirement has been included covering the Upfront Carbon (Life Cycle Assessment Modules A1-A5) in the building construction. Projects targeting 5 Star certification, registered before the 1st January 2024 must demonstrate a 10% minimum reduction compared to a "Standard Practice" reference building. This is a hypothetical building that represents standard contemporary construction and operation practices, covering the "warm shell" elements of the building up to the dripline, i.e. external elements are excluded.

At this early stage of design, we recommend targeting at least 15% reduction in upfront embodied carbon compared to the reference. This will offer a level of resilience against potential project changes during the design as well as potential challenges with lower-carbon material supply and procurement.

Currently the building is estimated to be ~14% better than standard practice overall. Refer to Appendix A for further detail.

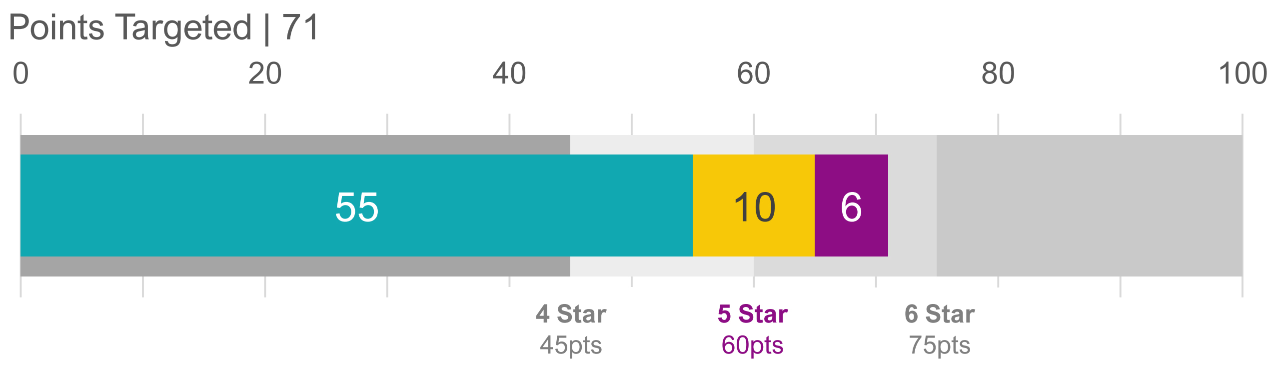
2.4 Te Aka Green Star Pathway

An initial Green Star pre-assessment has been carried out to inform the development design and align with a 5 Star target. Refer to Appendix B for further details. A minimum of 60 points are required at the end of construction to achieve 5 Star. We recommend 66 points minimum are targeted at this stage to allow a 10% buffer for any points to not be awarded.

Overall Target Benchmark

The below chart shows the overall benchmark and points per category from the Green Star assessment. The credits are presented with a traffic-light style 'confidence' rating per point.

This presents a confident pathway to achieving Green Star for the project with an +11-point buffer. The project is scoring well at this stage of the design. There may be opportunity to remove difficult and costly points at the next pricing review.



Higher confidence points are indicated as currently easily achievable, within current scope, or with little uncertainty (subject to submission documentation)

Medium confidence points indicated as available but minimal uplift in consultant scope or cost anticipated. Typically, these points are easily achievable, but further analysis and design work is required to turn them 'green'.

Uncertain or Lower confidence points may be available subject to budget cost alignment, or further detailed review such as energy modelling or identifying contractor and supply chain risk.

We note that most 'medium' points simply require further analysis not typically undertaken at Concept design.

Design Responses Associated with Medium Confidence Points

- Credit 8.0 - Provide a dedicated waste storage/sorting area sized based on expected generation of each waste stream and collection frequency. Complete an Operational Waste Management Plan to inform sizing (1pt) – Bin areas are noted already within the scheme. Requires a specialist to inform the design through further design review alongside NCC operations. Can be achieved with further review
- Credit 10.1 – internal noise from external noise sources and internal plant to be minimised in all Primary and Secondary areas (1pt) - Requires further review with an acoustician. The large library space and neighbouring streets may make this challenging, particularly in the eastern areas adjacent to Hastings Street given the operable windows. Must be carefully considered alongside the natural ventilation design
- Credit 10.2 - Acoustics reverberation to be minimised in all Primary and Secondary areas (1pt) - Requires further review with an acoustician. The large library space and hard finishes may present challenges, but these may be mitigated with good surface treatment.
- Credit 14.2 - Design to achieve best-practice level of Thermal Comfort for at least 95% of the nominated area. Risks associated with the double height space. Considered medium risk as it requires modelling to confirm likely conditions. (1pt) – May require increasing the winter heating setpoint to 21°C. Refer to Section 4.
- Credit 15.1 – Energy modelling and reduced Green House Gas emissions (2pts) – Typically, we have 2pts listed as 'float' until detailed energy modelling can be undertaken. A total of 13pts for this credit is typical for a building of this type.
- Credit 17B.3 – Electric and Fuel-Efficient Vehicle parking. Considered uncertain until the final extent of parking is determined. Moderately influenced by the state of LCAP 2 (2pts) – Will be reviewed at Developed design
- Credit 17B.4 – Bike parking for regular occupants. Occupant End of Trip is expected to be within the LCAP 2 project. This is allowed for, but final details are TBC with the architect. Will be reviewed at Developed design
- Credit 19.0 – Upfront and whole-of-life carbon is currently uncertain as no analysis has been able to be undertaken yet. This is expected to occur during preliminary design. Note that points are typically considered riskier in the early design stages, and rapidly firm-up as the design and procurement processes evolve (1pt) - Additional points possible after a Life Cycle Analysis is completed. Expect 4+ points may be achievable in credit 19.0, pending a full LCA, via the timber structure, low GWP concrete and steel alternatives. Please refer to Appendix C for further details.

Design Responses Associated with Lower Confidence or Uncertain Points

- Credit 12.0 - Design to avoid visual glare from direct solar gain. Note this is a minimum requirement for 2pts associated with daylight and view access - Can be achieved through a combination of external shades and blinds but may be challenging in the main spaces. Requires close coordination with AAL in Developed Design
- Credit 19.0 – Minimum 10% upfront carbon reduction (2pts) – As per 'medium confidence' note above.
- Credit 25.0 – Treat site stormwater run-off to best practice levels prior to discharge from site (1pt) – site extent and pollutant run-off are key determinants, as well as LCAP2 resolution regarding overland flow paths and location of treatment. Currently assumed 'in', but requires significant additional review from the civil engineer.

2.5 Next Steps

- Green Star workshop with wider design team to agree and finalise credits to adopted.
- Green Star design elements to be incorporated into the design.
- Design team to respond to Green Star Responsibilities Matrix

3 Net Zero Buildings certification (NZGBC)

Achieving a net-zero operational carbon is listed as a must-achieve for the Library Building.

We believe that formal certification via the NZGBCs newly released 'Net Zero Buildings' certification is the most appropriate and rigorous way of formalising this target.

3.1 Operational Requirements

The reporting and measurement requirements will cover:

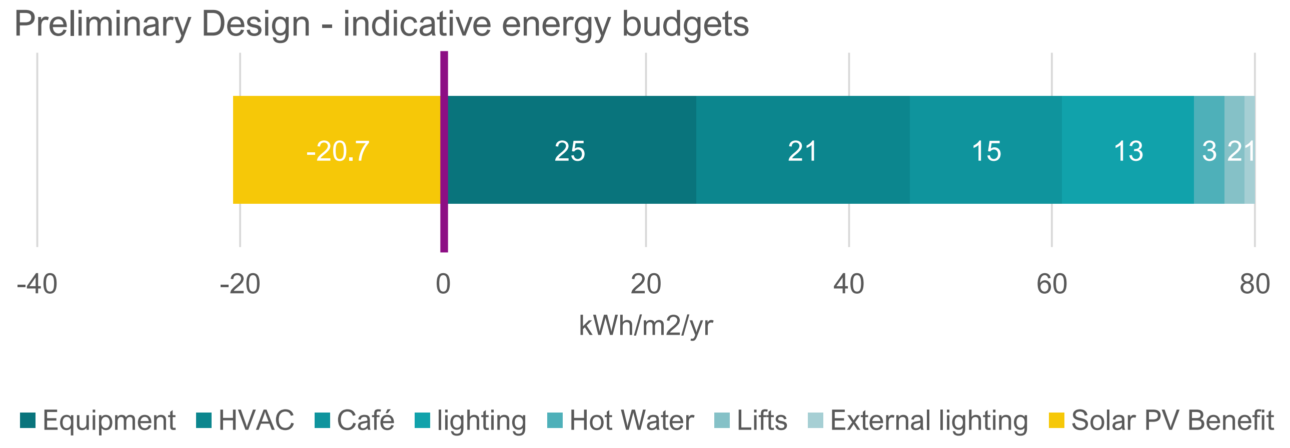
- Demonstrate best practice energy efficiency performance in practice (Compared to a typical NZ benchmark)
- Power and gas emissions onsite as well as associated distribution emissions
- Refrigerant leak impacts
- Potable water, wastewater, and waste emissions

Remaining emissions are covered by recognised and verified carbon credit offsets.

3.2 Energy Benchmarking

The building will need to demonstrate a reduction in energy consumption against other comparable benchmark buildings, i.e. other libraires. Three other library buildings will need to volunteer their energy consumption for benchmarking. Beca will engage with the NZGBC on this. The Library building will need to use less energy than these buildings as an initial step towards certification.

Prior to this benchmarking exercise, Energy and carbon benchmarks will be developed in the future design stages, providing a whole building and 'end use' budget for the design team to work towards. Note that these are indicative only and do not represent real or actual energy consumption, nor are they predictive.



3.3 Design philosophy

Façade performance

The façade will have a significant impact on the peak heating and cooling loads, and therefore the type of HVAC system required to meet these loads. The key determinants of the façade performance will be the degree of solar control performance provided through a combination of high-performance glazing, and reduced window area.

Further to solar control, reducing heat loss by minimising window area and having a low level of conductive heat transfer (U-value) through glazing is critical for winter performance and thermal comfort.

We also note airtightness testing could occur to improve the façade performance and reduce heat loss through infiltration and exfiltration. Note that this aligns with Green Star innovation points, but may be difficult to achieve in practice.

Low energy Heating Ventilation and Cooling Systems

A key focus is on the energy efficiency performance of the HVAC system. Given the Napier location, the building will be cooling load dominated meaning cooling system efficiency should be a primary target. Additional focus areas should include:

- Avoidance of simultaneous heating and cooling
- Demand controlled ventilation
- Heat recovery ventilation
- Careful zoning to match terminal units to similar loads
- Focus on ventilation system design efficiency
- High quality controls strategy

Other Systems

- The lighting power density should aim for 5W/m^2 total, at 320Lux across the floor plate. Consideration of daylight harvesting to automatically switch perimeter lighting when conditions allow will result in overall reduced base building load.
- Electric on-floor cylinders are the preferred option for the on-floor how water provision as heat loss from a return loop to a central heatpump cylinder may offset any efficiency gains.
- A comprehensive energy sub-metering strategy must be employed to enable energy end-uses (fans, pumps, lights, etc.) to be reviewed at developed design.

Construction/Commissioning Stage

- Comprehensive commissioning of building services with sufficient time allowance during construction programme.
- Focus on initial controls configuration for energy efficiency as well as meeting design functional requirements.
- Ensuring integrity of thermal insulation, with reduced thermal bridging and air tightness.
- Validation of energy sub-meters and energy monitoring system.

Post Occupancy

The operational stage is where the design energy performance is achieved and is of most importance to achieve the energy performance target:

- Sufficient training for the FM team to operate the building in an energy efficient manner including the provision of user guides outlining the energy efficient features of the design.
- Comprehensive building tuning utilising analytics approach during the first two years of operation to ensure the building is operating as per the design intent.
- Monthly monitoring of energy consumption and record keeping.
- Adoption of a continuous monitoring system with real-time diagnostics to identify energy inefficiencies.

3.4 Low energy design requirements and key assumptions

Design approach requirements

In order to minimise energy consumption, and therefore carbon, the below design criteria are proposed for review by the services engineer and architect (in the following design stages). Initial design targets are listed below:

Preliminary Design updates in **red**

Table 1 - Building performance attributes

Design attribute	Performance Target	Included?
Façade and thermal envelope		
• Avoidance of direct solar gain in summer months	• External shades and canopies • **Blinds or other glare reducing devices (refer glare summary below)**	• ✓ • TBC by Architect
• low U-value glazing	• Indicatively >U2.2 i.e. argon filled OR thermally improved framing	• ✓
• Manually operated opening windows	• Aim for 5-10% coverage of wall area. • Weather station to close windows on wind and rain conditions	• ✓ • TBC by Mech[2]
• Minimised infiltration when the building is closed	• Target 0.2 ACH infiltration (closed operation)	• TBC by Architect
• Insulation to above NZBC requirements	• Walls R3.0, Roof R5.0, Floors R3.0	• ✓
Air Systems		
• Maximum absorbed fan powers – AHUs	• 0.9-1.2 W/l/s	• TBC by Mech[3]
• Maximum absorbed fan powers – EC-FCUs	• 0.5-0.8 W/l/s	• TBC by Mech[2]
• Heat recovery effectiveness (if provided) – Include bypasses.	• 75%	• ✓
• EC and Variable speed controls	• Required	• ✓
• CO^2 control	• 800-1000ppm (initial)	• ✓
• Outdoor air supply on no occupancy	• OFF	• ✓
Heating and cooling Systems		
• Minimum SCOP	• 3.2, ideally 3.3+	• ✓
• Minimum SEER	• 3.3, ideally 3.5+	• ✓
• Maximum absorbed pump power – primary circuit	• ~80 W/l/s,	• TBC by Mech[2]
• Maximum absorbed pump power – secondary circuit	• ~200 W/l/s • **Variable speed**	• TBC by Mech[2]
Lighting Design		
• Assumed lighting Power Density	• 5 W/m2	• TBC by Elec[2]
• Target lighting efficacy	• >110 lumens/watt	• TBC by Elec[2]
• External lighting	• Kept to a minimum to meet CPTED requirements	• TBC by Elec[2]
• Internal lighting schedules	• Off overnight – to be reviewed against CPTED	• TBC by Elec / NCC
• Daylight harvesting and occupancy sensing	• Required in all spaces except where health and safety requirements exist (plant rooms etc)	• TBC by Elec
Domestic Hot Water		
• Electric resistance heating only	• YES	• ✓
• Local cylinders	• YES – avoid loops and circulators	• ✓

[2] Typically done at Developed Design

Design attribute	Performance Target	Included?
• Insulation	• Increased insulation on Hot water loops / dead-legs	• TBC by P&D
Solar PV		
• Annual generation target	• >39 MWh	• ✓ (>65 MWh)

Baseline Assumptions

- Further work and assumptions will be reviewed/tested at the subsequent design stages
- Energy benchmarks are still indicative only. NZGBC benchmarks are yet to be established.
- Coverage is for the main building only, Annex and LCAP 2 are excluded
- Solar PV
  - 39 MWh minimum annual target generation including all system losses (currently showing 65 MWh)
  - 1,100 kWh/kW_{peak} generation potential
- Equipment + Café
  - Assumes mostly plug-in laptops + AV equipment in main spaces, plus vacuum equipment etc.
  - Assumes higher quantum of power draw from innovation and make space – to be confirmed by NCC
- Café
  - Assumes no gas connection
  - Assumes café has counter style and reheat style cookware + a fryer, not full commercial kitchen (pizza oven, commercial ovens etc.)
  - Generic energy consumption rate of 15 kWh/m2/yr. - to be reviewed in detail with NCC at following deign stages
- Operating hours
  - 3600 operating hours year (8am-6pm, 7 days)

3.5 Limitations

The ‘operational energy budget’ and figures presented in this section are preliminary only as they do not yet reflect a complete design. The numbers presented are for comment only as explainers and as indicators of the energy and carbon targets that will be further developed. We do not believe the figures presented are suitable yet for benchmarking against actual carbon use or for reserving carbon offsets.

3.6 Next steps

- NCC to confirm sustainability approach and Net Zero certification adoption with Beca.
- NCC and Beca to further review the library operations and expectations around opening hours etc.
- NCC to confirm sustainability approach and Net Zero certification adoption with Beca.
- NCC and Beca to further review the library operations and expectations around opening hours etc.
- NCC to confirm the Net Zero Buildings certification is the desired pathway to certifying the operational net-zero carbon aspiration.
- Beca to engage with NZGBC to develop appropriate benchmark buildings.
- Computer modelling to confirm environmental performance is on-track

[3] Typically done at Developed Design

4 Thermal Comfort Assessment

4.1 Thermal comfort metrics

International research and studies of buildings in use indicate clear links between occupant thermal discomfort and their ability to perform a task, and links between comfortable environments, user satisfaction, and productivity.

A person's thermal comfort is primarily affected by the following environmental conditions: Air temperature, Radiant surface temperature, Relative humidity, Air velocity, Level of clothing, and Level of Activity.

Calculation of the Predicted Mean Vote (PMV) for a given situation is used to assess the likelihood of thermal comfort for a large group of people. PMV is an industry standard ISO/ASHRAE design index that predicts the mean value of the votes of a large group of persons on the following seven-point thermal sensation scale to give the predicted Percentage of People Dissatisfied (PPD) with the thermal environment:

- -3 = Cold.
- -2 = Cool.
- -1 = Slightly cool.
- 0 = Neutral.
- +1 = Slightly warm.
- +2 = Warm.
- +3 = Hot.

The thermal performance metrics and design performance targets for Te Aka ±0.5 for 98% of occupied hours (8am-6pm, 7days a week). This is a high degree of thermal comfort and translates to an environment where approximately 90% of users are thermally comfortable throughout the year.

Thermal Comfort Assumptions

Per guidance from NCC, we have assumed that the occupants (visitors and staff) are dressed to the conditions. We have also assumed that they have a lower activity level in winter (reading), than in summer (walking about) in order to add reflect the full range of occupancy conditions. This presents a more conservative view of the thermal comfort conditions

	Winter	Summer	Reference
Clothing	0.95 sweater, long pants, long sleeved clothing	0.55-0.6 Short pants and short sleeved shirts	ASHRAE Standard 55:2020
Activity levels	1.0 Sitting reading	1.7 Walking	ASHRAE Standard 55:2020

These numbers will need to be tested with the NZGBC for the thermal comfort assessments used in Green Star credit 14.0.

Air speeds within the space are assumed to be 0.15 m/s in winter, with the ability to increase in natural ventilation mode in summer, up to a 0.6m/s, to allow for some additional cooling effect on occupants.

Humidity is uncontrolled.

4.2 Thermal comfort modelling results

The thermal comfort results are shown below for the main library space. Cells in red show spaces not meeting the thermal comfort criteria. These spaces are on the perimeter only, and are largely a result of lower overall Radiant temperatures, i.e. cold surfaces, and a slightly low air temperatures.

Space	% of occupied hours within comfort criteria	
	± 1.0 PMV	± 0.5 PMV
GF Open Space - W	83%	64%
GF Open Space	100%	99%
GF Cafe - N	94%	80%
GF Cafe	100%	100%
GF New collection - N	92%	79%
GF Kids - N	94%	81%
GF Kids	100%	100%
GF Collection Display - N	91%	81%
GF Collection Display - E	92%	79%
GF Collection Display	97%	87%
GF New collection	100%	100%
GF New collection - E	91%	75%
L1 Collection - N	93%	77%
L1 Collection	100%	99%

The current modelling suggests no thermal comfort points would be awarded. However, these points are not expected to be difficult to achieve with some small changes to the design.

The bulk of non-compliant hours are in the winter mornings where the air temperature and radiant temperatures are too cool for someone that is sitting and reading.

The modelling does not yet include the impacts of natural ventilation (as the final markups were added later in the preliminary design stage, and final opening styles, extents etc. need to be agreed), however it is indicated that overheating in summer can be mitigated.

Note that these use the modelling inputs shown in Appendix E.

4.3 Controlling summer over-heating

The proposed openness and connection of the main library space back to the civic area to means that mixed-mode ventilation strategy is proposed. This means that full air conditioning, especially on hot summer days, is not feasible while also keeping energy consumption low. It also means that the air temperature will be close to the outdoor air temperature in the space.

Reducing radiant effects

Key to this is limiting the 'Mean Radiant Temperature' (MRT) within the building. This is the effective average temperature that people experience with respect to the heat exchange with the surrounding surfaces. Simply put, it is the feeling of warmth or coolth you experience from warm and cool surfaces around you (for example the heat radiating from a black asphalt road on a summer night, or the cold feeling near a window on a winter morning).

By keeping the MRT down, people will feel more comfortable, even with higher ambient air temperatures. To do this, the surfaces in the spaces need to be kept free of direct solar gain so that they do not heat up significantly. Not doing so will result in overheating, especially on summer days.

Increasing air speed

Further this assumes that occupants will be dressed appropriate to the weather (i.e. short sleeved summer clothing on hot days), and that air can pass over the skin at an elevated speed of at least 0.6m/s, either mechanical or natural (enough to cool, but is almost unnoticeable).

The necessity of fans in the spaces will be further reviewed at the developed design stage.

Avoiding direct solar gain

To avoid solar gain into the space, we have indicatively suggested a performance target of no solar gain in the building, between the hours of 9am and 4pm, between November and March (inclusive). This effectively stops the sun from entering the building between these hours. Note that it is still the intention to have daylight within the space, meaning they should still be bright, just not sunlit.

To achieve this, a combination of external shades and canopies are required, (along with limited use of internal blinds). Brighter glass with less solar control, and therefore glass which is lighter appearance can be selected if this criterion is met.

Solar gain is sufficiently controlled into the main building during the summer months per the findings in Table 2. This is achieved with the canopy, indicating that the louvres are not providing any summer benefit.

Further, attention will need to be paid to the skylights which may impact the degree of solar gain.

4.4 Maintaining winter comfort

In the winter months, the temperature outside can reach freezing point, and remains low in the mornings. The design intent is to admit solar gain which will help to passively heat the space. The low angle sun will hit the slab and keep it warmer overall, however the slab will need to be heated to keep surface temperatures warm underfoot. Note that this must also be balanced with glare risk, and risk of overheating during winter.

The heating strategy includes heated air systems via the Fan Coil Units which will help maintain space temperature (20°C). It is expected that the operable windows will remain closed for much of the winter mornings, and that the building will be mechanically ventilated and heated for this period.

Initial studies suggest that the PMV target will not be met because the assumed activity level (reading) is low, and so the heating levels need to increase to accommodate this, from 20°C to 21°C, with a corresponding increase in radiant temperatures via the slab.

Further, the mean radiant temperatures in the space, will need to be at or higher than the air temperature in the space. This will be reviewed in the developed design phase. The underfloor heating extent may be needed within the central areas of the floor slab.

We recommend that the air heating temperature is raised to 21°C.
Further review is required to determine the extent of the in-slab heating.

4.5 Slab insulation

The slab is intended to be heated, and as such will require insulation to keep it from losing heating in the winter (or from cooling due to cold ground below).

We recommend under slab and edge insulation to a minimum of NZGBC, but preferably to above R3.0.

TABLE 2.1.2.2A: Minimum construction R-values for heated roofs, walls or floors

Paragraph 2.1.2.2 a)

Building element	Construction R-values ($m^2 \cdot K/W$)[(1),(2),(3)]					
	Climate zone 1	Climate zone 2	Climate zone 3	Climate zone 4	Climate zone 5	Climate zone 6
Heated roof[(4)]	R6.6	R6.6	R6.6	R6.6	R6.6	R7.0
Heated wall	R2.9	R2.9	R3.0	R3.2	R3.4	R3.6
Heated floor	R2.9	R2.9	R2.9	R3.0	R3.2	R3.4

TABLE 2.1.2.2B: Minimum construction R-values for building elements that do not contain embedded heating systems

Paragraphs 2.1.2.2 b), 2.1.3.11

Building element	Construction R-values ($m^2 \cdot K/W$)[(1)]					
	Climate zone 1	Climate zone 2	Climate zone 3	Climate zone 4	Climate zone 5	Climate zone 6
Roof	R3.5	R4.0	R5.0	R5.4	R6.0	R7.0
Wall	R2.2	R2.4	R2.7	R3.0	R3.0	R3.2
Floor	R2.2	R2.2	R2.2	R2.4	R2.5	R2.6
Windows and doors	R0.33	R0.33	R0.37	R0.37	R0.40	R0.42
Skylights	R0.42	R0.42	R0.4.6	R0.46	R0.49	R0.51

Figure 2 - NZBC Clause H1/AS2 requirements for heated and non-heated envelope elements

4.6 Design Recommendations and Next Steps

Recommendations

- Refer to *Table 1 - Building performance attributes*, above. These figures apply to all construction elements.
- Increase the design air temperature condition to 21°C
- Under-slab and edge insulation to be included in the design by the Architect.

Next Steps

- Glazing selections to be reviewed at Developed Design to balance glare and radiant heat gain.
- Air speed requirements to be reviewed.
- Energy assessment (Developed Design)

5 Daylighting Assessment

The proposed strategy is to keep the glass as transparent as possible wherever solar gain is controlled externally. This allows for better visible light transmittance (VLT), and therefore allows for excellent visual connection to the outside, and light, clear glass. Controlling glare is critical to the success of the space as it will allow occupants to use the space more freely.

We have undertaken climate-based daylight modelling to assess glare risk and potential Green Star points. We have currently only assessed the main library as we believe the back-pack is lower risk overall. This will be re-assessed in future design stages. Currently the ESD specification calls for a glass with a VLT of 70%. This is a lighter glass and is the cause of a significant amount of glare from the open views to the north. Refer Figure 5 and Figure 6 below which show areas with a high degree of glare. Note that these use the modelling inputs shown in Appendix E

5.1 Green Star & ESD Brief Assessment Criteria

- Per Green Star v1.1 Credit 12.0 criteria (taking 10% of hours)
- Prerequisite – Required
  - Annual Sunlight Exposure, - A measure of how much bright sunlight enters the space for a given period (as a proxy for glare).
  - >1000lux, for more than 10% occupied hours per year per space: ASE (1000, 10%) for all spaces
- Points assessment – 2 points available for daylight access, 1 point for external views (already achieved)
  - Spatial Daylight Autonomy - A measure of the ability to use mostly daylight in a space as opposed to electric light.
  - >160lux, for >80% of occupied hours, across 60% of the floor area

Green Star Daylight and Glare Modelling Results

Space (Primary spaces only)	Area m²	Complaint Space Area	
		Glare assessment Pre-requisite ASE – Pass = 90% (<1000 lx, <10% hours)	Daylight Access assessment 2- points for SDA (>160 lx, >80% hours)
GF Cafe	97	14% (fail)	100%
GF Open Space	159	99% (pass)	65%
GF Kids	214	53% (fail)	81%
GF New collection	372	59% (fail)	100%
GF Collection Display	112	6% (fail)	100%
L1 Collection	965	75% (fail)	100%
Total compliant %	**1919**		**95%**
Result		**Pre-requisite failed**	**2 Points achieved (pending pre-requisite)**

5.2 Design Recommendations and Next Steps

Blinds are required to a significant extent of the building to meet the pre-requisite for the Green Star credit. If this is done, it is likely that 3pts would be achieved (currently deemed high risk). The markups opposite show the spaces that would require blinds.

We believe there is a qualitative assessment that could be undertaken to demonstrate to the NZGBC that the project is providing a high-quality environment to users. We believe that Green Star criteria may not be wholly appropriate to all spaces in the design (e.g., the kids activity space), and could be challenged via a technical query. In order to challenge the Green Star criteria, the project would need to demonstrate an alternative but equal compliance with criteria that provides high-quality outcomes for the Library.

Figure 3 - Ground Floor Blinds markup

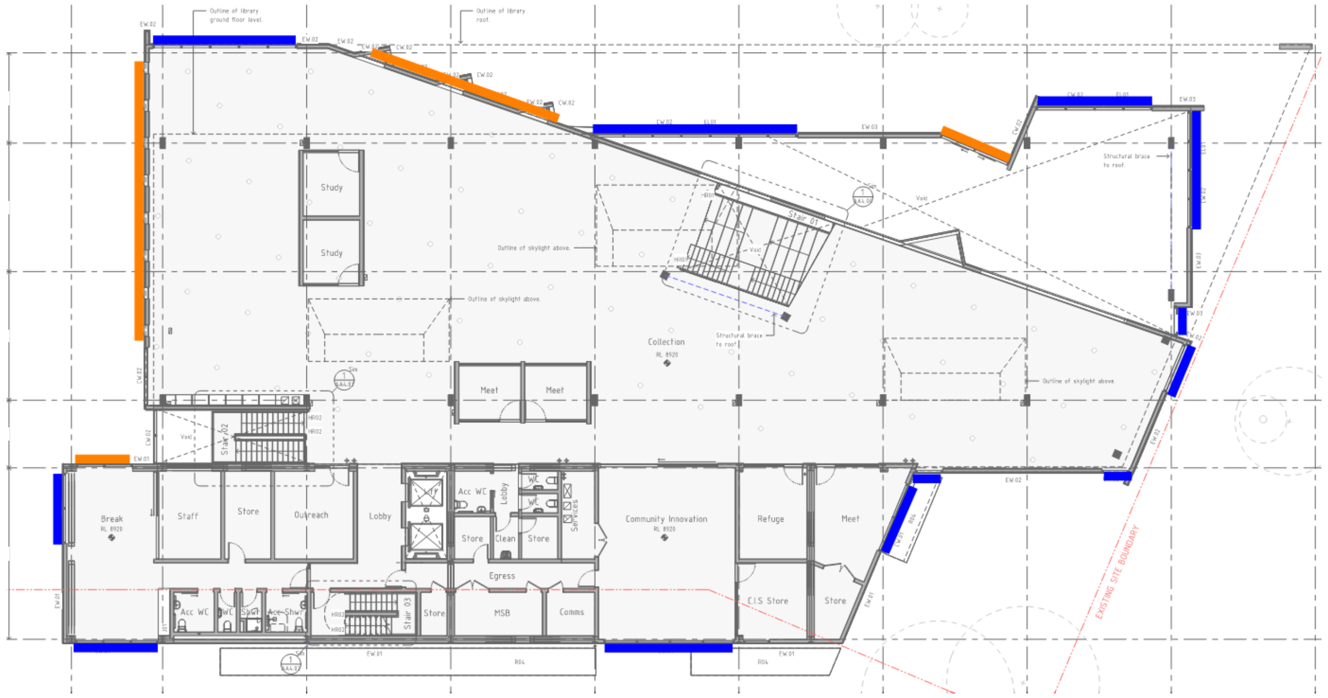


Figure 4 - First Floor Blinds markup

Design recommendations

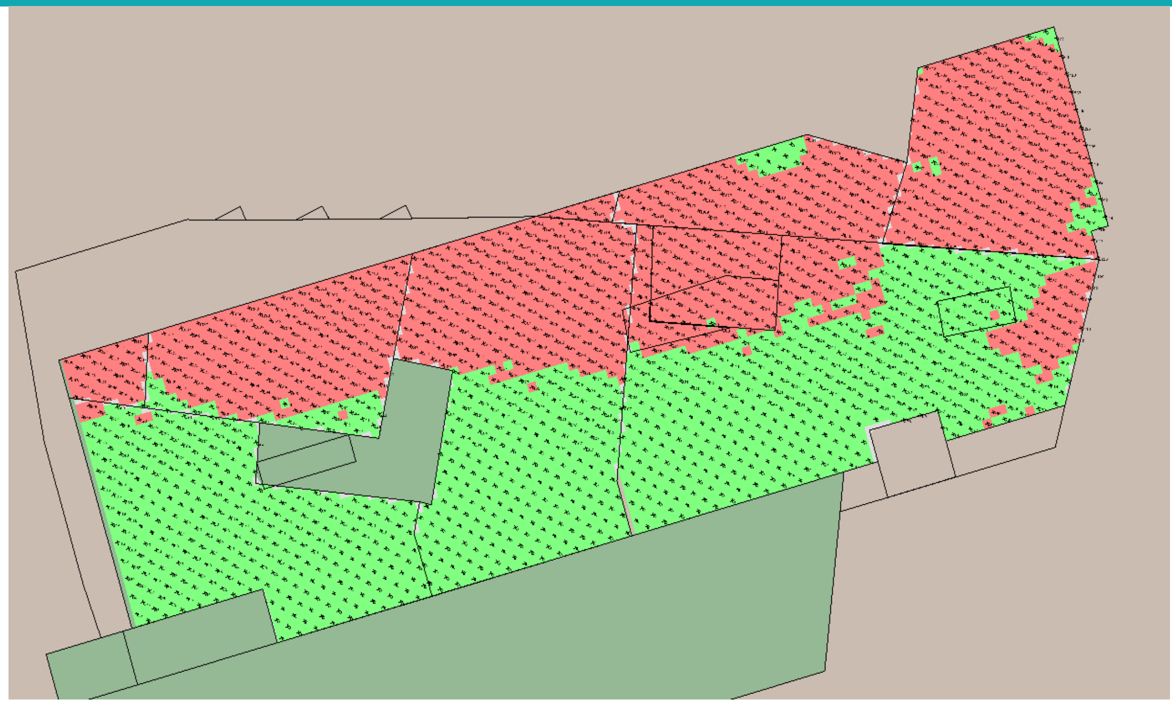
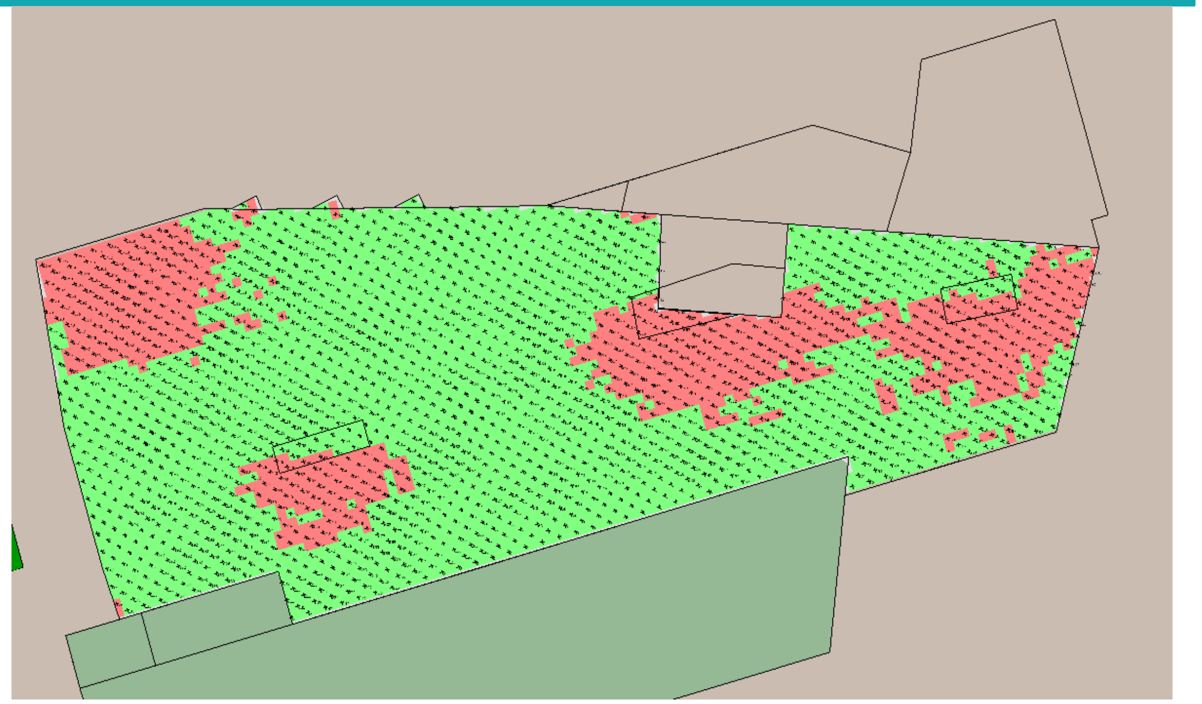
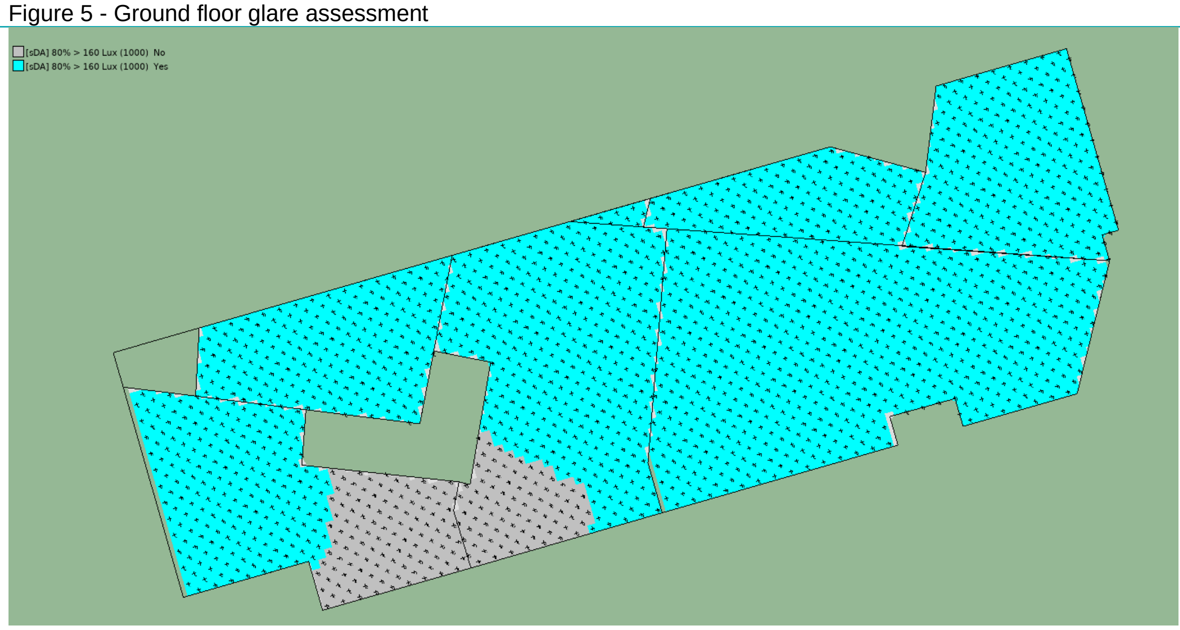
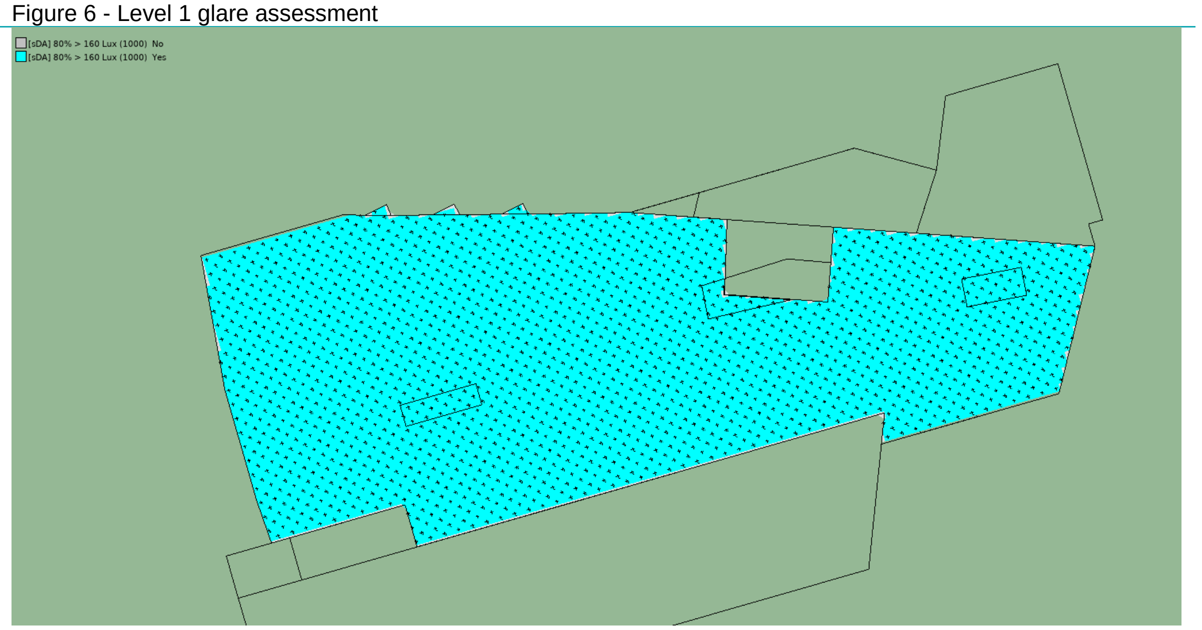
- Northern external louvres can be deleted.
- Eastern external louvres to be deleted or mounted vertically. Final orientation to be agreed.

Next steps

- Beca and Athfields to agree means of meeting Glare pre-requisite (blinds or other fixed shading devices).

Daylight Modelling Results

The daylight modelling indicates that glare is the primary concern, particularly on the northern façade. As discussed above, the degree of glare is very high, indicating that people may find the space uncomfortable if no means of managing glare is provided.

	Ground Floor	Level 1
Glare assessment Pre-requisite ASE (<1000 lx, <250 hours) Fail Pass ↑ N	 Figure 5 - Ground floor glare assessment	 Figure 6 - Level 1 glare assessment
Daylight Access assessment 2- points for SDA (>160 lx, >80% hours) Fail Pass	 Figure 7 - Ground floor Spatial Daylight Assessment	 Figure 8 - First Floor Spatial Daylight Assessment

6 ESD Initiatives to be incorporated into the design

Further to the above initiatives and design approaches we have summarised the ESD opportunities included in the preliminary design as follows:

6.1 Basecase Initiatives (Must-haves)

NZBC alignment, good practice, alignment with NCC Sustainability Approach, or mandatory Green Star:

- Iwi engagement/cultural narrative/ Te Aranga design integration
- Building thermal envelope to meet new Clause H1 R-values (warm roof, wall insulation, IGUs)
- HVAC design to meet new H1 minimum (VM3)
- Energy efficient HVAC/lighting/hot water system design and controls
- Heatpump source space heating and hot water to end of trip – no on-site combustion of fossil fuel
- Low GWP refrigerants specification
- End of trip showers and lockers for staff
- Cycle parks for staff and visitors
- Good practice acoustic design
- Water efficient fixtures/fittings
- Stormwater detention systems
- Energy and water submetering and monitoring strategy via a BMS
- Waste recycling/sorting area(s) and facilities within the library
- Engagement of an Independent Commissioning Agent to manage and report the building services commissioning
- Comprehensive commissioning and building handover
- Post-occupancy building tuning
- Building user guides/Logbook and enhanced handover to facilities management and library staff teams
- Reduced upfront embodied carbon (strategy to be confirmed):
  - timber structure where appropriate
  - low GWP concrete (e.g. fly-ash mix)
  - lower carbon content steel (reinforcing and primary structure)
  - timber partition framing
- 30kWp minimum rooftop solar PV array. **The exposed roof areas have been identified as a prime opportunity to showcase NCC's sustainability response**
- Rainwater harvesting system, indicatively sized to 10KL
- CO^2 monitoring to all regularly occupied spaces
- Subsoil drip irrigation or similar low-flow irrigation systems

6.2 Primary Green Star / ESD initiatives (5 Star target)

- Consider low carbon cladding/insulation options
- Landscaping/planting to enhance site ecological value
- Treatment/filtration of all site stormwater
- Offset "upfront carbon" associated with embodied carbon and construction.
- Access hatches and clear space provided around building services equipment to enable safe and accessible operation, maintenance, and cleaning.
- Printers to be specified with low-emission certifications by NCC
- Dedicated exhausts provided to mitigate pollutants within the workshop / innovation spaces
- Dimmable lighting and advanced lighting controls systems
- Blinds to spaces that are not sufficiently shaded by external canopies/shades to reduce glare
- Low VOC and low Formaldehyde products and furnishings throughout
- Best practice PVC materials throughout (pipes, cables, blinds, flooring)
- Design for accessibility with an accessibility design specialist (beyond minimum NZBC requirements, to cater, for example, people with autism and other needs)

6.3 Additional items for review

- Contractor to provide a Waste Management Plan and Environmental Management Plan
- Construction waste diversion from landfill
- Contractor to provide training in sustainability, health and wellbeing at toolbox talks.
- EV charging capability including eBikes and scooters (non-fast charging)

7 ESD implementation plan

We propose a positive-outcomes focussed approach to the implementation of the environmental sustainability framework. This is intended to improve overall environmental performance outcomes and building user perceptions using an evidence-based approach, while also providing specific design 'gateways' that align with the overall programme. The below table lists the recommended sustainability actions at each project stage and aligns with best practice:

Sustainability Action	Concept Design	Preliminary Design	Developed / Detailed Design	Tender Consent	Construction & Handover	Post-occupancy
• Establish project ESD brief including objectives, principles, targets and "must-have" design requirements	✓					
• Refine environmental performance targets	✓	✓				
• Mana Whenua consultation and establish design requirements	✓	✓				
• Review of broader community engagement and partnership opportunities	✓	With NCC				
• Development of Green Star strategy and confirmation of target pathway	✓	✓				
• Development of the Net Zero Carbon Strategy		Ongoing				
• Integration of Green Star Design and As Built certification		✓		(Design Submission)		(Built Submission)
• Climate Change Risk Assessment Workshop + Project Specific Climate Adaptation Plan (CCAP)		✓				
• Integrate design with NCC Low Carbon Sustainable Transport Plan		-				
• Develop an Operational Waste Management Plan		With NCC				
• Develop an accessibility and inclusion plan, and integrate into the design		With NCC				
• Life Cycle Carbon Reviews and detailed assessment	✓	✓				
• Façade Performance Analysis to inform design and specification	✓	✓				
• Energy/Daylight/Comfort Performance Modelling and Review		✓				
• Measurement and reporting against ESD brief alignment (Design stage)	✓	✓				
• Establish and incorporate ESD requirements into main contract						
• Measurement and reporting against ESD brief alignment (Construction stage)						
• Comprehensive commissioning and building handover						
• Post-occupancy Building Tuning and performance monitoring						
• Measurement and reporting against ESD targets						
• Continuous NCC stakeholder engagement	✓	✓				

A

Appendix A – Upfront Carbon Assessment

Memorandum

To:	Te Aka Design Team	**Date:**	19 December 2023
From:	Sam Kirkup and Phoebe Moses	**Our Ref:**	REFR-1852238096-107192
Copy:		**:**	
Subject:	Te Aka-Napier Library Upfront Carbon Preliminary Assessment		

Summary

We have carried out an initial high-level assessment of the upfront carbon to assess the building's ability to meet the mandatory Green Star carbon reduction requirement of 10%. The project is targeting a 15% upfront carbon reduction (Life Cycle Modules A1-A5, cradle-to-practical-completion). **The project's concept design achieves a ~14%* reduction against its baseline through the use of mass timber structural elements.**

Three primary structural options with different foundations (Pile type A, Pile type B, ground beam) were assessed. Based on these three options the project has been estimated** to have an upfront embodied carbon intensity of ~540 kgCO$_2$e / m^2. All three foundation options assessed had a carbon intensity within 10% of each other, with the total difference in foundation intensity only comprising ~1% of the magnitude of upfront carbon for the whole building.

The figure below summarises the potential impacts of each decarbonisation strategy compared to the reference baseline (using traditional construction materials).

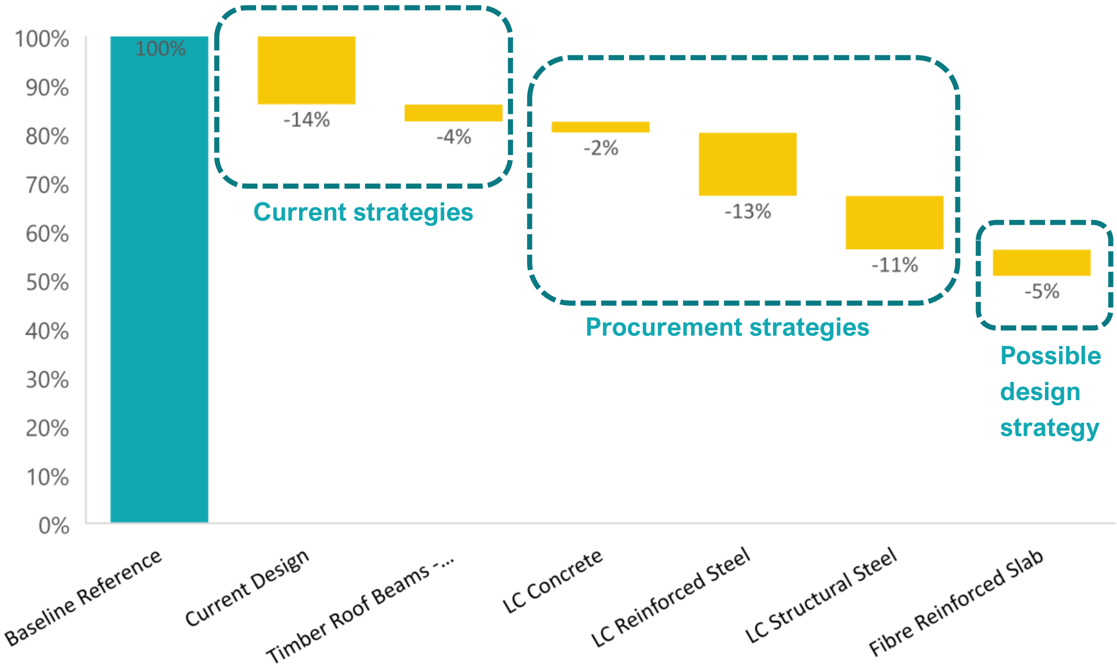


Figure 1: Upfront Carbon Reduction Strategies

**The 50% Preliminary Design drawings show the roof beams as mass timber, meaning the project is likely to exceed the 15% target reduction.*

***This is dependent on design development and inclusion of detailed items.*

Memorandum

Introduction and Overview

As part of the Te Aka project, a new community library and council premises are currently being designed for the Napier City Council on a centrally located site owned by the council, which was previously used for similar purposes. They are wanting to create a purpose-built space that will house the library and provide a learning environment for children and a meeting space for elderly and the wider community. The Napier Library is targeting a Green Star 5-star rating based on the New Zealand Green Building Council Design and As-Built v1.1 rating tool. To achieve this rating, the building is required to meet the mandatory minimum upfront carbon reduction of 10% against a reference baseline. The project has adopted a **15% upfront carbon reduction target** to provide a buffer for any fluctuations throughout the design and procurement process.

To help achieve reductions in carbon emissions, the project has indicated that low carbon materials should be used where possible. The current design comprises a large open atrium space with a mezzanine floor, largely constructed from mass timber, with a two-storey traditional steel and concrete structure along the south edge forming a ‘backpack’ to the building.

The structural concept design described three foundation options under the ‘backpack’, briefly described below:

Foundation types:

- Option 1: Piles type 1: 7.5t K Frames: 600∅ 17m deep, 10t K frames: 600∅ 23m deep.
- Option 2: Piles type 2: 7.5t K Frames: 900∅ 12m deep, 10t K frames: 900∅ 16m deep.
- Option 3: Outrigger ground beams under K frames

These three foundation options were assessed alongside the main building assessment, to provide a carbon lens to decision-making around the foundation typology.

The remainder of this memorandum summarises the results and key findings from the upfront carbon study. Please note, that the results at this stage are based solely on the library building structure and the council annex (chambers) building is excluded.

Memorandum

Results

1.1 Upfront carbon breakdown

The following graph shows the upfront carbon breakdown by building element / emissions source. It is based on the foundation Option 1.

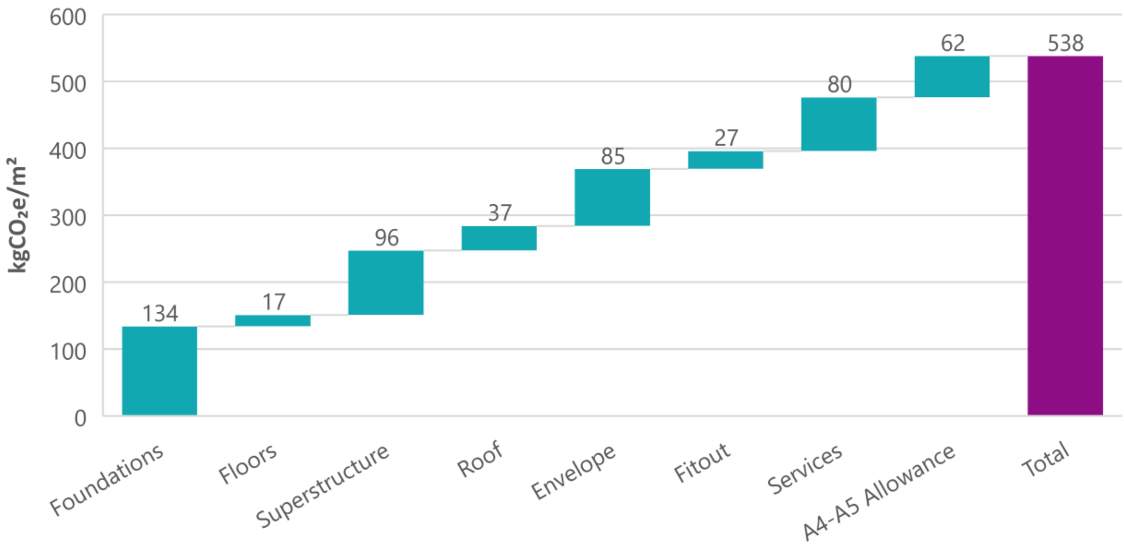


Figure 2: Upfront carbon breakdown by element

The graph below summarises the results of the upfront carbon comparison of the foundations. Although there is some variation between options, this is less than 10% of the overall foundation intensity, which is likely to be within the margin of error for this stage of design and assessment.

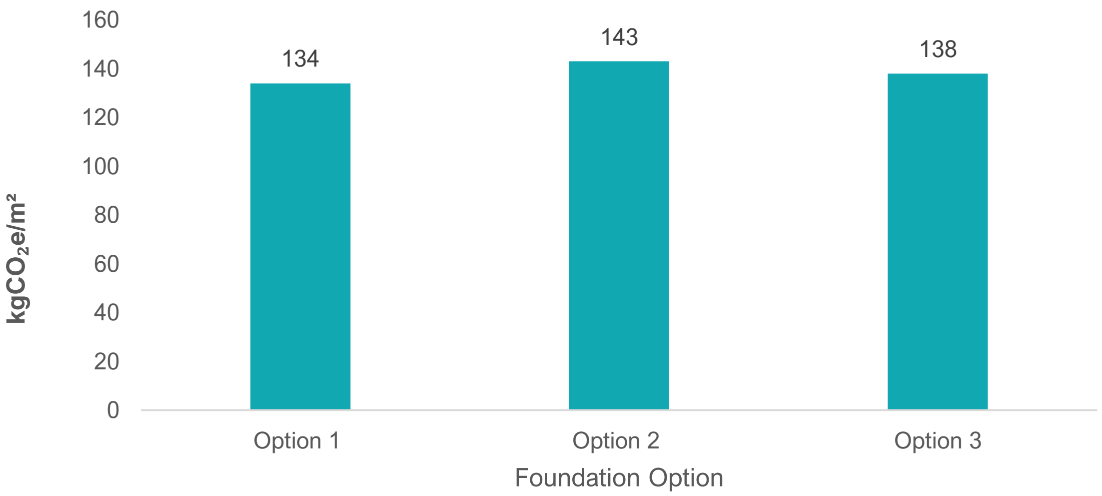


Figure 3: Upfront Carbon of foundations for each option

Memorandum

1.2 Carbon reduction strategies

A range of decarbonisation options were investigated for their impact on the upfront carbon of the building. We estimated the potential carbon reduction savings available through various decarbonisation initiatives, both from a design perspective and a procurement perspective. **The project has already significantly reduced its upfront carbon through the use of engineered timber throughout the building** (cross-laminated timber mezzanine floor and roof, glulam columns and laminated veneer lumber beams).

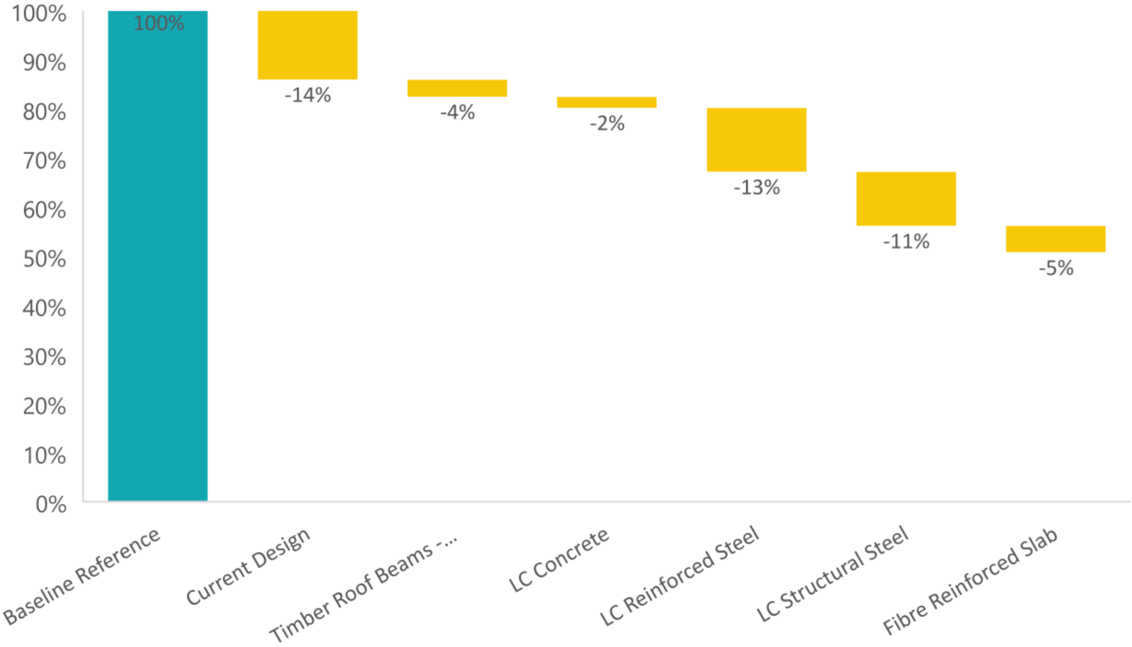


Figure 4: Carbon reduction strategies

The table below describes these options in further detail.

Table 1:Upfront carbon reduction strategies

Reduction Strategy	%Reduction	Description of Change
Current Design Features	14%	Superstructure Framing (replace steel with timber). Mezzanine Floor (replace concrete slab with CLT). Main Roof (replacing light weight DHS purlins to CLT solid roof). *These timber strategies provide ~160 kgCO2e / m2 of carbon storage provided there is FSC certification for timber sourcing.* Façade (Aluminium shading added- negative carbon impact).

Memorandum

Reduction Strategy	%Reduction	Description of Change
		PV Panels (Present in both reference and proposed – larger number to reduce)
Lower Carbon Concrete	2%	20% Reduction in carbon intensity compared to local average.
Lower Carbon Reinforcing Steel	13%	Procuring reinforcement from average Australian supplier or Singapore supplier.
Lower Carbon Structural Steel	11%	Reduction in carbon intensity of structural steel compared to median (~50-80% recycled content, EAF furnace steel, low-carbon grid).
Timber Roof Beams	4%	LVL roof beams instead of 610UB. Note this design strategy has now been confirmed in the 50% Preliminary Design. *This would increase expected carbon storage by ~5kgCo2e/m2.*
Fibre Reinforced Slab	5%	Design & Build slab, assumed reduces to 150mm thick, 3kg/m2 reinforcement

The number of Green Star points likely to be achieved under Credit 19 of GS DAB v1.1 is summarised in the table below. The project is likely to achieve at least 4 points under this credit.

Table 2: Green Star Credit 19 summary (baseline design)

Credit	Comment	Likely points gained
19.1	Conditional requirement for 5 star.	-
19.1 Upfront Carbon Reduction (6 points max)	Borderline 15% current reduction*.	1
19.2 Comparative Life Cycle Assessment (3 points max)	Points are dependent on energy modelling (not yet completed) – likely more points available after energy modelling.	1+
19.3 Long-term Carbon Storage (2 points max)	Widespread use of structural timber meets the requirement of at least 100 $kgCO_2e$ / m^2 of carbon storage.	2
19.3 Long-term Carbon Storage Innovation Points	These are not likely to be available as the threshold is >200 $kgCO_2e$ / m^2 of carbon storage.	0

** The project team have now indicated in the 50% Preliminary Design drawings that the mass timber roof beam option has been selected, therefore reaching a 18% reduction and providing margin to the 15% target.*

Memorandum

Key Findings and Discussion

- The building foundations and ground slab are collectively responsible for ~25% of the whole-building carbon impact. Therefore, any low-carbon initiatives applied to the foundations are likely to have the biggest carbon reduction impact for the building.
- Local concrete suppliers (both Firth) would likely need to procure alternative cementitious materials in order to claim any reduction in carbon intensity from baseline, to pursue the 'Low-carbon concrete' strategy.
- Mass timber has been assumed to be sourced from New Zealand suppliers. Note the results are highly sensitive to the location of mass timber manufacture, and the carbon savings may not be realised should imported mass timber be used instead.
- The building envelope hasn't been majorly reduced in any of these reduction strategies. This is an area of the building that is responsible for ~16% of the whole-building carbon impact. It is also the only area of the building that has increased its carbon intensity against the reference due to the addition of aluminium shading. Therefore, any future strategies (such as procuring 100% recycled or renewable aluminium framing) could target the envelope to help achieve further carbon reduction.
- Low carbon steel (reinforcing and structural) procurement would be likely to further significantly reduce the carbon impact of the building. However, these options are highly dependent on the ability of the supply chain to procure low-carbon steels at the time of construction.
- Option 1 provides the highest base reduction at this stage without the use of any further reduction strategies as it gives the lowest upfront carbon value for the foundations. However, all the foundation options vary negligibly from a carbon perspective, giving similar total upfront carbon value of around ~540 kg CO_2e / m^2
- At least 4 points under Green Star Credit 19 are likely to be available for this project, out of a total of 11. Further points may become available depending on the energy points assessment and final materials procurement.

Carbon Factors Used

The table below summarises the emissions factors used for primary materials, including standard (baseline) and low-carbon values. Note these values may update as we progress through the project, including further potential changes from the Green Building Council as to the appropriate baseline emissions factors for concrete. In addition, there will be options for low-carbon material procurement which sit between the standard and low-carbon values – impacts may be scaled to suit.

Table 3:Carbon Factors

Material	Emission Factor (Standard)	Emission Factor (Low-Carbon)
30 MPa Concrete	221.5 $kgCO_2e$ / m^3 (Hawke's Bay Regional Median)	177.2 $kgCO_2e$ / m^3 – 20% reduction

Memorandum

Material	Emission Factor (Standard)	Emission Factor (Low-Carbon)
Structural Steel	2.84 $kgCO_2e$ / kg (All Sections)	1.3 $kgCO_2e$ / kg
Reinforcing Steel	3.97 $kgCO_2e$ / kg	1.67 $kgCO_2e$ / kg 1.49 $kgCO_2e$ / kg (Steel Fibre)
Mass Timber	144 $kgCO_2e$ / m^3 (WPMA LVL) 65.9 $kgCO_2e$ / m^3 (Red Stag timber CLT)	N/A N/A

Limitations and Further Work

This assessment has been undertaken in line with the embodied carbon methodology of GS DAB v1.1. The scope of the up-front embodied carbon reduction requirement is determined to end at the building dripline, i.e., exclude any external works and ancillary buildings not providing core building services. The embodied carbon impacts of external works will still be required to be reported on separately at the time of submission.

To account for the level of design development, a contingency of 15% has been added to the material quantities. Where detailed information is not available, conservative estimates have been used – for example, the embodied carbon of building services, and construction site impacts. For this preliminary assessment a generic allowance for building services of 60 $kgCO_2e/m^2$ has been added to the services total (taken from BRANZ SR479: Embodied Carbon of Building Services). However, percentage improvements may reduce when final material quantities and additional fit-out scope items are incorporated.

The overall accuracy of the assessment is not to be assumed to be greater than +/- 30% at this design stage.

Further opportunities to increase the relative reduction in up-front carbon not investigated here in detail include:

- Looking to adopt low impact cladding.
- Careful selection of suppliers for other major material items to limit supply chain impact on LCA.

The figures provided in this memorandum are preliminary and are limited to the information provided for this estimate. The estimate should be treated as indicative only with the results reviewed at every design stage.

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B

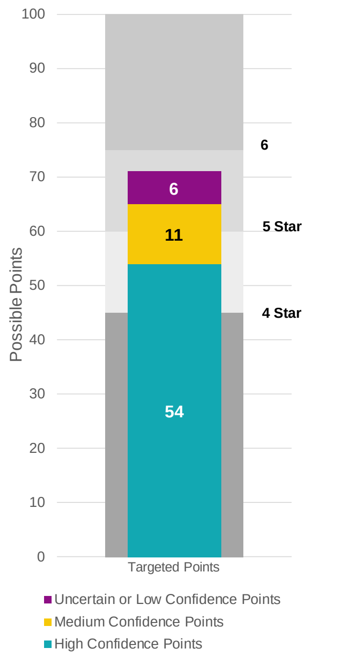
Appendix B – Green Star Pathway Review

Te Aka - Green Star Pathway Review v1.1

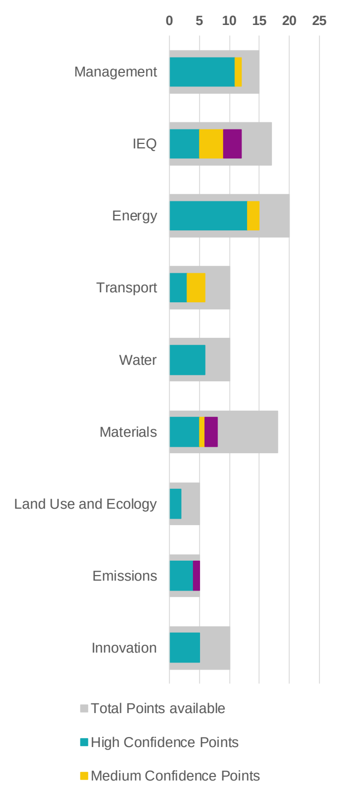
Revision3.0 - 22/12/2023 - Preliminary Design

Changes indicated in yellow

Points Targeted | 71



Points per category



Category	Credit	Available Points	Confidence Rating H	Confidence Rating M	Confidence Rating U	Credit Criteria and Design Response	Lead
Management	1.0 Green Star Accredited Professional	1	1			**Higher Confidence** 1.1 - 1pt - GSAP engaged to advise on sustainability and Green Star requirements through design and construction period	Beca ESD
	2.0 Commissioning and Tuning	4	4			**Higher Confidence** 2.1 - 2pt - Conditional Requirement: Environmental performance targets for operational water, energy, and carbon to be set and documented in Owner's Project Requirements (OPR) document. Tuning of building systems to be included as part of Commissioning works to reduce energy consumption and improve comfort levels 2.2 - 1pt - Services Maintainability Review led by ICA to review services design and suggest changes if required. 2.3 - 1pt - Having an Independent Commissioning Agent - engaged for the commissioning and tuning periods. Commissioning to CIBSE guides, with commissioning plans and reporting in place. Nb. Good for a complex regional project and must-have for net Zeb operational carbon	Beca Services TBIG
	3.0 Adaptation and Resilience	3	2			**Higher Confidence** 3.1 - 1pt - Conditional Requirement: Communicate the building's exposure to climate change hazards, and any identified risks to the client/building owner. Climate Adaptation Plan developed by design team. Areas identified with high climate risk are addressed / mitigated. Evidence of design responses required by project team. 3.3 - Low Damage Design philosophy to be incorporated into the structural design by DTC.	Beca ESD DTC
	4.0 Building Information	1	1			**Higher Confidence** 4.1 - 1pt - Detailed building information for NCC FM team, As-built documentations, O&Ms, Building User Guide, Log Book, building tour and training. Nb. NCC have made specific request for high-quality end of project docs.	Beca ESD
	5.0 Commitment to Performance	2	2			**Higher Confidence** 5.1 - 1pt - Building performance targets developed for operational energy, carbon, and water consumption. Performance to be measured and reported upon internally within NCC. 5.2 - 1pt - Requires internal commitment from NCC and design from AAL for a durable fitout with no major refit within 10years	NCC Beca ESD
	6.0 Metering and Monitoring	1	1			**Higher Confidence** 6.0 - 1pt - Minimum req: Metering is provided which is accessible and able to monitor all major energy and water end-uses. Energy sub-meters to align with energy & water monitoring strategy and each major use (lighting & power per floor, cafe, Heating & cooling, fans, annex, etc.). Water meters for mains, rainwater, cafe, annex, DHW. Monitoring via BMS	Beca Services
	7.0 Responsible Construction Practices	2				**Not Targeted** 7.0 - 2pt - potentially available dependent on Main Contractor appointment. Tier 1 contractors are usually able to score 2 points, Tier 2 contractors with ISO14001 may also score 1 point without significant additional costs. Unlikely to be scored in Napier.	
	8.0 Operational Waste	1		1		**Medium Risk** 8B Performance pathway: Provide adequately sized waste storage area for each waste stream to align with NCC strategy with appropriate access. Considered medium risk until waste profile and bin room size is established. Noting spaces have been provided for already by AAL. Requires waste specialist to provide a waste management plan at developed design.	NCC / TBIG AAL
Indoor Environmental Quality	9.0 Indoor Air Quality	4	2			**Higher Confidence** 9.1 - 1pt - Entry of outdoor pollutants is mitigated as per ASHRAE 62.1:2013 guidance, system is designed for ease of maintenance and cleaning with access to both sides of all moisture and debris catching components and air system is cleaned prior to occupation and use. 9.3 - 1pt - Extract air systems to all high indoor pollutant spaces. Photocopiers and printers to meet ECNZ low emissions targets. likely requires dedicated extract systems over and above NZBC requirements. Printing, cooking, 'make space' pollutants are removed or directly exhausted.	Beca Services
	10.0 Acoustic Comfort	3	1	2		**Higher Confidence** 10.3 - 1pt - Enclosed spaces built to minimise cross talk between rooms and between rooms and open areas. **Medium Confidence** 10.1 - 1pt - Low internal noise levels from traffic and plant. Nb. Potentially difficult to achieve with spatial planning with respect to indoor/outdoor and Natural Ventilation. This point should be targeted for a Library. Acoustic input required. 10.2 - 1pt - Reverberation times are below the maximum stated as per the recommended values provided in AS/NZ 2107:2016. Main library space may present challenges with geometry and hard surfaces. Acoustic input required.	TBIG
	11.0 Lighting Comfort	3	1			**Higher Confidence** 11.1 - min req. - Lighting to be LED fittings throughout with CRI >80, and diffusers or similar (no bare lamps). 11.4 - 1pt - Provide localised lighting control (switching and dimming) to all primary and secondary spaces. May require sophisticated lighting controls (DALI) and desk lamps as appropriate.	Beca Services
	12.0 Visual Comfort	3			3	**Uncertain & lower confidence - further review required** 12.1 - min req. - Blinds or external shading to reduce glare to all Primary and Secondary areas. Currently deemed a risky credit until modelling can confirm compliance pathway. Will require a mix of shades and blinds throughout. **Lower Confidence** 12.2 - 2pt - 60% of the floor area has good daylight access - may be difficult to achieve within the Waka / Mezzanine given the currently high walls. Glazing selection to be explored. Requires 12.1 to be scored first. 12.3 - 1pt - Good external views to 60%+ of nominated floor area. may be difficult to achieve within the Waka / Mezzanine given the currently high walls and distance from the facade	AAL
	13.0 Indoor Pollutants	2	1			**Higher Confidence** 13.2 - 95% of all Engineered Wood Products specified are required to meet low formaldehyde requirements. Includes mass timber structural elements and joinery.	AAL
	14.0 Thermal Comfort	2		2		**Medium Confidence** 14.1 - 1pt - PMV of ±1.0 required or ASHRAE 55 Adaptive thermal comfort of 80% is achieved for at least 95% of the nominated area. Risks associated with the exhibition space. Requires significant external shading and solar avoidance. To be reviewed via modelling. 14.2 - 1pt - PMV of ±0.5 required or ASHRAE 55 Adaptive thermal comfort of 90% to same area (tighter level of comfort)	Beca Services
Energy	15.0 Greenhouse Gas Emissions	18	11	2		**Higher Confidence** 15.2 - 11pts - No fossil fuels onsite. At least 60%, GHG emission reductions compared to a NZBC theoretical minimum reference building (but target 75%) . Requires an improvement on H1 thermal envelope, LED lighting + DALI controls throughout, variable speed AHUs, Heatpump heating & cooling, electric cylinder hot water generation, CO2 monitoring and control, very energy efficient HVAC system design especially at part loads, operable windows, efficient underfloor heating system, EC-FCU heating and cooling in all other spaces. Strong emphasis on passive design (minimising heat loss and heat gain), shading to limit solar gain in summer. Rooftop solar PV of approximately 30kWp or 220m2, **Medium Confidence** 15.2 - 2pts - assumed as 'float' until modelling and design is refined	Beca ESD
	16.0 Peak Electricity Demand Reduction	2	2			**Higher Confidence** 16B - 2pts - At least a 30% reduction in peak electricity demand compared to that of a reference building.	Beca ESD
Transport	17.0 Sustainable Transport	10	3	3		**Higher Confidence** 17B.2 - 1pt - Reduction in carparks compared to a standard-practice building 17B.5 - 1pt - Walkable neighbourhood (i.e. good site placement) 17B.4 - 1pt - Bicycle parks provided for at least 10% of visitors (390 visitors assumed on typical peak occupancy) - 20 parks spaced to AS2890.3 **Medium Confidence - dependent on number of parks provided** 17B.3 - 1pt - Electric Vehicle Parking for 5% of carparks 17B.3 - 1pt - 15% of total parks are dedicated for Fuel Efficient Vehicles. 5% maximum for motorcycle parking (note extent of car parking is TBC) 17B.4 - 1pt - Bicycle parks provided for at least 10% of FTE staff and regular occupants (assumed to be pax 60, closer to 20 in reality). Requires 6no. secure bike parks & lockers, 2no. showers and a drying locker/space. This is expected to be hosued in LCAP 2.	Boffa Miskell AAL
Water	18.0 Potable Water	10	6			**Higher Confidence** 18B.1 - 6pts - WELS rated fixtured and fittings: 4 Star WELS rated dual flush WCs. 5 star tapware. 6 star rated urinals. 7lit/minute showers, no or sub-soil drip irrigation systems, air source cooling. Addition of 10m^3 rainwater harvesting collecting from Library roof to supplement all irrigation, building washdown, and WC / Urinal flushing. Highly dependent on occupancy levels and assumptions. Refer early Prelimianry Design File note for full list.	AAL Beca Services
Materials	19.0 Life Cycle Impacts	11	1	1	2	**Mixed Confidence - further analysis needed** Conditional Requirement - Must achieve a minimum 10% upfront (A1-A5) carbon reduction. **Achieved Base on low GWP, timber, low Global Warming Potential SCMs within concrete slab e.g. flyash, lower GWP steel where possible. Initial assessments suggest 14% reduction.** 19.1 - 1pt for every additional 5% reduction of upfront carbon, to a maximum of 6pts 19.2 - 1pt for every 10% reduction in Lifecycle Assessment up to 3pts (excluding B6 module) - 1+ pt assumed as this analysis cannot be undertaken yet. 19.3 - 1pt for every 50kg/m2, up to 2pts for 100kg/m2 for long term structural carbon storage. - 2pts assumed	Beca ESD DTC
	20.0 Responsible Building Materials	3	1			**Higher Confidence** 20.3 - 1pt - at least 90% (by cost) of all permanent formwork, pipes, flooring, blinds and cables in the project do not contain PVC or are Best Practice PVC	AAL
	21.0 Sustainable Products	3	3			**Higher Confidence** 21.0 - 3pts - At least 9% of all products used on site are considered sustainable and have relevant product specific or industry wide EPDs associated with them, use recycled content, have third party certifications or are part of a stewardship program. We note most projects can attain high scores in this credit, however high confidence rating would require further design development and costing.	WTP AAL
	22.0 Construction and Demolition Waste	1				**Not targeted** 70% construction and demolition waste diversion from landfill. Not possible given demolition of the old library and lack of acceptable measurements from the demolition trade.	
Land & Ecology	23.0 Ecological Value	3	1			**Higher Confidence** 23.0 1pt - Enhance site ecological value via increased planting and vegetation to achieve 1 point criteria. Opportunity to incorporate native planting areas - potential to add 1-3 points. Further work with Boffa Miskell required.	Boffa Miskell
	24.0 Sustainable Sites	2	1			**Higher Confidence** 24.1 - CR - Site is not on land that is of significant ecological value (Conditional Requirement) 24.2 - 1pt - re-use of land - 1point	Beca ESD
Emissions	25.0 Stormwater	2	1		1	**Higher Confidence** 25.1 - 1pt - No increase in stormwater run-off (dependent on stormwater design) **Lower Confidence** 25.2 - 1pt - Stormwater run-off is treated prior to discharge from site. Further investigation required based on types of pollutants onsite, as well as the stormwater capture areas and overland flow paths. Risk is associated to the extent of the site boundary. To be confirmed by NCC and TBIG.	Boffa Miskell Beca Civil TBIG
	26.0 Light Pollution	1	1			**Higher Confidence** 26.1 - Min. Req. - Light pollution to neighbouring bodies reduced with outdoor lighting to be designed in accordance with AS4282:1997 26.2 - 1pt - light pollution to night sky to be reduced through control of upward lighting and careful selection of external light fittings. Needs to be carefully balanced against CPTED requirements.	Beca Services
	27.0 Microbial Control	1	1			**Higher Confidence** 27.0 - 1pt - Waterless heat rejection plant (Air source chillers)	Beca Services
	28.0 Refrigerant Impacts	1	1			**Higher Confidence** 28.0 - 1pt - Low GWP refrigerants used in Mechanical design with TSDEI (Total System Direct Emissions Impact) of <15. Requires smaller volumes of low GWP refrigerants in Mech plant.	Beca Services
Innovation	30.0 Innovation	10	5			**Higher Confidence** 29.4 - 1pt - Innovation Challenge - Financial transparency to provide NZGBC with a breakdown of documentation and implementation costs associated with Green Star design per credit 29.4 - 1pt - Innovation Challenge - Mana Whenua partnership and inclusion of Te Aranga design principles within the design 29.3 - 1pt - Percentage of sustainable products used in the project increases to 12% 29.3 - 2pts - Rooftop PV array to generate a minimum 10% of on-site annual energy consumption - est. 30kWp or 220m^2 **Not targeted** There are a range of other sustainable design and operation initiatives that could be pursued, e.g. designing for accessibility Innovation Challenege. The above represent the key items that fit directly within the sustianbility strategy.	WTP Mana Whenua WTP Beca Services
	Total Points	**110**	**54**	**11**	**6**		
	5 Star Minimum Target	**60**					
	Total Targeted Points	**71**					

High confidence points are indicated as currently achieved or within current scope (subject to submission documentation)
Medium confidence points indicated as available but minimal uplift in consultant scope or cost anticipated
Uncertain or Low confidence points may be available subject to budget cost alignment, or further detailed review

C

Appendix C – Solar Photovoltaic Analysis

Appendix C – Solar Photovoltaic Analysis

Solar Energy Generation Setup

We have modelled the solar PV generation per the Athfields 50% preliminary design drawing set, which shows three arrays of panels on the main library and back-pack roofs respectively. This analysis has been undertaken to approximate the potential annual energy generation per kW of array capacity.

Results

- Annual Generation estimate: 65.12 MWh
- kWh/kW panel: 1,183
- Main Library Building Energy offset target: 10%
- Estimated energy offset: 25.8% (assuming a whole building energy consumption rate of 80kWh/m^2/yr. – to be reviewed at Developed Design)

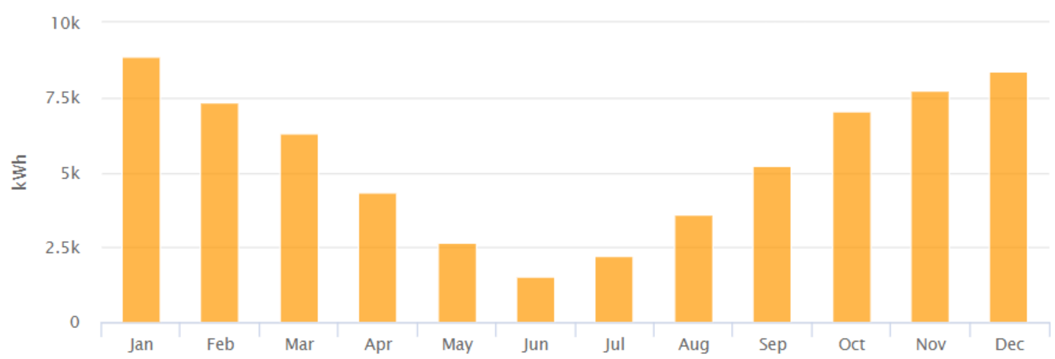


Figure 9 - Monthly Energy Generation Estimate

Shading/Spacing Comments:

- There are no concerns with shading from adjacent buildings (LCAP 2 and Dunvegan House).
- There is some moderate inter-row shading, particularly bad May to Aug – we recommend a minimum 0.8m row spacing.
- Plant rooftop array setback is too small – we recommend a 2m setback for health and safety due to height of the plant rooftop. Alternatively, these panels could be moved to the main roof.
- General recommendation – if using fixed tilt racking, a higher panel pitch could be tested to improve the kWh/kW panel performance (i.e. more yield). This will, however, require larger row spacing and be more visible from street level.

Assumptions

- Modelled using Helioscope Software.
- Nominal PV Panels: Trina Solar TSM-DE17M(II) 430W (x128)
- Racking: Fixed Tilt
- Pitch: 10°
- Azimuth: 341°
- Nominal Inverters: Sunny Tripower 20kW (x2)
- Adjacent building heights taken from LCAP2 pre-concept drawing set and estimates.

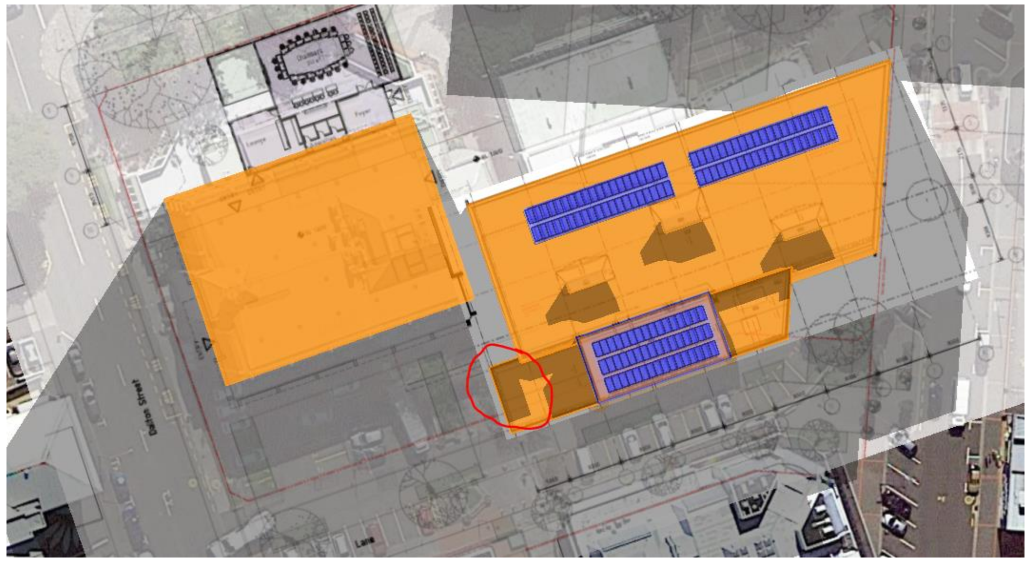


Figure 10 - Bird's-eye view indicating overshadowing extents

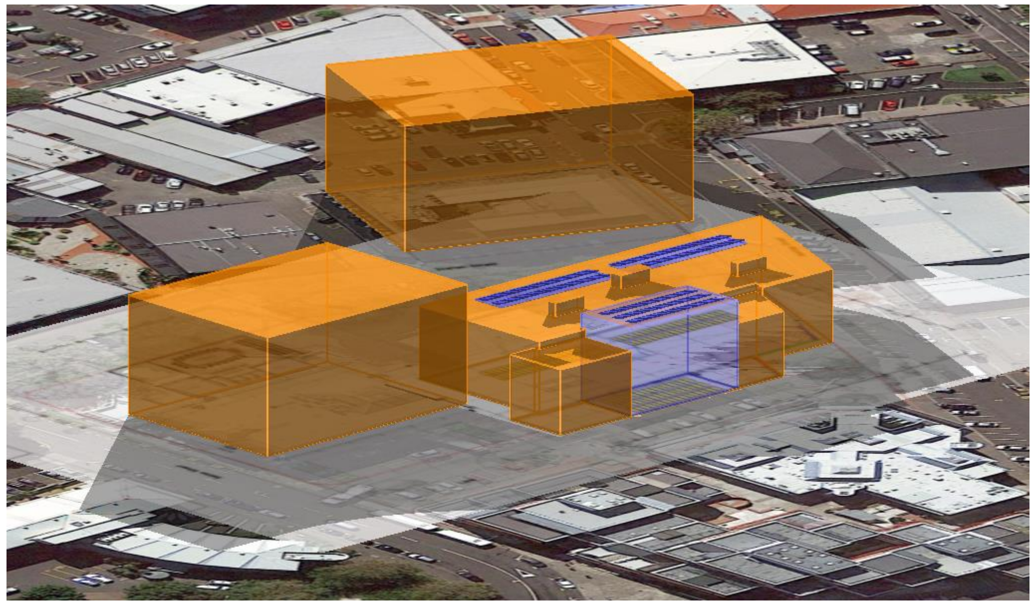


Figure 11 - View from the South

D

Appendix D – Climate Change Assessment

Te Aka - Climate Change Risk Assessment Register Rev B (Draft)

Identification → Risk Analysis → Mitigations / Adaptation Pathway

Ref	Risk Description	Direct / Indirect	Discipline	Chronic Change		Acute Events				Pre-Existing Mitigations (as of November 2023)		RCP 8.5 Risk Assessment (2040)			RCP 8.5 Risk Assessment (2090)			Design Adaptations		Post Adaptation Pathway Risk to 2090			Further Actions / Design Notes
				Mean Temperature Change	Sea Level Rise	Heatwave (45°C > 3 days)	Drought	Rainfall Event (100 yr ARI 10min)	Wind	Design	Management	Likelihood	Consequence	Rating	Likelihood	Consequence	Rating	Implement for 2040	Implement After 2040 (for 2090)	Likelihood	Consequence	Rating	
1	Overland flow paths inundate building thresholds.	D	Civil / Landscape					x		Landscape falls to the west of the site and large volumes may collect near lowest building thresholds. Floor levels are fairly fixed and most thresholds are level to external areas with strip drains. Design relies on overland flows to carry most of the water away from the building.		3	3	H	4	3	H	**Required Mitigation: TBC** Civil design to consider RCP8.5 rainfall intensities. Lowest floor level at bottom of terrace (with greatest inundation risk) be provided with larger falls/threshold and resilient internal floor finishes.	No mitigation required.	2	3	M	Risk of ponding at this location, west portion of the site and building are most succeptable. Modelling underway.
2	Site access cut off due to wider city flooding.	I	Civil		x			x			Emergency response	3	2	M	4	2	M	No mitigation required.		4	2	M	
3	Gutters systems become overloaded and cause damage to the building.	D	Architecture					x		Large mono-pitch roof delivers large volume to rear of building where an "internal gutter" manages this. Designated locations for gutter overflows to spill.	Regular cleaning to reduce risk of drainages blockages.	1	3	M	2	3	M	**Recommendation:** Remove internal gutter or provide large visible secondary flow paths from the gutter to protect from blockages or high intensity events that overload downstream drainage. Size all downstream pipework for RCP8.5 event and provide redundancy in flow paths..		2	3	M	Consider access for roof cleaning. Large leaves are of particular concern.
4	Changes in ground water conditions impacting on the building foundations.	D	Geotech		x			x				1	4	M	1	4	M	No mitigation required.		1	4	M	
5	Changes in ground water conditions increases risk of rainwater harvesting tank buoyancy.	D	Hydraulic		x			x				1	3	M	1	3	M	No mitigation required.		1	3	M	
6	Inundation to the building impacting on artwork and taonga.	D	Artist					x		Selection of resilient materials for artwork located on the GF. Artwork and other pieces will be raised on plinths.	Taonga will be stored on L1 - purpose made for this in alignment with Mana Whenua design narrative for the building..	1	2	L	2	2	L	No mitigation required.		2	2	L	
7	Water ingress through the skylight junctions.	D	Architecture					x		Membrane roof extends up to the skylights - tanked solution.		2	2	L	3	2	M	No mitigation required.		3	2	M	
8	Damage or death to soft landscaping elements (plants) due to flooding.	D	Landscape					x				2	2	L	3	2	M	No mitigation required.		3	2	M	
9	Surcharged stormwater infrastructure could back up into the building	I	Civil		x			x		External surface levels designed to convey the 1% AEP design rainfall event flow away from the building and off site and maintain a minimum of 500mm freeboard from these overland flows to the finished floor level, as per the NZ Building Code E1 Surface Water.		1	3	M	2	3	M	No mitigation required.		2	3	M	
10	Surcharged wastewater infrastructure could back up into the building	I	Civil		x			x		Wastewater would surcharge at the manholes adjacent to the building and follow the same stormwater overland flow paths away from the building.		1	4	M	1	4	M	No mitigation required.		1	4	M	
11	Wind-driven rain entering through louvres / windows / doors / junctions resulting in pooling within the building	D	Architecture					x	x			3	2	M	4	2	M	No mitigation required.		4	2	M	
12	Unable to use natural ventilation due to high temperatures, dust or smoke particles.	D	Mechanical	x			x		x	Ventilation system is mixed mode. Future-proof capacities could be provided to support pure mechanical ventilation or an improved natural ventilation potential.	Temporarily close the facility or reduce operations.	3	2	M	4	2	M	No mitigation required.		4	2	M	
13	Increased dust ingress through building junctions, framing and flashings causing damage to books and technology and art.	D	Architecture	x			x		x	Frameless glass doors and automatic doors, these do not provide a good seal.	Regular cleaning schedule.	3	1	L	4	1	M	No mitigation required.		4	1	M	
14	Lack of cooling capacity resulting in overheating within the building.	D	Architecture / Mechanical	x		x	x			The large canopies and london plane trees provide good shading. Indoor temperature conditions are relaxed within the library compared to office buildings. Thermal comfort metrics are to reflect this, while still targesting a high degree of thermal comfort. Chillers can operate at a reduced capacity.	Flexible dress codes	3	2	M	4	2	M	No mitigation required.		4	2	M	Staff workroom, meeting rooms, digital maker space are of concern but are not critical. Opp for skylights to function as thermal chimneys.
15	Heat island effect increasing local temperatures and exacerbating increased air temperatures.	D	Architecture	x		x	x			Considered placement of new trees to improve shading. Careful selection of paving colours and materials.		2	2	L	3	2	M	No mitigation required.		3	2	M	
16	Loss of landscaping / planting due to drought.	D	Landscape	x			x			10kL rainwater harvesting proposed. An allocation could be saved and dedicated to irrigation although it will not be as reliable during drought conditions.	Source other non-potable supply if required.	2	2	L	3	2	M	No mitigation required.		3	2	M	Reliant on plane trees provide valuable shading.
17	Cracking and sun damage to timber cultural artwork and timber cladding with drought conditions.	D	Architecture / Artist	x			x			Location of artwork, design of mounting systems and carving being considered.		2	2	L	3	2	M	No mitigation required.		3	2	M	
18	Material expansions and contractions of building envelope impacting on weathertightness and fixing strength.	D	Architecture			x						1	3	M	2	3	M	**Recommendation:** Include safety factor in material expansion to reduce risk.		2	3	M	
19	Chillers may trip out due to high ambient conditions.	D	Mechanical			x						1	3	M	2	3	M	**Recommendation:** Allocate expansion space for the plant for future replacements to accommodate for higher ambient design temperatures and loads.	**Recommendation:** Increase central plant capacity if necessary based on review of system operating load profiles, and predicted climate change impacts at time of plant replacement.	2	3	M	Note: Library could function as a place of respite.
20	Plantrooms could increase in temperature and result in failure of equipement such as switch boards, comms, fire pumps.	D	All Building Services			x						1	4	M	2	4	H	**Recommendation:** Allocate expansion space for the plant for future replacements to accommodate for higher ambient design temperatures and loads.	**Required Mitigation: TBC** Review ambient conditions for system selection at time of equipment replacement.	1	4	M	
21	Shut-down of critical electrical infrastructure due to overloading, risk of bushfire or other climate related event resulting in no network electrical supply.	I	Electrical			x					Emergency response / building closed	1	2	L	2	2	L	No mitigation required.		2	2	L	
22	Expansion of exposed structural elements resulting in component failures.	D	Structural			x						1	4	M	1	4	M	**Recommendation:** Include safety factor in material expansion to reduce risk.		1	4	M	

E

Appendix E – Modelling Inputs Summary

Limitations

This study has been prepared to inform the development of the building design. The study uses reference data sets for the computer model benchmarking of internal temperature, thermal comfort, daylight performance etc. Actual operating variables will differ (e.g. weather, usage patterns, blinds control, occupancy and power use, etc.). These models are only intended to help inform the building design and the predicted values may overestimate or underestimate the actual building performance in use. The computer simulation software calculates temperatures representing the average zone temperature. The actual temperatures will vary over the zone area.

- IESVE-2023 used
- Napier airport NIWA weather file used (historical)
- Annual Climate Based Daylight Modelling processes

Daylight modelling Inputs and assumptions

- Floor light reflectance: 0.2
- Ceiling light reflectance: 0.75
- Internal walls light reflectance: 0.5
- Measurement plane: floor level
- Analysis grid: 0.5m x 0.5m

Thermal modelling assumptions

- Met Rate - winter: 1.0 (reading, seated)
- Met Rate – Summer: 1.7 (walking)
- CLO (clothing values): Summer, 0.6, Winter, 0.95
- Air Speeds: Allowable from 0.15m/s up to 0.6m/s (0.6m/s was not used)
- Occupancy rate: 4 m^2/pp summer, 10m^2/pp winter (conservative)
- Occupancy Schedule: 8am-6pm, 7 days a week
- Sensible heat gains: 75W/person
- Latent heat gains: 55W/person

Architectural inputs

Geometry

- Geometry and orientation per AAL early Preliminary design update
- Overshadowing of adjacent buildings (LCAP2 and Dunvegan house)
- External louvres included
- Zoning to 4m perimeter boundaries
- Double height spaces zoned to 3m in height in occupied areas

Construction

- Floors: R3.0 m^2·K/W total R-value
  - Exposed concrete mass used
- Roofs: R5.0 m^2·K/W total R-value
- External walls: R3.0 m^2·K/W total R-value value
- Infiltration rate: 0.5ACH (accounting for more infiltration than typical curtain walled building)
- External glazing:
  - U value (window): 2.2 W/m^2·K total U-value
  - Shading Coefficient: 0.48
  - Visible Light Transmittance: 0.72 (Stopray 72T)

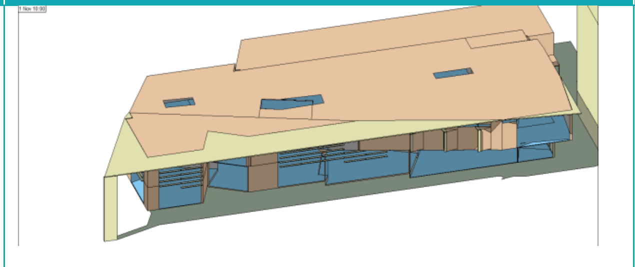
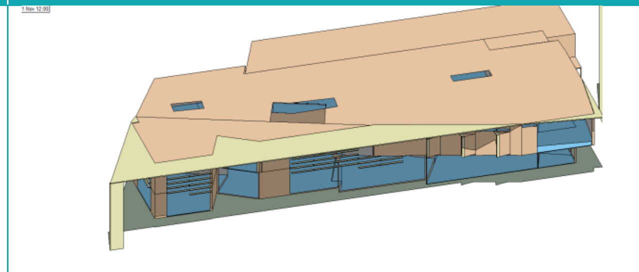
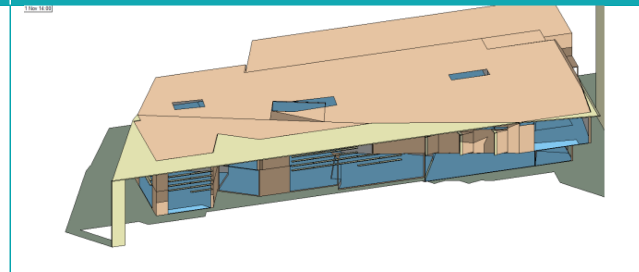
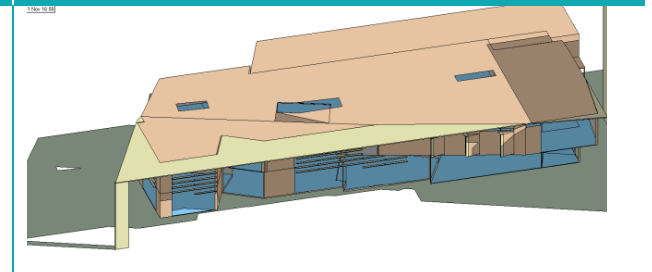
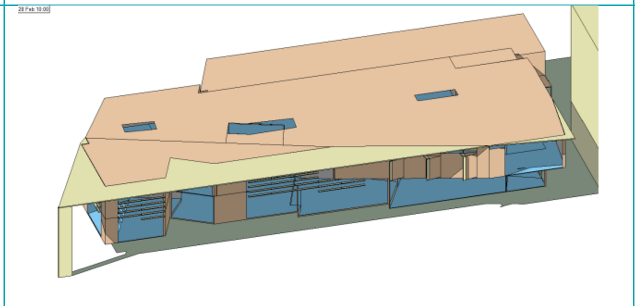
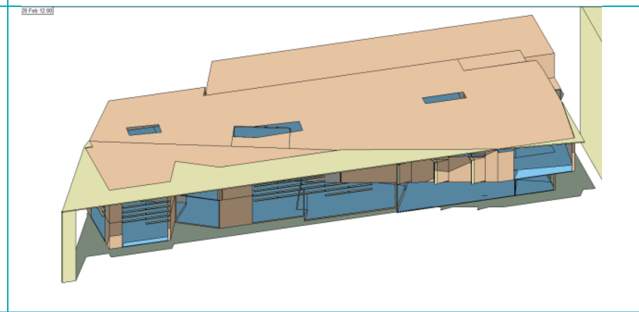
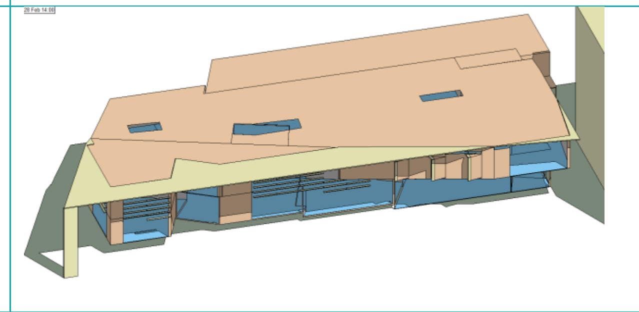
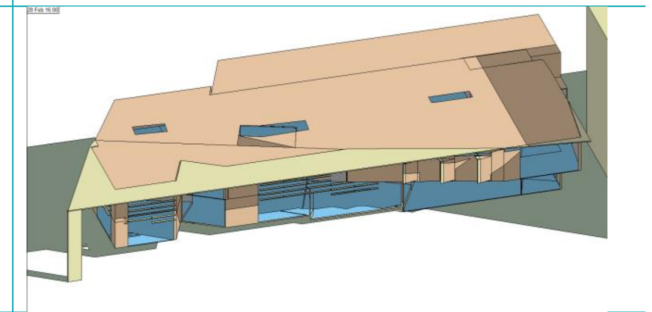
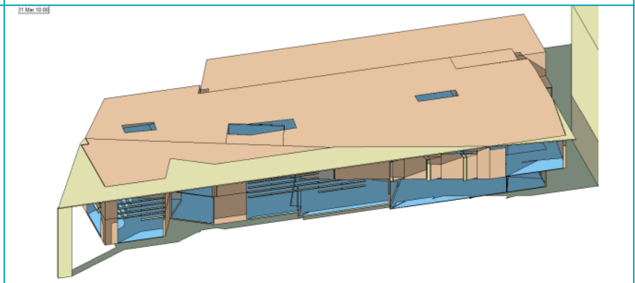
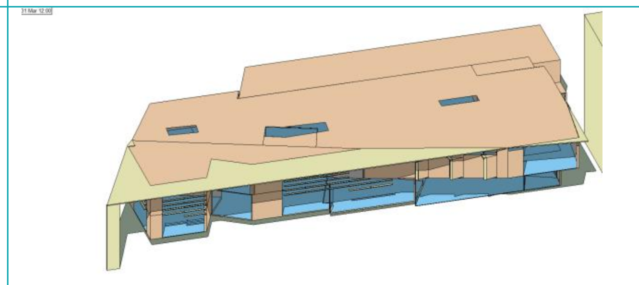
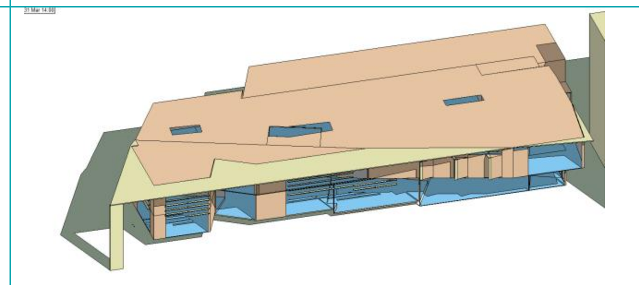
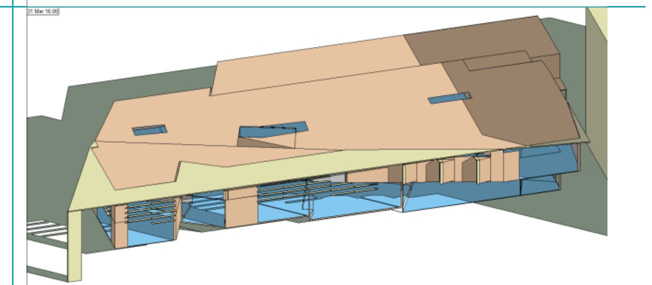
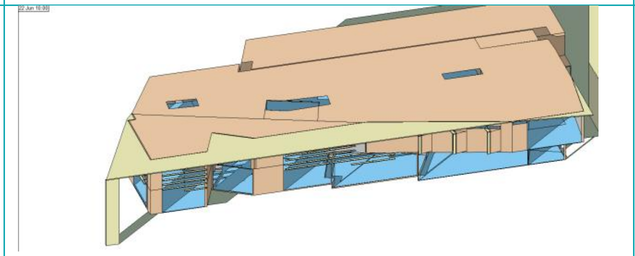
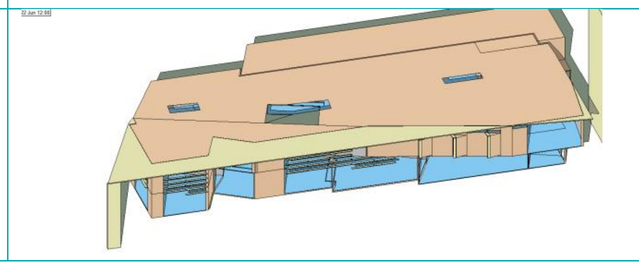
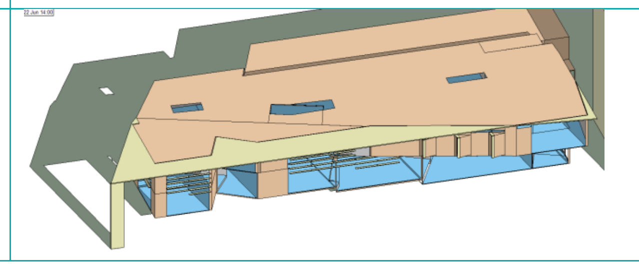
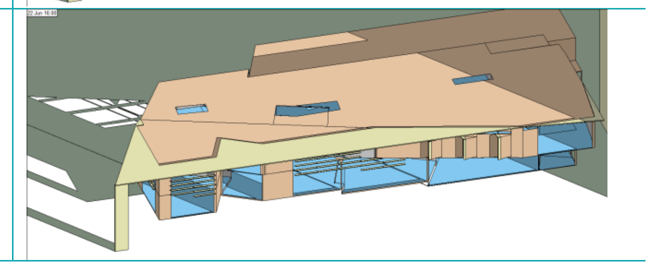
Conditioning system inputs

- Conditioning setpoints
  - Heating: 20°C
  - Cooling – L1 Collection areas: 23°C
  - Cooling – GF central areas: 23°C
  - Cooling – GF collection area: 25°C
- Relative Humidity: Uncontrolled
- Lighting & Small Power: 12 W/m^2 total
- Lighting & Small Power schedule: 8am-6pm, 7 days a week
- Heating systems:
  - 40 W/m^2 peak heating capacity – centre zones – per Mechanical Engineer
  - 60 W/m^2 peak heating capacity – perimeter zones - per Mechanical Engineer
  - Radiant fraction 0.4 to reflect blend of FCU and under-floor heating radiant systems.
  - Morning warmup: 1hr
- Cooling systems:
  - 55 W/m^2 peak cooling capacity - per Mechanical Engineer

Northern Façade Direct Insolation

The below images show the level of direct insolation to the main library space from a view due north, looking southwards over the building. The images show that the summer months (November to February inclusive) are well shaded by the northern canopy, with little to no direct insolation occurring between the hours of 10am to 4pm (peak operating hours). However, during the winter months the images show that risk of glare is expected during sunny days and require a means of glare control.

Table 2 - Northern facade solar insolation

	10 AM	12 PM	2 PM	4 PM
Nov 1				
Feb 28				
Mar 31				
Jun 22				

- Due north, 30° inclination
- Summer months = almost no direct solar gain (November – February inclusive)
- Winter months = high degree of direct solar gain (March – November)