MASTER PLAN STUDY - MAY 2020

WILD WATERWORKS AT CONFEDERATION BEACH PARK

HAMILTON, ONTARIO

**CITY OF HAMILTON PUBLIC WORKS DEPARTMENT,
HEALTHY & SAFE COMMUNITIES**

BY: FORREC LTD. | CBRE | CLOWARD H2O

Hamilton

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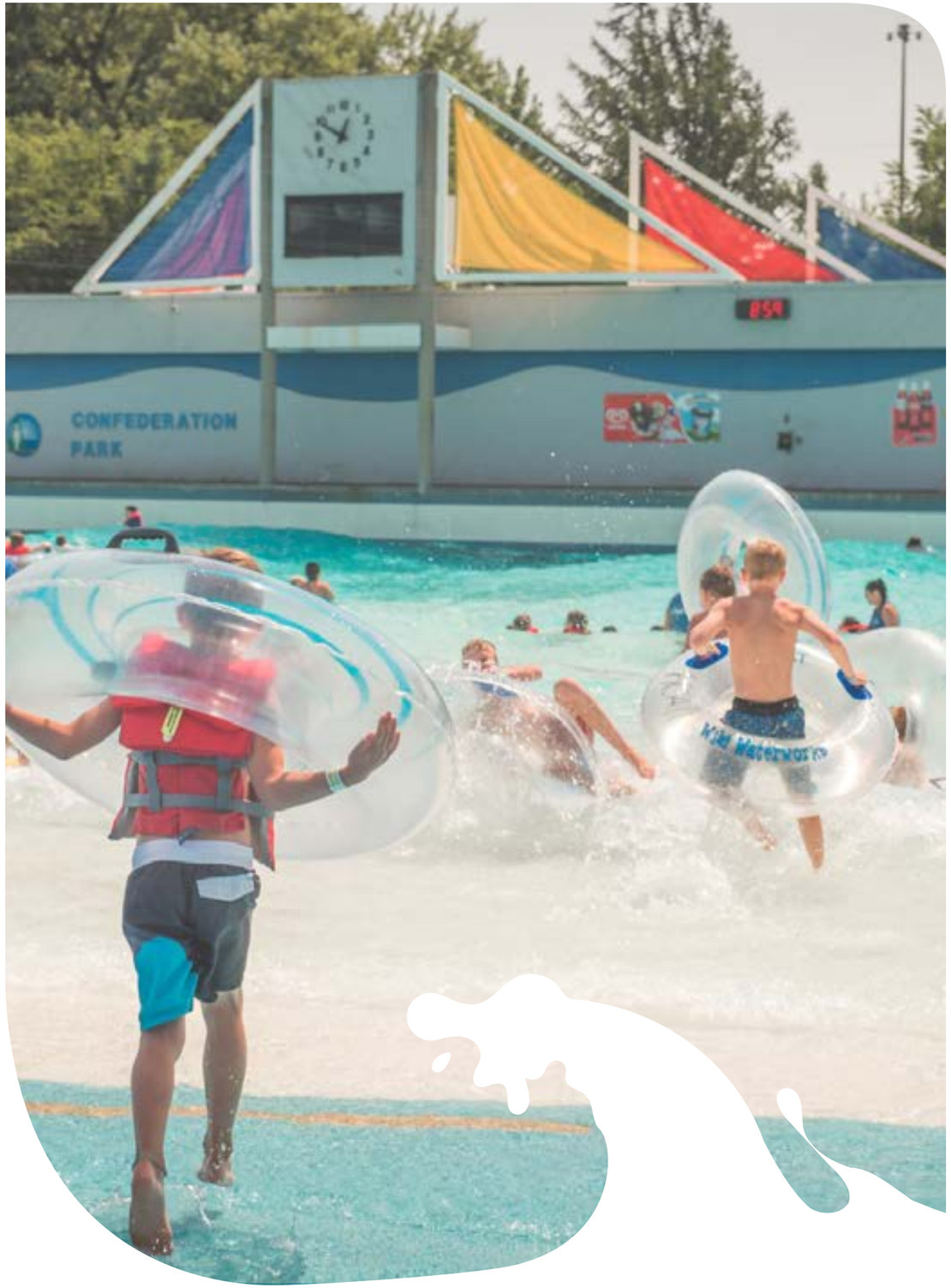

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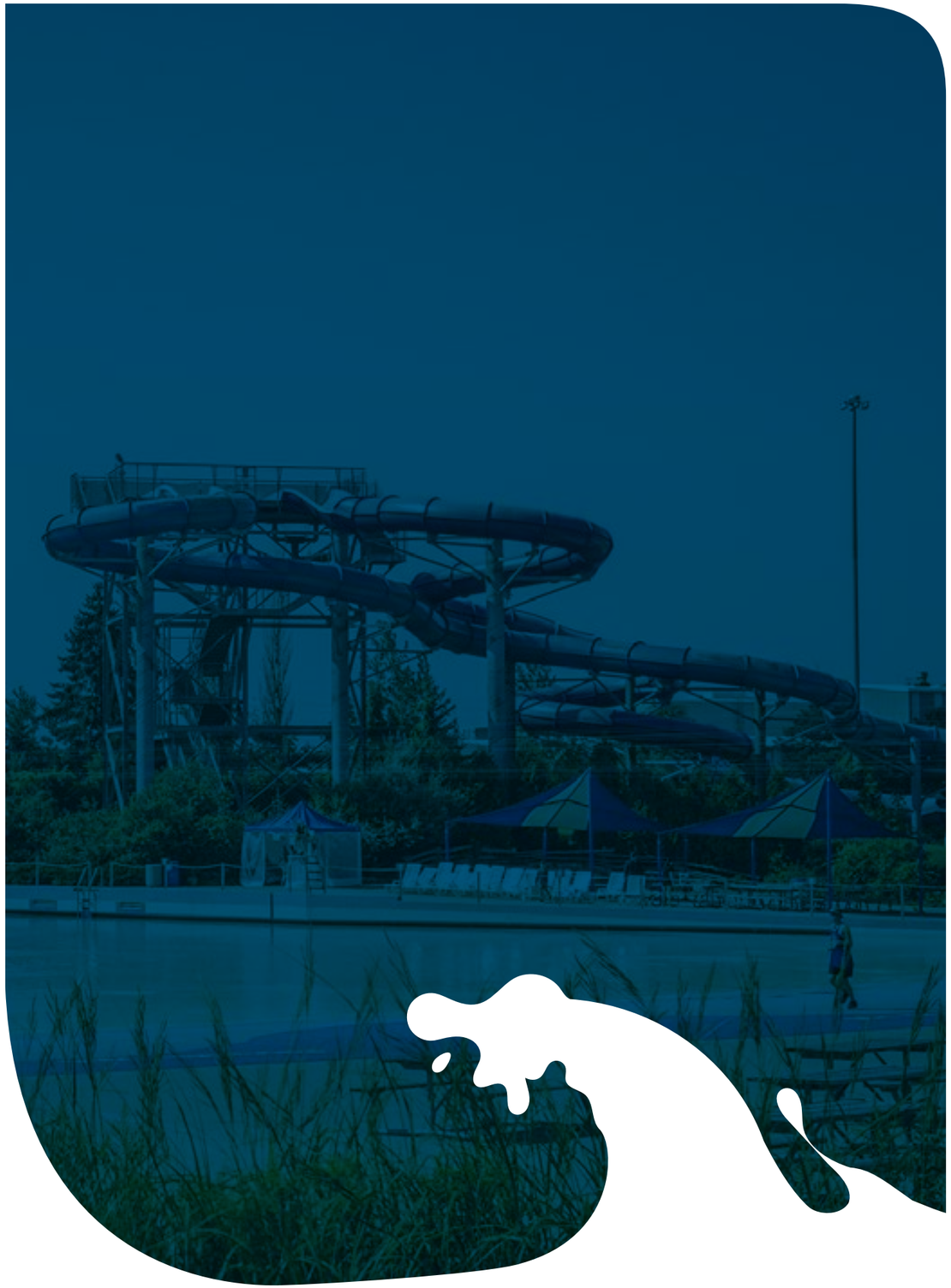

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Master Plan Study Wild Waterworks at Confederation Beach Park PROJECT #18-185

May 4th, 2020

Dear Romas,

FORREC is pleased to submit our FINAL report for the Master Plan Study of Wild Waterworks at Confederation Beach Park.

Our report follows the agreed Scope of Work and provides you with an objective evaluation and analysis of existing conditions, options for programming and redevelopment at four levels.

In addition to the work completed by the FORREC team, Cloward H2O Aquatic Engineers have reviewed existing aquatic facilities and have provided detailed recommendations. Their findings are in the report appendices.

CBRE have provided a Market and Financial Analysis Valuation and Advisory Services for the water park which we have utilized to help inform reinvestment levels for your consideration. Their findings are in the report appendices.

Our report provides you with an evaluation and analysis of the existing parkland, vehicular movements (bus/car parking), required for Wild Waterworks. We have also provided requirements for food and beverage as well as entertainment facilities to improve the water park and dry land recreation extending the seasonal use of the park.

Please feel free to contact me directly to respond to any questions you may have on our report.

Yours truly,

Glenn A. O'Connor, OALA, FCSLA, ASLA
Senior Director Water Parks, FORREC Ltd.

cc.
Scott Torrance, Practice Leader, Landscape Architecture Studio
Matthew Dawson, Senior Director
Steven C Rhys, Executive Vice President

1 EXECUTIVE SUMMARY

1 EXECUTIVE SUMMARY

1.1 OVERVIEW

Wild Waterworks at Confederation Beach Park, is a family, outdoor seasonal water park located on Lake Ontario between the Queen Elizabeth Way and Lake Ontario in the City of Hamilton.

The 4.9hectare (12.1 acre) water park is owned by the City of Hamilton and managed by the Hamilton Conservation Authority. The water park is a recreation and entertainment resource for the public that opened in 1983.

At the time of it's opening 35 years ago, water parks were still relatively new in the market, consequently many of the features that we know and enjoy today, either did not exist, or were just developing. At the time, Wild Waterworks was a new and innovative facility, well ahead of its time and offered a great family experience. Over the years Wild Waterworks has become a much -loved, family Regional water park. Guest expectations have evolved significantly since the park opened in 1983. Unfortunately, given the age and condition of the rides/attractions and guest areas, the current guest experience is well below the expectations of today's guest and the market in general.

The issue can be summarized as "The guest gets what they pay for and paid for what they got".

In other words, the cost to attend is relatively low and so is the entertainment experience. An important issue is the age of the facility and specifically, the mechanical components and individual water attractions. Each of these components have a limited life expectancy, many have already exceeded that service life. These components require an increasing amount of capital annually to maintain the facility in operating condition until it no longer proves to be economical to operate. A better understanding of lifecycle and replacement costs are required to make better informed decisions and plan for capital expenditures. This study addresses this issue and provides four (4) options for courses of action. The proposed enhancements to the water park are intended to address this situation and enhance guest experience and increase overall annual attendance.

1.2 MASTER PLAN STUDY

This Master Plan Study investigated the feasibility and economic viability of Wild Waterworks based on varied levels of investment; including no investment and replacing rides/attractions as the current attractions approach their end of life.

A detailed SWOT analysis of existing facilities was carried out for the overall park which guided a range of potential solutions to resolve known or newly identified issues.

Four (4) options were objectively considered for the water park to provide a comprehensive range of solutions for consideration by Committee and ultimately, Council of the City of Hamilton.
This review of options assessed the existing Wild Waterworks Park and provided recommendations for improvements and redevelopment. The viability of the waterpark was considered together with opportunities for improvement and methods of increasing annual attendance at the waterpark.

The options considered can be summarized as follows:

1. ***Do Nothing:*** Do nothing, consider the probable remaining life cycle of all facilities.
2. ***Replace Like for Like:*** Replacement of existing rides, attractions, and facilities with same/similar.
3. ***Modest Enhancements:*** Replacement of rides and attractions with the addition of new dry/wet attractions, and improved operational systems
4. ***New Design:*** New design, rides and attractions, and facilities to meet future guest needs.

To assist in objectively evaluating these four options, an updated Market and Financial Analysis was completed, as well as a review of existing Aquatic systems considering current condition and remaining service life. This information provided much needed background information for decision making and analysis purposes. Based on this information, redevelopment options were considered including a range of warranted investment levels which were tested by the feasibility consultant. To meet a range of potential attendance levels, the Concept plan options, and programming were refined to suit the warranted investment levels as supported by projected attendance. Capital investment options for revitalization were considered based on the **Market and Financial Analysis of Wild Waterworks, included in Appendix 1** of this report.

The four options are presented in this study as well as a preferred, recommended option for City consideration. Prior to advancing any of the Council selected options, there may be additional studies required to further assess impacts. This includes but is not limited to an updated traffic analysis.

1.3 OVERVIEW OF FINDINGS

Most of the existing facilities and infrastructure are dated and at a point in their life cycle where they require major refurbishment or replacement. Others are in reasonable repair and require only minor modifications.

Many of the weaknesses identified throughout the water park are largely the result of the age of the facility infrastructure and the pressures current attendance place on aging, end of life facilities. All building facilities, while generally structurally sound, are significantly undersized to meet the current attendance levels and are poorly distributed throughout the site. This creates circulation congestion issues throughout, particularly at the entrance area, negative guest experience and the loss of potential revenue.

Outdated POS (Point of Sale) systems compound these challenges by reducing the efficiency with which staff can serve guests' needs. The attractions and infrastructure are reaching, at the end of, or far past a reasonable lifespan and are having difficulty functioning under the stress of peak attendance days.

Most of the threats identified in the analysis relate directly to the insufficient size of existing building or site facilities, rides/attractions and the physical degradation of attractions and their corresponding mechanical systems. These systems, rides/attractions and facilities will continue downward on the degradation cycle as most have far exceeded a reasonable operating life cycle.

Overall, there are many challenges the park faces including a number of infrastructure issues which must be addressed as soon as possible.

1.4 THE WAY FORWARD

The Water Park design and facilities options were planned in a comprehensive way from the standpoint of a guest, while considering opportunities for future expansion. The features are a major component of this destination to create a unique place aimed at an enhanced and memorable guest experience. As with any park reinvestment, the investment is tied to attendance and phasing to achieve the desired results that can be sustained over both the short and long term. Planning and design work address the issues and opportunities identified in the Analysis task. We proposed a range of solutions to enhance guest experience, improve the mix of rides and attractions to provide new, more interesting challenges to meet a changing demographic and increase potential and sustained park attendance.

Wild Waterworks opened in 1983 and achieved its highest annual attendance, with just over 153,000 guests in its first year. Attendance over the past 35 years has averaged and stabilized at approximately 110,000 with peak attendance of 140,000 in 2005 and 2016. In 2018, attendance was approximately 128,000, which was much better than the stabilized average. Based on past and current revenue, operations costs, the park breaks even operationally at approximately 100,000 guests per year.

The analysis reviewed each of the options for the water park, provided estimated attendance levels for each of the four options, programming, area requirements, phasing and resultant budgets.

1.5 OPTIONS CONSIDERED

1 Do Nothing

Do Nothing: Do nothing, consider the probable remaining life cycle of all facilities. Based on the market and feasibility analysis and estimated attendance, the overall size of Wild Waterworks would remain unchanged. Attendance for **Option 1: "Do Nothing"**, would gradually decrease in the next 2-5 years falling well below 100,000. As infrastructure, rides and attractions continue to age and are taken out of service, it is expected that the park will become increasingly expensive to operate and would eventually be closed.

This Option was not considered financially viable and is not recommended.

2 Replace Like for Like

Replacement of existing Rides, Attractions and Facilities with same/similar.

Based on the market and feasibility analysis and estimated attendance, the overall size of Wild Waterworks would remain unchanged. Attendance for **Option 2: "Like for Like"** will slowly increase over the average current attendance, increasing gradually over the next 2-5 years. The size of the water park will remain unchanged for this option as the current park area can generally accommodate the attendance with new building facilities and new rides.

This Option was not considered financially viable and is not recommended.

3 Modest Enhancements

Replacement of some rides, attractions, dryland climber, sheltered recreation area for adverse rain conditions, improved ticketing systems and RFID wristbands. The water park size for **Options 3: "Modest Enhancements"** would need to be increased to accommodate increased annual (daily) attendance, as well as provide new rides and attractions for guests. Attendance will increase initially and stabilize after year 3 as a stabilized attendance level is achieved. This will require additional park area and an increased service level of rides and attractions and expanded parking facilities.

This Option is considered the most financially viable and is recommended.

4 New Design

New design, Rides and Attractions and Facilities to meet future guest needs and attendance.

The water park size for **Options 4: "New Design, New Program"** would need to be increased to accommodate increased annual (daily) attendance, as well as provide new rides and attractions for guests. Attendance will increase steadily over the next 5-8 years until a new stabilized attendance level is achieved. This will require additional park area and an increased service level of rides and attractions and expanded parking facilities.

This Option was not considered financially viable and is not recommended.

Improvements to Wild Waterworks Water Park are intended to align with the 2016, City of Hamilton Strategic Plan to support the Vision, Mission, Culture and Priorities of the City of Hamilton.

The recommendations and background contained in the report will ultimately assist City staff to prepare a report to Public Works Committee and Healthy and Safe Communities and ultimately, City of Hamilton Council.

2
PURPOSE OF STUDY

FORREC Ltd. was retained by the City of Hamilton in October 2018 to prepare a Master Plan Study, Wild Waterworks at Confederation Beach Park Hamilton.

Wild Waterworks is an existing outdoor seasonal family water park, located at 680 Van Wagners Beach Road, between the Queen Elizabeth Way and Lake Ontario in the City of Hamilton. The 4.9hectare (12.1 acre) water park is a significant anchor within Confederation Beach Park – a 93hectare (228 acre) public park stretches 4 km along Lake Ontario. It is owned by the City of Hamilton and managed by the Hamilton Conservation Authority. The water park is a regional recreation and entertainment resource for the public that opened in 1983. The Master Plan Study Area is approximately 10 hectares (24.7 acres), which includes the guest drop off and adjacent parking lot to the west of the 4.9ha water park.

The purpose of this Master Plan Study is to:

- **Review** and assess the existing Wild Waterworks Park at Confederation Park in Hamilton and provide recommendations and options for improvements and redevelopment.
- **Create** a place to draw visitors to this destination time and time again, enhance the overall guest experience and to meet current guest demands/expectations.
- **Provide** water park rides and attractions targeted for a primary family demographic, designed to an International standard. This includes family from young children to teens, young adults and older adults while considering wet and dry activities.
- **Investigate** options for extended seasonal utilization.
- **Prepare** and update a Market and Financial Analysis of Options.
- **Review** existing Aquatic systems and consider current condition and remaining service life.
- **Undertake** improvements that support City and Conservation Authority core values.

2.1 CITY OF HAMILTON MISSION STATEMENT

In 2016, the City of Hamilton adopted a new Strategic Plan. The Master Plan Study: Wild Waterworks at Confederation Beach Park helps, in part, to implement this Strategic Plan.

"OUR VISION"

To be the best place to raise a child and age successfully.

Being the best place to raise a child and age successfully means having an inclusive community that actively engages in making Hamilton a better place for everyone. It is creating an accessible environment that encourages the positive development of children as they move towards being healthy adults and seniors, supporting residents through all of life's stages.

"OUR MISSION"

To provide high quality cost conscious public services that contribute to a healthy, safe, and prosperous community, in a sustainable manner.

"OUR CULTURE"

- Collective Ownership
- Steadfast Integrity
- Courageous Change
- Sensational Service
- Engaged Empowered Employees

"OUR PRIORITIES"

- Community Engagement and Participation
- Economic Growth and Prosperity
- Healthy and Safe Communities
- Clean and Green
- Built Environment and Infrastructure
- Culture and Diversity
- Our People and Performance"

(City of Hamilton, Strategic Plan, 2016)

2.2 BACKGROUND

Wild Waterworks is an outdoor seasonal water park that opened in 1983.

At the time of it's opening, water parks were still relatively new in the market, consequently many of the features that we know today, either did not exist, or were just developing. (Wet n' Wild in Orlando, is generally considered the first large-scale water park in North America which opened in June 1977). Since that time, rides/attractions have evolved significantly, so have the guest expectations.

Further, since 1983, several additions and improvements have been made to the rides and attractions at Wild Waterworks including the Lazy River, which opened in 1994 and the East slide complex (Proslide) which was replaced and reopened in 2008.

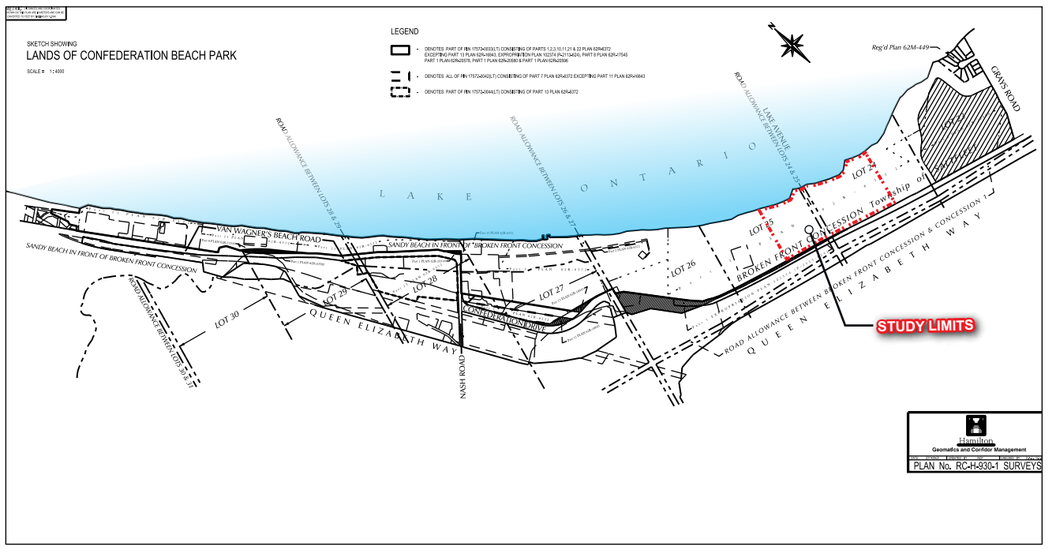
The Outdoor water park has an existing area of approximately 49,000 m^2 (4.9ha), plus adjacent parking and drop off facilities to the west. The total approximate area for review in this study is approximately 100,000m^2 (10 ha).

See Figure 1: Aerial photograph - Existing conditions. (Google Earth).

- The current annual attendance for the water park ranges from a low of approximately 87,000 to a high of 145,000 annual visitors. The City of Hamilton intends to revitalize Wild Waterworks water park facilities to enhance the guest experience and increase attendance over a sustained period of time.
- Target future annual attendance was based on the 2018 CBRE Market and Financial Analysis of Options and were mutually agreed to during the study. Increases above current attendance were expected, provided the offering of rides and attractions were updated to meet current expectations. As a starting number, based on the Sierra Planning and Management Consultants Economic Feasibility Study (2016), an Increase of 130% attendance was considered as a minimum guide. Note, the current Sierra study did not identify an upper threshold figure. The updated CBRE report will set target annual attendance.
- Supplemental economic feasibility work was completed by CBRE who are familiar with the local Ontario market and entertainment attractions. The findings of their review are contained in Appendix A-1, Market and Financial Analysis of Wild Waterworks Options.
- The water park currently operates during a peak three to four (3-4) month season. 90-100 days approximately. A four (4) season facility is only possible with the addition of an indoor water park component. The CBRE feasibility consultant considered if an investment of this scale is warranted and summarized their findings in the final report.
- As part of the study, a range of additional dry land activities were explored to extend the seasonal aspects of the park in both the spring and fall and to increase the offerings during cooler or rainy summer weather.
- Most of the existing facilities are somewhat dated and at a point in their life cycle where they require major refurbishment or replacement. Others are in reasonable repair and require minor modifications only.

FIGURE 1: ***Aerial photograph - Existing conditions. (Google Earth)***

FIGURE 2: ***Sketch-Lands of Confederation Beach Park (Surveys)***



2.3 PROJECT GOALS AND OBJECTIVES

The City of Hamilton provided an outline of their Project Goals and Objectives in their RFP, dated July 20, 2018, these are paraphrased as follows.

GOALS

- To investigate the feasibility of Wild Waterworks based on different levels of investment; including no investment and exchanging like for like attractions as the current attractions approach their end of life.
- To identify opportunities to maximize the economic viability and profitability of the waterpark.
- To provide recommendations for new attractions to replace the existing rides/attractions.
- To provide recommendations for expansion or re-visioning of the waterpark with additional attractions.
- To review general, current operations of the waterpark and provide suggestions for improvements and efficiencies.
- To provide redevelopment options that consider a range of warranted investments.
- To provide an implementation strategy for each option.
- To provide feedback on current remaining life cycle of the park without new investments.
- Consider the entire study area to Identify parking, transportation and operational opportunities outside of current waterpark footprint. (study area).
- To provide options for phasing redevelopment.

OBJECTIVES

1. Determine the viability of waterpark, areas of strength as well as opportunities for improvement.
2. To identify methods of increasing annual attendance at the waterpark.
3. Identify opportunities for increased year -round guest use for all ages.
4. Provide recommendations for identified changes.
5. Consider outcomes of “Do Nothing” to improve the facilities/attractions.
6. Provide recommendations for parking spaces as required for expansion of recreational offerings.

To achieve these Goals and Objectives, FORREC prepared a program to address and consider the Master Planning and design of a facility to meet guest needs, projected increased annual attendance, operational changes/ recommendations to adjust the current way of doing business.

Capital investment options for revitalization and opportunities to extend the operational season were considered based on the Market and Financial Analysis of Wild Waterworks Options prepared by CBRE.

Phased implementation options for an economically viable operation were provided, all with adequate passenger parking lots, bus, vehicular and pedestrian circulation.

The Water Park design and facilities were planned in a comprehensive way from the standpoint of a guest while considering opportunities for some limited future expansion. The features are a major component of this destination to create a unique place aimed at an enhanced and memorable guest experience. As with any reinvestment, the investment is tied to attendance and phasing to achieve the desired results that can sustained over both the short and long term.

The recommendations contained in the report will ultimately form part of a staff report to Public Works and Healthy and Safe Communities and ultimately, City of Hamilton Council for consideration.

2.4 STUDY TEAM AND ACKNOWLEDGMENTS

FORREC + CBRE + CLOWARD H2O

FORREC Ltd. led the Consulting team in the preparation of the Master Plan Study, review and analysis of existing site, redevelopment options, programming and budgets. They were also responsible for the preparation of the report.

Glenn A. O'Connor,
Principal Author and Project Manager

Ingrid Vaivads, Programming + Design

Nadia Pausch, Diagrams, Figures and Assist with text.

Tony Zhou, Report Graphics

Scott Torrance, Review and Advisor

Photograph credits: *Marketing photographs were provided by Hamilton Conservation Authority. These were released for use in public documents and have been used throughout this report. Photographs of facilities or existing infrastructure were taken by FORREC of Cloward H2O.*

CBRE was responsible for Market and Financial Analysis of Wild Waterworks Options, included here as **Appendix A-1**.

Fran Hohol, Principal Author

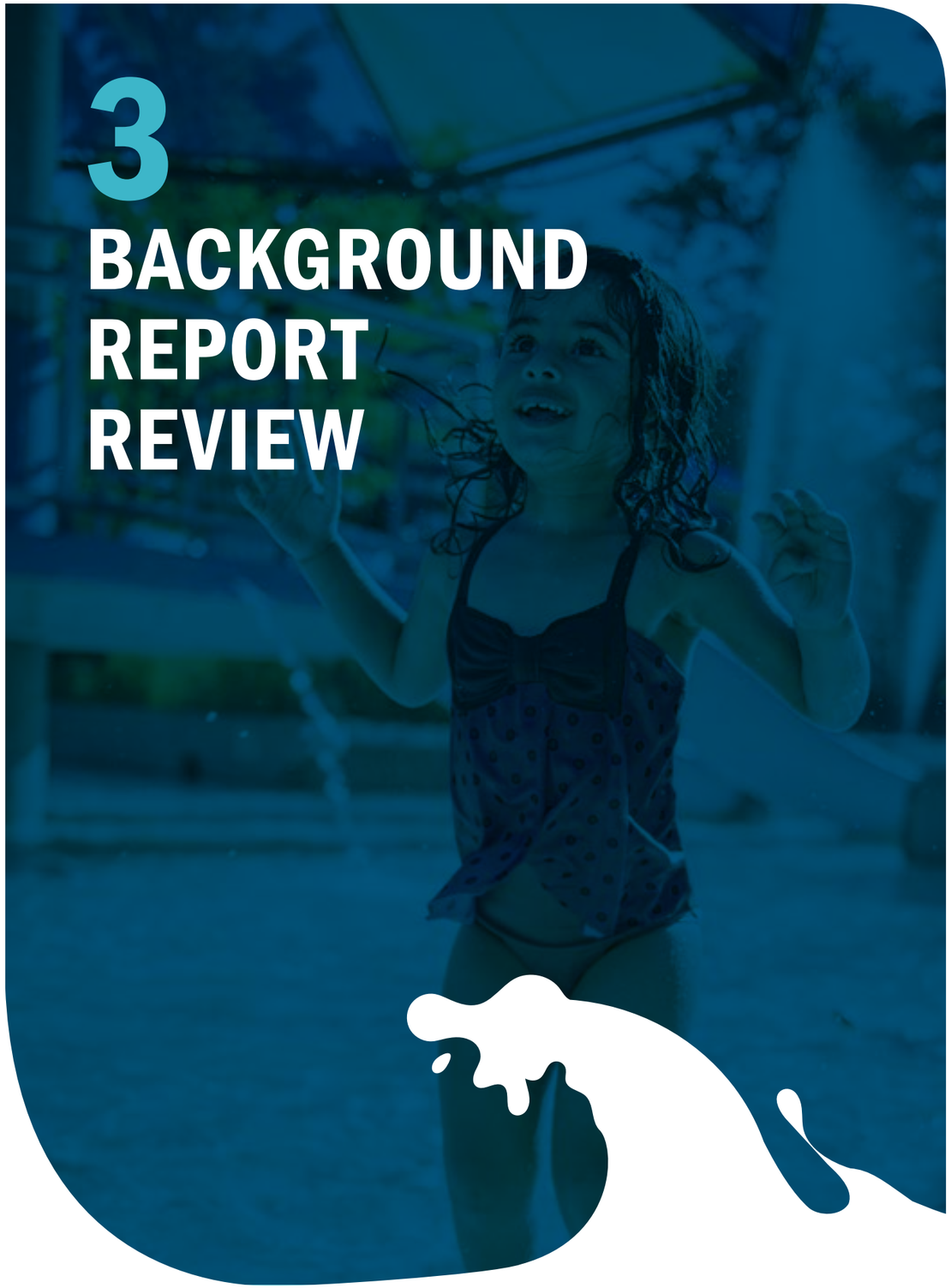
Rebecca Godfrey, Writer + Research

Hildegard Snelgrove, Research Assistant

Cloward H2O was responsible for Aquatic Engineering Facility Review Report + Recommendations, included here as **Appendix A-2**.

Allen Clawson, Principal Author

The study team would like to acknowledge City of Hamilton and Hamilton Conservation Authority staff members who guided, challenged us and helped to shape this Master Plan to plan to create a great water park for the people of Hamilton and surrounding communities.



3 BACKGROUND REPORT REVIEW

3 BACKGROUND REPORT REVIEW

The Master Plan Study and Capital Improvement Plan is to be done within the context of the overall Confederation Beach Park Master Plan and it's supporting studies. This Wild Waterworks Study is a supporting study identified in the PW Report (PW11005 (d) dated August 11, 2016) and as such, must work within that context.

3.1 CONFEDERATION PARK MASTER PLAN REVIEW & UPDATE (2010)

Confederation Park Master Plan Review & Update 2010, prepared by G. O'Connor Consultants Inc. was a comprehensive, park wide report with extensive public consultation. This report considered new development opportunities and activities taking into consideration: the valuable lakefront setting; unifying the overall park elements; integration of the Waterfront Trail and pedestrian links to the Red Hill Valley and City; while completing improvements that support the City and Conservation Authority core values.

The report considered numerous upper tier planning policies, regulations and documents to ensure any park improvements are supported by Provincial, Region and City planning requirements. A Central Recreation/Commercial Village was proposed subject to a feasibility and business case validation. The plan retained and restored valuable littoral wetlands, savanna and dune habitats within the park zone. Recommended removing underutilized and inappropriately located recreational uses and re-deploying these lands to better meet community needs. The plan also applied new design principles to connect the waterfront trail and focus new development with a commercial central village area and provided improved connections to trails and public transit with surrounding neighbourhoods. Wild Waterworks was viewed as a valuable resource that required further and more detailed study with potential to be expanded and enhanced.

Overall, Confederation Park Master Plan Update through its implementation will demonstrate and showcase this City-Wide Park as example of blending built and natural environments to enhance the quality of life for the public.

3.2 SIERRA PLANNING AND MANAGEMENT CONSULTANTS ECONOMIC FEASIBILITY STUDY (2016)

The **Economic Feasibility Study: Confederation Park Master Plan** was prepared by Sierra Planning and Management in 2013 and updated in 2016. The basis of the analysis was a review of the 2010 Confederation Park Master Plan Review and Update to consider the potential Commercial Development Opportunities and to assess the financial feasibility of the development proposed in the Master Plan Review and Update.

The study found that while Confederation Beach Park has a significant draw from both its primary and secondary markets, it is "an under-developed asset both in terms of economic potential and level of utilization". Given that both the primary (Hamilton, Burlington) and secondary (Brampton, Mississauga, Oakville, Milton, St. Catharine's-Niagara, Kitchener-Waterloo, Guelph) markets are expected to experience significant population growth in the coming years, Confederation Beach Park is well-positioned to benefit from the corresponding potential attendance increase. In order to strategically position the Park, capital investment is required in addition to programming which distinguishes the Park from nearby draws such as the Burlington waterfront. The regional tourism market has the potential to drive activity and revenue in the Park, which meets the goals and objectives of the City of Hamilton and the Hamilton Conservation Authority, however development is required to maintain and broaden regional appeal. Aging assets in a "state of under-investment have the potential to negate any gains to visitation and spending from new development" and should be considered a priority.

The study identified Wild Waterworks as Confederation Beach "Park's largest attraction and important revenue generating facility" and noted "the future success of [Wild Waterworks] will be integral to the Park's continued operations". Over 20% of visitation in the Park is specifically to Wild Waterworks, however its aging facility requires capital investment. The study highlighted various revenue generating strategies for the water park, including better marketing of premium add-ons such as cabana rentals, the addition of attractions which extend the operating season, increasing spending by trail users, and planning activities which cater to a broader demographic.

Both short-, medium-, and long-term focus items were identified within the report and given approximate investment values. Of note for the waterpark are the following:

SHORT-TERM FOCUS

- The development of a comprehensive master plan for Wild Waterworks ($150,000)
- Replacement of Little Squirt Works ($1,500,000)

LONG-TERM FOCUS

- Aesthetic upgrades to the entry façade ($400,000)

However, there were areas of the report that were unclear regarding the warranted investment levels, annual attendance data and spend per person. As a result of discussions with City of Hamilton staff, it was agreed the feasibility components which were not developed would be captured by a more refined report to be prepared by CBRE as part of this master plan study.

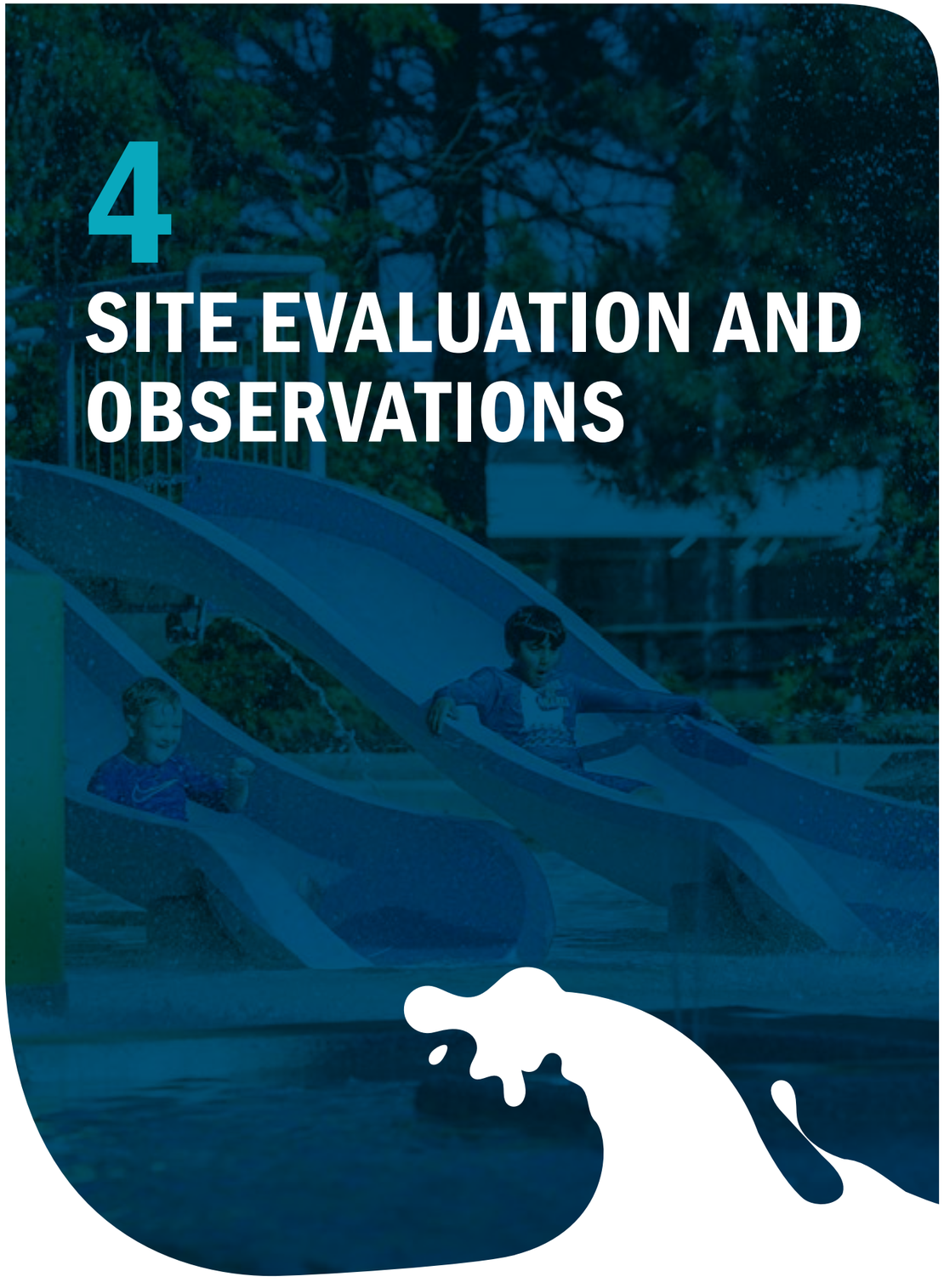
3.3 CITY OF HAMILTON PUBLIC WORKS & HEALTHY AND SAFE COMMUNITIES, CONFEDERATION BEACH PARK MASTER PLAN – FEASIBILITY STUDY - PW11005D (2016)

Report PW11005d was prepared by staff of the City of Hamilton's Public Works and Healthy and Safe Communities and submitted to the chair and members of the Public Works Committee for consideration on August 11, 2016.

The report made a series of recommendations that provided short term budgets for additional studies and mid-long-term budgets for Capital reinvestment to be incorporated into the City of Hamilton Capital Budget Process. Further, the report recommended that a program be developed to implement the capital program and life cycle replacements and develop a funding strategy for Confederation Beach Park and Wild Waterworks. These recommendations were based upon both the 2010 Confederation Park Master Plan Review and Update prepared by G. O'Connor Consultants Inc. as well as the 2016 Economic Feasibility Study: Confederation Park Master Plan prepared by Sierra Planning and Management. The report confirms that Confederation Beach Park "warrants a renewed capital investment over the next 10-15 years to properly manage the park and provide adequate waterfront amenities to support the large volume of seasonal visitors". The report also noted several other related staff information reports that were previously submitted over several years, from 2011-2016 that identified a variety of issues at Confederation Beach Park which support reinvestment in both the overall Park and Wild Waterworks.

The report provided criteria for attractions and spaces warranting investment, noting that investment should generate economic return, improve access to nature, promote sustainability, encourage health and wellness, create recreation opportunities, and capitalize on tourism potential within the broader region.

The report recommendation was for an implementation strategy for the redevelopment of Confederation Beach Park be received and either all or a portion of the Master Plan be incorporated into the City of Hamilton's 10-year Capital forecast. It further endorses that Public Works and Healthy and Safe Communities should work with the Hamilton Conservation Authority in the execution of these recommendations.



4 SITE EVALUATION AND OBSERVATIONS

4.1 STAKEHOLDERS WORKSHOP AND SITE VISITS

AUGUST 9, 2018 · SITE VISIT & START-UP MEETING

FORREC senior staff attended a start-up workshop meeting with City of Hamilton staff to discuss the overall study, review scope of work and deliverables and review staff objectives for the study. This workshop was very productive and resulted in the identification of several existing information gaps in available background data or studies. As a result, the scope and deliverables for the Master Plan Study were revised which have been included in this report.

FORREC and their team also reviewed the available City of Hamilton supplied background documentation including Building Condition assessments and the available feasibility, market report by Sierra Management Consultants. Based on this review, it was agreed to retain CBRE to complete a market and financial analysis for Wild Waterworks which was focused and addressed the range of options required by City of Hamilton staff. The CBRE report is included in this report as **Appendix 1**.

AUGUST 29TH, 2018 · SITE VISIT

FORREC senior staff visited the site together with the Aquatic Engineer Cloward H2O and City of Hamilton team members including operations and management staff from Wild Waterworks. The purpose of this meeting and site visit was to collect background information related to existing conditions, evaluate existing equipment, facilities, operations, rides and attractions.

We had a detailed site visit to gain a qualitative review and debrief, to investigate the current features, park attributes, and challenges.

During the site visit, FORREC and Cloward staff:

- Reviewed the park and pool layout, in-pool hydraulic conditions, general structures, waterproofing or coating issues and other items as practical to gain a comprehensive understanding of existing conditions
- We discussed operational history and past repair work with operations staff.
- Photographed and identified components, recording make/model/serial number of key pieces of equipment.
- Evaluated the condition and operational history of key equipment, controls, and piping.

OCTOBER 25TH, 2018 · SITE VISIT

FORREC staff visited the site again on October 25th, 2018 and were led on a comprehensive site walk by Wild Waterworks operations staff. The purpose of this site visit was to allow additional team members to collect any remaining background information related to existing conditions, facilities, operations, rides, and attractions.

During the site visit, FORREC staff:

- Discussed operational history, trends, and challenges with staff.
- Photographed and documented specific site elements for reference and use in the SWOT analysis.
- Confirmed facility counts (i.e. washroom/shower/locker counts).
- Evaluated the site from the perspective of circulation, arrangement of facilities and attractions, guest comfort, aesthetic quality, and park adjacencies.

Our team compiled the information gathered to build and generate ideas and identify current issues. We reviewed the site from a guest experience standpoint and each ride/attraction to assess the current operational entertainment capacity, potential capacity, attendance and flow through of all rides, circulation, food and beverage areas, washrooms, guest services, and arrival sequence. Parking, vehicular circulation, and the proximity to available expansion property (5 ha) to the West was also considered. The review of future expansion at this phase is only preliminary to review site attributes and features, adjacency for expansion purposes.

The meetings were valuable and allowed a collaborative effort with input from all who attended. Stakeholder participation was important to allow a comprehensive range of ideas and observations to be shared between the parties. Site visits led by operational staff were critical stepping stones to gaining a comprehensive understanding of the current site, allowing us to assist in the subsequent planning analysis, programming, and design phases.

4.2.1 SITE EVALUATION - SWOT ANALYSIS

Arrival and Facilities

ARRIVAL - PARKING, ENTRY, ACCESS

STRENGTHS
- Mature trees in drop off circle and perimeter
- Bus and car drop off/turn around area

OPPORTUNITIES
- Additional land available to enlarge entry zone
- Upgrade **POS** system and turn styles

WEAKNESSES
- Inadequate bus and car parking area
- Visually unappealing entrance
- Entry/park disconnected from waterfront trail
- Facilities densely clustered near park entrance
- Concrete posts add to disorientation of plaza

THREATS
- Poor entry/wayfinding plaza causes backlog
- Queues lines cross, creating circulation issues
- Entry is dark and small, ticket windows backlogged
- No dedicated entry/exit lanes, no fast pass lane for ticket/seasons pass holders

FOOD FACILITIES - FOOD & BEVERAGE - OLLIE'S LANDING

STRENGTHS
- Highest revenue restaurant in the park
- Well loved by guests

OPPORTUNITIES
- Sufficient park area to relocate/enlarge

WEAKNESSES
- Poor location, crowded
- Insufficient seating
- BOH is undersized, poor garbage access

THREATS
- Misleading signage on administration building, guests inadvertently enter staff offices

FOOD FACILITIES - FOOD & BEVERAGE - WAVES

STRENGTHS
- Current space is modest, handles small groups

OPPORTUNITIES
- Sufficient park area to relocate/enlarge

WEAKNESSES
- Poorly located, queue causes congestion
- Understaffed - increases congestion, lowers revenue

THREATS
- N/A

FOOD FACILITIES - FOOD & BEVERAGE - BREAKERS

STRENGTHS
- Recent upgrades to facility

OPPORTUNITIES
- Sufficient park area to relocate/enlarge

WEAKNESSES
- Queue interferes with beach seating
- Main cold storage accessed outside building

THREATS
- N/A

FACILITIES - GUEST SERVICES & RETAIL

STRENGTHS
- Location is clearly visible and accessible
- Size is reasonable

OPPORTUNITIES
- Guest demand supports dedicated retail space

WEAKNESSES
- Functions as both guest services and retail (separate)

THREATS
- N/A

FACILITIES - CHANGEROOMS & WASHROOMS

STRENGTHS
- Flow-through layout circulates guests into park

OPPORTUNITIES
- Sufficient park area to relocate/enlarge

WEAKNESSES
- Only guest washroom facility in the park
- Insufficient number of showers, lack privacy
- Insufficient locker space
- Lockers inside changeroom are an inefficient and expensive use of space
- Queue blocks circulation, washrooms and changerooms poorly organized

THREATS
- No family changerooms or washrooms
- Number of washrooms is significantly under code

FACILITIES - TUBE STORAGE

STRENGTHS
- Tube rentals generate significant revenue

OPPORTUNITIES
- Sufficient park area to relocate/enlarge

WEAKNESSES
- Insufficient number of tubes, inadequate space
- Location is removed from water attractions
- Current location creates circulation congestion

THREATS
- N/A

FACILITIES - BACK OF HOUSE (BOH)

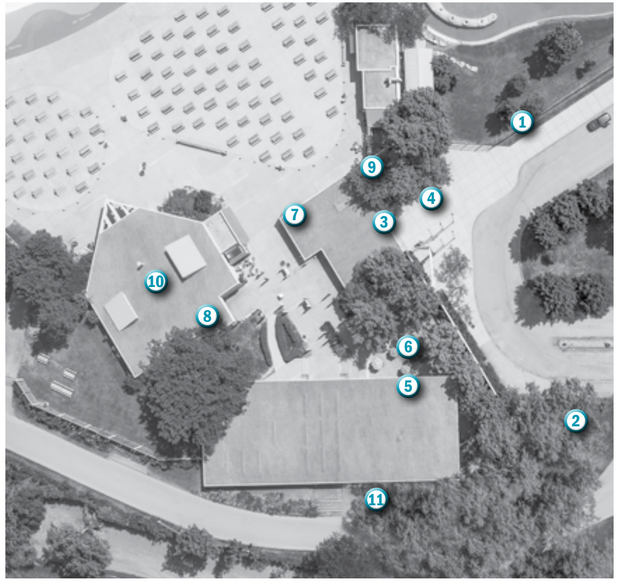
STRENGTHS
- N/A

OPPORTUNITIES
- Sufficient park area to relocate/enlarge

WEAKNESSES
- Severe lack of storage space
- Garbage area is not buffered from waterfront trail
- Staff washroom count is below code, undersized change and locker facilities

THREATS
- N/A

FIGURE 3: ***SWOT ANALYSIS - Arrival and Facilities***



Unsightly chain-link fence with barbed wire at park entrance.

Lack of access between water park and waterfront trail; insufficient bicycle parking for trail users.

Dated signage, poorly defined entrance. Dark, cramped entry with only two ticket booths.

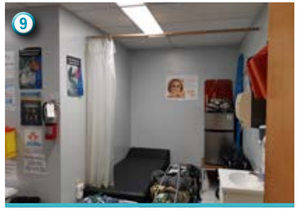
Frequent backlog of guests waiting to enter the park, no shade or defined queuing.

Ollie's Landing is in an awkward, removed location and lacks prominent signage.

Ollie's Landing has insufficient seating for guest demand.

Signage for Ollie's Landing located on the admin building is confusing to guests.

Insufficient locker count to meet guest demand.



First Aid is undersized and poorly located for EMS personnel.

Changerooms are used for off-season storage.

Garbage pick-up area is unsightly and has no buffer from the waterfront trail users.

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Rides and Attractions

RIDES & ATTRACTIONS - WAVE POOL

STRENGTHS

- Reasonable size wave pool, good capacity
- Excellent water clarity and wave quality
- Centrally located with large beach area
- Newer wave equipment, good working condition

OPPORTUNITIES

- Provide lounge chair seating
- Provide planting islands, shade
- Site additional cabanas around wave pool
- Enhance wave pool backdrop

WEAKNESSES

- Wave pool requires daily makeup in water
- Certain equipment end of life cycle
- Beach return grating below current standards
- No planting or shade on beach
- Tubes allowed in wave pool increases lifeguarding difficulty

THREATS

- Wave pool surfacing and tiles are degrading (safety concern)
- Paving around wave pool is rough, hot to touch

RIDES & ATTRACTIONS - LAZY RIVER

STRENGTHS

- Creative river structure, well-integrated with site
- Nice planting along river edges
- River queue functions well operationally
- Both zero entry ramp and stair access provided

OPPORTUNITIES

- Add water features to open space on river banks
- Theme queue railing, improve guest experience

WEAKNESSES

- Caulked joints are unsightly, moldy
- River is poorly waterproofed
- Insufficient propulsion traps debris
- Significant leaf litter, inadequate drain grates
- Narrow width reduces capacity, increases lifeguarding difficulty

THREATS

- Long lifeguard patrol areas with blind spots
- Exposed pipe on beach spray nozzles poses safety risk
- Degradation of the surfacing, rough to touch

RIDES & ATTRACTIONS - LITTLE SQUIRT WORKS

STRENGTHS
- Shade sails in good condition
- Good privacy, separation from busier areas

OPPORTUNITIES
- Sufficient area to expand/re-design pool
- Potential cabana location at raised platform over electrical room

WEAKNESSES
- Entire system performing poorly, end of lifespan
- Degrading surfaces, sediment in the pool
- Uncomfortable and insufficient seat walls
- Inadequate deck drainage
- Poor play value

THREATS
- Paving poses drainage issues and trip hazards
- Combined water system creates sanitation hazard
- Height, material, design of pool poses safety risk
- Safety issue with pools and walls

RIDES & ATTRACTIONS - WHITEWATER TUBE SLIDES (“EAST” SLIDES)

STRENGTHS
- Slide pumps operating well
- Popular, excellent level of fun/excitement
- Excellent views over the park
- Queue line functions reasonably well

OPPORTUNITIES
- Add theming and signage to slide tower
- Visibility and marketing from signage toward highway

WEAKNESSES
- All slide surfaces visibly aging
- Slide joints leaking
- High winds and noise on top of slide tower
- Lack of shade on top of tower and stairs
- Inadequate safety rails along queue walkway
- Limited ride value and experience

THREATS
- N/A

RIDES & ATTRACTIONS - PROSLIDE BODY & TUBE SLIDES (“WEST” SLIDES)

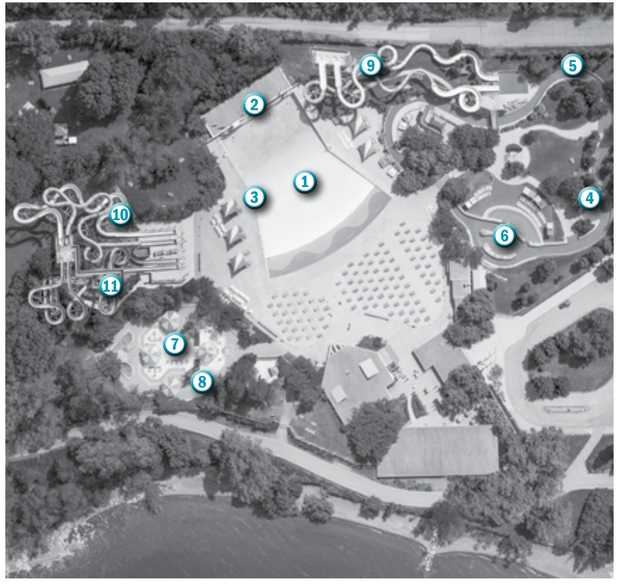
STRENGTHS
- Slides in good working order
- Ramp access to tower platform
- Excellent views over the park
- Less noisy and windy than west slide complex

OPPORTUNITIES
- Reintroduce bridge and viewing platform over lower portion of slides

WEAKNESSES
- Certain equipment causing failures
- Unsightly closed railing along queue ramp, lack of ventilation creates odours
- Deck drains not functioning optimally
- Lack of shade on top of tower and queue
- Certain ride paths are not exciting
- Limited ride value and experience

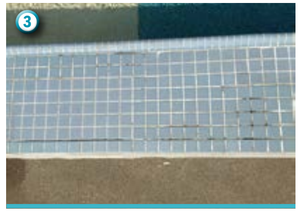
THREATS
- Loose granular underneath slide tower is safety hazard for inspections, maintenance staff
- Combined water system creates sanitation hazard

FIGURE 4: ***SWOT ANALYSIS - Rides and Attractions***



Allowing tubes in the pool reduces visibility and causes lifeguarding challenges.

Wave pool backdrop signage is dated and unthemed; there is the opportunity to enhance and increase entertainment value.



Wave pool surfacing and tile is degrading, potentially leading to sharp debris in the wave pool, posing a safety risk.

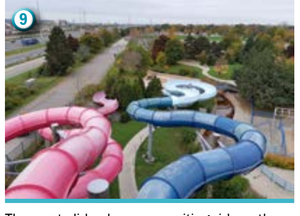
Minimal propulsion in the river creates eddies which trap people and debris.

Narrow river allows tubes to bunch up, decreasing safety.

Exposed spray nozzle pipe poses a safety risk. Caulked joints are unsightly and collecting mold.

The slides and pool surfacing in Squirt Works is visibly degrading.

The seat walls around Squirt Works are uncomfortable and do not provide sufficient seating counts.



The west slides have an exciting ride path but are visibly aging.

Loose rocks under the east slides work pose a safety hazard.

The enclosed east slide queue is unsightly and collects odours.

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Amenities, Layout and Operations

AMENITIES - SEATING

STRENGTHS
- Picnic tables at wave pool provide significant seating

OPPORTUNITIES
- Introduce varied seating at wave pool beach

WEAKNESSES
- No lounge chair seating on wave pool beach
- Picnic tables are unsightly, old, splintering
- Picnic tables congest circulation through beach area
- Number of lounge chairs is insufficient
- Lack of privacy and shade on wave pool beach
- Picnic tables are not flexible seating option

THREATS
- N/A

AMENITIES - GENERAL SHADE

STRENGTHS
- Mature trees offer good shade

OPPORTUNITIES
- Introduce shade structures and planting beds

WEAKNESSES
- No shade on the wave pool beach

THREATS
- N/A

AMENITIES - CABANAS

STRENGTHS
- In high demand, rented out at excellent rate

OPPORTUNITIES
- Numerous potential cabana locations

WEAKNESSES
- Flimsy, cheap temporary structures
- Insufficient number of cabanas

THREATS
- N/A

AMENITIES - EVENT SPACE

STRENGTHS
- Large area at pavilions for events

OPPORTUNITIES
- Sufficient space to improve facilities and access

WEAKNESSES
- Location of party rooms are awkward and uninviting, close to garbage area

THREATS
- N/A

PARK LAYOUT

STRENGTHS
- Wave pool centrally located
- Mature trees

OPPORTUNITIES
- Sufficient area to improve circulation
- Sufficient area for expansion of attractions, facilities

WEAKNESSES
- Circulation isn't continuous throughout park
- Squirt Works is isolated
- No dry or covered play
- Poor circulation

THREATS
- No washrooms or refreshments at squirt works

OPERATIONS

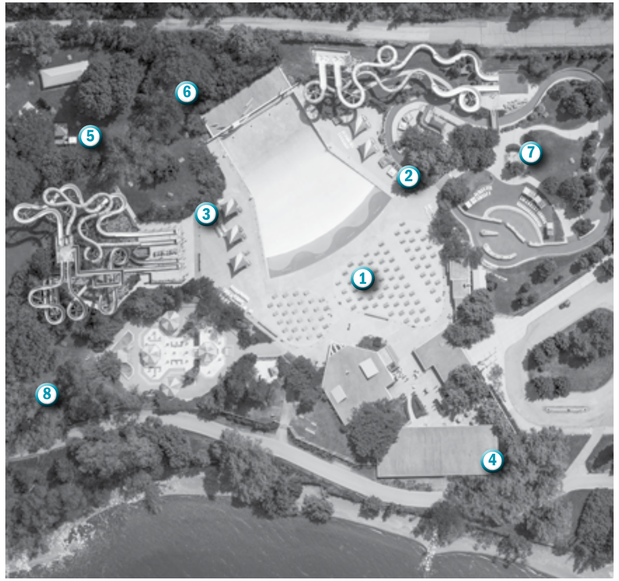
STRENGTHS
- Dedicated, skilled and committed staff

OPPORTUNITIES
- Improved efficiency through upgraded ticketing/POS/wristband system

WEAKNESSES
- Garbage pickup times interfere with guest enjoyment (strong odours)

THREATS
- Combined filtration systems cause operational challenges, impacts guest experience
- POS system is insufficient for use in water park

FIGURE 5: ***SWOT ANALYSIS - Amenities, Layout and Operations***



Wave pool beach has no lounge chairs or shade.

Unused areas pose opportunities for infilling of rides or attractions.

Cabanas should be more sturdy, permanent structures.

Party rooms are isolated and unwelcoming.

There is extensive pavilion space available for large groups.

There is no buffer between BOH chemical treatment and guest areas, posing a safety risk.

There are many excellent cabana locations around the park.

Large, unused space exists around the edges of the site.

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4.2.2 FACILITY ANALYSIS

Arrival & Ticketing
Both the arrival plaza and ticketing facilities are significantly undersized to meet the current attendance demands, resulting in significant wait times entering the water park resulting in reduced guest satisfaction. The existing arrival plaza currently provides less than half of the area required to service the guest arrivals during peak times. The ticketing and bag check facilities both need to double in size to satisfy attendance demands.

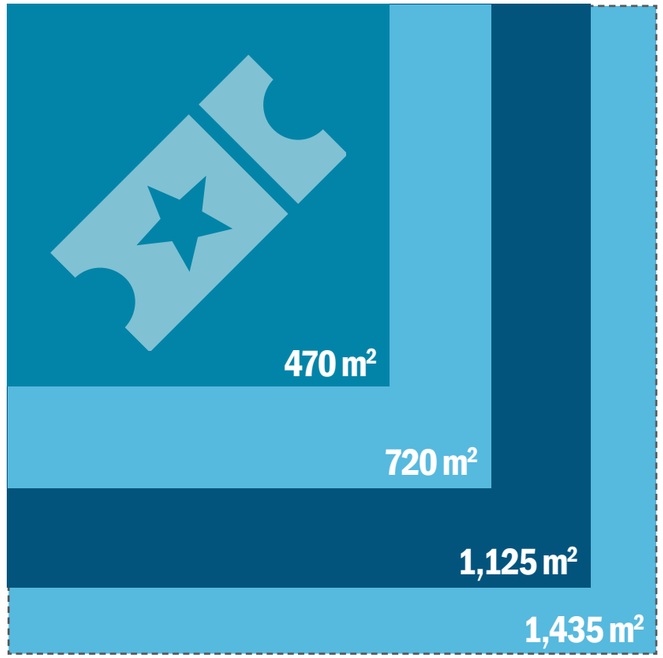
Food & Beverage
There are currently three food and beverage facilities in the park: Ollie's Landing, Breakers, and Waves. The number of food service units are all undersized and poorly distributed throughout the park. The main sit-down facility (currently Ollie's Landing) is substantially undersized and so are the two quick service units. The clustered location at the entrance of the park further reduces the units' ability to function efficiently, causing congestion and poor service which reduces guest satisfaction and resultant spend.

Changerooms & Washrooms
The changeroom facilities are dated and many of the layout choices are no longer appropriate for today's guest standards. For example, the showers are 'gang-style' without privacy which is not a style that is used in modern water parks. Additionally, the quantity of showers, changerooms, and lockers are all insufficient to meet current demands. The quantity of washrooms are also significantly under code, with the women's facility requiring almost double the number of fixtures to accommodate current attendance. Changeroom and washroom facilities are presently combined at the entrance without any satellite washroom distribution causing further congestion at the entrance.

Retail
Retail in the park is currently housed within the guest services facility. Retail should be a dedicated unit and is presently significantly undersized for current attendance numbers. Undersized retail limits revenue generation in the water park, as evidenced by the low per guest spend.

Administrative and FOH
The admin and FOH facilities are also undersized. This lack of space for staff reduces operational efficiency and makes it difficult to manage basic needs such as storage and space for staff.

FIGURE 6: ***Arrival Plaza and Ticketing Area Comparisons - Existing 1983 / Current Required / Update***



LEGEND

Existing (1983)

Plaza Area (Outside Gate): 470 m²

Ticketing (The Gate): 2 Booths

Bag Check: 2 Counters & Wristbands

Current Required

Peak Arrivals: 480 Guests

Plaza Area Requirement (Outside Gate): 720 m²

Ticketing (The Gate): 3 Booths

Bag Check: 3 Counters & Wristbands

Modest Improv.

Peak Arrivals: 750 Guests

Plaza Area Requirement (Outside Gate): 1,125 m²

Ticketing (The Gate): 5 Booths

Bag Check: 5 Counters & Wristbands

New Design

Peak Arrivals: 960 Guests

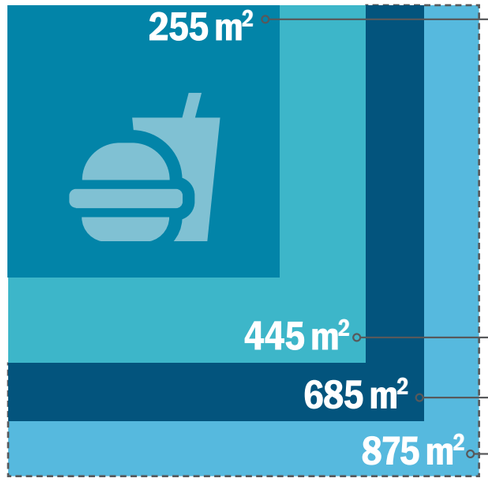
Plaza Area Requirement (Outside Gate): 1,435 m²

Ticketing (The Gate): 6 Booths

Bag Check: 6 Counters & Wristbands

0 m 10 m 30 m 50 m

FIGURE 7: ***Food and Beverage Facility Area Comparisons - Existing 1983 / Current Required / Update***



MAIN FACILITY (SIT DOWN) (OLLIES)
Hourly Meal Count: Unknown
Seats: 60
BOH: 75m²
FOH: 130m²
Total Area: 205m²

QUICK SERVICE (BREAKERS)
Hourly Meal Count: Unknown
Seats: 0
BOH: 25m²
FOH: 0m²
Total Area: 25m²

QUICK SERVICE (WAVES)
Hourly Meal Count: Unknown
Seats: 0
BOH: 25m²
FOH: 0m²
Total Area: 25m²

MAIN FACILITY (SIT DOWN)
Hourly Meal Count: 280
Seats: 95
BOH: 115m²
FOH: 215m²
Total Area: 330m²

QUICK SERVICE (2 TOTAL)
Hourly Meal Count: 190
Seats: 45
BOH: 40m²
FOH: 75m²
Total Area: 115m²

MAIN FACILITY (SIT DOWN)
Hourly Meal Count: 430
Seats: 144
BOH: 175m²
FOH: 330m²
Total Area: 505m²

QUICK SERVICE (2 TOTAL)
Hourly Meal Count: 290
Seats: 72
BOH: 65m²
FOH: 115m²
Total Area: 180m²

MAIN FACILITY (SIT DOWN
Hourly Meal Count: 550
Seats: 185
BOH: 225m²
FOH: 420m²
Total Area: 645m²

QUICK SERVICE (3 TOTAL)
Hourly Meal Count: 370
Seats: 95
BOH: 80m²
FOH: 150m²
Total Area: 230m²

LEGEND

Existing (1983)

Attendance: 100,000

Planned Guest Design Day: 1,400

Hourly Meal Count Total: Unknown

Current Required

Attendance (2018): 128,481

Guest Design Day Program Capacity: 2,050

Hourly Meal Count Total: 470

Modest Improv.

Projected Attendance (2022): 145,000

Projected Guest Design Day: 3,000

Hourly Meal Count Total: 720

New Design

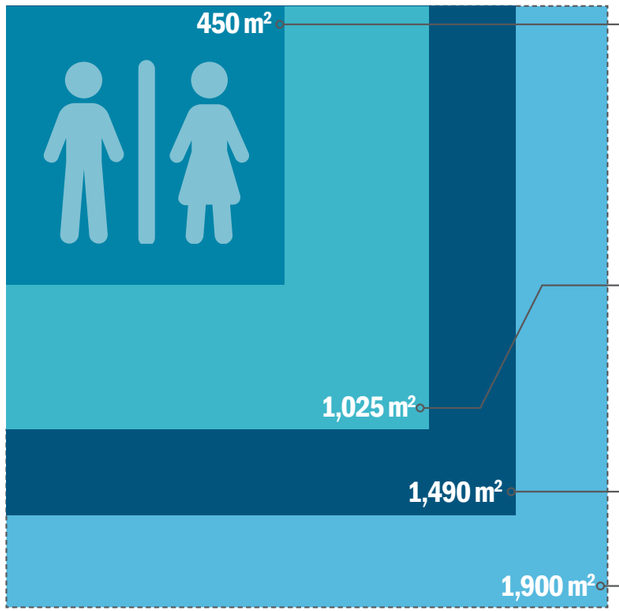
Projected Attendance (2022): 185,000

Projected Guest Design Day: 3,830

Hourly Meal Count Total: 920

0 m 10 m 30 m 50 m

FIGURE 8: ***Male/Female Change Facilities Area Comparisons - Existing 1983 / Current Required / Update***



450 m²	MALE		FEMALE	
	Washrooms:	12	Washrooms:	13
	Sinks:	7	Sinks:	7
	Showers:	14	Showers:	11
	Change Rooms:	78m² *	Change Rooms:	60m²*
		2 (Private)		12 (Private)
	Lockers:	546*	Lockers:	558*

*Change facility and lockers are combined

1,025 m²	MALE		FEMALE	
	Washrooms:	17	Washrooms:	26
	Sinks:	9	Sinks:	13
	Showers:	21	Showers:	21
	Change Rooms:	21	Change Rooms:	21
	Lockers:	1,660		

1,490 m²	MALE		FEMALE	
	Washrooms:	25	Washrooms:	38
	Sinks:	13	Sinks:	20
	Showers:	30	Showers:	30
	Change Rooms:	30	Change Rooms:	30
	Lockers:	2,400		

1,900 m²	MALE		FEMALE	
	Washrooms:	30	Washrooms:	45
	Sinks:	15	Sinks:	23
	Showers:	36	Showers:	36
	Change Rooms:	36	Change Rooms:	36
	Lockers:	2,905		

LEGEND

Existing (1983)
Attendance: 100,000
Planned Guest Design Day: 1,400

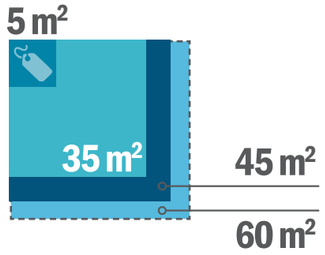
Current Required
Attendance (2018): 128,481
Guest Design Day Program Capacity: 2,050

Modest Improv.
Projected Attendance (Year 3): 140,000
Projected Guest Design Day: 3,000

New Design
Projected Attendance (Year 3): 187,000
Projected Guest Design Day: 3,830

0 m 10 m 30 m 50 m

FIGURE 9: ***Retail Area Comparisons - Existing 1983 / Current Required / Update***



LEGEND

Existing (1983)
Attendance: 100,000
Estimated Per Guest Spend: $0.10
Retail Area: 5 m²

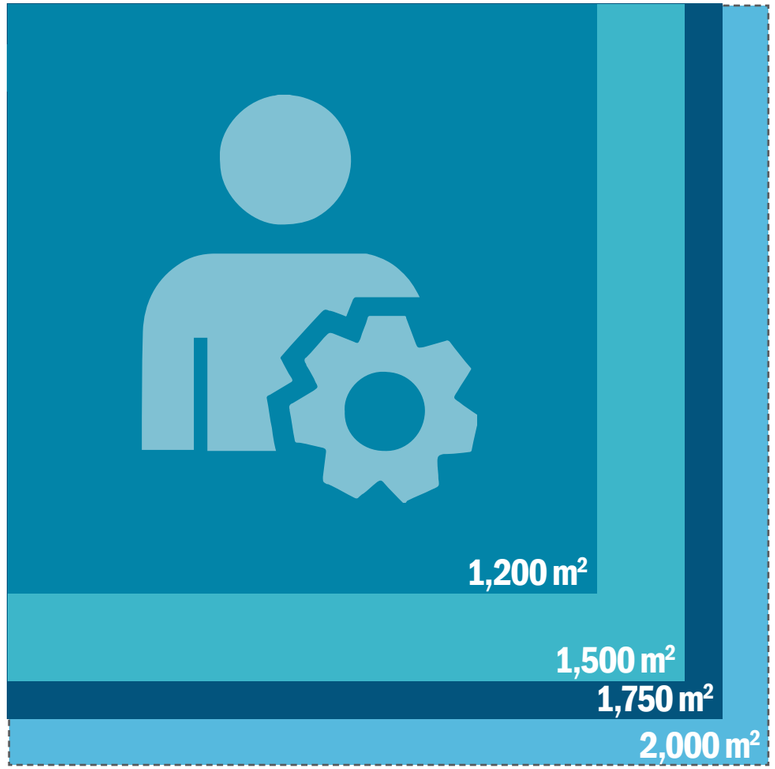
Current Required
Attendance: 128,481
Estimated Per Guest Spend: $0.60
Retail Area: 35 m²

Modest Improv.
Attendance: 145,000
Estimated Per Guest Spend: $0.75
Retail Area: 45 m²

New Design
Attendance: 185,000
Estimated Per Guest Spend: $0.80
Retail Area: 60 m²

0 m 10 m 30 m 50 m

FIGURE 10: ***Admin/FOH Area Comparisons - Existing 1983 / Current Required / Update***



LEGEND

Existing (1983)
Attendance: 100,000
FOH Area: 1,200 m²
BOH Area: 600 m²

Current Required
Attendance: 128,481
FOH Area Requirements: 1,500 m²
BOH Area Requirements: 800 m²

Modest Improv.
Attendance: 145,000
FOH Area Requirements: 1,750 m²
BOH Area Requirements: 900 m²

Future
Attendance: 185,000
FOH Area Requirements: 2,000 m²
BOH Area Requirements: 1,000 m²

0 m 10 m 30 m 50 m

4.2.3 SITE EVALUATION - ANALYSIS SUMMARY

A number of trends emerge when considering the SWOT and facility analyses.

The site has a reasonable amount of open space around the periphery of the site that is currently being utilized as passive park area. Mature trees and other vegetation help to enhance the park, frame or screen views and provide a backdrop for rides and attractions. In recent years, the maintenance of the grounds landscaping has improved as staff have made a concerted effort to improve and maintain the landscaping.

The centralized location of the wave pool and corresponding beach area functions as a “base camp” and allows guests to easily orient themselves. The most notable strength is the dedication of the full-time staff to the maintenance and operation of the water park. Several key skilled and dedicated staff have been able to reduce the water park operations costs while refurbishing older infrastructure with minimal operation funds.

Many weaknesses identified are largely a result of the age of the facility’s infrastructure and the pressures current attendance rates place on aging, end of life facilities. All building facilities, while structurally sound, are significantly undersized to meet the current attendance and are poorly distributed throughout the site. This creates circulation congestion issues throughout (particularly at the entrance area), negative guest experience, and the loss of potential revenue. Outdated POS systems compound these challenges by reducing the efficiency with which staff can serve guests’ needs. The attractions are reaching or are at the end of their lifespan and are having difficulty functioning under the stress of peak days.

Most of the threats identified in the analysis relate directly to the insufficient size of existing facilities or the physical degradation of attractions and their corresponding mechanical systems. A majority of these systems, rides, attractions, and facilities have far exceeded a reasonable operating life cycle.

Other weaknesses relate to the growth of the water park over time and design decisions that were not fully considered when additional attractions or facilities were being built. Amenities such as shade or guest seating have not been properly provided. Revenue-generating amenities such as cabanas and event space are not being capitalized to their full potential. The mix of attraction types provided does not include dry play activities or places for guests to congregate during inclement weather events. The selection of rides and attractions no longer meets the increasing demands of guests for an improved entertainment experience.

On a positive note, the adjacent space to the water park presents an excellent opportunity to remedy many of the layout and programming challenges the park currently faces. There is space to expand/redistribute facilities to meet code/guest requirements, add attractions to increase guest entertainment, and integrate amenities such as shade and seating throughout the site. Underutilized areas within the water park also create an opportunity to provide additional attractions and reorganize facilities.

Overall, there are many challenges the park faces, including a number of critical safety issues which must be addressed as soon as possible. The water park has assets which can be leveraged to overcome several obstacles currently hindering its smooth and successful operation.

4.3 ANNUAL ATTENDANCE PAST AND FUTURE

Wild Waterworks opened in 1983 and achieved its highest annual attendance, with just over 153,000 guests in its first year. Attendance over the past 35 years has averaged approximately 110,000 with peak attendance of 140,000 in 2005 and 2016. Attendance has fallen below 100,000 guests in 8 of the past 35 years. In 2018, attendance was approximately 128,000, which was much better than the stabilized average. Based on past and current revenue, operations costs, the park breaks even operationally at approximately 100,000 guests per year. As part of their market and financial analysis, CBRE reviewed the four options required for this study as well as a fifth, indoor water park option requested by City staff. The findings of their report are contained within the Appendix A-1, Market and Financial Analysis of Wild Waterworks. Their analysis reviewed each of the four options for the water park and provided estimated attendance levels for each of the four options. Based on the market and feasibility analysis and estimated attendance, the overall size of Wild Waterworks would remain unchanged for both Option 1+2. Attendance in Option 1 would gradually decrease in the next 2-5 years falling well below 100,000. As infrastructure, rides and attractions continue to age and are taken out of service, it is expected that the park will become increasingly expensive to operate and would be closed. Attendance for Option 2 will slowly increase over the average attendance, increasing gradually over the next 2-5 years. The size of the water park will remain unchanged for this option as the current park area can accommodate the anticipated attendance.

The water park size for Options 3+4 would need to be increased to accommodate increased annual (daily) attendance, as well as provide new rides and attractions for guests. For both options, attendance will increase steadily over the next 5-8 years until a new stabilized attendance level is achieved. Both option 3+4 require additional park area and an increased service level of rides and attractions. Details of the Four Options are presented in subsequent sections of the report.

4.5 ANALYSIS OF FOUR OPTIONS

City of Hamilton staff requested that the Master Plan Study include a range of four (4) options for presentation to Senior Management and Public Works Committee and Healthy and Safe Communities in early 2020.

These options can be summarized and will be evaluated as follows:

Master Plan Study include a range of four (4) options

1. ***Do Nothing:*** Do nothing, consider the probable remaining life cycle of all facilities.
2. ***Replace Like for Like:*** Replacement of existing rides, attractions, and facilities with same/similar.
3. ***Modest Enhancements:*** Replacement of rides and attractions with the addition of new dry/wet attractions, and improved operational systems.
4. ***New Design:*** New design, rides and attractions, and facilities to meet future guest needs.

To complete the analysis of four options, we have broken our scope into tasks as shown below.

SITE EVALUATION, ANALYSIS AND OBSERVATIONS

- We reviewed all information collected and recorded to assist in understanding the existing site features, parkland and landscape conditions. This was used to help prepare our comparison and analysis of current capacities and desired capacities. Our team completed a data analysis of both existing and projected attendance.
- Using the market information provided by the City of Hamilton, together with the annual attendance projected by CBRE, we considered individual rides and capacities to determine which rides and attractions are performing well, which are under performing and which are at acceptable levels of performance. We also compared this to the site and area capacities together with the probable service life remaining by estimating how long the ride/attraction will perform as intended.
- The same steps were taken for all the other facilities including washrooms, change areas, food and beverage, circulation and overall guest experience. This helped guide in a clear and objective way, decisions on replacement of older, under- performing rides/attractions, adding new rides/attractions and any other design modifications to enhance guest experience, increase capacity or correct identified operational issues.
- FORREC retained Cloward H2O, Aquatic Engineers from Provo Utah, USA, to examine the current aquatic infrastructure through the eyes of an experienced engineer. This was critical to understand the condition and potential remaining service life of existing equipment. Cloward provided an engineering assessment related to the serviceability, operating condition and anticipated longevity of existing systems related to the circulation, treatment and controls of water quality within the park. Their findings and recommendations addressed how to best approach resolution of the identified issues. This report includes, by aquatic attraction, an evaluation of the existing systems (description, condition, functionality, remaining life, risk assessment, photographic documentation, etc.), explanations of identified issues, recommended options for remediation and/or improvements.
- The Aquatic Engineering Report is included as **Appendix A-2: Aquatic Engineering Facility Review Report + Recommendations**

1 4.5.1 Do Nothing

The **“Do Nothing”** option considers the remaining and expected lifespan of the water park facilities assuming no major upgrades or capital investment is made to the existing facility.

Given most of the existing infrastructure is aged and has already exceeded a reasonable and expected life cycle, the degradation of infrastructure, rides, and attractions will continue. As rides and attractions stop working or no longer can be reasonably repaired, they will be incrementally closed or shut down. Once this occurs to a point where guest experiences are adversely impacted, guest attendance is expected to begin declining noticeably from current levels. Once the annual attendance drops below the ±90,000 visits required for break even revenue targets, operating costs will exceed revenues. At this point in time the City will need to re-examine the financial viability of Wild Waterworks. It is highly possible the City will need to consider the range of options presented in this report to upgrade facilities or consider closing the facility for other City wide purposes.

Current, aging infrastructure will continue to degrade requiring higher expenditures annually to maintain current operating conditions. It is expected an average of 15-20% annual increase in maintenance costs will occur. This will require an increase in the number of maintenance staff to implement repair work and further require additional and highly specialized repair staff or vendors. We note that many of the facilities have already had a greatly extended life cycle due to the efforts of dedicated and highly skilled staff. While this is a tremendous asset to the water park, it is not reasonable to expect that this trend will occur indefinitely.

While the “**Do Nothing option”** may sound like a no capital cost option, it will require an increasing level of operating/maintenance capital to continue to keep the park open for the remainder of its life cycle. Once the park reaches the point where the decision is made to close, the park will require demolition, regrading and restoration/rehabilitation, seeding and preparation for a future use. We have included a cost for this work.

Little Squirt Works
Ideally this entire area should be replaced. There are too many repairs and alterations to mechanical systems, surfacing, paving, drainage, etc required for the pool to function properly and safely.

Wave Pool
Another pool coating re-finish will be necessary in the next few years, as once the finish begins to deteriorate total failure is relatively rapid. Wave pool equipment is in excellent working condition with another 10-15 years life expectancy. Overall the wave pool has a life expectancy of 10-15 years.

East Slides
The East slide complex has a life expectancy of 8 – 12 years if upgraded with new slide pumps.

West Slide
The West slide complex requires moderate amounts of maintenance and repairs in order to continue to function. Failure is imminent if issues aren’t addressed in the near future.

Eazy River
The Eazy River has a few years of service remaining with continued maintenance. Caulking should be replaced, among a few other maintenance items.

2 4.5.2 Replace Like for Like

The **"Like for Like"** option considers the replacement of rides, attractions, and facilities with similar elements to those currently existing as existing facilities come to the end of their lifespan and begin to fail. For example, an existing body slide would be replaced with a newer body slide of like or similar quality, rather than replacing with an entirely different ride or attraction. To the extent practical, the replacement ride/attraction will occur within a similar footprint which further limits the type of replacement which can be utilized. This approach envisions an incremental replacement program of rides and attractions.

All buildings that exist today are undersized to meet the current attendance levels. All front of house, food and beverage, washrooms/showers, lockers, and other staff and guest buildings need to be replaced to meet code requirements and current guest attendance. In this option, it is anticipated that all buildings will be replaced and located to optimize program and resolve many known operational issues.

Further, annual attendance will not increase in this option as the existing facilities will be correctly sized to handle current attendance rates.

Front Entry & Facilities
Given that many of the issues identified in the SWOT (Strengths, Weakness, Opportunities and Threats) analysis relate to the insufficient size of existing facilities, the entrance buildings will be replaced in all options involving capital investment. This includes increasing the size of ticketing, food and beverage, washrooms, changerooms, lockers, retail, first aid, and administrative facilities to meet current attendance requirements. Plaza space both outside and within the water park will be provided to ease circulation and wayfinding issues in addition to providing appropriate queuing areas. The redesign of the entrance facilities will also address missing connectivity with the waterfront trail. The increase in size of the entrance facilities will push the arrival sequence west into the existing parking lot. Vehicular and bus parking and drop off areas will also move west and be reconfigured based on existing attendance needs. The current overflow parking will be redesigned as part of the permanent parking area for the water park.

Little Squirt Works
Ideally this entire area should be replaced. As outlined in the Aquatic Engineering Report (see Appendix A-2), this pool is the most problematic feature in the entire park regarding sanitation and safety and has the most pressing need for replacement. The recommended course of action is to redesign and replace the pool and its features entirely. The pool should be designed to have a dedicated water treatment system, leaving the existing water treatment system to service the east slide complex.

East and West Slide Complexes
Both slide complexes are visibly aging and will eventually require replacement. With the redesign of Little Squirt Works, including a dedicated water treatment system, the east slides have the potential to last another 8 – 12 years with new pumps and diligent maintenance (Aquatic Engineering Report, Appendix A-2). Once the East and West Slide complexes have reached the end of their lifespan, they will be replaced with similar body and tube slide complex rides.

The west slide complex is in need of immediate attention to avoid imminent failure. Even with careful maintenance, it is likely that the west slide complex will need to be completely replaced in the next few years. Once this complex fails, it will be replaced with another tube slide complex.

Replace Like for Like (continue)...

Eazy River
The Eazy River, has some years of service life remaining, if retained, requires updates to improve its construction weaknesses. The lack of propulsion, poor waterproofing, narrow width, rough surfacing, and insufficient drain grates should all be addressed to increase the safety, efficacy, and entertainment value of this attraction. The path of the river is well-integrated into the site and can be reused with minimal changes or interventions.

Paving & Pool Surfacing
There are numerous concerns with the pool finishes and hardscape paving which should be addressed. Both the wave pool and river should be resurfaced to reduce safety risks. The concrete paving should be replaced with a slip and heat-resistant surfacing to reduce injuries, improve park aesthetics, and increase guest enjoyment. These improvements should be phased in over time as adjacent rides/attractions are replaced.

FIGURE 11: ***Like for Like Option***

REPLACE LIKE FOR LIKE ANTICIPATED OUTCOMES

OUTCOMES

- Adequately sized entrance facilities, improved parking and drop off
- Washrooms/showers brought up to code
- Provides connection with the waterfront trail
- Increased revenue generation potential
- Improved hygiene and safety standards
- Improved entertainment value

NOT ADDRESSED

- No increase in capacity or attendance
- No improvement in facility distribution throughout park
- No increase in lounging or shade
- No improvement to cabanas or event space
- No dry activities or sheltered areas
- No activities for teens only
- No activities for adults only

While the **"Like for Like"** option allows building facilities and attractions to be brought to meet current standards and accommodate current attendance, it does not address many key issues and cannot accommodate an increase in attendance.

3 4.5.3 Modest Improvements

The **"Modest Improvements"** option considers both the retention or replacement of major rides and attractions together with the addition of new dry/wet attractions, a sheltered recreation area and improved operational systems. It retains some of the strategies from the "Like for Like" option while also providing additional, new attractions and program to the park. In this option, phased replacement of rides/attractions will occur as they reach end of their respective life cycle. The rides/attractions will be replaced with facilities which are more appropriate for the targeted guest demographic, ages, and types of experiences and thrill levels. Key facilities such as the Wave Pool and Eazy River would be retained and maintained for the remainder of their life cycle and would be replaced in a similar location with layout refinements and additions

Front Entry & Facilities
Given that many of the issues identified in the SWOT (Strengths, Weakness, Opportunities and Threats) analysis relate to the insufficient size of existing facilities, the entrance buildings will be replaced in all options involving capital investment. This includes increasing the size of ticketing, food and beverage, washrooms, changerooms, lockers, retail, first aid, and administrative facilities to meet current attendance requirements. Plaza space both outside and within the water park will be provided to ease circulation and wayfinding issues in addition to providing appropriate queuing areas. The redesign of the entrance facilities will also address missing connectivity with the waterfront trail. The increase in size of the entrance facilities will push the arrival sequence west into the existing parking lot. Vehicular and bus parking and drop off areas will also move west and be reconfigured based on attendance needs. The current overflow parking will be redesigned as part of the permanent parking area for the water park.

Little Squirt Works
This entire area will be redesigned and replaced in its entirety. The pool should be designed to have a dedicated water treatment system, leaving the existing water treatment system to service the east slide complex.

The new area will increase active water play elements (i.e. squirt guns, tipping bucket, etc.).

A new washroom and a food and beverage unit will be located adjacent to the kid's pool to improve the distribution of facilities throughout the park and provide easy access for parents of young children. Varied types of seating and cabanas around the attraction will be provided.

East and West Slide Complexes
Both slide complexes are visibly aging and will eventually require replacement. With the redesign of Little Squirt Works, including a dedicated water treatment system, the east slides have the potential to last another 8 – 12 years with new pumps and diligent maintenance. Once they have reached the end of their lifespan, they will be replaced with newer body slides, tube slides, a thrill ride or other rides to satisfy the program requirements and guest needs.

The west slide complex requires immediate attention to avoid failure. Even with careful maintenance, it is likely that the west slide complex will need to be completely replaced in the next few years. Given the popularity of these slides, it is recommended that when the complex fails, it be replaced with another tube slide complex with an exciting ride path. The selection will depend on providing a balanced range of rides and attractions throughout the park.

Modest Improvements (continue)...

Easy River
The Eazy River requires updates to improve its construction weakness. The lack of propulsion, poor waterproofing, rough surfacing, and insufficient drain grates should all be addressed to increase the safety, efficacy, and entertainment value of this attraction. The path of the rivers is well-integrated into the site and can be reused with minimal changes or interventions. Once the facility reaches the end of its service life, a new lazy or action river should replace this with some additional features and possibly a greater length.

Paving & Pool Surfacing
There are numerous concerns with the pool finishes and hardscape paving which should be addressed. Both the wave pool and river should be resurfaced to reduce safety risks. The concrete paving should be replaced with a slip and heat-resistant surfacing to reduce injuries, improve park aesthetics, and increase guest enjoyment. These improvements should be phased in over time as adjacent rides/attractions are replaced.

Play Structure
A new play structure will be added adjacent to Squirt Works to provide additional program for younger children. The play structure can be a combination of either wet or dry play with an opportunity to provide a significant amount of shade and varied levels of play value.

Adventure Course
The northeast corner of the site is generally disconnected from the balance of park attractions, currently serving as a pavilion event space and passive park area. A dry play activity that caters to older kids/teens would take advantage of the mature tree canopy and be integrated into the space. An adventure ropes course or tree-top trek type of attraction would cater to this age demographic. Circulation will be considered providing a connection to the whole park.

Family Raft Ride
The water park is currently lacking a thrilling family ride such as a family raft ride. A four or six-person family style raft ride will be added between the east slide complex and the wave pool, providing additional program and visual mass to the southeast corner of the site.

Teen Activity Pool
The water park is also currently lacking a water activity for older children and teens. A portion of the area inside the river will be infilled with a teen activity pool, offering a mix of exciting water play options such as floatable walks, zip lines, climbing walls, and basketball, among other activities.

Both a washroom and food and beverage unit will be located inside the river loop to improve the distribution of facilities throughout the park and cater to the demographic of the teen activity pool.

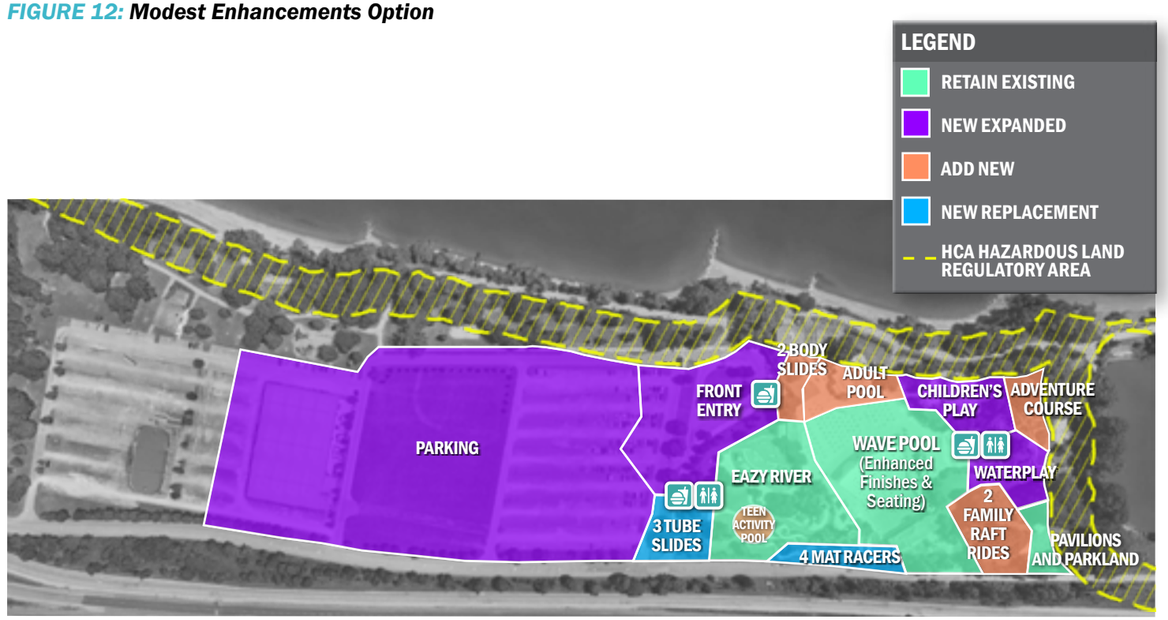
Guest Amenities
Additional areas of planting will be integrated throughout the park including the wave pool beach area to provide shade, visual interest, and moderate privacy for guests. Picnic tables will be replaced with loungers and chairs, offering a more comfortable and relaxing guest experience and greater deck area capacity.

Cabanas will be increased in number and upgraded to permanent structures with better distribution throughout the water park.

Theming and signage can improve significantly, creating a clear wayfinding strategy while enhancing the guest experience and branding/ marketing potential of the park.

A new point of sale (POS) system and radio frequency identification (RFID) wristbands will be integrated with facilities and ticketing to improve ticket processing times, encourage revenue generation through cashless payment, and improve the guest experience.

FIGURE 12: ***Modest Enhancements Option***



4 4.5.4 New Design

The **"New Design"** option considers a new layout and program of the water park including a complete redesign of the existing facility, retaining few, if any of the original components. In this option, the water park will be designed to meet projected future attendance and provide rides and attractions that meet the family demographic and current guest expectations.

The proposed location of rides and attractions and their relationship to one another and to facilities have been explored in an in-depth design process. The new design will accommodate the future projected annual attendance.

Front Entry & Facilities
The entrance buildings will be designed to accommodate both current and future attendance. This includes increasing the size of ticketing, food and beverage, washrooms, changerooms, lockers, retail, first aid, and administrative facilities. Plaza space both outside and within the water park will be provided to improve circulation and wayfinding, in addition to providing appropriate queuing areas. The redesign of the entrance facilities will also address missing connectivity with the waterfront trail. The increase in size of the entrance facilities will push the arrival sequence west into the existing parking lot. Vehicular and bus parking and drop off areas will also move west and be reconfigured based on attendance needs. The current overflow parking will be redesigned as part of the permanent parking area for the water park.

Additional washroom and food and beverage units will be distributed throughout the site at necessary locations, allowing guests to easily access facilities and increasing the potential revenue generation of the park.

Wave Pool
A new wave pool will be designed to accommodate the future annual attendance and create shallow water zones for small children and larger beach areas for relaxing and lounging. Given new wave machine technology, the wave heights may be varied to meet different guest profiles at different times of day from smaller children family friendly to larger more teenager/ adult thrill level.

Children's Activity Pool
A children's play area will be designed with exciting, age-appropriate activities. Active water play elements such as squirt guns and tipping buckets will be integrated into a wet deck or shallow pool. Colourful paving and themed water features will create an immersive environment for children to play and explore. Shaded areas offer respite from the sun and places for parents and children to relax.

Both a washroom and food and beverage unit will be located in the near vicinity to provide easy access for parents of young children. Varied types of seating will be provided, including lounge chairs and cabanas.

Play Structure
A play structure will be added to provide additional program for younger children. The play structure can be either wet or dry play, and there is the opportunity to shelter a portion of the area depending on the type of structure.

Adventure Course
The northeast corner of the site will be transformed into a dry play activity that caters to older kids/teens and which takes advantage of the mature tree canopy, such as an adventure ropes course or tree-top trek. Circulation will be considered to connect the attraction to the rest of the park activities.

New Slide Complexes
Both existing slide complexes are visibly aging and will be replaced with newer body slides, tube slides, a thrill ride and other rides to satisfy the program requirements and guest needs. The selection will depend on providing a balanced range of rides and attractions throughout the park.

Family Raft Ride
A four or six-person raft ride will be integrated into the site, adding a thrilling ride for the entire family to enjoy.

Easy River
An Eazy river will be designed to be well-integrated with the site and other rides/ attractions. Water spray features will be integrated with the river, adding entertainment value. Bubblers, spray guns, overhead waterfalls, and other features offer a wonderful opportunity to make the river a dynamic experience for all age levels.

Other Dry activities and sports
A range of other sports and recreation facilities were considered as part of this new design such as cricket, pickle ball courts, sand volleyball and other dry sports. After reviewing the opportunities, the team determined with City staff these uses are more suitable for the former campground area being developed as City-wide sports zone as envisioned in the Confederation Beach Park Master Plan Review & Update 2010, prepared by G. O'Connor Consultants Inc..

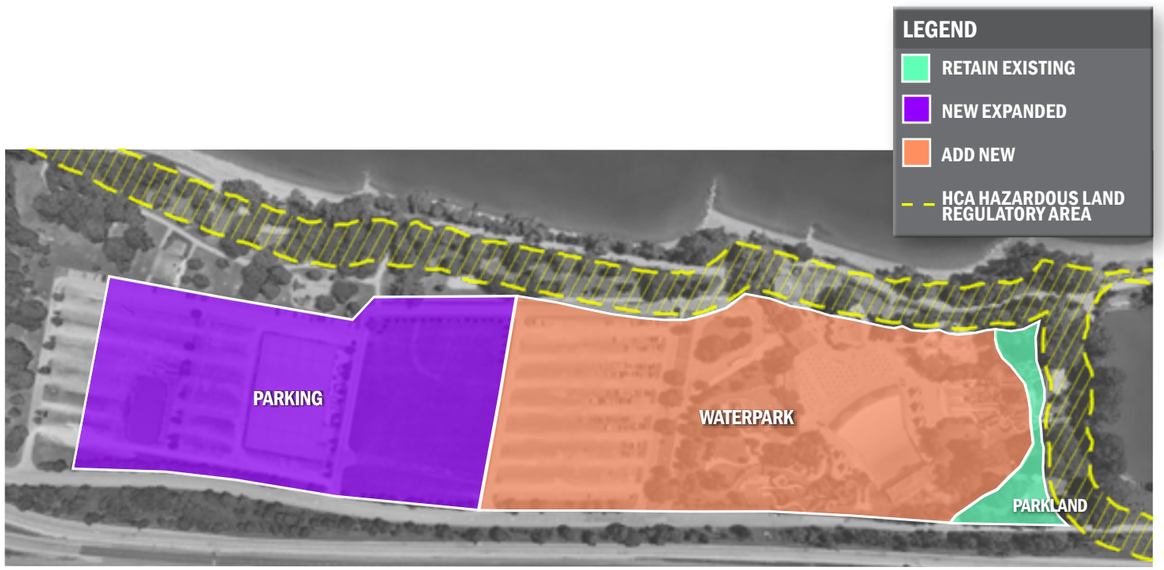
Teen Activity Pool
A lively and energetic teen activity pool will offer a mix of exciting water play options such as floatable walks, zip lines, climbing walls, basketball, among others. Places for older children and teens to play, interact, and hang out will be integrated with the area.

Guest Amenities
Planting islands will be designed throughout the park to provide shade, visual interest, and moderate privacy for guests. Dedicated areas for loungers, chairs, and tables will all be provided, offering a comfortable and relaxing guest experience. Cabanas will be themed and well-sited, maximizing their revenue generation capacity. Paving and pool surfacing throughout the park will be slip and heat-resistant, and will be designed to enhance the attractions, features, and identity of the park.

Theming and signage will improve significantly, creating a clear wayfinding strategy and enhance the guest experience and branding/ marketing potential of the park.

A new point of sale (POS) system and radio frequency identification (RFID) wristbands will be integrated with facilities and ticketing to improve ticket processing times, encourage revenue generation through cashless payment, and improve the guest experience.

FIGURE 13: ***Mew Design Option***



NEW DESIGN ANTICIPATED OUTCOMES

OUTCOMES

- Adequately sized entrance facilities
- Washrooms/showers brought up to code
- Provides connection with the waterfront trail
- Improved vehicular/bus parking, drop off
- Increased revenue generation potential
- Improved hygiene and safety standards
- Improved entertainment value
- Improved operational efficiency
- Increased capacity, greater annual attendance
- Improved facility distribution throughout park
- Improved lounging and shade areas
- Improved and increased number of cabanas
- Provides dry activities
- Improved seasonal activities
- Provides teen activities
- Improved activities for adults only
- Optimal location/relationship of each attraction
- Increased guest satisfaction
- Improved F+B sales and overall park attendance

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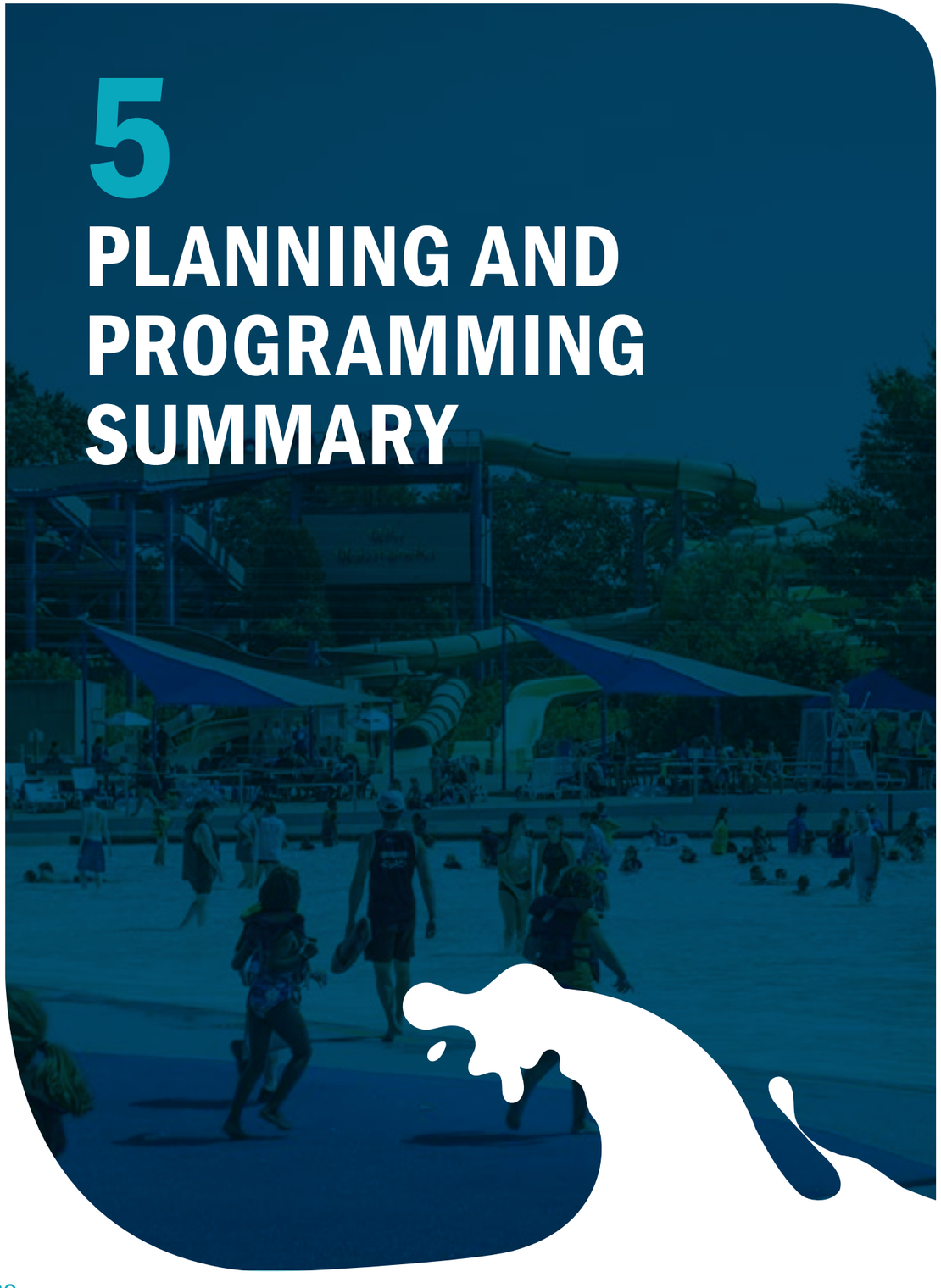
5 PLANNING AND PROGRAMMING SUMMARY



5 PLANNING AND PROGRAMMING STUDY

PLANNING AND PROGRAMMING ATTRACTIONS/RIDES

The planning and design work will address the issues and opportunities identified in the Analysis task. We considered a range of solutions to enhance guest experience, improve the mix of rides and attractions to provide new, more interesting challenges to meet a changing demographic and increase potential park attendance. We prepared summary graphics and figures to clearly illustrate and support our findings.

These will include dry land play and activities during rain days.

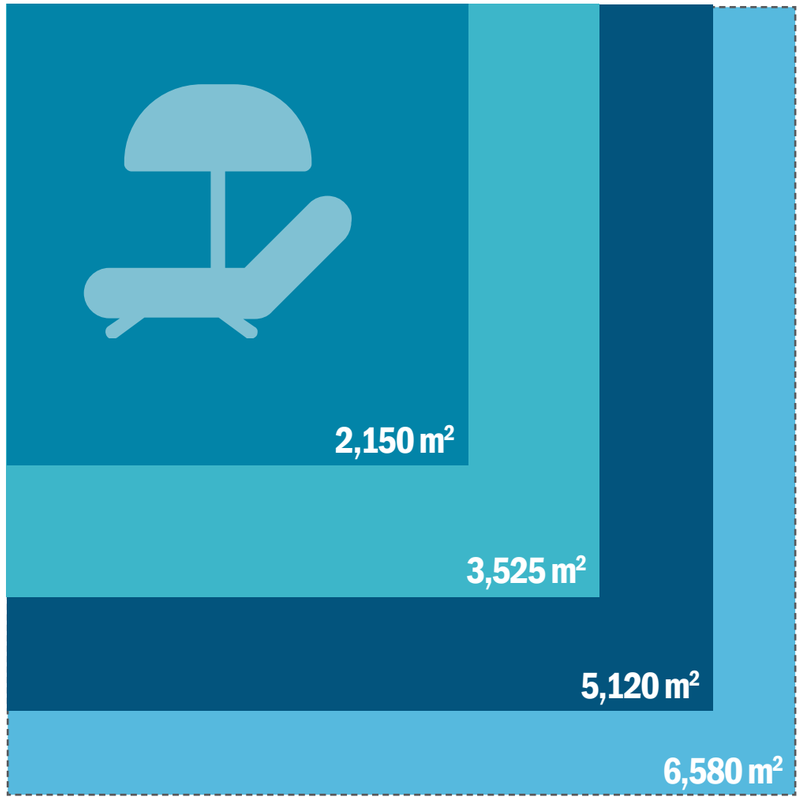
FORREC prepared an Overall Vision Plan for the 10ha site, including the Wild Waterworks Water Park, drop off/arrival areas, parking lot and overflow grass area up to the sand volleyball area. It considered and accommodated the range of programs and activities discussed during the analysis phase. This will allow potential for expansion either initially or in the longer term as deemed applicable by the study.

This task will bring together all the previous discussion and observations to date that creatively address and resolve, to the extent practical, the issues identified and desired programs. Our overall plan will organize and create strong relationships between various elements or areas, whether rides, attractions, food and beverage or back of house. We will show, as appropriate, the replacement of new more iconic rides to supplement and increase the capacity while enhancing the guest experience.

Improvements to driveway, bus drop off, parking and entrances. The plan addresses the required parking, guest arrival sequence, vehicular circulation, pedestrian circulation, water park, dry play and wet programs.

Potential links to the Ontario and Waterfront Trail, adjacent picnic areas, protection of parkland features.

FIGURE 14: ***Lounging Area Comparisons - Existing 1983/ Current Required / Update***



LEGEND

Existing (1983)

Guest Design Day Assumption: 1,400

Percentage of Guests Lounging (Passive Activity): 30%

Number of Lounge Chairs: 160

Number of Picnic Tables: 284

Lounging Area Available: 2,150 m²

Current Required

Guest Design Day Assumption: 2,050

Percentage of Guests Lounging (Passive Activity): 40%

Number of Guests Lounging: 820

Area Requirement (4.3 m²/pp): 3,525 m²

Modest Improv.

Guest Design Day: 3,000

Percentage of Guests Lounging (Passive Activity): 40%

Number of Guests Lounging: 1,190

Area Requirement (4.3 m²/pp): 5,120 m²

New Design

Guest Design Day: 3,830

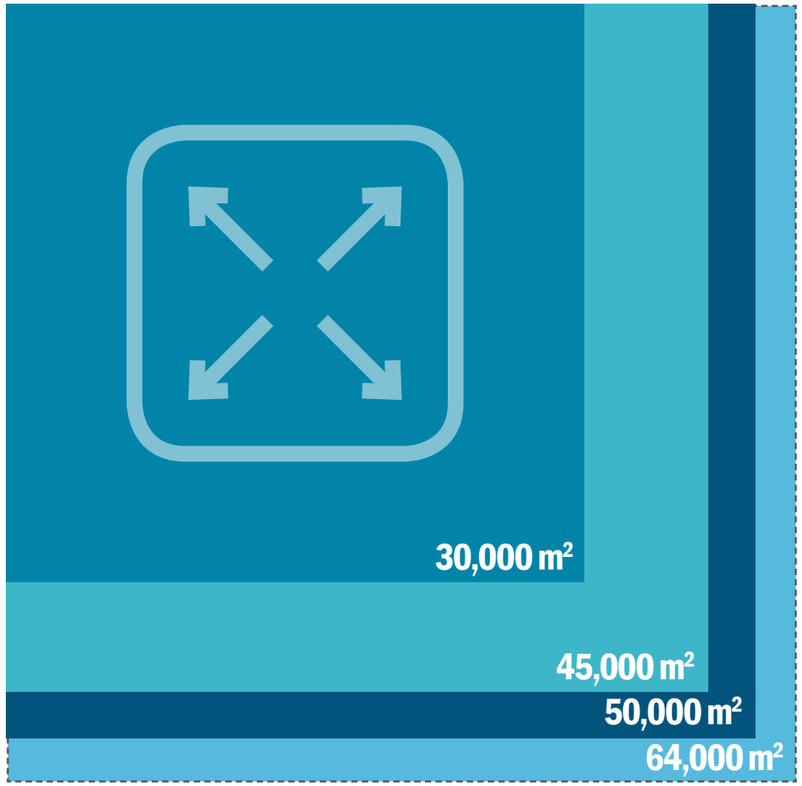
Percentage of Guests Lounging (Passive Activity): 40%

Number of Guests Lounging: 1,530

Area Requirement (4.3 m²/pp): 6,580 m²

0 m 10 m 30 m 50 m

FIGURE 15: ***Park Size Requirement with Increased Attendance - Existing 1983 / Current Required / Update***



LEGEND

Existing (1983)

Attendance: 100,000

Guest Design Day: 1,400

Opening Day Park Area: 20,000 m²

Park Area Per Guest: 14.28 m²/pp

Current In Park Area: 30,000 m²

Guest Design Day: 3,000

Park Area Per Guest: 10 m²/pp

Current Required

Attendance: 128,481

Guest Design Day: 3,000

Current Usable Park Area: 30,000 m²

In Park Usable Area Requirement: 45,000 (4.5 Ha)

Park Area Per Guest: 15 m²/pp

Modest Improv.

Attendance: 145,000

Guest Design Day: 3,000

Overall Park Area Requirement: 50,000 m²

Park Area Per Guest: 16.5 m²/pp

New Design

Attendance: 185,000

Guest Design Day: 3,830

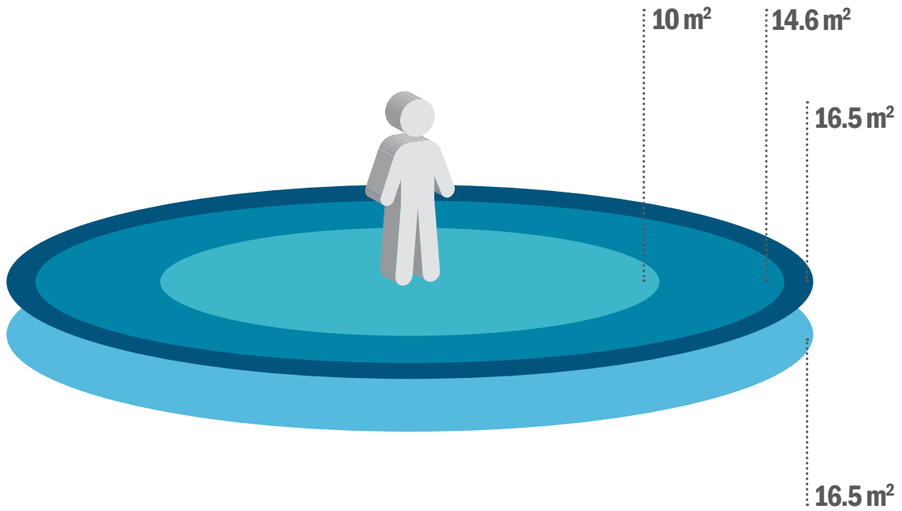
Overall Park Area Requirement: 64,000 m² (6.4 Ha)

In Park Area Requirement: 55,000 (5.5 Ha)

Park Area Per Guest: 16.5 m²/pp

0 m 30 m 50 m 250 m

FIGURE 16: Park Size Requirement with Increased Attendance - Existing 1983 / Current Required / Future



LEGEND

Opening (1983)
Attendance: 100,000
Guest Design Day: 1,400
In Park Area: 20,500 (2.05 Ha)
Park Area Per Guest: 14.6 m²/pp

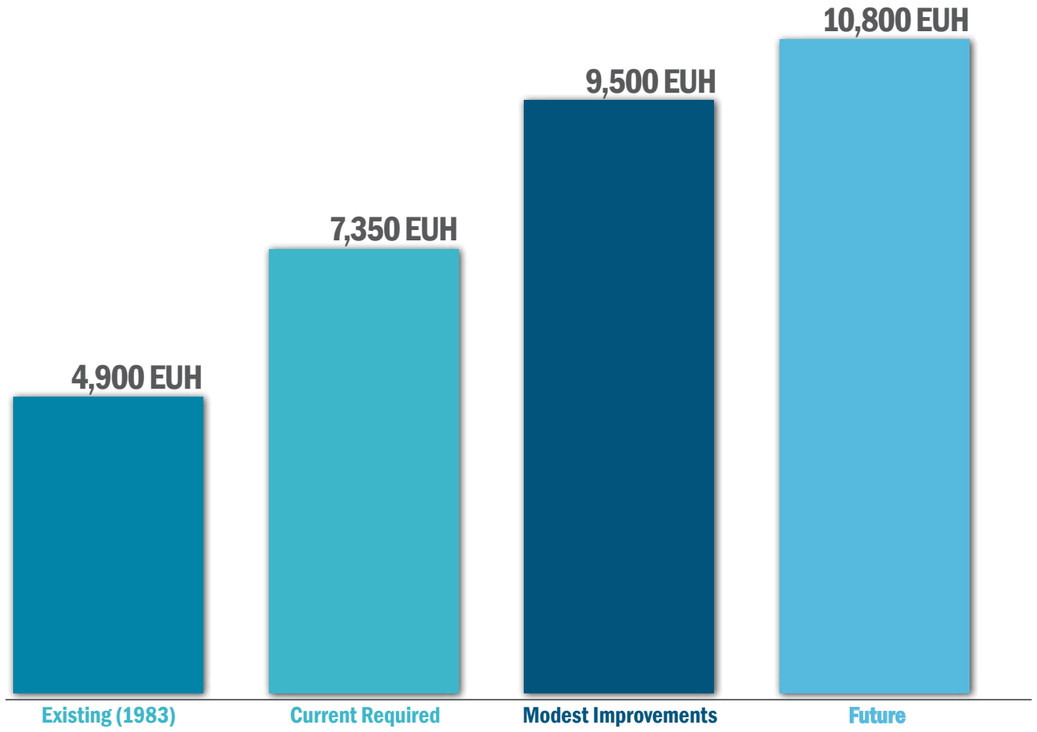
Current
Attendance: 128,481
Guest Design Day: 3,000
In Park Usable Area: 30,000 (3.0 Ha)
Park Area Per Guest: 10 m²/pp

Modest Improv.
Attendance: 145,000
Guest Design Day: 3,000
In Park Area: 50,000 (53.0 Ha)
Park Area Per Guest: 16.5 m²/pp

New Design
Attendance: 185,000
Guest Design Day: 3,830
In Park Area: 64,000 (6.4 Ha)
Park Area Per Guest: 16.5 m²/pp

0 m 5 m 10 m

FIGURE 17: Water Rides and Water Attractions Entertainment Capacity Comparisons - Existing 1983 / Current Required / Update



LEGEND

Existing (1983)
Attendance: 100,000
Design Day: 1,400
Optimal Entertainment Units Per Hour (EUH): 3.5
Total Entertainment Units Required: 4,900

Current Required
Current Design Entertainment Analysis
Attendance (2018): 128,481
Total Entertainment Units Per Hour Available: 7,340
Entertainment Units Per Hour (EUH): 2.5
Recommended Design Day Capacity: 2,050
Resultant Entertainment Units Per Hour (EUH): 3.6

Modest Improv.
Projected Attendance (Year 3): 140,000
Design Day: 3,000
Total Entertainment Units Per Hour Required: 9,500
Entertainment Units Per Hour (EUH): 3.5

New Design
Design Entertainment Requirement
Projected Attendance (Year 3): 187,000
Design Day: 3,830
Total Entertainment Units Per Hour Required: 12,000
Entertainment Units Per Hour (EUH): 3.5

FIGURE 18: ***What is entertainment units per hour (EUH)?***

3 Entertainment Unit Per Hour (EUH)

EUH is the number of activities a guest participates in one hour.

3 to 4 EUH is recommended.

FIGURE 19: ***Current Entertainment Capacity Analysis - Guest Distribution***

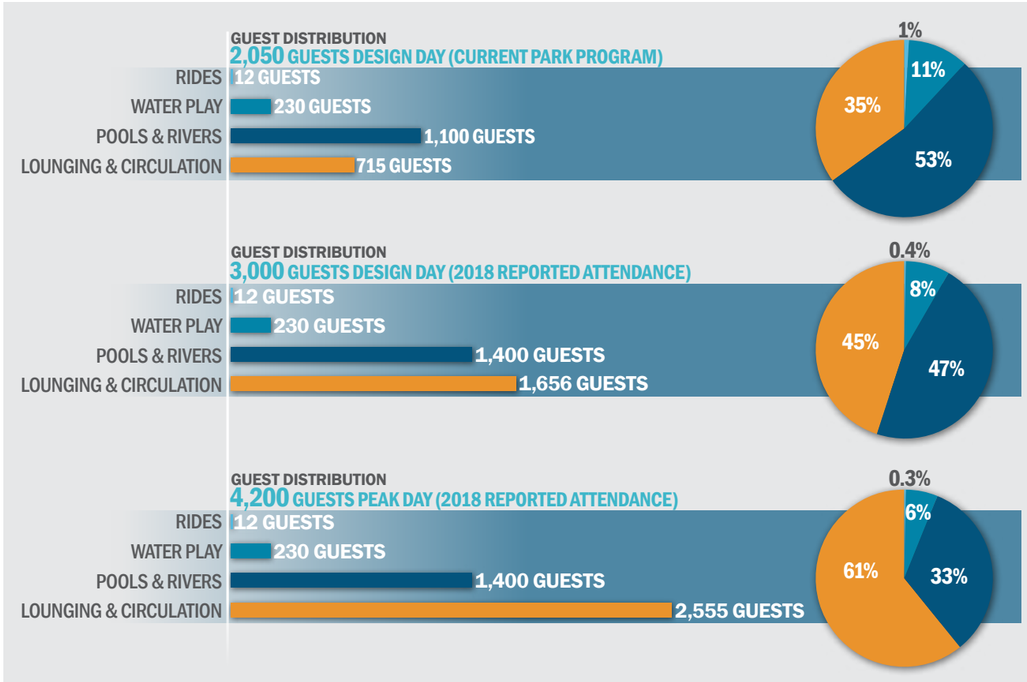


FIGURE 20: ***Entertainment Capacity Distribution***

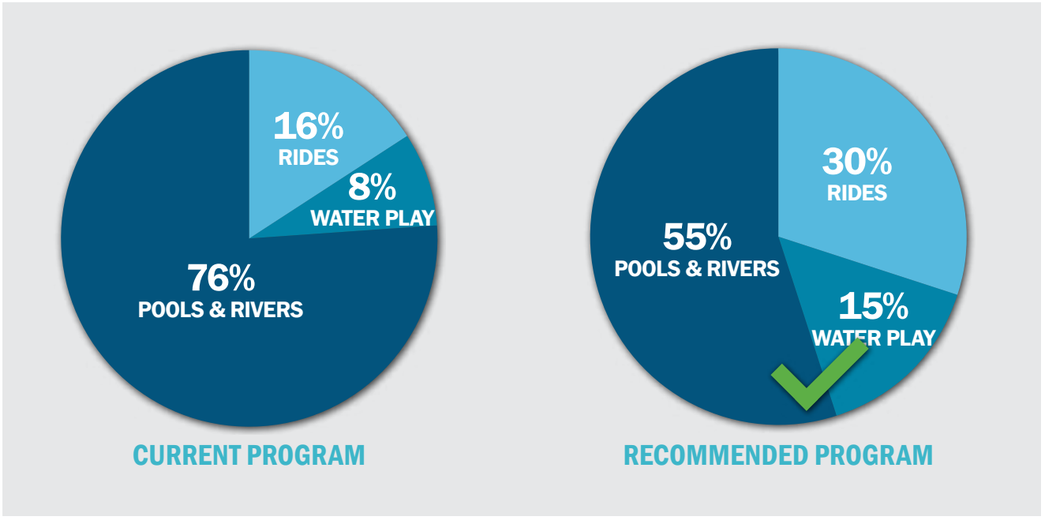


FIGURE 21: ***Current Entertainment Capacity Analysis - Entertainment Units Per Hour***

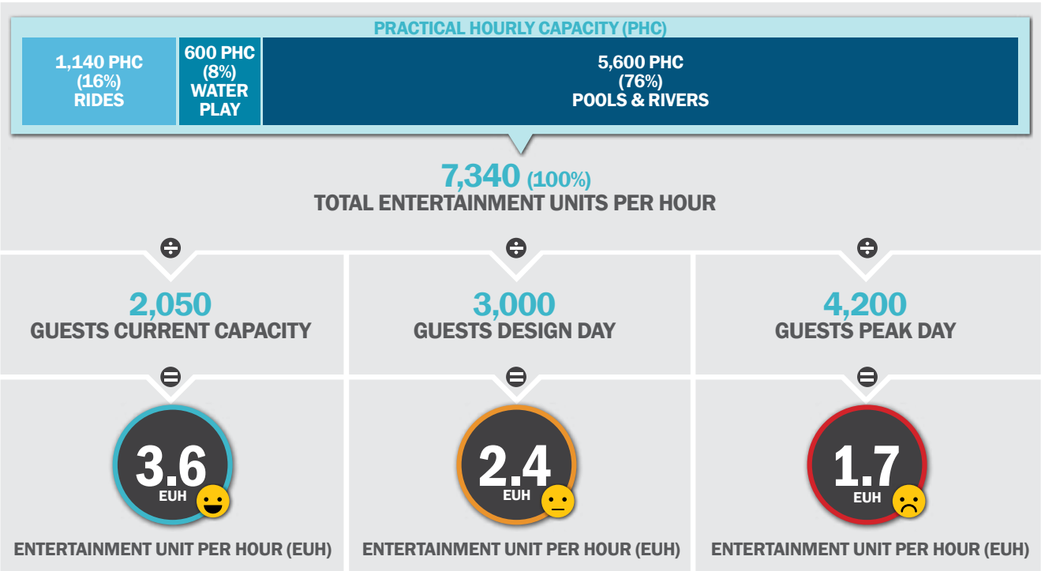
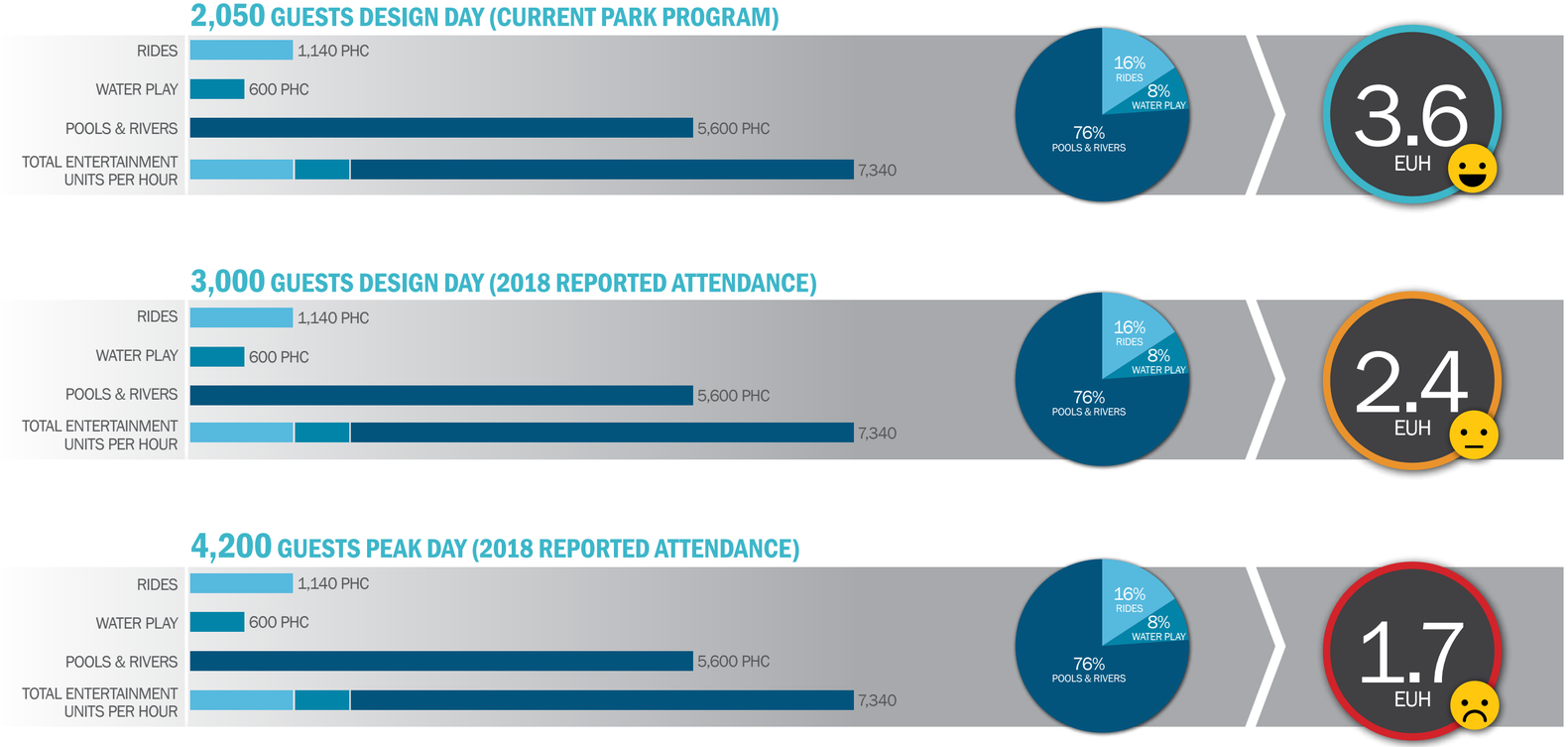


FIGURE 22: ***Existing Number of Water Rides and Water Attractions by Guest Type - Guest Segmentation***

FIGURE 23: ***Numbers of Rides and Attractions by Experience - Experience Segmentation***

FIGURE 24: ***Current Entertainment Capacity Analysis Entertainment Units Per Hour***



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5.1 GUEST EXPERIENCE

The following section graphically illustrates the range of Guests experiences currently offered and the relative sizes of the current entertainment offered compared to expected entertainment.

In most categories, including but not limited to guest services, washrooms/lockers, showers, lounging, rides and attractions, the existing water park is not able to adequately or properly meet the needs of the guest or their expectations. The type of rides/attractions available and the distribution is limited within the park. As illustrated in the following figures, most categories require enhancement to meet current guests demand and will need to increase in size and or quality to meet future increased attendance. Many of the observations that were previously noted by staff as a concern are correct and are the result of attendance levels being higher than the facilities are designed to accommodate. This overcrowding adversely impacts the guest experiences. Guest expectations have evolved significantly since the park opened in 1983. At the time the park opened, Wild Waterworks was well ahead of its time and offered a great family experience. Unfortunately given the age and condition of the rides/attractions and guest areas, the current guest experience is well below the expectations of today's guest and the market in general.

The issue can be summarized as "The guest gets what they pay for and paid for what they got".

In other words, the cost to attend is relatively low and so is the experience. The proposed improvements are intended to address this situation and enhance guest experience and increase overall annual attendance.

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FIGURE 25: ***Guest Experience Option 2***

FIGURE 26: ***Guest Experience Option 3***

FIGURE 27: ***Guest Experience Option 4***

FIGURE 28: ***Key Programming Metrics***

ATTENDANCE SUMMARY					
ANNUAL ATTENDANCE			**124,900**	**145,000**	**185,000**
Design Day			**2,585**	**3,002**	**3,830**
EUH REQUIREMENT					
Entertainment Units per Hour per Visitor	PHC	3.50	**8,144**	**9,455**	**12,063**
PARK AREA			**m^2**	**m^2**	**m^2**
Water Park Area Requirement	m^2/pp	16.50	**42,660**	**49,525**	**63,187**
Parking Area Requirement	m^2		**37,574**	**46,444**	**57,483**
Arrivals Plaza (Outside Gate)	m^2		**900**	**1,126**	**1,436**
GUEST ACTIVITY DISTRIBUTION					
% Of Guests in Rides and Attractions			**60%**	**60%**	**60%**
% Of Guests on Deck Lounging			**40%**	**40%**	**40%**
FOH/BOH REQUIREMENTS			**m^2**	**m^2**	**m^2**
FOH/Administration & Guest Services			**1,500**	**1,750**	**2,000**
Back Of House			**800**	**900**	**1,000**

FIGURE 29: ***Guest Amenities***

GUEST WASHROOM, CHANGEROOM, LOCKERS & SHOWER FACILITIES		OPTION 3 145,000 ATTENDANCE	
		DD	Fixtures
Peak in Park Design Day		3,002	
No. Female WC		38	
No. Male WC		25	
Park Distribution		3	
Total Facilities	100%	**406**	**63**
Main A	70%	**285**	**44**
Satellite B	15%	**61**	**9**
Satellite C	15%	**61**	**9**
Total Area Required (m²)	**100%**	**406**	**63**
WATER PARK SHOWER CALCULATION			
No. of Showers Men		30	
No. of Showers Women		30	
Total Area Required (m²)		**150**	
WATER PARK CHANGE ROOM CALCULATION			
No. of Changerooms Men		30	
No. of Changerooms Women		30	
Total Area Required (m²)		**210**	
WATER PARK LOCKERS CALCULATION			
Ratio of Guests Per Locker		0.80	
No. of Lockers		2,401	
Total Area Required for 4 High (m²)		**720**	
FACILITIES TOTAL (m²)		**1,487**	

FIGURE 30: ***Revenue Facilities***

FOOD AND BEVERAGE REQUIREMENTS AND CAPACITY		OPTION 3 145,000 ATTENDANCE
Meals		
Hourly Meal Count (3 Hour Period)		**720**
Sit Down	60%	**432**
Quick Service	40%	**288**
TOTAL AREA REQUIRED (m²)		**684**

RETAIL SPACE REQUIREMENTS (m²)		OPTION 3
Estimated Annual Attendance		145,000
Estimated Spend Per Head for Merchandise		$0.75
Estimated Annual Sales		$108,750
Assumed Gross Revenue per (m²)		$3,000
Retail Space (m²)		36
Additional Storage and BOH	20%	7
RETAIL SPACE REQUIRED (m²)		**44**

FIGURE 31: ***Water Park Attractions Program Option 3***

RIDES & ATTRACTIONS PROGRAM	Unit/ Qty.	Instant Capacity	Practical Hourly Capacity
Water Rides (Body, Tube and Raft Slides)	16	25	2,862
Water Play Attractions		550	1,400
Dry Play Attractions (Adventure Trail)		50	113
Pools & Rivers		1,100	5,728
Seating Capacity		1,191	
TOTAL ATTRACTION CAPACITY		**1,725**	**10,103**

WATER PARK SUMMARY		
Poolside Seating Capacity Total	41%	1,191
Water Rides & Attractions Total	59%	1,725
GUEST TOTAL		**2,916**
ENTERTAINMENT UNITS PER HOUR PHC (ACTIVE)		**3.46**

FIGURE 32: ***Guest Amenities***

GUEST WASHROOM, CHANGEROOM, LOCKERS & SHOWER FACILITIES		OPTION 4 185,000 ATTENDANCE	
		DD	Fixtures
Peak in Park Design Day		3,830	
No. Female WC		48	
No. Male WC		32	
Park Distribution		3	
Total Facilities	100%	**519**	**80**
Main A	70%	**363**	**56**
Satellite B	15%	**78**	**12**
Satellite C	15%	**78**	**12**
Total Area Required (m²)	**100%**	**519**	**80**
WATER PARK SHOWER CALCULATION			
No. of Showers Men		38	
No. of Showers Women		38	
Total Area Required (m²)		**191**	
WATER PARK CHANGE ROOM CALCULATION			
No. of Changerooms Men		38	
No. of Changerooms Women		38	
Total Area Required (m²)		**268**	
WATER PARK LOCKERS CALCULATION			
Ratio of Guests Per Locker		0.80	
No. of Lockers		3,064	
Total Area Required for 4 High (m²)		**919**	
FACILITIES TOTAL (m²)		**1,897**	

FIGURE 33: ***Revenue Facilities***

FOOD AND BEVERAGE REQUIREMENTS AND CAPACITY		OPTION 4 185,000 ATTENDANCE
Meals		
Hourly Meal Count (3 Hour Period)		**919**
Sit Down	60%	**551**
Quick Service	40%	**368**
TOTAL AREA REQUIRED (m²)		**873**

RETAIL SPACE REQUIREMENTS (m²)		OPTION 4
Estimated Annual Attendance		185,000
Estimated Spend Per Head for Merchandise		$0.80
Estimated Annual Sales		$148,000
Assumed Gross Revenue per (m²)		$3,000
Retail Space (m²)		49
Additional Storage and BOH	20%	10
RETAIL SPACE REQUIRED (m²)		**59**

FIGURE 34: ***Water Park Attractions Program Option 4***

RIDES AND ATTRACTIONS PROGRAM	Unit/ Qty.	Instant Capacity	Practical Hourly Capacity
Water Rides (Body, Tube and Raft Slides)	19	27	3,342
Water Play Attractions		800	2,040
Dry Play Attractions (Adventure Trail)		110	135
Pools & Rivers		1,417	7,603
Seating Capacity		1,528	
TOTAL ATTRACTION CAPACITY		**2,354**	**13,120**

WATER PARK SUMMARY		
Poolside Seating	39%	1,528
Water Rides & Attractions Total	61%	2,354
GUEST TOTAL		**3,881**
ENTERTAINMENT UNITS PER HOUR PHC (ACTIVE)		**3.38**

6 RIDES AND ATTRACTIONS


Tube Slides


Family Raft Ride

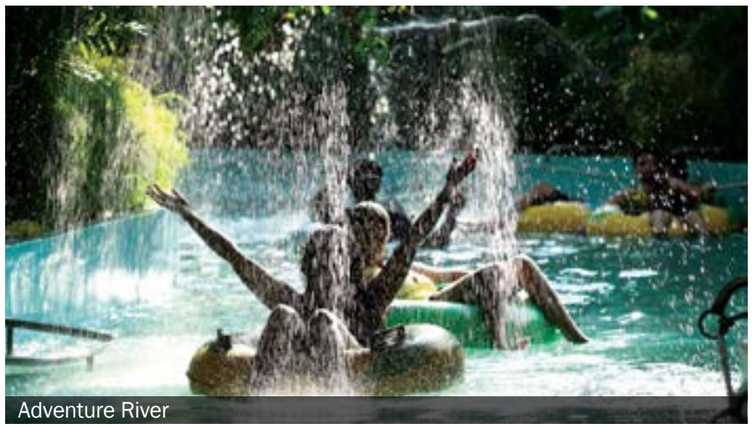

Body Slide


Wave Pool


Family Raft Ride


Interactive Water Play


Matt Racers


Adventure River


Activity Pool


Activity Pool


Adventure Trail


Adult Experience Pool

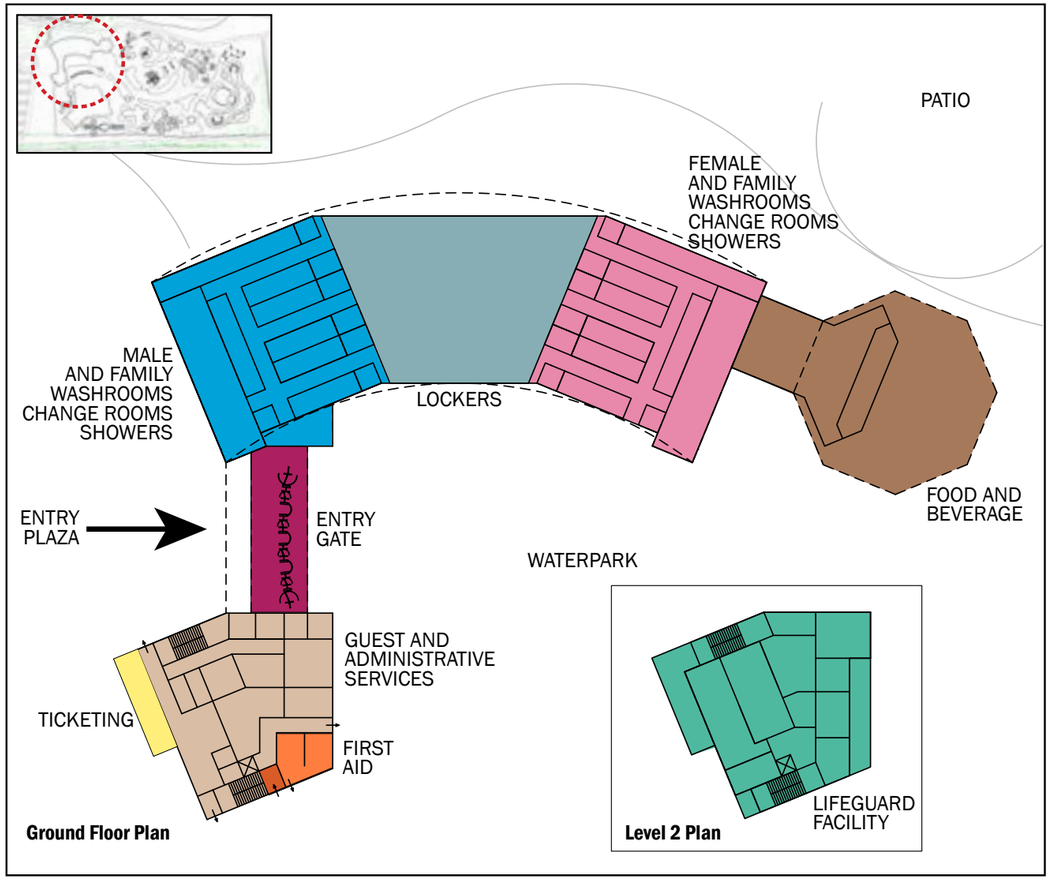

Cabanas


Tots Water Play


Kids Interactive Play

7 BUILDING DESIGN

FIGURE 35: ***Building Design, Functional Relationship Diagram***



8
MASTER PLAN OPTIONS

8.1 MARKET AND FINANCIAL ANALYSIS OF WILD WATERWORKS

OPTIONS - SUMMARY

FORREC retained CBRE to review the Wild Waterworks operation and provide a market feasibility study and financial analysis. This information was used to consider the existing Park and attendance within the market and options for future attendance for the four (4) options. In addition to the Four required Options, CBRE also investigated the potential of an indoor facility to address the desire of the City to create a year -round facility. This was Option Five in their report. Option Five was deemed not to be financially viable and there was no warrant for additional year -round indoor leisure pool facilities in the lower City of Hamilton. This market area of the lower City is currently over served with indoor pools, so no further research was completed on an indoor facility. Additionally, based on the warranted investment levels for the other options, it is expected that the investment for an indoor water park is not warranted.

CBRE met with City of Hamilton staff to gain a complete understanding of the scope of work to be undertaken, the expected study outputs, visited the site and reviewed available background reports.

The report contains the following sections:

1 STUDY BACKGROUND

This section contains the background, objectives and scope.

2 HISTORICAL PERFORMANCE

This section examines the historic attendance, per capital spend, operating revenues, expenses and gross revenue and capital spending.

- Review of historical attendance levels by; day of week; month; origin, admission rate, etc.
- Review of historical detailed operating statements (most recent 3 to 5 years)
- Operating hours and staffing schedule
- Historical per cap spends

3 COMPARABLE ANALYSIS

This section examines 10 comparable/ competitive attractions 9 in Ontario and 1 in New York state. This includes attendance, pricing, facility types and F+B.

A review of competitive/comparable attractions in the Ontario market and elsewhere in Canada was completed. Information gathered included the following:

- Site size.
- Facilities offered.
- Published admission rates.
- Dates of operation.
- Key user groups.
- Attendance and utilization factors.
- Seasonal utilization rates attained.
- Capital improvements.

For confidentiality reasons, no individual market or financial performance data will be provided, however we will provide general market indicators.

4 MARKET ASSESSMENT

This section examines the potential market capture areas as well as primary, secondary markets, domestic and International markets and visitor profile.

Profile the size and psycho demographic and travel characteristics of the resident and tourist markets to Hamilton Halton Brant (RTO 3) as target markets for the subject attraction, including:

1. Primary Resident Market – those living within 0-60 minutes of the site
2. Secondary Resident Market – those living within 60-120 minutes of the site
3. Domestic Tourists – Domestic tourists to Hamilton Halton Brant, excluding those captured in the primary and secondary resident markets
4. International Tourists – US and Overseas visitors to RTO 3

Utilizing existing data produced by Statistics Canada through the Travel Survey of Residents of Canada (TSRC) and the International Travel Survey (ITS), they identified the profile of existing overnight and day trip visitor market to RTO 3. They profiled the size and travel party composition of the visitor market by geographic origin (Ontario, Rest of Canada, US and International).

5 FACILITY PROGRAMS AND ASSUMPTIONS

This section examines the four options and potential programs and budgets tested for investment levels.

6 ATTENDANCE PROJECTIONS

This section provides an estimate of attendance for the four options over a period of time to reach stabilized attendance levels.

Based on the 3 alternative facility program/ concept options identified by FORREC for the attraction, CBRE estimated the share of the market that the subject attraction should reasonably be expected to capture by market segment for the first five years of operation.

For each of the options, they analyzed each segment in terms of attainable fees and use this analysis in our projection of operating results.

7 FINANCIAL PROJECTIONS

This section provides estimated investment levels, operating projections as well as financing implications and expenses.

Based on the 3 alternative options, financial operating projections were prepared to reflect projected attendance levels, all potential sources of revenue, and required operating expenses for all components of the facilities and operation over the first 5 years. As part of this analysis, revenue, staffing, operating and expense schedules were also prepared.

8 CAPITAL INVESTMENT IMPLICATIONS

This section compares the financial model for each option and the implications of financing and warranted investment levels.

Relying on estimates of order of magnitude project capital costs by component provided by FORREC together with our operating projections for the attraction, CBRE examined the potential return on investment for each concept scenario using traditional debt/equity financing.

The market and financial report will assist you in making decisions with respect to this project and the financial viability of three options.

The CBRE report is included as **Appendix: A-1** Market and Financial Analysis of Wild Waterworks Options.

8.2 OPTION 1: DO NOTHING OPTION ($5M CDN.) ANNUAL ATTENDANCE DROPS TO 90,000 IN 5 YEARS.

The "**Do Nothing**" option considers the remaining and expected lifespan of the water park facilities assuming no major upgrades or capital investment is made to the existing facility. Given the current age of most of the existing infrastructure, the degradation cycle of infrastructure, rides and attractions will continue because most of the facility has already exceeded a reasonable and expected life cycle.

Current, aging infrastructure will continue to degrade requiring higher expenditures annually to maintain current operating conditions. It is expected an average of 15-20% annual increase in maintenance costs will occur over current budgets. As this continues, the operations will become financially cost prohibitive.

LITTLE SQUIRT WORKS

Ideally this entire area should be replaced as soon as practical due to safety and to function properly. Life expectancy, this should be replaced or removed with 1-2 years maximum.

WAVE POOL

Wave pool equipment is in excellent working condition with another 10-15 years life expectancy. Overall the wave pool has life expectancy of 10-15 years.

EAST SLIDES

8 – 12 years with new slide pumps.

WEST SLIDE

Requires moderate amounts of maintenance and repairs in order to continue to function.

However, failure is very likely if issues aren't addressed in the near future. Life expectancy, is limited and this should be replaced or removed with 1-2 years maximum

EAZY RIVER

The Eazy River has a few years of service remaining with continued maintenance. Caulking should be replaced, among a few other maintenance items.

Based on the market and financial analysis, the **"Do Nothing"** option will continue to decline in performance and as rides/ attractions are closed or fail, the attendance will decrease until it drops below 90,000 annual visits within the next 3-5 years, or sooner depending on facility closures. The feasibility study predicts that once attendance decreases below the 100,000 threshold and maintenance costs increase, the park will no longer be financially viable and would likely be closed.

This **"Do Nothing"** option *is not considered financially viable and is not recommended.*

8.3OPTION 2: REPLACE LIKE FOR LIKE ($24.92M CDN.) ANNUAL ATTENDANCE INCREASES TO 120,000 IN 5 YEARS

The **"Replace Like for Like"** option considers the replacement of rides or attractions and facilities with similar elements to those currently existing, replaced as existing facilities come to the end of their lifespan and begin to fail.

FRONT ENTRY & FACILITIES

The entrance buildings will be replaced entirely, this includes increasing the size of ticketing, food and beverage, washrooms, changerooms, lockers, retail, first aid, and administrative facilities to meet current attendance requirements. Further, major new infrastructure must respect the current Conservation hazard land setbacks of 46m. Plaza space both outside and within the water park will be provided to provide appropriate queuing areas, ease circulation and wayfinding issues. The redesign of the entrance facilities will also address missing connectivity with the waterfront trail. The increase in size of the entrance facilities will push the arrival sequence westerly into the existing parking lot. Vehicular and bus parking and drop off areas will also move west and be reconfigured based on existing attendance needs. The current overflow parking will be redesigned as part of the permanent parking area for the water park. Existing parking lot and bus drop off remain in this scheme. The Confederation Park Master Plan Update (2010) confirms the water park zone is to remain and include improved facilities.

LITTLE SQUIRT WORKS

Ideally this entire area should be replaced as soon as practical due to safety and to function properly. The recommended course of action is to redesign and replace the pool and it's features entirely. The pool should be designed to have a dedicated water treatment system, leaving the existing water treatment system to service the east slide complex. Life expectancy, this should be replaced or removed with 1-2 years maximum.

EAST AND WEST SLIDE COMPLEXES

Both slide complexes are visibly aging and will eventually require replacement. With the redesign of Little Squirt Works, including a dedicated water treatment system, the east slides have the potential to last another 8 – 12 years with new pumps and diligent maintenance.

Once the East and West Slide complexes have reached the end of their lifespan, they will be replaced with similar body and tube slide complex rides.

The west slide complex requires immediate attention to avoid imminent failure. Even with careful maintenance, it is likely that the west slide complex will need to be completely replaced in the next few years. Once this complex fails, it will be replaced with another similar tube slide complex.

EAZY RIVER

The Eazy River, has some years of service life remaining, if retained, requires updates to improve its construction weaknesses. The lack of propulsion, poor waterproofing, narrow width, rough surfacing, and insufficient drain grates should all be addressed to increase the safety, efficacy, and entertainment value of this attraction. The path of the river is well-integrated into the site and can be reused with minimal changes or interventions.

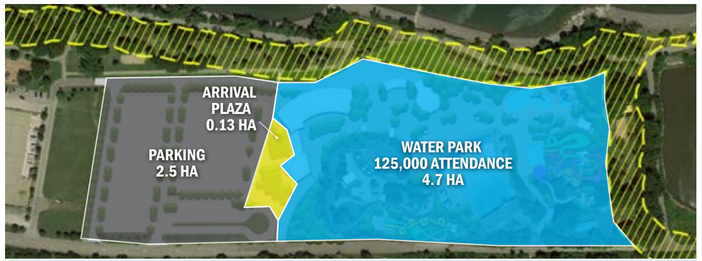
PAVING & POOL SURFACING

There are numerous concerns with the pool finishes and hardscape paving which should be addressed. Both the wave pool and river should be resurfaced to reduce safety risks. The concrete paving should be replaced with a slip and heat-resistant surfacing to reduce injuries, improve park aesthetics, and increase guest enjoyment. These improvements should be phased in over time as adjacent rides/ attractions are replaced.

Based on the market and financial analysis, the **"Replace Like for Like"** attendance Option 2 will slowly increase the average attendance over the next 2-5 years to 120,000. The size of the water park will remain unchanged for this option as the current park area can accommodate the anticipated attendance. However, based on the feasibility analysis, the like for like option is not financially viable as the modest increase in attendance does not have a return on investment for the required $24.92M capital investment.

The ***"Like for Like Option"*** *is not considered financially viable and is not recommended.*

FIGURE 36: ***Replace Like for Like Project Capacity Plan (Option 2)***



Annual Attendance: 125,000
Arrival Plaza Area: 0.13 HA
Water Park Area: 4.7 HA
Parking Area: 2.5 HA

Reported Design Day: 3,000
Current Design Day Capacity: 2,050
Hourly Entertainment Capacity: 8,200
Entertainment Units Hourly (EUH): 2.4

FIGURE 37: ***Replace Like for Like Master Plan (Option 2)***

LEGEND

1. Car Parking
2. Taxi Drop Off
3. Bus Parking/Drop Off
4. Arrival Plaza
5. Front Gate Facility (New Expanded)
6. Entry Plaza
7. BOH
8. Service Access
9. Party Room
10. Main Food & Beverage
11. Children's Waterplay (New Expanded)
12. Parkland
13. Food & Beverage / WC
14. Tube Slides (2) & Body Slides (2) (New)
15. Flex Pavilions (Existing)
16. Wave Pool (Existing)
17. Lounging
18. Tube Slides (2) (New)
19. Cabanas
20. Eazy River (Existing)
21. Emergency First Aid Access
22. Retail (New Expanded)
23. HCA Hazardous Land Regulatory Area

LEGEND

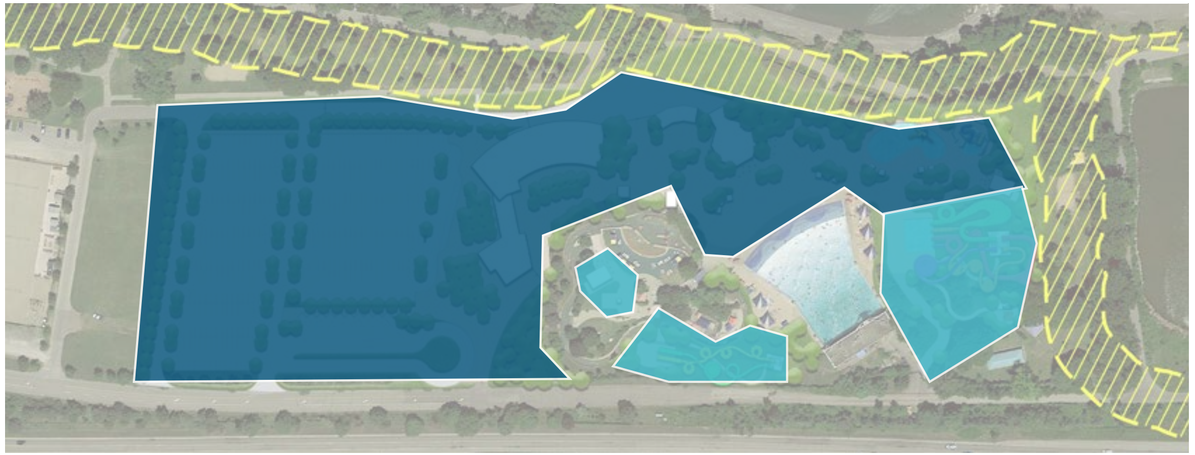
- Waterfront Trail
- Guest Circulation
- Vehicular Circulation - Bus
- Vehicular Circulation - Car
- Vehicular Circulation - Service/ Emergency/First Aid

FIGURE 38: ***Replace Like for Like Circulation (Option 2)***

LEGEND

- PHASE 1
- PHASE 2

FIGURE 39: ***Replace Like for Like Phasing (Option 2)***



8.4 OPTION 3: MODEST ENHANCEMENTS ($40.14M CDN.) ANNUAL ATTENDANCE INCREASES TO 145,000 IN 7 YEARS

The "Modest Enhancements" option considers the retention or replacement of major rides and attractions together with the addition of new dry/wet attractions, a sheltered recreation area and improved operational systems. It retains some of the strategies from the "Like for Like" option while also providing additional, new attractions and program to the park. In this option, phased replacement of rides/ attractions will occur as they reach end of their respective life cycle.

FRONT ENTRY & FACILITIES

The entrance buildings will be replaced entirely, this includes increasing the size of ticketing, food and beverage, washrooms, changerooms, lockers, retail, first aid, and administrative facilities to meet current and moderate attendance increase requirements. Further, major new infrastructure must respect the current Conservation hazard land setbacks of 46m. Plaza space both outside and within the water park will be provided to provide appropriate queuing areas, ease circulation and wayfinding issues. The redesign of the entrance facilities will also address missing connectivity with the waterfront trail. The increase in size of the entrance facilities will push the arrival sequence westerly into the existing parking lot. Vehicular and bus parking and drop off areas will also move west and be reconfigured based on existing attendance needs. The current overflow parking (green area) will be redesigned as part of the permanent parking area for the water park. This green overflow parking area is not used for any sports, all new sports are being built in the former campground as outlined in the Confederation Park Master Plan Update (2010), Fig 20 of that report confirms the water park zone to remain. The water park increases in size approximately by 20% in area, excluding the parking expansion.

LITTLE SQUIRT WORKS

This entire area will be redesigned and replaced in its entirety. The pool will be designed to have a dedicated water treatment system, leaving the existing water treatment system to service the east slide complex.

The new area will increase more active water play elements (i.e. squirt guns, tipping bucket, etc.).

A new washroom and a food and beverage unit will be located adjacent to the kid's pool to improve the distribution of facilities throughout the park and provide easy access for parents of young children. Varied types of seating will be provided and cabanas around the attraction will be provided.

EAST AND WEST SLIDE COMPLEXES

Both slide complexes are visibly aging and will eventually require replacement. With the redesign of Little Squirt Works, including a dedicated water treatment system, the east slides have the potential to last another 8 – 12 years with new pumps and diligent maintenance. Once the East and West Slide complexes have reached the end of their lifespan, they will be replaced with similar body and tube slide complex rides.

The west slide complex requires immediate attention to avoid imminent failure. Even with careful maintenance, it is likely that the west slide complex will need to be completely replaced in the next few years. Once this complex fails, it will be replaced with another similar tube slide complex.

EAZY RIVER

The Eazy River requires updates to improve its construction weakness. The lack of propulsion, poor waterproofing, rough surfacing, and insufficient drain grates should all be addressed to increase the safety, efficacy, and entertainment value of this attraction. The path of the river is well-integrated into this site and can be reused.

Once the facility reaches the end of its service life, a new lazy or action river should replace this with some additional features and possibly greater length.

PAVING & POOL SURFACING

There are numerous concerns with the pool finishes and hardscape paving which should be addressed. Both the wave pool and river should be resurfaced to reduce safety risks. The concrete paving should be replaced with a slip and heat-resistant surfacing to reduce injuries, improve park aesthetics, and increase guest enjoyment. These improvements should be phased in over time as adjacent rides/ attractions are replaced.

PLAY STRUCTURE

A new play structure will be added adjacent to Little Squirt Works to provide additional program for younger children. The play structure can be a combination of either wet or dry play with an opportunity to provide a significant amount of shade and varied levels of play value.

ADVENTURE COURSE

The northeast corner of the site is generally disconnected from the balance of park attractions, currently serving as a pavilion event space and passive park area. A dry play activity that caters to older kids/teens would take advantage of the mature tree canopy and be integrated into the space. An adventure ropes course or tree-top trek type of attraction would cater to this age demographic. Circulation will be considered providing a connection to the balance of the park activities.

FAMILY RAFT RIDE/MAT RACERS

The water park is currently lacking a thrilling family ride. A four or six-person family style raft ride will be added between the east slide complex and the wave pool, providing additional program and visual mass to the southeast corner of the site.

TEEN ACTIVITY POOL

The water park is also currently lacking a water activity for older children and teens. A portion of the area inside the river will be infilled with a teen activity pool, offering a mix of exciting water play options such as floatable walks, zip lines, climbing walls, basketball, among other activities.

Both a washroom and food and beverage unit will be located inside the river loop to improve the distribution of facilities throughout the park and cater to the demographic of the teen activity pool.

GUEST AMENITIES

Additional areas of planting will be integrated throughout the park including the wave pool beach area to provide shade, visual interest, and moderate privacy for guests. Picnic tables will be replaced with loungers and chairs, offering a more comfortable and relaxing guest experience and greater deck area capacity.

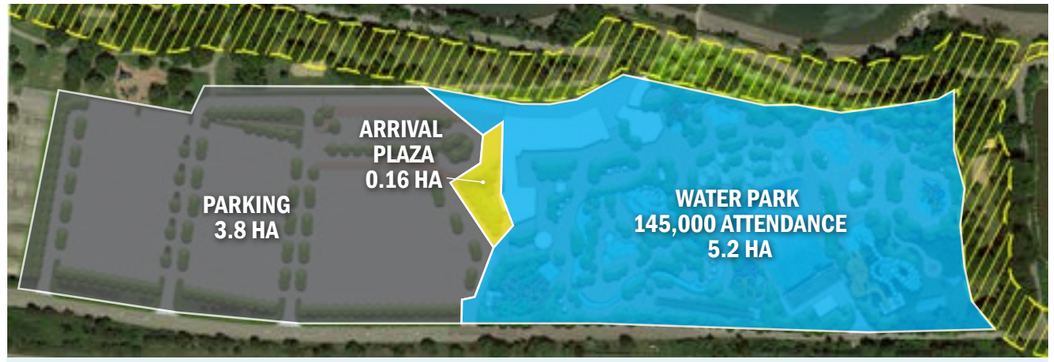
Cabanas will be increased in number and upgraded to permanent structures with better distribution throughout the water park.

Theming and signage can improve significantly, creating a clear wayfinding strategy and while enhancing the guest experience and branding/ marketing potential of the park.

A new point of sale (POS) system and radio frequency identification (RFID) wristbands will be integrated with facilities and ticketing to improve ticket processing times, encourage revenue generation through cashless payment, and improve the guest experience.

Based on the market and financial analysis, the **“Modest Enhancements”** attendance Option 3 will slowly increase the average attendance over the next 7 years to 145,000 until a new stabilized attendance level is achieved. The size of the water park will increase in size to accommodate the anticipated attendance and an increased service level of rides and attractions. Based on the feasibility analysis, the **“Modest Enhancements”** is recommended as the projected net operating profit levels should be sufficient to service debt levels to 1/3rd of capital costs. The “Modest Enhancements” is recommended.

FIGURE 40: ***Modest Enhancements Project Capacity Plan (Option 3)***



Annual Attendance: 145,000
Arrival Plaza Area: 0.16 HA
Water Park Area: 5.2 HA
Parking Area: 3.8 HA
Design Day: 3,000

Peak in Park Design Day: 2,700
Peak in Park Peak Day: 3,000
Hourly Entertainment Capacity: 9,500
Entertainment Units Hourly (EUH): 3.5

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FIGURE 41: ***Modest Enhancements Master Plan (Option 3)***

LEGEND

1. Car Parking
2. Taxi Drop Off
3. Bus Parking/Drop Off
4. Arrival Plaza
5. Front Gate Facility
6. Entry Plaza
7. BOH
8. Service Access
9. Party Room
10. Main Food & Beverage
11. Water Experience Pools
12. Children's Waterplay
13. Adventure Trail
14. Interactive Waterplay
15. Parkland
16. Existing Flex Pavilions
17. Family Raft Rides (2)
18. Food & Beverage / WC
19. Cabanas
20. Existing Wave Pool
21. Main Lounging
22. Body Slides (2)
23. Mat Racers (4 Lanes)
24. Existing Eazy River
25. Retail
26. Activity Pool
27. Tube Slides (3)
28. Emergency First Aid Access
29. Pool Sider Body Slides (2)
30. HCA Hazardous Land Regulatory Area

LEGEND

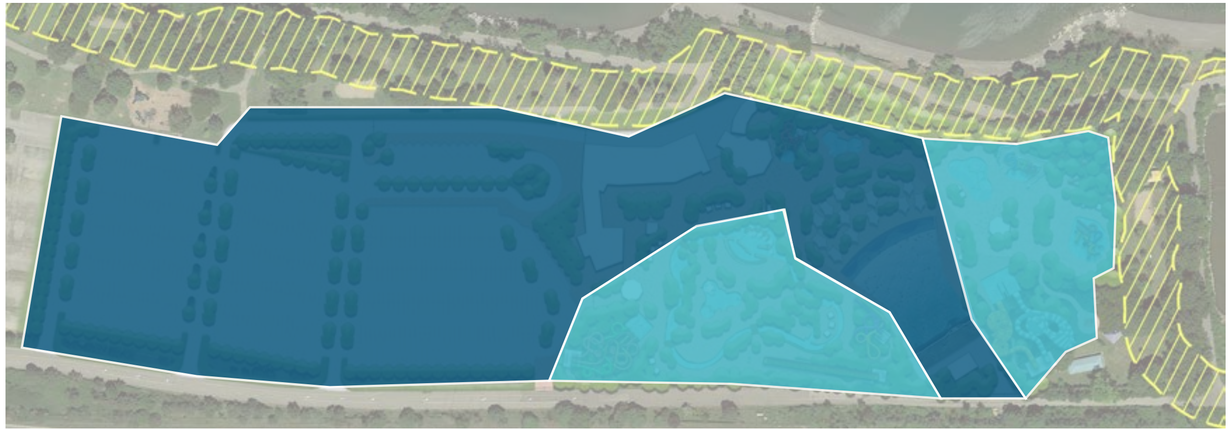
- Waterfront Trail
- Guest Circulation
- Vehicular Circulation - Bus
- Vehicular Circulation - Car
- Vehicular Circulation - Service/ Emergency/First Aid

FIGURE 42: ***Modest Enhancements Circulation (Option 3)***

LEGEND

- PHASE 1
- PHASE 2

FIGURE 43: ***Modest Enhancements Phasing (Option 3)***



8.5 OPTION 4: NEW DESIGN, NEW PROGRAM ($61.12M CDN.) ANNUAL ATTENDANCE INCREASES TO 185,000 IN 7 YEARS

4.5.4 NEW DESIGN, NEW PROGRAM

The "New Design, New Program" option considers a new layout and program of the water park including a complete redesign of the existing facility. In this option, the water park will be designed to meet projected future attendance and provide rides and attractions that meet the family demographic and current guest expectations.

The proposed location of rides and attractions and their relationship to one another and to facilities have been explored, the new design will accommodate the future projected annual attendance.

FRONT ENTRY & FACILITIES

The entrance buildings will be replaced entirely, this includes increasing the size of ticketing, food and beverage, washrooms, changerooms, lockers, retail, first aid, and administrative facilities to meet future attendance requirements. Further, major new infrastructure must respect the current Conservation hazard land setbacks of 46m. Plaza space both outside and within the water park will be provided to provide appropriate queuing areas, ease circulation and wayfinding issues. The redesign of the entrance facilities will also address missing connectivity with the waterfront trail. The increase in size of the entrance facilities will push the arrival sequence westerly into the existing parking lot. Vehicular and bus parking and drop off areas will also move west and be reconfigured based on existing attendance needs. The current green overflow parking will be redesigned as part of the permanent parking area for the water park. This green overflow parking area is not used for any sports, all new sports are being built in the former campground as outlined in the Confederation Park Master Plan Update (2010), Fig 20 of that report confirms the water park zone to remain. The water park increases in size approximately by 30% in area, excluding the parking expansion.

Additional washroom and food and beverage units will be distributed throughout the site at necessary locations, allowing guests to easily access facilities and increasing the potential revenue generation of the park.

WAVE POOL

A new wave pool will be designed to accommodate the future annual attendance and create shallow water zones for small children and larger beach areas for relaxing and lounging. Given new wave machine technology, the wave heights may be varied to meet different guest profiles at different times of day from smaller children family friendly to larger more teenager/adult thrill level.

CHILDREN'S ACTIVITY POOL

A children's play area will be designed with exciting, age-appropriate activities. Active water play elements such as squirt guns and tipping buckets will be integrated into a wet deck or shallow pool.

Colourful paving and themed water features will create an immersive environment for children to play and explore. Shaded areas offer respite from the sun and places for parents and children to relax.

Both a washroom and food and beverage unit will be located in the near vicinity to provide easy access for parents of young children. Varied types of seating will be provided, including lounge chairs and cabanas.

PLAY STRUCTURE

A play structure will be added to provide additional program for younger children. The play structure can be either wet or dry play, and there is the opportunity to shelter a portion of the area depending on the type of structure.

CHILDREN'S ACTIVITY POOL

A children's play area will be designed with exciting, age-appropriate activities. Active water play elements such as squirt guns and tipping buckets will be integrated into a wet deck or shallow pool.

Colourful paving and themed water features will create an immersive environment for children to play and explore. Shaded areas offer respite from the sun and places for parents and children to relax.

Both a washroom and food and beverage unit will be located in the near vicinity to provide easy access for parents of young children. Varied types of seating will be provided, including lounge chairs and cabanas.

PLAY STRUCTURE

A play structure will be added to provide additional program for younger children. The play structure can be either wet or dry play, and there is the opportunity to shelter a portion of the area depending on the type of structure.

ADVENTURE COURSE

The northeast corner of the site will be transformed into a dry play activity that caters to older kids/ teens and which takes advantage of the mature tree canopy, such as an adventure ropes course or tree-top trek. Circulation will be considered to connect the attraction to the rest of the park activities.

NEW SLIDE COMPLEXES

Both existing slide complexes are visibly aging and will be replaced with newer body slides, tube slides, a thrill ride and other rides to satisfy the program requirements and guest needs. The selection will depend on providing a balanced range of rides and attractions throughout the park.

FAMILY RAFT RIDE/MAT RACERS

A four or six-person raft ride will be integrated into the site, adding a thrilling ride for the entire family to enjoy.

EAZY RIVER

An Eazy River will be designed to be well-integrated with the site and other rides/attractions. Water spray features will be integrated with the river, adding entertainment value. Bubblers, spray guns, overhead waterfalls, and other features offer a wonderful opportunity to make the river a dynamic experience for all age levels.

TEEN ACTIVITY POOL

A lively and energetic teen activity pool will offer a mix of exciting water play options such as floatable walks, zip lines, climbing walls, basketball, among others.

Places for older children and teens to play, interact, and hang out will be integrated with the area.

GUEST AMENITIES

Planting islands will be designed throughout the park to provide shade, visual interest, and some privacy for guests. Dedicated areas for loungers, chairs, and tables will all be provided, offering a comfortable and relaxing guest experience. Cabanas will be themed and well-sited, maximizing their revenue generation capacity. Paving and pool surfacing throughout the park will be slip and heat-resistant, and will be designed to enhance the attractions, features, and identity of the park.

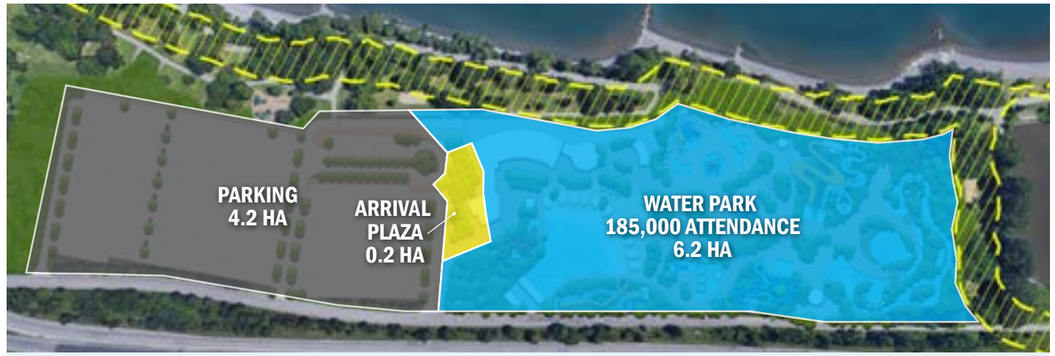
Theming and signage will improve significantly, creating a clear wayfinding strategy and enhance the guest experience and branding/marketing potential of the park.

A new point of sale (POS) system and radio frequency identification (RFID) wristbands will be integrated with facilities and ticketing to improve ticket processing times, encourage revenue generation through cashless payment, and improve the guest experience.

Based on the market and financial analysis, the **"New Design, New Program"** attendance Option 4 will slowly increase the average attendance over the next 7 years to 185,000 until a new stabilized attendance level is achieved. The size of the water park will increase in size to accommodate the anticipated attendance and an increased service level of rides and attractions.

However, based on the feasibility analysis, the **"New Design, New Program"** is financially not viable as the projected net operating profit levels will not be sufficient to service debt levels for the required $61.12M capital investment. The "New Design, New Program" is not considered financially viable and is not recommended.

FIGURE 44: ***New Design Project Capacity Plan (Option 4)***



Annual Attendance: 185,000
Arrival Plaza Area: 0.2 HA
Water Park Area: 6.2 HA
Parking Area: 4.2 HA
Design Day: 3,830

Peak in Park Design Day: 3,500
Peak in Park Peak Day: 3,830
Hourly Entertainment Capacity: 12,000
Entertainment Units Hourly (EUH): 3.5

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FIGURE 45: ***New Design Master Plan (Option 4)***

LEGEND

1. Car Parking
2. Taxi Drop Off
3. Bus Parking/Drop Off
4. Arrival Plaza
5. Front Gate Facility
6. Entry Plaza
7. Main Food & Beverage
8. BOH
9. Service Access
10. Party Room
11. Children's Waterplay
12. Food & Beverage / WC
13. Family Raft Rides (2)
14. Adventure Trail
15. Cabanas
16. Parkland
17. Water Experience Pools
18. Lazy River
19. Tube Slides (4)
20. Interactive Waterplay
21. Body Slides (2)
22. Activity Pool
23. Lounging
24. Wave Pool
25. Mat Racers (6 Lanes)
26. Retail
27. Emergency First Aid Access
28. HCA Hazardous Land Regulatory Area

LEGEND

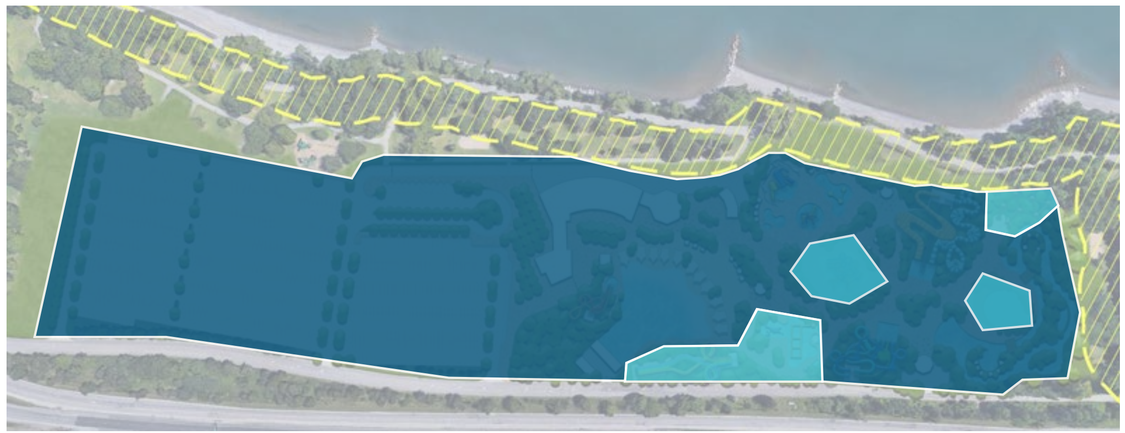
- Waterfront Trail
- Guest Circulation
- Vehicular Circulation - Bus
- Vehicular Circulation - Car
- Vehicular Circulation - Service/ Emergency/First Aid

FIGURE 46: ***New Design Circulation (Option 4)***

LEGEND

- PHASE 1
- PHASE 2

FIGURE 47: ***New Design Phasing (Option 4)***



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9 ROUGH ORDER OF MAGNITUDE BUDGET (THREE OPTIONS)

9 ROUGH ORDER OF MAGNITUDE BUDGETS

Rough order of magnitude budgets are provided for three of the four options which require capital, Options 2,3 +4. The investment budget level is tied to attendance and phasing to achieve the desired results that can sustained over both the short and long term. These investment levels and budgets were tested by CBRE as part of their financial analysis. Based on their attendance projections for the Four Options, FORREC provided preliminary rough budget ranges for testing purposes. These ranges were tested based on the financial model and subsequently refined based on attendance, operating costs, expenses, interest expenses all compared to revenue sources. The resulting Rough Order of Magnitude Budgets reflect anticipated local costs in the local market based on 2020 costs. Budget estimates include City of Hamilton design contingencies of (10%), additional studies, permits, construction contingencies of (12%), project management fees of (15%). Inflation will need to be added to all estimates at (2%) per year from the 2020 base year to when funds are approved. It should be noted that while these are not final budget numbers for elemental items within the budget, they are indicative of the overall budget warranted for each of the options and identify the level of warranted investment.

FIGURE 48: ***Wild Waterworks WP R.O.M. Estimate Summary***

	OPTION 2 LIKE FOR LIKE		OPTION 3 MODEST ENHANCEMENTS		OPTION 4 NEW BUILD	
BREAKOUT	Gross Budget	% Of Total	Gross Budget	% Of Total	Gross Budget	% Of Total
HARD COSTS						
Architecture Subtotal	$4,921,500	27%	$5,641,500	19%	$6,116,500	14%
Rides/Attractions Subtotal	$6,960,000	38%	$14,460,000	49%	$27,480,000	62%
Site Work Subtotal	$6,307,000	35%	$9,194,625	31%	$11,015,875	24%
HARD COST TOTAL	$13,507,000	100%	$25,989,500	100%	$45,486,500	100%
SOFT COSTS						
Design Contingency Subtotal	$1,818,850	10%	$2,929,613	10%	$4,461,238	10%
Studies, Permits, Construction Contingency Subtotal	$2,182,620	12%	$3,515,535	12%	$5,353,485	12%
City Project Management Fees Subtotal	$2,728,275	15%	$4,394,419	15%	$6,691,856	15%
Soft Cost Total	$6,729,745	37%	$10,839,566	37%	$16,506,579	37%
TOTAL	**$24, 918, 245**		**$40,135,691**		**$61,118,954**	

OPTION 2: REPLACE LIKE FOR LIKE ($24.92M CDN.)

FIGURE 49: ***Wild Waterworks WP R.O.M. Estimate Option 2 Like For Like***

PROGRAM AREA BREAKDOWN	Gross Area (m^2)	Estimated Gross Budget	Cost/m^2	% Of Total
Architecture				
Administration	150	$387,500	$2,500	
Guest Services	130	$335,000	$2,500	
Entry	175	$283,500	$1,500	
First Aid	35	$72,000	$2,000	
Ticket/Cash Control	120	$240,000	$2,000	
Tube Rental	20	$40,000	$2,000	
Storage	45	$67,500	$1,500	
Life Guard Facillity	50	$106,000	$2,000	
Change/Washrooms	960	$1,920,000	$2,000	
Lockers	495	$990,000	$2,000	
Restaurant Kitchen	240	$480,000	$2,000	
Subtotal	2,420	**$4,921,500**		**27%**
Rides/Attractions				
Rides & Play Attractions (Purchased Lump Sum)		$4,050,000		
Pools (Site Built Lump Sum)		$750,000		
Mechanical Fit Out (Lump Sum)		$2,160,000		
Subtotal		**$6,960,000**		**38%**
Site Work				
Walkways, Plaza & Paving	15,690	$2,353,500	$150.00	
Softscape/Landscape	13,795	$1,724,375	$125.00	
Curbs (lin.M)	2,110	$263,750	$125.00	
New gravel parking	19,130	$1,434,750	$75.00	
Landscape reinstatement (outside park limits)	4,245	$530,652	$125.00	
Subtotal	6,150	**$6,307,000**		**35%**
HARD COSTS TOTAL		**$18,185,500**		**100%**
Design Contingency Soft Costs				
Design Contingency		$1,818,850		10%
Studies, Permits, Construction Contingency		$2,182,620		12%
City Projects Management Fees		$2,728,275		15%
Sub total (design continency, permits, management fees)		**$6,729,745**		**37%**
HARD & SOFT COSTS TOTAL		**$24,918,425**		

OPTION 3: MODEST ENHANCEMENTS ($40.14M CDN.)

FIGURE 50: ***Wild Waterworks WP R.O.M. Estimate Option 3 Modest Enhancements***

PROGRAM AREA BREAKDOWN	Gross Area (m^2)	Estimated Gross Budget	Cost/m^2	% Of Total
Architecture				
Administration	155	$387,000	$2,500	
Guest Services	134	$335,000	$2,500	
Entry	189	$283,500	$1,500	
First Aid	36	$72,000	$2,000	
Ticket/Cash Control	120	$240,000	$2,000	
Tube Rental	20	$40,000	$2,000	
Storage	45	$67,500	$1,500	
Life Guard Facility	53	$106,000	$2,000	
Change/Washrooms	960	$1,920,000	$2,000	
Lockers	495	$990,000	$2,000	
Restaurant Kitchen	255	$510,000	$2,000	
Retail	45	$90,000	$2,000	
Cabanas (Lump Sum)		$100,000		
General Warehouse/Shops and Maintenance	500	$500,000	$1,000	
Subtotal	**3,007**	**$5,641,500**		**19%**
Rides/Attractions				
Rides & Play Attractions (Purchased Lump Sum)		$9,000,000		
Pools (Site Built Lump Sum)		$1,000,000		
Mechanical Fit Out (Lump Sum)		$4,460,000		
Subtotal		**$14,460,000**		**49%**
Site Work				
Walkways, Plaza & Paving	24,315	$3,647,250	$150.00	
Softscape/Landscape	18,110	$625,000	$125.00	
Refurbish Parking	19,000	$1,900,000	$100.00	
Curbs (Lm)	2,670	$333,750	$120.00	
New Parking (Gravel)	31,865	$2,389,875	$50.00	
Subtotal		**$9,194,625**		**31%**
HARD COSTS TOTAL		**$29,296,125**		**100%**
Design Contingency Soft Costs				
Design Contingency		$2,929,613		10%
Studies, Permits, Construction Contingency		$3,515,535		12%
City Projects Management Fees		$4,394,419		15%
Sub total (design continency, permits, management fees		**$10,839,566**		**37%**
HARD & SOFT COSTS TOTAL		**$40,135,691**		

OPTION 4: NEW DESIGN, NEW PROGRAM ($61.12M CDN.)

*FIGURE 51: **Wild Waterworks WP R.O.M. Estimate Option 4 New Design, New Program***

PROGRAM AREA BREAKDOWN	Gross Area (m^2)	Estimated Gross Budget	Cost/m^2	% Of Total
Architecture				
Administration	155	$387,500	$2,500	
Guest Services	134	$335,000	$2,500	
Entry	189	$283,500	$1,500	
First Aid	356	$72,000	$2,000	
Ticket/Cash Control	120	$240,000	$2,000	
Tube Rental	20	$40,000	$2,000	
Storage	45	$67,500	$1,500	
Life Guard Facillity	53	$106,000	$2,000	
Change/Washrooms	960	$1,920,000	$2,000	
Lockers	495	$990,000	$2,000	
Restaurant Kitchen	300	$600,000	$2,000	
Retail	75	$150,000	$2,000	
Cabanas (Lump Sum)		$175,000		
General Warehouse/Shops and Maintenance	750	$750,000	$1,000	
Subtotal	**3,332**	**$6,116,500**		**14%**
Rides/Attractions				
Rides & Play Attractions (Purchased Lump Sum)		$12,000,000		
Pools (Site Built Lump Sum)		$5,000,000		
Mechanical Fit Out (Lump Sum)		$10,480,000		
Subtotal		**$27,480,000**		**62%**
Site Work				
Walkways, Plaza & Paving	24,950	$3,741,000	$150.00	
Softscape/Landscape	28,155	$3,519,375	$125.00	
Refurbish Parking	4,640	$580,000	$125.00	
Curbs (Lm)	2.265	$225,000	$125.00	
New Parking (Gravel)	38,565	$1,620,000	$60.00	
Subtotal		**$11,015,875**		**24%**
HARD COSTS TOTAL		**$44,612,375**		**100%**
Design Contingency Soft Costs				
Design Contingency		$4,461,238		10%
Studies, Permits, Construction Contingency		$5,353,485		12%
City Projects Management Fees		$6,691,856		15%
Sub total (design continency, permits, management fees)		**$16,506,579**		**37%**
HARD & SOFT COSTS TOTAL		**$61,118,954**		

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10 CONCLUSIONS AND RECOMMENDATIONS

10.1 CONCLUSIONS

The 2020 Master Plan Study, Wild Waterworks at Confederation Beach Park Hamilton, Ontario presents a comprehensive review of Wild

Waterworks and proposes a range of options based on a review of existing infrastructure, comprehensive data analysis, market and financial analysis, programming and design. This review of options assessed the existing Wild Waterworks Park and provided recommendations for improvements

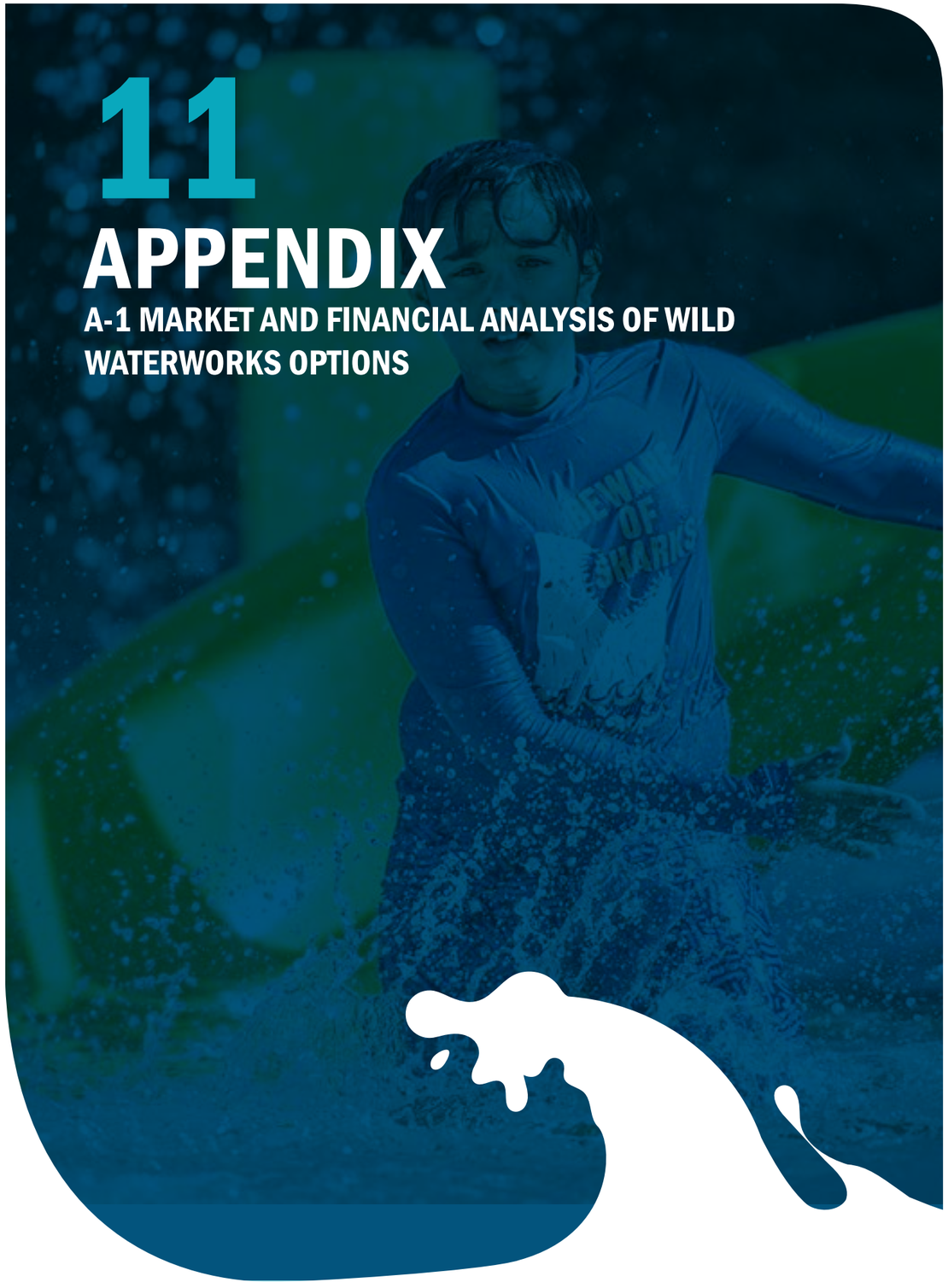
and redevelopment. The viability of the waterpark was considered together with opportunities for improvement and methods of increasing annual attendance at the waterpark. The Water Park design and facilities options were planned in a comprehensive way from the standpoint of a guest, while considering opportunities for expansion.

The features are a major component of this destination to create a unique place aimed at an enhanced and memorable guest experience. As with any park reinvestment, the investment is tied to attendance and phasing to achieve the desired results that can sustained over both the short and long term. Planning and design work address the issues and opportunities identified in the

Analysis task. We proposed a range of solutions to enhance guest experience, improve the mix of rides and attractions to provide new, more interesting challenges to meet a changing demographic and increase potential and sustained park attendance. The following are the recommended first steps towards the implementation and improvements to Wild Waterworks.

10.2 RECOMMENDATIONS

1. That the Report “Master Plan Study Wild Waterworks at Confederation Beach Park” prepared by FORREC be adopted and presented to Public Works Committee for consideration.
2. That **“Option 3, Modest Improvements”** be selected as the recommended option.
3. That a detailed business case be developed using the available FORREC report, together with the CBRE Market and Financial Analysis of Wild Waterworks.
4. That following selection of a suitable Option by Public Works Committee and Council, a detailed Water Park Concept Plan be prepared by a qualified Water Park consultant.
5. That subject to the final business case, Option 3 be constructed in phases, as soon as practical.



11 APPENDIX

A-1 MARKET AND FINANCIAL ANALYSIS OF WILD WATERWORKS OPTIONS

11

APPENDIX

A-2 AQUATIC ENGINEERING FACILITY REVIEW REPORT + RECOMMENDATIONS

Aquatic Engineering Facility Review

Report & Recommendations

Wild Waterworks

Date: **15 October 2018**

Prepared by: **Allen Clawson, P.E.**

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Introduction and Overview

Wild Water Works of Hamilton Ontario has engaged Forrec and CLOWARD H_2O to provide an assessment report and recommendations for the various pools, slides, water features and their associated mechanical systems currently in operation at the park.

The initial investigative site visit was carried out by Allen Clawson (CH2O) and Glenn O'Connor (Forrec) on the 29th of August 2018. Our team worked with Peter Purins and other park operational staff through the day to ensure that each system was accessed, non-visible infrastructure was explained, mechanical equipment was evaluated, and operational issues thoroughly discussed.

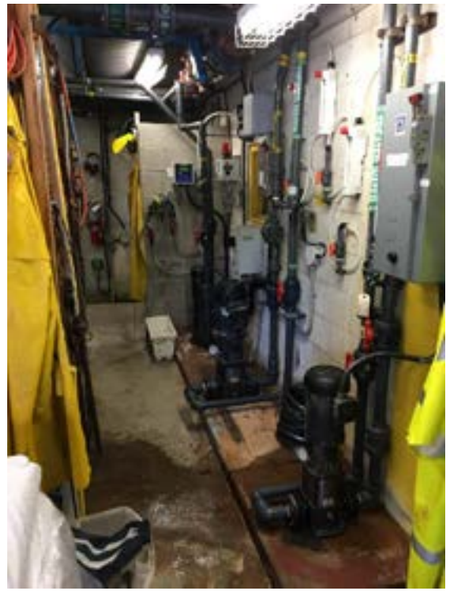
This assessment focuses on the operational condition of the existing structures, coatings, finishes, ride components and mechanical systems with the objective of determining the viability of the recommended course of action between: 1) Projecting potential serviceability over a 5-7year term. 2) Prioritizing replacement for risk management and working toward an overall renovation master plan. 3) Complete re-design and re-development of the park.

Scanned copies of the original plans from 1982-83 and the expansion in 1994 were provided as reference along with the "West Slides" (Pro-Slide) added in 1999 and replacement of the "East" slides in 2008. Various other repairs and re-configurations have been made of necessity to correct or replace failed, damaged, or worn equipment (i.e. replacement of wave generation equipment in 2011, new pool surface finishes, …). However, for the most part the existing structures and systems are operating as designed with only incidental upgrades in the intervening years and they are nearing the end of their expected service life.

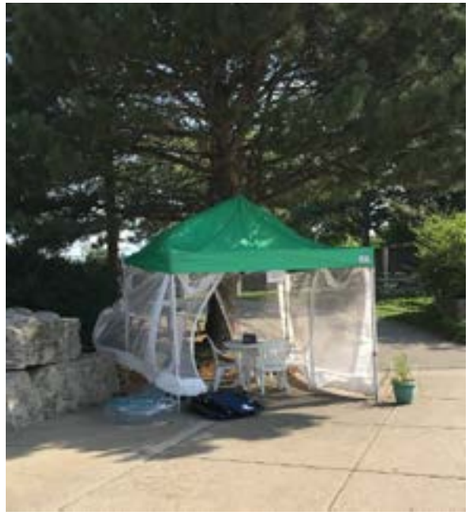
It is evident that any significant renovation of buildings or infrastructure will require complete replacement of all basic mechanical and electrical systems. Much is not only outdated but inadequate to the current number of guests and staff using the facility.

Overall Facility & Basic Infrastructure System Observations

In addition to the specific evaluation of the Pools and Aquatic Systems specifically in the CLOWARD H_2O scope, we were asked to provide an opinion regarding several other points relating generally to the condition of the buildings and supporting infrastructure. The following then are our notes and observations though no detailed analysis was carried out.



- Despite age and challenges the overall facility is in remarkably good condition with a few notable exceptions. I attribute this to the staff dedication and commitment to excellence, especially Peter. What he is doing in his efforts to keep up with preventative maintenance, inspections and his attention to detail, processes and planning has extended the life of existing attractions and infrastructure many years.
- Peter's description of his attention to certain details such as timing the start of the wave cycles or kids pool sprays to be active when the doors open was exemplary and representative of the attitude overall of the full-time staff.
- Aging infrastructure will continue to degrade and require higher expenditures annually. The city should expect an average of 15-20% annual increase in maintenance costs. It is important to note that some large expenditures (such as structural repair on towers or re-surfacing of the wave pool) may spread over multiple years. This also means that Peter needs a corresponding increase in staff to implement the repair work.
- Entry gate, food service, restrooms, lockers, pavilions, and all FF&E are definitely showing their age and appear to be operating at or beyond capacity when the park is busy (reported to us that a 1,500 person day is insane and staff have trouble managing)
- City needs to identify their long-term goal – and willingness to re-invest most if not all proceeds back into the park for maintenance and upgrades. Of course, this requires higher ticket prices and larger crowds that cannot currently be justified or accommodated, even if they could attract them.
- Cabanas need to be upgraded to permanent structures, portable maybe (i.e. with forklift), but permanent. Lots of potential locations for Cabanas were evident throughout.



- Most of the pumps are in their last phase of life. Noted multiple failures, repairs, rebuilds, etc. Pump failures will continue throughout the park and should be replaced with new whenever possible. A comprehensive plan to do so should be formulated and spares purchased for those at the highest levels of risk to minimize downtime when the pumps finally let go. New pumps should be purchased with high efficiency motors and fit with VFDs to enable operations to fine-tune flow to the slides and features without adding artificial head by choking flow with valves. Typically, the energy cost savings from VFDs and high efficiency motors will pay for the upgrade within a few months of operation. Even with a seasonal park it would likely have an ROI of less than 2 years.
- Combined filtration systems should be separated for sanitation purposes.
- Secondary Sanitation Systems should be considered on any new, upgraded or renovated systems.

Wave Pool

System Description:

Approximate Water Surface Area:	3,000 m^2
Total Pool Volume:	5 Million Liters, 5,000 m^3 [1.32 M gallons]
Design Treatment Flow Rate:	3x 84.1 L/s, 900 cmh [4,000 gpm]
Design Turnover Time:	5.56 hr (330 min)
Filter:	Vacuum DE filter sumps (3) using Pearlite coating media

Observations

1. It was reported that the wave pool loses approximately 50 mm [2”] of water /day and requires about 15,000 L [4,000 gal] /day in makeup water. These values do not add up – 50 mm of water loss is 10x the reported makeup volume. However, assuming the 50mm is correct, most of the observed losses must be due to leaks in the pool shell or piping. Based on our experience and calculated estimation, maximum daily evaporation loss for this pool would be expected to be more in the range of 6-8 mm, very close to the reported makeup volume. Thus, further investigation will be necessary to determine the water-tightness of the pool and systems.
2. Beach deck is rather barren and needs something to break up the monotony. Everywhere else there are planters, trees and flowers, but the wave pool deck is just a big field of splintery picknick tables and cracked concrete.
3. Pool was re-surfaced in 2004. Operator reports evidence of deterioration of that finish (including waterline and coping tile) indicating that another re-finish will be necessary soon. Once the finish begins to deteriorate total failure is relatively rapid.
4. Resilient decking (Duraroc) finish was added at the beach in 2011 then re-done in 2016. Material seems to be in good condition at the beach and is a nice addition with color, slip resistance, and impact attenuation.
5. Balance tank (Filter tanks) were inspected and re-coated in 2011. Coatings have failed and are pealing off the interior of the tanks.
6. Circulation/treatment appeared to be in decent working condition with well cared for equipment. I’ve rarely seen such organization and cleanliness in a facility of this age.

7. We were not able to see the condition of the filter disks but presumably, and from all appearances, they are in good shape and have been well maintained/replaced as necessary by operations staff.
8. Original design called for 3 operating filter sumps and 1 spare or future filter for slides. It appears that the spare was fit out and is now in use as a 4th filter on the wave pool increasing the total flow capacity to 1,200 cmh [5,290 gpm] for a turnover of 4.2 hrs (250 min). If this is the case, and the pumps can move the design flow, the resulting turnover is much better.
9. Treatment pumps were reportedly replaced in 2012 but recent failures indicate that the pumps have likely not been operating optimally in the past so continued failures are likely. As is common with vacuum DE style filters, it is fairly clear that the treatment pumps were routinely run under high negative pressure conditions in the past. This condition causes cavitation, degradation of impellers and pump volute and causing vibration that damage bearings and seals. It is likely that the pumps, though they appear to be functional, are operating at a reduced capacity and certainly at reduced life expectancy.
10. New wave equipment (installed in 2012) appears to be in excellent working condition and well maintained should have better that 15 years left in it.
11. Beach return grating / skimming is not up to today’s standards but appears sufficient to the need. However, due to operations running the water level a bit higher than design intended the gutter is consistently flooded so provides no skimming action. This is the same with the side gutters. Consequently, floating debris must be manually removed. The trade-off however, is accelerated degradation of the pool finish so, in this case operations has made the right choice to raise water level.
12. Electrical service components appear to be in serviceable condition though aged as one would expect in a moist environment.

Design Evaluation

1. Original design called for 3 operating filter sumps and 1 spare or future filter for slides. the design turnover was 5.5 hours which, while technically meeting code requirements is somewhat below standards for a heavily used pool of this type. Our standard for a wave pool would be a 3-4 hour turnover rate design to accommodate a large number of patrons.
2. It was not clear from the walk-thru but it appears that the spare filter sump has been fit out since original construction and is now in use as a 4th filter on the wave pool. Assuming equivalent design flow to the other 3 sumps this increases the total flow capacity to 1,200 cmh [5,290 gpm] for a turnover of 4.2 hrs (250 min). If this is the case, and the pumps can

move the design flow, the resulting turnover is much more in line with today's standards. This should be confirmed with operations staff.

3. Design pipe sizing results in high velocities – higher than 1.5 m/s [5 ft/s] on suction lines and greater than 3 m/s [10 ft/s] on some pressure lines. This is well beyond the recommended velocities for PVC piping and will result in scouring of the inner walls, thinning and eventual failure of the pipe and fittings. High velocities also create excessive pressure loss (higher than necessary energy consumption) and increased potential for water hammer. Recommended velocities are < 1 m/s [3.3 ft/s] for suction and < 2 m/s [6.5 ft/s] for pressure lines.
4. Drain piping is not capable of full treatment flow as designed without excessive head differential. Thus, if the pool is not filled to gutter level the pumps will quickly drain-down the balance tank and may expose the filter disks to air while water is displaced from the balance tank to the pool to create the necessary operating head. This has likely contributed to the short life expectancy of the treatment pumps.

Concerns & Recommendations

Concern 1: Pool may be leaking as much as 150,000 L [40,000 gal] /day according to reports that there are 50 mm [2"] of water loss per day. This is a huge load on the chemical treatment and heating to bring that volume of makeup water up to steady state with the pool that could be saved if the leaks are found and repaired.

Recommendation 1: Validate the volume of water loss and investigate where leaks may be (pool shell, piping, balance tank, filter sumps, etc.) and repair.

Concern 2: Pool surface degradation. This could be a source of the leaking in C1 and can also be a safety hazard as pieces of the floor become loose potentially creating sharp edges and debris in the pool.

Recommendation 2: Drain the pool and carefully examine the pool surface during the off season. Consult a qualified pool finish contractor to recommend patching or replacing the existing finish. Using a quality material that can be exposed to dry conditions and will stand up to freeze/thaw cycles will minimize future refinishing work. One material to consider would be a relatively new powdercoat material from ecoFINISH (https://www.ecopoolfinish.com/) which is a flame-applied polyethylene coating.

Concern 3: Balance tank waterproofing coating has failed.

Recommendation 3: Recommend removing the existing coating then prepping and replacing with either a quality cementitious coating similar to Basecrete (http://www.basecreteusa.com/) or the same flame applied polyethylene as in R2 above.

Concern 4: Circulation pumps have most likely been damaged through cavitation due to operational conditions in the past and are functioning at reduced capacity/efficiency today. This is resulting in higher operational costs (power) and reduced capacity for water quality.

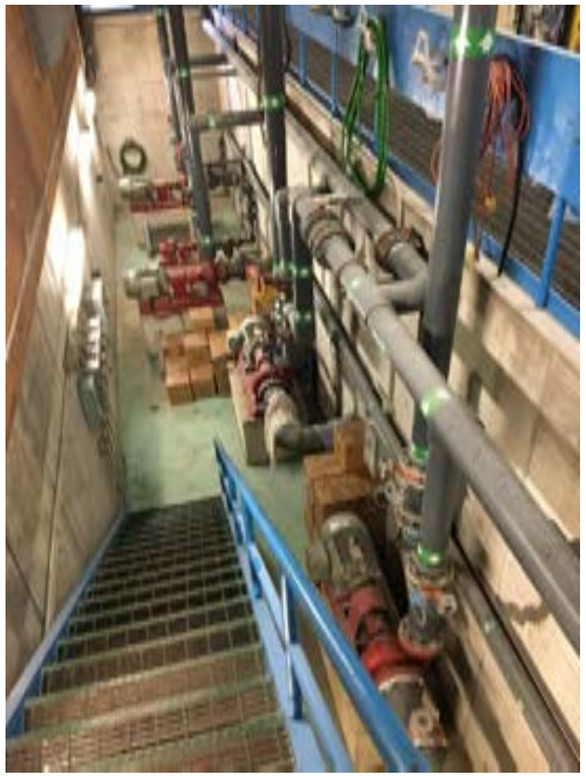
Recommendation 4: Replace pumps with new at original design capacity. Recommend high efficiency motors and VFD operators to maintain constant flow. Pressure transducers on each pump suction should be implemented to alarm and reduce pump flow when pump suction drops below the NPSHr limit for that pump.

Concern 5: As the park becomes more popular the design filter capacity is likely to be exceeded and water quality will suffer as a result. Original design turnover is 5.6 hours which may have been reduced to 4.2 hours by brining on the 4th filter sump (to be verified). The flow rate cannot be increased however due to the pipe size constraints.

Recommendation 5: Short of major demo of the pool shell, adding drains, and replacing piping there is no simple way to increase treatment flow. Care should be taken to ensure that new pumps (R4) are optimized the filter sump and piping capacities. It may be possible to engineer a retrofit drain and return system that would augment the optimized existing treatment by creating a wall drain on each side wall the returning through the wave generator chambers. This would require some detailed engineering to determine feasibility with the existing structures and facilities.

Summary

With the above outlined deficiencies addressed we would expect that the system could operate with only general PM for another 10-15 years. The basic piping is essentially in good order as far as we can determine though a bit undersized and limiting to the additional desired capacity. It should be possible to R&R existing equipment without changing the basic infrastructure. However, electrical might be a can-of-worms once opened and require new conduit runs, wire pulls, breakers and possibly boxes.



East Side: Slides & Kids Pool

System Description

Approximate Water Surface Area:	1,200 m^2
Total Pool Volume:	1 Million Liters, 1,000 m^3 [264,000 gallons]
Design Treatment Flow Rate:	Unknown
Design Turnover Time:	Unknown
Filter:	High Rate Sand

General Observations

1. Kids Pool and East Slides share a common circulation and treatment system. This is problematic from an operation and sanitation point of view but the facility and operators have learned to live with the issues this creates.
2. Actual installed treatment equipment (pumps and filters) was not determined during the site visit nor was the age/condition of the filer media. We anticipated being able to identify this information from the drawings provided to us but have been unable to do so. Water quality on this lightly attended day appeared good but reportedly degrades on a moderately busy day. This may be due to many factors ranging from pump performance, filter media condition, and oxidation/sanitation chemistry control.
3. If similar pipe sizing criteria to what was used in design of the wave pool then pipe velocities are likely excessive leading to reduced efficiencies, potential for pipe/fitting scouring and increased risk of water hammer.
4. It was reported that there is approximately 20,000 L [5,200 gal] /day of makeup water used in these combined systems. Though there may be leaks this seems to be a nominal amount and not unexpected with the amount of splash, spray and carryout due to the slide and spray feature operations.

East Slides

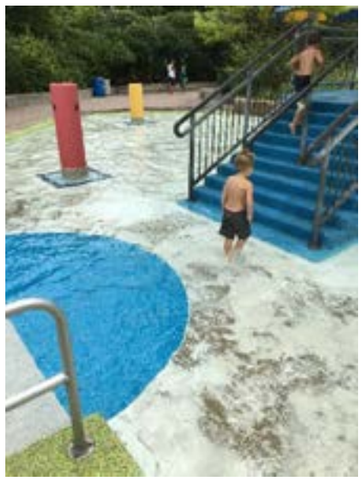
5. Structural repair of the slide tower was carried out last spring when significant corrosion damage to the upper deck was found.
6. Slides are aging/weathering but in good working order if good maintenance practices are continued.
7. Slide pumps have seen failures and will continue to do so. Equipment is aged and should be replaced proactively to prevent failure during operation. Piping appears to be

undersized with higher than recommended velocities (as has bee noted on the wave pool). This is likely contributing to pump wear.

8. Operator noted that pumps are difficult to prime – a further indication of a combination of pump wear (cavitation) and smaller than recommended pipe size causing restricted inlet flow. Dampened check valves should be considered for installation on the discharge of each slide pump to help prevent loss of prime and minimize risk of water hammer when an e-stop is thrown, or pump is shut down in normal operation. See Appendix C.
9. Deck drains did not appear to be working well – maybe just due to accumulation of debris at the end of seasonal operation.
10. It was unclear how the collection tank for the slides was connected to the kid's pool area though the two are treated in common.
11. Electrical panels in the slide pump house appeared to not be faring well. May need to be replaced within a short time, perhaps along with new pumps.

Kids Pool

12. Multiple issues with nozzles and control valves. Operation staff has been working to correct these issues and have restored function to a good portion of the nozzles compared with a few years ago. It should be possible to disassemble and repair or replace the solenoids and get all the systems working.
13. Shade sails over the pool are in fairly good condition having been replaced within the last few years.
14. Pool deck is sand bedded pavers with low points and drainage issues evident all over. This would not be code allowable in most locations in North America.
15. Duraroc on slide platform and around pool perimeter showing signs of deterioration.
16. A large quantity of sand was noted in the in pool from degrading concrete surfaces and washing in from deck due to storms. Loose material such as sand creates potential for sanitation issues in the pool and should be cleaned out daily if necessary. The source of these (deck and decomposing pool finish) should be corrected.
17. Inadequate deck drainage, deck appears to slope toward pool instead of away in some areas.
18. Pump noise was excessive, an indication of wear and imminent failure.
19. Drains, inlets and skimming all appear inadequate to the guest capacity. A number of the return fittings are damaged



and not functioning. It is probable that the pool met design standards at the time of construction but does not do so now.

20. Of any of the features in the park this pool is the most problematic in terms of sanitation and safety.
21. Electrical in the kid's pool vault also appeared to be nearing it's end though it is impressive that the original Crystal Fountains controller from 1983 is still functioning as well as it is.

Concerns & Recommendations

Concern 6: Common circulation system and aging filtration / sanitation equipment.

Recommendation 6: Circulation and treatment for the slides and kids pool should be separated to allow operations to optimize water quality and sanitation. Inspect and verify condition of sand filter media looking for caking, channeling, etc. if sand is worn (typical 5-7 year life) consider replacing with activated glass media such as Dryden Aqua AFM (see Appendix A)

Concern 7: Slide pumps have most likely been damaged through cavitation due to operational conditions in the past and are functioning at reduced capacity/efficiency today. This is resulting in priming difficulties, higher operational costs (power) and reduced capacity for slide function. Kids pool pumps also seemed excessively loud, indicative of bearing / seal issues. Several of the pumps were observed to be leaking.

Recommendation 7: Replace pumps with new at slide design capacity. Recommend high efficiency motors and VFD operators to maintain constant flow. Pumps should operate at constant flow condition to ensure that the slides are operating within manufacturers specified conditions. Add dampened check valves to improve priming and reduce the risk of water hammer.

Concern 8: Slide deck drains not flowing causing standing water. This is both a safety and potential health hazard.

Recommendation 8: Check and clean out deck drain lines. Ensure that slide water drains away quickly and thoroughly after each rider.

Concern 9: Inoperative nozzles and valves in kids play area.

Recommendation 9: Repair or replace inoperable valves and solenoids on kids pool spray features. Flush lines with strong sanitizing solution prior to operation.

Concern 10: Kids pool deck material is inappropriate for the application and has slope and draining issues.

Recommendation 10: Pool deck should be a durable, slip resistant, impervious surface. Cast in place concrete is the common choice. Newer resilient surface materials available today, such as LifeFloor (www.lifefloor.com) can be applied over concrete to enhance the slip resistance and attenuate falls.

Concern 11: Loose material, sand, decomposed concrete, etc. evident in the kids pool.

Recommendation 12: Sand and debris should be cleaned out as often as necessary to prevent accumulation. Repair or replace the materials, finishes, etc. where this debris in coming from.

Concern 11: Drains, skimming and returns appear inadequate to ensure proper circulation, treatment and sanitation in the kids pool

Recommendation 12: There is no simple fix for this. Continual repairs can be implemented but resolving the root problem will likely require replacing the pool.

Summary

In consideration of all of the issues raised with this system we believe the best course of action would be to demo the existing kids pool leaving the existing treatment system for just the slides. With new slide pumps and continued vigilance in maintaining the slides and their mechanical systems the slides should last another 8-12 years though there will undoubtedly be additional structural issues to address with the slide tower and supports along the way.

A brand new kids pool with a separate treatment and circulation system at current industry standards should be planed and built.

West Side: Slides & River

System Description

Approximate Water Surface Area:	2,200 m^2
Total Pool Volume:	2 Million Liters, 2,000 m^3 [528,000 gallons]
Design Treatment Flow Rate:	Unknown
Design Turnover Time:	Unknown
Filter:	High Rate Sand

General Observations

1. Actual installed treatment equipment (pumps and filters) was not determined during the site visit nor was the age/condition of the filer media. We anticipated being able to identify this information from the drawings provided to us but have been unable to do so. Water quality on this lightly attended day appeared good but reportedly degrades on a moderately busy day. This may be due to many factors ranging from pump performance, filter media condition, and oxidation/sanitation chemistry control.
2. If similar pipe sizing criteria to what was used in design of the wave pool then pipe velocities are likely excessive leading to reduced efficiencies, potential for pipe/fitting scouring and increased risk of water hammer. This is very likely a contributing factor in the lack of propulsion and skimming efficiency noted.
3. Recent repair work (last season?) was done on both the river and slides. Slides were painted and the river was caulked. Though there are some issues with these repairs they were largely effective at extending the life and reducing water losses.

West Slides

1. Slide fiberglass and support structures are definitely showing their age. Corrosion on steel members has been noted and attempts have been made to protect and paint. Gel coating on fiberglass is oxidized and at a point where accelerated deterioration is likely.
2. We were not able to get a close look at the interior slide surfaces but the exterior had been recently painted – already pealing off in many places
3. Leaks were evident at several joints. This will accelerate as the fiberglass and support structures continue to age.
4. Water hammer condition reported on slide pumps. Should retrofit with dampened check valves on pump outlet. See Appendix C. Otherwise the slide pumps appear to be some of the best operating pumps on the site without many of the difficulties observed elsewhere.

5. Slide pump intake in the river flow should be evaluated. These are direct suction grates and the open area appears very small when compared with the flow required and the pumps installed. Design and record drawings of this area are unclear and it is likely that modification has been made since that time. Intake grate velocities should be kept to less than 0.5 m/s [1.5 ft/s] to avoid entrapment danger when the slide pumps are operating.
6. Reported leaks in slide pump intake box at the river.

River

7. River propulsion is minimal and very inefficient. Average velocity appears to be around 0.3 m/s [1.0 ft/s]. What propulsion there is appears to be primarily driven by the slide pumping. The propulsion intakes, nozzles and pumps designed for the task appear to be largely ineffective for that purpose though design intent and calculations were not evident on the provided drawings for a thorough evaluation. Possibly this detail was left to the discretion of the contractor.
8. Several large eddies exist in the river channel. This condition traps people and debris.
9. A large quantity of leaf litter from all the amazing planting and trees was evident – skimming and drain grates are inadequate to the task and are constantly plugged. Need a much more robust means of removing both floating and sinking debris.
10. Drain grates throughout appear inadequate and possibly pose an entrapment risk. Need to verify piping and drain velocities
11. River structure is creative and fun. However, it was poorly waterproofed. Recent comprehensive caulking work appears to have dramatically reduced water loss through leakage. However, caulking is rarely a permanent solution.
12. Caulking contractor opened up joints that were placed to be decorative and filled with caulk. This potentially weakened the structure (similar to crack control joints) and may cause additional cracking to occur.

13. The caulk that was used throughout the river is staining, growing algae and mold.

14. Spray nozzles in the play beach zone have been repaired in an unconventional manner. The effect is good with good water spray as intended but the fix exposes pipe and valves that are an attractive nuisance and potential danger for kids.
15. Surface degradation of the pool walls and floor is evident throughout.

Concerns & Recommendations

Concern 13: Slide structures and fiberglass deterioration.

Recommendation 13: Structural support of the slide tower and supporting columns should be carefully inspected by a qualified structural engineer and the fiberglass by the slide manufacturer. Their instructions for repair and maintenance should then be carried out.

Concern 14: Slide pump water hammer, if not corrected will eventually result in catastrophic failure.

Recommendation 14: Retrofit piping to install a dampened check valve (see Appendix C).

Concern 15: Slide intake drain box and grating appear to be undersized for the slide flow. All river intake grates (propulsion and treatment) appear similarly undersized.

Recommendation 15: Direct suction fittings on a pool should be designed as “unlockable” with low velocities through the cover to eliminate risk of entrapment. Refer to ASME/ANSI A112.19.8.

Concern 16: Leak in slide intake box.

Recommendation 16: Open, inspect and repair slide intake box leak. Apply an appropriate elastomeric coating.

Concern 17: River propulsion pumping is ineffective. Low velocities are not necessarily a problem, but mixing/sanitation of the water is somewhat dependent on the movement through the channel.

Recommendation 17: This is difficult to solve without re-construction of the propulsion stations however, it may be possible to design new intake systems and wall jets at the existing locations with marginal impact to pool structure.

Concern 18: Caulking material used appears to be the wrong sort. Less than 1 year old, the caulk joints are discolored and evidently harboring micro-organisms (mold, algae and bacteria). This is a sanitation and well as an aesthetic issue. If unchecked will lead to failure of the caulk joints.

Recommendation 18: Replace caulking with a quality sealing compound such as Deck-O-Seal by WR Meadows.

Concern 19: Spray nozzles in river island area is a potential safety hazard.

Recommendation 19: Nozzles should be recessed within a contained are in accessible to curious guests. Nozzle velocities over 2 m/s [6 ft/s] should be avoided unless the stream is completely inaccessible by guests.

Concern 20: Surface degradation of concrete in the river.

Recommendation 16: Erosion and spalling of the concrete river surface finish is evident throughout. As the structure ages this degradation is likely to accelerate, eventually exposing reinforcing steel to the water. A coating could be applied to halt the degradation similar to what is recommended for the wave pool. Using a quality material that can be exposed to dry conditions and will stand up to freeze/thaw cycles will minimize future refinishing work. One material to consider would be a relatively new powdercoat material from ecoFINISH (https://www.ecopoolfinish.com/) which is a flame-applied polyethylene coating.

Summary

Overall and despite the deficiencies noted, the river and it’s mechanical systems are in decent condition given the current state of maintenance and labor required. The slides are on the verge of potential failure of one kind or another and in need of attention prior to re-opening next season.

Conclusions and Summary

For the age and obvious challenges this facility faces the staff is doing a remarkable job at keeping up on critical issues. It is a rare thing indeed to see 30-year old mechanical spaces in as good a condition and organized so well.

That said, there are certainly some very real and pressing priorities that need attention in order to maintain a quality, safe experience for guests in the near (5-7 year) term.

Item	Priority
• Evaluate River drains and slide intake box – effect repairs	Immediate
• Re-build and protect river spray nozzles	Immediate
• Inspect and repair east & west slide structures and fiberglass	Immediate
• Dampened Check Valves on Slide pumps	Immediate
• Design and construct new Kids Pool to address the multiple issues	1 year
• Replace wave pool treatment pumps	1 year
• Repair and re-coat wave pool balance and filter tanks	1 year
• Evaluate feasibility of optimization of wave pool treatment, 3-hour turnover	1 year
• Evaluate sand filters, replace media as necessary	1-2 years
• Replace East Slide pumps	1-2 years
• Resurface Wave Pool	1-2 years
• Replace River Caulking	2-3 years

Appendix A: Activated Filtration Media

DRYDEN AQUA

HOME ABOUT AFM® SWIMMING POOLS WATER TREATMENT AQUARIA & AQUACULTURE CONTACT

AFM®

Activated Filter Material

What is AFM®?

AFM® Activated Filter Media is a direct replacement for sand, doubling the performance of sand filters without the need of additional investments in infrastructure. AFM® resists biofouling, biocoagulation and transient wormhole channeling of unfiltered water and never needs to be recharged or replaced.

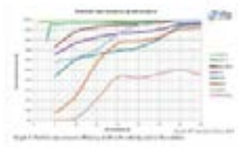
AFM® is a highly engineered product manufactured from a specific glass type, processed to obtain the optimum particle size and shape. It is then exposed to a 3-step activation process to increase its surface area by up to 300 times for superior mechanical and electro-static filtration performance.

AFM® benefits at a glance

- ... more than doubles the performance of an existing filtration system
- ... is not subject to biodynamic instability and will never allow untreated water to pass
- ... substantially lowers chlorine oxidation demand
- ... lowers backwash water demand by an average of 50%
- ... is expected to last for the life of the filtration system
- ... provides quick return on investment

Excellent performance of AFM® in comparison with quartz sand and other glass filter media

AFM® comes with important certifications such as NSF 50 (swimming pools) and 61 (drinking water), HACCP, UK DWI and others. AFM® has been independly tested by IFTS Institut de la Filtration et des Techniques Séparatives in France in 2014 and its superior performance over quartz sand and othe glass filter media was confirmed and and is documented in the the 2014 IFTS Report available below. AFM® more than doubles the performance of a quartz sand filter and it performes multiple times better than all other glass filter media tested.



What makes AFM® so effective?

1. Clean, carefully selected glass

AFM® is only made from pure green and brown glass which have the necessary metal oxides to help make AFM® self-sterilising.

2. Ideal hydraulic properties

The raw material is ground into the optimal grain size and shape that is crucial for the outstanding hydraulic characteristics of AFM®. No dangerous glass splinters are allowed to be present in the filter material. Our manufacturing process is ISO certified.

3. Activation process

The AFM® activation process creates a mesoporous structure with a huge catalytic surface area. Sand has a surface area of 3,000 m^2 per m^3 but AFM® has a surface area up to 300 times greater for adsorption and catalytic reactions. Hydroxyl groups on the surface give AFM® a strong negative charge, known as the zeta potential, that attracts heavy metals and organic molecules. In the presence of small amounts of oxygen or oxidising agents, the catalytic surface generates free radicals that make AFM® self-sterilising.

Appendix B: Typical Life Expectancy of Critical Pool Equipment

The following are predicated on indoor equipment installation and an effectively implemented preventative maintenance program.

Motors: High-quality, commercial type motors that are well maintained have a typical useful life expectancy of 7-12+ years.

Pumps: High-quality, commercial type pumps that are well maintained area expected to last between 15-20 years.

Sand Filter Tanks: High-quality, commercial type tanks typically last 20-30 years. FRP tanks are not subject to corrosion degradation and when installed indoors have a life expectancy in excess of 30 years.

Sand Filtration Media: This topic is very controversial but almost everyone agrees that most sand type materials should be replaced when backwashing no longer returns the system to normal, “clean filter”, lower pressures. Many filter suppliers recommend changing the sand every 5-7 years. Specialty filter media may have much longer life cycles with some never needing to be changed. In an system with frequent or aggressive backwash cycles a 5-year replacement cycle would not be unusual.

Sand Filter Internal Components: in addition to normal wear, it is common for laterals to be damaged by the media change process. Therefore, filter manufacturers typically recommend that laterals (both upper and lower) be replaced when media is changed or every 5-7 years.

Heaters: Very dependent on the type and quality of the Chiller. Many facilities expect 10+ years before considering replacing them. Regular maintenance is extremely important but equally important is recording temperatures and power consumption to give an accurate picture of how the chiller is performing. Costly damage can be avoided by watching for degradation in performance which can lead to irreversible damage. The final decision is usually based on performance cost vs. cost of a new chiller unless there is a major breakdown.

Chemical Control Systems: pH and ORP probes should be replaced every 6-12 months. The rest of the components are robust and should last 20+ years.

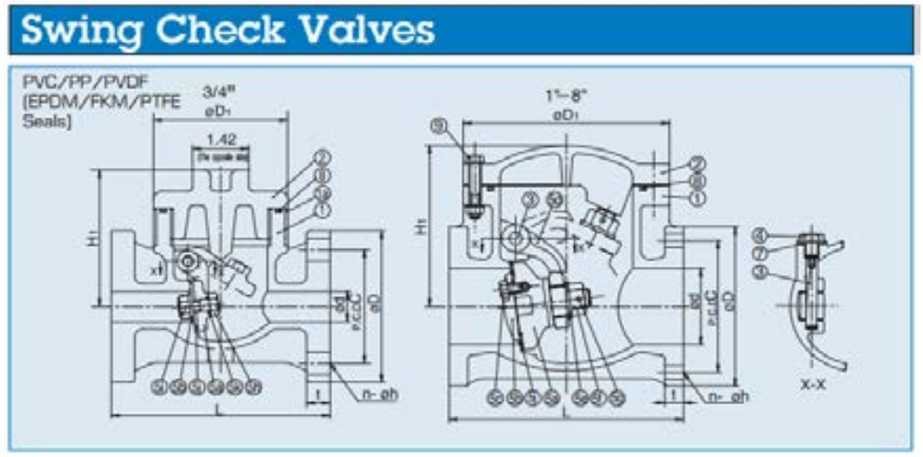
Appendix C: Large Diameter Swing Check Valves

Current piping and method of control on slide pumps is producing water hammer when the system is shut down. Adding dampened check valves or replacing existing non-dampened check valves will improve the longevity of the installation.

Swing Check Options - Assist Assemblies

Swing check valves often have the option to install an external spring or lever & weight assist assembly. This assembly is mounted external to the valve. When fluid pressure starts to drop, the spring (or lever & weight) retracts the swing arm and brings the disc back into the seat position effectively reducing the speed of the fluid flowing back towards the check valve, in turn reducing the shock caused by water hammer. The assembly returns the disc to the seat, but does not add to the sealing force. Hence, minimum backpressure requirements still apply for swing check valves with spring assists.

Because lever and weight assemblies rely on gravity to provide their assistance on a closed stroke, they tend to work better in vertical installations.



Swing Check Valve – Sample Specification

All swing check valves shall be of solid thermoplastic construction, having no metal that comes in contact with media, (except when lever & weight or stainless-steel spring option is installed). Valves shall incorporate a single disc design suitable for either horizontal or vertical installations. Valves shall be of top entry bonnet design for maintenance purposes with O-ring top bonnet seal. PVC shall conform to ASTM D1784 Cell Classification 12454A, PP conforming to ASTM D4101 Cell Classification PP0210B67272 and PVDF conforming to ASTM D3222 Cell Classification Type II. Valves shall be rated to 150psi sizes 3/4” through 3”, 100psi sizes 4” through 6”, and 70psi size 8” at 70º F, as manufactured by Asahi/America, Inc.

11 APPENDIX

A-3 PROGRAM OPTIONS

ATTENDANCE SUMMARY			OPTION 2	OPTION 3	OPTION 4
ANNUAL ATTENDANCE			**124,900**	**145,000**	**185,000**
Peak Month		40%	49,960	58,000	74,000
Peak Week		23%	11,491	13,340	17,020
Peak Day		25%	2,873	3,335	4,255
Design Day		90%	2,585	3,002	3,830
Peak In Park DD		90%	2,327	2,701	3,447
Peak In Park PD		90%	2,585	3,002	3,830
EUH					
Entertainment Units per Hour per Visitor (PHC)		3.50	8,144	9,455	12,063
PARK AREA			**m²**	**m²**	**m²**
Water Park Area Requirement	m^2/pp	16.50	42,660	49,525	63,187
Parking Area Requirement	m^2		37,574	46,444	57,483
GUEST ACTIVITY DISTRIBUTION					
% Of Guests In Rides & Queues			15%	15%	15%
% Of Guests In Water Play Attractions			15%	15%	15%
% Of Guests In Pools & Rivers			30%	30%	30%
% Of Guests On Deck Lounging			40%	40%	40%
TOTAL			**100%**	**100%**	**100%**

ENTRY PLAZA	m^2/pp	OPTION 2	OPTION 3	OPTION 4
		m²	**m²**	**m²**
Outside Gate	1.50	1,000	1,126	1,436
Inside Gate	3.00	400	675	862

FOH/BOH REQUIREMENTS	OPTION 2	OPTION 3	OPTION 4
	m²	**m²**	**m²**
FOH/Administration & Guest Services	1,500	1,750	2,000
Back of House	800	900	1,000

GUEST WASHROOM, CHANGEROOM, LOCKERS & SHOWER FACILITY GUIDELINESWATER PARK WC CALCULATION	OPTION 3 145,000 ATTENDANCE
Peak in Park Design Day	3,002
Ratio of Female Guests Per WC (50% of guests)	40
No. Female WC	38
No. Female Sinks (1:2 per WC)	19
Ratio of Male Guests Per WC (50% of guests)	60
No. Male WC Fixtures Required	25
No. Male WC	8
No. Male Urinals	17
No. Male Sinks (1:2 per WC)	13
Total Fixtures	**63**
Area Required Per WC (m²)	**6.5**
Park Distribution	**3**

BREAKOUT		m²	Fixtures
Main A	70%	285	44
Satellite B	15%	61	9
Satellite C	15%	61	9
Total Area Required	**100%**	**406**	**63**

WATER PARK SHOWER CALCULATION	
Peak in Park Design Day	3,002
Ratio of Guests Per Shower	1:50
No. of Showers Men	30
No. of Showers Women	30
Area Required Per Shower (m²)	2.5
Total Area Required (m²)	**150**

Note: One shower and one change room combined in one stall

WATER PARK CHANGE ROOM CALCULATION	
Peak in Park Design Day	3,002
Ratio of Guests Per Changeroom	1:50
No. of Changerooms Required	60
No. of Changerooms Men	30
No. of Changerooms Women	30
Area Required Per Changeroom (m²)	3.5
Total Area Required (m²)	**210**

WATER PARK LOCKERS CALCULATION	
Peak in Park Design Day	3,002
Percentage of Guests Requiring Lockers	80%
No. of Lockers Required	2401
Area Required Per Locker (m²)	1.2
Total Area Required (m²)	2881
Total Area Required (4 High) (m²)	**720**

FACILITIES TOTAL (m²)	1,487

TICKETING REQUIREMENT		OPTION 3 145,000 ATTENDANCE
Design Day	90%	3,002
Daily Hours of Operation		10
TICKETING DISTRIBUTION		
Walk-up		50.00%
Group Tickets (Gross)		35.00%
Advance Individual Guest Sales		5.00%
Multi Visit Tickets (if applicable)		5.00%
Annual Pass		5.00%
		100.00%

WALKUP	
Transactions per hour is based on 0:02:00 (2.00) minutes per transaction, with the number of transactions based on the average walkup group size of 3 persons, as corresponds the # of visitors/car.	
Peak walk up ticketing hour	375
Max. Number of transactions/hr.	126
Sales positions Required	4

GROUP	
Transactions per hour is based on 0:06:00 (6.00) minutes per transaction, with the number of Group sales ticketing based on 40 persons per group, anticipated size of individual coach average capacity.	
Peak Group Ticketing Hour	210
Max. Number of Transactions/hr.	6
Sales Positions Required	1

DESIGN DAY GUEST ARRIVALS			OPTION 3 - 145,000 ATTENDANCE	
Time	Arrivals	Departures	Arriving	Departing
9:00-10:00 AM	0.00%	0.00%	0	0
10:00-11:00 AM	25.00%	0.00%	750	0
11:00-12:00 PM	20.00%	0.00%	600	0
12:00-1:00 PM	15.00%	5.00%	450	150
1:00-2:00 PM	10.00%	10.00%	300	300
2:00-3:00 PM	8.00%	10.00%	240	300
3:00-4:00 PM	10.00%	15.00%	300	450
4:00-5:00 PM	10.00%	15.00%	300	450
5:00-6:00 PM	2.00%	20.00%	60	600
6:00-7:00 PM	0.00%	20.00%	0	600
7:00-8:00 PM	0.00%	5.00%	0	150
	100.00%	**100.00%**	**3,002**	**3,002**

ARRIVALS PLAZA	No. of Guests	Area Requirement m²/pp	Total Area m²
Peak Guest Arrival	750	1.5	1,126

FOOD AND BEVERAGE REQUIREMENTS AND CAPACITY				OPTION 3 145,000 ATTENDANCE	
Meals					
Peak in Park DD Attendance					2,701
Meal Demand				80%	2,161
Hourly Meal Count				3	720
Sit Down				60%	**432**
Quick Service				40%	**288**
FACILITY BREAKDOWN	Hourly Meals	Turns/ Hour	Covered Seats	Area/ Seat (m^2)	Area Req'd (m^2)
Main F&B (1 Facility)	**432**	3	144	3.5	504
Quick Service (2 Facilities)	**288**	4	72	2.5	180
TOTAL	**720**		**216**		**684**

FACILITY BREAKDOWN		Covered Seats	Total Area	BOH Area (m^2) 35%	Seating Area (m^2) 65%
1 Main	100%	144	504	176	328
2 Quick Service	50%	36	90	32	59
3 Quick Service	50%	36	90	32	59
Total	**100%**	**72**	**180**	**63**	**117**

RETAIL SPACE REQUIREMENTS	OPTION 3 145,000 ATTENDANCE
Estimated Spend Per Head for Merchandise	$0.75
Estimated Annual Sales	$108,750
Retail Space (m^2)	36
Additional Storage and BOH (m^2) 20%	7
RETAIL SPACE REQUIRED (m^2)	**44**

GUEST PARKING CALCULATIONS							OPTION 3 - 145,000
PEAK IN PARK DESIGN DAY							**3,002**
Mode of Transportation	% of Guests Arriving by Vehicle Type	# of Guests Arriving by Vehicle Type	Persons per Vehicle	Total # of Spaces Required	Average # of Spaces per Hectare	Total Area (m^2)	Gross Up Area (m^2)
Private Car	85%	2,551	3	850	250	34,017	39,120
Bus	15%	450	45	10	60	1,668	2,084
Taxi Stacking						120	138
Guest Total	100%	3,002				35,805	41,342
Employee Parking	5.0%	128	1.5	85	250	3,402	5,103
TOTAL GENERAL - OVERALL TOTAL						**39,206**	**46,444**

WATER PARK RIDES & ATTRACTIONS								OPTION 3
Water Rides	Area (m^2)	Unit/ Qty.	Capacity/ Unit	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity
Matt Racers		4	1	4	120	480	80%	384
Body Slides		2	1	2	120	240	80%	192
Pool Sider Body Slides		2	1	2	120	240	75%	180
Family Raft Rides		2	4	8	720	1440	80%	1,152
Tube Rides Complex		3	2	6	360	1080	80%	864
Children's Body Slides		3	1	3	60	180	50%	90
Subtotal		**16**		**25**		**3,660**		**2,862**

Water Play Attractions	Area (m^2)	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity	Design Requirements
Water Play Structure		350	3	1,050	80%	840	
Children's Water Play	400	200	4	800	70%	560	2.0 m^2/person
Subtotal		**550**		**1,850**		**1,400**	

Dry Play Attractions	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity
Adventure Trail	50	3	150	75%	113
Subtotal	**50**		**150**		**113**

Pools & Rivers	Area (m^2)	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity	Design Requirements
Wave Pool	1,950	650	6	3,900	80%	3,120	3.0 m^2/person
Eazy River	1,350	450	6	2,700	80%	2,160	3.0 m^2/person
Teen Activity Pool	300	100	4	400	70%	280	3.0 m^2/person
Adult Plunge Pool	200	80	3	240	70%	168	2.5 m^2/person
Subtotal	**3,800**	**1,100**		**6,600**		**5,728**	
TOTAL ATTRACTION CAPACITY		**1,725**				**10,103**	

Seating Capacity	Area (m^2)	Unit/ Qty.	Capacity/ Unit	Instant Capacity
Parkwide Lounging				910
F&B Patios				200
Cabanas		20	4	80
TOTAL SEATING CAPACITY				**1,191**

WATER PARK SUMMARY		
Poolside Seating Capacity Total (Passive)	41%	1,191
Water Rides & Attractions Total (Active)	59%	1,725
Guest Total		**2,916**
ENTERTAINMENT UNITS PER HOUR PHC (ACTIVE)		**3.46**

GUEST WASHROOM, CHANGEROOM, LOCKERS & SHOWER FACILITY GUIDELINES WATER PARK WC CALCULATION	OPTION 4 185,000 ATTENDANCE
Peak in Park Design Day	3,830
Ratio of Female Guests Per WC (50% of guests)	40
No. Female WC	48
No. Female Sinks (1:2 per WC)	24
Ratio of Male Guests Per WC (50% of guests)	60
No. Male WC Required	32
No. Male WC	11
No. Urinals	21
No. Male Sinks (1:2 per WC)	16
Total Fixtures	80
Area Required Per WC (m^2)	6.5
Park Distribution	3

BREAKOUT		m^2	Fixtures
Main A	70%	363	56
Satellite B	15%	78	12
Satellite C	15%	78	12
Total Area Required	**100%**	**519**	**80**

WATER PARK SHOWER CALCULATION	
Peak in Park Design Day	3,830
Ratio of Guests Per Shower	1:50
No. of Showers Men	38
No. of Showers Women	38
Area Required Per Shower (m^2)	2.5
Total Area Required (m^2)	**191**

Note: One shower and one change room combined in one stall

WATER PARK CHANGE ROOM CALCULATION	
Peak in Park Design Day	3,830
Ratio of Guests Per Changeroom	1:50
No. of Changerooms Required	77
No. of Changerooms Men	38
No. of Changerooms Women	38
Area Required Per Changeroom (m^2)	3.5
TOTAL AREA REQUIRED (m^2)	**268**

WATER PARK LOCKERS CALCULATION	
Peak in Park Design Day	3,830
Percentage of Guests	80%
No. of Lockers Required	3064
Area Required Per Locker (m^2)	1.2
Total Area Required (m^2)	3676
Total Area Required (4 High) (m^2)	**919**

FACILITIES TOTAL (m^2)	1,897

TICKETING REQUIREMENT		OPTION 4 185,000 ATTENDANCE
Design Day	90%	3,830
Daily Hours of Operation		10
TICKETING DISTRIBUTION		
Walk-up		50.00%
Group Tickets (Gross)		35.00%
Advance Individual Guest Sales		5.00%
Multi Visit Tickets (if applicable)		5.00%
Annual Pass		5.00%
		100.00%

WALKUP Transactions per hour is based on 0:02:00 (2.00) minutes per transaction, with the number of transactions based on the average walkup group size of 3 persons, as corresponds the # of visitors/car.	
Peak walk up ticketing hour	479
Max. Number of transactions/hr.	160
Sales positions Required	5

GROUP Transactions per hour is based on 0:06:00 (6.00) minutes per transaction, with the number of Group sales ticketing based on 40 persons per group, anticipated size of individual coach average capacity.	
Peak group ticketing hour	268
Max. Number of transactions/hr.	7
Sales positions required	1

DESIGN DAY VISITORS			OPTION 4 - 185,000 ATTENDANCE	
Time	Arrivals	Departures	Arriving	Departing
9:00-10:00 AM	0.00%	0.00%	0	0
10:00-11:00 AM	25.00%	0.00%	957	0
11:00-12:00 PM	20.00%	0.00%	766	0
12:00-1:00 PM	15.00%	5.00%	574	191
1:00-2:00 PM	10.00%	10.00%	383	383
2:00-3:00 PM	8.00%	10.00%	306	383
3:00-4:00 PM	10.00%	15.00%	383	574
4:00-5:00 PM	10.00%	15.00%	383	574
5:00-6:00 PM	2.00%	20.00%	77	766
6:00-7:00 PM	0.00%	20.00%	0	766
7:00-8:00 PM	0.00%	5.00%	0	191
	100.00%	**100.00%**	**3,830**	**3,830**

ARRIVALS PLAZA	No. of Guests	Area Requirement m^2/pp	Total Area m^2
Peak Guest Arrival	957	1.5	1,436

FOOD AND BEVERAGE REQUIREMENTS AND CAPACITY				OPTION 4 185,000 ATTENDANCE
Meals				
Peak in Park DD Attendance			3	**3,447**
Meal Demand			80%	**2757**
Hourly Meal Count			3	**919**
Sit Down			60%	**551**
Quick Service			40%	**368**

FACILITY BREAKDOWN	Hourly Meals	Turns/ Hour	Covered Seats	Area/ Seat (m²)	Area Req'd (m²)
Main F&B (1 Facility)	551	3	184	3.5	643
Quick Service (2 Facilities)	368	4	92	2.5	230
TOTAL			**276**		**873**

FACILITY BREAKDOWN		Covered Seats	Total Area	BOH Area (m²) 35%	Seating Area (m²) 65%
1 Main	100%	184	643	225	418
2 Quick Service	50%	46	115	40	75
3 Quick Service	25%	23	57	20	37
4 Quick Service	25%	23	57	20	37
Total	**100%**	**92**	**230**	**80**	**149**

FULL BUILD OUT GUEST PARKING CALCULATIONS							OPTION 4 - 185,000
PEAK IN PARK DESIGN DAY							**3,830**
Mode of Transportation	% Guests Arriving by Vehicle Type	# Of Guests Arriving by Vehicle Type	Persons per Vehicle	Total # of Spaces Required	Average # of Spaces per Hectare	Total Area Require-ment (m²)	Gross Up Area Re-quirement (m²)
Private Car	85%	3,255	3	1,085	250	43,401	49,911
Bus	15%	574	45	13	60	2,128	2,659
Taxi Stacking						120	138
Guest Total	100%	3,830				45,649	52,709
Employee Parking (add 5% of total guest cars)	5.0%	163	1.5	109	250	4,340	4,774
TOTAL GENERAL - OVERALL TOTAL						**49,989**	**57,483**

RETAIL SPACE REQUIREMENTS	OPTION 4 185,000 ATTENDANCE
Estimated Spend Per Head for Merchandise	$1.00
Estimated Annual Sales	$185,000
Retail Space (m²)	62
Additional Storage and BOH m² 20%	12
RETAIL SPACE REQUIRED (m²)	**74**

WATER PARK RIDES AN& ATTRACTIONS								OPTION 4
Water Rides	Unit/ Qty.	Capacity/ Unit	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity	
Matt Racers	6	1	4	120	720	80%	576	
Body Slides	2	1	2	120	240	80%	192	
Pool Sider Body Slides	2	1	2	120	240	75%	180	
Family Raft Rides	2	4	8	720	1440	80%	1,152	
Tube Rides Complex	4	2	8	360	1440	80%	1,152	
Children's Body Slides	3	1	3	60	180	50%	90	
Subtotal	**19**		**27**		**4,260**		**3,342**	

Water Play Attractions	Area (m²)	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity	Design Requirements
Water Play Structure		500	3	1,500	80%	1,200	
Children's Water Play	700	300	4	1,200	70%	840	2.0 m²/person
Subtotal		**800**		**2,700**		**2,040**	

Dry Play Attractions	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity	
Dryland Attractions	50	2	100	50%	50	
Adventure Trail	60	3	180	75%	135	
Subtotal	**110**		**180**		**135**	

Pools & Rivers	Area (m²)	Instant Capacity	Cycles/ hour	Theoretical Hourly Capacity	Efficiency	Practical Hourly Capacity	Design Requirements
Wave Pool	2,500	833	6	5,000	80%	4,000	3.0 m²/person
Eazy River	1,750	583	6	3,500	80%	2,800	3.0 m²/person
Teen Activity Pool	500	167	4	667	70%	467	3.0 m²/person
Adult Plunge Pool	400	160	3	480	70%	336	2.5 m²/person
Subtotal	**5,150**	**1,417**		**8,500**		**7,603**	
TOTAL ATTRACTION CAPACITY		**2,354**				**13,120**	

Seating Capacity	Unit/ Qty.	Capacity/ Unit	Instant Capacity
Parkwide Lounging			1,138
F&B Patios			270
Cabanas	30	4	120
TOTAL SEATING CAPACITY			**1,528**

WATER PARK SUMMARY		
Poolside Seating Capacity Total (Passive)	39%	1,528
Water Rides & Attractions Total (Active)	61%	2,354
Guest Total		**3,881**
ENTERTAINMENT UNITS PER HOUR PHC (Active)		**3.38**

Hamilton

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