CITY OF YELLOWKNIFE

GOVERNANCE AND PRIORITIES COMMITTEE AGENDA

Monday, November 16, 2020 at 12:05 p.m.

Chair: Mayor R. Alty,
Councillor N. Konge,
Councillor S. Morgan,
Councillor J. Morse,
Councillor C. Mufandaedza,
Councillor S. Payne,
Councillor R. Silverio,
Councillor S. Smith, and
Councillor R. Williams.

On the advice of the Chief Public Health Officer concerning gatherings, the City of Yellowknife's meetings will be accessible to the public via webcast. Any person wishing to speak to an item on the agenda is asked to email cityclerk@yellowknife.ca.

Item	Description
1.	Approval of the agenda.
2.	Disclosure of pecuniary interest and the general nature thereof.
ANNEX A 3.	A presentation regarding the Water License Renewal.
ANNEX B 4.	A presentation regarding the Aquatic Centre Design Plan.

WATER LICENCE RENEWAL

Governance and Priorities Committee

November 16, 2020

Outline

- Background
- What the Water Licence regulates
- Areas Water Licence Applies to
- Ongoing Discussions with Regulators
- Ongoing and Planned Projects
- Timeline

Background

- Water Licence is required under the *NWT Waters Act* to draw water from local water bodies and deposit waste into the environment
- Two types of water licences – Type A and Type B
- Type of water licence depends on the project type and criteria for project as outlined in the Land and Water Boards of the Mackenzie Valley Guide to the Water Licensing Process
- City falls under the municipal undertakings Type A water licence criteria which applies to direct water use of 2,000 m^3 or more per day and any deposit of sewage serving a population of 2,000 or more
- All Type A water licences require a public hearing as part of the application process

Background

- City of Yellowknife's current Type A Water Licence has been in place since 2010 and will expire in May 2022
- Seeking renewal for 15 years
- Renewal process can take up to 18 months
- MVLWB has requested the City submit it's renewal application by January 2021

What our municipal water licence regulates

- The amount of water the City is allowed to withdraw from local water sources monthly and annually
- Terms and conditions for the design, construction, operation, maintenance, monitoring, management and reporting of all of the City's waste and water facilities
- The condition of wastewater before it can be released to the environment
- Conditions for the closure and reclamation of waste disposal facilities
- Management of stormwater
- Spill contingency

What is *not* regulated by the water licence

- Drinking water quality is regulated by the Department of Health and Social Services under the *NWT Public Health Act.* It will *not* be part of what is looked at under the water licencing process.

Application is made up of several documents

Water Treatment Plant

- ❑ Water Treatment Plant Operation and Maintenance Manual

Stormwater

- ❑ Stormwater Management Plan

Wastewater Facilities

- ❑ Sewage Disposal Facilities Operations and Maintenance Manual
- ❑ Fiddler's Lake Treatment System Management Plan

Solid Waste Facility

- ❑ Solid Waste Facility Operations and Maintenance Manual
- ❑ Hazardous Waste Management Plan
- ❑ Compost Facility Operation and Maintenance Manual
- ❑ Interim Closure and Reclamation Plan
- ❑ Solid Waste Facility Interim Groundwater Monitoring Plan

Spill Contingency

- ❑ Spill Contingency Plan

Ongoing Discussions with Regulators

- Phosphorus Treatment
- Condition of Wastewater Receiving Environment
- Sludge Management of Lagoon
- Fiddler’s Lake Treatment System Management Plan
- Closure Activities at Solid Waste Facility
- Stormwater Management and Treatment

Project Planning

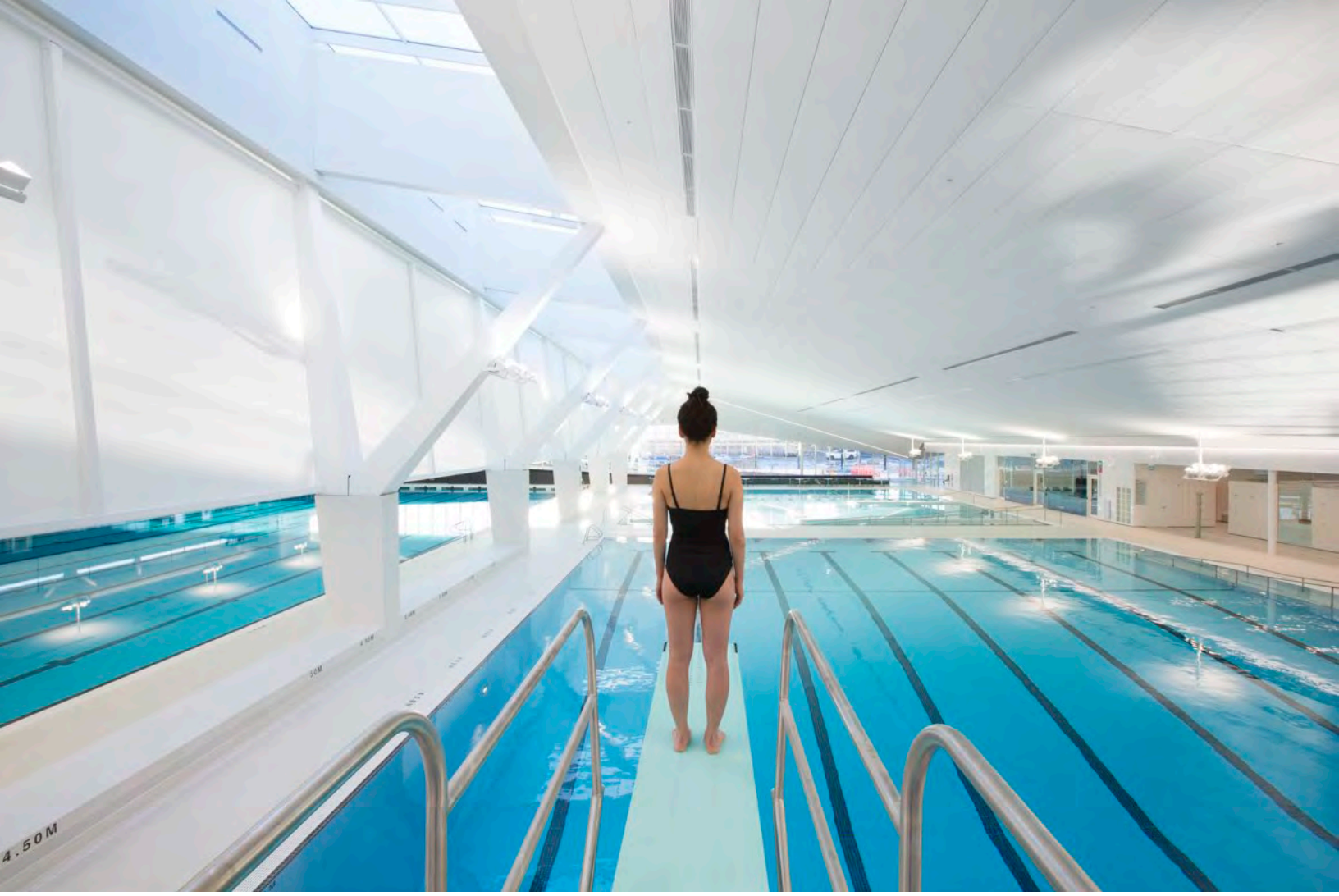
2021	Trapper's Lake Control Structure Replacement	2023	Lagoon Desludging Phase 2
	Lagoon Sludge Laydown Area – Construction		Lagoon Dam Inspection
	Lagoon Dam Inspection		Submarine Pipeline Replacement – Engineering
	Lift Station #5 Sewage Containment Area – Engineering		Landfill Cell C – Construction
	Lift Station Backup Power		Stormwater Treatment Analysis
	Submarine Pipeline Replacement – Engineering		Phosphorus Treatment Analysis
	Landfill Cell C – Planning		
2022	Lagoon Desludging Phase 1	2024	Lagoon Desludging Phase 3
	Lift Station #5 Sewage Containment Area – Construction		Submarine Pipeline Replacement – Construction
	Submarine Pipeline Replacement – Engineering		
	Landfill Cell C – Engineering		


0032-10
Lagoon Control
Structure
Trapper's Lake
0032-F3
Effluent Compliance
Point
Sewage
Lagoon
Sewage Forcemain
0032 F1
Effluent Sampling
Point
Outflow to Great Slave
Lake

Tentative Timeline

November 2019 to April 2020	Gather Data and Revise Documents
May-June 2020	Review Documents and Revise Prior to Engagement
June – October 2020	Engagement – Regulatory
September – October 2020	Engagement – Public
November 2020 to January 2021	Finalize Documents
January 2021	Submission of Renewal Package to MVLWB
April/May 2021	Technical Sessions
July/August 2021	Public Hearing
February 2022	Issuance of New Licence

Questions?



CITY OF YELLOWKNIFE

YELLOWKNIFE Aquatic Centre

Concept Design Report

Prepared for: City of Yellowknife

November 2020

TAYLOR ARCHITECTURE GROUP

MJMA

Executive Summary

Ruth Inch Memorial Pool was constructed circa 1987, and is reaching the end of its useful life as an aquatic facility. In 2016, City Council directed Administration to pursue a $12.9M federal grant for construction of a new Aquatic Centre. In 2018, the Aquatic Centre Advisory Committee (ACAC) was formed, and a consultant was retained to prepare a Pre-Design Plan. The ACAC recommended a new Aquatic Centre complete with a leisure pool and separate 52m, 6 lane lap pool.

Taylor Architecture Group was retained in December 2019 to finalize details of the Pre-Design Plan, and (if approved), complete bridging documents for a Design-Build process for the new Aquatic Centre. In February 2020, City Council directed TAG to develop two concepts for the new Aquatic Centre:

1) A new Aquatic Centre with a 25m lane pool
2) A new Aquatic Centre with a 52m lane pool

Four options for a new Aquatic Centre are presented in this report:

Option 1a	**25m, 6 lane pool**	**Option 2a**	**52m, 6 lane pool**
Option 1b	**25m, 8 lane pool**	**Option 2b**	**52m, 8 lane pool**

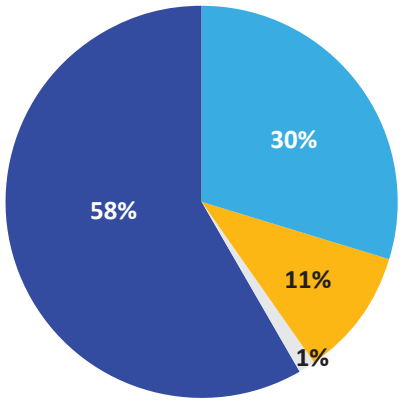
TAG/MJMA have recommended proceeding with 8 lanes, for either a 25m or 52m length pool.

Community Consultation & Survey Results

Based on 456 survey respondents from the September 2020 consultation sessions, public feedback can be summarized as follows:

Lane Pool Length

- 52-metre lane pool: 266 responses in favour
- 25-metre lane pool: 136 responses in favour
- Not in favour of a new aquatic centre: 49 responses
- No answer selected: 6 responses



Spaces and Amenities

Keep the facility program as outlined in the Pre-Design Plan (see program table on the next page), with the possible addition of a large waterslide (requested by 10% of respondents).

Aquatic Centre Site

Directly east of the Ruth Inch Memorial Pool, at the old Pitch & Putt location.

Concept Designs

Refer to Sections 4.5 and 4.6 for Concept Design Drawings.

Aquatic Centre Program

Public Areas

- Vestibule
- Lobby
- Coat/Boot Room
- Public Washrooms
- Canteen
- Change Rooms
  - Two of universal design
- Multipurpose Rooms
  - Two that may be combined into one
- 2nd Floor Spectator Seating

Private Areas

- Administration
- Janitor Room

Building Services

- HVAC
- Pool systems
- Electrical

Natatorium

- Lane pool (25m or 52m)
  - 8 lanes
  - 1m and 3m spring boards
  - 2 x 1m wide movable bulkheads (in 52m option)
  - Ramp entry (25m), accessible lift (52m)
- Leisure Pool
  - Beach entry
  - Play and spray features including small slide
  - Lazy river
  - 3 lanes of 25m
- Splash Pad
- Therapy Pool
  - Ramp entry
- Steam Room
- Storage (general and youth clubs)
- Office space (youth clubs)

City of Yellowknife Office Space

Community Services Dept.

- 5 offices

Lease (revenue) Space

- Ability to subdivide into two spaces if necessary

O&M & Construction Cost Estimates

	OPTION 1a 25m, 6 lane pool	**OPTION 1b** 25m, 8 lane pool	**OPTION 2a** 52m, 6 lane pool	**OPTION 2b** 52m, 8 lane pool
O&M COSTS				
Annual Energy Costs (Enersys estimate / Hanscomb estimate)	$373,400 / $364,320	$394,500 / $375,840	$486,500 / $415,360	$541,100 / $437,280
O&M Annual Projections (Hanscomb)	$2,281,560	$2,353,700	$2,601,190	$2,738,460
CLASS D ESTIMATE				
Total Construction Cost Including All Allowances	**$52,394,100**	**$53,374,200**	**$61,746,500**	**$63,685,800**

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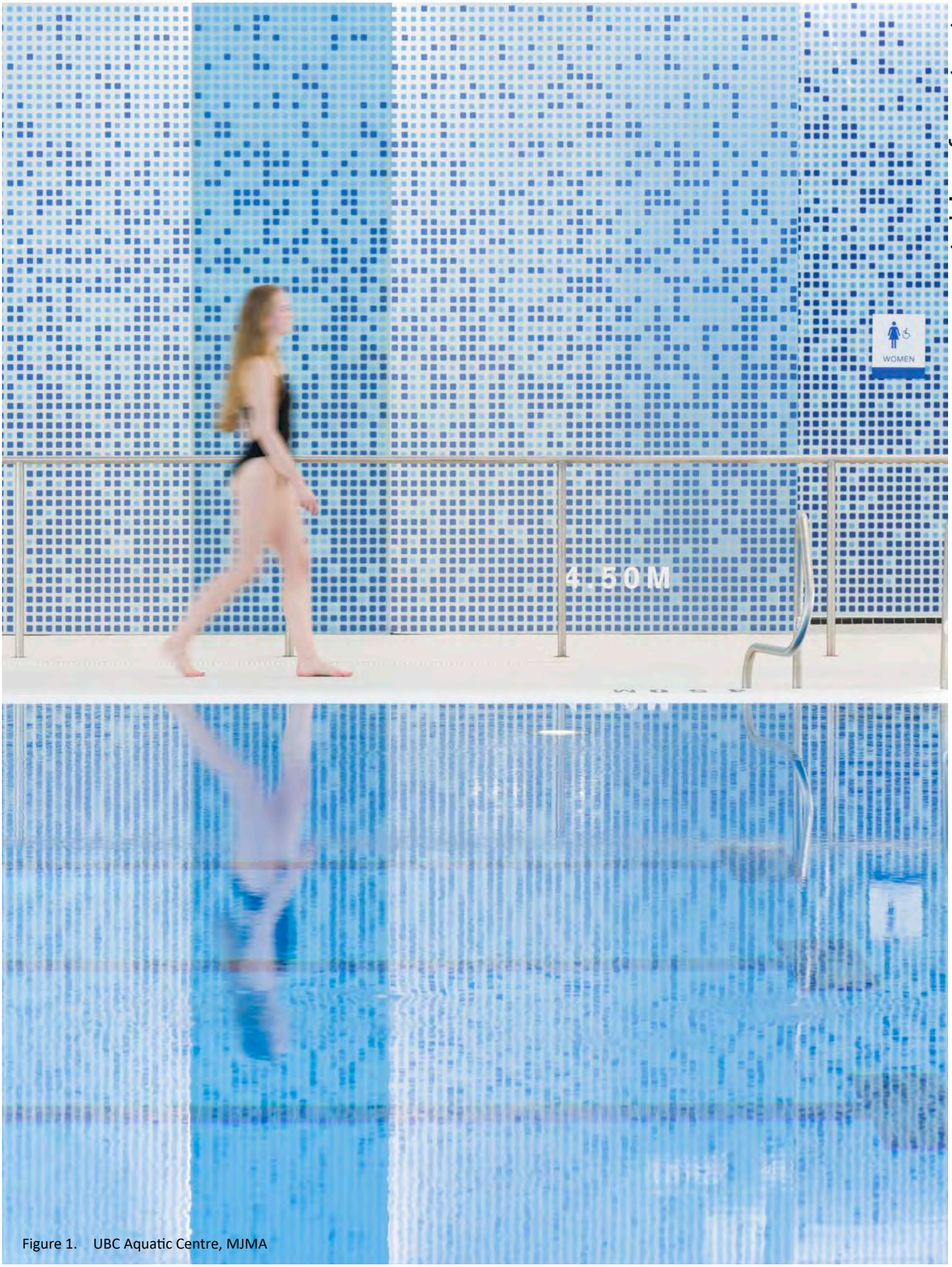

Figure 1. UBC Aquatic Centre, MJMA

TAYLOR ARCHITECTURE GROUP
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1 Introduction

This report presents two Concept Designs for the new Aquatic Centre in Yellowknife: a facility with a 25m lane pool, and a facility with a 52m lane pool. The intent of the report is to provide Yellowknife's City Council with the pertinent information required to make an informed decision on which option to proceed with into the next phase of the project (Bridging Documents).

The report includes the following sections:

1. An introduction including project background information
2. A discussion on pool design in general, including the cost and operations differences between a 25m and 52m lane pool, and 6 vs. 8 lanes
3. A summary of the community consultation survey results completed in October 2020
4. An overview of the concept designs, including site, building program, and key design concepts
5. An overview of the Energy Modeling process undertaken for the two concept designs, comparing the estimated energy usage and operating costs of each option
6. An overview of the Class D Construction Cost Estimate undertaken for the two concept designs, and potential impacts of Covid-19 to this project
7. An overview of including estimated operation and maintenance costs, and life cycle costs
8. A summary including the pros and cons of each concept design, taking all of the above into account

1.1 Documentation Established to Date

- Aquatic Centre Pre-Design Plan, dated October 2018, prepared by Stantec
- Desktop Geotechnical Evaluations, dated May 2020, prepared by Tetra Tech
- Preliminary Traffic and Parking Studies, dated June 2020, prepared by Creative Transportation Solutions Ltd
- Phase 1 Environmental Site Assessments, dated May 2020, prepared by Tetra Tech
- Site Selection Recommendation issued to City Administration, dated July 2020, Prepared by TAG
- Topographic Survey, dated September 2020, prepared by Sub-Arctic Surveys

1.2 Concept Design / Bridging Document Project Team

Architect/Prime Consultant	Taylor Architecture Group (TAG) Simon Taylor, NWTAA, OAA, NBAA, MRAIC Melani Korver, NWTAA, MRAIC
Aquatic Design Specialists	MJMA Robert Allen, OAA, FRAIC, LEED AP PRO OBEC Kiefer Savage, OAA Intern Architect
Mechanical Engineering	TAG Engineering (TAG ME) Elaine Gillespie, P.Eng Nick Shopian, P.Eng
Electrical Engineering	TAG Engineering (TAG ME) Piotr Ziminski, P.Eng
Structural Engineering	McElhanney Consulting Brad Nelson, P.Eng Logan Callele, P.Eng
Quantity Surveying	Hanscomb Art Maw, PQS(F), MRIC

1.3 Project Background

Ruth Inch Memorial Pool was constructed circa 1987, and is reaching the end of its useful life as an aquatic facility. In 2016, City Council directed Administration to pursue a $12.9M federal grant for construction of a new Aquatic Centre. In 2018, the Aquatic Centre Advisory Committee (ACAC) was formed, and a consultant was retained to prepare a Pre-Design Plan.

1.3.1 Pre-Design Plan

A Pre-Design Plan was prepared by Stantec in October 2018, led by the ACAC. This study involved a household survey and a survey of community organizations and presented two options to the public: 1) a New Build option with a 25m, 6 lane pool; and 2) a Renovated Ruth Inch Memorial Pool option with a substantial addition to the facility that included a new 25m, 6 lane pool. These two options were presented to the public and to stakeholder groups for feedback. Based on the comments received, the ACAC recommended a new Aquatic Centre complete with a leisure pool and separate 52m, 6 lane lap pool.

1.3.2 2020 City Council Direction

Taylor Architecture Group was retained in December 2019 to finalize details of the Pre-Design Plan, and (if approved), complete bridging documents for a Design-Build process for the new Aquatic Centre. In February 2020, City Council directed TAG to develop two concepts for the new Aquatic Centre:

1) A new Aquatic Centre with a 25m lane pool
2) A new Aquatic Centre with a 52m lane pool

1.3.3 Site Selection

The Pre-Design Plan recommended two site options for consideration: 1) the Ruth Inch Memorial Pool Site (location of the old pitch & putt site); and 2) the Multiplex/Fieldhouse Site (south of the Fieldhouse parking lot). In the spring of 2020, the City commissioned three studies for each site: a Desktop Geotechnical Evaluation, a Phase 1 Environmental Site Assessment, and a Preliminary Traffic and Parking Study.

TAG evaluated the information contained in these reports to develop a list of criteria that were scored and weighted in a site selection matrix, comparing the two sites. The comparison showed that the Ruth Inch Memorial Pool site scored higher in every category, and this site was ultimately selected as the home of the new Aquatic Centre by City Administration. See Appendix B for the site selection matrix that was used to evaluate the two site options.

1.3.4 Community Consultation

A community consultation process was led by TAG in September 2020, with two main aims: 1) confirm the spaces and amenities as outlined in the 2018 Pre-Design Report; and 2) provide feedback on whether residents would like to see a new Aquatic Centre with a 25m lane pool or a 52m lane pool.

TAG and MJMA (the Aquatic Design Specialist consultant) prepared an extensive collection of information describing the history of the project, the spaces and amenities possible for a new Aquatic Centre, differences between a 25m and 52m lane pool, and the size and estimated cost of each size of facility (as taken from the Pre-Design report). This information was consolidated into 15 information panels which were made available both online and at three in-person public consultation events, along with a survey to collect feedback. Results of the community consultation are discussed in Section 3 of this report.

The City of Yellowknife is planning a new aquatic centre.

Here is a brief history of the project so far.

November 2016
City Council directs administration to pursue a $12.9M federal grant for construction of a new aquatic centre

April 2018
Aquatics Centre Advisory Committee (ACAC) is formed. The City retains a consultant to prepare a PreDesign Plan

June 2018
Household surveys are undertaken to collect community feedback about the potential project

September 2018
Two preliminary concepts are presented to the community for feedback:
1) a new Aquatic Centre with a 25m lap pool
2) a Renovation/Addition to Ruth Inch Memorial Pool, with a new 25m lap pool and expanded support spaces

October 2018
PreDesign Plan is presented to Council including a recommendation from ACAC for a new Aquatic Centre with a 52m pool, based on public feedback. Capital cost is estimated at $49.8M.

December 2019
City retains Taylor Architecture Group to finalize details of PreDesign Plan and (if approved) complete bridging documents for a Design-Build process

February 2020
Council instructs TAG to develop 2 concepts for the new Aquatic Centre:
1) a new Aquatic Centre with a 25m lane pool
2) a new Aquatic Centre with a 52m lane pool

March 2020
Public consultation is delayed due to COVID-19

now

Public consultation to determine:

25m or 52m pool?

October 2020
TAG to submit concept plans and recommendation based on public feedback

November 2020
Council decision on recommended option

May 2021
Completion of bridging documents & issuance of Design-Build RFP

August 2021
Design-Builder selected

October 2021
Public referendum for approval of funds

December 2021
Contract awarded to Design-Builder

April 2022
Construction begins

November 2023
Construction is complete

Figure 2. Public consultation information panel showing the timeline of the project to-date

1.4 Concept Designs

TAG and MJMA have prepared two concept designs for City Council's consideration. The concept designs are for either a **25m or 52m lane pool**, with **6 lanes**. These concepts are based on the program recommendations from the Pre-Design Report, community consultation feedback, and TAG/MJMA's own recommendations.

This report will outline the two concept options above, along with corresponding Class D construction estimates, O&M projections, and results from an Energy Modeling exercise comparing the options. In addition to this, estimates and O&M projections have also been completed for lane pools with **8 lanes**, as a comparison.

Option 1a is a new Aquatic Centre with a 25m, 6 lane pool
Option 2a is a new Aquatic Centre with a 52m, 6 lane pool

6 lane lap pools were recommended in the Pre-Design Plan. Cost estimates and O&M projections have been completed for these two options.

Option 1b is a new Aquatic Centre with a 25m, 8 lane pool
Option 2b is a new Aquatic Centre with a 52m, 8 lane pool

TAG/MJMA have recommended 8 lane lap pools. Concept design drawings have been developed for these two options only (but can be easily modified to suit the 6 lane options). Cost estimate and O&M projections have also been completed for these options.

1.5 Next Steps

Once Council makes a decision on whether to proceed with the project, and which option to proceed with, TAG will begin preparing Bridging Documents. These will be incorporated into a design-build RFP for construction of the new Aquatic Centre. A preliminary timeline for the selection of the design-builder, public referendum and construction of the facility are indicated on the previous page.

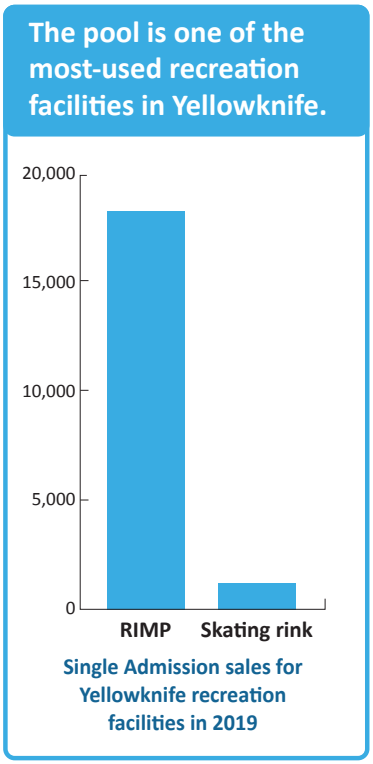


Figure 3. RIMP vs. Skating Rink use

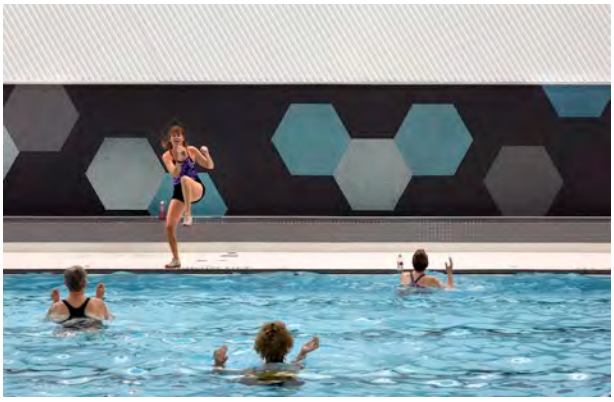
2 Aquatic Centre Design Considerations

2.1 Pool Design Across Canada

Aquatic centre design is more and more centered on creating facilities that are true community hubs, offering a broad spectrum of things to do, from passive to active, that appeal to people of all ages and abilities. The goal is to create a vibrant community space where people can not only come to exercise and play, but also meet, mingle and discover in a comfortable and welcoming place.

A key part of making the facility community-centered is providing accessible and inviting areas for socialization and viewing. There should be a place to safely store boots, coats and strollers, a place to get a snack or a beverage, and a comfortable places to sit, socialize and view what is going on in the aquatics area. Allowing the Multipurpose Rooms to open up to this social space offers further flexibility and can support everything from larger social meetings, events and tournaments, to birthday parties.

Another area of increasing focus is the provision of facilities that better serve users from all gender identities, age groups and physical abilities through the use of universal change rooms and washrooms. Where possible, all pool basins will have ramps for ease of entry. In the case of a 52 metre pool with movable bulkheads, a ramp is not possible, but a pool lift will be provided.



One of the best ways to offer a great combination of activities is to provide different pool basins that are geared for different activities and operate at different water temperatures and depths. Providing a separate lap basin, a leisure basin and a hot tub basin is ideal as this provides a mix of water temperatures and depths.

Each basin should be designed to accommodate multiple uses, ensuring that diverse programming is supported as much as possible.

Including features that appeal to youth is important, both in terms of providing features that allow for competitive fun like climbing walls, and features that encourage social activity like built-in screens for an aquatic movie night.

2.2 Basin Types

Lap basins are typically cooler water, and are where lane swimming and competitive swimming take place. They are rectangular with a length of 25 or 52 meters and a width determined by the number of lanes. These basins can also be given a deep end to allow for diving boards, climbing walls, and to accommodate scuba lessons.

These basins are typically sub-dividable with ropes to create the swim lanes or to allow for the basin to be sub divided so that simultaneous different activities can occur. The unobstructed open water in these types of pools also allows for lots of other interesting activities.

Leisure basins are typically warmer water and shallower. These basins can take on many different shapes according to the desired aquatic programming, and because of the shallow, warmer water, are typically used most frequently.

Areas can be created within the leisure pool for lots of different water conditions from just a few inches of water to four feet to allow for a range of water play, different kinds of aerobics, swimming lessons, water toys, seating areas, and areas where competitive swimmers can warm up for a competition. Lazy rivers can be incorporated into this pool type, which is a loop within the basin that has a current and is great for water walking or just floating along. Careful internal layout of these basins is important to allow for multiple activities to take place at the same time.

Hot tub basins or **therapy pools** are even warmer water. These can come in many shapes, and should be designed to accommodate casual seating and socializing, as well as stretching and physical therapy.

The great thing about having all these basins together is that they create opportunities for a mix of activities and encourage participation from everyone - athletes, non-athletes, and people of all ages and abilities. They also encourage mixed use: competitive swimmers can warm in the lap section of the leisure pool, and an aerobics class can wind down in the hot tub.

2.3 25m or 52m Lane Pool?

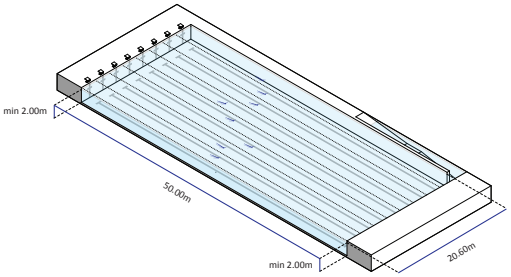
The choice between a 25 and 52 metre lane pool length is usually strongly influenced by the nature of the competitive and training programs that need to be accommodated in the facility. A 52 metre pool is required where there is a desire to train and hold meets for 52 metre long course swimming events, competition water polo events and competition synchronized swimming events. These are the only competitive events that cannot be held in a 25 metre pool.

Competitive 25 metre short course swimming events can be held in a 25 metre pool and in a 52 metre pool through the use of a movable bulkhead. Both basin types can be divided to allow for overlapping programming; in a 25 metre pool this would be through the use of rope dividers to allow for things like diving in the deep end combined with open swimming or lessons in the shallow end. In a 52 metre pool the division would be through the use of a movable bulkhead. The 52 metre basin has the ability to allow for 25 metre short course events to be put on simultaneously with deep end diving.

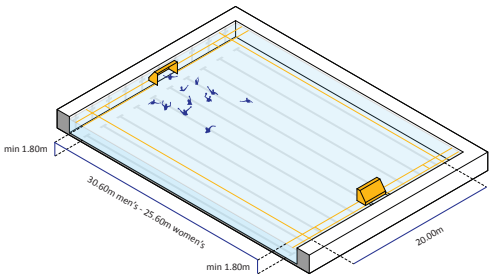
With larger pools come larger costs, both capital and operating. Unless there is a genuine requirement to train and host for 52 metre events, the additional length of pool does not typically drive user numbers for the facility. For this reason there are comparatively few 52 metre pools built in comparison with 25 metre pools.

Activities you can *only* do in a 52m pool:

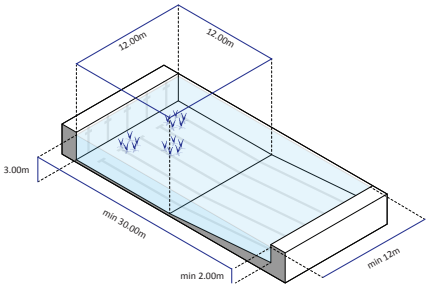
Race! 50m Long Course



Play! Water Polo Competitions



Dance! Synchronized Swimming Competitions



2.4 6 or 8 Lanes?

The number of lanes in a lap pool will also determine the type of competitive events that can be held in the facility. Often local swim organizations will want 8 lanes to allow for more swimmers to participate per heat and allow for greater efficiency in holding larger swim meets. Given the higher cost of the 52 metre pool, and the focus on long course swim competition, 52 metre facilities with fewer than 8 lanes are uncommon, especially as new builds.

Swim Canada

Swim Canada New Construction Pool Guidelines (Appendix G) identify the minimum requirements for sanctioned competitions in both 25 and 52 metre competitive pools. Local and Regional competitions require a minimum of 6 lanes. Provincial level competitions require a minimum of 8 lanes with an additional 5 lane 25 metre warm up pool. National level competitions require a minimum of 10 lanes with an additional 8 lane 25 (or 52) metre pool.

There are also requirements for spectator and deck seating. Local and Regional competition pools should allow for spectator seating of 200 and deck seating of 100. Provincial and National competition pools should have a minimum of 750 spectator seats and 500 deck seats.

Activities you can do in a 25m pool:

Everything else!

What can you do in different pool sizes?

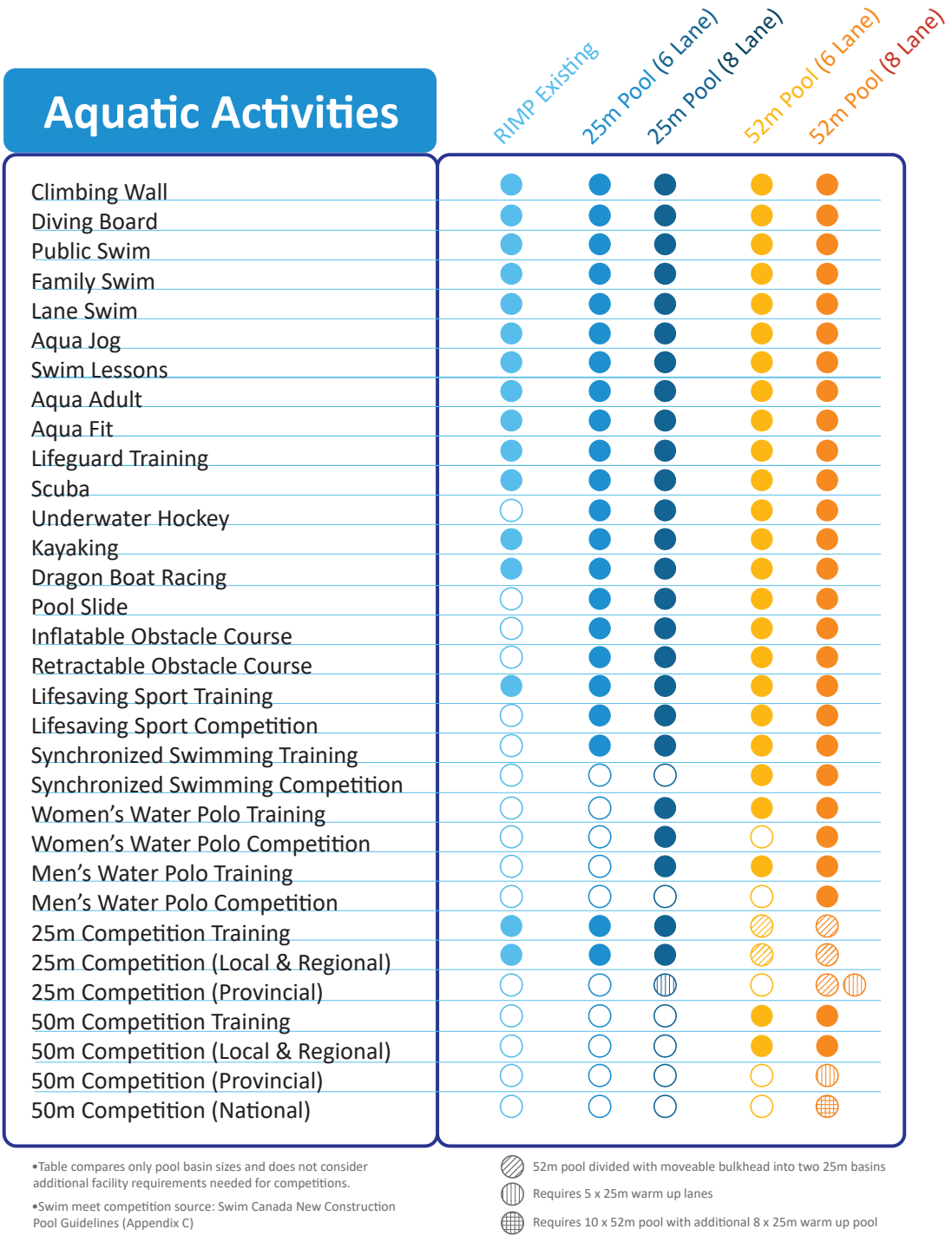
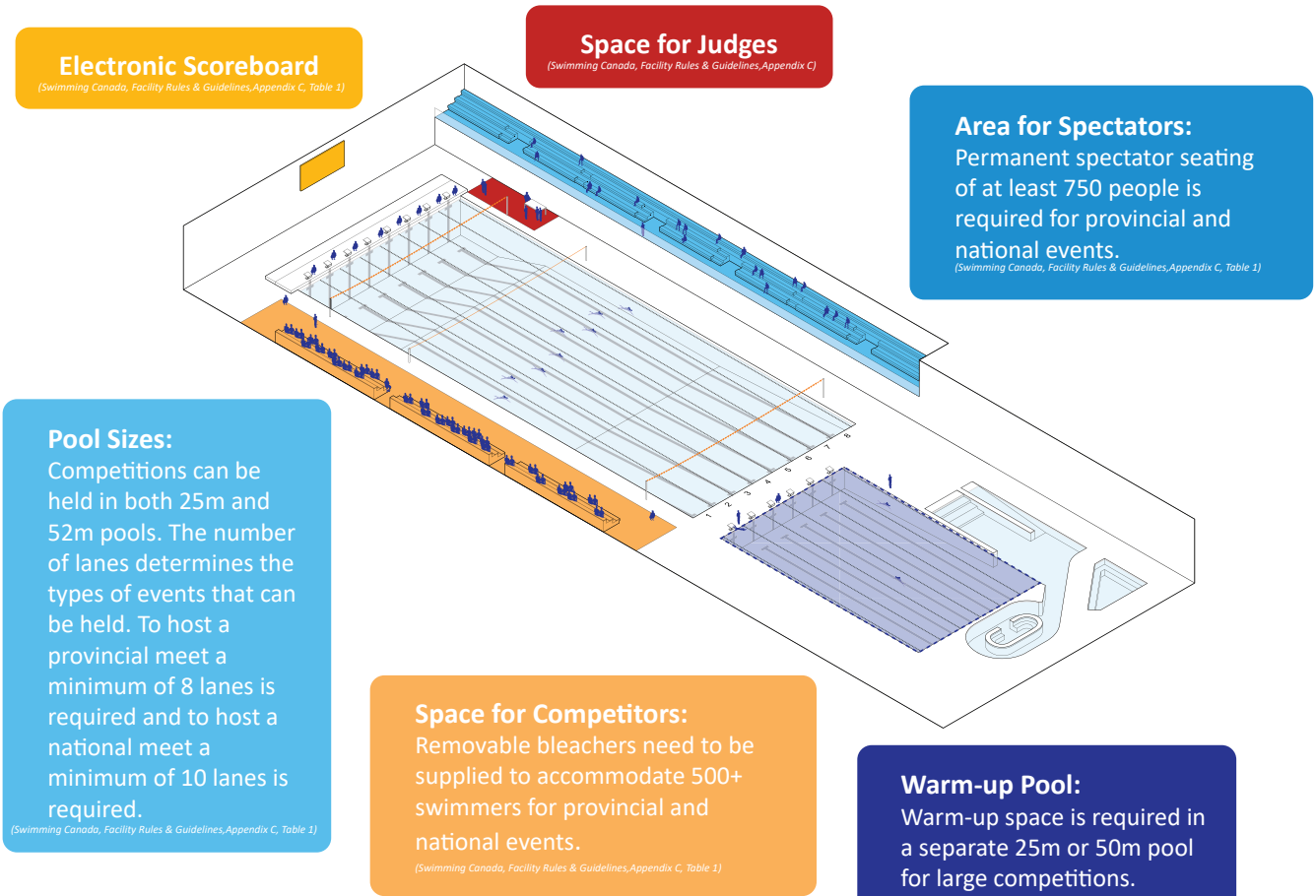


Figure 4. Public consultation information panel showing activities possible in different lane pool sizes

Competition Requirements

Facility requirements for regulated provincial and national competitions - according to Swim Canada - are illustrated below. Based on the current concept design options for the new Aquatic Centre, Yellowknife still could not host regulated provincial or national competitions without a sizable increase in building area including additional spectator and competitor seating, and additional warm up lanes.



There are a lot of regulations and standards that need to be met to certify an event with Swim Canada. These regulations typically require a great deal of extra space to fit all of the competitors, judges and spectators. The aquatic centre has to grow in every aspect to accommodate all of the additional people and spaces.

Figure 5. Public consultation information panel showing requirements for competitive events

2.5 Capacity and Demand

The facility should be designed to meet user demand in coming years. In a general sense, the goal is to arrive at a "sweet spot" of being neither too big nor too small for the active user group in Yellowknife, at the completion of construction and in coming years.

To determine the requirements for hitting this sweet spot, several considerations should be taken into account. Different factors are at play when quantifying both the demand for aquatic centre use, and the actual, effective capacity of each design option.

User demand at RIMP can largely be categorized under three streams:

- Programming or course enrollment (e.g. swim lessons)
- Admissions and passes (e.g. public lane swim)
- Facility rental by clubs and special events

The capacity of a future Aquatic Centre can be calculated based on:

- Maximum occupancy according to pool guidelines
- Staffing capacity, based on a lifeguard-to-swimmer ratio

Based on these different inputs, the relationship between existing demand and future capacity is not a direct or obvious translation. An overview of relevant factors is outlined below.

2.5.1 Aquatic Centre Capacity

The diagrams to the right indicate approximate values for the maximum occupancy of sample design options, according to BC Guidelines for Pool Design (2014).

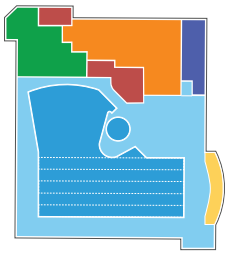
Each blue figure on the right represents 100 bathers: the total possible capacity for each facility is in the range of several hundred. According to practical, actual usage of the facility, maximum occupancy is not likely to be the limiting factor. For lane swimmers (as an example), two people per lane is a more comfortable number than twenty, regardless of whether twenty is allowable by code.

In the context of a new Yellowknife Aquatic Centre, a more definitive way of determining pool capacity may be according to staffing capacity. The City of Yellowknife currently uses the following calculation for lifeguard to bather ratios:

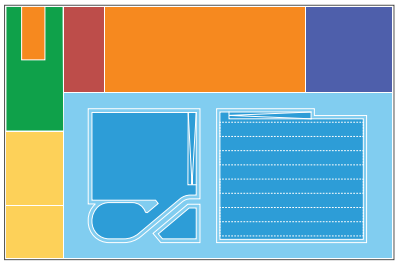
- 1-35 bathers = 1 guard
- 36-70 bathers = 2 guards
- 71-124 bathers = 3 guards
- 125-200 bathers = 4 guards
- 201-300 bathers = 5 guards
- Each additional 100 people = 1 additional guard

By this metric, if a theoretical new 25m pool were to be used at its full capacity of 750 bathers, the City would require 10 lifeguards on deck.

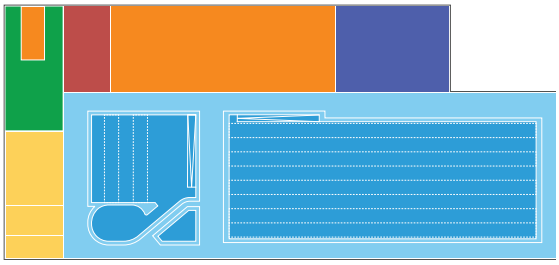
Ruth Inch Memorial Pool



Example 25m Pool



Example 50m Pool



Shown above:
Graphic representation of maximum occupancy for sample facility designs, where  represents 100 people
(based on BC Guidelines for Pool Design)

At the current time, the City employs 6 full-time lifeguards, plus casual staff hours in an amount equivalent to roughly 2 additional full-time staff. The City has indicated that the maximum capacity of RIMP is 274 patrons, as dictated by the GNWT Department of Health. In order for the existing pool to operate at the full capacity of the physical facility, 5 lifeguards would be required on deck at once.

A new 25m pool would roughly double the maximum occupancy of the facility, and greatly increase the number of bathers who could comfortably swim at one time. A new 52m pool could accommodate almost triple the maximum occupancy of RIMP. In both scenarios, however, the number of lifeguards available to be on deck at once should be taken into account as a more immediate limiting factor than the maximum allowable occupancy.

2.5.2 Projected Increase in User Demand

It has been assumed that user demand would increase if a new facility were built. This is based partially on trends demonstrating increased interest and increased attendance rates after the construction of a new public facility. Perhaps more significant are the results of the 2018 Pre-Design survey (shown right), which indicate that Yellowknifers would be more inclined to use the pool if several issues with the existing facility were resolved.

Based on these factors, a 20% projected increase in course enrollment has been estimated (shown below) upon opening of the new Aquatic Centre. Additional course growth would largely be based on population growth over time.

In 2018, only 52% of households expressed satisfaction with the current facility.

Based on survey responses from 425 Yellowknife households, the #1 issue cited about the pool was:

"It doesn't have the amenities desired"
— 41% of respondents

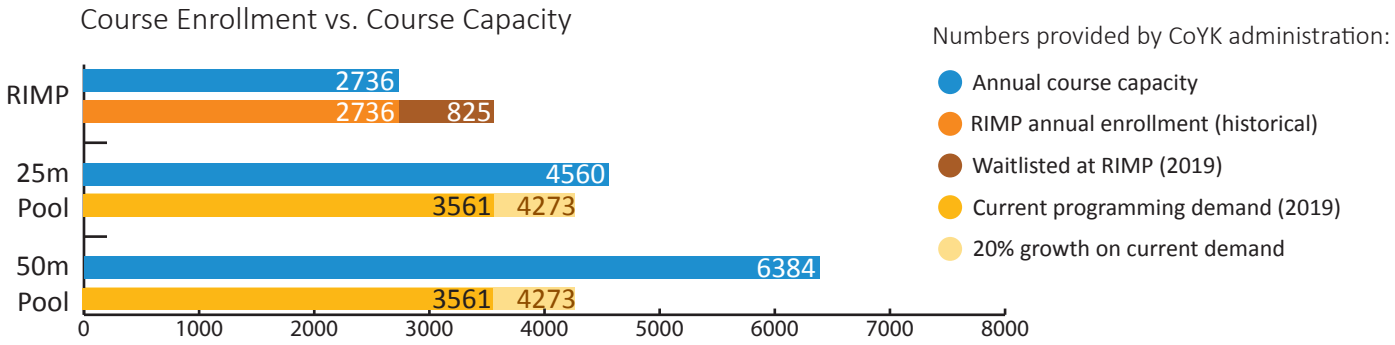
Residents also cited the following issues as preventing them from using the pool more often:

- The water is too cold
- The pool is crowded
- It is very difficult to register my child for swimming lessons

Each of these issues is largely related to the insufficient size of the existing facility.

2.5.3 User Demand for Aquatic Programming

Very clear data is available on current user demand for aquatic programming at RIMP. From 2017–19, an annual average of 2,736 people were enrolled in courses. In 2019, an additional 825 were waitlisted – demonstrating clearly that user demand for programming was not met by the facility's current capacity. Approximately 1 in 4 course applicants were waitlisted.



The numbers shown above were provided by City Administration. The estimated course capacity for a new 25m pool would be 28% in excess of what is required to meet the current demand (if demand were to remain constant). The course capacity of a new 50m pool would be even higher, with an additional estimated 79% enrollment capacity above current demand.

With a projected increase of 20% on current user demand, the course enrollment capacity for a new 25m pool is estimated to exceed demand by 7%. With a new 52m pool, capacity would exceed projected demand by an estimated 49%. Note that these numbers are preliminary estimates only.

2.5.4 Estimating Demand for Admissions and Passes

While programming demand is clearly tracked via the course waitlist, there is no equivalent data tracking for passes and admissions. It is understood that prospective RIMP-users are turned away when the facility has reached maximum capacity; however, the exact "overflow" number is not recorded. So, although information is available on the annual number of passes sold, the actual demand for admissions is not exactly quantified.

Similarly, the City of Yellowknife has indicated that the facility is currently overbooked for rentals, and demand is not met by RIMP. It has been assumed that rentals of the facility will increase if the capacity exists to do so.

2.5.5 A Note on Demand, Capacity, and Revenue Projections

Section 7.2 of this report includes estimated revenue projections for each facility design option. These figures were provided by the City of Yellowknife in advance of the public consultation process. Annual estimated revenue totals were presented publicly, to inform residents of the potential tax increase that would subsidize the facility's operations.

Because of the factors outlined above, it is recommended that the City undertake a thorough analysis of staffing capacity and user demand, if revenue projections are required to be accurate within a specified margin of error. The numbers included in Section 7.2 should be considered as "order of magnitude" estimates based on the information available, rather than a comprehensive business plan.

2.6 Importance of Design

A well designed facility, both functionally but also aesthetically, is a major civic asset to the community and can be a huge draw for social and sport activity for both locals and visitors. The creation of great social spaces at the heart of the building, maximizing the programming possibilities for the pool basins and taking every opportunity to bring in controlled natural light and views, will create a rich and welcoming community building. An investment in responsible design that prioritizes appropriate and durable materials and operational efficiency will ensure that the 'life of the building' costs are minimized.

3 Community Consultation

3.1 Overview

The community consultation process for this phase of the project had three main goals:

1. Inform the community about the project in general, and about pool design considerations including the differences between an Aquatic Centre with a 25m lane pool vs. a 52m lane pool

2. Evaluate public interest in proceeding with an Aquatic Centre with a 25m lane pool or a 52m lane pool, or to not proceed with a new Aquatic Centre at all

3. Confirm the spaces and amenities that the community would like to see in a new Aquatic Centre

3.2 Consultation Information Panels

For the consultation session, 15 information panels were prepared for the public. These panels contained details on the history of the project, the program proposed in the Pre-Design Plan, activities that can occur in Aquatic Centres (both leisure and competitive), comparisons of what can be achieved in 25m vs. 52m lane pools, and the estimated costs associated with each option - both capital costs and O&M costs.

As the concept designs had not been developed at the time of the consultation, the estimated construction costs were taken from the Pre-Design plan, adding a +/- 25% potential margin of error which is in line with estimates for projects at this stage of development. Projections for operations and maintenance costs were reviewed in more detail, extrapolating information from the current RIMP budget as well as historical utility costs for the new aquatic centre in Iqaluit. Again, these were shown with a +/-25% margin of error.

Please see Appendix C for a copy of the 15 information panels that were provided.

3.3 Consultation Process and Survey Results

Three in-person consultation sessions were held during a week in September 2020, following all guidelines for Covid-19 social distancing as advised by the Chief Public Health Officer.

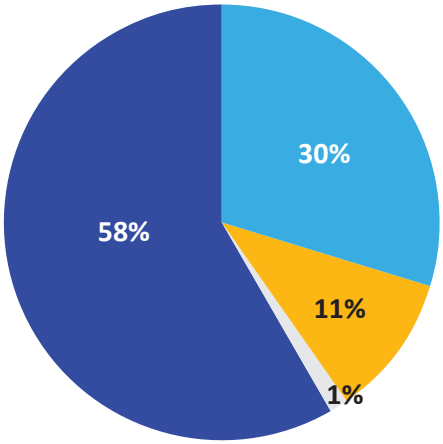
The consultation sessions were advertised with postcard mail-outs to Yellowknife residents, as well as through social media and radio advertisements. Additionally, stakeholder community organizations were invited to participate in a one-on-one Zoom session with the project team. It is assumed that these groups felt that the survey was sufficient, as they did not request further input.

Feedback was collected in the form of a four-question survey, which was given to participants at the in-person consultation sessions, and also made available online. 39 paper surveys were completed, and 417 digital surveys. In total, there were 456 survey respondents. The answers to each of the four questions are summarized in the following pages.

Question 1) Lane Pool Length

The first question was related to support for the new Aquatic Centre, and preference on the length of the lane pool. The majority of respondents selected the option of a 52m pool.

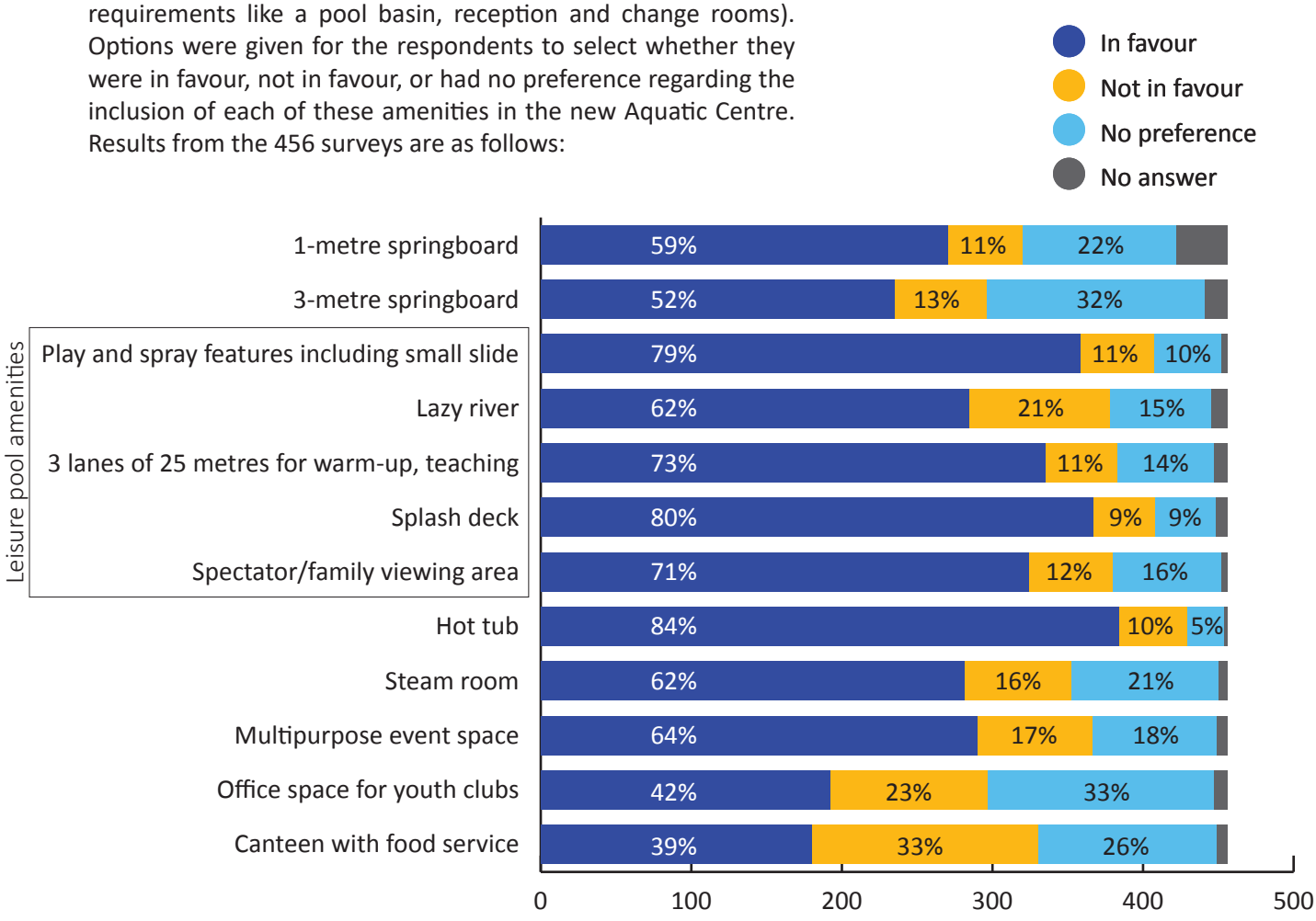
- 52-metre lane pool: 266 responses in favour
- 25-metre lane pool: 136 responses in favour
- Not in favour of a new aquatic centre: 49 responses
- No answer selected: 6 responses



Question 2) Spaces and Amenities

The second question was intended to confirm or gauge respondents' support for the building program recommended by the 2018 Pre-Design Plan.

Shown below is the list of spaces and amenities that were previously recommended (additional to basic programmatic requirements like a pool basin, reception and change rooms). Options were given for the respondents to select whether they were in favour, not in favour, or had no preference regarding the inclusion of each of these amenities in the new Aquatic Centre. Results from the 456 surveys are as follows:

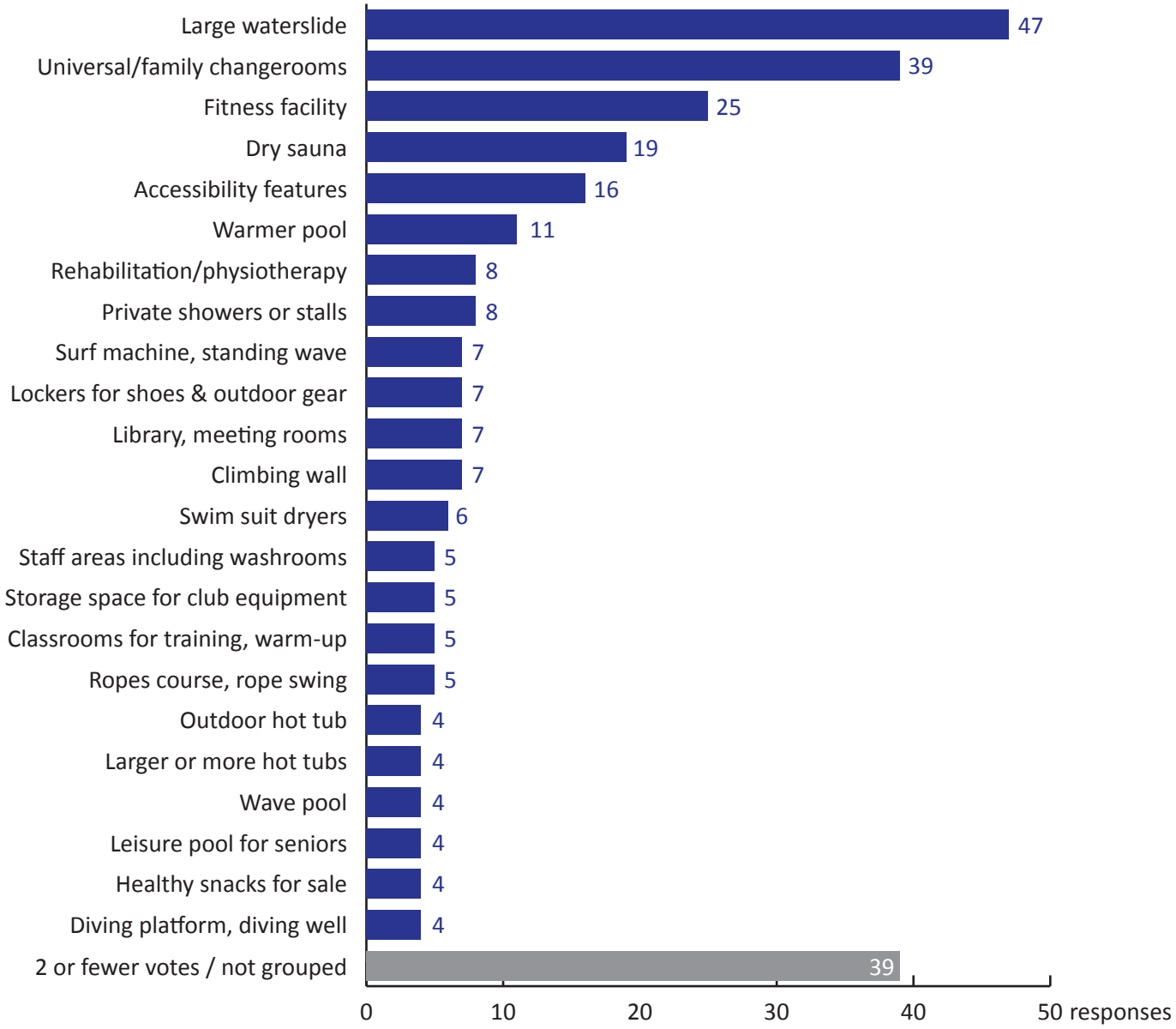


Taylor Architecture Group / MJMA

Question 3) Additional Amenities

The third question asked if there were any additional spaces or amenities that they would like to see, other than those listed in the Pre-Design Plan. No specific options were suggested by the survey, so respondents filled in their own ideas and suggestions. 243 responses were given, with each worded differently.

A log of each written response is included under Appendix D. For the purpose of summarizing results, similar answers have been grouped together in the bar graph below, wherever the intent of several respondents was clearly in alignment. Where an item was mentioned in fewer than 3 responses, or was non-specific/unclear in intent, that item is not individually described below, but is included in Appendix D. Of the 243 responses, 39 fall into this category.



In addition to the responses represented above, 3 votes each were given to each of the following:
Extra support for a family viewing area; Change rooms separated by gender; Deep end of pool sized for scuba and water polo; Childcare/daycare services; Cafe or cafeteria stalls; Spa amenities for tourism; Study space (food-friendly) with tables and chairs; Rental space for NGO's or related services; Splash deck or water park; Better change rooms and showers; Deck space for teaching.

Question 4) Further Feedback

The final question was an open-ended request for any additional feedback regarding a new Aquatic Centre in Yellowknife.

Similar to the approach for Question 3, all written responses are included in Appendix D, with the most common threads, themes or categories represented below. A total of 215 responses were received for this question; some responses address multiple of the items listed here. 39 of these 215 do not clearly align with other responses, and are not individually listed.

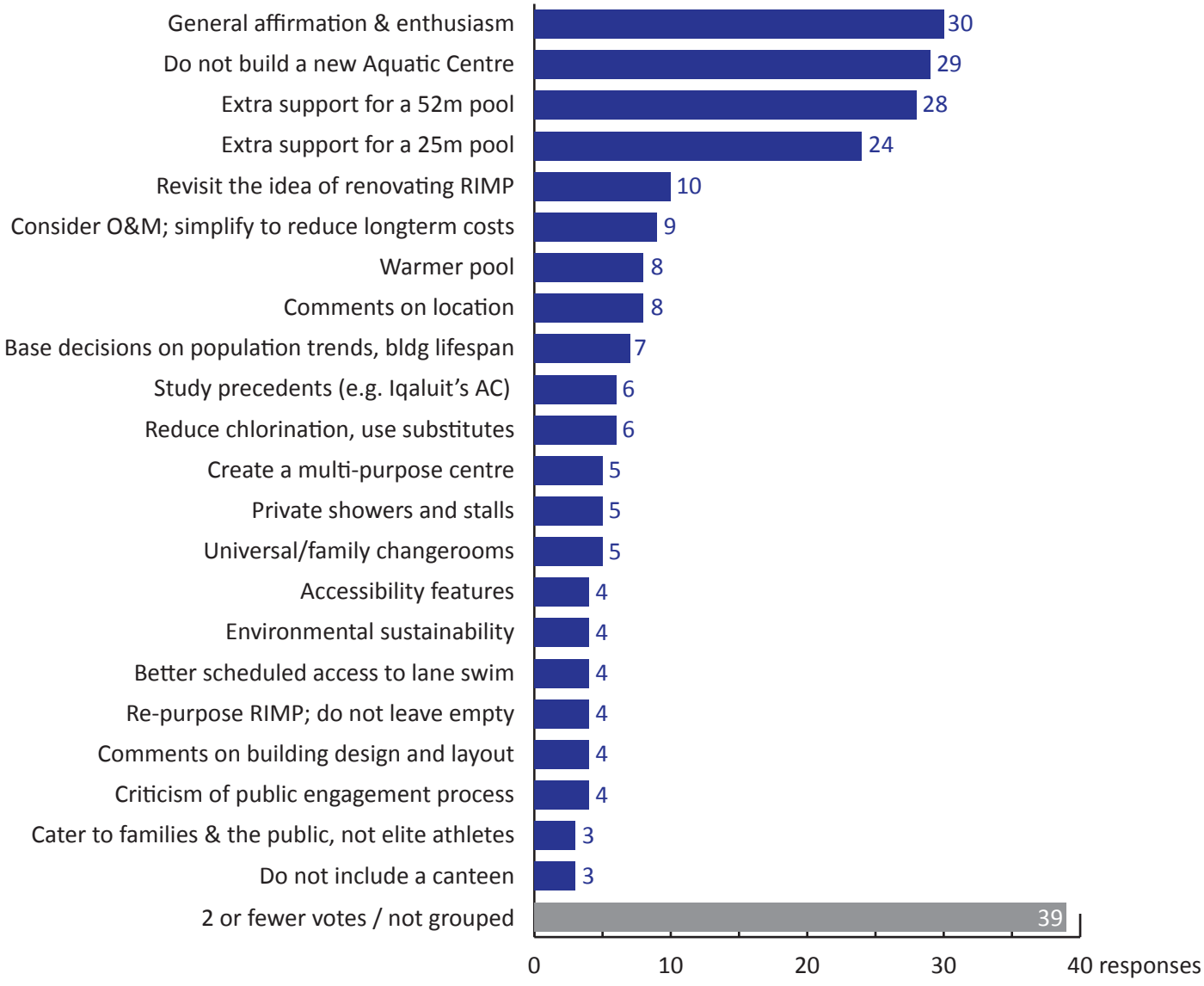


Figure 6. Regent Park Aquatic Centre, MJMA

3.4 Summary

Based on this consultation session, the majority of survey respondents (58%) were in favour of a new Aquatic Centre with a 52m lane pool, while 30% were in favour of a new Aquatic Centre with a 25m lane pool.

11% (49 respondents) were not in favour of building a new Aquatic Centre at this time. This group was comparatively vocal in response to Question 4) "Further Feedback", and largely cited economic concerns related to Covid-19. Information regarding the impact of Covid-19 on project costs is included in Section 6 of this report.

Of the spaces and amenities recommended by the 2018 Pre-Design Plan, most were supported by the respondents, with Hot tub and Splash deck receiving more than 80% "in favour" responses. Only two of the options received less than 50% "in favour" votes: Office Space for Youth Clubs, and Canteen with Food Service.

47 respondents suggested the addition of a large waterslide, representing 10% of total respondents, and 19% of those who answered Question 2. This feature has been included as an option in the cost estimate under Section 6.1.2.

Aside from the waterslide and universal change rooms (which are included in both the Pre-Design Plan and the Concept Design), the most commonly suggested additional amenity is a City-run fitness facility. 25 respondents suggested a weight room, cardio room or running track, and specified that this amenity would be especially valued by parents whose children are taking swim lessons.

The final question demonstrated a tight split on some key issues. 30 respondents used this blank space to express enthusiasm for the new pool, while 29 expressed the opposite opinion that it should not be built (or not be built at the present moment). 28 respondents wrote justifications for choosing the 52m option, and 24 wrote justifications for choosing the 25m option.

Regardless of which outcome they selected, many respondents framed their statements in terms of long-term fiscal responsibility and economic impact or opportunity. Several responses posed questions about Yellowknife's population projections, Operations & Maintenance costs, and building lifespan, suggesting that the project be viewed as an long-term investment with costs and benefits – both in terms of economics and community health.

% in favour	Space or Amenity in Pre-Design Plan
80%+	Hot tub Splash deck
70-80%	Play and spray features, small slide 3 lanes of 25m for warm-up/teaching Spectator/family viewing area
60-70%	Multipurpose event space Steam room Lazy river
50-60%	1-metre springboard 3-metre springboard
40-50%	Office space for youth clubs
less than 40%	Canteen with food service

Are the Survey Results Representative of All Yellowknifers?

All public input received is valuable, and important to the process of developing a program for the new Aquatic Centre.

It should, however, be noted that although the consultation process intended to invite feedback equally from all residents, the survey was not a random sample survey. In order to take the survey, respondents were required to attend a consultation session or create a Place Speak account, which both constitute an active effort to "go out of their way" to comment on the project.

It is likely, therefore, that residents who actively responded to the survey are those with a particular interest in the project – rather than a random sampling of all Yellowknife taxpayers.

4 Concept Designs

4.1 Aquatic Centre Site

The site for the new Aquatic Centre will be directly east of Ruth Inch Memorial Pool, where currently two rock outcrops are located (one of which contains remnants of the old Pitch & Putt mini golf course). This site is centrally located in the City, with access to existing parking and public transit, McMahon Frame Lake Trail and Franklin Avenue.

The site contains a variety of existing complimentary recreational amenities including the Curling Centre, Community Arena, Tennis Courts and Clubhouse, McNiven Beach Park and the existing Ruth Inch Memorial Pool building which is intended to be re-purposed into another community facility in the future. The three existing buildings are all tied into a district biomass system located north of the Community Arena. According to the City of Yellowknife, the district system is aging and may require replacement or upgrading in the near future. The intent is to tie the new Aquatic Centre into this district system. This will be further investigated in the next phase of the project.

Parking for the new Aquatic Centre will be located in the already paved area to the east of the building, with overflow parking in the existing parking lot further south. A parking study recently completed for this site indicated that there is sufficient capacity in these areas to accommodate the new Aquatic Centre, including parking allowances for a re-purposed Ruth Inch Memorial Pool facility in future.

The site is surrounded by trees and rock, a true reflection of the natural landscape surrounding Yellowknife. The intent is to preserve and highlight these natural features as much as possible with the new Aquatic Centre design. The possibility exists to create an interactive relationship between the new Aquatic Centre and McMahon Frame Lake Trail. Its close connection to McNiven Park also provides an opportunity to bring new life to this often overlooked recreation space in Yellowknife.

Figure 7. Aquatic Centre Site

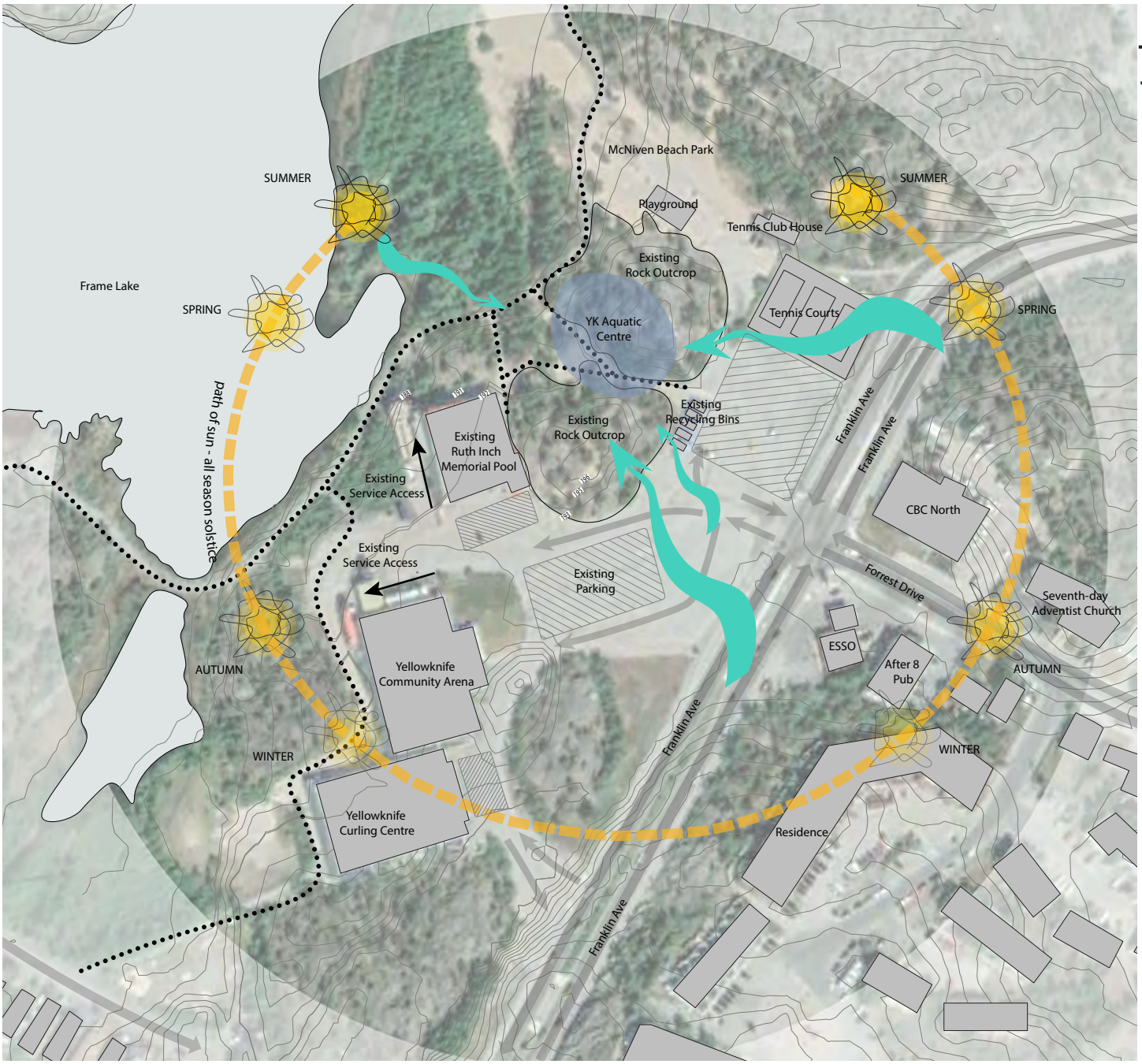


Figure 8. Site Plan Study - New Aquatics Centre

4.2 Building Program

The building program is a list of all of the spaces and amenities that should be included in the new Aquatic Centre.

4.2.1 2018 Pre-Design Plan

The 2018 Pre-Design Plan recommended the following building program. These spaces have been carried over into the Concept Design, with a few adjustments as noted.

Public Areas

- Vestibule
- Lobby
- Coat/Boot Room*
- Public Washrooms
- Canteen
- Change Rooms (universal design)
- Multipurpose Rooms (2)
- Spectator Seating (2nd floor)

Private Areas

- Administration
- Janitor room

Building Services

- HVAC
- Pool systems
- Electrical

Natatorium

- Lane pool (25m or 52m)
  - 6 lanes**
  - 1m and 3m spring boards
  - 2 x 1m wide movable bulkheads (in 52m option)
  - Ramp entry (25m), accessible lift (52m)
- Leisure Pool
  - Beach entry
  - Play and spray features including small slide
  - Lazy river
  - 3 lanes of 25m
- Splash Pad
- Therapy Pool
  - Ramp entry
- Steam Room
- Storage (general & youth clubs)
- Office space (youth clubs)

* added to the program by TAG

** TAG recommends an 8 lane lap pool. See Section 4.2.4

4.2.2 Additional Spaces

In addition to this, the following spaces were requested to be added by the City of Yellowknife:

- **City of Yellowknife office space** (2nd floor)
  The City's Community Services Department is intended to be relocated here, to free up space in the overcrowded City Hall offices.

- **Lease space** (2nd floor)
  This is intended to provide revenue to offset the operations and maintenance costs of the new building. Space can be leased to tenants who are offering goods or services that are complimentary in nature to the new Aquatic Centre, such as those related to health, wellness and recreation. This could include massage or sport therapy, a fitness centre, or a sporting supply store.

City of Yellowknife Office Space

Community Services Department

- 5 offices

Lease Space

- Ability to subdivide into two spaces if necessary

4.2.3 2020 Consultation Survey Results

The recent public survey indicated that respondents were largely satisfied with the building program as recommended in the Pre-Design Plan. A few items stood out from the responses:

Additional Amenity: Waterslide

The most requested additional amenity was the inclusion of a large waterslide feature, as indicated by 10% of respondents. Large slides add another element of fun to the pool environment. They do however take up additional deck space including their own dedicated basin, and would therefore add to the footprint of the facility. They also entail additional operations & maintenance costs, as well as supervision requirements. Refer to Section 6.1.2 for a cost estimate on the addition of a waterslide feature to the project.

Additional Amenity: Fitness Centre

A fitness centre was the second most requested additional amenity, at 8.5% of respondents. The inclusion of a fitness centre was not part of the Pre-Design plan. It could, however, be an option if the second floor lease space was rented out to a fitness club. This possibility should be considered during the design phases, as the floor system in this location would have to be engineered to accommodate the loading requirements of such a space.

Pre-Design Plan Amenity: Canteen

Public interest in a canteen appeared to be mixed, with only 39% of respondents in favour of this amenity, 33% not in favour, and 26% having no preference. The provision of a food and beverage option is an important amenity if the building is meant to act as an inviting community hub. TAG/MJMA recommend a canteen that provides a limited offering of cold snacks and beverages for those waiting for their children to finish swim lessons, or just using the pool lobby as a social space. This space can either be staffed by the City of Yellowknife, or leased out to an independent contractor.

Pre-Design Plan Amenity: Youth Club Office

Only 42% of respondents were in favour of providing an office space for youth clubs. 33% were not in favour, and 23% had no preference. As this office would occupy very little space in the new Aquatic Centre, it is recommended to keep it in the program based on stakeholder input during the Pre-Design phase.

Changes to the Pre-Design Plan Program

According to these results, TAG/MJMA are not recommending any change from the program areas listed in the Pre-Design Plan, with the exception of a coat room and the possible exception of a large waterslide. A coat room off the lobby is an important functional space in a pool facility, especially in a winter city such as Yellowknife. The waterslide could be considered (alongside its additional cost) by Council, keeping in mind that only 10% of respondents requested this additional amenity.

4.2.4 6 vs. 8 lanes

As discussed in Section 2.4, a lap pool with 6 lanes would be able to host local and regional competitions, but not be as accommodating for water polo and synchronized swimming. If a new facility is being constructed, limiting it to a 6 lane lap pool would make the facility less attractive for sport tourism in Yellowknife. Because of this, TAG and MJMA strongly recommend a lap pool with 8 lanes, and this is what has been shown in the concept design plans for the facility.

Cost estimates and O&M projections for a 6 lane lap pool have also been included in this report for each option, for comparison. If Council chooses to proceed with a 6 lane pool, the concept designs can be easily modified to reflect this change.

4.2.5 Building Area Comparison

The overall building area identified in the Pre-Design plan was refined during the Concept Design stage. Adjustments to the building area are identified as follows:

- Additional mechanical/service space was required to fit all of the HVAC, pool equipment and electrical systems required by the program. Note that the final mechanical room area is to be confirmed by DB team.
- Area for the 2nd floor spectator seating was provided. This was mentioned in the Pre-Design report, but not included in the area calculation.
- Addition of City of Yellowknife office space, and Lease (revenue) space, as outlined in Section 4.2.2. These spaces do not greatly impact the overall cost of the project, as they are included on a second floor that already requires access and circulation for the spectator seating. Being located on a second floor also means that no additional foundation or roof costs are incurred, which are the largest impacts to construction costs.
- Addition of coat/boot storage in lobby - an important functional space for an Aquatic Centre especially in a winter city. This was also mentioned in the feedback from the public consultation.
- Addition of building circulation and structural allowances (structure and wall thicknesses). These did not appear to be included in the building areas provided by the Pre-Design plan, but are included in the Concept Designs and associated cost estimates.

A summary of the PreDesign vs. Concept Design overall building areas is below.

		25m 6 lane pool		25m 8 lane pool	52m 6 lane pool		52m 8 lane pool
		Pre-Design (m^2)	Concept Design (m^2)	Concept Design (m^2)	Pre-Design (m^2)	Concept Design (m^2)	Concept Design (m^2)
ground floor	Natatorium	1850	1654	1812	2500	2347	2650
	Changerooms	400	420	420	500	500	500
	Administration	100	130	130	140	130	130
	Multipurpose rooms	180	122	122	220	114	114
	Lobby	200*	277	277	210*	329	329
	Canteen	not included	41	41	35	33	33
	Washrooms	80*	46	46	90*	57	57
	Steam room	30*	28	28	30*	25	25
	Coat room	not included	25	25	not included	24	24
	Storage	30*	79	79	40*	41	41
	Mechanical/services	70*	251	251	120*	239	239
	Subtotal ground floor	2940	3073	3231	3850	3839	4142
	Remaining area not accounted for (in Pre-Design Plan)	60			50		
	Circulation / Structure		398	384		357	328
	Total ground floor	**3000**	**3471**	**3615**	**3900**	**4196**	**4470**
2nd floor	Spectator viewing area	not included	180	180	not included	180	180
	Lease space	not included	133	133	not included	133	133
	CoYK office	not included	104	104	not included	103	103
	Washrooms	not included	17	17	not included	13	13
	Club Office	not included	18	18	not included	15	15
	Storage	not included	28	28	not included	23	23
	Mechanical/services	not included	215	215	not included	248	248
	Subtotal second floor	0	695	695	0	715	715
	Circulation / Structure	0	388	388	0	281	281
	Total second floor	**0**	**1083**	**1083**	**0**	**996**	**996**
	Total gross floor area	**3000**	**4554**	**4698**	**3900**	**5192**	**5466**

* estimated based on Pre-Design drawing (no number provided)

Figure 9. Area comparison chart between Pre-Design plans and Concept Design plans

4.3 The Concept Design Phase

The Concept Designs shown in this report still represent a very early stage of design. While they are refined from the Pre-Design plan, they are still at the **Concept** stage, meaning that they are suggestions of how the building could be organized based on a closer review of building space requirements, additional public feedback and the new piece of information for the project which is a defined site. The main configuration of the building is more defined, including a location for the main entrance and service access, and important adjacencies between program spaces are represented.

These concept drawings do not, however, necessarily represent what the final design will or should look like. Project considerations that are addressed during later stages of design include further consultation with City staff to determine specific space and maintenance requirements, sizing of mechanical and electrical equipment, and the development of other technical requirements of the building. Design decisions made by the design-builder will also have a significant impact on the overall configuration, detailing, and cost of the new Aquatic Centre.

4.4 Design Approach - Key Concepts

A new Aquatic Centre provides a rare opportunity to create a civic hub building in Yellowknife that provides much-needed indoor social and recreational space in our winter city. The building should strive to be welcoming, community focused, and inclusive for people of all ages and abilities. It is important to recognize that the facility will be built on Chief Drygeese Territory. The design needs to reflect this with the inclusion of indigenous art or other elements.

Key design concepts have been identified in response to the site, feedback from the community, and good design practices. These include:

- Community focused environment
- Lobby as the "heart" of the building (centrally located, social space, views to the natatorium)
- Creation of an exciting interior public space
- Inclusive design
- Reflection of local indigenous culture
- Ability to host competitive events
- Incorporation of natural light
- Preserve and work with the natural landscape where possible
- Connection to the adjacent McNiven Park and McMahon Frame Lake Trail
- Building servicing separate from public entrance

Building concept designs for both the 25m and 52m options offer a simple, economical building form, with a roofline that responds to the activities inside the building (high volume for two-storey spaces, diving boards, lower volume elsewhere). They provide opportunities to bring high natural light into the pool spaces and provide views to the landscape from the pool deck. The designs integrate the unique rock outcrops present on the site, utilizing them to frame the public entrance and become part of the facade of the building

These design concepts establish an essential set of criteria that the eventual design-builder must adhere to. This is key to ensuring this facility meets not only the functional aspects of pool design, but also a broader vision for the new Aquatic Centre as an iconic, thoughtfully designed, civic minded community space in Yellowknife.

Figure 10. Regent Park Aquatic Centre, MJMA

4.5 Concept Design Option 1a / 1b: 25m Lane Pool

4.5.1 Site Approach: 25m lane pool

This concept option, the smaller of the two, is nestled into the site, with the main entrance located in the valley between two existing rock outcrops. A landscaped section in this area allows space for benches, bike racks and stroller storage, and provides a comfortable setback from the parking lot. Once past the rock, the building opens towards the north and east to provide a connection to Frame Lake, McMahon Frame Lake Trail, and McNiven Park.

Building servicing on the west side of the building is separated from the main entrance, with a new access road adjacent to the existing RIMP building.

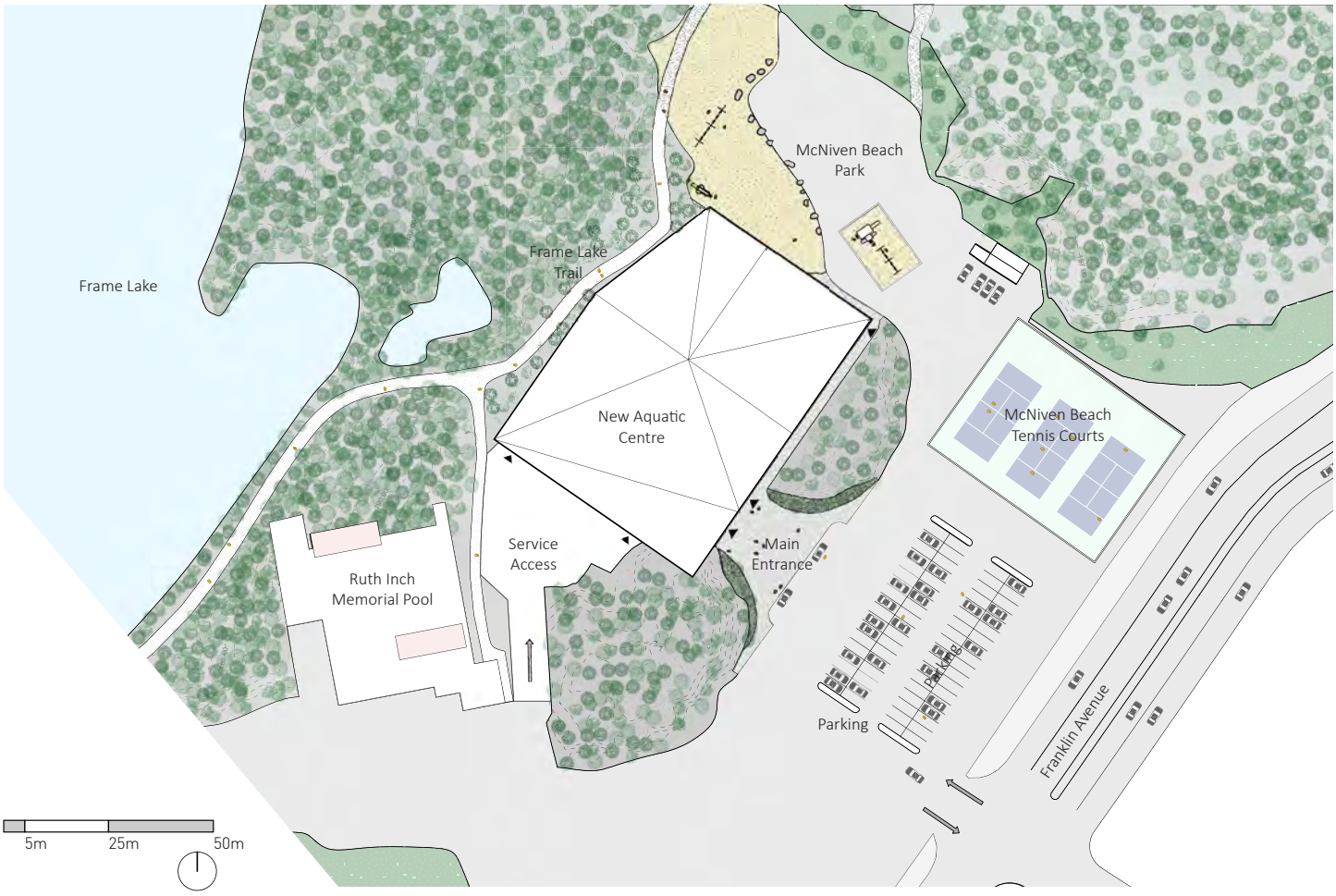


Figure 11. New Aquatics Centre Concept Design - 25m lane pool Site Plan

4.5.2 Building Design: 25m lane pool

Building Organization

The building is organized around a central lobby, with the natatorium (pool space) oriented towards Frame Lake. The main entrance includes a large coat room with lockers for the safe storage of outer wear. A canteen provides snacks and beverages for pool spectators. Administration and change rooms are located along the south end of the building, and building servicing is located along the west exterior wall. Two multipurpose rooms open into the lobby and natatorium, with a removable partition between them.

Natatorium

The natatorium includes a leisure pool with both a ramped entry and shallow, broad steps, 3x25m lanes, a lazy river, spray features and a small slide. A large steam room is provided, as well as a splash deck with additional spray features. The 25m lane pool includes an access ramp, 8 lanes, and 1m and 3m springboards. The therapy pool or hot tub is located at the north end of the building with views towards Frame Lake.

Storage for pool equipment is provided in multiple locations off the natatorium space, and additional storage units on the pool deck can also be accommodated.

Second Storey

A second storey on the south end of the building contains the City of Yellowknife offices, lease space (which can be subdivided into two spaces if required), pool spectator seating, storage, and a youth club office. This space is accessible from an exterior vestibule on the main floor, so that it can be accessed after pool hours without having to go through the main facility.

Additional service space is also located on a partial second storey above the main floor service space.

Universal Change Rooms

The two change rooms are intended to both be of universal design (allowing male and female patrons to use them at the same time). Having two separate universal change rooms provides flexibility for pool operations depending on the activities occurring in the pool. For example, one change room can be shut down for cleaning while the other remains open. Or, one change room can be dedicated to families or a particular user group if required. Universal change room design must be carefully considered in order to ensure that all users feel comfortable in the space. Toilet stalls, change rooms and private shower stalls are separated by full height partitions. The main change room space is typically designed with maximum transparency to the adjacent corridors and natatorium to act as a visual cue to discourage changing in the open (shared) areas.

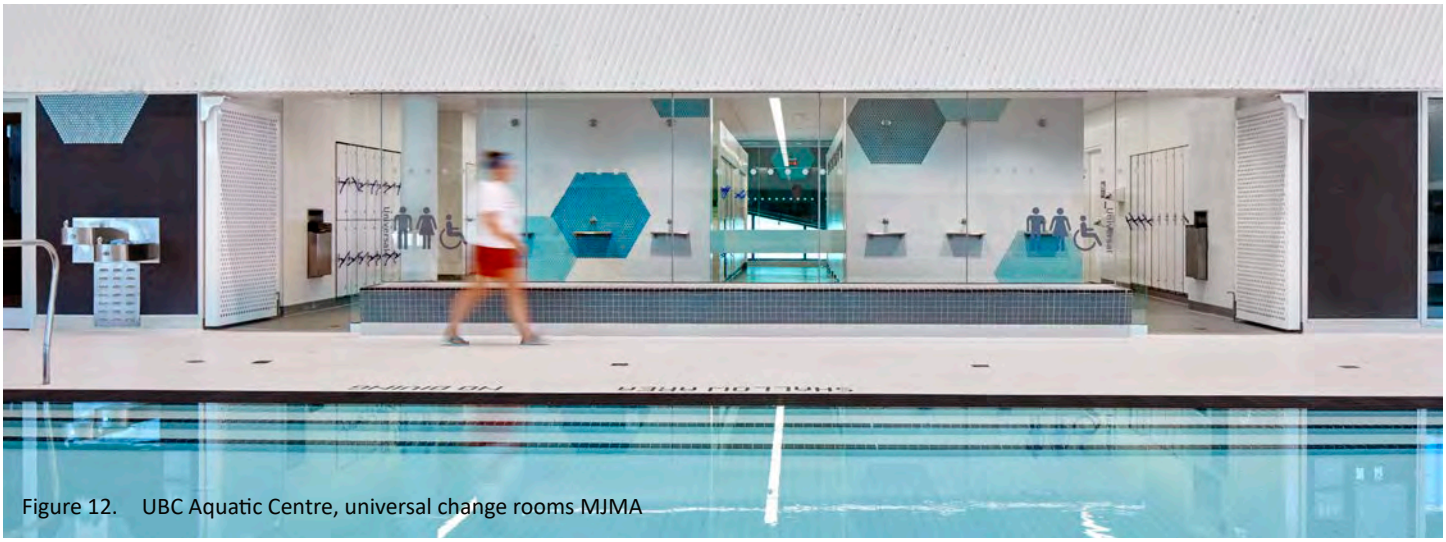
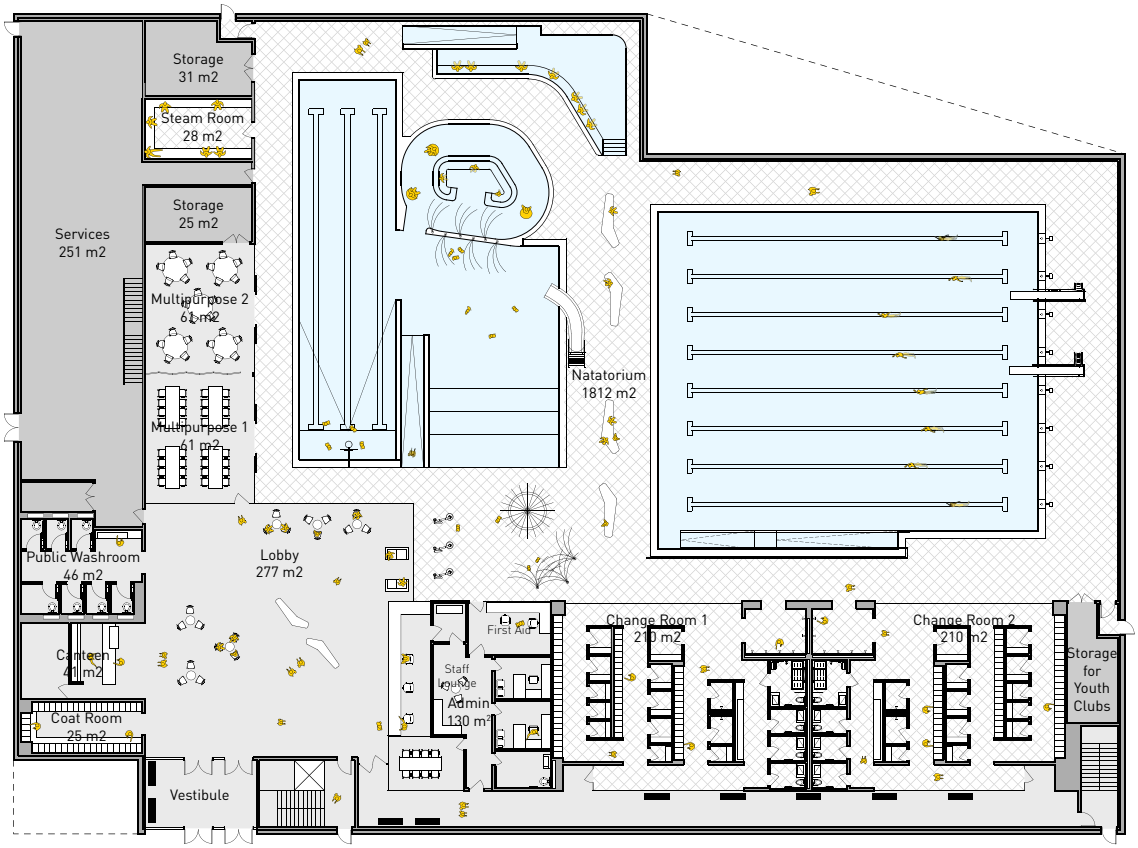
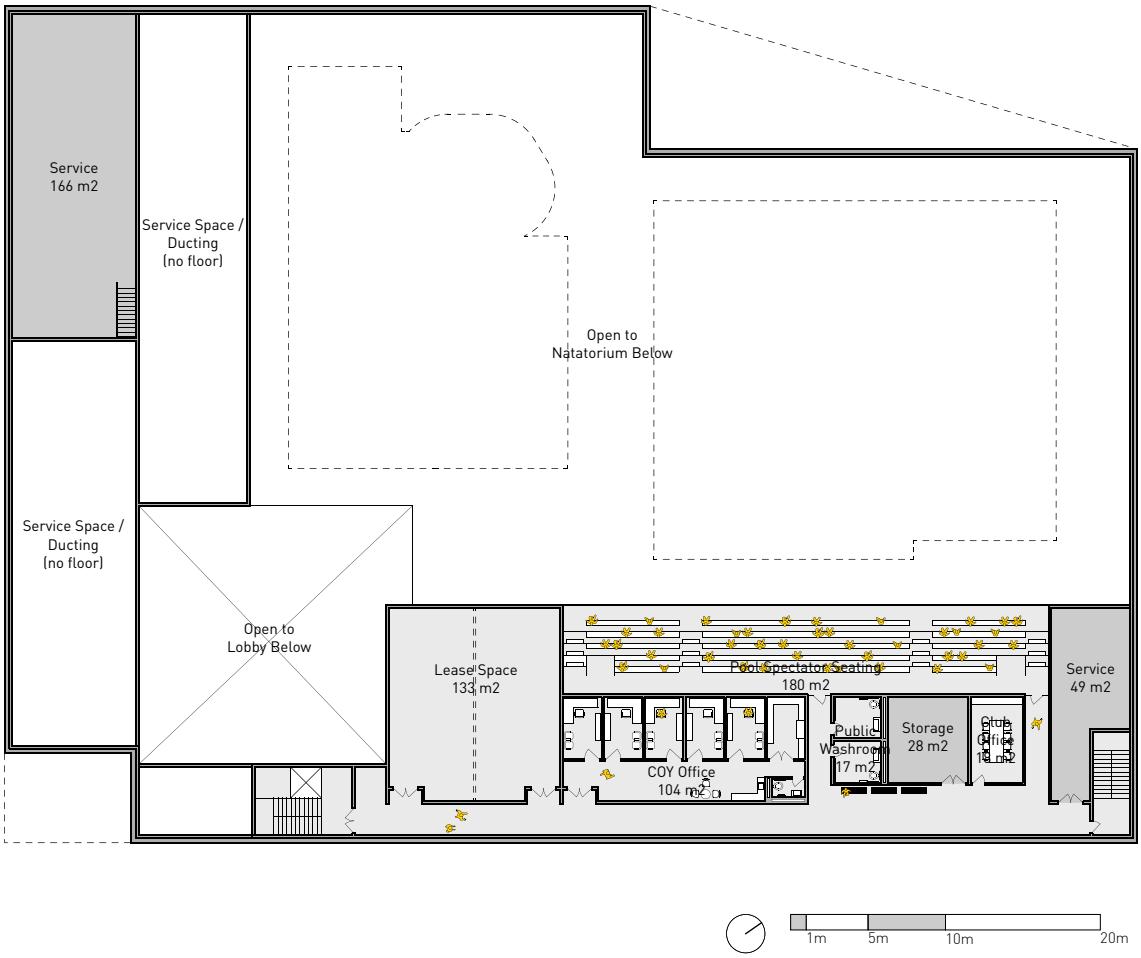


Figure 12. UBC Aquatic Centre, universal change rooms MJMA



Main Floor Plan
(3,615m2)



Second Floor Plan
(1,083m2)

Figure 13. New Aquatics Centre Concept Design - 25m lane pool (with 8 lanes) Building Plan

4.6 Concept Design Option 2a / 2b: 52m Lane Pool

4.6.1 Site Approach: 52m lane pool

The site approach for the 52m pool option is very similar to the 25m option. Again, the building is nestled into the site with a landscaped main entrance approach between the two existing rock outcrops. This option also provides a connection to Frame Lake and McMahon Frame Lake Trail to the north, and McNiven Park to the east.

Building service access takes the same approach as the 25m option, with servicing on the west side of the building.

Figure 14. New Aquatics Centre Concept Design - 52m lane pool Site Plan

Figure 16. Interior rendering showing a potential view from the lobby

Figure 15. Exterior rendering showing a potential view of the new Aquatic Centre

Taylor Architecture Group / MJMA

4.6.2 Building Design: 52m lane pool

Building Organization

The building design for the 52m pool follows the same basic approach as the 25m option. The building is organized around a central lobby, with the natatorium (pool space) oriented towards Frame Lake. The main entrance includes a large coat room with lockers for the safe storage of outer wear. A canteen provides snacks and beverages for pool spectators. Administration, change rooms, and building services are located along the west end of the building. Two multipurpose rooms open into the lobby and natatorium, with a removable partition between them. In this option, the multipurpose rooms can also be fully opened up to become an extension of the lobby when not in use.

Natatorium

The natatorium includes a leisure pool with both a ramped entry and shallow, broad steps, 3x25m lanes, a lazy river, spray features and a small slide. A large steam room is provided, as well as a splash deck with additional spray features. The 52m lane pool includes two 1m movable bulkheads to subdivide the pool (hence the additional 2m required for this length of pool), universal access lifts, 8 lanes, and 1m and 3m springboards. The therapy pool or hot tub is located at the north end of the building with views towards Frame Lake.

Storage for pool equipment is provided in multiple locations off the natatorium space, and additional storage units on the pool deck can also be accommodated.

Second Storey

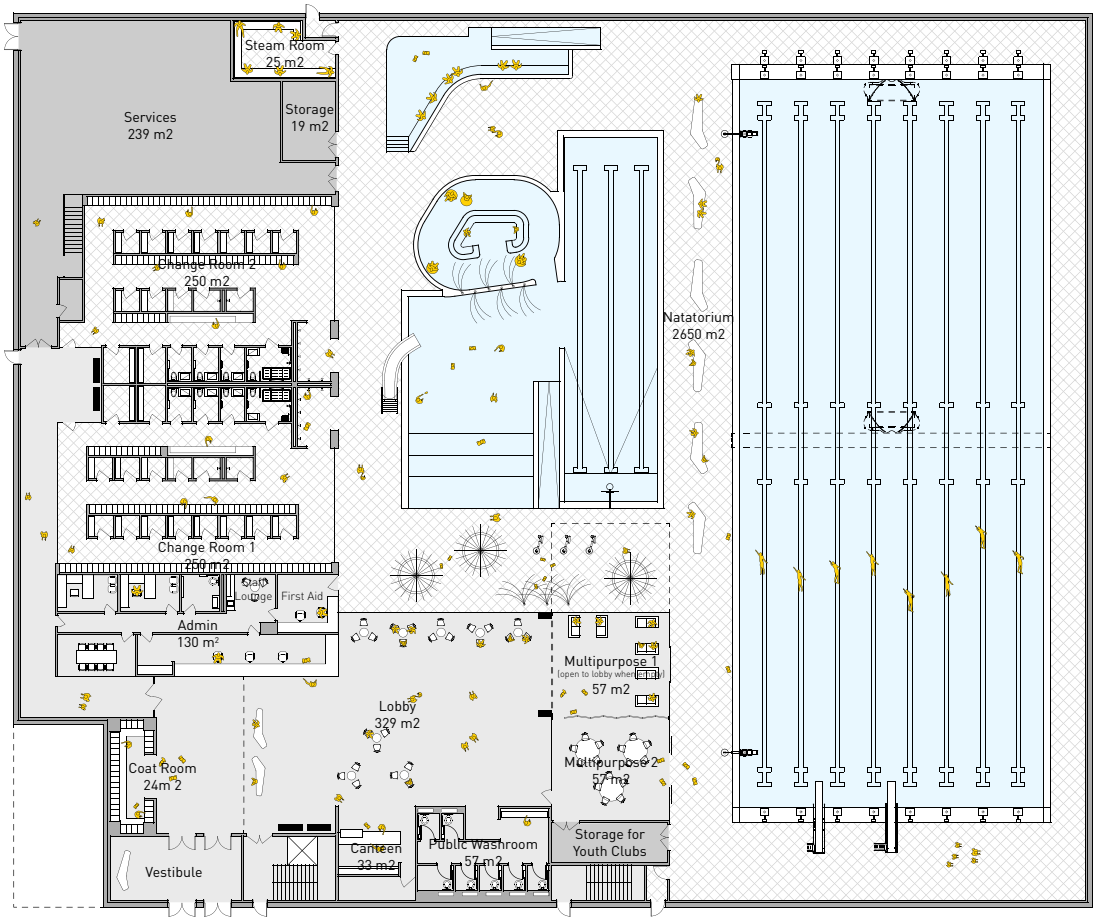
A second storey on the south end of the building contains the City of Yellowknife offices, lease space, pool spectator seating, storage, and a youth club office. This space is accessible from an exterior vestibule on the main floor, so that it can be accessed after pool hours without having to go through the main facility.

Additional service space is also located on a partial second storey above the main floor service space.

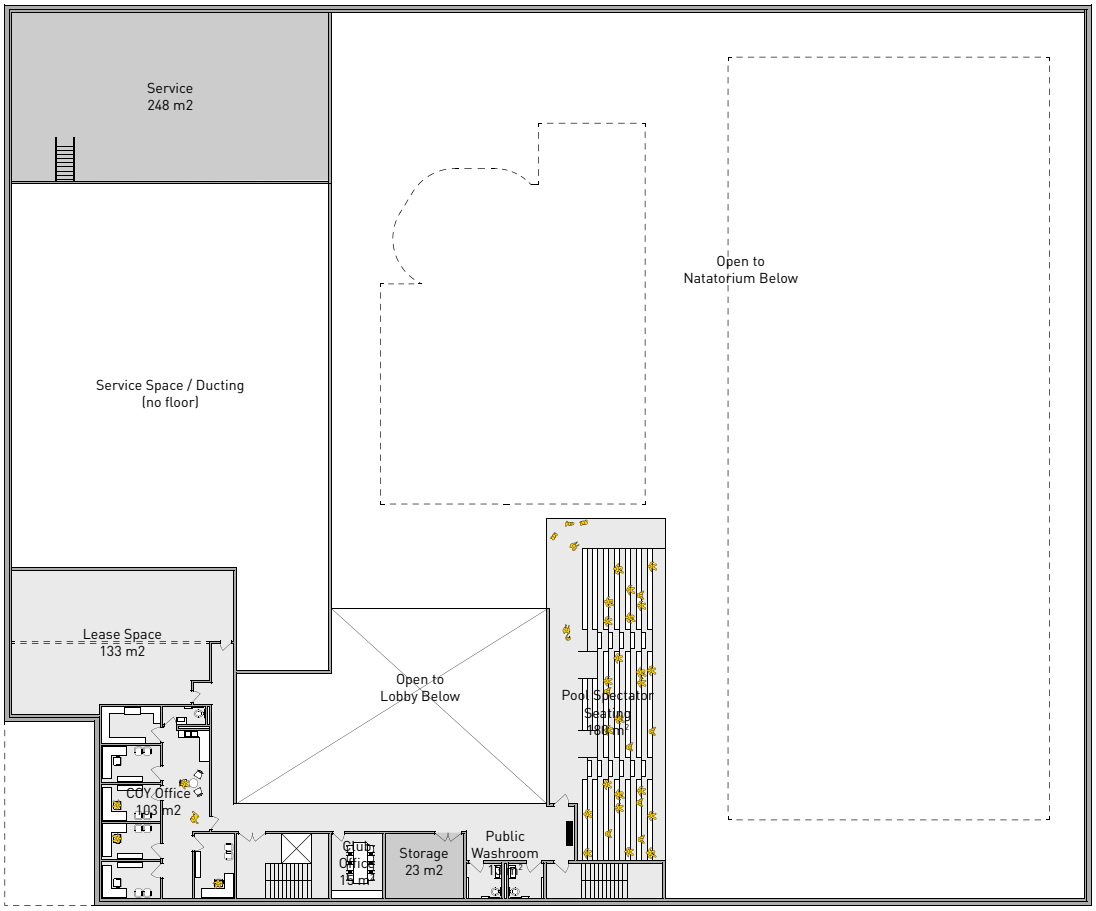
Roof Design

The concept for the roof design is a response to the activities inside the building (high volume for two-storey spaces, diving boards, lower volume elsewhere). While the concept plans are relatively simple in form, the roof design is intended to provide a bit of architectural interest and aesthetic appeal that will help make the Aquatic Centre a distinct and recognizable civic building in Yellowknife.

Figure 17. Aquatic Centre Site - view from parking lot



Main Floor Plan
(4,470m2)



Second Floor Plan
(996m2)

20m
10m
5m
1m

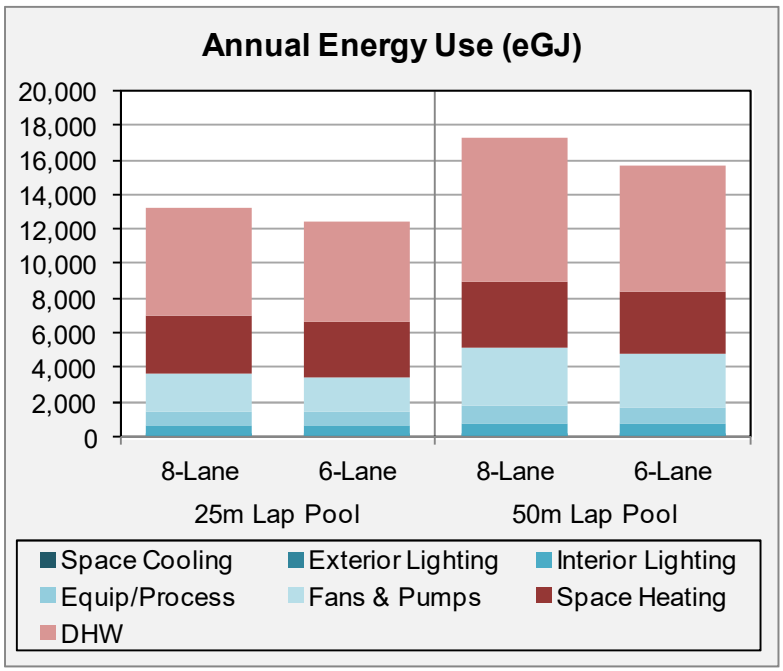
Figure 18. New Aquatics Centre Concept Design - 52m lane pool (with 8 lanes) Building Plan

5 Energy Model

An energy modeling exercise was undertaken by EnerSys Analytics in order to evaluate estimated annual energy usage and costs for each option. The model incorporated information provided by the design team, including concept design plans and preliminary structural, mechanical and electrical design briefs. The following are excerpts taken from Enersys' report, which can be found in Appendix E.

5.1 Annual Energy Use

The adjacent figure provides the comparative annual energy use for the two options. The red and blue shading represent different energy sources: the blue-shaded components are served by electricity, and the red by the district biomass system.



25m vs. 52m lane pools

The 52m pool was estimated to use about 31% (8 lane) and 26% (6 lane) more energy than the corresponding 25m pool.

6 vs. 8 lanes

As expected, the 6-lane lap pool options used less energy than for the 8-lane options – for all the major end-uses. For the 25m lap pool design, the 6-lane option used 6% less energy than for the 8-lane option, while the 52m design used 10% less energy for its 6-lane option.

5.2 Annual Energy Costs

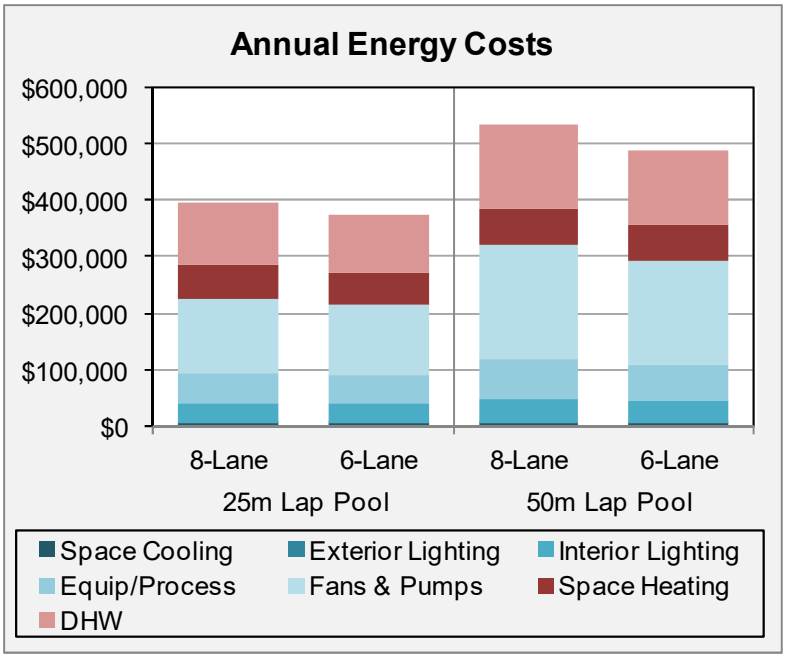
The 52m pool's utility costs were similarly higher than for the 25m pool – although not by the proportional amount, because of the differences between the cost of electricity and biomass used for heating.

25m vs. 52m lane pools

The adjacent figure shows the relative cost, distinguished by end-use and energy source. At current utility rates, the 52m pool's annual energy costs were estimated at about 35% (8 lane) and 30% (6 lane) higher than for the 25m design.

6 vs. 8 lanes

Given the smaller natatorium and lap pool water volume, the 6-lane lap pool options resulted in lower energy bills than for the 8-lane options. For the 25m lap pool design, the 6-lane option provided for (6%) lower energy costs than for the 8-lane option. The 52m design's 6-lane option provided for an estimated (10%) lower energy costs than for its 8-lane option.



5.3 Summary

While the energy use and costs for the 52m pool design ranged between 26% to 35% higher than for the 25m pool design, the 52m 8-lane and 6-lane pool options were only 16% and 13% larger in building area than for the 25m options. This may infer that the larger pool design results in disproportionately higher relative energy use, as the size of the natatorium really drives energy use.

The 8-lane lap pool natatorium building area for the 52m design is 44% larger than for the corresponding 25m pool natatorium, while the 6-lane natatorium is 39% larger for the 52m design. Associated water heating and process loads (pumps, filtration, etc.) are not quite proportional to the natatorium size since they both have the same water features, which especially influences energy use, but there still is a significant relationship between pool size and energy use. Hence, this largely explains why the 52m pool provides for the seemingly disproportionate increase in energy use in comparison to relative total floor areas.

6 Class D Estimates

Class D estimates were undertaken for each of the concept designs, including both 8 and 6 lane pool options:

Option 1a- 25m, 6 lane pool
Option 1b - 25m, 8 lane pool
Option 2a - 52m, 6 lane pool
Option 2b - 52m, 8 lane pool

Hanscomb identifies that a Class D estimate is expected to have a 20-30% degree of accuracy. In other words, bid results might vary by this amount if the construction budget were set at this milestone estimate.

In a design-build method of project delivery, it is possible to provide a maximum construction budget in the RFP documents and request that the design-builder work within this budget. However, this may require an allowance for more design flexibility by the design-build team.

Note that this estimate is for the construction of the facility, not the overall project cost. Additional costs to the project include items such as: Project Management, Bridging Consultant, Commissioning, City Expenses, Owner Third-Party Testing During Construction, Due Diligence Studies, Costs related to Referendum and Review of DB Proposals, Stipends, Building Permit and Development Fees, FF&E (loose), Project Contingency which will cover Owner Changes during Construction, and Consultant Contingency. Approximately an additional 5-7%.

6.1 Concept Design Cost Estimate

The cost estimate breakdown for the 4 pool options are located on the next page. A comparison between the total construction costs for the different pool options, including all allowances, is shown in the table below. The $ value is the cost increase in dollars between two options, and the % value is the percentage increase.

	OPTION 1a 25m, 6 lane pool **$52,394,100**	**OPTION 1b** 25m, 8 lane pool **$53,374,200**	**OPTION 2a** 52m, 6 lane pool **$61,746,500**	**OPTION 2b** 52m, 8 lane pool **$63,685,800**
OPTION 1a 25m, 6 lane pool **$52,394,100**		$980,100 (1.87% increase)	$9,352,400 (17.85% increase)	$11,291,700 (21.55% increase)
OPTION 1b 25m, 8 lane pool **$53,374,200**			$8,372,300 (15.69% increase)	$10,311,600 (19.32% increase)
OPTION 2a 52m, 6 lane pool **$61,746,500**				$1,939,300 (3.14% increase)
OPTION 2b 52m, 8 lane pool **$63,685,800**				

Figure 19. Class D Estimate comparison between pool options

6.1.1 Allowances

As shown in the cost estimate, **allowances for the project make up a large percentage (up to 38%) of the overall construction cost** (not including general requirements and contractor fees). They are intended to cover project unknowns, and in this case, the design fee for the design-build team. Allowances include the following:

- Design and pricing allowance (12%). This covers design and pricing unknowns due to the project's early stage of design (does not cover program space modifications; not to be confused with design-build fees)
- Escalation allowance (7.5%), to cover escalating costs up to a 2022 construction start date
- Construction allowance (5%), to cover post contract construction unknowns (change orders; not including owner changes)
- Proponents design allowance (12%), to cover the design fee for the design-build team
- Covid-19 allowance (8+3%)

Class D Construction Cost Estimate

	OPTION 1a 25m, 6 lane pool (4,554m2)	**OPTION 1b** 25m, 8 lane pool (4,698m2)	**OPTION 2a** 52m, 6 lane pool (5,192m2)	**OPTION 2b** 52m, 8 lane pool (5,466m2)
New Construction	$23,552,200	$24,036,700	$28,176,600	$29,135,500
Site Development (6700m2)	$1,445,400	$1,445,400	$1,445,400	$1,445,400
Subtotal	$24,997,600	$25,482,100	$29,622,000	$30,580,900
General Requirements (20%)	$4,999,500	$5,096,400	$5,924,400	$6,116,200
Contractor Fee (7%)	$2,099,800	$2,140,500	$2,488,200	$2,568,800
Subtotal	$32,096,900	$32,719,000	$38,034,600	$39,265,900
Design and Pricing Allowance (12%)	$3,851,600	$3,926,300	$4,564,200	$4,711,900
Escalation Allowance (7.5%)	$2,696,100	$2,748,400	$3,194,900	$3,298,300
Construction Allowance (5%)	$1,932,200	$1,969,700	$2,289,700	$2,363,800
Total Construction Cost	**$40,576,800**	**$41,363,400**	**$48,083,400**	**$49,639,900**
Proponents Design Allowance (12%)	$4,869,200	$4,963,600	$5,770,000	$5,956,800
Connection to district biomass	$1,654,100	$1,654,100	$1,654,100	$1,654,100
Total Construction Cost - Including Design	**$47,100,100**	**$47,981,100**	**$55,507,500**	**$57,250,800**
Covid-19 Allowance (8+3%)	$5,294,000	$5,393,100	$6,239,000	$6,435,000
Total Construction Cost Including all Allowances	**$52,394,100**	**$53,374,200**	**$61,746,500**	**$63,685,800**

See Appendix F for a full breakdown of the Class D Estimate

Figure 20. Class D Estimate breakdown by pool option

6.1.2 Waterslide Cost

The additional cost to add a waterslide is approximately $725,000 plus allowances, for a total estimated cost of $1.4M.

6.1.3 Covid-19 considerations

Covid-19 will likely have an impact on the construction industry for the next several years. The supply of construction materials has already been affected, and if current travel restrictions persist into the construction start date of 2022 for this project, this could have an impact on the pool of skilled labour and management available.

Hanscomb was asked to include a letter outlining Covid-19 concerns specific to this project. They have recommended a total allowance of 11%, which includes 8% to cover additional construction costs, and 3% to cover increases to construction management. These costs are shown in Figure 20 on the previous page.

See Appendix F for the full Covid-19 Concerns letter by Hanscomb.

6.2 Cost Increase from Pre-Design Plan

The Pre-Design Plan recommended a new Aquatic Centre with a 52m, 6 lane lap pool, and an overall building area of 3900m2. The estimated capital cost was identified at $49.8M.

The 25m, 6 lane option in the Pre-Design Plan showed an overall building area of 3,000m2. The Pre-Design Plan did not give an estimate for this option, however using the same methodology as the 52m option, the estimate would have been approximately $38.2M.

The discrepancy between this most recent Class D cost estimate, and the estimate provided in the Pre-Design plan can be attributed to four main factors:

1. Construction Cost Allowances

It is not clear whether the m2 cost in the Pre-Design plan included the allowances listed in Section 6.1.1., other than an escalation allowance of 8% which was identified. Certainly the allowance for Covid-19 was not included in that estimate, as it could not have been anticipated at that time.

2. Building Area Differences

As indicated in Section 4.2.5, the overall area in the Pre-Design plan did not account adequately for some areas such as building structure (wall thickness), mechanical/storage space, boot/coat storage, or spectator seating. In addition, two program areas were added to the project following Pre-Design (City of Yellowknife office space, and Lease space). All of these additional areas also require circulation and structural allowances.

3. Site Development

Site development costs have been refined based on known site conditions (following the site selection), and an allowance for connection to a district biomass system.

4. Phase of Design

All of the above can be attributed to level of detail (both of the design and estimated costs) of projects depending on what phase of design they are in. For example, the Pre-Design plan was done “pre” design, meaning that it was a suggestion of program areas and floor plans based on basic preliminary information, public feedback, and educated assumptions. Cost estimates at that very early stage of design are very rough, and are refined as the project moves through phases. Even at this Concept Design phase, consultation with City staff has not been done and building systems have not been finalized, therefore the building area (and cost) is still subject to change based on these factors. As the project moves forward, these details will be reviewed in more detail and therefore the building design, overall area, and project cost will be further refined.

6.3 Federal Funding

The City has received $12.9M in Federal funding for the construction of a new Aquatic Centre. This has not been factored into the cost estimates.

6.4 Building Now vs. Later

Construction costs are increasing at an exponential rate. In particular, construction costs for projects in the Northwest Territories have increased over the last 20 years at a rate of approximately 8 times the original value.

6.4.1 Escalation in Construction Costs

As an example, the construction costs of three schools built in the NWT over the course of approximately 20 years with very similar program and building areas followed this pattern:

- In 1995, St. Patrick High School in Yellowknife (5,000m2) was built for approximately $4.5M.
- In 2000, Weledeh School in Yellowknife, similar program and size, was added adjacent to St. Patrick High School and cost approximately $12M.
- In 2012, the Inuvik Schools project (East Three School), with the same program and size of the Weledeh and St. Patrick schools combined (10,000m2), was built for $100M. Inuvik is a more expensive location to build in (approximately 30% greater than Yellowknife), therefore in Yellowknife dollars this is about $70M.

This suggests that in the span of 17 years, the same building type and size increased in cost from $4.5M to approximately $35M.

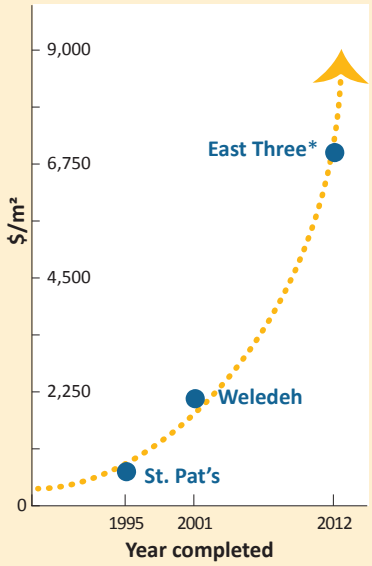
6.4.2 Re-purposing Ruth Inch Memorial Pool

This reasoning also applies when considering the value of the existing pool (RIMP) building. The RIMP building is 1,900m2. To build a similar structure in today's dollars would be $20M. However, based upon cost-of-construction increases seen in the NWT over the past 20 years, it can be expected that to build a similar sized facility in 20 years would cost the City approximately $160M. As such, it would be wise for the City to maintain the existing facility as an asset, so that it can be re-purposed to meet a future City infrastructure requirement.

The exponentially increasing cost of construction means the best time to build is now.

A full renovation could increase the building's lifespan by 20 years — but by that time, the cost of building a new aquatic centre will likely have **more than doubled.****

Historical construction costs ($/m²) for NWT school facilities



* East Three school is located in Inuvik. For accurate comparison to Yellowknife schools, the construction cost shown here has been reduced by a factor of 1.3

** in fact, costs will have increased by up to 8 times

Figure 21. Comparison of construction costs for similar projects over a 20 year span

6.5 Summary

The Class D construction cost estimates indicate that the projected construction costs have increased from the original estimate in the Pre-Design plan. Including all allowances, the 25m facility ranges from approximately **$52.4M - $53.4M** for a 6 or 8 lane pool, respectively. The 52m facility is approximately $10M more, ranging from approximately **$61.7M - $63.7M** for a 6 or 8 lane pool, respectively.

Interestingly, the premium to increase to 8 lanes (from 6) in the 25m pool is only $1M, while that same increase for the 52m pool is only $2M. These increases make up a small percentage of the overall project costs; therefore it may make sense to proceed with 8 lanes in order to accommodate the additional programming options that an 8 lane pool provides.

These estimates must be weighed against the operations and maintenance costs, programming options available for each option and the most recent consultation feedback, in order to determine which option makes the most sense for Yellowknife now, and in the future.

7 Operations & Maintenance Costs

7.1 Annual O&M and Energy Costs

Hanscomb has provided a summary of estimated annual O&M and Energy costs for each Aquatic Centre option.

	OPTION 1a 25m, 6 lane pool	**OPTION 1b** 25m, 8 lane pool	**OPTION 2a** 52m, 6 lane pool	**OPTION 2b** 52m, 8 lane pool
Operations & Maintenance Costs*	$2,281,560	$2,353,700	$2,601,190	$2,738,460
Energy Costs	$364,320	$375,840	$415,360	$437,280
Total Annual Costs	**$2,645,880**	**$2,729,540**	**$3,016,550**	**$3,175,740**

See Appendix F for a full summary of annual O&M and Energy Costs.

Figure 22. Annual O&M and Energy Cost breakdown by pool option

*Operation and Maintenance costs include the following costs: Energy (all building systems), Staff salaries, Communications, Custodial & Basic Maintenance, Security, Maintenance & Repair, Water & Sewer, Building Envelope, Built-in Equipment Repair. Staff salaries account for approx. 83% of the overall O&M costs.

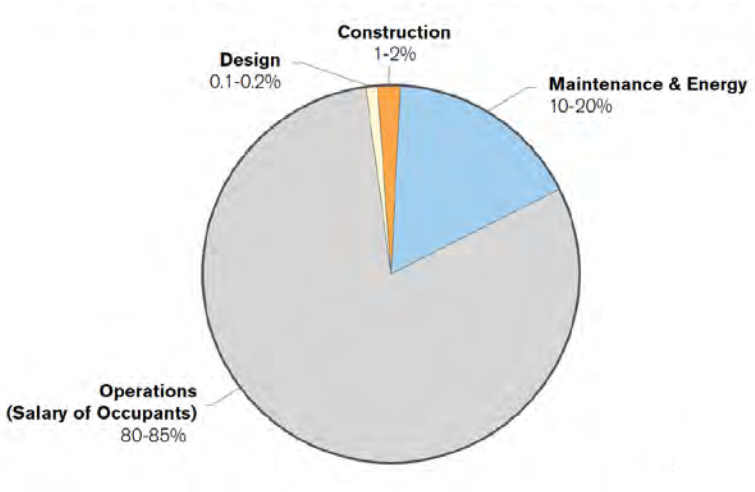


Figure 23. Breakdown of costs of a typical building over its life span (source: RAIC fee guide)

By far, the largest impact to O&M costs are operations (staffing) costs. Staffing costs are difficult to predict at this stage, as in a pool facility the number of pool users directly impacts the number of lifeguards required to be on duty. For the purposes of this estimate, staffing has been scaled from current RIMP staffing costs by approximately 1.4 for the 25m options, and 1.6 for the 52m options, based on preliminary estimates from the City of Yellowknife. This equates to about 8 and 10 lifeguards receptively which, using the current lifeguard to swimmer ratio, would limit total swimmers to 600 and 800 maximum at any given time if the pool was fully staffed.

7.1.1 Energy Costs from Hanscomb vs. EnerSys

A note that the energy cost estimates provided by Hanscomb differ from those estimates provided by EnerSys (shown in Section 5). This discrepancy is because they were arrived at by two different methods (references to historical data for similar building types vs. energy modeling of the concept designs). One method is not necessarily more accurate than another, however they do demonstrate the range in estimated costs that are typical at this early concept design stage.

7.2 Revenue Projections and Annual Operating Subsidy

Projected revenues for the new Aquatic Centre pool options have been estimated by the City of Yellowknife. A breakdown of the revenue categories and estimates for the 6 lane pool options are shown in Figure 24 below. The 8 lane pool total revenue estimates are shown in Figure 25 below.

	2022 RIMP projections	25m 6 lane pool	52m 6 lane pool
REVENUES			
Grants, recoveries, advertising	$ 11,860	(not factored in)	
Admissions and passes	$ 264,822	$ 340,400	$ 436,130
Facility rentals	$ 104,672	$ 145,000	$ 243,600
Aquatic programming	$ 280,718	$ 415,294	$ 415,294
Space rental	$ -	$ 43,200	$ 43,200
Total revenues	**$ 662,072**	**$ 943,895**	**$ 1,138,224**
% difference from RIMP	100%	143%	172%

Figure 24. Breakdown of revenue estimates

Using these figures, along with the estimated O&M costs for each pool option, an estimated 2024 tax rate increase has been provided by the City of Yellowknife, as follows:

Annual Net Operating Expense (projected)

These estimates are based on numbers provided by the City of Yellowknife. A 25% margin of error is applied to each projection, as some variables for facility operations have yet to be determined.

	2022 Projections for RIMP		Projections for 25m, 6 lane pool	Projections for 25m, 8 lane pool	Projections for 52m, 6 lane pool	Projections for 52m, 8 lane pool	
Revenue	$ 662,072		$943,894	$974,446	$1,138,224	$1,197,254	
Expenses	$ 1,940,094	+/-25%	$2,645,880	$2,729,540	$3,016,550	$3,175,740	+/-25%
Net operating expenses	$1,278,022		$1,701,986	$1,755,094	$1,878,326	$1,978,486	
Recovery (estimated)	34%		36%	36%	38%	38%	
estimated 2024 tax rate increase			1.13%	1.27%	1.60%	1.87%	

Figure 25. Annual Net Operating Expense estimate

As stated in Section 2.5 (Capacity & Demand), a more thorough business plan is recommended if revenue projections are to be guaranteed within a specified margin of error. Staff salaries will constitute the largest operating expense for the Aquatic Centre. The number of staff on deck will be the determining factor in the facility's capacity. Capacity, in turn, should be considered a significant factor when estimating annual revenue generation. These inputs are not wholly contingent on the size or design of the physical facility (which has been the focus of this involvement), but rather on staffing procedures, availability of local workers, and user demand.

7.3 Building Life Cycle Costs

Building life cycle costs were also provided by Hanscomb for each option, showing an estimate of all significant costs of ownership over a **25 year period**.

Hanscomb has defined the costs as follows:

Operation & Maintenance Costs *– These costs are the ongoing costs to operate and maintain the building during the 25-year life of the building. Items included within these costs are staffing, communications, custodial & basic maintenance, security, maintenance & repair, water & sewer, building envelope and built-in equipment repairs. These costs have been developed using historical data.*

Energy Costs *– These costs are the ongoing costs to heat, cool and provide power to the building during a 25-year period. These costs have been developed using historical data for similar types of buildings. We would be able to better quantify these costs as the design develops and the projected total energy use for the new building is quantified.*

Cyclical Renewal Costs and Salvage Value *– During the life of a building certain items need to be replaced for the building to continue to be used to it's full potential. We have included for allowances for these renewals based on the current level of design. We will be able to split these costs into more details as the design develops. The salvage value is the inherent value of the items renewed during the life of the building at the end of the study period. For example, we are assuming that the interior finishes will be renewed every 8 years, so they would be renewed during years 8, 16 and 24. Since the interior finishes were just renewed in year 24 then at the end of the study period the interior finishes are brand new have still have significant inherent value and we deduct that costs from the overall cost.*

	OPTION 1a 25m, 6 lane pool	**OPTION 1b** 25m, 8 lane pool	**OPTION 2a** 52m, 6 lane pool	**OPTION 2b** 52m, 8 lane pool
Operations & Maintenance Costs	$73,757,140	$76,089,240	$84,089,980	$88,527,560
Energy Costs	$11,777,550	$12,149,970	$13,427,550	$14,136,170
Cyclical Renewal Costs	$17,121,110	$17,662,470	$19,519,710	$21,648,760
Salvage Value	($6,332,330)	($6,532,540)	($7,219,480)	($7,976,460)
Total Life Cycle Costs (25 years)	**$96,323,470**	**$99,369,140**	**$109,817,760**	**$116,336,030**

See Appendix F for a full summary of building Life Cycle Costs.

Figure 26. Life Cycle Cost breakdown by pool option

7.4 Summary

In addition to the capital costs of construction a building, the largest costs for a facility are those required to run the facility over its life span. These include operations and maintenance costs, energy costs, and cyclical renewal costs (replacement of building components over time).

As anticipated, the preliminary estimates indicate that these costs increase as the size of the building increases.

O&M and Energy Costs for the 25m facility ranges from approximately **$2.6M - $2.7M** annually for a 6 or 8 lane pool, respectively. The 52m facility is +/- $400k more, ranging from **$3.0M - $3.2M** for a 6 or 8 lane pool, respectively.

For comparison, estimated annual operating, maintenance and energy expenses taken from the City's 2022 budget for RIMP are approximately $1.9M.

Building Life Cycle Costs for each pool option over a 25 year period range from approximately **$96.3M - $99.4M**, respectively for a 25m, 6 or 8 lane pool, and **$109.8M - $116.3M**, respectively for a 52m, 6 or 8 lane pool.

The largest impact to O&M costs are operations (staffing) costs. Staffing costs are difficult to predict at this stage, as in a pool facility the number of pool users directly impacts the number of lifeguards required to be on duty. For example, RIMP currently uses a ratio of 1 lifeguard for every 35 swimmers. At the end of the day, the operations costs estimated here may vary substantially depending on how the City is able to staff the facility. More staff means more operations costs, but also more capacity for swimmers, and more potential for revenue.

Figure 27. Regent Park Aquatic Centre, MJMA

8 Summary

8.1 Aquatic Centre Design Considerations

25m or 52m Lane Pool

The choice between a 25 and 52 metre lane pool length is usually strongly influenced by the nature of the competitive and training programs that need to be accommodated in the facility. A 52 metre pool is required where there is a desire to train and hold meets for 52 metre long course swimming events, competition water polo events and competition synchronized swimming events. These are the only competitive events that cannot be held in a 25 metre pool.

6 or 8 Lanes

The number of lanes in a lap pool will also determine the types of competitive events that can be held in the facility. A summary of what types of regulated events can be held (depending on the number of lanes) is outlined on Figure 4, and in the summary table in Section 8.6.

Often, local swim organizations will want 8 lanes to allow more swimmers to participate per heat and create more efficiency when holding larger swim meets. Given the higher cost of the 52 metre pool, and the focus on long course swim competition, 52 metre facilities with fewer than 8 lanes are uncommon, especially as new builds.

For the purposes of this report, TAG has recommended an 8 lane lap pool.

8.2 Community Consultation

The community consultation process for this phase of the project aimed to evaluate public interest in proceeding with an Aquatic Centre with a 25m lane pool or a 52m lane pool, or to not proceed with a new Aquatic Centre at all. It also intended to confirm the spaces and amenities that the community would like to see in a new Aquatic Centre.

Feedback was collected in the form of a four-question survey, which was given to participants at three in-person consultation sessions, and also made available online. 39 paper surveys were completed, and 417 digital surveys. In total, there were 456 survey respondents.

Although the consultation process intended to invite feedback equally from all residents, the survey was not a random sample survey. Therefore, an assumption can be made that current users of Ruth Inch Memorial Pool are more heavily represented in the survey results than those who do not have an interest in swimming.

8.2.1 Survey Results

Lane Pool Length

Based on the consultation session, the majority of survey respondents (58%) were in favour of a new Aquatic Centre with a 52m lane pool, while 30% were in favour of a new Aquatic Centre with a 25m lane pool.

11% were not in favour of building a new Aquatic Centre at this time. This group largely cited economic concerns related to Covid-19.

In terms of Aquatic Centre amenities, respondents were largely in favour of those recommended in the Pre-Design plan. Based on responses, one additional amenity that Council may wish to consider is the inclusion of a waterslide, which was requested by 10% of respondents.

Note that these survey results were based on the Pre-Design Plan cost estimates, not the latest Class D Cost Estimates included as part of this report.

8.3 Site

The site for the new Aquatic Centre is directly east of Ruth Inch Memorial Pool, at the old Pitch & Putt location. This decision was based on a review of three studies procured for this site, and the other site under consideration (Multiplex/Fieldhouse site). The studies included a Desktop Geotechnical Evaluation, a Phase 1 Environmental Site Assessment, and a Preliminary Traffic and Parking Study.

This site is centrally located in Yellowknife, with access to existing parking and public transit, McMahon Frame Lake Trail and Franklin Avenue. It is near a variety of existing recreational amenities, as well as a district biomass system which is intended to provide heat to this new facility.

8.4 Concept Designs

TAG and MJMA have prepared two concept designs for City Council's consideration. The concept designs are for either a **25m or 52m lane pool**, with **8 lanes**. These concepts are based on the program recommendations from the Pre-Design Report, community consultation feedback, and TAG/MJMA's own recommendations.

Estimates and O&M projections have also been completed for lane pools with **6 lanes**, as a comparison.

Option 1a is a new Aquatics Centre with a 25m, 6 lane pool
Option 1b is a new Aquatics Centre with a 25m, 8 lane pool
Option 2a is a new Aquatics Centre with a 52m, 6 lane pool
Option 2b is a new Aquatics Centre with a 52m, 8 lane pool

The recommended program for the new Aquatic Centre includes the following spaces:

Public Areas

- Vestibule
- Lobby
- Coat/Boot Room
- Public Washrooms
- Canteen
- Change Rooms
  - Two of universal design
- Multipurpose Rooms
  - Two that may be combined into one
- 2nd Floor Spectator Seating

Private Areas

- Administration
- Janitor Room

Building Services

- HVAC
- Pool systems
- Electrical

Natatorium

- Lane pool (25m or 52m)
  - 8 lanes
  - 1m and 3m spring boards
  - 2 x 1m wide movable bulkheads (in 52m option)
  - Ramp entry (25m), accessible lift (52m)
- Leisure Pool
  - Beach entry
  - Play and spray features including small slide
  - Lazy river
  - 3 lanes of 25m
- Splash Pad
- Therapy Pool
  - Ramp entry
- Steam Room
- Storage (general and youth clubs)
- Office space (youth clubs)

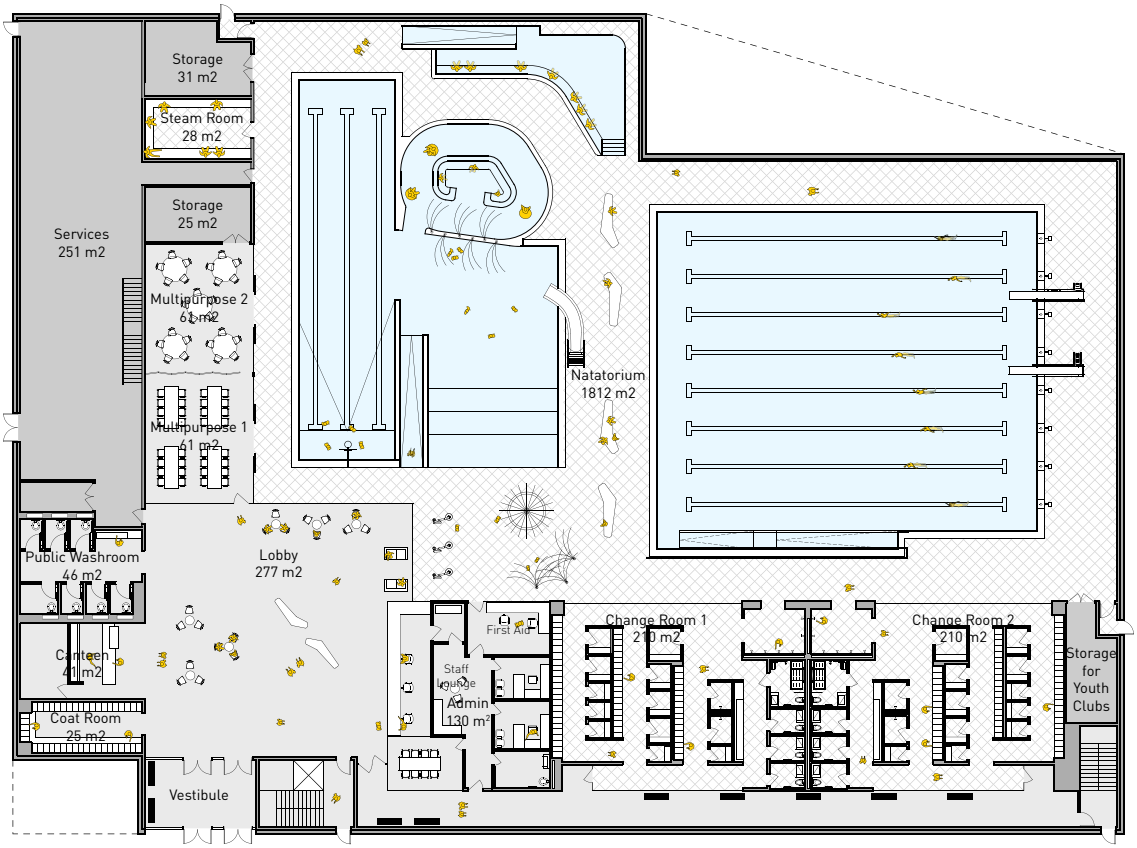
City of Yellowknife Office Space Community Services Dept.

- 5 offices

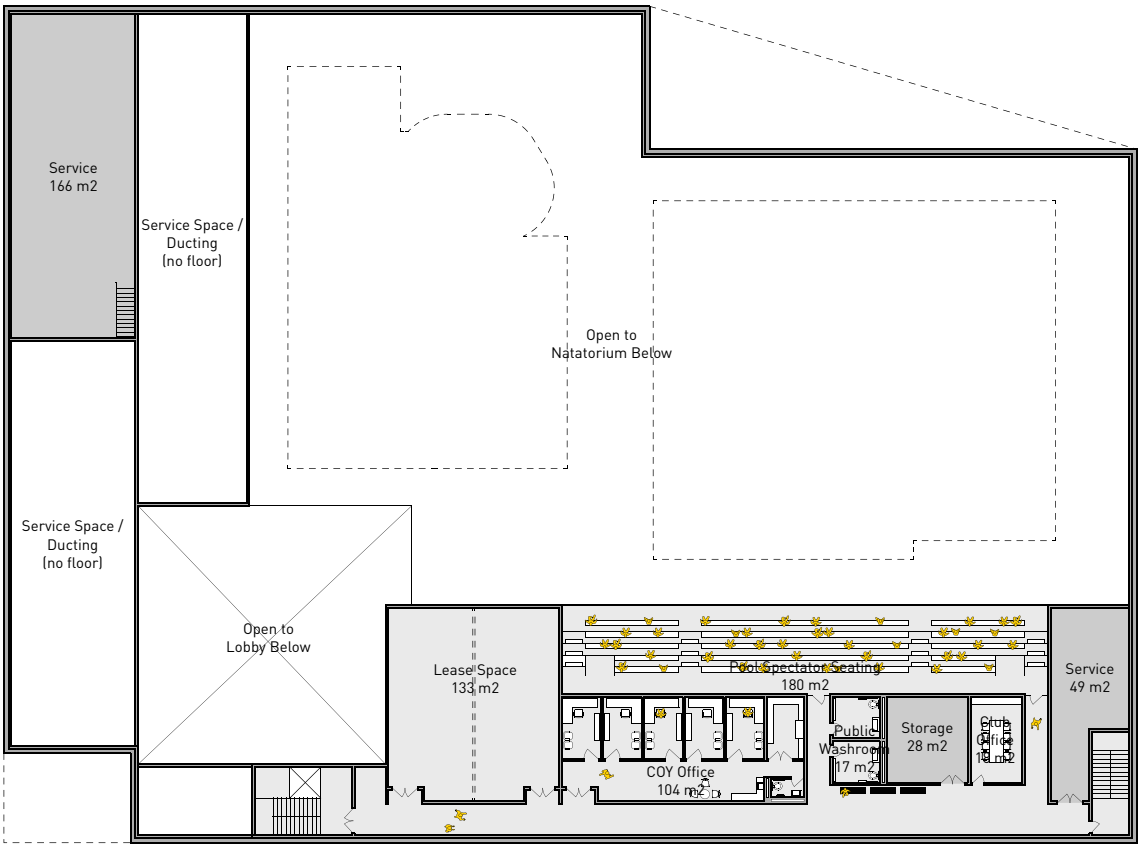
Lease (revenue) Space

- Ability to subdivide into two spaces if necessary

25m Lane Pool (Option 1b)



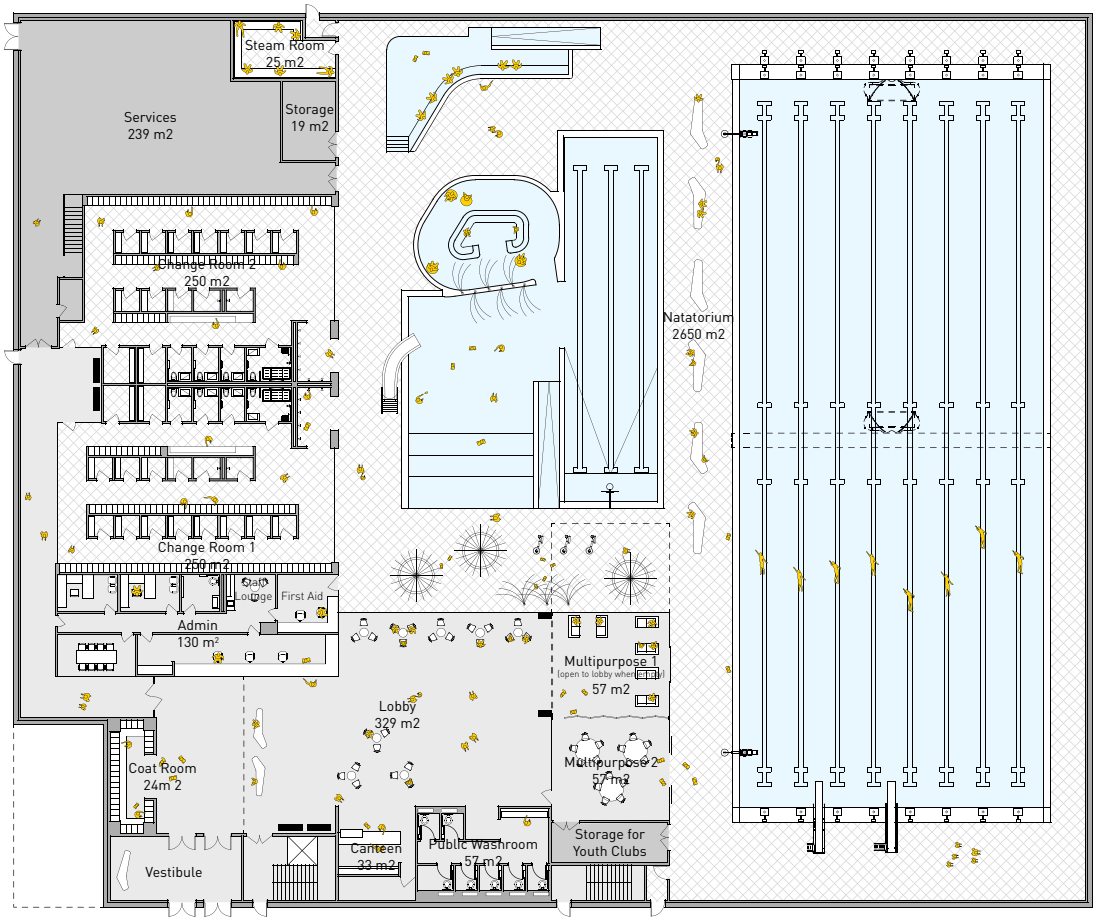
Main Floor Plan
(3,615m2)



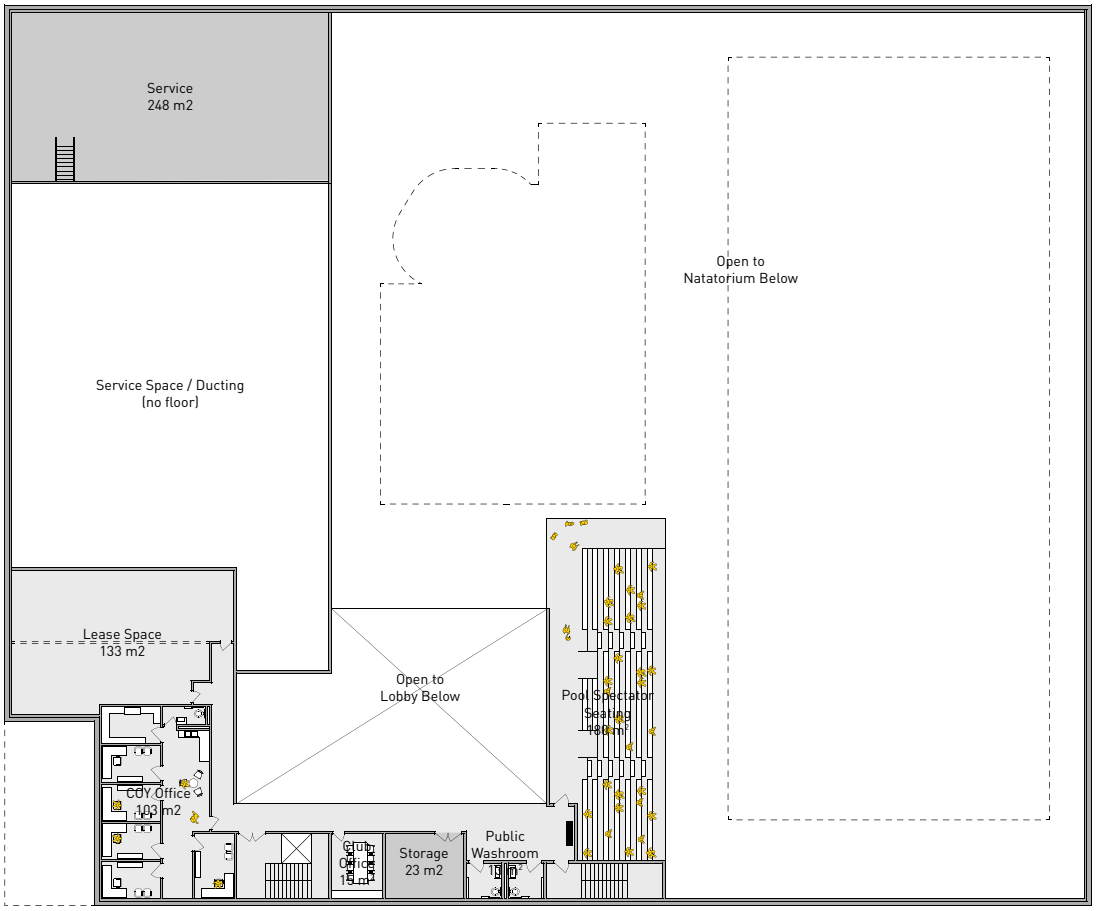
Second Floor Plan
(1,083m2)

Figure 28. New Aquatics Centre Concept Design - 25m lane pool (with 8 lanes) Building Plan

52m Lane Pool (Option 2b)

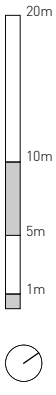


Main Floor Plan
(4,470m2)



Second Floor Plan
(996m2)

Figure 29. New Aquatics Centre Concept Design - 52m lane pool (with 8 lanes) Building Plan



8.5 Design Approach - Key Concepts

Key design concepts have been identified in response to the site, feedback from the community, and good design practices. These include:

- Community focused environment
- Lobby as the “heart” of the building (centrally located, social space, views to the natatorium)
- Creation of an exciting interior public space
- Inclusive design
- Reflection of local indigenous culture
- Ability to host competitive events
- Incorporation of natural light
- Preserve and work with the natural landscape where possible
- Connection to the adjacent McNiven Park and McMahon Frame Lake Trail
- Building servicing separate from public entrance

Building concept designs for both the 25m and 52m options offer a simple, economical building form, with a roofline that responds to the activities inside the building (high volume for two-storey spaces, diving boards, lower volume elsewhere). They provide opportunities to bring in high natural light to the pool spaces and provide views to the landscape from the pool deck. The designs integrate the unique rock outcrops present on the site, utilizing them to frame the public entrance and become part of the facade of the building

These design concepts establish an essential set of criteria that the eventual design-builder must adhere to. This is key to ensuring this facility meets not only the functional aspects of pool design, but also a broader vision for the new Aquatic Centre as an iconic, thoughtfully designed, civic minded community space in Yellowknife.

8.6 Pros/Cons of each option

The following table identifies some of the main pros and cons for each of the pool options.

	OPTION 1a 25m, 6 lane pool	**OPTION 1b** 25m, 8 lane pool	**OPTION 2a** 52m, 6 lane pool	**OPTION 2b** 52m, 8 lane pool
PROS	• Lowest construction, O&M costs and energy usage • Ability to host regulated local and regional competitions • Meets current pool demand plus growth • Staffing this size of pool to reach its maximum occupant capacity is more reasonable to achieve than in a larger pool	• Ability to host regulated local and regional competitions • Allows for greater number of swimmers to train and compete per heat • Allows for water polo training & competitions (women's) • More attractive for sport tourism and lane swim capacity than its 6-lane counterpart • Meets current pool demand plus growth • Staffing this size of pool to reach its maximum occupant capacity is more reasonable to achieve than in a larger pool	• Ability to host regulated local and regional competitions • Greater ability to accommodate multiple activities in the lane pool at one time • Allows for synchronized swimming competitions, and water polo training • Most recent public consultation indicated a preference for a 52m lane pool	• Ability to host regulated local and regional competitions • Allows for greater number of swimmers to train and compete per heat • Allows for synchronized swimming and water polo competitions • More attractive for sport tourism than its 6-lane counterpart • Most recent public consultation indicated a preference for a 52m lane pool
CONS	• Inability to host regulated provincial or national competitions • Inability to train for long course (50m) races • Fewer lanes means less capacity for lane swimmers and less efficiency in holding larger swim meets	• Inability to host regulated provincial or national competitions • Inability to train for long course (50m) races	• Inability to host regulated provincial or national competitions • Inability to host synchronized swimming or water polo competitions • Capacity of pool may be in excess of actual demand (pool may be under utilized) • Staffing this size of pool to reach its maximum occupant capacity will likely be difficult to achieve based on trained lifeguard shortages in Yellowknife and across Canada.	• Highest construction, O&M costs and energy usage • geared mainly towards competitive swimmers, however still unable to host regulated provincial or national events without additional warm up lanes, spectator seating, and deck space • Capacity of pool may be in excess of actual demand (pool may be under utilized) • Staffing this size of pool to reach its maximum occupant capacity will likely be difficult to achieve based on trained lifeguard shortages in Yellowknife and across Canada.

Figure 30. Pros & Cons of each pool option

8.7 O&M and Cost Estimates

Costs for a building over its life span include Capital Costs (initial investment to construct the building), as well as Operations, Energy and Management costs. The largest costs for a facility are those required to run the facility over its life span.

The following table summarizes the energy use and O&M costs, Class D Estimates (capital costs), and Life Cycle Costs (over a 25 year period) for each of the pool options.

The City currently has access to $12.9M in Federal funding for the construction of a new Aquatic Centre, which has not been factored into these estimates.

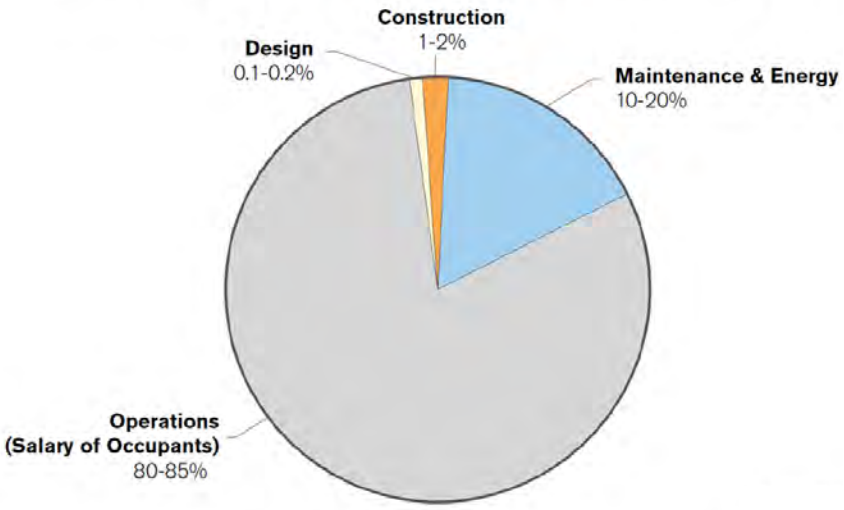


Figure 31. Breakdown of costs of a typical building over its life span (source: RAIC fee guide)

	OPTION 1a 25m, 6 lane pool	**OPTION 1b** 25m, 8 lane pool	**OPTION 2a** 52m, 6 lane pool	**OPTION 2b** 52m, 8 lane pool
ENERGY USE AND O&M COSTS				
Annual Energy Use (Enersys)	12,500 GJ/year	13,200 GJ/year	15,700 GJ/year	17,300 GJ/year
Annual Energy Costs (Enersys estimate / Hanscomb estimate)	$373,400 / $364,320	$394,500 / $375,840	$486,500 / $415,360	$541,100 / $437,280
O&M Annual Projections (Hanscomb)	$2,281,560	$2,353,700	$2,601,190	$2,738,460
CLASS D ESTIMATE				
Total Construction Cost	$40,576,800	$41,363,400	$48,083,400	$49,639,900
Total Construction Cost incl. D-B Design Fees & District Biomass Hook Up	$47,100,100	$47,981,100	$55,507,500	$57,250,800
Covid-19 Allowance	$5,294,000	$5,393,100	$6,239,000	$6,435,000
Total Construction Cost Including All Allowances	**$52,394,100**	**$53,374,200**	**$61,746,500**	**$63,685,800**
LIFE CYCLE COSTS				
25 year life cycle costs (not including capital cost)	$96,323,470	$99,369,140	$109,817,760	$116,336,030

Figure 32. Energy Use, O&M Costs, Class D Estimates and Life Cycle Cost breakdown by pool option

8.8 Capacity and Revenue

Using the estimated O&M costs and revenue projections, an estimated 2024 tax rate increase has been provided by the City of Yellowknife for each pool option, as follows:

Annual Net Operating Expense (projected)

These estimates are based on numbers provided by the City of Yellowknife. A 25% margin of error is applied to each projection, as some variables for facility operations have yet to be determined.

	2022 Projections for RIMP		Projections for 25m, 6 lane pool	Projections for 25m, 8 lane pool	Projections for 52m, 6 lane pool	Projections for 52m, 8 lane pool	
Revenue	$ 662,072		$943,894	$974,446	$1,138,224	$1,197,254	
Expenses	$ 1,940,094	+/-25%	$2,645,880	$2,729,540	$3,016,550	$3,175,740	+/-25%
Net operating expenses	$1,278,022		$1,701,986	$1,755,094	$1,878,326	$1,978,486	
Recovery (estimated)	34%		36%	36%	38%	38%	
estimated 2024 tax rate increase			1.13%	1.27%	1.60%	1.87%	

Figure 33. Annual Net Operating Expense estimate

A more thorough business plan is recommended if revenue projections are to be guaranteed within a specified margin of error. Staff salaries will constitute the largest operating expense for the Aquatic Centre. The number of staff on deck will be the determining factor in the facility's capacity. Capacity, in turn, should be considered a significant factor when estimating annual revenue generation. These inputs are not wholly contingent on the size or design of the physical facility (which has been the focus of this involvement), but rather on staffing procedures, availability of local workers, and user demand.

8.9 Next Steps

Following the presentation of this report, Council is tasked with making the following decisions in relation to a new Aquatic Centre in Yellowknife:

1. 25m or 52m lane pool
2. Accept or Reject TAG/MJMA recommendation for 8 lanes instead of 6 lanes
3. Addition of waterslide to program

If Council votes to proceed with an Aquatic Centre with either a 25m or 52m lane pool, the next phase will entail producing Bridging Documents for incorporation into a design-build RFP for construction of the new facility.

Once a design-builder is selected and the cost of the project more definitively known, a public referendum will be held in the Fall of 2021, asking if residents are in favour of borrowing the funds required to build the new Aquatic Centre.

If the referendum is passed, a contract will be signed with the design-build team and the project will proceed into construction documents, with a projected construction start date of Spring 2022, and projected completion date of November 2023.

Appendix

A Concept Design Drawings

B Site Selection Matrix/Recommendation

C 2020 Public Consultation Information Panels

D 2020 Public Consultation Survey Results

E Energy Model Report

F Class D Estimate including Life Cycle and O&M costs, and Covid-19 considerations

G Facility Rules & Guidelines of Swimming Canada

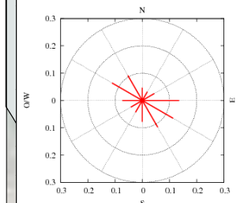
CITY OF
YELLOWKNIFE

YELLOWKNIFE Aquatic Centre

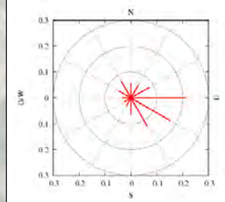
Concept Design Report
November 2020

Appendix A:
Concept Drawings

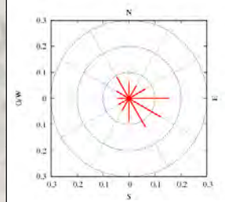
Prevailing Wind Rose Diagram
Winter (DJF)



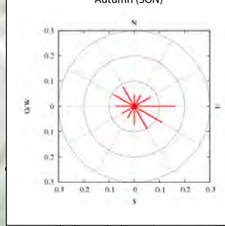
Prevailing Wind Rose Diagram
Spring (MAM)



Prevailing Wind Rose Diagram
Summer (JJA)



Prevailing Wind Rose Diagram
Autumn (SON)



Proposed Building Location
prevailing wind
solar path
vehicular traffic
pedestrian movement
parking

McNiven Beach Park
Playground
Tennis Club House
Existing
Rock Outcrop
Tennis Courts
YK Aquatic
Centre
Frame Lake
SUMMER
SPRING
AUTUMN
WINTER
Path of sun - all season solstice
Existing
Ruth Inch
Memorial Pool
Existing
Rock Outcrop
Existing
Recycling Bins
Franklin Ave
CBC North
Existing
Service Access
Existing
Service Access
Existing
Parking
Forrest Drive
Seventh-day
Adventist Church
ESSO
After 8
Pub
Yellowknife
Community Arena
Yellowknife
Curling Centre
Residence
Anson Dr
Catalina Dr
Catalina Dr

TAYLOR ARCHITECTURE GROUP

MJMA

SITE STUDY

Yellowknife Aquatic Center
Concept Design

true north

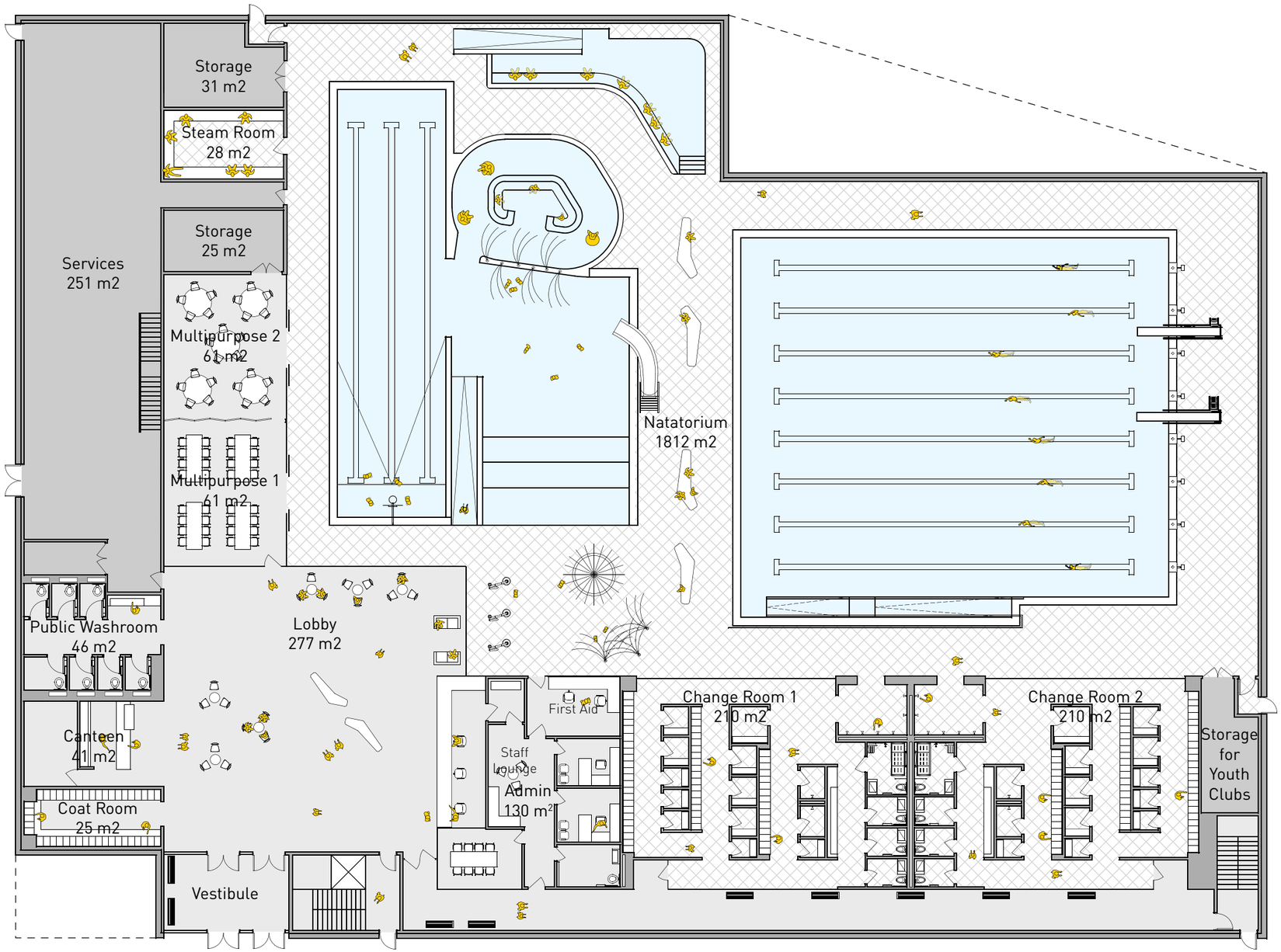
TAYLOR ARCHITECTURE GROUP

MJMA

Option 1 - 25m Lane pool - Site plan

Yellowknife Aquatic Center
Concept Design

true north



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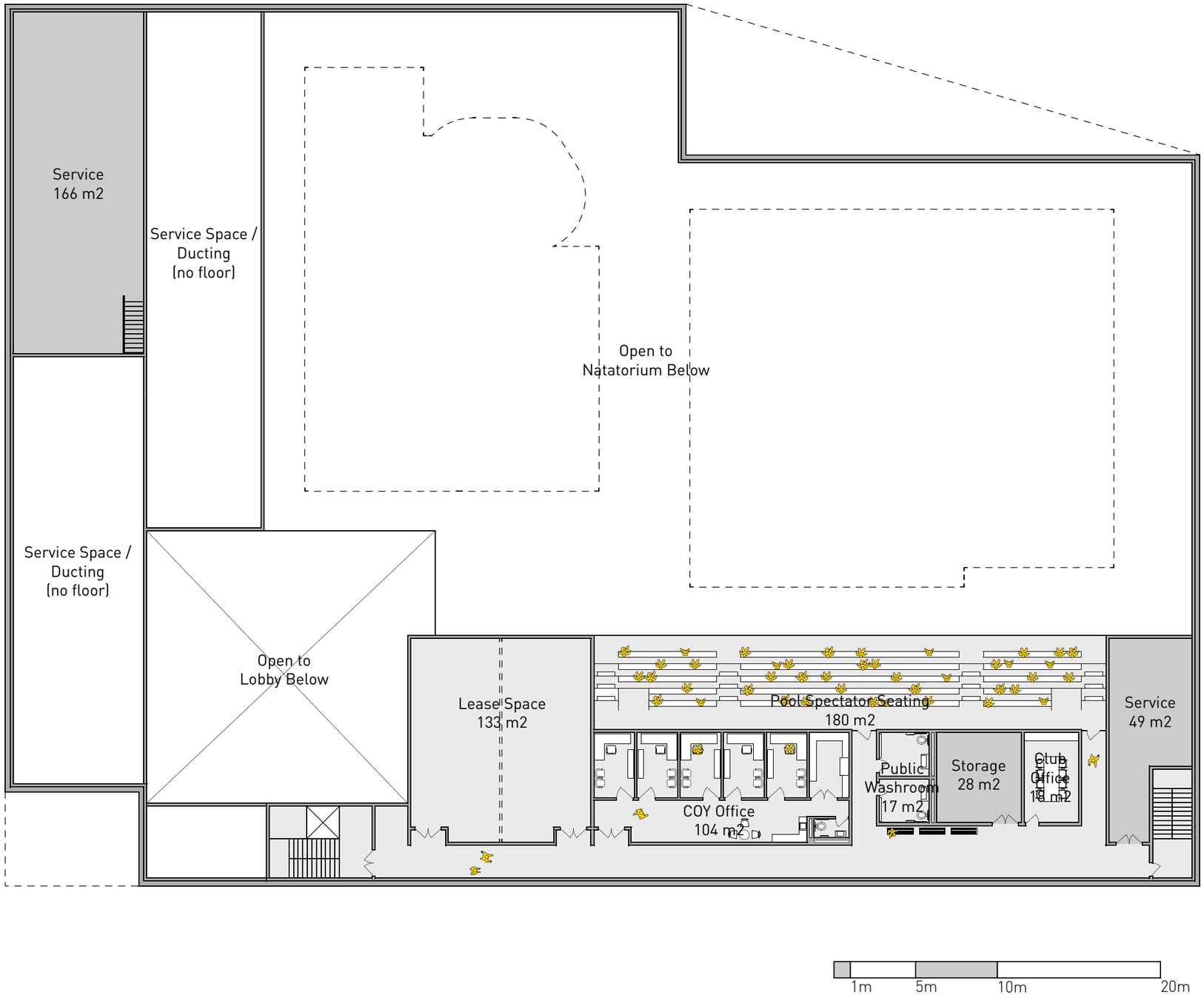
MJMA

Option 1 - 25m Lane pool - Main floor plan

Yellowknife Aquatic Center
Concept Design

true north



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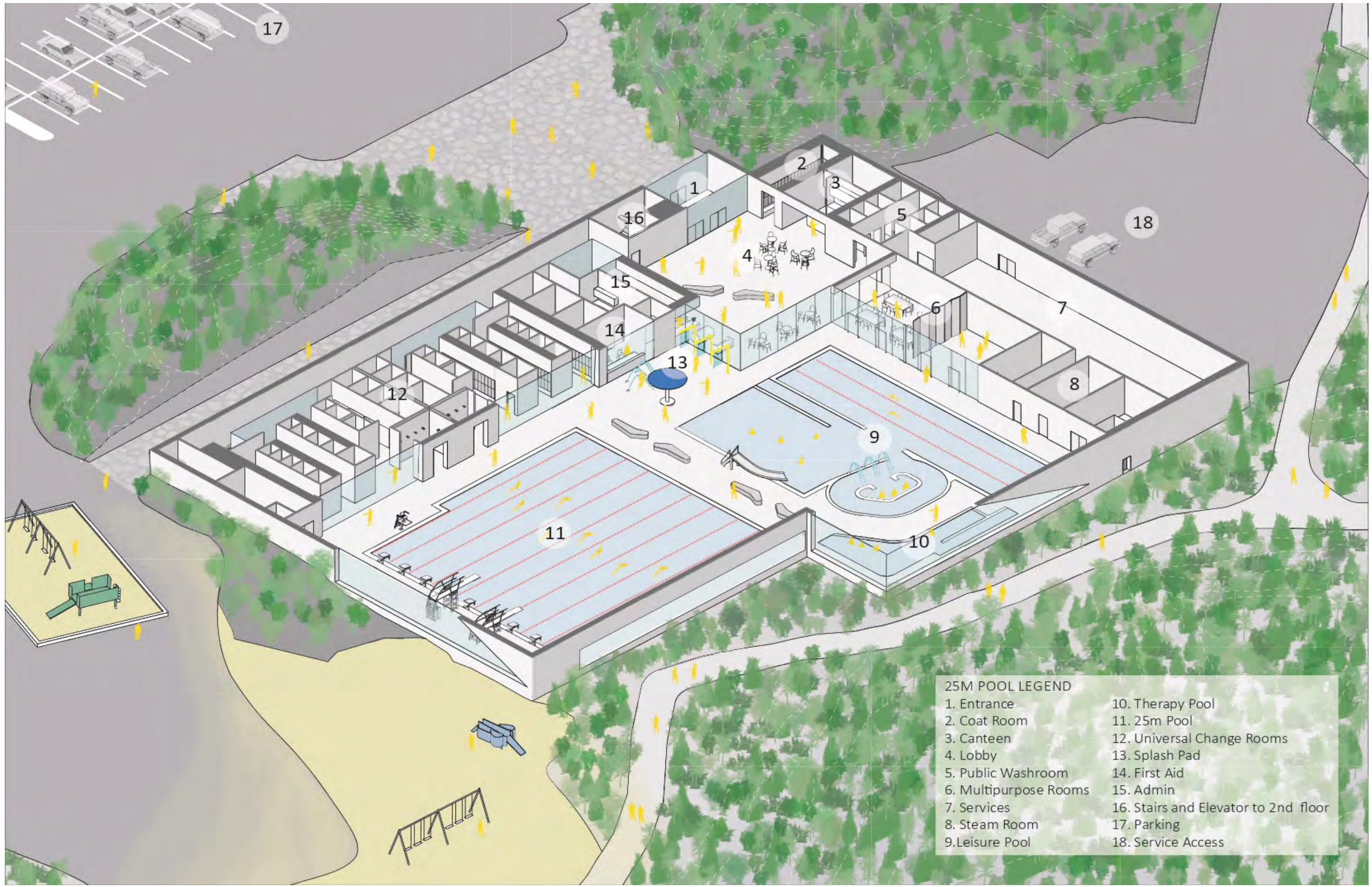
MJMA

Option1- 25m Lane pool - Second floor plan

Yellowknife Aquatic Center
Concept Design

true north



TAG
TAYLOR ARCHITECTURE GROUP

MJMA

Option 1 - 25m Lane Pool - Axonometric View

Yellowknife Aquatic Center
Concept Design

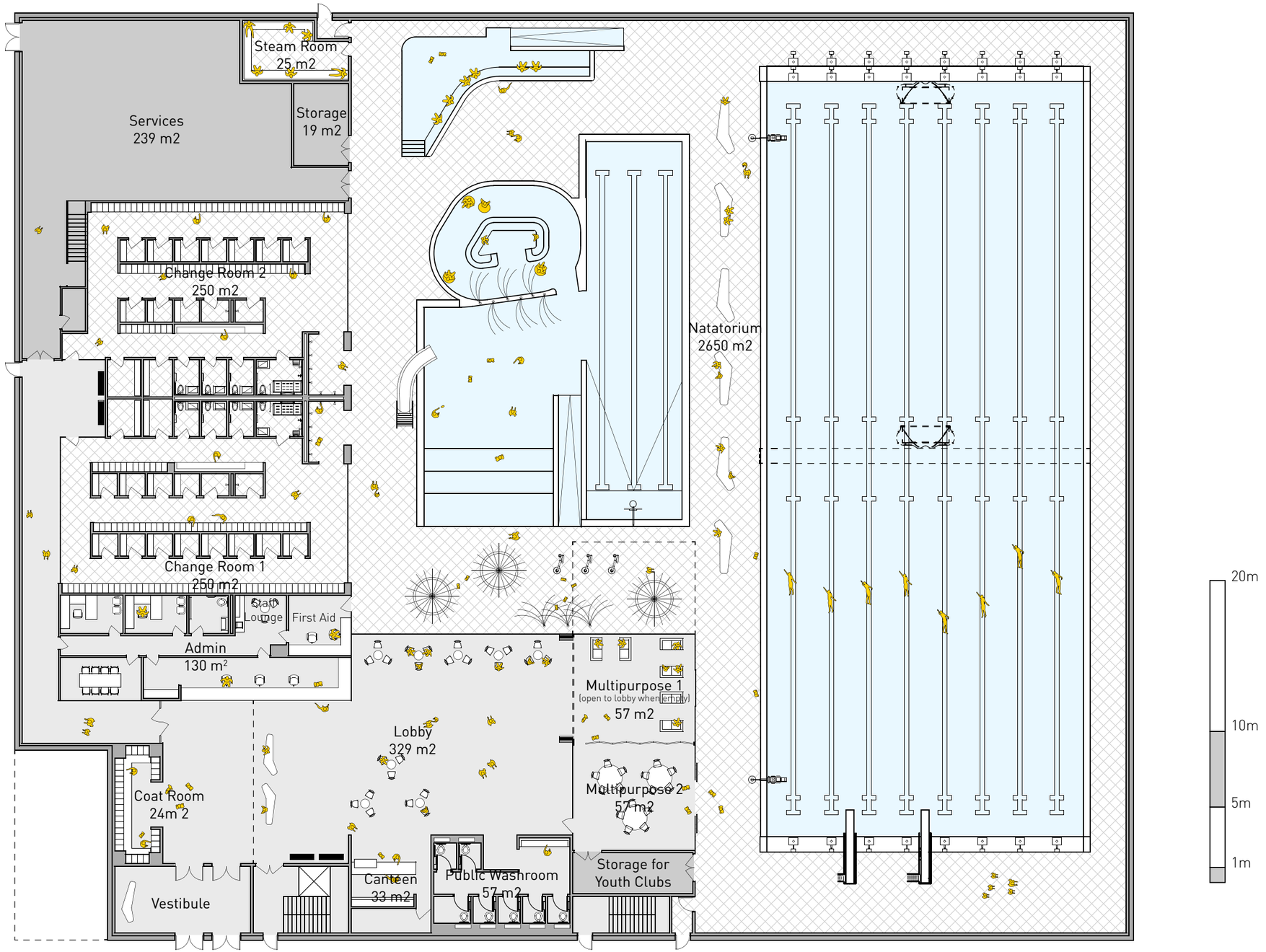
TAYLOR ARCHITECTURE GROUP

MJMA

Option 2- 52m Lane pool - Site Plan

Yellowknife Aquatic Center
Concept Design

true north



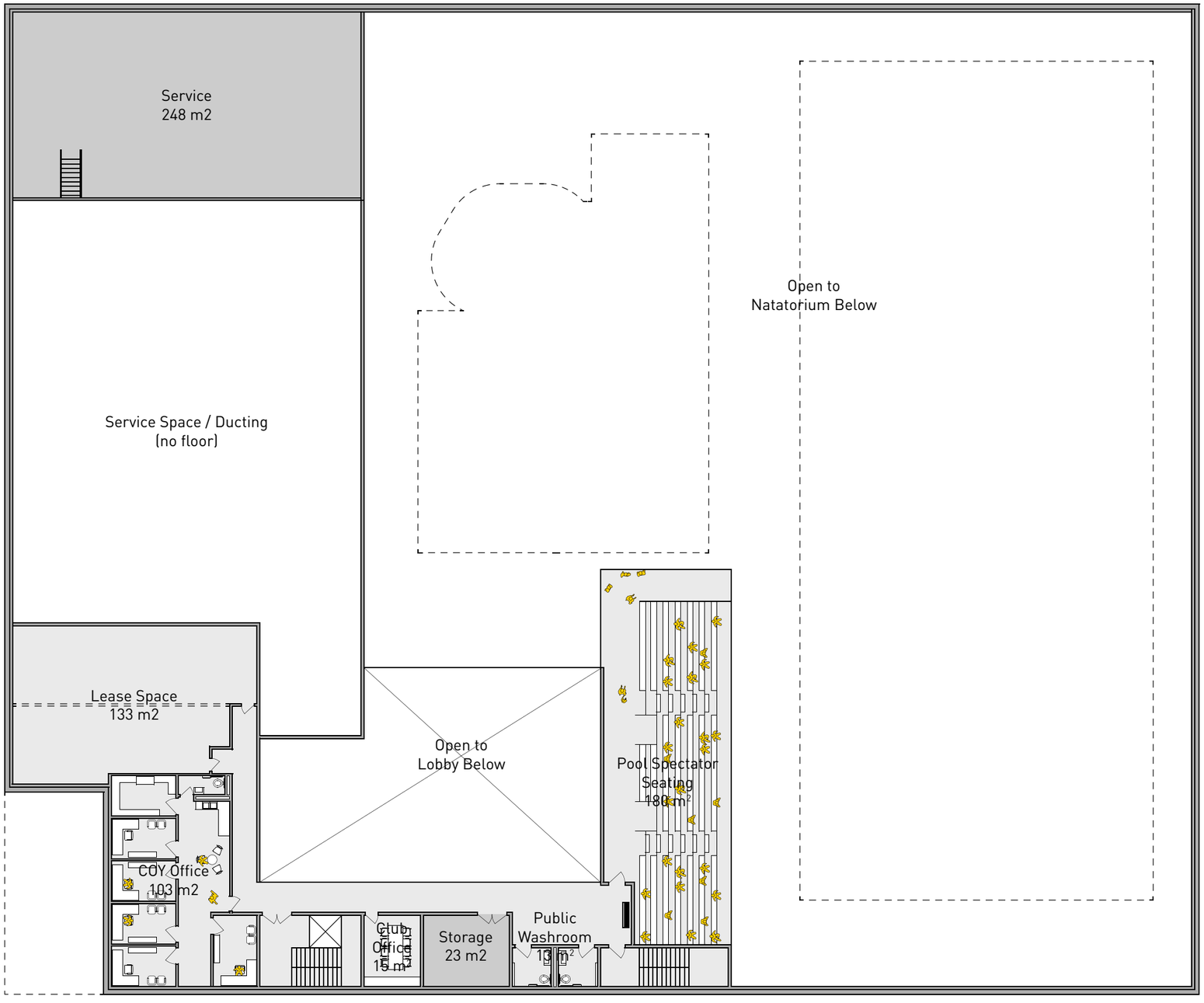
TAYLOR ARCHITECTURE GROUP

MJMA

Option 2 - 52m Lane pool - Main floor plan

Yellowknife Aquatic Center
Concept Design

true north



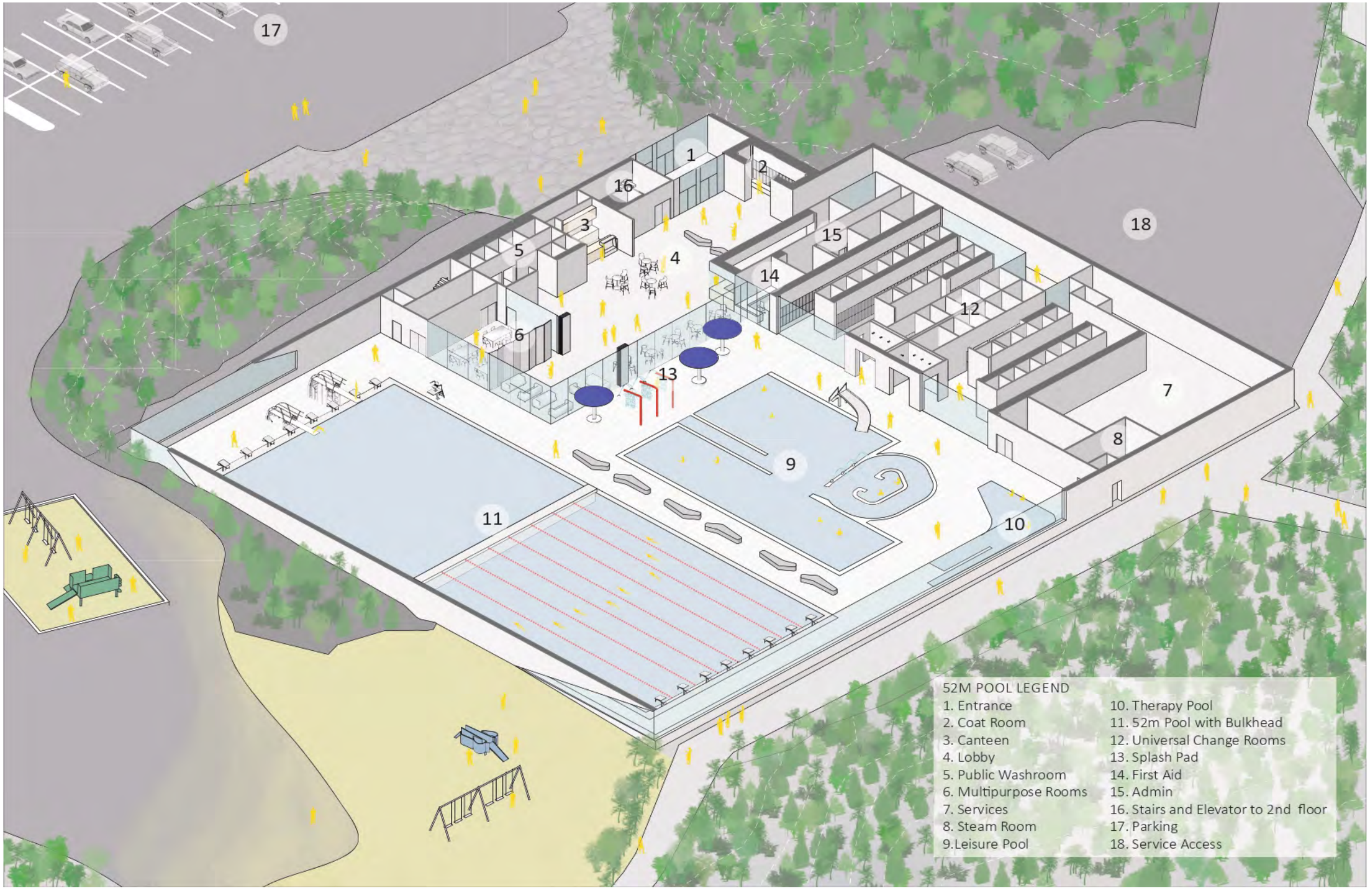
TAYLOR ARCHITECTURE GROUP

MJMA

Option 2 - 52m Lane pool - Second floor plan

Yellowknife Aquatic Center
Concept Design

true north

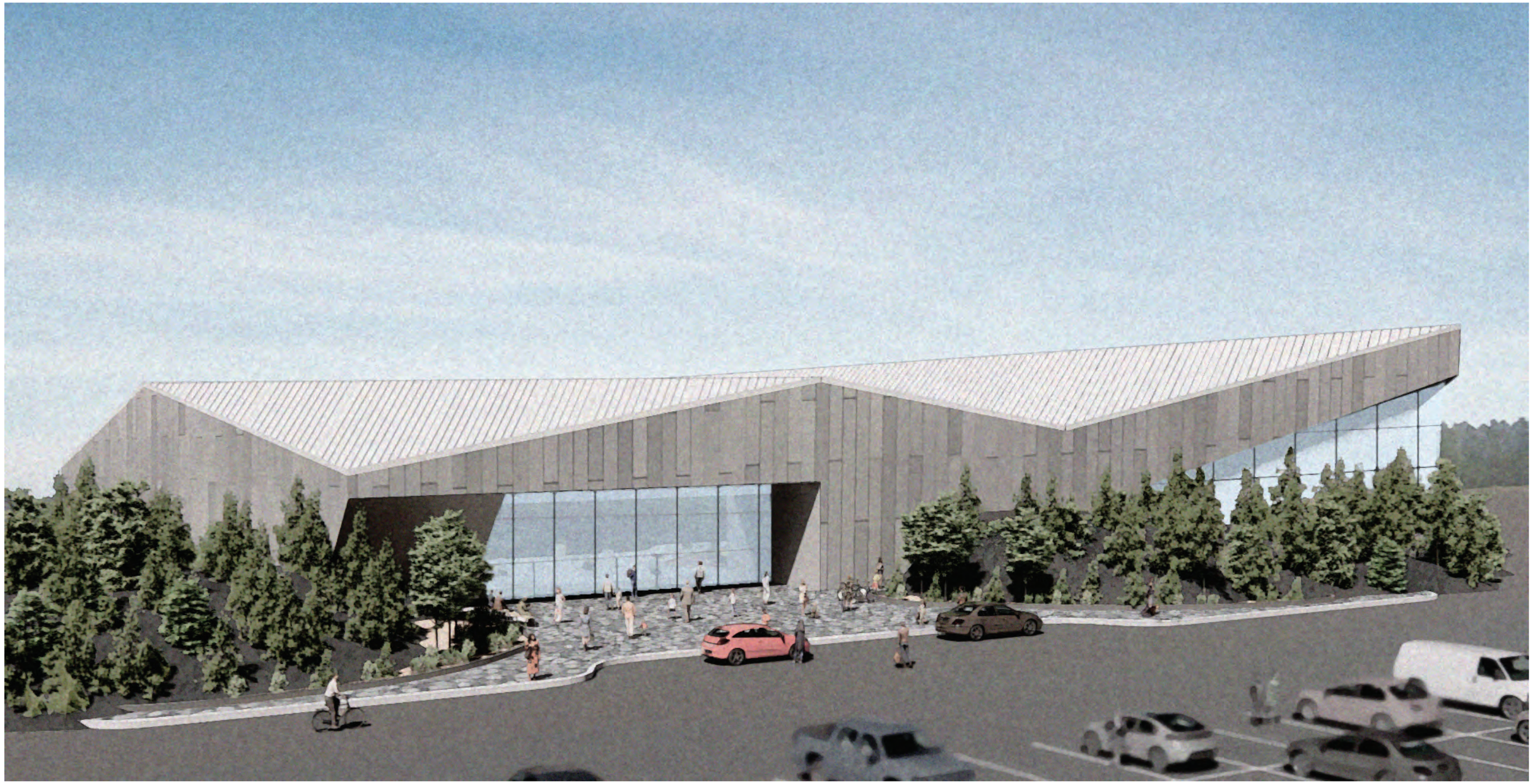


TAYLOR ARCHITECTURE GROUP

MJMA

Option 2 - 52m Lane Pool - Axonometric View

Yellowknife Aquatic Center
Concept Design



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MJMA

EXTERIOR PERSPECTIVE CONCEPT

Yellowknife Aquatic Center
Concept Design

TAYLOR ARCHITECTURE GROUP

MJMA

Interior Perspective Concept

Yellowknife Aquatic Center
Concept Design

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YELLOWKNIFE
Aquatic Centre

Concept Design Report
November 2020

Appendix B:

Site Selection Recommendation

TAYLOR ARCHITECTURE GROUP

3502 RACCINE RD. ■ YELLOWKNIFE, NT ■ X1A 3J2 ■ 867 920-2728 ■ EMAIL: TAG@TAGYK.COM ■ WWW.TAGYK.COM

To:	City of Yellowknife	Project:	Yellowknife Aquatics Centre
Attn:	Grant White	Project no.	19-022
Cc:	Scott McFadyen, Colliers Project Leaders	Location:	Yellowknife, NT
From:	Melani Korver	Date:	July 2, 2020

Re: Recommendation for Site Selection

Recommendation

The Aquatics Centre Predesign Plan recommended two sites for consideration for the new Aquatics Centre in Yellowknife:

- Site 1: east of existing Ruth Inch Memorial Pool (old Pitch and Putt site)
- Site 2: south of the Fieldhouse & Multiplex

Based on the site comparison undertaken by Taylor Architecture group and described below, TAG strongly recommends that the **existing RIMP site is selected for the new Aquatics Centre in Yellowknife**. This site encompasses lower financial risk to the City in terms of foundation costs, and greater opportunities in terms of complimentary amenities and accessibility to the public.

Site Selection Process

In order to compare the technical feasibility of each site, the City of Yellowknife retained three study reports for each site:

- Desktop Geotechnical Evaluation (prepared by Tetra Tech, submitted May 20, 2020)
- Phase 1 Environmental Site Assessment (prepared by Tetra Tech, submitted May 2, 2020)
- Preliminary Traffic and Parking Study (prepared by Creative Transportation Solutions, submitted June 29, 2020)

Taylor Architecture Group used the information contained in these three reports to develop a list of criteria that were scored and weighted in a site selection matrix, comparing the two sites. Additional criteria that TAG felt differentiated the two sites were also captured in the matrix. The comparison shows that the Ruth Inch Memorial Pool site scored higher in every category (Geotechnical Report, Environmental Report, Traffic Report and Additional Criteria), resulting in the following total weighted scores:

Multiplex/Fieldhouse Site Score	75
RIMP Site Score	103

Please see the attached site selection matrix for detailed information regarding the evaluation.

Sincerely,

Melani Korver
melani@tagyk.com
TAYLOR ARCHITECTURE GROUP

Yellowknife Aquatics Centre - Site Selection Matrix

Score:
1 = poor
2 = fair
3 = good

Total = weight x score

Criteria	Criteria Description: Multiplex/Fieldhouse Site	Criteria Description: RIMP Site (pitch & putt)	Scoring Reasoning	Criteria Weight	Multiplex/Fieldhouse Score	Multiplex/Fieldhouse Total	RIMP Site Score	RIMP Site Total
Geotechnical Report								
Surface conditions	Mix of bedrock outcrop in NW corner, to organic material and vegetation. Drainage ditch runs through the east end of the site.	Site largely covered by exposed bedrock: Two large rock outcrops and some sand in north part of site	Consistent surface conditions across site is preferable; exposed bedrock is preferable	2	2	**4**	3	**6**
Bedrock profile	Bedrock ranges from outcropping at NW corner of site (max 8m above parking lot elevation), to at least 9m deep (based on borehole samples). Suggested that bedrock may dip steeply under a portion	Two rock outcrops (max. 3m above parking lot elevation), and ranging from 0.3m-2.7m below grade elsewhere on site (based on borehole samples)	Bedrock close to the surface is preferable; low exposed bedrock is preferable (less blasting required)	2	2	**4**	3	**6**
Bearing capacity of soil	Low	N/A (no soil; bedrock has highest bearing capacity)	Soil with high bearing capacity, or exposed bedrock is preferable	2	1	**2**	3	**6**
Groundwater present	Yes - in drainage ditch at east end of site - acts as path for groundwater flow through culverts under Kam Lake Road and through the site towards the southeast. Drainage ditch will require relocation.	Yes - at lowest point between rock outcrops (this likely acts as a drainage path for groundwater flow towards frame lake). Note manhole located at west end of site - may require relocation.	Minimal groundwater is preferable	3	1	**3**	3	**9**
Anticipated Permafrost	none	none	No permafrost is preferable	3	3	**9**	3	**9**
Foundation Options	Rock socketed steel piles or strip and spread concrete footings, depending on depth to bedrock	Shallow foundation: Strip and spread concrete footings to bedrock May also use rock socketed steel piles or a mix of the two types	Shallow foundation is preferable (most cost effective)	3	2	**6**	3	**9**
Additional testing required	Recommend additional boreholes drilled at centre and east portions of site	Recommend additional boreholes drilled along trail running through the two outcrops	No additional testing is preferable	1	2	**2**	2	**2**
Subtotal						**30**		**47**
Environmental Report								
Historical spills	historical petroleum hydrocarbon spill at Fieldhouse parking lot, directly east of site	historical petroleum spill at Esso gas station, 90m SE of site	No historical spills, or spills located offsite are preferable	2	2	**4**	3	**6**
Additional testing required	Recommend additional testing	Recommend additional testing	No additional testing is preferable	1	2	**2**	2	**2**
Subtotal						**6**		**8**
Traffic Report								
Traffic adjustments	None	Westbound approach on Forrest Drive would be near capacity with site traffic added - resolve with westbound left	No traffic adjustments are preferable	2	3	**6**	2	**4**
Parking capacity	Parking defecit: -4 stalls during weekdays; -78 stalls during Satudays	Parking surplus: +37 stalls during weekdays; +13 stalls during Saturday	Adequate or surplus parking is preferable	3	2	**6**	3	**9**
Pedestrian connectivity	Limited sidewalk access at Kam Lake Rd/Old Airport Rd intersection, and only partial sidewalk along Kam Lake Rd. Site is currently geared towards arrival by vehicle.	Site is directly adjacent to Frame Lake Trail system, and Franklin Avenue (full sidewalk)	High degree of pedestrian connectivity is preferable	2	2	**4**	3	**6**
Cycling connectivity	Cycling route on Kam Lake south of Woolgar	Cycling route on Franklin south of Forrest and Forrest east of Franklin	High degree of cycling connectivity is preferable	2	2	**4**	3	**6**
Transit connectivity	Near westbound stop for Route B and Route B express	Near northbound and southbound stops for Route A and Route B (2 routes)	Served by multiple routes is preferable	2	2	**4**	3	**6**
Subtotal						**24**		**31**
Additional Criteria								
Proximity to other recreational and cultural amenities	Multiplex, Fieldhouse, Arctic Indigenous Wellness Camp	YK Community Arena, YK Curling Centre, RIMP building, tennis courts, volleyball courts, McNiven park & playground, Frame Lake Trail	Close proximity to other facilities is preferable	2	2	**4**	3	**6**
Impact on existing site activities	None	Pitch and putt removed (not currently used), relocation of recycling containers, relocation of trail running through the site.	Minimal impact on existing site activities is preferable	1	3	**3**	2	**2**
Additional Site Work	Parking lot between Fieldhouse and Site is unpaved. Consider paving.	Parking lot requires levelling and resurfacing	Minimal additional site work is preferable	2	2	**4**	2	**4**
Views from the site/new building	Potential views to Kam Lake Road, concrete plant, residential neighbourhood and Multiplex/Fieldhouse. Potential views to forested area to the east.	Potential views to Frame Lake and trail system, RIMP building, Franklin Ave	Views to natural settings are preferable	1	2	**2**	3	**3**
Site Context & Architectural Potential	Multiplex & Fieldhouse are boxy, industrial buildings that do not necessarily respond to site; site is geared towards arrival by vehicle.	RIMP, Curling Centre and Arena are lower scale buildings. Proximity to frame lake trail requires a more "human scale" building design	Architectural potential is somewhat subjective. RIMP site has more context (architectural and landscape) that it must respond to, whereas Fieldhouse site is more of a "blank slate" site	1	2	**2**	2	**2**
Subtotal						**15**		**17**

	Multiplex/Fieldhouse	RIMP Site
Total Weighted Score	**75**	**103**

(highest score wins)

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