NAPIER
CITY COUNCIL
Te Kaunihera o Ahuriri

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EXTRAORDINARY

EXTRAORDINARY SUSTAINABLE NAPIER COMMITTEE

Open Attachments Under Separate Cover

Meeting Date:	Thursday 17 February 2022
Time:	3.00pm
Venue:	Via Zoom (Audiovisual Link)

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WARREN AND MAHONEY®

NAPIER AQUATIC CENTRE

CONCEPT DESIGN

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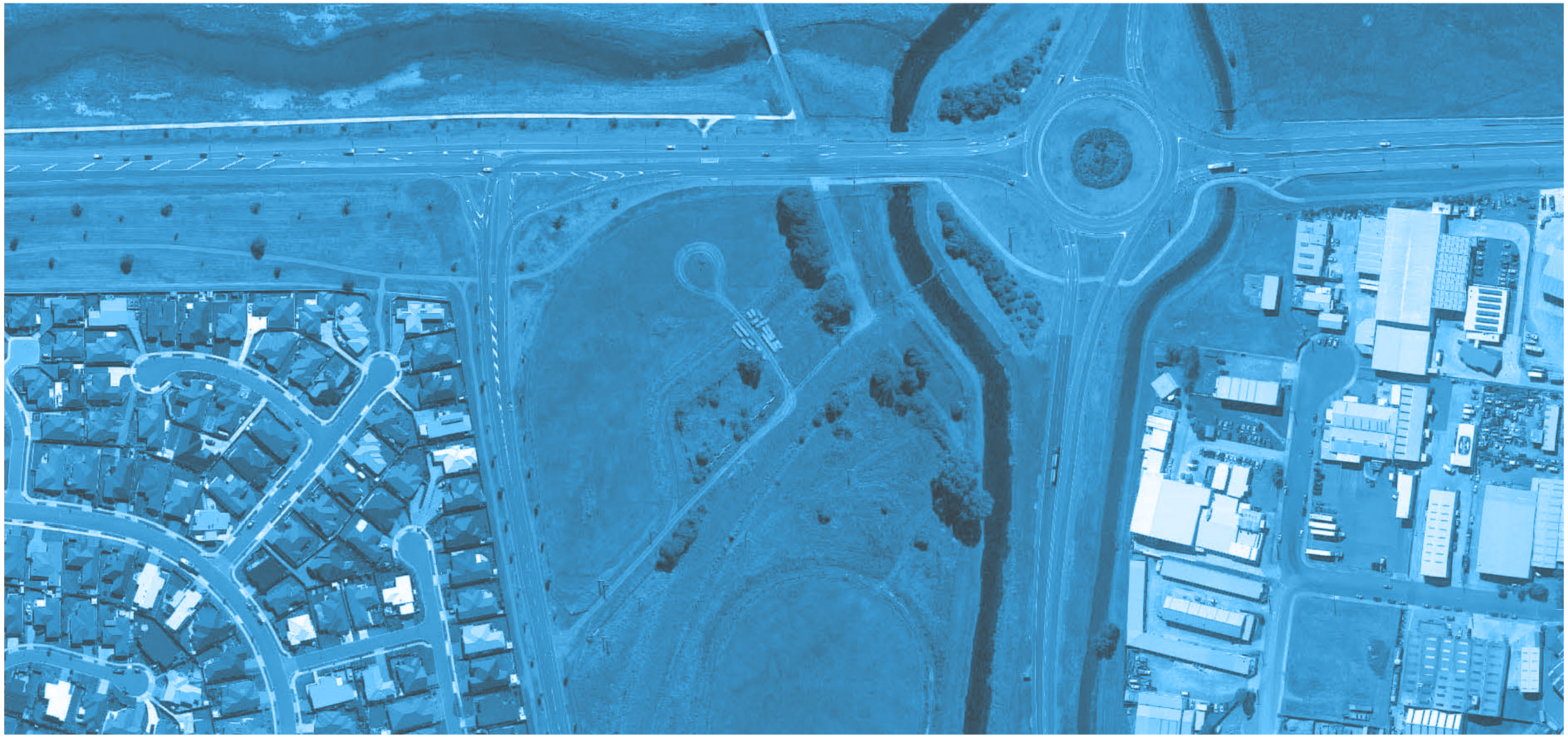
Revision 2.0

—

February 2019



Prepared for

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NAPIER AQUATIC CENTRE

Document Revision Status

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Revision 2.0

Document Control

—

Prepared by Architectural Graduate
Alexandra Smith

Reviewed by Project Architect
Alex Head

Approved by Principal
Peter Marshall, on behalf of
Warren and Mahoney
Architects Limited

Disclaimer

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While we have endeavoured to summarise the Design process in this document and appendices, the report format cannot represent the broad range and depth of information captured on the Design Drawings, Specifications and Schedules. Approval of the specific issues contained in this report does not discharge the obligation of the client team to review the drawings and specifications in their entirety.

Primary Contact

—

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INTRODUCTION

EXECUTIVE SUMMARY

This report describes the concept design for the Napier Aquatic Centre.

The design is based on the QEII Sport and Recreation facility in Christchurch. The design has been modified to respond to the following input and key drivers:

- Specific site and environmental conditions and constraints.

- Improve on the QEII design taking on board operator feedback.

- Napier Council design change requirements.

The design has been developed to respond as follows:

1. Orientation:

The facility is orientated to face the approach from Tamatea Drive and create a sheltered West facing outdoor play area.

2. Parking:

A simple and clear drop-off process is proposed along the south side of the facility. This provides drop-off for cars, buses and coaches.

2. Future flexibility:

The building has been located so that the pool hall or fitness centre and the associated plant room can be extended to the east.

3. Resilience

The building is located within the green /Managable risk of liquifaction zone as identified in Tonkin and Taylors Geotech report.

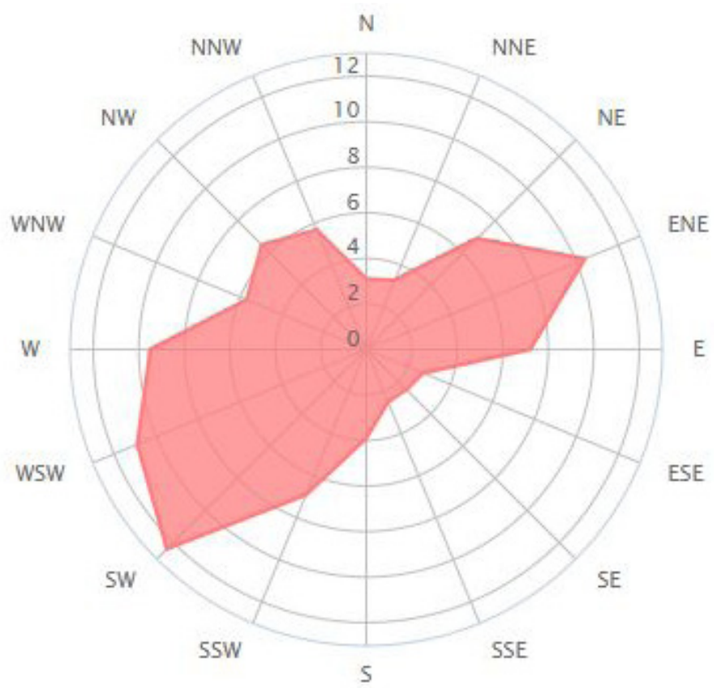
Next steps:

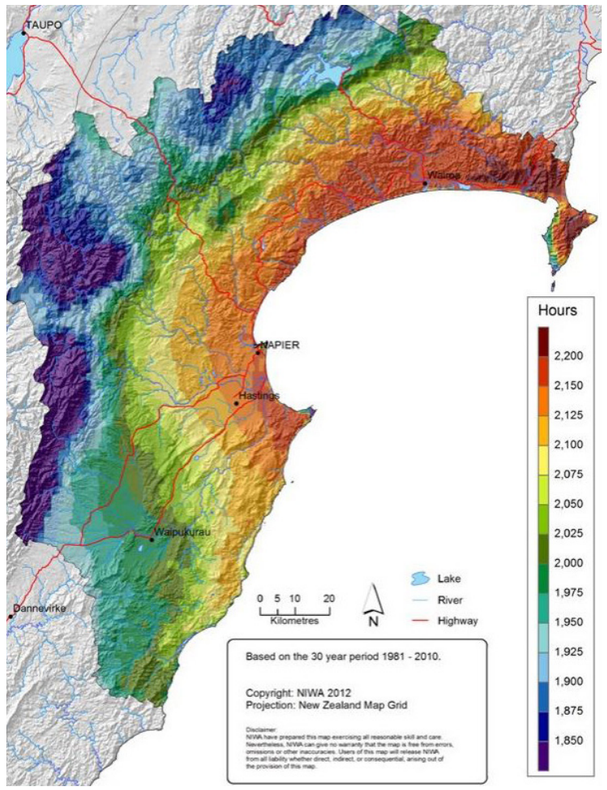
This report is a draft. The concept design will be developed with input from the Services, Structural, Geotech and Acoustic Engineers over the coming weeks. This may affect site setout and building form will adjust to reflect co-ordination between structure, services and architecture.

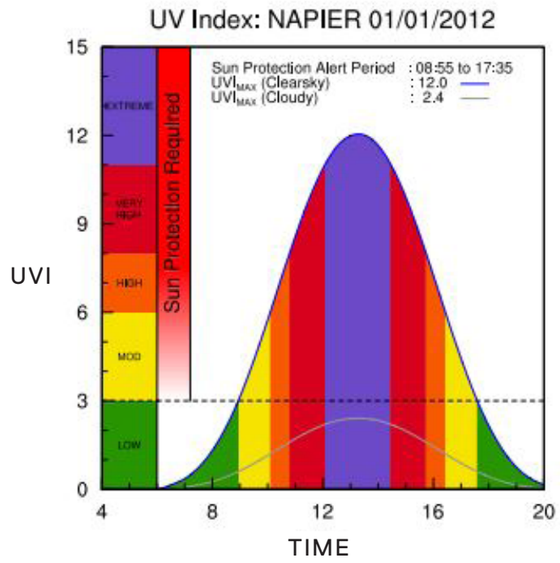
A topographical or boundary survey was unavailable during the preparation of this report. It is recommended that these are completed to verify the site boundaries and levels.

SITE ANALYSIS

ENVIRONMENTAL CONDITIONS







WIND ANALYSIS

The Hawke's Bay region is less windy than many other coastal areas of New Zealand. The western ranges have a sheltering effect that often results in calm conditions or very light winds. Of the strong winds that have been recorded in Napier, 34% occured in spring, 26% in winter, 23% in summer, and 17% in autumn.

The prevailing summer wind (Dec-Feb) is from the East / East Nor-east. This wind is also common in early autumn and late spring, along with Sou-West / West Sou-west and some lighter Nor-west winds too. The SW wind prevails May-September,

Any outdoor areas serving the pool will need to provide shelter from the NE winds as these are most likely to prevail when this area is in use. Protection from the SW will be secondary as this wind prevails in winter and in bad weather systems.

SUNSHINE HOURS

The extensive sheltering by the western high country makes much of Hawke's Bay a very sunny region. Bright sunshine hours are highest at and near the coast.

Napier has one of New Zealand's sunniest climates, with more than 2000 hours of sunshine recorded annually.

The pool will need to be designed to mitigate direct sunlight and glare for pool users, whilst also providing a pleasantly lit space and visibility.

An outdoor area of the pool is likely to be well used in summer months.

UV INDEX

The figure above shows an example of a UV forecast for Napier, and indicates the levels of UV and times of the day where sun protection is required.

As in other parts of New Zealand, Napier has an extremely high UV Index in Summer. It will be important that any outdoor play area is designed to provide shade options, particularly between 11am and 4pm in the summer months.

SITE ANALYSIS

LOCATION PLAN

Not To Scale

DESIGN RESPONSE

DESIGN PRINCIPLES

OPERATIONAL EFFICIENCY

→ A simple building arrangement allows separation of wet and dry components.

VISUAL ENGAGEMENT

→ Hydroslides provide visual landmark for the facility from the main road.

→ Controlled glazing to the pool hall provides views to the park to the North West whilst controlling glare.

→ Fitness areas and studios are placed on display, activating outdoor space and providing visual beacon from State Highway 2

→ Visual connections provide passive surveillance of the shared green space and the car park and are a significant component of CPTED design for the facility

ACCESS

→ Public access provided from Tamatea Drive

→ Service access is to the South East of building

PARK / WATERPLAY / FAMILY SPACE

→ A shared green / sporting space for the community to use

→ Park like nature, with grassed areas, picnic spaces, swing ball

SHELTER AND ASPECT

→ External spaces are orientated to be protected from the prevailing nor-easterly wind

→ Afternoon sunshine is captured in west facing areas providing amenity for the cafe outdoor seating area and the shared green space

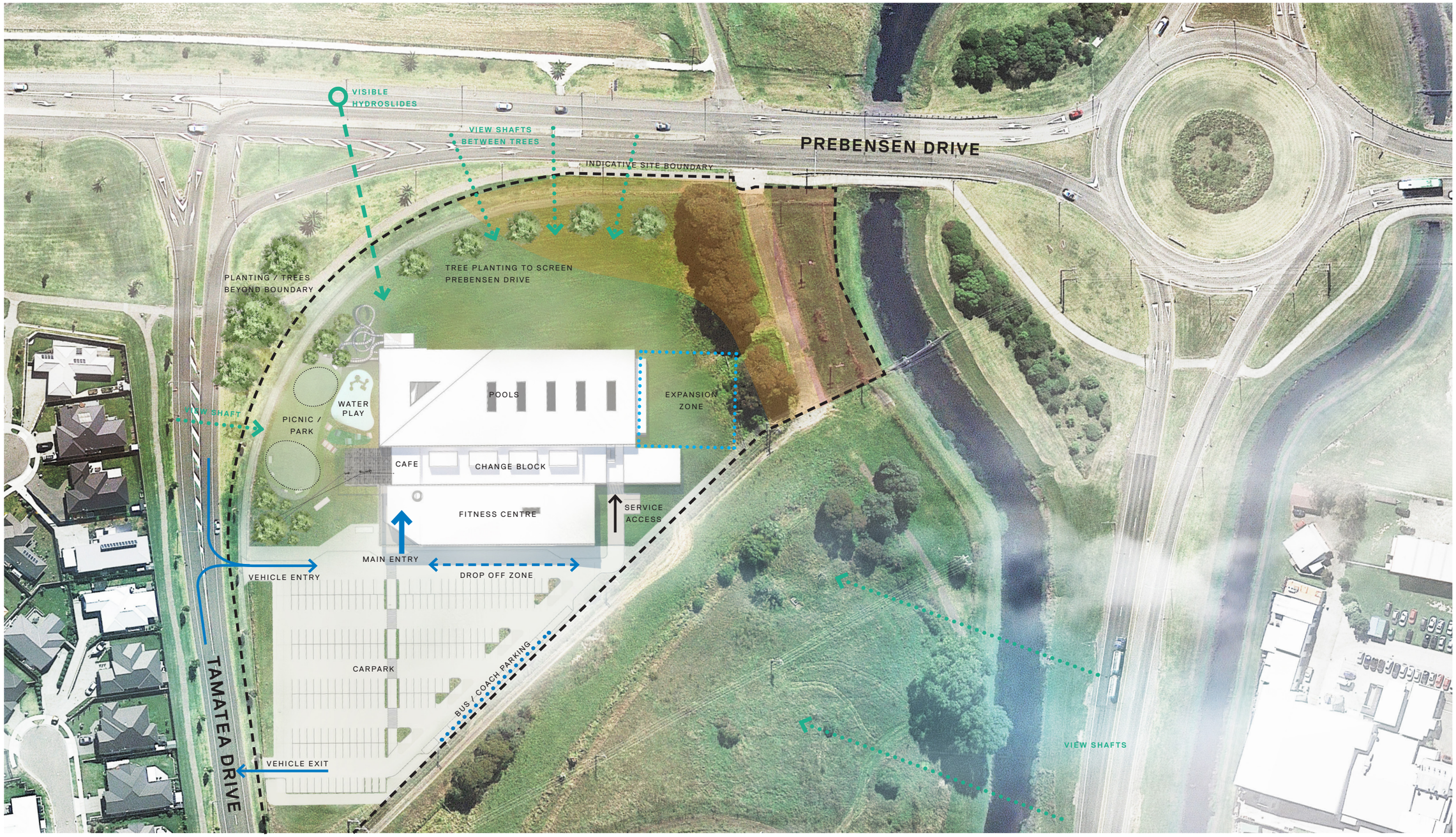
FUTURE EXPANSION

→ Provision has been made to enable the construction of an additional pool to the east end of the pool hall in future.

DESIGN RESPONSE

SITE PLAN

Not To Scale



DESIGN RESPONSE

FLOOR PLAN

1:500 @ A3

LEGEND:

1. MAIN ENTRANCE
2. RECEPTION
3. RETAIL SPACE
4. STAFF AREAS AND MEETING ROOMS
5. FITNESS CENTRE
6. CHANGE FACILITIES
7. CAFE - WET AND DRY
8. MAIN POOL HALL
9. LEISURE POOL WITH ROCK CLIMBING AND BOMBING POOL
10. HYDROSLIDES
11. OUTDOOR WATER PLAY
12. CASUAL SEATING AND LOUNGERS
13. GRASSED PARK AREA
14. PICNIC AREAS / BBQS
15. INFORMAL RECREATION AREA. URBAN SEATING / BASKETBALL HOOPS, SKATE, BIKE LOCKS
16. PLANTING AROUND NORTH AND WESTERN EDGES OF OUTDOOR AREA TO SCREEN PREBENSEN & TAMATEA DRIVE

DESIGN RESPONSE

DESIGN CHANGES FROM QEII

1:500 @ A3

The following design changes and developments have been incorporated to respond to operator feedback and the Napier Aquatic Brief.

LEGEND:

- **A** SECOND BODY SLIDE ADDED TO PROVIDE A TOTAL OF TWO WATER SLIDES
- **B** OUTDOOR AREA INCORPORATED WITH IMPROVED CONNECTION TO INDOOR LEISURE POOLS
- **C** LAZY RIVER REMOVED AND DEEPER BODY OF WATER INCLUDED FOR BOMBING / AQUA CLIMBING
- **D** WARM WATER POOL SPACES (WWP / SPA / SAUNA / STEAM) LOCATED CLOSER TO CHANGE ROOMS TO ALLOW SPACE FOR FUTURE POOL EXPANSION
- **E** CHANGING ROOMS ENLARGED AND WET / DRY SEPERATION ACHIEVED FOR BETTER OPERATIONAL OUTCOMES
- **F** CAFE WET LOUNGE CREATED ACCESSED FROM POOLSIDE
- **G** FOYER AND RECEPTION ADJUSTED TO RESPOND TO ENTRY FROM SOUTH.
- **H** RETAIL AREA CREATED ADJACENT TO THE FOYER SPACE FOR IMPROVED FLOW
- **J** DRY CHANGE ROOMS RE-PLANNED TO IMPROVE LAYOUT
- **K** SPECTATOR SEATING AREA INCREASED TO PROVIDE SEATING CAPACITY FOR APPROXIMATELY 250
- **L** ADDITIONAL TWO LANES ADDED TO LEARN TO SWIM POOL

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DESIGN RESPONSE

OUTDOOR AREA: DRY SIDE ENTRY

The building entry faces the Tamatea Drive to the West and is immediately visible on approach creating a clear and legible entry sequence. This provides an opportunity to create an active civic address to the building which can be developed to provide a range of informal recreation opportunities.

The cafe location is designed to service the wet pool side and the dry side and will activate the main entrance by servicing a dry seating area adjacent to the foyer and an outdoor undercover seating area.

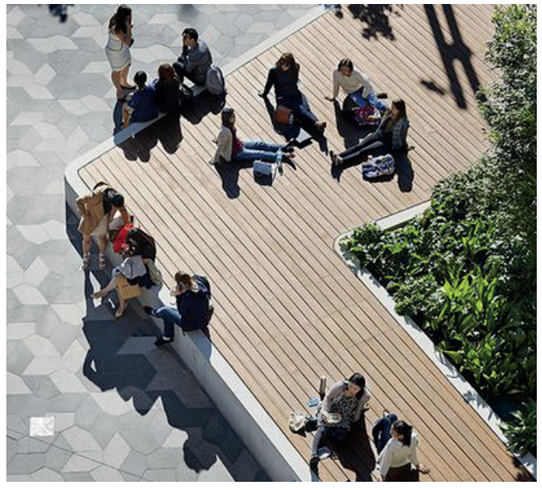
It is envisaged that the outdoor civic entry would be activated by integrating play, recreation and informal seating spaces into the landscape.

MAIN ENTRANCE

URBAN PLAY AREA

DRY SIDE CAFE

NATIVE PLANTING AND FENCING



SEATING PLATFORMS

DESIGN RESPONSE

OUTDOOR AREA: WET SIDE POOL RECREATION

The indoor leisure pool opens to the west to provide connection to an enclosed, fenced, outdoor play area. A range of outdoor water play and informal recreation spaces could be created to create a hub or outdoor social activity, including water jets, barbeque areas, grassed areas and undercover seating. The outdoor area is west facing and sheltered from the prevailing summer North East wind. Landscape features and planting would be developed to provide visual seperation from the residences to the west of Tamatea drive.

The cafe location is designed to service the wet pool side and outdoor undercover seating area to service this outdoor play zone.

WET SIDE CAFE

CASUAL SEATING

PICNIC AREAS

SUN SHADES

WATER PLAY

DESIGN RESPONSE

AERIAL VIEW

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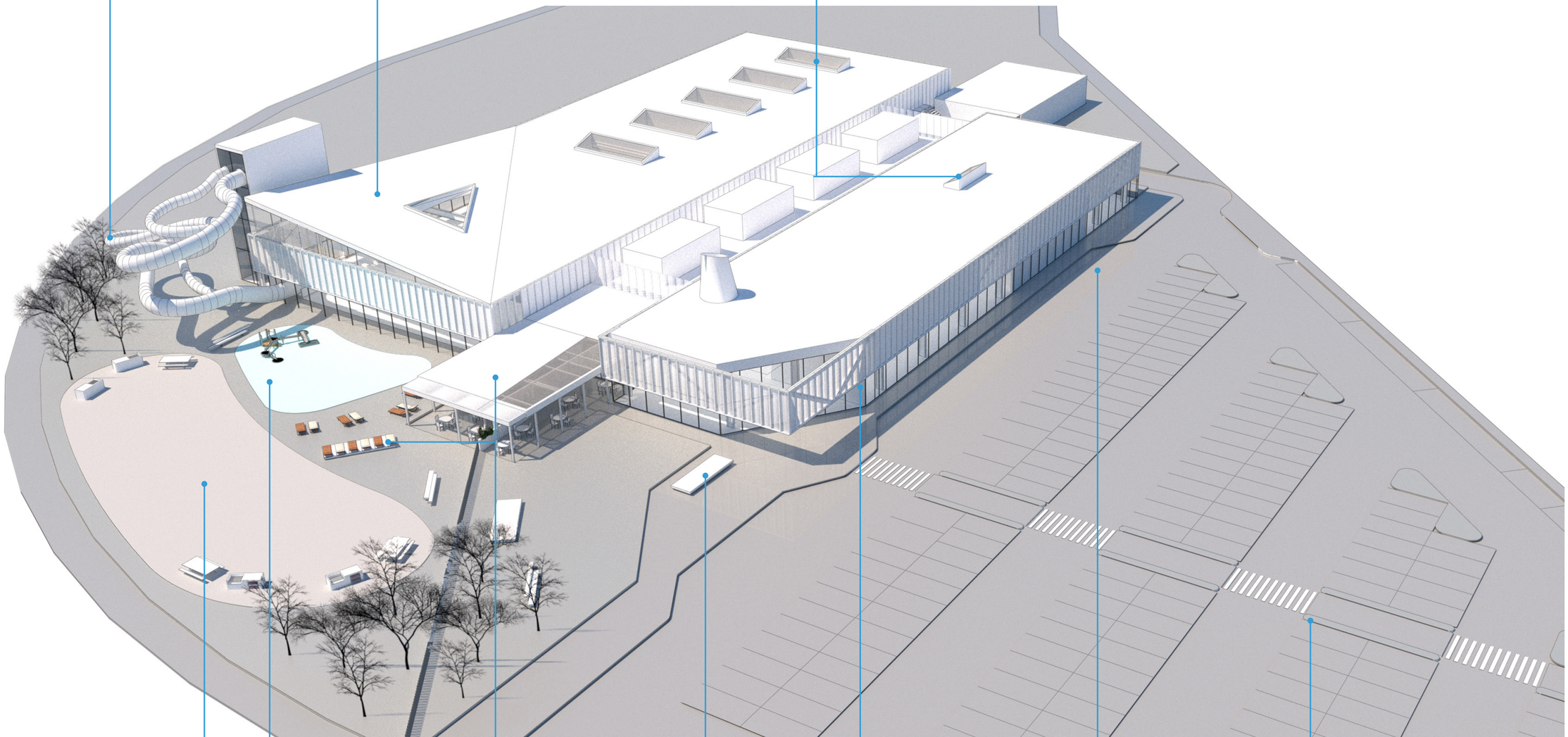
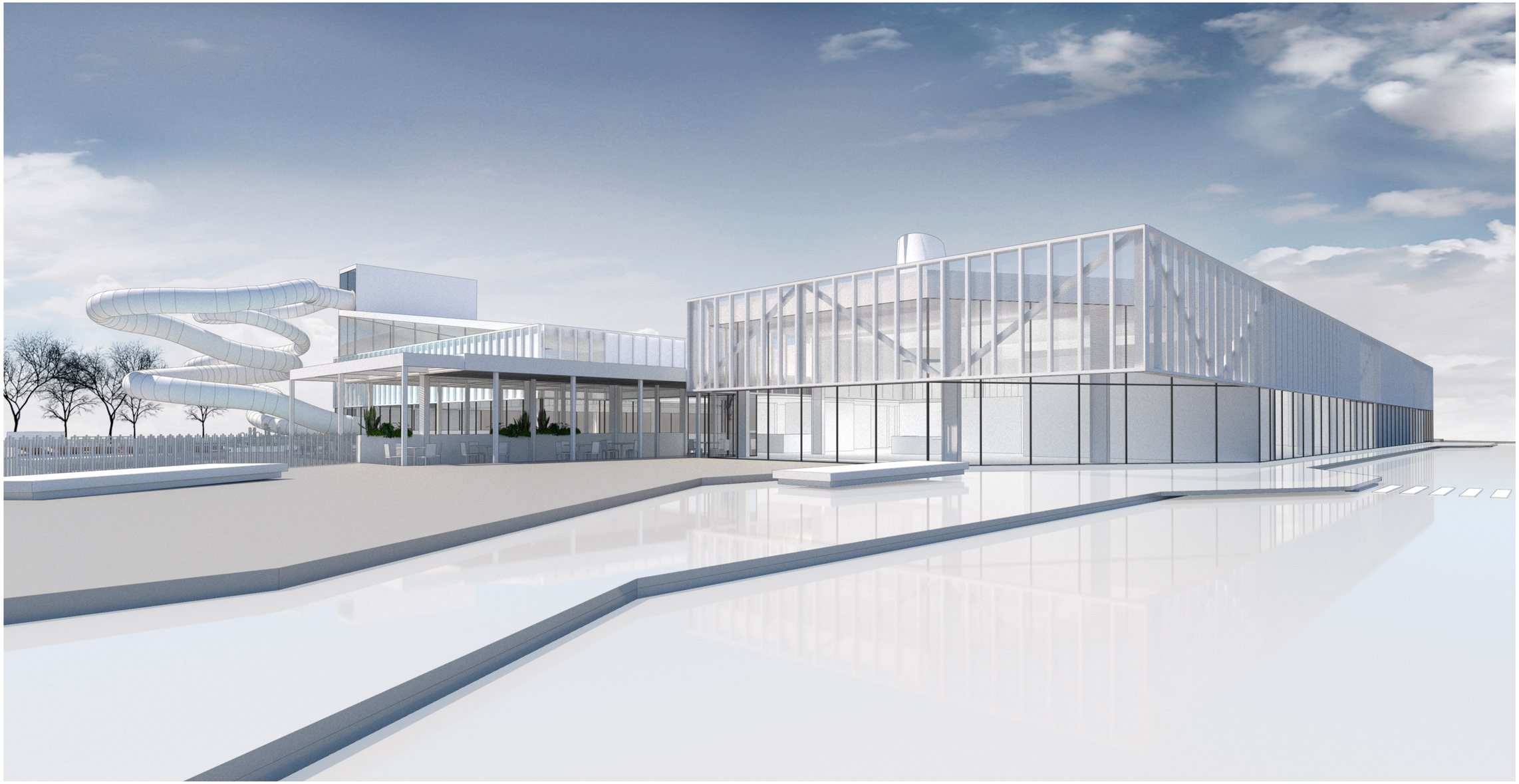


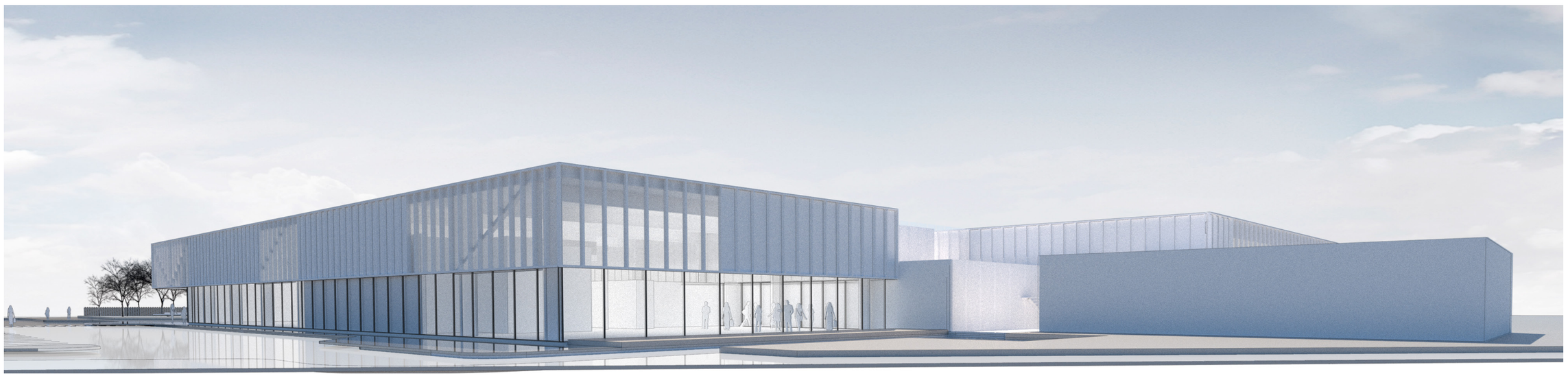
DESIGN RESPONSE

MAIN ENTRANCE



DESIGN RESPONSE

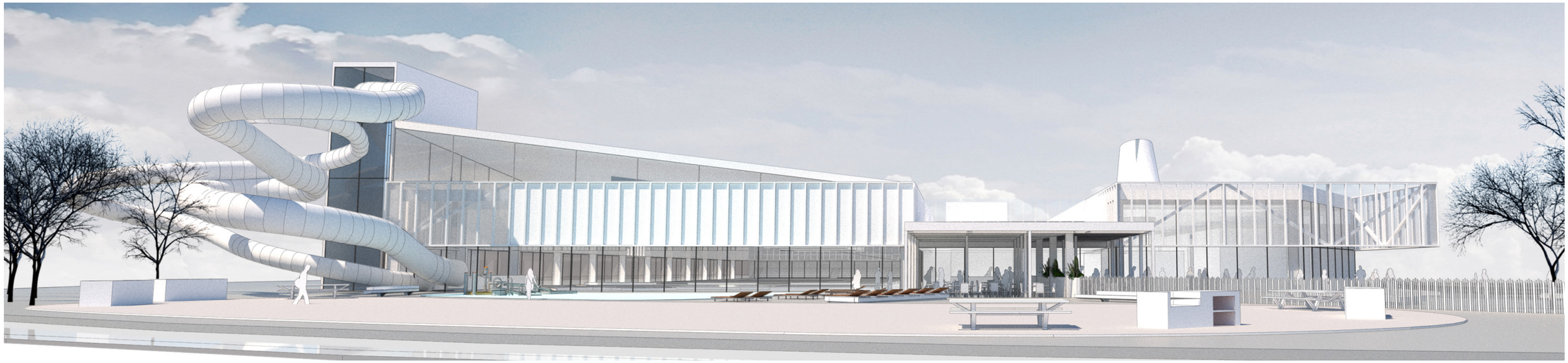
NORTH WEST - HYDROSLIDES

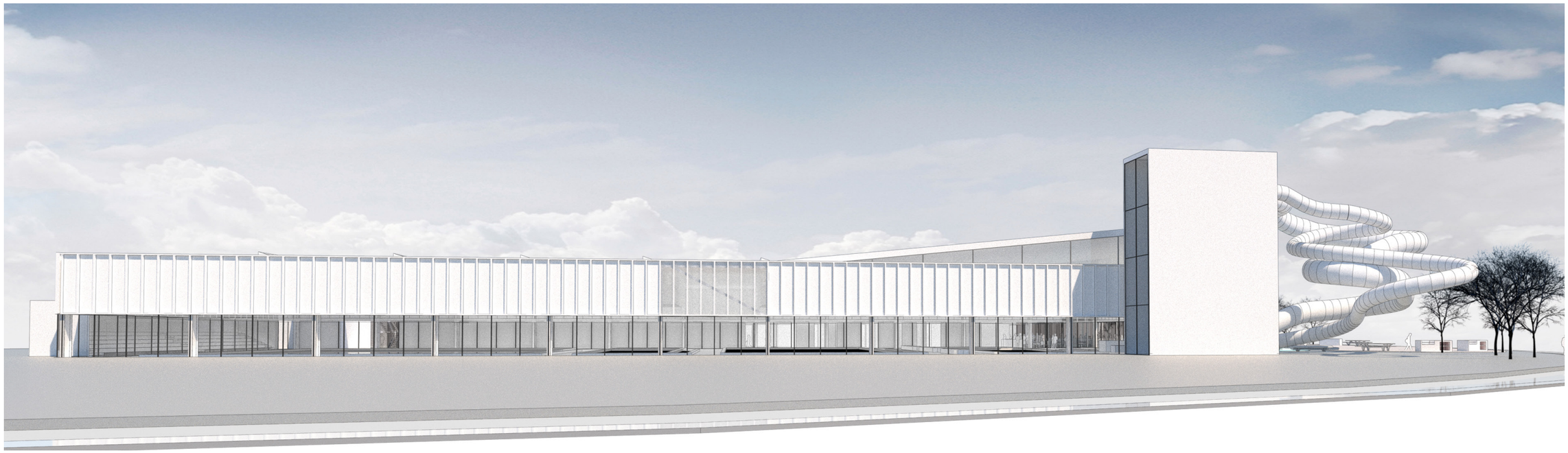


SOUTH WEST - FITNESS CENTRE

DESIGN RESPONSE

WEST - VIEW FROM TAMATEA DRIVE



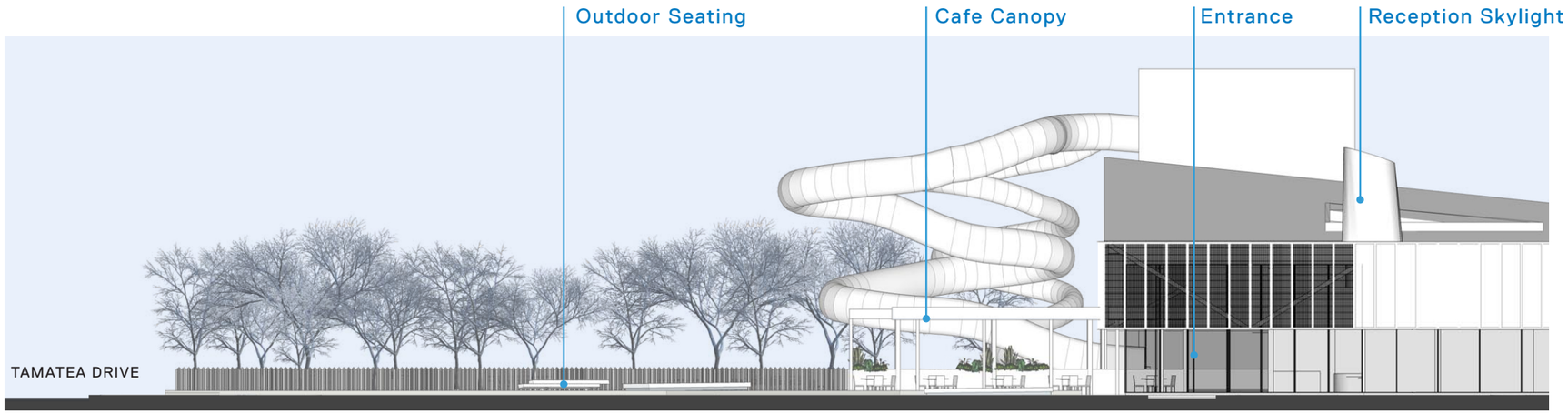


NORTH -VIEW FROM PREBENSEN DRIVE

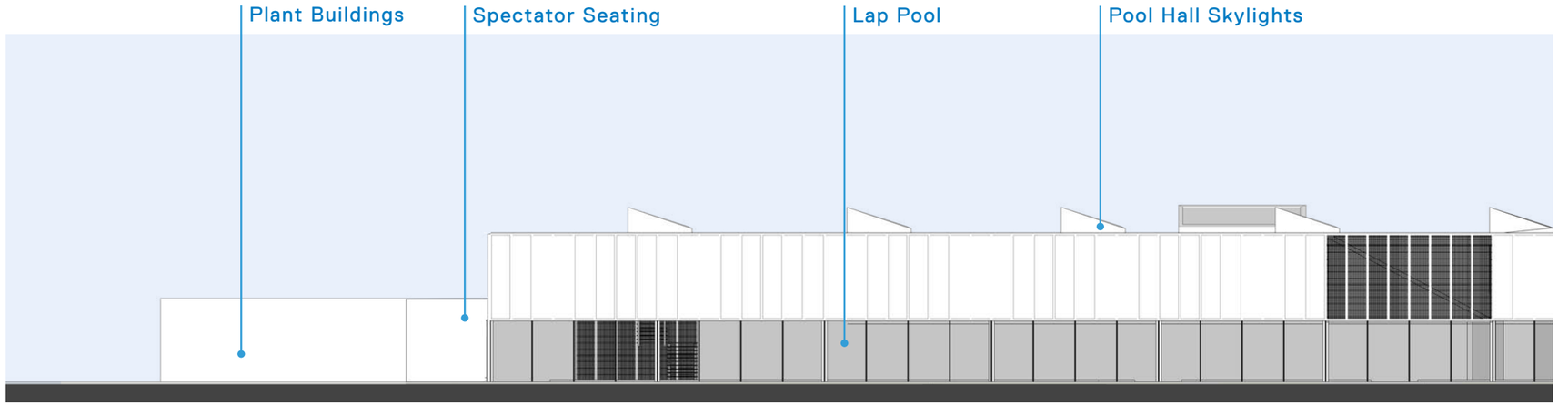
ELEVATIONS

SCALE 1:250 @ A3

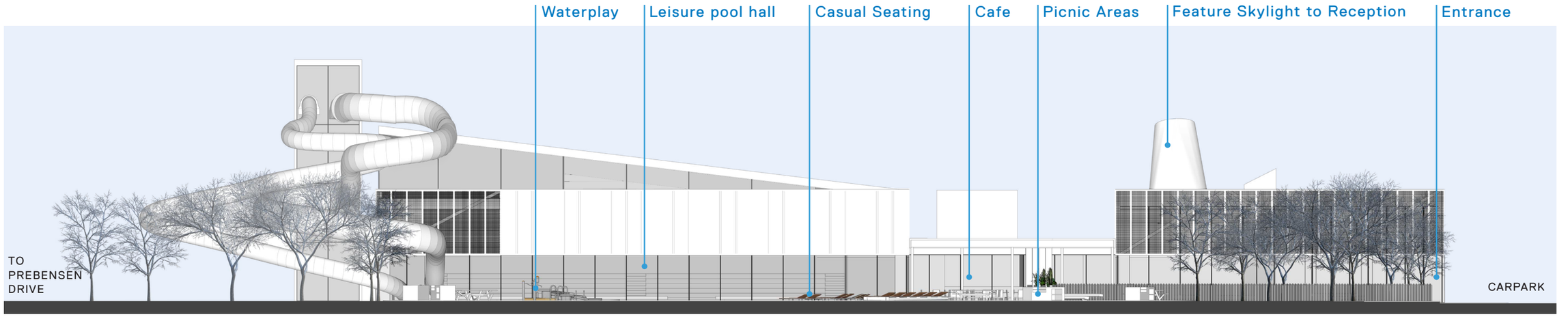
0 2 4 6 8 10



SOUTH



NORTH



WEST

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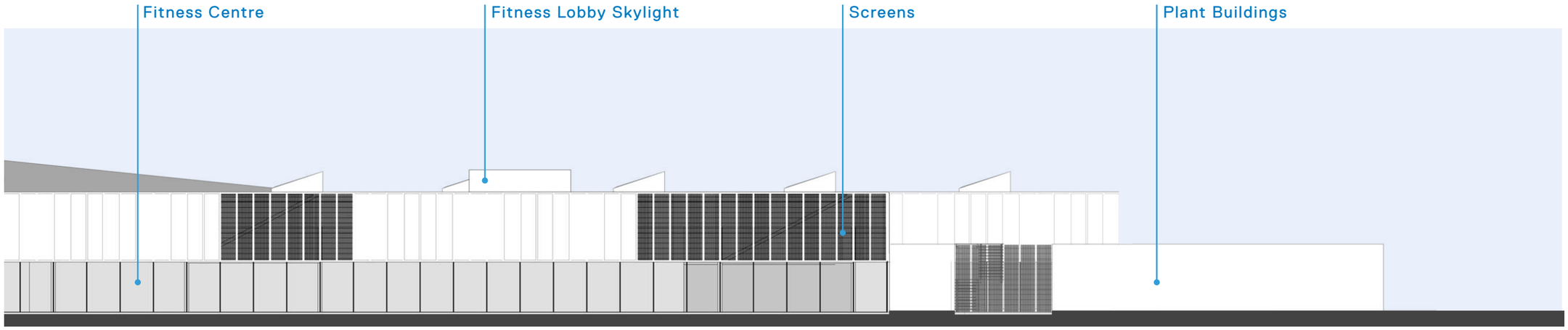

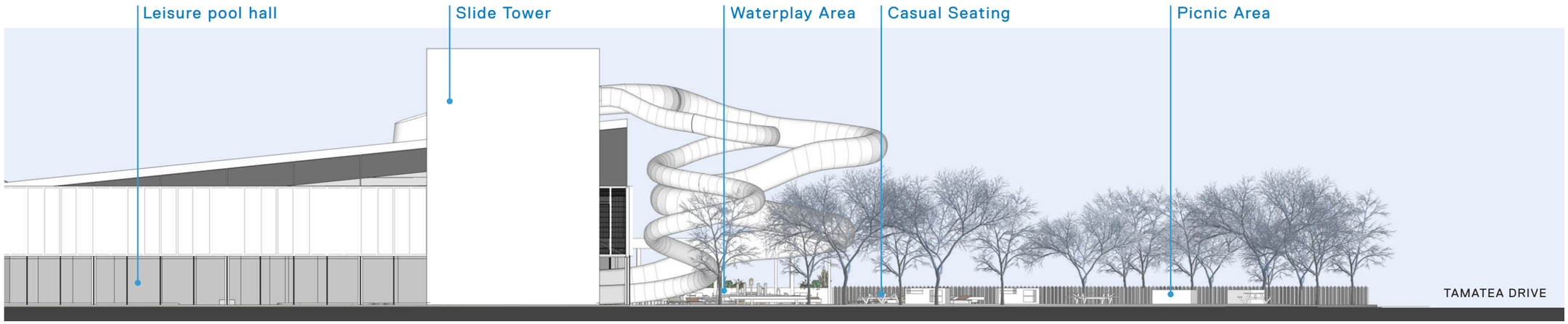

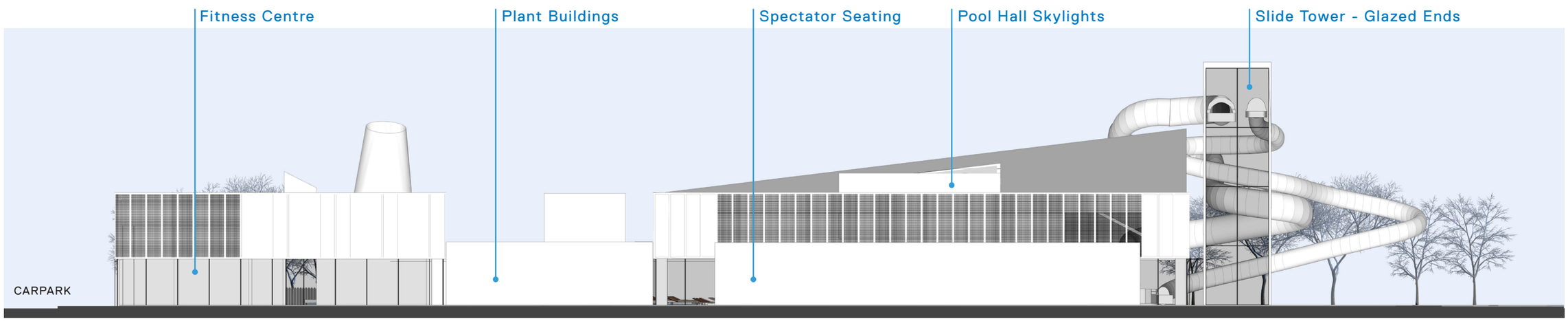

EAST

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AREA SCHEDULE

NAPIER AQUATIC CENTRE			
Concept Design | 18th February 2019			
Item	**Room**	**Napier Aquatic Areas as drawn (18th Feb 2019)**	**Notes**
	Reception / Foyer / Wind lobby	167	
	Security / Data Room	15	
	Money Counting / Banking Room	inc above	
	Public Toilets	13	
	Retail	45	Dedicated retail area shown separate from foyer. QEII retail utilises the full area of the foyer which is undesirable
	Café, Kitchen and Dishwash/Waste Room	112	
	Front of House Components | Subtotal	**352**	
	Birthday Party & Marshalling Room	30	
	L.T.S (Learn to Swim) Office	30	
	Wet Change Rooms	264	77m2 family change, 91m2 male, 91m2 female. (QEII change rooms were 70m2 male / female and 75m2 family)
	Pool Control Room	5	
	Cleaners Room	6	
	Sauna	25	
	Steam Room	25	
	L.T.S Store	inc below	
	Wet Pool Store	101	
	L.T.S Poolside WC	4	
	Waterslide Raft Storage / Stair	64	Raft store 20m2, Stair 30m2, Plant 14m2
	Wet side circulation	75	
	Other 'Wet' Pool Components | Subtotal	**629**	
	Spectator seating	**93**	
	Pool Hall	**2847**	
	Fitness, Weights & Cardio Studio	303	
	Spin Room	73	
	Fitness Co-ordinators Office	9	
	Fitness Assessment Room 1	10	
	Fitness Assessment Room 2	10	
	Fitness Stores	11	
	Studio Store	17	
	Group Fitness Studio	275	
	Dry Waiting Area / Circulation	117	
	Dry Change Rooms	93	
	Fitness Centre Components | Subtotal	**918**	
	Staff Room	35	
	Staff Offices	95	
	Staff Change	14	
	Large Multipurpose Meeting Room	75	
	Small Meeting Room	20	
	Dry Circulation	inc above	
	Admin / Dry Support Components | Subtotal	**239**	
	Plantroom (Indoor)	**228**	
	Subtotal	**5306**	
	Total Measured GFA	**5400**	Excluded energy centre, chlorine gen room and associated service yard areas (external areas of the building)
	Other areas		
	Chlorine gen	36	
	External energy centre compound	208	

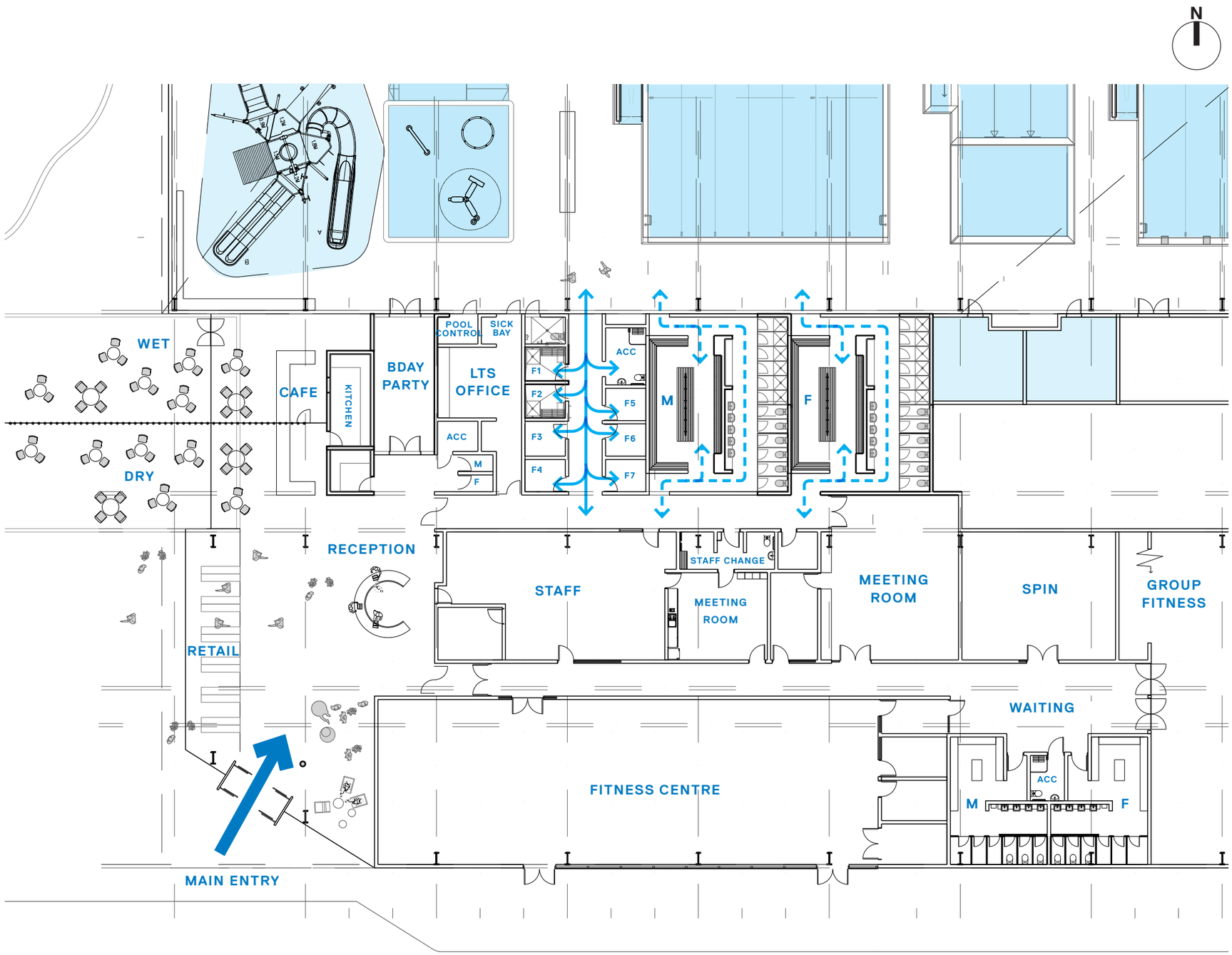
CHANGE FACILITIES

FLOOR PLAN

1:250 @ A3

The change room layout have been modified from the QEII change rooms to increase the area and provide a more typical wet / dry seperation.

This linear model seperates patrons into seperate family, male and female change processes and is best from an operational, cleaning, perspective.



LEGEND:

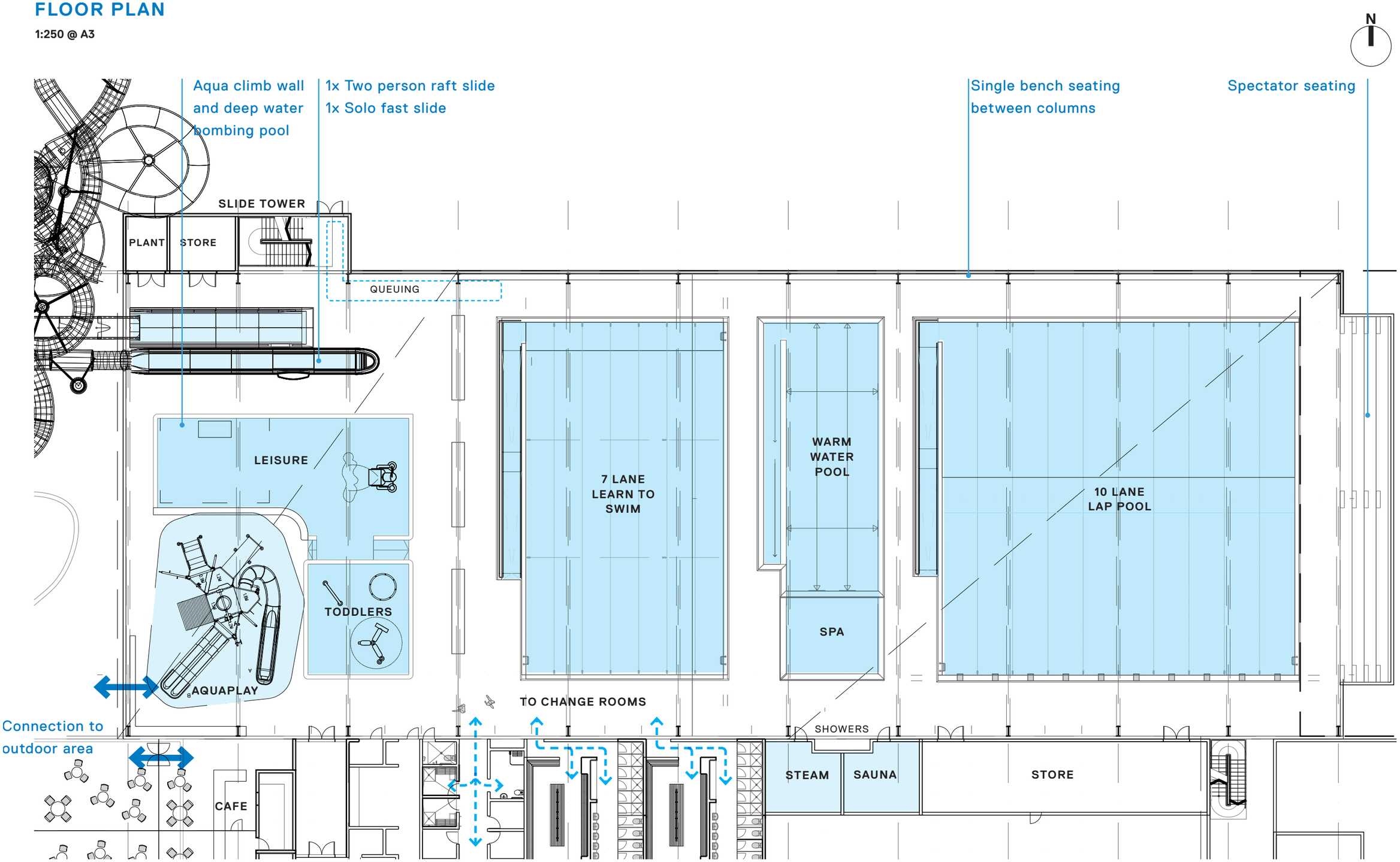
FAMILY CHANGE PROCESS

MALE / FEMALE CHANGE PROCESS

AQUATIC FACILITIES

FLOOR PLAN

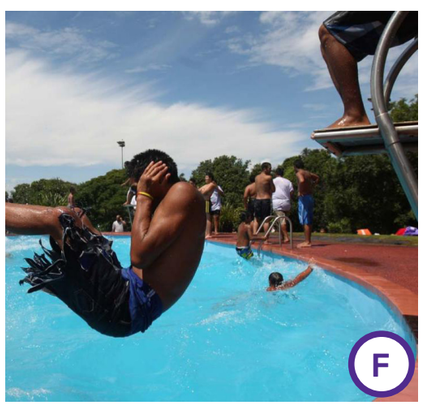
1:250 @ A3

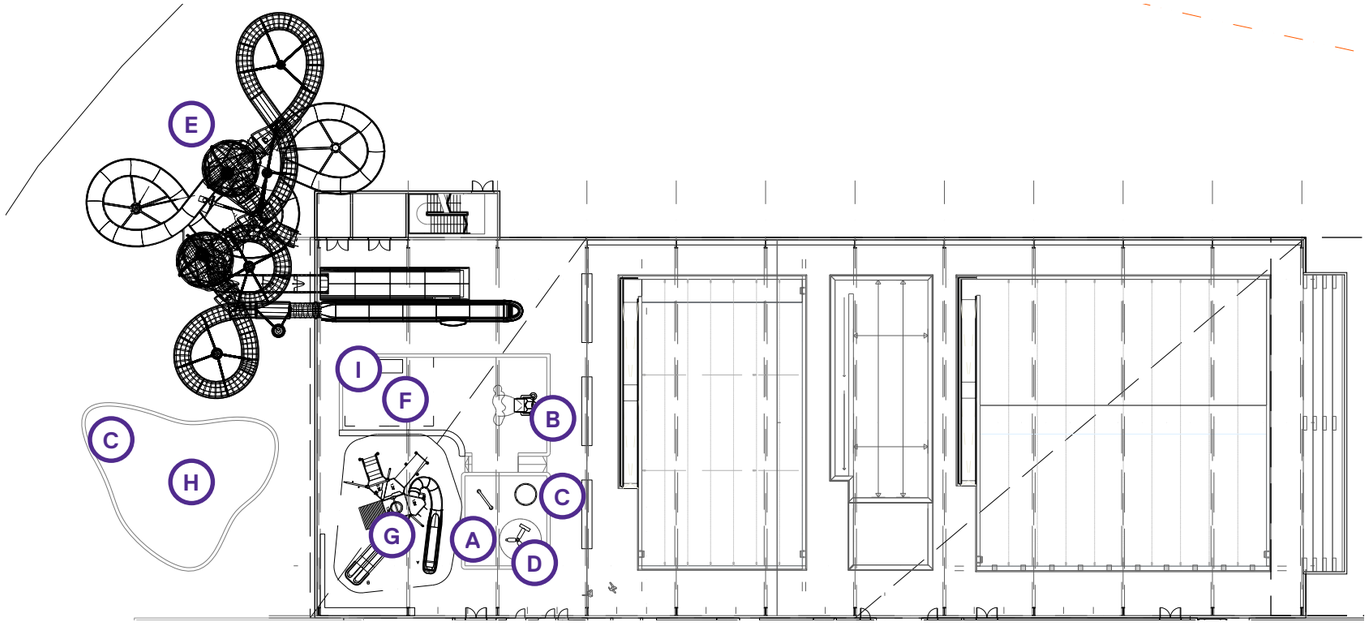


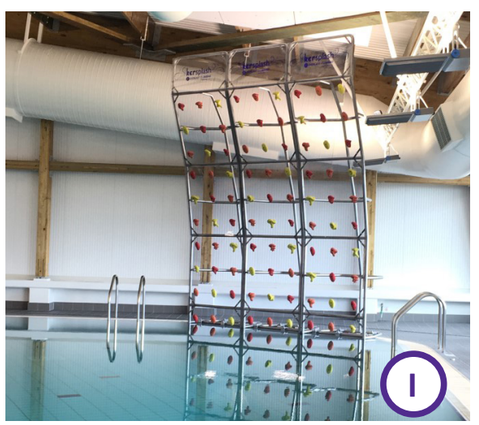
AQUATIC FACILITIES

EQUIPMENT LOCATIONS

The diagrams below indicate a range of water play equipment, slides and features. These are intended to describe he generic look and feel of the features. Toys would be selected to be plug and play and slide and zero depth equipment would be kept generic in the employers requirements to ensure competiive price tension.





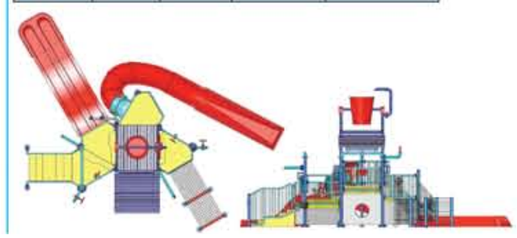


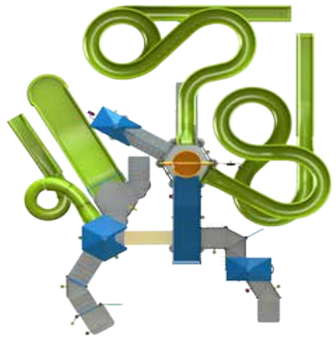
AQUATIC FACILITIES

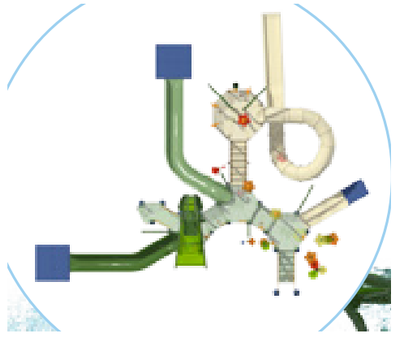
AQUAPLAY OPTIONS

Vortex, Proslide and Whitewater all have a range of appropriate zero depth equipment and features. Some of these are indicated below. These should be developed by the Contractors as part of the Design / Build tender to ensure price tension is maintained and provide a range of offerings

300	Approx. Pool Size feet²	Approx. Pool Size metres²	Approx. Unit Size (LxWxH) feet	Approx. Unit Size (LxWxH) metres
300	2460	229	40 x 33 x 15	12.1 x 9.9 x 4.6
300TB	2810	261	40 x 33 x 20	12.1 x 9.9 x 6.1







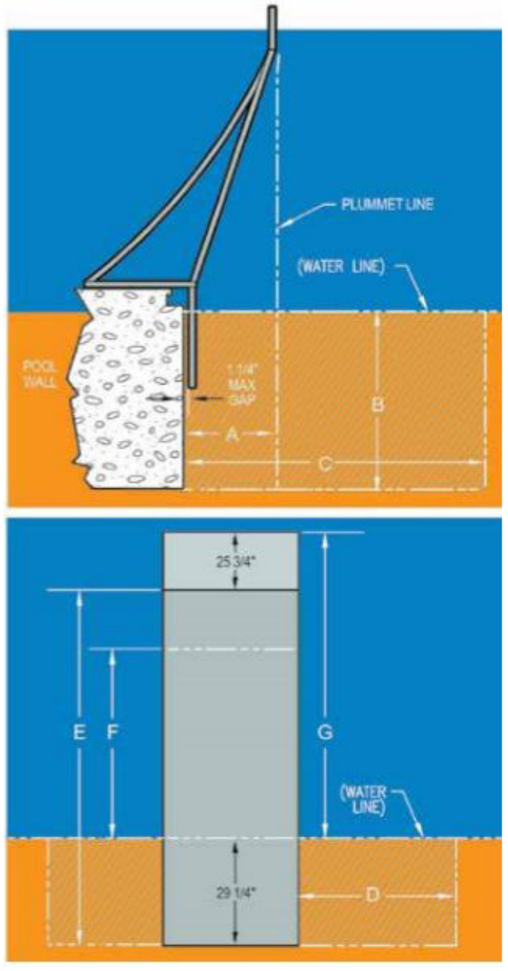
AQUATIC FACILITIES

AQUA CLIMB OPTIONS - DEPTH REQUIREMENTS

Standard Height Options	Distance of plummet line from pool wall (A)	Minimum pool depth required (B)	Obstruction free zone from pool wall out (C)	Obstruction free zone either side of AquaClimb (D)	Available climbing height (E)	Height of last foothold above deck* (F)	Total wall height above level pool deck (G)
2H	1’	4’	7’	5’	6’ 7”	2’ 1”	6’ 3”
3H ALT	1’ 9”	5’	9’	5’	8’ 10”	4’ 5”	9’ 7”
3H	1’ 9”	6’	9’	5’	9’ 10”	5’ 5”	9’ 7”
4H ALT	2’ 6”	7’	10’	5’	12’ 1”	7’ 8”	12’ 10”
4H	2’ 6”	8’	10’	5’	13’ 1”	8’ 8”	12’ 10”
5H ALT	3’ 3”	8’	12’	6’	15’ 5”	11’	16’ 1”
5H	3’ 3”	9’	12’	6’	16’ 5”	12’	16’ 1”

* Distance from bottom of wall to uppermost climbing hold.
** Based on climer’s feet positioned at least 2’ below highest hand grip.
ALT or alternate configurations will have the top row of handholds plugged for non-climbing terrain to meet pool depth requirements.

IMPORTANT SAFETY NOTE:
AquaClimb safety distances and pool depths are based upon a climber entering the water **FEET FIRST**. The AquaClimb was designed for a feet first entry at all times and supervision must be present when the AquaClimb is in use. To ensure the maximum level of safety, **THERE MUST BE NO DIVING AT ANY TIME.**



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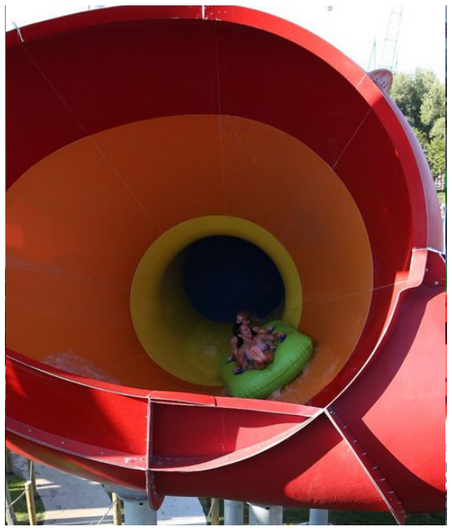
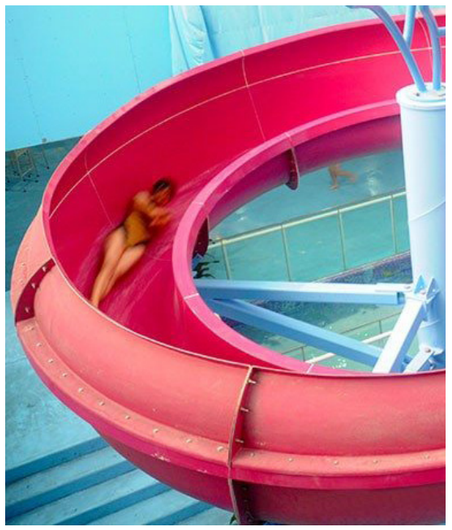
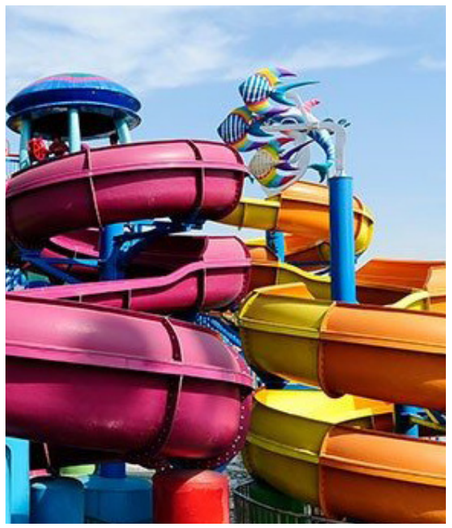
AQUATIC FACILITIES

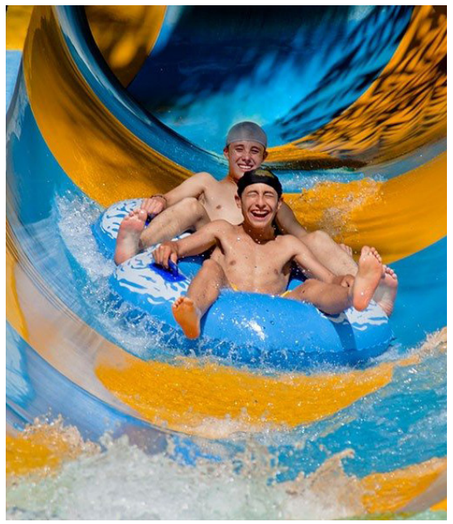
PROSLIDE HYDROSLIDES

HIGH TERROR — LOW TERROR







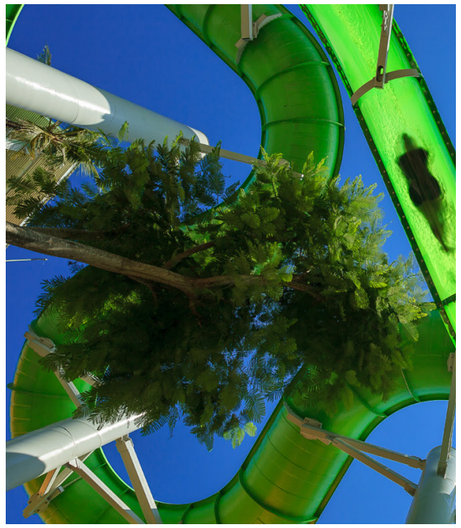


SLIDE	TORNADO 18	TWISTER	TWISTER	PIPELINE
Description	1-2 person Raft Slide. Patented funnel shape. ‘Slow and go’ technology.	Body Slide Back to back turns, 360 loops. Open or closed.	Body Slide Back to back turns, 360 loops. Open or closed.	1-2 person Tube Slide. Banked 180 and 360 turns. Open or Closed
Length	151.5m	43.3m	51.2m	119.5m
Height	12.8m	5.2m	5.0m	12.7m
Dispatch Rate	12 seconds	12-15 seconds	12-15 seconds	12 seconds
Flow rate (m3/hr)	680	228-341	228-341	570-680
Hourly Capacity	180-360	180	180	300-600

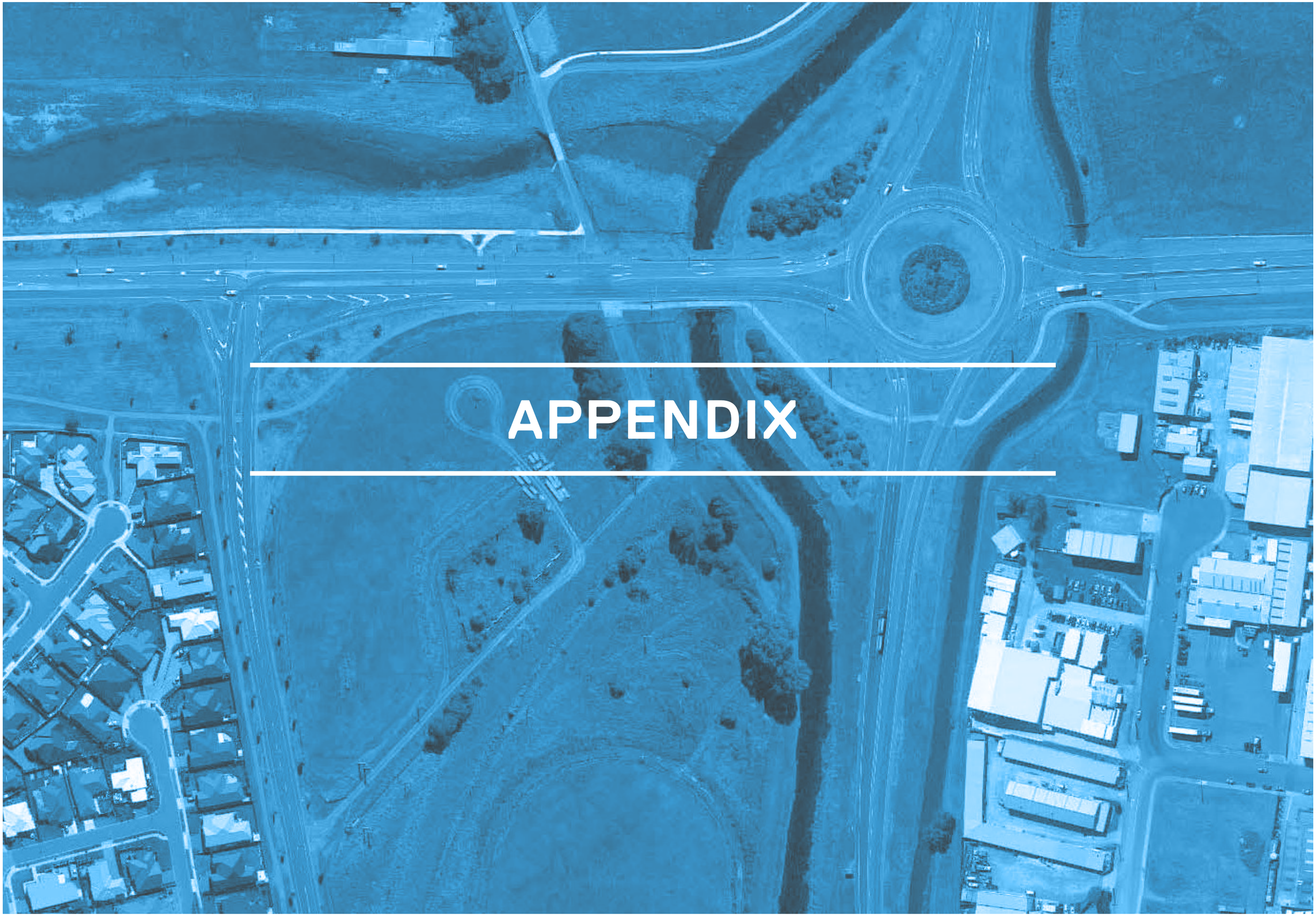
AQUATIC FACILITIES

WHITEWATER HYDROSLIDES

HIGH TERROR — LOW TERROR



SLIDE	FLATLINE LOOP	CONSTRICTOR	GIANT AQUATUBE	AQUATUBE
Description	Body Slide Aquatube with sheer drop Aqualaunch and flatened figure eight section.	1 - 2 Person Inner Tube Tight, high banking, high speed turns. Expanding flume width.	Body Slide Larger version of the Aquatube body slide.	Body Slide Highly customisable Suitable for all ages and skills levels
Length	67.4m	131.4m	75.7m	66.9m
Height	12.2m	12.2m	8.4m	8.4m
Flume Width	0.8m	1 - 2m	1.4m	0.9m
Speed	9+ m/s	8 m/s	4 - 7 m/s	4 - 7 m/s
Hourly Capacity	180	480	240	240

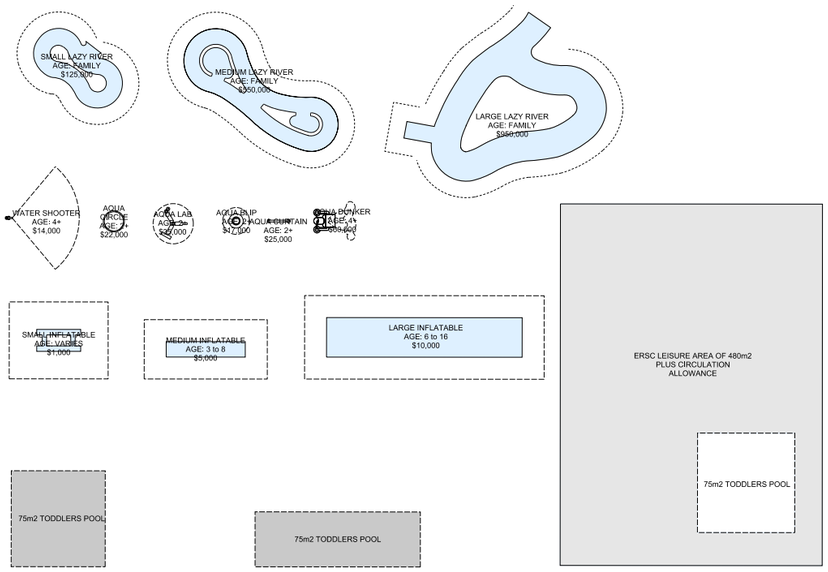


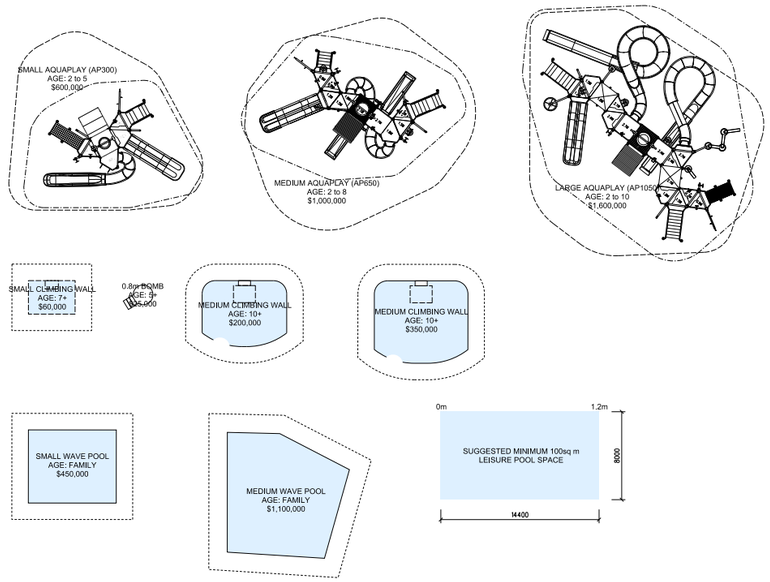
APPENDIX

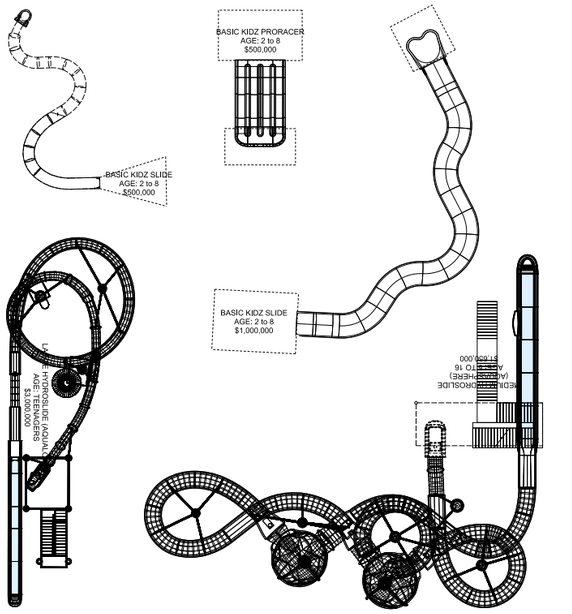
LEISURE WATER

LEISURE COMPONENTS AND BENCHMARKS

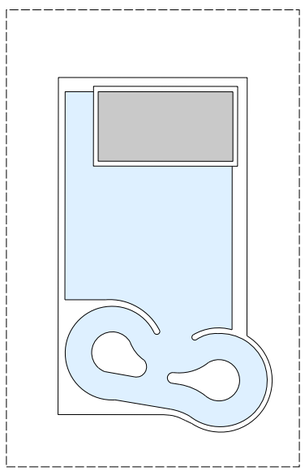
LEISURE COMPONENTS



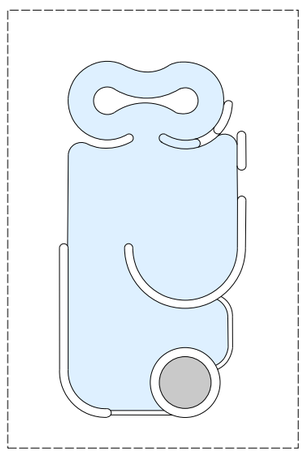




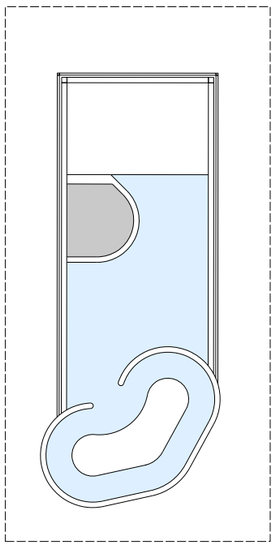
LEISURE BENCHMARKS



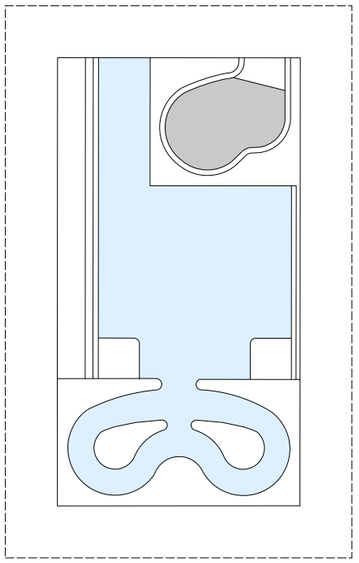
SELWYN AQUATIC CENTRE



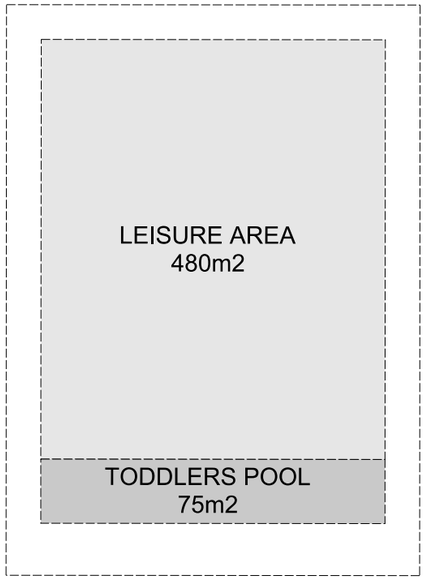
DUDLEY AQUATIC CENTRE



ASHBURTON AQUATIC CENTRE



BLENHEIM AQUATIC CENTRE



ERSC BRIEF

REPORT

Tonkin+Taylor

Onekawa Aquatic Centre Development

Geotechnical & Land Contamination Considerations

Prepared for
Napier City Council
Prepared by
Tonkin & Taylor Ltd
Date
February 2022
Job Number
1009171.v0.2

Exceptional thinking together
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08.2.22	0.2	Draft report with client comments update	J Yule	M Thomas	

Distribution:

Napier City Council	1 electronic copy
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Table of contents

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Napier City Council (NCC) to undertake an engineering risk review into geotechnical and contaminated land aspects of the proposed Onekawa aquatic centre development.

T+T undertook geotechnical investigations and prepared a series of technical reports including contaminated land[1] and geotechnical assessments[2] in 2021. Following which, T+T was subsequently asked to assist in confirming project risks and reviewing the expected scope of groundworks to support initial development costings. This report forms the basis of that assessment and is expected to support a project cost comparison (undertaken by others) between the Onekawa site and a previous scheme at Prebensen Drive. The Prebensen Drive site was part way through enabling earthworks before the project was put on hold, while NCC investigate possible uses for the Onekawa complex, which houses the existing aquatic centre and other sports complexes.

The scope of this work has been undertaken in accordance with our variation order[3] dated 5 November 2021 and has included:

1 Review existing design schemes for the Prebensen Development and overlay these onto two options ("Options 1 and 3") at Onekawa, including a series of plans and cross sections;

2 Review the expected earthworks volumes and ground treatment associated with the ground conditions and contamination soils at the site;

3 Provide a summary of disposal options and landfill options to allow QS costings;

4 Review landfill gas requirements and confirm the extent and programme of an investigation;

5 Provide a summary risk register for both the Onekawa and Prebensen sites;

6 Summarise further works that are expected to be required as part of site masterplanning; and

7 Prepare this summary report and attend a workshop scheduled for February 2022.

2 Background

The Onekawa park site was formally part of a shallow intertidal lagoon in central Napier, and is now bounded by Madi Road, Flanders Ave and residential properties.

This land was uplifted during the 1931 Napier earthquake, and subsequently used for grazing land. During the 1930s to late 1950s the site was extensively earthworked and landfilling was undertaken, we understand much of it being municipal waste, placed in long trenches.

The site has been home to the Onekawa pool complex since 1964, which has been modified and upgraded since then, with infilling of some of the older pool structures. Technical studies by T+T and others have been used to define the extent of the filling, which does extend beyond the NCC Onekawa property parcel into the surrounding residential areas.

T+T undertook intrusive investigations across the site in 2020 and 2021, with these investigations generally confirming:

- NCC wishes to examine the feasibility of redeveloping the existing Onekawa aquatic facility to include a new 25 m pool, learn to swim area and full modern facility, similar in scale to the previously proposed Prebensen Drive site. The ground level at Onekawa is relatively flat at about RL 12m (Nap 1962 datum);

[1] Tonkin & Taylor Ltd, Onekawa Aquatic Centre-Contaminated Land Assessment v2, July 2021, T+T ref: 1009171
[2] Tonkin & Taylor Ltd, Onekawa Aquatic Centre-Geotechnical Assessment v3, July 2021, T+T ref: 1009171
[3] Tonkin & Taylor Ltd, Onekawa Aquatic Centre- Geotechnical and Contaminated Land investigations, Variation V03, technical inputs into pricing exercise, 5 November 2021

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- Uncontrolled fill and landfill refuse were encountered over most of the site. The southern portion of the site had a much higher refuse content and the fill was thickest (over 3m deep) and the most variable;
- The remainder of the site was typically underlain by up to 2m of mixed cohesive uncontrolled fill, comprising a mixture of clay, silt, rootlets, glass, ceramic, bricks and metals and other demolition waste type materials;
- The ground conditions beneath the fill comprised a mixture of alluvial sediments, including a very soft compressible estuarine silt layer. This layer is expected to consolidate (settle) under loading and anecdotal evidence of settlement of landscaping bunds around the site was mentioned to T+T staff during our site walkovers;
- Contaminated land testing encountered localised areas of elevated heavy metal samples across both Options 1 and 3. However, asbestos was not encountered in any of the samples analysed. Some sample results were elevated above the Class A landfill exceedance criteria, however, further leachability sampling was recommended to confirm acceptance;
- Groundwater at the site was relatively high, ranging in depths from 1 to 3m, typically about 2m below ground level; and
- The two options known as “Option 1” and “Option 3” were identified as potentially being easier to develop, largely due to a more limited fill extent and requiring limited demolition. These two options are shown in Figure 1 below. For our most recent works the extents of these options have been slightly adjusted to suit site constraints.

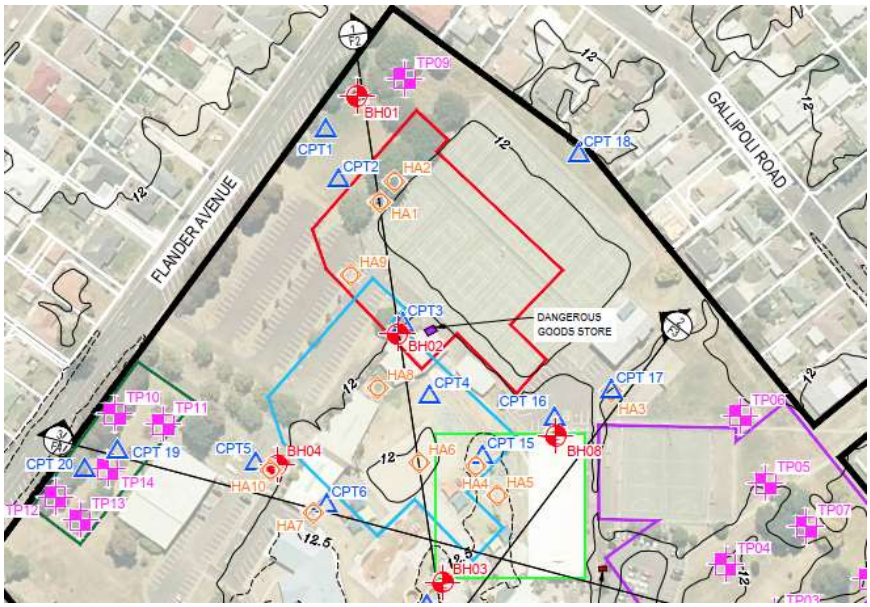

Figure 1-Site layout showing Options 1 (red) and 3 (blue) and approximate extents.

3 Design assumptions and information ‘gaps’

At the time of writing, an architectural assessment has not been completed for the Onekawa development. Accordingly, there is significant uncertainty about the proposed layout and final form for the development. The following sections outline assumptions that we have had to make or where further information will be required to confirm costs in more detail. This list is not exhaustive and specialist architectural advice and further masterplanning will be required.

3.1 Finished levels

The previous Prebensen drive development had a finished floor level of about 13.30m RL as per Warren and Mahoney drawings[4] (about 1.3m above existing ground levels), we understand this was largely to facilitate development above the measured groundwater level, so that the pool base would sit elevated above the groundwater level.

At Onekawa, the ground level and groundwater levels are comparative (12m RL ground level and 1-2m deep groundwater profile). Accordingly, for the purposes of this assessment we have adopted a similar levels profile to Prebensen drive, with finished floor level 1.3m above the existing ground level, to provide sufficient freeboard above groundwater levels for ease of construction. NCC's GIS maps portal does not show the site mapped as a known flood hazard area. However, we strongly recommend this is reviewed at the next design stage. Raising ground levels will also require large wide batter slopes to tie into the surrounding sites, which may encroach on existing infrastructure, requiring additional retaining or transitioning. Placement of fill would also require consideration of consolidation settlement effects within underlying materials and flow on effects to the buildings and infrastructure.

Alternatively, the floor level could be reduced or kept to closer to the current ground level. While this could simplify settlement effects, this may mean constructing closer to the groundwater level and may require pumping and tanking of foundation treatment to mitigate buoyancy pressures and deal with groundwater inflows.

Overall final building levels will likely be a trade-off between raising the site (and mitigating settlement due to filling) and lower ground levels (whilst dealing with groundwater and foundation preparation/treatment). Selection of building levels should be based on a whole of project assessment (i.e. incorporating architectural, infrastructural, planning aspects etc). We recommend this is workshopped further during later design stages.

3.2 Earthworks footprint

At Prebensen Drive, an earthworks batter of 5 to 10% was adopted. We expect this was to form relatively gentle grassed batters around the site, which could be used for recreational purposes. At Onekawa, such batters are likely to be difficult to implement, due to the presence of neighbouring properties and a sewer rising main (in the case of Option 1) and existing buildings and the existing aquatic centre (in the Case of Option 2).

We have proposed a 1V:10H slope around the perimeter of the development, if a FFL of 13.3m is adopted. This may require localised landscaping walls and transitions to manage the change in grade around the perimeter of the development. This also means that the development footprint will encroach on existing buildings that are proposed to be kept operational and the access to the neighbouring Omni gym will be impacted in the case of Option 3.

Accordingly, further work would be required to confirm transitional areas and changes in grade around the site once design levels are more advanced.

Overall, both earthworks footprints are expected to be between about 11,000 and 12,000m^2.

3.3 Extent of impervious areas and stormwater requirements

The site is split into two catchments, with the northwestern side collected and discharged along Flanders Ave, which is then discharged to the Cross Country Drain at Taradale Rd. The southeastern

[4] Warren and Mahoney, Concept Design Report, May 2019, Rev 2.1

catchment is collected and conveyed to the Cross Country Drain by a separate pipe outfall running southwest of the development.

Whilst the site is not mapped within the 50 year flood plain as per NCC GIS maps, there is significant downstream flooding about 500m downstream of the site. We strongly recommend that Hawkes Bay Regional Council (HBRC) is engaged during masterplanning works to confirm any flood hazard information at the site and determine a strategy for overall stormwater management at this site. It is likely that stormwater detention will be required to attenuate peak stormwater flows (as was the case at Prebensen Drive).

Development of the site will also increase impervious areas within the catchment, from roof catchment, additional car parking and hardstand areas. For the case of Option 1, this is particularly relevant as the courts will be relocated and further areas within the eastern catchment will be converted to impervious areas, further increasing impervious extents. Stormwater management, treatment requirement and attenuation measures will need to be confirmed during masterplanning phase so that appropriate areas are identified in the site footprint to meet these storage requirements. It is highly likely that a detention pond (or series of ponds) will be required, similar to the Prebensen Scheme.

Our concept sketch plans provided with this report show the same footprint as the Prebensen pond layout as an example of how this could be integrated into the design. However, this will need to be sized appropriately during the design stage.

3.4 Service relocation/bridging

Figure 2 below shows the NCC council services at the site, including trunk sewer mains, sewer rising mains and water/stormwater network across the site. A full site topographical survey is yet to be completed. However, a number of services are likely to require relocation. We suggest this is reviewed in more detail during masterplanning. A sewer pump station is also present on the northeastern edge of the site, which is a constraint to development in this area of the site. Appropriate setbacks from the pump station and ensuring ongoing maintenance access will need to be incorporated into the Onekawa design.

Figure 2-NCC GIS site services plan, Onekawa complex

4 Earthworks extents/site preparation

This section outlines the expected ground works associated with contaminated soil removal, site preparation and earthworks.

These volumes are estimated from cross section and plan sketches only and summarised in Table 4.1 below. A 3-D earthworks model has not been prepared. As part of this assessment, we have made the following assumptions:

- All uncontrolled fill under the footprint will be removed down to clean natural soils;
- Contaminated soil testing undertaken to date within the footprint of Options 1 and 3 is highly variable, with some areas identified as being relatively clean, whilst others exceeding landfill acceptance criteria (which will require leachability testing prior to acceptance). We have assumed that all materials removed from the site will need to be disposed of to a Class A landfill (i.e. Omarunui Landfill). However, leachability testing will need to be carried out to confirm acceptance to Omarunui.
- We consider that disposal on site (in landscaping disposal mounds/bunds) of some of the lower-level contaminated material may be possible. This would be subject to further grid-based sampling, to confirm viability and design/sourcing of suitable capping materials. However, provisional estimates have been provided below. Given the profile of the site and the surrounding residential land use, this may be difficult to implement.
- A landfill gas membrane would potentially be required around the perimeter wall of the excavation to prevent horizontal migration of landfill gases into the site. This follows the identification of possible landfill gas in a test pit on the southern end of the site. A full landfill gas assessment should be undertaken to confirm this requirement.
- To fill the resultant excavation, local 'straight haul' gravel or other suitable fill will be required to level the site following contamination removal.
- The site will be filled to a provisional finished level of 13.3m RL, which will require importation of additional fill on site, presumably again straight haul gravel, similar to what has been completed at Prebensen Drive. Clay fill could be imported if a suitable source is identified, although, this would be more sensitive to changes in moisture during the Autumn or spring earthworks shoulder seasons.

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Table 4.1: Onekawa Earthworks and site preparation summary

Item	Option 1	Option 3
Approximate Earthworks extent	11,400m^2	11,800m^2
Excavation and undercutting of contaminated fill	14,130m^3 (pool area) 3,000m3 (levelling of proposed courts relocation)	14,500m3
Potential contaminated soil disposal storage on site (TBC-subject to further sampling)	5,000m^3 retained on site in disposal areas 1 and 2	8,000m^3 retained on site in disposal areas 1, 2 and 3
Disposal off site assumed to Omarunui Landfill (TBC-subject to further sampling and acceptance)	9,130m^3	6,500m^3
Fill import to replace contaminated soils	14,130m^3	14,500m^3
Fill import to raise finished floor level if required (including batters, excluding expected pool volume)	11,800m^3	13,200m^3
Demolition requirements	Demolition and clearance of Netball HB building and two small single level buildings. Removal of existing court hardstand, fencing and	Demolition of 4 building around the complex. Removal of the former diving pool (3m) deep and concrete surround
Retaining requirements	Low height walls, 112m total length, assumed to be block walls or similar	Low height walls, 70m total length, assumed to be block walls or similar
Utility relocation	Water main to be relocated, impacts of scheme on sewer rising main to be checked following survey.	Multiple stormwater and sewer lines to be diverted or disestablished.
Specialist requirements	Landfill gas membrane constructed on the southwestern side of the platform at base and sidewall of filling (110m long).	Landfill gas membrane constructed under perimeter of the building footprint under each sidewall of filling (approx. 400m).
Constraints	Construction encroaching toward neighbouring residential sites on northeastern boundary. Building set back and restrictions to be confirmed by Architect. Set back from sewer booster station required.	Access to Omni Gym restricted, building will limit access and amenity to the existing aquatic centre complex during construction. Loss of splash pad and recreational area amenity during construction.
Opportunities	Option 1 requires a smaller scale of demolition and site works are relatively confined to one area of the site. This will make the existing centre more functional during construction. Investigate further areas to retain contaminated soils on site where possible (under court areas for example).	Option 3 could potentially be revised to include the existing building or completely remove this to limit the footprint clashing with other structures on site.

Additional work is also potentially required for ground improvement, as has been identified in the T+T Geotechnical report. This is likely to require geotechnical/structural coordination to confirm a suitable foundation solution. For planning and budgeting purposes we suggest that an allowance for ground improvement solution (Stone Columns of Rammed Aggregate Piers [RAPs]) is included in the initial budget. By lifting the platform up, out of the ground, the scope of the ground improvements may be able to be reduced by reinforcing the fill with geogrid or preloading/surcharging with additional filling and monitoring. Again, this can be reviewed with the design team once levels and a structural form are known.

Based on a 100m by 80m platform, with ground improvement columns extending to 14m, this is expected to include approximately 2,420 RAP 600mm dia columns (or similar equivalent) with a total lineal metreage of 33,880m.

5 Programme

A comparative programme has been developed between future works at the Onekawa site and the Prebsensen Drive location, which is approximately 80% through the enabling works phase before the works were mothballed.

The Onekawa project is in its infancy and provides a much more challenging consenting/ development programme. Accordingly, the programme for the Onekawa design and consenting is likely to be relatively long and subject to increased escalation costs of the project lifecycle.

Table 5.1 and Table 5.2 below provide an estimated comparison between the two sites and the key milestones that could be expected to be required during the timeframe.

Table 5.1: Programme Comparison-Onekawa Site (assumes no enabling works)

No	Task	Timeframe	Typical cumulative programme	Comments/deliverables
1	Masterplanning/Topographical Survey	3 months	3 months	Masterplanning report, survey report, asset condition survey
2	Landfill Gas Assessment, further contamination and geotechnical testing	12 months - landfill gas 3 months geo/contam	12 months	Landfill gas assessment to be undertaken in parallel with masterplanning an completed at end Preliminary Design
3	Masterplanning Stormwater support/civil infrastructure assessment	3 months	12 months	To be undertaken in conjunction with masterplan.
4	Preliminary Design, following Masterplanning, technical studies, traffic, civil, architecture. Initial public consultation	6-9 months	12 months	Technical packages for Resource Consent
5	Resource Consent Processing, public consultation, feedback and Selection 92 requests (if applicable)	6 months	18 months	Technical documentation, community engagement, hui etc
6	Design-Build specimen design package for tender	3 months	21 months	Specimen design and principals' requirements summary.

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No	Task	Timeframe	Typical cumulative programme	Comments/deliverables
7	Design-Build-Tender process and review	2 months	23 months	Tender evaluation.
8	Detailed design/BC submission	6 months	29 months	Detailed Design package
9	Construction of enabling works to commence	1 month	30 months	Physical works commence (construction duration unknown).

Table 5.2: Programme Comparison-Prebensen Site (assuming completing enabling works)

No	Task	Timeframe	Cumulative programme	Comments
1	Restart enabling works	0.5 months	0.5 months	Engagement with HBRC/NCC regulatory/compliance team required.
2	Complete enabling works, fill settlement monitoring, handover and sign off	4 months	4.5 months	Geotechnical completion report. Any other post construction consent conditions to be addressed.
3	Tender process and review (in parallel with enabling works)	3 months	4.5 months	Tender evaluation and negotiation period.
4	Resource Consent Processing (for the Building), public consultation, feedback and Selection 92 requests (if applicable)	3 months	7.5 months	Technical documentation, community engagement, hui etc
5	Detailed design/BC submission	6 months	13.5 months	Design Build team to prepare.
6	Construction Commence-start up	1 month	14.5 months	Construction of structural/physical works to commence.

6 Project Risk Summary

Project risk registers have been created for the Onekawa and Prebsensen sites. These outline the critical ground related project risks, any existing controls and potential controls to mitigate or reduce the risk impact. These documents should be updated as the progress progresses, and the risk levels adjusted to match any developments.

As expected, the Onekawa site includes a number of high-risk items, which is typical of brownfields/contaminated site developments. Further technical studies may be required to evaluate these risks in more detail. The risk profile for the groundworks at Prebensen is more limited, largely due to the fact that much of the enabling works have been completed.Table 6.1 below summarises the key design risks and potential effects on remedial works costs. These are largely applicable for both Options 1 and 3 at Onekawa.

Table 6.1: Onekawa Risk Summary

Key Design Issue	Impact	Relative Cost/Risk Effect
Floor level unconfirmed	Uncertainty around cut/fill levels and ground level relative to base of existing fill.	Large uncertainty around fill volumes and impacts on building foundation requirements. Higher floor level will induce settlement, requiring mitigation. Lower floor level will bring base of pool closer towards soft silt layer/groundwater, potentially requiring dewatering and tanking.
Landfill gas	Uncertainty if landfill gas membrane required. No landfill gas study undertaken.	Conservative pricing required to include landfill gas membrane or perimeter of Option 3 and southern edge of Option 1.
Uncontrolled/Contaminated fill	Extent of fill removal unclear and disposal on or off site.	Disposal of material off site will incur significant expense. Uncertainty if material can remain on site in landscaping mounds/bunds. This will require further sampling and review. Consider conservative removal volumes. Disposal rates available from local landfill (Omarunui).
Demolition	Additional works required for removal of structures, removal of carparking areas and any external structures (lighting etc).	The extent of removal of hard surfaces is uncertain. QS to price for a conservative site clearance demolition range.
Foundation Design/Ground improvement	Ground conditions are anticipated to be highly variable. Either preloading or ground improvement expected to be required to mitigate compressible soils.	Assume a conservative ground improvement (RAP or similar) spacing over the whole building footprint and contractor to provide rates.
Liquefaction/Seismic Resilience	Ground improvement may be required to meet structural design tolerances	Ground improvement to mitigate liquefaction is likely to be extensive. This is related to finished level as additional filling may improve liquefaction resilience (but incur additional settlement). Raising ground levels will assist in providing a raft over liquefiable layers, so is a significant opportunity.
Lack of design input-Structural	Uncertainty on structural tolerance for settlement and liquefaction design guidance	Conservative assumptions for settlement mitigation may be required without structural design guidance on suitable foundation tolerances. Uncertainties of foundation design elements (for example any uplift restraint or heavy column loads). This may require additional contingency in the budget.
Lack of design input-Civil	Uncertainties about road frontage upgrades (if necessary), stormwater treatment and detention	Uncertainty about requirement and size of any stormwater infrastructure, earthworks volumes and fill import.

Key Design Issue	Impact	Relative Cost/Risk Effect
	requirements (i.e. ponds/swales), earthworks levels and volumes.	Stormwater pond design in contaminated soils may require additional allowance for lining/soil removal etc.
Utilities relocation	Sewer, stormwater and water pipes run through the site and may need relocation. A survey may be required to confirm all assets in project area.	NCC to provide asset plans, undertake topographical surveys to confirm invert levels and extent of services on site to be removed or relocated.
Demolition of existing structures, courts etc	Additional allowance needed for removal of existing buildings and hardstand areas.	Undertake ACM investigations for demolition works and price for ACM removal from buildings where required.
Groundwater effects	Limited groundwater monitoring undertaken to date. Uncertainties for founding levels relative	Long term groundwater monitoring should be undertaken. Assume site to be raised and provide contingency for groundwater pumping etc. Review levels once architect is engaged.
Cost Escalation	Significant cost increases since Prebensen Drive issued for Tender	Revaluate the Prebensen Drive site to understand escalation costs. Allow for significant contingency for future escalation.

The risk registers are provided in Appendix B.

7 Further works

The following section outlines the expected works required for subsequent design stages at Onekawa. We recommend these be staged appropriately for regular QS and risk review in general accordance with NZCIC Guidelines[6].

Masterplanning;

1. Architectural bulk and location plan, design sections and design features report to a suitable masterplanning level;
2. Topographical survey, including collecting information on the existing service network;
3. Infrastructure assessment, following the topographical survey; and
4. Stormwater masterplanning assessment, in conjunction with the architectural masterplanning assessment.

Preliminary Design/Resource Consent;

5. Contaminated land DSI report;
6. Urban design/Architectural / Landscaping assessment;
7. Initial structural design review;
8. Traffic ITA assessment, confirmation of parking and any road frontage upgrades;
9. Civil design report including stormwater treatment sizing, cut and fill levels and volumes, utilities connections and relocations (if necessary);
10. Geotechnical Interpretive Report following early engagement with the structural engineer and confirmation of ground levels and foundation solutions; and

[6] NZ Construction Industry Council, CIC Guidelines, Preface, Preamble and Glossary, Version 1.0, August 2016

11. Planning Assessment and Assessment of Effects (AEE) report, community consultation and Iwi engagement.

Developed Design/Tender support (to support a Design-Build arrangement):

12. Structural design and structural features report;
13. Geotechnical design features report and Principal's requirement review;
14. Services/M&E assessment, Fire Engineering assessment;
15. Noise and vibration assessment; and
16. Quantity Surveyor review.

8 Conclusions

T+T have undertaken a risk review, with respect to potential groundworks at the Onekawa Aquatic Centre development site. This follows site investigations and initial reporting by T+T in 2021.

Significant earthworks would be required to remove uncontrolled fill, that has been identified to contain elevated heavy metal contamination. This was deposited as initial landfilling at the site between the 1930s and 1950s. Removal of this material and disposal to landfill is likely to present a significant project cost. Accordingly, we strongly recommend that further grid-based contamination sampling is undertaken to delineate and estimate contamination extents and the volume of the materials for disposal. A review of potential on site disposal/capping of material in landscaping bunds should also be carried out and discussed with NCC staff and stakeholders.

A series of risk registers and concept plans are appended to this report to assist with high level project costing and review. We have also provided a suggested scope for further works to assist in developing the scheme further. Overall, both "Option 1" and "Option 3" have a similar risk profile and similar quantum of earthworks. Option 1 includes redevelopment of the court areas which will limit the ability to dispose of material on site, while Option 3 will involve more demolition works and potentially encroach on existing buildings and access points.

Prebensen Drive site has a much lower ground risk profile, largely reflective of its "Greenfield" status and the fact that much of the groundworks have already been completed, with minimal hindrances.

9 Applicability

This report has been prepared for the exclusive use of our client Napier City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

The construction rates utilised for this high level cost estimate are based on assumed design concepts, estimated quantities and a combination of recently submitted tender rates for similar projects within the regional area along with the latest available rates from QV Cost Builder database (formerly Rawlinsons). These rates are based on historic information and data and do not include allowance for any cost escalation since the date of the data other than where/as specifically stated.

Consequently, a significant margin of uncertainty exists on the cost estimate and the contingency we have allowed should be considered as part of the cost rather than a potential add on.

In particular, we have not made any attempt to allow for the potential impact of COVID-19 in this estimate. Also, supply chain disruptions are currently having quickly-changing effects on construction costs and schedules. We recommend you seek up-to-date specialist economic advice on what budgetary allowances you should make for escalation, including for any potential changes in construction costs and timing in relation to both COVID-19 and supply-chain issues.

Tonkin & Taylor Ltd

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Jamie Yule	Mark Thomas
Project Manager	Project Director

JWY
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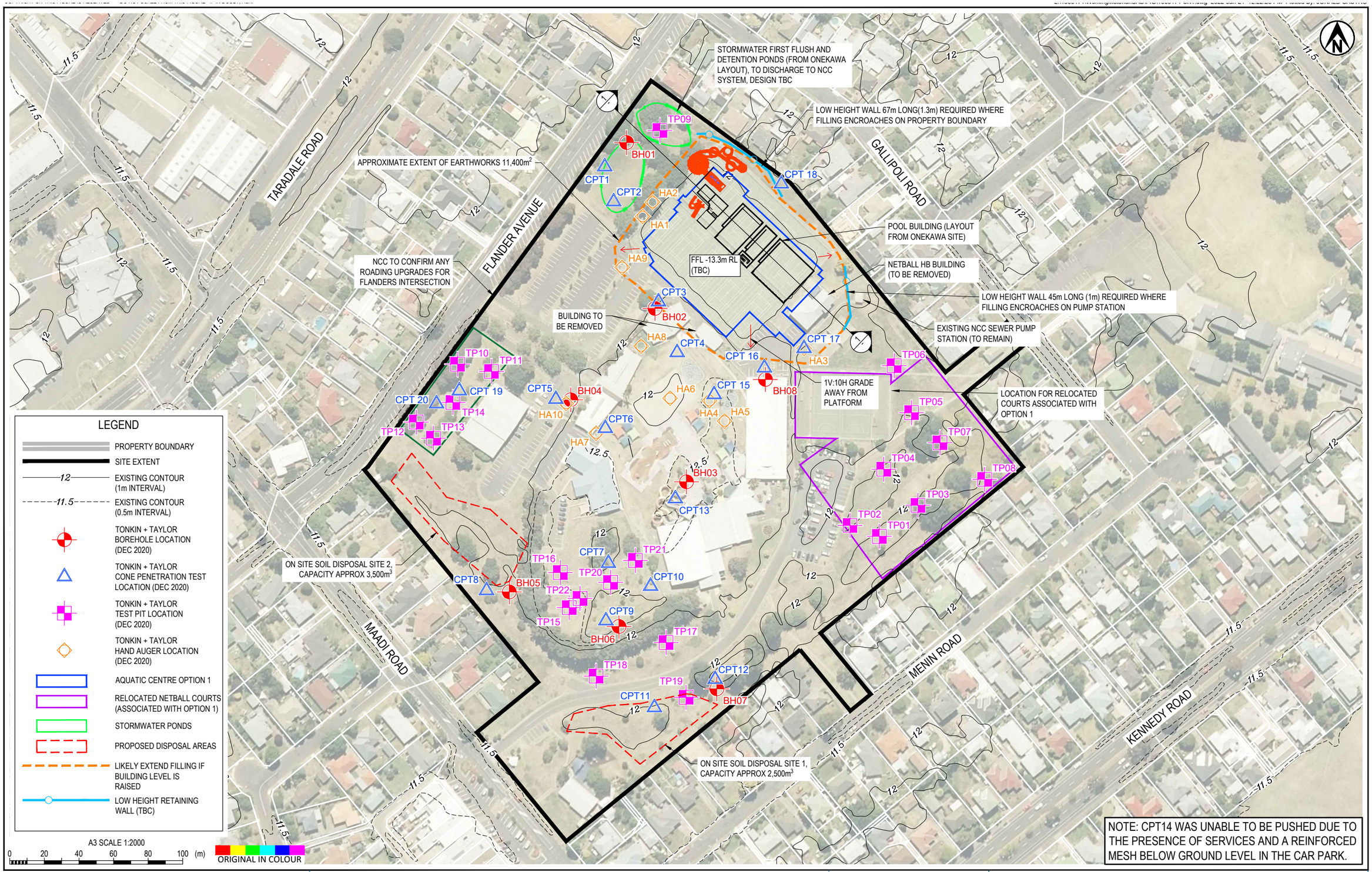
Appendix A: Sketch plans

- **Option 1 layout plan**
- **Option 1 cross section**
- **Option 3 layout plan**
- **Option 3 cross section**



NOTES.

1. AERIAL PHOTO SOURCED FROM LINZ DATA SERVICE <https://data.linz.govt.nz/layer/53401-hawkes-bay-03m-rural-aerial-photos-2014-2015/ , LICENSED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE (CC BY 4.0). ACCESSED 21/12/2020.
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4. COORDINATE DATUM: NZGD2000, NEW ZEALAND TRANSVERSE MERCATOR (NZTM2000).
5. LEVEL DATUM: LINZ (MSL) NAPIER VERTICAL DATUM 1962

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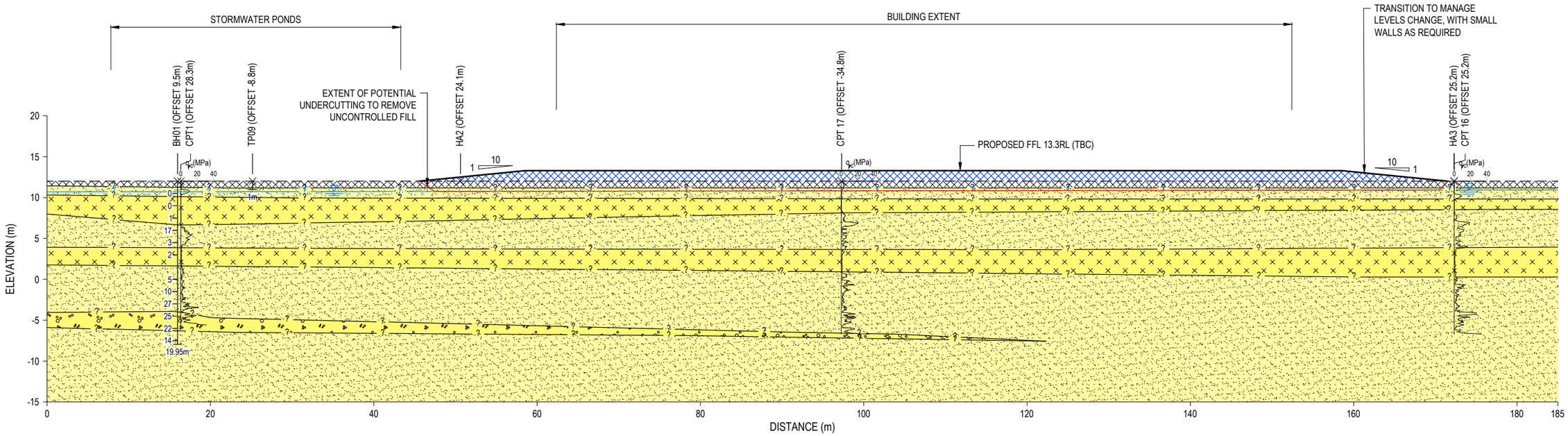
PROJECT No.	1009171	
DESIGNED	JWY	Nov.21
DRAWN	JC	Nov.21
CHECKED		
APPROVED		DATE

CLIENT **NAPIER CITY COUNCIL**

PROJECT **ONEKAWA AQUATIC CENTRE**

TITLE GEOTECHNICAL INVESTIGATION
AQUATIC CENTRE SITE PLAN -OPTION 1

SCALE (A3) 1:2000 FIG No. SKETCH 1 REV 2



SECTION 1
SCALE 1: 500 SK1

LEGEND

- EXISTING GROUND PROFILE
- INFERRED GEOLOGICAL BOUNDARY
- INFERRED GROUNDWATER LEVEL
- UNDERCUT EXTENT
- PROPOSED ENGINEERING FILL
- EXISTING UNCONTROLLED FILL
- ALLUVIAL SANDS AND SILTS
- ESTUARINE SILTS
- ALLUVIAL GRAVEL

EXCAVATION SEQUENCING:

- EXCAVATE AND UNDERCUT POOL AREA TO STOCKPILE APPROX. 14,130m^3
- EXCAVATE COURTS TO LEVEL OUT APPROX. 3,000m^3 TOTAL EXCAVATION OF APPROX. 17,130m^3

DISPOSE ON SITE 5,000m^3 IN DISPOSAL AREA 1 AND 2 (WHERE POSSIBLE). BALANCE OF 9,130m^3 TO BE DISPOSED TO LANDFILL (ACCEPTANCE TO BE CONFIRMED)

IMPORT AND REPLACE SOILS WITH LOCAL STRAIGHT HAUL 14,130m^3

FILL IMPORT TO RAISE LEVELS MINUS POOL AREA OF 1,400m^2 ASSUME 1.5m DEPTH
TOTAL ADDITIONAL IMPORT OF 11,800m^3

A3 SCALE 1:2000
0 20 40 60 80 100 (m)

ORIGINAL IN COLOUR

NOTES.
1. ALL DIMENSION ARE IN METRES UNLESS NOTED OTHERWISE.
2. EXISTING CONTOUR COPIED FROM NAPIER CITY COUNCIL GIS <http://www.gis.napier.govt.nz/IntraMaps80/?project=NCC> DATED 09 DEC 2020.
3. LEVEL DATUM: LINZ (MSL) NAPIER VERTICAL DATUM 1962

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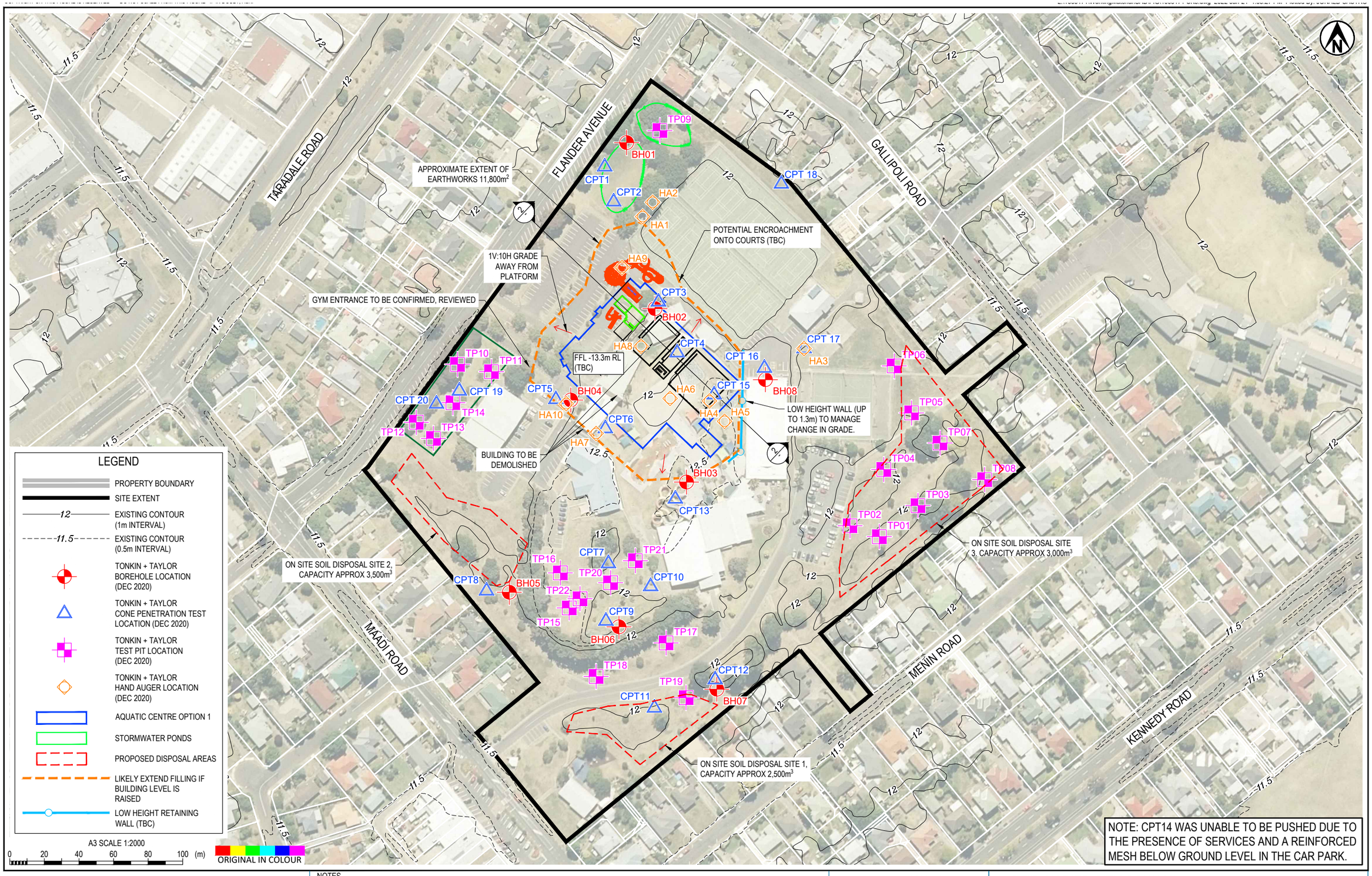
CLIENT **NAPIER CITY COUNCIL**
PROJECT **ONEKAWA AQUATIC CENTRE**
TITLE GEOTECHNICAL INVESTIGATION
GEOLOGICAL CROSS SECTION -OPTION 1
UNDER REVISION 1
SCALE (A3) 1:500 FIG No. SKETCH 2 REV 2



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5. LEVEL DATUM: LINZ (MSL) NAPIER VERTICAL DATUM 1962

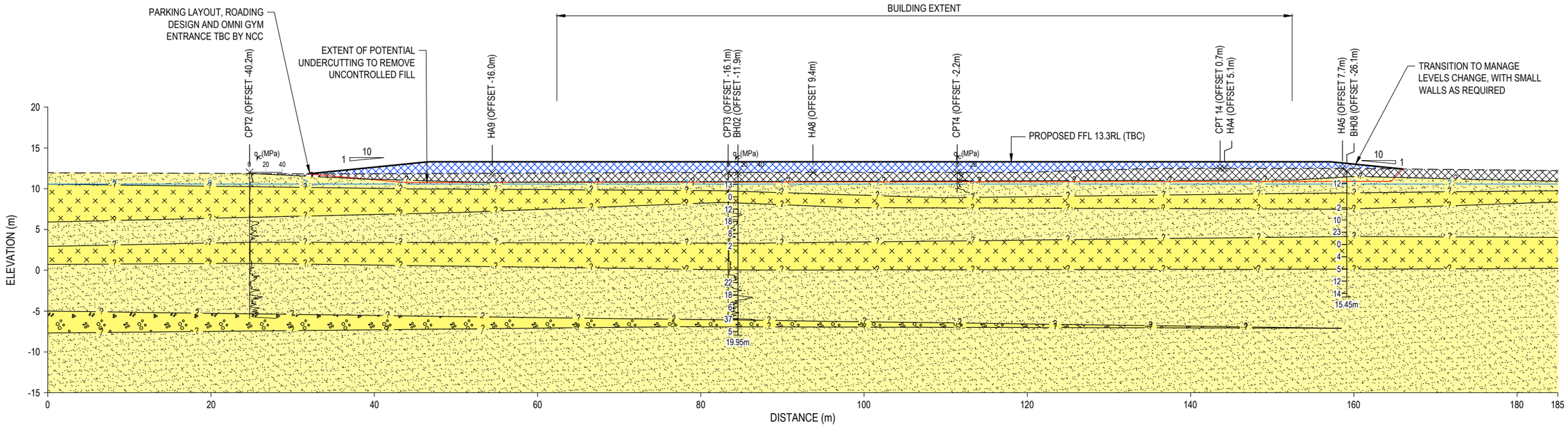
PROJECT No.	1009171	
DESIGNED	ZAFR	Jan.21
DRAWN	JC	Jan.21
CHECKED		
APPROVED		DATE

CLIENT **NAPIER CITY COUNCIL**

PROJECT **ONEKAWA AQUATIC CENTRE**

TITLE GEOTECHNICAL INVESTIGATION
AQUATIC CENTRE SITE PLAN -OPTION 2

SCALE (A3) 1:2000 FIG No. SKETCH 3 REV 2



SECTION 2
SCALE 1:500 SK13

LEGEND

- EXISTING GROUND PROFILE
- INFERRED GEOLOGICAL BOUNDARY
- INFERRED GROUNDWATER LEVEL
- UNDERCUT EXTENT
- PROPOSED ENGINEERING FILL
- EXISTING UNCONTROLLED FILL
- ALLUVIAL SANDS AND SILTS
- ESTUARINE SILTS
- ALLUVIAL GRAVEL

EXCAVATION SEQUENCING:

- EXCAVATE AND UNDERCUT TO STOCKPILE 14500m^3

DISPOSE ON SITE 5,000m^3 IN DISPOSAL AREA 1 AND 2 (WHERE POSSIBLE), 3000m^3 IN DISPOSAL AREA 3.TOTAL OF 8,000 RETAINED ON SITE.

DISPOSAL OF 6,500m^3 OFFSITE TO LANDFILL

IMPORT AND REPLACE BALANCE OF SOILS-14,500m^3 IMPORT WITH GAP65

FILL IMPORT TO RAISE LEVELS MINUS POOL AREA OF 1,400m^2 ASSUME 1.5m DEPTH =13200m^3

A3 SCALE 1:2000
0 20 40 60 80 100 (m)

ORIGINAL IN COLOUR

NOTES.
1. ALL DIMENSION ARE IN METRES UNLESS NOTED OTHERWISE.
2. EXISTING CONTOUR COPIED FROM NAPIER CITY COUNCIL GIS <http://www.gis.napier.govt.nz/IntraMaps80/?project=NCC> DATED 09 DEC 2020.
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PROJECT No.	1009171	
DESIGNED	JWY	Nov.21
DRAWN	JC	Nov.21
CHECKED		
APPROVED		DATE

CLIENT **NAPIER CITY COUNCIL**
PROJECT **ONEKAWA AQUATIC CENTRE**
TITLE GEOTECHNICAL INVESTIGATION
GEOLOGICAL CROSS SECTION -OPTION 2
SCALE (A3) 1:500 FIG No. SKETCH 4 REV 2

Appendix B: Risk Review

- **Onekawa Park Risk Register**
- **Prebensen Drive Risk Register**

Project Name	Onekawa Aquatic Centre
Project Number	1009171
Phase	Geo
Prepared by:	JWY
Reviewed by:	
Date :	2/12/2021

Ref ID #	Threat/ Opportunity	Risk Name	Risk Description	Risk Category (edit on Reference Tab)	Existing Control(s) (if any)	Risk Assessment (with Existing Controls)			Possible treatment/mitigation	Risk Assessment (after treatment)			Risk Owner
						Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating	
1	Threat	Finished Levels	Design-Finished Floor Levels remain unconfirmed. Earthworks volumes uncertain. Ground treatment and settlement driven by finished level. Uncertainty in cost implications.	Engineering/Design	Nil	Likely	Major	High	Engage an architect to undertake a masterplan. Engage topographical surveys.	Possible	Minor	Moderate	NCC
2	Threat	Demolition of Existing Buildings	Demolition and Removal of Existing building. Encountering unidentified Asbestos Containing Material (ACM)	Environmental	Nil	Likely	Moderate	Moderate	Undertake Asbestos Surveys for existing buildings across the site	Possible	Minor	Moderate	NCC
3	Threat	Roading upgrades and intersection detailing on Flanders Avenue	Additional roading design, traffic calming and new intersection required to facilitate development. Additional costs, design and consenting may be required.	Engineering/Design	Nil	Likely	Moderate	Moderate	Undertake transport assessment to confirm traffic design requirements.	Unlikely	Minor	Low	NCC
4	Threat	Demolition of Existing Buildings-Disruption	Disruption to site users as a result of demolition works, ACM removal and concrete breaking.	Environmental	Nil	Likely	Moderate	Moderate	Undertake environmental assessment, erosion controls. Implement mitigation measures during	Unlikely	Minor	Low	NCC
5	Threat	Environmental Controls-Erosion Controls/Dust	Irritation to site users due to ongoing works, sediment discharges due to works.	Environmental	Nil	Possible	Moderate	Moderate	Undertake environmental assessment, erosion controls. Implement mitigation measures during works	Unlikely	Minor	Low	NCC
6	Threat	Stormwater design	Requirements to detain or treat stormwater as a result of development works requiring unforeseen costs.	Engineering/Design	Nil	Possible	Major	Moderate	Undertake a stormwater review as part of masterplanning approach. Understand detention requirements once catchments mapped and development context understood.	Unlikely	Minor	Low	NCC
7	Threat	Structural Design	Structural designers requirements unclear. May lead to uncertainties in design requirements, costs for foundation works.	Engineering/Design	Nil	Possible	Major	Moderate	Engage structural engineer during masterplanning works to understand structural form and requirements.	Possible	Minor	Moderate	NCC
8	Threat	Utilities relocations	Uncertain on levels across the site of existing services. Bridging may be required, unclear if site servicing is adequate for development.	Engineering/Design	Nil	Likely	Major	High	Engage Civil Engineer to undertake Infrastructure assessment. Undertake full site topographical survey to map services.	Possible	Minor	Moderate	NCC
9	Threat	Cost Escalation	Unforeseen cost increases due to supply chain pressures, material shortages, market pressures.	Construction	QS pricing to incorporate escalation	Likely	Major	High	Ensure sufficient levels of contingency for development budgets	Likely	Major	High	NCC
10	Threat	Unforeseen ground conditions	Unforeseen ground conditions require extended preloading or additional foundation treatment	Engineering/Design	Geotechnical Investigations undertaken	Likely	Major	High	Undertake further geotechnical investigations in areas of uncertainty.	Possible	Moderate	Moderate	NCC/Design team
11	Threat	Landfill Gas	Unexpected compliance and construction costs to mitigate landfill gas risks.	Engineering/Design	Nil	Likely	Major	High	Undertake landfill gas assessment and monitoring to inform design and long term land use.	Unlikely	Moderate	Moderate	NCC
12	Threat	Contaminated Ground	Unexpected contamination encountered leading to increased costs for disposal and removal from site,	Environmental	Contaminated land investigations undertaken	Likely	Major	High	Undertake further sampling to inform disposal and identify "hot spots"	Possible	Moderate	Moderate	NCC/Design team
13	Threat	Community engagement	Community unsupportive of proposal, leads to delays, rework and additions costs.	Stakeholder	Public consultation proposed	Possible	Major	Moderate	Undertaken community engagement and workshopping of options with community.	Possible	Moderate	Moderate	NCC
14	Threat	Groundwater effects	Construction requires dewatering that may require consenting inputs, additional costs and design	Consenting	Limited groundwater monitoring undertaken to date	Possible	Major	Moderate	Undertake longer term groundwater monitoring and review once design layout confirmed	Unlikely	Minor	Low	NCC
15	Threat	Covid 19	Pandemic delays project, cost overruns and suppliers limited due to supply chain issues.	Project Risk	Nil	Possible	Major	Moderate	Ensure programme risks are documented. Engage with suppliers and key consultants early.	Possible	Moderate	Moderate	NCC
16	Threat	Seismic Design	Changes to seismic design requirements result in redesign works, cost increases and a more complex foundation system	Engineering/Design	Geotechnical Investigations undertaken	Likely	Major	High	NCC to understand implications of new MBIE guidance on the development and sensitivity to new seismic guidance	Possible	Moderate	Moderate	NCC
17	Threat	Site layout	Site layout insufficient to meet principals requirements and include stormwater management devices, parking and maintain existing facilities.	Engineering/Design	Overview study completed but no formal architectural masterplanning study.	Likely	Major	High	Undertake Architectural masterplanning exercise.	Possible	Moderate	Moderate	NCC
18	Threat	Parking	Increased parking requirements means additional parking measures needed or clash with existing site usage.	Engineering/Design	-	Likely	Moderate	Moderate	Undertake traffic and architectural studies to undertaken parking requirements	Possible	Moderate	Moderate	NCC
19	Opportunity	Landscaping	Opportunity to enhance landscaping at the site and amenity values.	Stakeholder	-	Likely	Moderate	Moderate	Undertake further studies, including landscape opportunity review.	Possible	Moderate	Moderate	NCC
20	Threat	Consenting risk	Consent delays due to requests for further information, additional consenting requirements and further studies	Consenting	-	Likely	Moderate	Moderate	Undertake pre-application meeting with stakeholders including HBRC and NCC planners.	Possible	Moderate	Moderate	NCC
21	Opportunity	iwi engagement	Opportunity to engage with Iwi to integrate Mana Whenua into the design process	Stakeholder	-	Likely	Moderate	Moderate	Engage early with Iwi and include in design workshopping.	Possible	Moderate	Moderate	NCC

28/01/2022 4:41 PM

Project Name	Prebenson Aquatic Centre						**Prepared by:**	JWY						
Project Number	1009171						**Reviewed by:**							
Phase	Geo						**Date :**	2/12/2021						

Ref ID #	Threat/ Opportunity	Risk Name	Risk Description	Risk Category (edit on Reference Tab)	Existing Control(s) (if any)	Risk Assessment (with Existing Controls)			Possible treatment/mitigation	Risk Assessment (after treatment)			Risk Owner
						Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating	
1	Threat	Finished Levels	Design-changes to finished levels as a result of design changes requiring additional earthworks and regrading of site levels.	Engineering/Design	Nil	Possible	Major	Moderate	Review design following any updates to scheme plan.	Possible	Minor	Moderate	NCC
2	Threat	Code requirement changes	Design- Changes in MBIE geotechnical guidance meaning revision to geotechnical site requirements. Potentially requiring further ground improvements.	Engineering/Design	Site set backs implemented from crest of drain.	Possible	Major	Moderate	Review geotechnical design following any further project works.	Possible	Moderate	Moderate	NCC/Design team
3	Threat	Site reestablishment	Construction-Additional costs to re-instate and re-establish site controls. May require weed removal and reinstatement/review of erosion controls.	Environmental	hardfill platform placed on site, erosion controls implemented and remain in place.	Likely	Minor	Moderate	Review once works recommence. Ensure erosion controls re-established and consent conditions adhered to.	Possible	Insignificant	Low	NCC/Contractor
4	Threat	Cost escalation	Programme-Delay to programme as a result of delayed physical works. Resulting in increase in physical works costs, supply chain pressures etc	Project Risk	Enabling works approx. 80% complete.	Likely	Major	High	Contingency required for updated scheme costings.	Possible	Major	Moderate	NCC
5	Threat	Covid-19	Construction-Delays to physical works and additional costs as a result of Covid-19, including additional PPE, slower working programme and delays.	Project Risk	Project contingencies	Possible	Major	Moderate	Project contingency to be reviewed. Review procurement and supply chain processes to secure materials.	Possible	Major	Moderate	NCC
6	Threat	Stakeholder engagement	Negative publicity as a result of stakeholder dissatisfaction, leading to delays, additional project reviews and cost escalation.	Stakeholder	Ongoing project and council review.	Almost Certain	Major	High	Review processes, consult community groups, address concerns where possible	Likely	Major	High	NCC
7	Threat	Contractor availability	Construction-Limited appetite in construction market due to high workload and project risk.	Construction	Tender pulled from market. Construction cost and review underway.	Possible	Moderate	Moderate	Review procurement strategy should project re-start. Engage construction market in EOI process.	Unlikely	Minor	Low	NCC
8	Threat	Road upgrades	Design- Changes in local network and land use leading to potentially increased road frontage upgrade scope.	Engineering/Design	Civil design completed by others for previous scheme.	Possible	Moderate	Moderate	Undertake design review following any further project works.	Possible	Moderate	Moderate	NCC

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