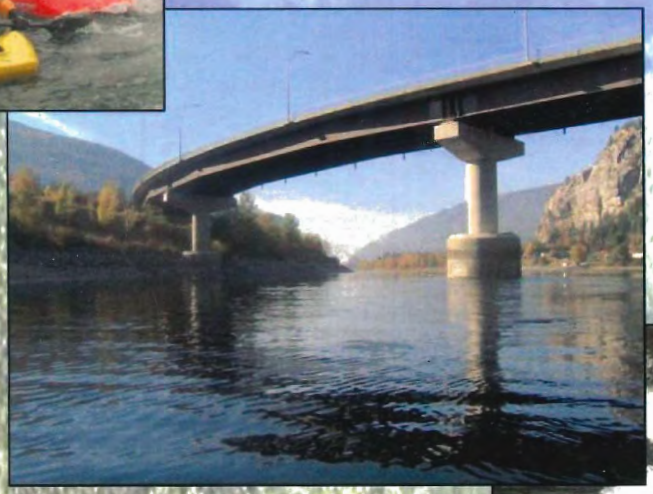
Columbia River Recreation Plan



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CASTLEGAR, B.C.

Executive Summary

The Columbia River Recreation Plan (CRRP) will involve the community in its entirety as well as visitors with the Kootenay and Columbia Rivers while fostering a sense of environmental stewardship through river recreation. Key recommendations include the construction of a whitewater park on the Columbia River at Millennium Park, supporting local river festivals, as well as making improvements to the area below the Brilliant Dam. Elements of the plan consist of: an examination of the potential of the Columbia and Kootenay Rivers, Recreational Uses of the Kootenay and Columbia Rivers, River Recreation Inventory and Analysis, Guiding Principals, Recommendations, an examination of economic precedents, Estimate Costs, Impacts on Fish, Environmental Regulations, Community Consultation, Potentially Affected Interests and a Strategy for Implementation. If the plan user is unfamiliar with whitewater recreation or whitewater parks they should first refer to Appendix 1 which provides an introduction to these topics.

A Source of Potential examines the value of the Kootenay and Columbia rivers within Castlegar and how they could be better highlighted for the benefit of the City of Castlegar and all of its residents.

Recreational Uses of the Kootenay and Columbia Rivers outlines current and past uses that occurred within city limits.

River Recreation Inventory and Analysis documents different locations within Castlegar and examines their suitability for the construction of a whitewater park. Each site includes a brief description, as well as a summary of opportunities and constraints. The sites are referenced to locations on the **River Inventory Map.**

Guiding Principals provides a plan vision as well as goals, objectives, and action steps regarding the Millennium Park site, the Brilliant Site, and whitewater festivals. A site map of the proposed construction at Millennium Park is included.

An Examination of Economic Precedents in Golden, CO. is a case study of a whitewater park and the associated economic benefits to the local area.

Estimated Costs provides an idea of the cost associated with the proposed improvements at the Millennium Park site.

Impacts on Fish provides a summary of a study on the effects of whitewater parks on fish species and how this relates to the Castlegar River Recreation Plan.

Environmental Regulations provides an overview of what regulations must be complied with once a design has been established.

Potentially Affected Interests takes an inventory of community groups who may not be in support of the CRRP and looks at what their misgivings may be and how they could be settled.

Community Consultation documents how the community was solicited for input during the planning process.

A Strategy for Implementation outlines specific actions that community groups and individuals can take to work towards an implementation of the CRRP.
Additional information necessary to the plan can be found in the following sections: **Resources, Relevant Plans and Regulations** and the appendices.

These plan elements come together to provide the motivation as well as the necessary information to make the vision of the CRRP a reality. Castlegar and the surrounding area would greatly benefit from the implementation of this plan

"People only protect what they love, but they can only love what they know."
-Jacques-Yves Cousteau

Columbia River Recreation Plan Introduction

Since the Kootenay and Columbia River are not immediately visible from the city, for them to become more powerful assets, they must be pro-actively highlighted. An inventory of the two rivers looks at the untapped potential of specific sites on the rivers and how they can be enhanced to increase river recreation in Castlegar. The economic and social benefits of increasing resident and tourist involvement with the rivers are also examined. Recommendations provide the City with a clear strategy for increasing river recreation through different avenues. The plan includes a basic overview of different types of river recreation and the required environment of each activity as well as a summary of the basic structure and site requirements of whitewater parks. For those unfamiliar with whitewater recreation it is recommended that they refer to An Introduction to Whitewater Recreation located in appendix 1.

A Source of Potential

The Kootenay and Columbia rivers quietly make their way through the City of Castlegar. The two rivers come to a confluence within a stone's throw of Columbia Avenue, although they are out of sight. The full recreational potential of these waterways has yet to be realized. The Kootenay and Columbia Rivers can benefit Castlegar by: increasing tourism, creating new and exciting recreational opportunities, and helping the community foster a stronger relationship with the natural environment. In spite of this Castlegar has been built with its back to the rivers.

People have always placed a high value on being within sight of water. Even today, when there is no need to haul water for our daily needs, most people would rather live near a body of water. Highlighting the river would help to tap into this primal feeling of contentment and would do more to endear the City to tourists and residents alike. Water has, and always will be a major focus for our society. Since the Kootenay and Columbia Rivers are the major bodies of water flowing through town, it only makes sense that we do more to bring them to the forefront.

In addition to holding an innate appeal, the rivers also offer a great variety of recreation through paddle sports and fishing. Sports that could be practised on the rivers range from whitewater kayaking to flat water canoeing. Increasing recreational opportunities on the Kootenay and Columbia Rivers in town would serve to draw people into Castlegar. Not only do these activities attract the primary participants, but their friends and families who may accompany them. The more recreational opportunities there are in Castlegar the more local businesses will benefit through the increased tourist traffic as well as the local citizens who are not leaving Castlegar to look for recreational opportunities.

Furthermore, the rivers could become a more integral part of Castlegar community identity. Rivers such as the Kootenay and Columbia Rivers are capable of inspiring people. If the whole community where to relate more personally to the rivers, it would be something that could draw people together. The rivers could create a closer relationship between Castlegar and the entirety of the local natural environment. For this to happen we need to see the rivers as something more than a place to put our industrial and personal refuse. The rivers could become a source of greater civic pride.

Recreational Uses of the Kootenay and Columbia Rivers

Although it is difficult to calculate the number of user days for different forms of recreation on the Kootenay and Columbia there is plenty of anecdotal evidence that there are significant levels of recreation occurring at present. Fishermen, kayakers and canoeists can all be found on the watercourses within Castlegar.

Fishermen are a common sight on both of the major river corridors in Castlegar. Both locals and tourists frequent the rivers for the chance to catch a variety of fish.

Kayakers often ply the waters of the Kootenay River below the Brilliant Dam at Brilliant Wave. This location makes it a less visible form of recreation; however, the Brilliant Wave receives a significant number of user days in all weather conditions. The Brilliant Wave is used to host a local kayaking festival which occurs annually. A local kayaking club known as the Borderline Boaters organizes the event. In the past there was a junior development kayaking program run through the local school district. However, due to liability issues the program was discontinued (Duncan 2006).

Occasionally a canoe can be seen navigating the Columbia within the city limits. The Columbia provides excellent canoeing and sight-seeing opportunities. In fact, in the past there was an annual canoe race from Castlegar to Trail (Thurston 2006).

River Recreation Inventory and Analysis

The following inventory was completed to summarize opportunities and constraints present at various sites on the Kootenay and Columbia Rivers in Castlegar in relation to the construction of a whitewater park as well as sites that would be suitable for beginner paddlers to develop their skills. Opportunities, constraints as well as a brief description are included for each site. The ideal site would have pre-existing access and parking, good spectating opportunities, and sufficient gradient and flow to satisfy the site requirements of a whitewater park or a beginner area. The sites are referenced with numbers to locations on the Columbia and Kootenay Rivers in Castlegar map, located on page 9.

Site Number and Location	Description	Opportunities	Constraints
1- River right channel below the Robson Bridge	A deep swift moving channel containing the main flow.	-Guaranteed to always have water -Central location -Feature could be situated close to shore -Swift current -Good location for spectators	-Water diversion necessary for construction -Steep bank to access the river -No existing eddy
2-River left channel downstream of Robson Bridge	Large channel with a narrow constriction that ends in a swift riffle.	-Sufficient gradient and flow -At extreme low flows water does not enter the channel making construction possible without having to divert water -Existing access from roads that access sewage lagoons -Very promising from an engineering prospective	-Near outflow of sewage lagoons -Metal and other industrial refuse nearby in river
3- Eddy downstream of the Robson Bridge	A large eddy on river right with a small wave train running parallel with shore.	-Observable gradient -Large Eddy -Close to downtown -Some existing whitewater	-The riffle is approx. 100m from shore which would make water diversion necessary for construction -Possible access issues -Poor area for spectators
4-Flatwater at Millennium Park Channel	Large pool with minimal flow.	-Next to possible location of white water park would allow for integration of beginners with more advanced paddlers	-At extreme low flows there is no water

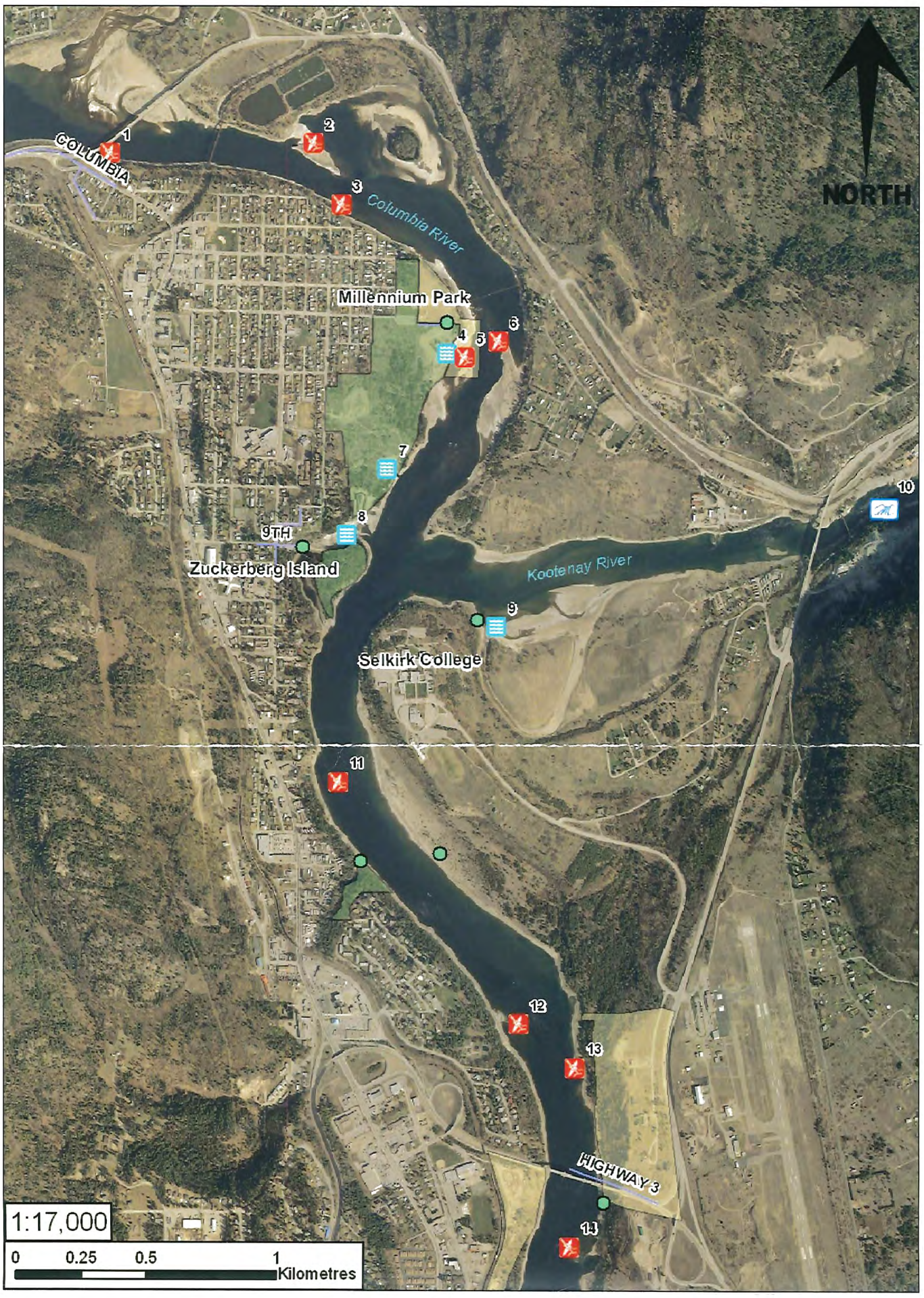
Site Number and Location	Description	Opportunities	Constraints
5- Millennium Park Channel	A side channel flowing next to Millennium park.	-At extremely low flows construction would be possible without having to divert water -Centrally located in an area that people already frequent -Large Eddy -Good location for spectators	-At lower water levels flow through the channel would be minimal or non-existent -Private property, although the site is vacant
6- River Left Channel Across from Millennium Park	A deep swift moving channel containing the main flow.	-Some existing whitewater -Contains main river channel -Some existing whitewater	-Water diversion necessary for construction -Access would be from the river left side -Poor location for spectators
7-Small pool under bridge along Millennium Park Trail	Small pool fed by the Columbia that is passed over by a bridge.	-Good for flat water instruction -Nice sandy beach -Location would attract interest of trail users	-Large number of aquatic weeds
8-Zuckerberg Island Channel	A large pool on the upstream side and a larger lagoon on the downstream side.	-Good location -Water on the upstream side is clear and weed free	-Lagoon is very dirty water -At extremely low water levels the pool dries up
9-Oxbow channel at Selkirk College	Large oxbow channel with minimal flow.	-Good for flat water instruction as well as beginner moving water instruction -Good access -Nice sandy beach	-Boats would need to be walked down to the river -At extreme low flows the moving water in the oxbow is non-existent

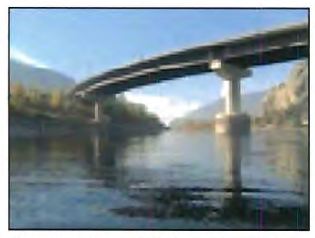
Site Number and Location	Description	Opportunities	Constraints
10-Brilliant Wave, located below the Brilliant Dam just outside of Castlegar	This feature ranges from a large glassy wave to a unpredictable hole depending on water levels. There is a marginally passable trail to the wave from an unofficial parking lot.	-A world class wave when it works -Large eddy -Good opportunities for spectators -Used to host national team trials in 1995 -Low consequence environment	-Not central to downtown -Parking lot is a contaminated site -Dependant on the intersection of specific water levels on the Kootenay and the Columbia -Water level information not available -Brilliant expansion project could permanently impact the existing feature
11- Wave Train opposite College	A medium sized wave train with large eddy on river right bank.	- Excellent spot for placing a wave forming obstruction -Some existing whitewater	-Blocking water would be necessary for construction -Existing access is poor -Poor site for viewing -Site does not flush into flat water
12-River right riffle above the Kinnaird Bridge	Large riffle with some small waves.	-Sufficient gradient and flow	-Poor access -Poor location for spectators -Blocking water would be necessary for construction
13- River left channel above Kinnaird Bridge	A fast flowing channel close to shore.	-Excellent spot for placing a wave forming obstruction -Guaranteed water flow -Close to shore for spectators	-Not centrally located -Access could be an issue -Currently a popular spot with fishermen -Does not flush into flat water

Site Number and Location	Description	Opportunities	Constraints
14- Point bar below Kinnaird Bridge	A large point bar from river left to centre.	-As different areas of the bar have different elevations it would be possible to build different features for different water levels -At extremely low water levels construction would be possible without having to block water -Low consequence environment	-Possible access issues -Not centrally located -Area frequented by fishermen

River Inventory Map

Columbia and Kootenay Rivers in Castlegar
Inventory of Potential Whitewater Uses





Site 1: River Right Channel at the Robson Bridge

Site 3: Eddy Below Robson Bridge

Site 4: Millennium Park Channel

Site 5: River Left Channel at Millennium Park

Eddy Adjacent to Wavetrain Opposite Selkirk College

Site 10: Wavetrain Opposite Selkirk College

Site 12:River Left Channel Above Kinnaird Bridge

Kinnaird Bridge

Legend

- Brilliant Wave
- Potential Site for Whitewater Park
- Site Suitable for Begginer Paddlers
- River Access Points
- RR-1 Zoning
- Parks Zoning
- Streets Near Access Points

Datum: NAD 83
Projection: UTM Zone 11N

Selkirk College

A bird's eye view of the Millennium Park channel and the Columbia River

Guiding Principals

The guiding principals of the CRRP are the values that will be used to judge whether our actions are congruent with our original ideas. They can serve as a compass to ensure that we stay on our desired course. Keeping environmental sustainability and economic viability at the forefront of the plan will ensure that we are not causing damage to the environment through our actions and that we are not throwing money into a bottomless pit with no returns in sight.

Guiding Principals:

- Involve the community in its entirety as well as visitors with the Kootenay and Columbia Rivers while fostering a sense of environmental stewardship through outdoor recreation.
- Ensure that the project is economically viable and environmentally sustainable.

Vision

Our vision is a broad statement of what we will see in the future if our plan is used effectively. It represents the results of the plan.

- All segments of the community of Castlegar have the opportunity to interact with and appreciate the Kootenay and Columbia Rivers through recreation. Local youth have an exciting new form of recreation accessible to them. The Kootenay and Columbia Rivers have become a positive focal point for visitors and residents alike. Environmental stewardship is a growing concern. The local economy is expanding with an influx of new permanent residents as well as increasing revenue from tourism.

Recommendations

The section contains recommendations intended to increase the number of people recreating on the Kootenay and Columbia Rivers.

Millennium Park

The Resource

The Millennium Park Site is the ideal location for a whitewater park. The existing channel formation would make it easier to engineer a feature; and sufficient river gradient and flow are present. Currently, without any type of modifications a small wave forms at higher flow levels. The central location would serve to draw people into town and towards the river. The existing infrastructure at Millennium Park would encourage a variety of uses in the area as well provide ample area for spectators. Engineering a wave at Millennium Park will draw paddlers as well as members of the community to the river. Having the feature in town would open up recreational opportunities for young people who do not have the means to travel to the Slocan River or Brilliant. An engineered site would also provide the area with a feature that only relies on the water level in the Columbia as opposed to an intersection of water levels on the Columbia and the Kootenay.

Priority: High

Goal 1.0.0

- ❖ Engineer a river feature at the Millennium Park location that appeals to a range of river users and ability levels while maintaining environmental sustainability.

Objective 1.1.0

- ➢ Arrange to have an engineering feasibility study performed on the site.

Action Steps 1.1.1

- Collect the prerequisite data to an engineering feasibility study (see appendix 2).
- An engineering firm should be contracted to perform a feasibility study on what type of feature it is possible to create at the Millennium Park site and see if this intersects with what local river users envision.

Objective 1.2.0

➢ Ensure that the feature created is congruent with what local paddlers want.

Action Steps 1.2.1

- Form a local committee consisting of: community members, planners, engineers, educators, and paddlers to oversee the development of the CRRP.

- Form a focus group of local paddlers to determine what type of feature is desired by the paddling community.

Objective 1.3.0

➢ Comply with environmental regulations.

Action Steps 1.3.1

- An "Approval Application or Notification for Changes in and About a Stream" form should be completed and submitted to the provincial government once a design has been established (see Appendix 4).

- Ensure that the construction design complies with the Department of Fisheries and Oceans "No Net Loss" policy regarding the preservation of fish habitat (see Appendix 4).

Goal 2.0.1

❖ Promote environmental stewardship and create stronger ties to the land.

Objective 2.2.0

➢ Educate the public about fish communities and natural processes taking place along the Columbia.

Action Step 2.2.1

- Create and place interpretive signs around the Millennium Park site.

Access

Municipal and provincial jurisdiction will affect the development of this site. Therefore an application for tenure must be completed as well as gaining the support of the City of Castlegar. If the City of Castlegar, the RDCK, other institutional organization or a non-profit organization were to back the project an application for a Free Crown Grant could be made. An application for sponsorship by a provincial ministry would be necessary.

This would negate having to pay an annual nominal fee for the use of the land. The actual island that forms the channel exists in the RR-1 City of Castlegar Zoning category. This zoning does allow for recreational uses. The complete by-laws regarding zoning can be found in the reference section. The Millennium Park site is accessed through residential streets and is serviced by a large parking lot which is rarely close to capacity. The configuration of some intersections may need to be changed due to an increase in traffic.

Goal 3.0.0

- ❖ Secure tenure for the area of the Millennium Park channel.

Objective 3.1.0

- ➢ Complete necessary applications.

Action Step 3.1.1

- Complete the "Applying for Crown Tenure" form (see Appendix 4).
- Complete an application for a Community and Institutional Use of Crown Land Free Crown Grant.

Goal 4.0.0:

- ❖ Gain the support of The City of Castlegar.

Objective 4.1.0

- ➢ Maintain open lines of communication with City Council and community members to inform them of our intentions and listen to feedback.

Action Steps 4.1.1

- Keep council up to date on progress of the CRRP by attending council meetings.
- Request formal support in the application procedure for a Free Crown Grant

Goal 5.0.0

- ❖ Gain the support of the Sinixt Nation.

Objective 5.1.0

- ➢ Maintain open lines of communication with the Sinixt Nation to listen to feedback and concerns.

Action Steps 5.1.1

- Find contact person within the Sinixt Nation who is willing to provide feedback.

Goal 6.0.0

- ❖ Ensure that residents near Millennium Park are not adversely affected by increased traffic.

Action Step 6.0.1

- Perform traffic study before and after construction in order to assess the need to make changes to traffic patterns.

Occurrence

If the site is well engineered, it should be possible to have a wave forming at the Millennium Park site year round. Since the Columbia experiences seasonal fluctuations between 1000-4000 m^3/s the wave should be engineered to function within that range.

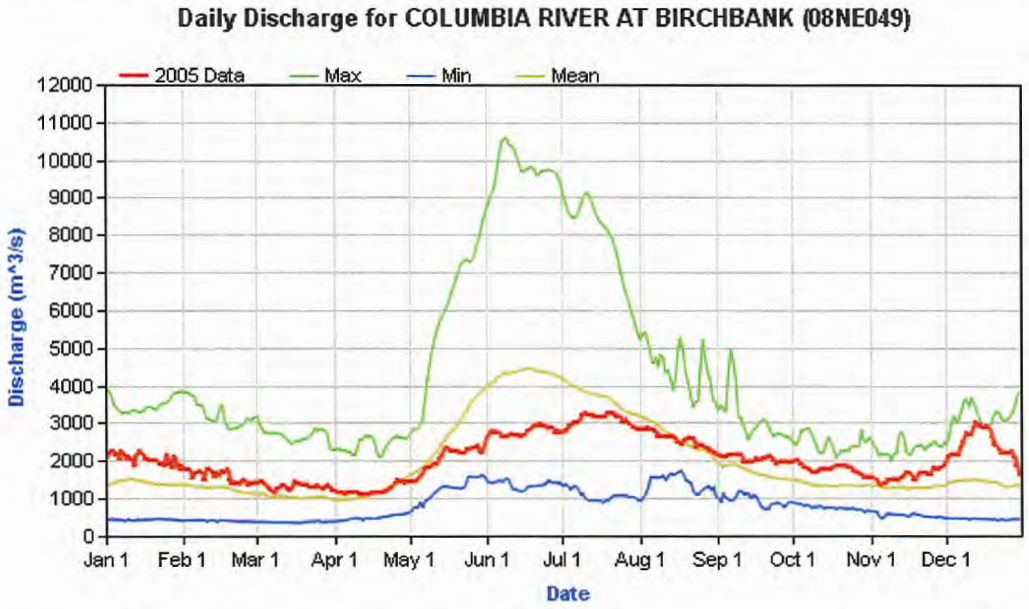


Figure 1: The yellow line represents the historic seasonal average volume of the Columbia River from the gauge station at Birchbank (Real-Time 2006).

Millennium Park Site Map

Organized Paddling Festivals

Festivals draw participants from out of town and showcase the local rivers. They also allow locals and tourists alike the chance to learn how to kayak. Operators of whitewater parks have found that hosting competitive events was one of the best ways to attract a large number of paddlers to the area. Hosting large kayaking competitions that are part of a competitive circuit are capable of attracting elite paddlers from longer distances (Marca, Henderson, Raucher and Whitcomb 2003). Working with existing festivals as well as looking at the possibility of reviving old festivals, and creating new opportunities for festivals should be looked at.

Kootenay Whitewater Festivals

Currently the local paddling club, the Borderline Boaters, organizes an annual paddling festival. The festival aims at attracting experienced paddlers to the area as well as providing opportunities for people with little no paddling experience to try the sport. This is a well established annual event.

Priority: Moderate

Goal 7.0.0

- ❖ Increase the attendance of the Kootenay Whitewater Festival.

Action Step 7.0.1

- Provide the Borderline Boaters with additional funding and resources for advertising purposes in return for creating wider opportunities for non-paddlers at their annual festival.

The King of the Columbia Canoe Race

In the past the "King of the Columbia" was a canoe race that took place between Castlegar and Trail. Here is an event that a large segment of the population would have the necessary skills to participate in and would bring the community to the banks of the river.

Goal 8.0.0

- ❖ Revive the "King of the Columbia" canoe race

Action Step 8.0.1

- Find someone capable and willing to organize the event.

Brilliant

The Resource

The foremost play wave in the Kootenays exists right here in Castlegar. The main wave, approximately 800m downstream from the dam, has been the location of an annual kayaking competition for the past 10 years. This site was also been used for the National Freestyle Team Trials in 1997. Upstream of the main wave are three more waves which form to varying degrees at different water levels. In order to attain these upstream waves, kayakers must paddle approximately 200m up the river left side, then ferry across the width of the Kootenay without compromising their upstream position. From there it is a matter of "catching the wave". After coming off the wave, the kayaker must again paddle hard to get across to the river left side, and start the cycle again. This deters widespread use of these waves.

Occurrence

It is uncertain if the Brilliant Expansion Project will adversely affect the waves below the dam. A general analysis would suggest that although the wave may continue to exist, it is unlikely that it will be the same world class feature. Since the Brilliant Expansion project will virtually eliminate the need for spilling over the top of the Dam, the velocity of the water flow will be significantly reduced. Additionally, the use of a Caplan turbine is projected to further reduce the velocity of the water. Since velocity is a key factor in the equation of wave formation it would seem that the likelihood of this site continuing to provide high quality whitewater is low. The quality of the wave depends on an intersection of flows on the Kootenay and Columbia Rivers. The wave forms to its most desirable shape when the Brilliant Dam is releasing at least one full gate, and the Columbia is at a medium level. Although the number of days that the main wave is

viable varies from year to year anecdotal evidence suggests that it functions to some degree on average for a quarter of the year. Since release information for the Kootenay River is unavailable it is impossible to determine if the main wave will be forming without making a visual assessment. The main wave can vary from being a small friendly feature suitable to beginners, to a large intimidating feature that only more advanced paddlers make use of, but when optimal water levels occur it is an excellent wave.

Priority: moderate

Due to ambiguity concerning the existence of the Brilliant wave in the future the action priority for this area is moderate with the exception of goal 9.0.0., which should be considered high. If Brilliant Expansion Project begins operation and the wave continues to form, these goals should be considered a high priority.

Goal 9.0.0

- ❖ Be proactive to ensure that the Brilliant Expansion Project will not degrade the quality of the existing whitewater with the highest priority being given to the main wave.

Action Step 9.0.1

- Work with CPC to ensure that the Brilliant Expansion project will not adversely affect the existing whitewater below the dam.

Goal 10.0.0

- ❖ Make it possible to assess whether or not the main wave is forming.

Action Step 10.0.1

- Install a web-cam in a location where it has a clear vantage point of the main wave.

Access

To access the river paddlers currently park under the Brilliant Bridge. Some choose to launch below the bridge and paddle upstream while others opt to walk upstream over the

rip rap on a makeshift trail and then launch at the main wave or continue upstream to a point where the upper waves can be paddled to. Due to strong currents it is impossible to paddle the entirety of the way to the Upper Waves. The bank is steep enough to deter paddlers from walking to the Upper Waves.

Goal 11.0.0

- ❖ Secure physical and legal access to the existing whitewater below the Brilliant Dam.

Action Steps 11.0.1

- Secure a term of access in a written document through negotiations with Columbia Power Corporation. The terms of access should allow for the improvement of access to the upper waves.
- Make the Upper Waves easily accessible by the construction of a walkway. Involve local kayakers in the construction of walkways and trail improvements.

An Examination of Economic Precedents in Golden, CO.

Introduction

The Preliminary Evaluation of the Beneficial Value of Waters Diverted in the Clear Creek Whitewater Park in the City of Golden, performed by Stratus Consulting for the City of Golden, CO (a link to this complete study can be found in Appendix 4) was chosen as a model that could be compared to Castlegar. The type of project undertaken in Golden was closely related to the proposed project at Millennium Park in Castlegar. It was a centrally located and relatively low cost channel improvement where kayakers are not charged a usage fee. Additionally, the size of Golden, Co. at 18,000 is in the same ball park as the size of Castlegar when the surrounding areas and the City's role as a regional hub are considered.

Benefits

The report found that the annual economic beneficial value generated by the whitewater park was between $1.4 and $2.0 million USD. The direct stimulus to the local economy was calculated to be in a range of $449,955.00 to $882,146.76 USD. It is important to note that Stratus Consulting felt that this estimate was conservative and the actual value

was likely higher. The report makes a long run prediction that over the next twenty years the whitewater park will provide a economic benefit of $15.4 to $23.0 million USD. These values are not inclusive of several benefits that could not be calculated at that time, but would likely have a positive effect on the economy. Those values included: increased property value, special events held at the whitewater park, and benefits to event sponsors.

The study correlated number of user days to the time of year and number of user days to river flow. When the time of year was considered the report identified three categories. Peak use occurred from mid-May to mid-July. Moderate-peak use occurred from mid-April to mid-May and mid-July to early October. Non-peak use occurred from October to April. When river flow was considered it was found that a moderate volume attracted the largest number of users. This is because as flow increases the river becomes less forgiving and this deters novices and intermediates from paddling.

Staging competitions was found to be an effective way to significantly increase tourist traffic. The cost of staging events was between $2000 and $59,000 USD depending on the scale of the event. Benefits not included in the economic benefit valuation included: money spent by event spectators, revenue received by local vendors, revenues received by event sponsors, civic pride associated with hosting large events, and benefits received by kayaking gear manufactures.

When the benefits are considered, the fact that the project cost $170,000 and the facility does not charge a user fee, are quite remarkable.

In Relation to Castlegar

The report clearly shows that whitewater parks have a huge potential to generate money for the local economy. A whitewater park would draw people from out of the region, and out of the province. Furthermore, the Millennium Park location would necessitate that tourists coming to use the park would need to pass directly through the commercial areas of Castlegar.

Paddling festivals could be held in conjunction with other events taking place downtown, such as Sun Fest. The proposed band shelter in Millennium Park could be used during paddling festivals for musical entertainment. Events would be an effective tool to publicize and maximize the benefit of the facility.

The study found that the whitewater park received maximum levels of use during the warmer months. It is likely that the tapering use towards the end of summer could be attributed to extreme low water levels which Colorado experiences in August. However, the Columbia maintains a high level throughout the summer. A key part of maximizing the benefits of a whitewater park in Castlegar would be to construct a forgiving feature that functions to its fullest potential during the summer months when more people are travelling. Historically, the Brilliant Wave does not form during the summer months.

Beyond the economic benefits of a whitewater park the study also cited civic pride and the increased desirability of Golden as benefits. These too would be felt in Castlegar.

Estimated Costs

The following section provides estimated costs for the improvements at Millennium Park. Costs have been estimated by examining similar projects, communicating with engineering firms, and consulting local experts. Estimating costs for all components of this plan was not possible due to time constraints.

Engineering Feasibility Study

Recreational Engineering and Planning has provided an itemized estimate budget for an engineering feasibility study. The entire document can bee found in appendix 3.

Table 1: Estimate budget for engineering feasibility study provided by REP.

Work Item	Task	Cost. Based on $100/hr
1	Obtain all mapping, flowdata, ownership information, etc. that may affect the design of a whitewater park. Municipality to provide a Mylar or electronic basemap at the appropriate scale for the design for each site that is deemed viable by the client/municipality. Aerial photographs and topography maps at 2' contours typically provide the most vital information.	To be supplied by the Municipality
2	On site inspection of multiple sites in and around Castlegar. Meet with Municipal staff and other interested parties on site to confirm the viability of the project and to discuss concerns related to permitting, land ownership, costs, and site development.	$2,700.00
3	Develop a reproducible conceptual plan for one (1) site. This plan will include a written letter style report on recommendations for in-channel improvements to enhance boating and fish habitat and for access and bank improvements. The intent is to provide:	$3,800.00
	-Approximate rendering (conceptual level) of structures that are structurally and hydraulically sound, aesthetically pleasing and natural in appearance;	
	-Structures that are designed to withstand major flooding as well as help reduce any bank erosion problems	
	-Enjoyable whitewater features for boaters of all ability levels	
	-Enhanced habitat for fish	
	-An area that can be enjoyed by bank users and boaters.	
4	Preliminary cost estimate for one (1) site	$800.00
	Subtotal	$7,300.00
	Expenses: Travel, fax, printing, copies, phone.	$1,800.00
	Total (U.S. dollars)	**$9,100.00**
5	Additional sites: Additional engineering and design related to conceptual design and investigation of alternate sites. Includes a reproducible concept level site rendering and conceptual level cost estimate.	$3,200.00

Construction of a Whitewater Recreation Facility

Engineering firms are reluctant to provide cost estimates without have first assessed the proposed site. Completed projects and feasibility studies are examined to provide guidelines for estimating costs. Table 2 provides an estimate of costs for the construction of a single wave feature in Golden, B.C. from the *Feasibility Study Golden Whitewater Kayak Park* (Bourassa, Fritsch, Hoffart, McAllister 2005).

Table 2: Estimate construction costs for a single feature in the proposed whitewater park in Golden, B.C.

PLAY WAVE FEATURE Item	Qty	Unit	Unit Price (2007)	Cost ($)	Comments
Rock Constriction					
Rocks - Boulder Size				$0	
Rock Bolts	50	EA	$177.00	$8,850	
Crane	6	DAY	$1,400.00	$8,400	*Annual Cost*
Jersey Barriers	7	EA	$140.00	$980	
Dyke Improvements					*Allows for protection from 200*
Earth and Rock Materials	114.3	m^3	$45.00	$5,144	*year flood with kayak park*
Equipment	7	DAY	$743.00	$5,201	*in place*
-Dump Truck and Excavator Hoe					
River Bed Alternations					*Required - inadequate slope*
Rocks - Boulder Size (Donated - CP)	-			$0	*Donation of rocks from CP Rail*
Rip-Rap Fill	1050	m^3	$24.00	$25,200	
Equipment	7	DAY	$743.00	$5,201	
-Dump Truck and Excavator Hoe					
Fish Ladder					*Estimated from "Design of*
Unit Price per Volume	3	m^3	$2,613	$7,839	*Fishways and Other Structures"*
Maintenance Costs	2	%		$157	*-Charles Clay, 1995*
DIRECT COST TOTAL				$66,974	

The above cost estimate was performed by engineering students with no previous experience in dealing with whitewater parks. Recreational Engineering and Planning generally estimates that a single feature costs roughly $180,000. However, unique site attributes may cause the total cost to be higher or lower. Gary Lacey of REP states, "you can be from anywhere from under $100 thousand to over $2 million depending on the size of the river, how easily the water can be controlled during construction, and the availability of local rock. We charge a lump sum for mobilization and water control, by the cubic yard for rock, with a percentage off the total for contingencies and engineering costs." (Lacey 2007) The whitewater park in Golden, Co. shares similarities with the proposed project at Millennium Park in that it was an enhancement in an existing river channel that required minimal enhancement. This project included several features and cost a total of $170,000 USD. This would seem to be the closest available estimate of costs for the engineering of a recreational facility at Millennium Park.

Impacts on Fish

Biological Opinion of Potential Effects of Whitewater Parks on In-Stream Trout Habitat is a study performed by American Fisheries Biologist Claire McGrath. It was prepared specifically to look into what effects whitewater parks in pre-existing river channels have on fish. The report concluded that overall whitewater parks have a positive impact on Salmonids. Key points of the report have been summarized in the following section.

Salmonid fish species inhabit streams and prefer cold well-aerated water because of the high levels of dissolved oxygen. Areas of cover such as undercut banks, overhanging vegetation or deep pools are preferable to them. Structures placed in the stream to produce features can change water depth and velocity as well as substrate composition. In some cases the construction of whitewater parks reduces vegetation cover, which fish depend on. Resource mangers may add in-stream structures to create varied habitat. Some of these structures resemble the structures used to create features in whitewater parks. These features serve to better aerate the water via turbulence and create scouring pools, which are desirable to Salmonids. It has been shown that in-stream structures may increase fish populations due to the increase in varied habitat and in fact whitewater parks create excellent fish habitat. However, during times of intense use, such as competitions, the disturbance caused by kayakers could be enough to frighten away fish. Pools created by scouring would more likely be used during winter, when paddlers are not using the area. Winter habitat is often the limiting factor in fish populations.

Reduced vegetation cover and sedimentation during construction is cited as the most serious threats that whitewater parks pose to fish populations. Ways to mitigate impacts on fish include: limiting river access to a few specific points, using natural vegetation to provide cover, and posting signs to users of the site for the purpose of educating them about riparian ecology and how to minimize their impacts.

In Relation to Castlegar

The Columbia is a large volume river with relatively homogenous aquatic environment. The varied structure provided by a whitewater park would create new niche habitats for

Salmonids as well as increasing water aeration and providing cover. It is unlikely that a whitewater park located in the Millennium Park channel would have any effect on sturgeon, as they prefer to remain in deeper waters. Times of spawning and other critical stages in the life cycle of fish would have to be considered when timing the construction phase (Vandenbos 2007).

Environmental Regulations

Until there is a construction site plan with accurate dimensions the permitting process cannot be started. As soon as there is a design concept, this should be the first priority as it can be a length process. Relevant regulations which will need to be considered are outlined below.

Any type of construction that takes place in the river will fall under the jurisdiction of three different sets of regulations. The *Navigable Waters Protection Act*, section 35 of *The Fisheries Act,* the provincial *Water Act*, as well as the *Standards and Best Practices for In-stream Works.*

Any type of construction that takes place in or near a stream in the province of British Columbia requires that an application be made to the provincial government. The application is surprisingly straightforward and relates to the specifics of the construction process. It details who will be doing the work, what type of work will be taking place, and the dimensions of the intended work. These forms should be looked at more closely once the exact specifications of what is going to be constructed are decided (Ministry of Environment 2006).

The navigable waters act ensures that any type of construction that takes place on a navigable piece of water does not interfere with the passage of boats. The creation of a channel improvement should not affect the overall ability of the Columbia to be navigated (Navigable Waters Act 2007).

The DFO is also involved through section 35 of the *Fisheries Act*. Since the construction will take place in fish habitat it will be necessary for DFO to authorize the work. The guidelines in place ensure that there is "no net loss" of fish habitat (Fisheries Act 2007). Fortunately for this project, channel improvements that are made for the purpose of whitewater recreation mimic natural river features and often create fish habitat. Salmonid species require swift flowing well oxygenated water. The creation of a whitewater feature can parallel Salmonid habitat requirements. Whitewater features aerate the water, and eddies that are created on the sides of channels can become valuable fish habitat. A Colorado-based study has come to the conclusion that artificial whitewater features do not adversely affect Salmonid species (McGrath 2003).

The Standards and Best Management Practices for In-stream Works is a document that provides strategies for minimizing environmental impacts of the construction process. Learning more about these regulations will be imperative to the successful implementation of this plan.

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Potentially Affected Interests

As with any proposed changes that affect a community there will be individual community members or groups of community members who may be opposed to the CRRP. In this section the CRRP endeavours to identify groups or individuals who may be opposed to the plan, what their specific concerns are, and solutions to these concerns.

Sinixt Nation

The areas along the Columbia and Kootenay River were heavily used by the Sinixt Nation. They may be concerned about cultural artefacts that could potentially be on the bank. However, since construction will occur in the river, it would seem unlikely that this would negatively impact cultural concerns. However, they must be consulted with prior to the construction process.

The City of Castlegar

There may be concerns from city officials and all members of the community as to what effect the proposed whitewater park may have on bank erosion at the Millennium Park site. Proper engineering of the site will ensure that this will not be an issue. It would also be necessary for the city to allow machinery on the Millennium Park site during the construction process of the whitewater park.

Trails Users

This group of may not want to see an increase in the number of people using the Millennium Park site. They may find it preferable to keep the number of users limited to the current levels. Some of these people may see the whitewater park as a potential hazard.

Anglers

Community members who engage in fishing on the Columbia River will likely be concerned what effect the whitewater park will have on fish populations. However, since evidence indicates that whitewater parks have a positive effect on Salmonids, and no detrimental effect on sturgeon, they will likely become supporters of the project.

Area Residents

Nearby home owners may be concerned with noise related to a higher volume of traffic travelling to Millennium Park.

Industry

Celgar may not be supportive of this project. Several years ago Columbia Power Corporation considered dredging the Columbia River below the Hugh Keenleyside Dam to create a greater hydraulic head. However it was decided that the project would not go ahead. The reason cited was that in the past, before Celgar efficiently treated their effluent they deposited a significant amount of pollutant which has accumulated in the river sediment. The dredging did not occur as officials were worried about stirring up that pollutant. This project may revisit that problem, which would create bad publicity for Celgar.

Community Consultation

The concept of a river recreation plan for Castlegar was first introduced to the Borderline Boaters by Andrew Cline in early fall of 2006. The idea of developing a whitewater park in Castlegar was brought before city planners in October. During the first week of November a round table discussion was held with city officials, employees, and local experts. In the first week of December a presentation was made before city council. In March a community open house was held for the purpose of gathering further input from people who might directly in indirectly affected by CRRP goals and objectives. Opinions were solicited by circulating a digital copy of the CRRP to various members of the community.

A strategy for Implementation

In this section the necessary steps to the implementation of this plan are outlined in relation to which members of the community would be best suited to carrying them out. The reasons that co-operation of each group is outlined, followed by a requested action step that would help to implement the CRRP.

Sinixt Nation

The formal support of the Sinixt Nation for the intended land use would make the tenure application process smoother as well as making the overall project socially sustainable. That the Sinixt Nation is in agreement with the goals and objectives of the CRRP is of high importance.

Action Step 1

- Inform the CRWS of any specific concerns regarding the proposed land use at Millennium Park.

Action Step 2

- Provide a letter of formal support for the tenure application process.

Action Step 3

- Consider being the central part of an opening ceremony.

The City of Castlegar

Formal support from the City of Castlegar would make the application for a free Crown Land Grant possible. Providing the Columbia River Whitewater Society with any concerns now would allow us to make necessary adjustments. Having the City on-side for this plan is vital in regards to allowing construction equipment access to the river through Millennium Park. Since the City of Castlegar will be the primary benefactor of this plan, making considerations for an in-kind contribution of labour or equipment in the

next budget in regards to the construction process or upkeep would be very much appreciated.

Action Step 1

- Provide a letter of formal support for the tenure application process.

Action Step 2

- Review the land use and zoning maps included in the CRRP to verify that they are up to date and accurate.

Action Step 3

- Make allowance for passage of construction equipment through Millennium Park

Action Step 4

- Consider budgeting resources for a portion of the cost of the proposed improvements at Millennium Park.

Action Step 5

- Provide support for Border Line Boaters festivals in the form of financial donations or logistical assistance.

The Border Line Boaters

The local kayaking club should work to keep paddling in the spotlight through continuing to provide all members of the community with avenues for learning more about water sports. Additionally the following action steps should be followed.

Action Step1

- Attend council meetings and voice support for the CRRP

Action Step 2

- Keep paddling in the local media by submitting photos to local newspapers.

Action Step 3

- Ensure media coverage of Border Line club events and work to increase membership.

Action Step 4

- Review and implement goals, objectives and action steps regarding whitewater festivals in the Recommendation section.

Columbia River Whitewater Society

The CRWS will be responsible for guiding the CRRP through the permitting process and any relevant regulations. The CRWS will continue to strategise the implementation of this plan as well as coordinate community outreach and logistics regarding the feasibility study and the construction process. Seeking corporate sponsorship and other funding sources will be key to the success of the plan.

Action Step 1

- Attend City Council meetings and work to include the CRRP in the new OCP update.

Action Step 2

- Begin work completing all necessary forms regarding tenure application as outlined in the CRRP.

Action Step 3

- Continue to research different aspects of the construction and permit process while referring to the CRRP for guidance.

Action Step 4

- Maintain open lines of communication through community forums, letters to the editor, websites, or any other means determined to be appropriate.

Action Step 5

- Respond to concerns and feedback, and if necessary make amendments to the CRRP.

Action Step 6

- Look at different forms of fundraising as well as canvassing local industry and government for financial support.

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Appendix 1: A Summary of Whitewater Recreation

Introduction

The following summary has been created with the purpose of providing a reference to different types of paddle sports. Although this is not a comprehensive list of all forms of river recreation it does provides a good overview. Each sport offers different opportunities and has different levels of participation at both the local and international level. For example, providing a facility that is suitable to rafting would provide immediate economic benefits by providing local rafting companies with another venue. However, in Canada, the number of people who participate in private rafting trips is relatively small. While kayaking, a more individual sport, experiences higher levels of participation locally and abroad because it allows for a greater development of personal skills. It is important to note that each sport looks for slightly different river features, although there are common components. A recreational site should be designed to maximize the desirability for all user groups.

Rafting

Modern rafting began in earnest in the 1960s with a few adventurers making use of army surplus life rafts from World War II. Since then this segment of whitewater recreation has exploded with commercial rafting companies operating on rivers around the world. Whitewater rafting is probably the most common form of whitewater recreation that the average person has experienced, due to the fact that a commercial outfitter does not require their guests to have any prior expertise. A professional guide steers the raft and the crew listens to paddle commands called by the guide and therefore are only needed to provide the forward momentum of the raft. Commercial rafting companies operate on all types of moving water, from family float trips to extreme adventures. A facility that accommodated rafting would allow all visitors to experience it if a commercial operator chose to offer trips on it. In many cases the accommodation of rafting is used as a cost-recovery strategy for whitewater recreation facilities. The constant income provided by rafting is funnelled back into the cost of the project and thus helps to pay for the facility.

Figure 2: A crowd of rafters on the Thompson River (photo: Free Flowing Rivers).

Canoeing

An ancient form of transportation that has a significant part in Canadian history, From its first use by the native peoples, and then the explorers, the canoe is a cornerstone in Canadian identity. In fact, the Sinixt Nation plied the waters of the Columbia Basin in "sturgeon-nosed" canoes as long as 5000 years ago (Sinixt).

Today canoeing is a popular form of outdoor recreation, and while canoeing on still water is a readily accessible way to interact with water, canoeing on moving water does require a greater depth of knowledge about moving water and rescue techniques.
Navigating whitewater in a canoe presents a greater challenge than in a raft or kayak and is therefore better suited to milder whitewater. Anything beyond class III requires expert ability in a canoe. Presently the Columbia already provides excellent moving flat water and mild rapids for canoeing. The addition of a whitewater facility could provide a broader spectrum of local paddling experiences for canoeists.

Figure 3: Canoeists enjoying an afternoon on the Columbia (Photo: T. Thurston).

Kayaking

Kayaking was created by the Inuit, in the Far North, and was used as a means of hunting on the Arctic Ocean. The word kayak means "Hunter's Boat." The original kayaks were extremely long, narrow boats fashioned out of seal skins and wood. Kayaks are unique in their capacity to be easily re-righted by the paddler in the event of capsizing. Slalom, creeking, and freestyle are the most commonly practiced forms of whitewater kayaking. Through a recent revolution in design and materials kayaking has evolved into a more fun and "user friendly" sport. In the past kayaks were constructed out of fibreglass, which is not particularly resilient to impact. This meant that often time's kayakers would find themselves in a sinking ship. With the advent of the plastic moulded boat, the "sinking ship scenario" was eliminated and design improvements helped the sport make the jump from obscure to relatively mainstream.

Slalom

The only aspect of the sport that is currently a sanctioned Olympic event is slalom. It was the first form of whitewater kayaking that actively pushed boat design and what was possible in a kayak. It involves navigating a whitewater course that has been marked with gates hanging from cables across the river. The object is to complete the course as short a time as possible while weaving through the gates, much like slalom skiing. Slalom events are usually staged in moderately rough water, but can occur on mild to extremely rough whitewater. Slalom kayaks are often in excess of 3m long. They are narrow and often made of lightweight materials such as carbon fibre. In the past there was a slalom course on the Slocan River, although it is currently in a state of disrepair.

Figure 4: A slalom kayaker navigates the 2004 Olympic course in Athens, Greece.

Creeking

The most common images of kayaking in the media are of creeking. Creeking is a non-competitive form of kayaking that focuses on running steep and technical creeks. It is characterized by guiding your kayaking through tight moves around rocks and other obstacles.

Creek boats are within the 220 to 270 cm range in length and upwards of 72 gallons of volume. This makes them predictable and safe, giving paddlers more confidence for running difficult whitewater. Whatshan Creek, pictured below, is a local example of a creek run. There are no existing examples of whitewater facilities attempting to re-create the environment that creeking takes place in.

Figure 5: Local kayaker Mikal St. Duncan on Whatshan Creek (Photo: C. Jacks).

Freestyle

Freestyle kayaking is one of the fastest growing segments of the sport of kayaking. It mainly focuses on surfing standing waves or holes on the river and is based around performing various tricks while surfing. Freestyle kayaking is fun, safe and in the process of becoming an Olympic sport. A facility geared towards freestyle kayaking could also include elements that would make it suitable for rafters, tubers, canoeists, and river runners.

Freestyle kayaks are short (often less than 200cm in length) and have lower volume ends, which make them more responsive and manoeuvrable for performing tricks.

Many freestyle paddlers will drive to or paddle to a feature on a river and remain there for several hours with the sole purpose of surfing the one specific feature. This is referred to as "park and play." Local examples of park and play would be "Brilliant Wave" below Brilliant Dam, or "Hero Hole" in Trail. Paddlers travel great distances, and even internationally, to access well-known waves, such as Skookumchuck Narrows located in Egmont B.C.

Figure 6: Hero Wave is a popular spot with local paddlers (Photo: C. Jacks).

River Running

River Running unites all forms of kayaking. Anyone who kayaks, regardless of whether they prefer freestyle, creeking, or slalom, likely also participates in river running, this is the common denominator in the kayaking world.

In river running the whole of the river is interacted with and the focus tends to be on the experience of traveling down the river. River running can takes place on mild to wild whitewater. River trips can be as short as half an hour and cover only several kilometres of river or as long as a week and cover over a hundred kilometres. River running boats are similar in design to freestyle boats, although they are slightly usually longer and have slightly more volume. They could be thought of as a cross between creek boats and freestyle boats, as they borrow design features from both styles.

Figure 7: Kayaking is often a social event (Photo: Dragan).

Tubing

Floating down the river on an old inner tube is something that most of us have done at one time or another. Although tubers are notorious for making poor decisions on the river and being inadequately prepared for the river environment, tubing can be a safe and fun form of recreation if the participants are properly prepared and educated. Whitewater recreational facility could certainly provide tubers with a safer environment for tubing. Have a facility located in town would also eliminate the need to leave town for such family outings.

Figure 8: A tuber enjoys a summer day.

River Surfing

River surfing can be performed on the same kind of standing waves utilised by kayakers. River surfing is done with either a surfboard or a body board. Companies specialising in "river boards" are beginning to emerge. In Colorado, where whitewater parks are common, there is a growing community of river boarders.

Figure 9: Youth enjoying a channel improvement project at Clear Creek Whitewater Park in Boulder, CO (Photo: Rip Boards).

An Introduction to Whitewater Recreation Facilities

Introduction

A whitewater recreation facility, more commonly called a whitewater park, is an "improved" channel of a river or a completely constructed whitewater course which is not part of a natural river. They are created with the purpose of mimicking features favoured by paddle sport enthusiasts such as waves or re-circulating hydraulics normally found in rivers. These sites are often used to stage competitions.

Figure 10: An example of a channel improvement in Vail, CO. which is used to host world class competitions (Photo: Teva Mountain Games).

Figure 11: A state of the art whitewater park in Charlotte NC (Photo: DoubleyouEss).

Since these sites are engineered they are more reliable than natural river features which change according to fluctuations in water levels. Although recreational facilities that exist in the channel of a river do also experience fluctuating water levels, the way in which the features are engineered can allow them to "work" at a wider range of water levels.

River Features

Whitewater parks create features that paddlers refer to as "waves" and "holes". They each offer paddlers the ability to perform a different set of freestyle moves. That is to say, some moves that can be performed in a hole cannot be performed on a wave, and vice-versa. Different paddlers will have different preferences as to what they would rather surf. What they both have in common, is that they are re-circulating hydraulics. The re-circulating water can be easily identified, as it is the aerated white water. The water that is not aerated is moving downstream, while the aerated water is falling down the face of the feature. The whitewater is the force that retains the kayaker and makes surfing possible. The whitewater portion of a feature is called the "foam pile". A larger foam pile will cause the feature to be more retentive, while a small foam pile will cause the feature to be less retentive, or "flushy". It is important to note that the ability of a feature to retain a whitewater boat determines whether it is better suited to beginners or experts. Experts who are more confident in their skills usually prefer a more retentive feature, as it allows them to execute a greater variety of freestyle moves, while a beginner may find a retentive feature intimidating. However, no feature designed for recreational purposes should be able to retain a boater against their will. It should require skill to remain on the feature. A feature that retains a boater against their intentions is referred to as "trashy".

Waves

This type of feature can be identified by a smooth glassy face and a smaller portion of aerated water. The foam pile is generally smaller than the foam pile on a hole and there is a vertical drop from the top of the foam pile to the bottom of the trough. The

whitewater does not fall into the trough, but remains near the top of the face of the wave. Waves are generally less retentive than holes. (See figure 12)

Figure 12: The glassy face, vertical drop, and smaller foam pile are diagnostic features of a wave (Photo: Doubleyouess).

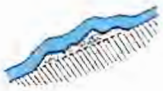
Holes

Lacking the vertical drop from foam pile to trough, holes are generally more retentive than a wave. The foam pile meets the trough. Creating a hole requires less water volume and velocity than a wave. (See figure 13)

Figure 13: The foam pile tumbles down to meet the trough and a glassy face is absent. (Photo: R.E.P.)

The Basics of Engineering Whitewater Parks

The basic variables involved in a constructed whitewater facility or channel improvement are the slope and the volume of water.



If you have water and slope you can modify the river bed profile either by taking off some rocks or adding rocks.

If you have slope but no water: create a pond downriver and bring up water with pumps

If you have water but no slope : use the difference in height created by a dam and build a branch river which will spread the fall

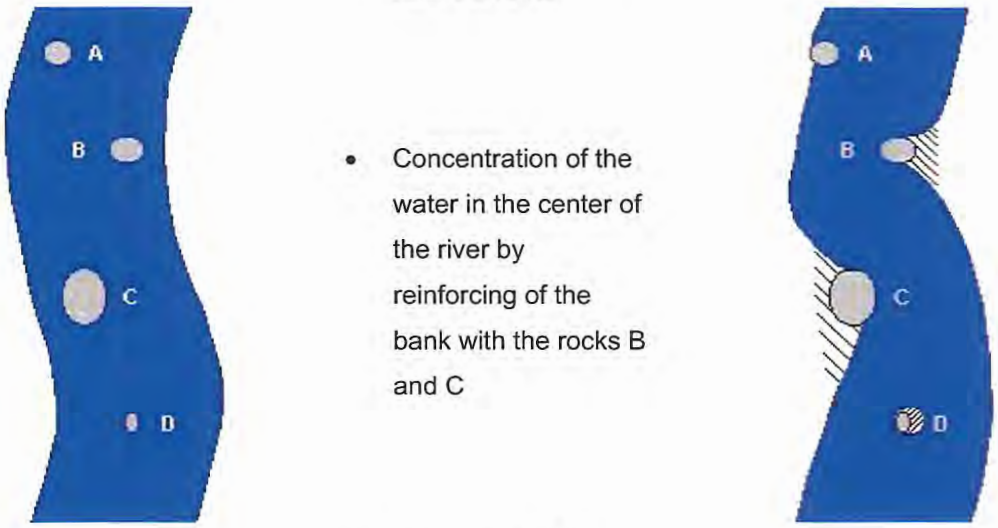
If you have neither water nor slope : do an earth-moving to create a little colline and a pond downriver, bring up water with pumps

If you have water but no slope : install a pumping station which will bring water to the beginning of the course

If you are at the sea side: build a little dam in an estuary and stock the high tide water. The stocking will provide the whitewater stadium with water during low tide.

Figure 14: This figure illustrates the different options for either creating an artificial whitewater course or a channel improvement in relation to the two most basic variables, slope and volume of water (Hydrostadium).

There are many different strategies and considerations involved in channel improvements. Generally a channel improvement project is significantly cheaper than an entirely constructed whitewater facility. However, in some cases a channel improvement can become comparable in cost to an artificial course if the river bed or river bank is erosion prone. This can lead to costly "over-engineering" (Campbell).



- Creation of a movement against the current with the moving of the rock A near the bank
- Concentration of the water in the center of the river by reinforcing of the bank with the rocks B and C
- Separation of the principal water vein by reinforcing of the rock D

Figure 15: This diagram illustrates some of the principal strategies employed when working with an existing river channel (Hydrostadium)

Construction

There are a number of engineering firms that specialize in the construction of whitewater recreation facilities. The most prominent companies include: Hydrostadium, REP, Mclaughlin Rincon Ltd., and Whitewater Parks International.

Appendix 2: Data Required for an Engineering Feasibility Study

Flow data for the Columbia, and ownership information, site maps, soil types existing on proposed sites as well as maps displaying all zoning are required by engineering firms prior to a feasibility study.

Soil Data

The dominant soil in the area surrounding Millennium Park is classified as a rapidly drained orthic sombric brunisol with orthic dystric brunisol as the sub-group. This soil classification is associated with moderately coarse and very coarse textured glaciofluvial deposits. According to the Soil Resources of the Nelson Map Area (Jungen 1980) the corresponding engineering classification of this soil is A-1-b or A-3 under the AASHO system or as SP under the Unified system.

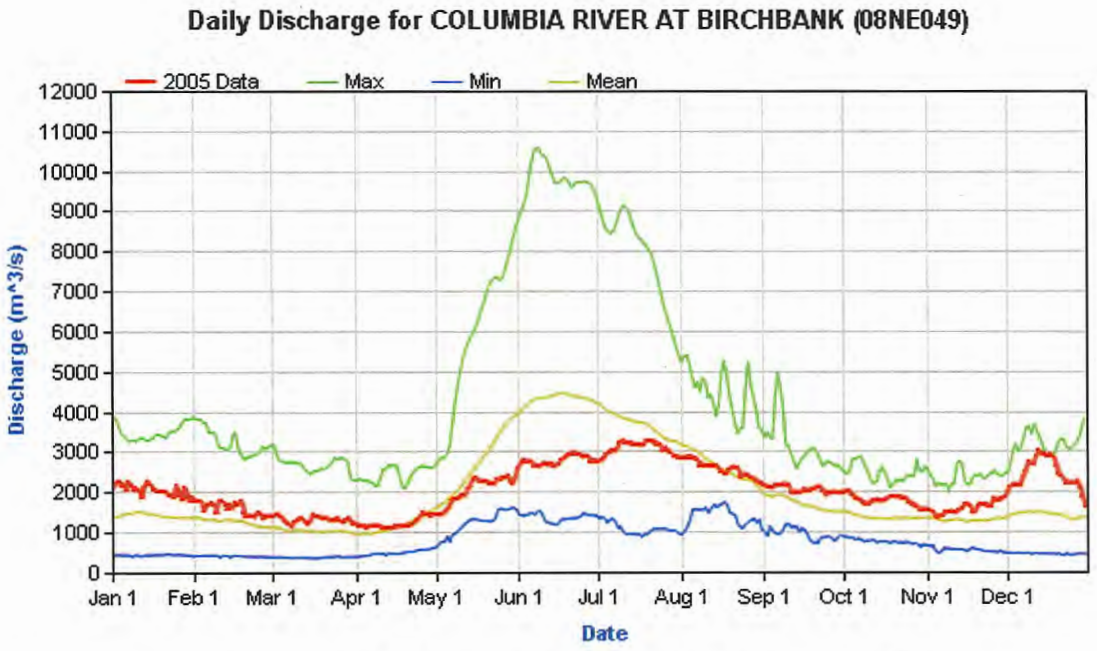
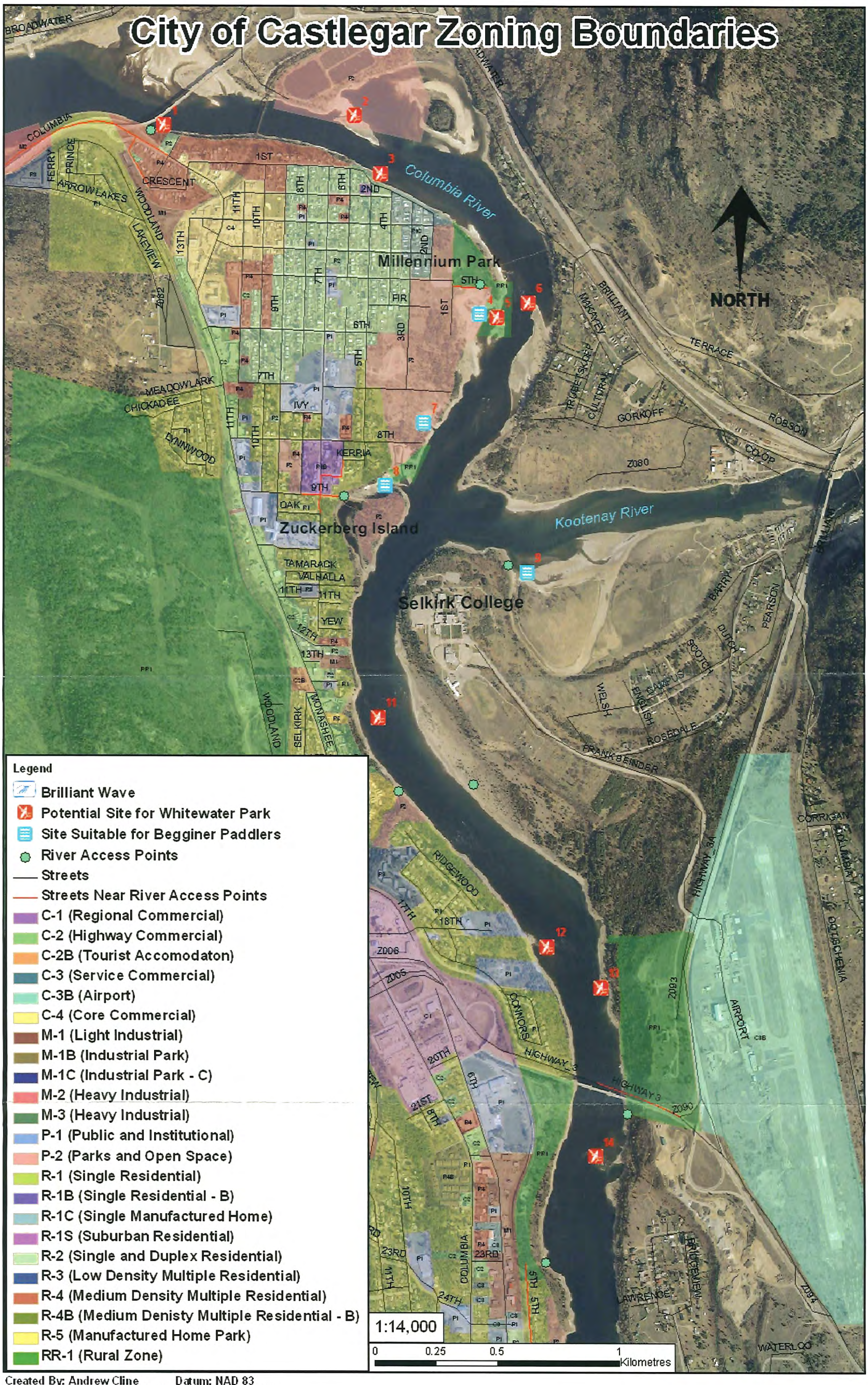


Figure 16: Displays annual flow data for the Columbia (Real-Time 2006)

Millennium Park Site Map

City of Castlegar Zoning Boundaries



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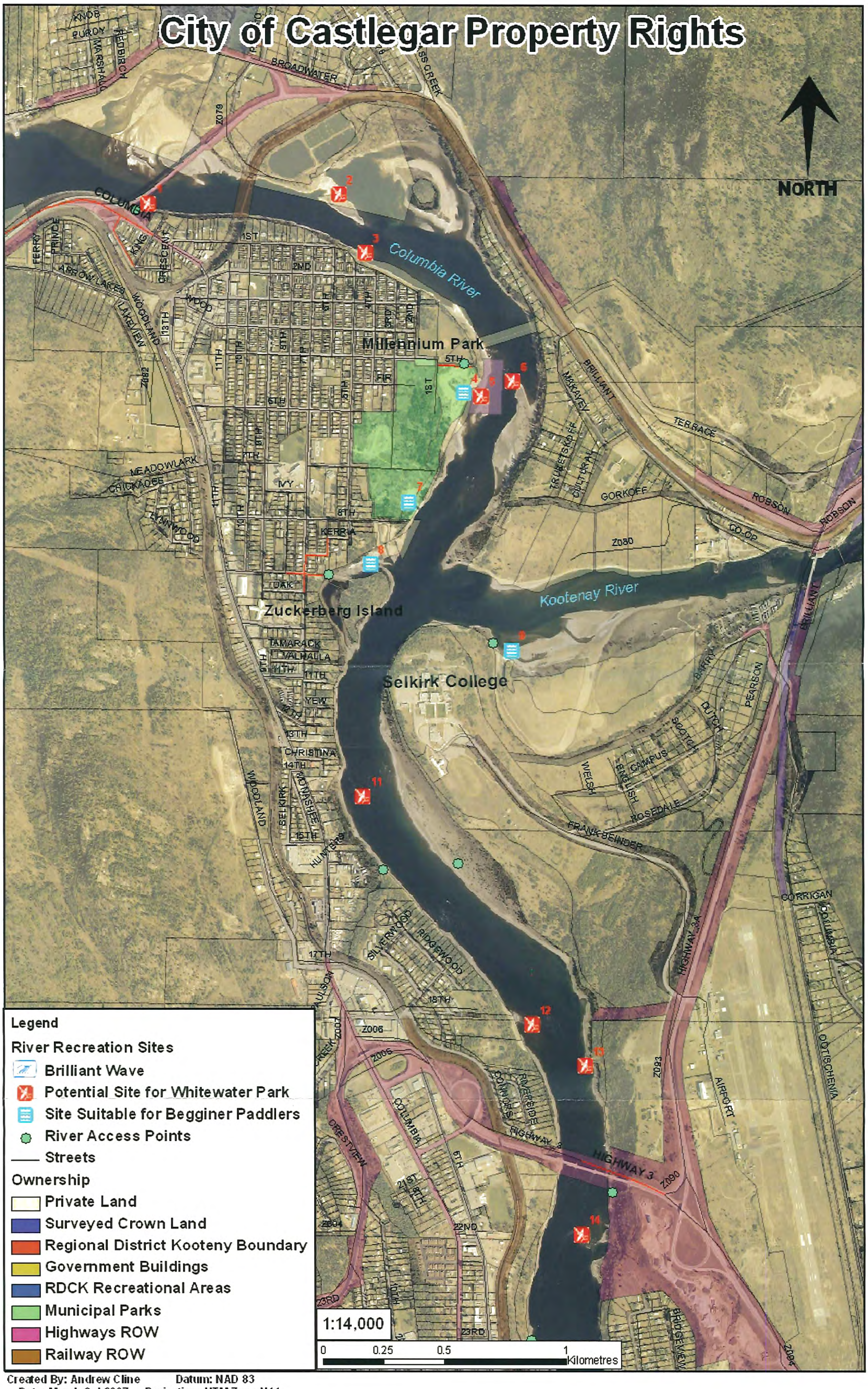
Date: March 3rd 2007 Projection: UTM Zone N11

City of Castlegar Property Rights



Created By: Andrew Cline Datum: NAD 83
Date: March 3rd 2007 Projection: UTM Zone N11

Appendix 3: Proposal for Feasibility and Conceptual Design Services

By Recreation Engineering & Planning ("REP")
February 28, 2007

The following proposal is for design services for whitewater improvements proposed near Castlegar, B.C. The intent of these services is to provide professional services to complete a feasibility investigation and conceptual design services. This project is envisioned as an in-stream whitewater improvements project. This contract is being sent to Andrew Cline.

Work Item	Task	**Cost,** Based on $100/hr
1	Obtain all mapping, flow data, ownership information, etc. that may affect the design of a whitewater park. Municipality to provide a Mylar or electronic basemap at the appropriate scale for the design for each site that is deemed viable by the client/municipality. Aerial photographs and topography maps at 2' contours typically provide the most vital information.	To be supplied by the Municipality
2	On site inspection of multiple sites in and around Castlegar. Meet with Municipal staff and other interested parties on site to confirm the viability of the project and to discuss concerns related to permitting, land ownership, costs, and site development.	$2,700.00
3	Develop a reproducible conceptual plan for one (1) site. This plan will include a written letter style report on recommendations for in-channel improvements to enhance boating and fish habitat and for access and bank improvements. The intent is to provide:	$3,800.00
	-Approximate rendering (conceptual level) of structures that are structurally and hydraulically sound, aesthetically pleasing and natural in appearance:	
	-Structures that are designed to withstand major flooding as well as help reduce any bank erosion problems	
	-Enjoyable whitewater features for boaters of all ability levels	
	-Enhanced habitat for fish	
	-An area that can be enjoyed by bank users and boaters.	
4	Preliminary cost estimate for one (1) site	$800.00
	Subtotal	$7,300.00
	Expenses: Travel, fax, printing, copies, phone.	$1,800.00
	Total (U.S. dollars)	**$9,100.00**
5	Additional sites: Additional engineering and design related to conceptual design and investigation of alternate sites. Includes a reproducible concept level site rendering and conceptual level cost estimate.	$3,200.00

Schedule

Work can begin immediately upon notice to proceed with a goal of completing a preliminary plan within six weeks.

Payment

Invoices will be sent every 30 days for work completed plus expenses. Payment is due within 30 days.

If the above proposal is acceptable to you, please sign below.

Notes

This proposal is for conceptual level planning only. Engineering, and engineering services will be provided under a separate contract in subsequent phases of this project. All documents related to this project are for planning and illustrative purposes and are specifically not intended for construction.

Submitted by: _____ _____

Gary M. Lacy, P.E. Date

Approved by: _____ _____

[Please Type Name, Title, Address, and Telephone Number] Date

Appendix 4: Relevant Plans, Regulations and Resources

Relevant Plans

The Castlegar Official Community Plan
Aspects of what Castlegar hopes to achieve in its updated official community plan have been taken into account. Once the updated version is available it should be consulted with. The update will be available on the City of Castlegar website.

City of Castlegar Website
http://www.castlegar.ca/OCP_update.htm

Relevant Regulations

Application for a Free Crown Grant
This site provides all of the necessary information regarding the tenure process.

Ministry of Agriculture and Lands
Crown Land Administration Division
http://www.al.gov.bc.ca/clad/tenure_programs/programs/community/guide/index.html

Application for Changes or Construction in and About a Stream
This is a link to a PDF of the application form that must be filled out once a design has been established.

British Columbia Ministry of the Environment
Water Stewardship Division
http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/application.pdf

Department of Fisheries and Oceans
Federal regulations regarding waterways can be found here. Since these regulations are constantly evolving it would be prudent to continue to check up on this periodically. Once a design has been established it would have to be congruent with the relevant regulations.

Department of Fisheries and Oceans
Acts, Orders and Regulations
http://www.dfo-mpo.gc.ca/communic/policy/dnload_e.htm

Resources

Front Counter BC
Zoning, ownership, and land use information can be found on this site. All information deemed to be necessary at the time of writing was included. However, should more research be required this is a good resource.
http://www.frontcounterbc.gov.bc.ca/

Recreational Engineering and Planning
This website provides a wealth of information on the engineering process as well as other aspects of whitewater parks. The Economic report completed by Stratus Consulting can be found on this page.
http://www.wwparks.com/

City of Castlegar
The complete zoning by-laws can be found here.
http://www.castlegar.ca/bylaws/800_con.pdf