

**A Bottled Water Free Special Olympics Canada 2014 Summer Games: Developing Sustainable Tap  
Water Solutions**

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**ENVR 400**

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# **A Bottled Water Free Special Olympics Canada 2014 Summer Games: Developing Sustainable Tap Water Solutions**

*A UBC SEEDS Project*

ENVR 400  
Final Report

April 2, 2014

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## 1. Executive Summary

The University of British Columbia (UBC) will be hosting the Special Olympics Canada 2014 Summer Games from July 8-12th. This event will feature up to 2,000 athletes, coaches and officials from across Canada and will attract around 5,000 – 10,000 public spectators. Typically, bottled water is a common sight at sporting events despite its significant environmental footprint and unsubstantiated health benefits relative to tap water. Both the Games Organizing Committee and UBC, value sustainable water usage and waste management as a key sustainability goal; as a result, the 2014 Summer Games will strive to be a bottled water free event.

The objective of this SEEDS project is to develop and evaluate alternatives to bottled water use by developing tap water distribution plans for each sporting venue. Each proposed solution was assessed based on social, economic, and environmental factors to determine the most sustainable and effective method of distributing tap water during the event. In addition, a nation-wide survey was conducted with athletes, coaches, Chefs and mission staff to identify potential social barriers to implementing our plan. Effective methods of promoting the event were also considered. If successful, our proposal can be used as a standard for future sporting events on campus and further UBC efforts in becoming a "zero waste" and "bottled water free" campus.

The final evaluation of our proposed options found that no single water solution was best for every venue. For indoor venues, portable water containers seemed to be the best solution where the number of such containers will depend on the sporting event and venue. For outdoor venues there is a possibility of bringing third party organizers to supply portable water stations; however, some were financially unfeasible while others depend on availability. Each option's proposed plan for water distribution source was refined after our survey highlighted that the main concern of tap water was availability. Lastly, our survey showed that close to 98% of respondents believed in the Games Organizing Committee's ability to provide quality tap water, where some of the respondents do not trust the quality of Vancouver's drinking water. Thus, we do not foresee any major barriers to implement these plans since most participants are familiar with drinking tap water from previous games and practices.

## 2. Introduction

Bottled water has been shown to have many negative environmental impacts, which is why there has been a movement in recent years to promote tap water as an alternative. The production process of plastic bottles is the main reason behind its large environmental footprint. According to the non-profit organization, the Pacific Institute, for every one litre of bottled water produced three litres of water is wasted in the production process (Pacific Institute, 2007). Similarly, for every one ton of plastic produced three tons of carbon dioxide are generated (Pacific Institute, 2007). The amount of energy consumed to create the plastic bottles, which is a petroleum product is also significant.

As many events in the past have relied on hydrating their athletes by providing bottled water, our goal is to facilitate a bottled water free event at all sporting venues for the Special Olympics Canada 2014 Summer Games. To do this, our team developed tap water distributions plans for each venue, taking into consideration survey responses from Games participants including the athletes and coaches. Each tap water distribution plan took into account factors such as the number of attendees present at each venue per day, the minimum amount of water that must be provided based on water estimates, tap water refill locations, and the possibility of providing temporary large scale water distribution units. Each plan was also evaluated and scored based on social perception, financial feasibility, and environmental sustainability. Sustainable water usage fell under the goal of the Special Olympics Committee, and this bottle-water free event will serve to help them align themselves with the Canadian Standard Association for Sustainable Events.

The team at UBC we collaborated with for this project is Matt Dolf (director of Special Olympics Initiatives), Ashlee Jollymore (Resource Management and Environmental Studies (RMES) PhD student), Liska Richer (director of UBC SEEDS Program) and Bud Fraser (Water and Zero Waste Engineer for Campus Sustainability). Moreover, to gain an overview of UBC sporting events and UBC food services, we have also worked with Bradley Thomas (UBC Athletics and Recreation) and Loriann McGowan (Student Housing and Hospitality Services (SHHS) & UBC Food Services) for this project.

### 3. Locations of Interest

The Special Olympics Canada 2014 Summer Games will be held from July 8 to July 12. During this event, up to 2,000 athletes, coaches and officials from across Canada will compete in sporting events at 11 locations, of which 9 will be held on the Vancouver campus. Note, for this project, our primary focus was the Summer Games and does not include the opening/closing ceremonies or practice sessions. The sporting events and associated are given below; for venue pictures, see Appendix A.

#### **On-Campus Venues by Sport**

- Athletics (Track & Field) - Rasphal Dhillon Track & Field Oval
- Basketball - War Memorial Gym
- Bocce - Wolfson Fields, Frank Buck Field and Whit Mathews Field
- Power Lifting and Rhythmic Gymnastics - Doug Mitchell Thunderbird Sports
- Soccer - Varsity Field
- Softball - Thunderbird Park Baseball Diamond
- Swimming - Aquatics Centre

#### **Off-Campus Venues by Sport**

- Golf - University Golf Course (University Endowment Lands, BC)
- Five and Ten Pin Bowling - The Zone Bowling Centre (Richmond, BC)

## 4. Background Information

### Negative Environmental Effects of Bottled Water

Global demand for bottled water has increased over the last decade, even in countries where the quality of tap water is considered excellent and readily accessible (Wilk, 2006). Bottled water is generally perceived as being cleaner and safer for consumption than tap water as a result of negative media coverage surrounding municipal water contamination (Saylor & Prokopy, 2011), such as the *E. coli* outbreak in Walkerton, Ontario (Hrudey & Hrudey, 2004). This mentality towards tap water has led to an increase in bottled water production, which is linked to a series of negative environmental effects. Bottled water is typically packaged in PET, a polymer that can take up to 1000 years to degrade (thus occupying large amounts of space in landfills) if not recycled (Napier & Kodner, 2008). The production, transportation, storage, and recycling of bottled water is a very energy intensive process. In Canada, approximately 3 million barrels of oil are used to create the 2 billion litres of water consumed annually by Canadians (Bottle Water Free Day, 2013). The energy use also accounts for the significantly higher costs associated with drinking bottled water, even though, both bottled and tap water may actually come from same source. Not all plastic bottles end up being recycled; many plastic water bottles end up in landfills and incinerators where their break down results in the production of dioxins and bisphenols that have been associated with a host of health issues including birth defects and cancer (Doria, 2006).

### Perception of Bottled Water

Studies have been conducted on the perception of drinking bottled water versus tap water, mostly through surveys and interview, to determine how best to promote tap water. Typically, bottled water is perceived to be cleaner than tap water as there is a perception of risk associated with drinking tap water, stemming from media outlets who may often falsely and negatively report about municipal water contaminations and health breakouts (Slovic, 1987). Consumer trust in tap water is often closely linked to local water quality (Hu, Morton & Mahler, 2011). In one study, women were found to have higher tendencies towards purchasing and drinking bottled water than men (Saylor & Prokopy, 2011). A lack of social pressure, forgetfulness, lack of motivation, lack of knowledge, and inconvenience were also found to be why people choose to drink bottled water (Saylor & Prokopy, 2011).

Contrary to popular belief, research has found that bottled water is not necessarily “cleaner” than tap water; in fact, municipal tap water is subject to more stringent regulations and monitoring than bottled water (Copes, Evans & Verhille, 2009). Bottled water, however, is regulated as a food product under the Canadian Food and Drug Administration and not subject to the strict regulations and monitoring standards established by Health Canada and provincial Water Protections Acts for municipal water treatment centres (Copes, Evans & Verhille, 2009). A study in Italy concluded that bottled water might in some cases contain higher levels of mineral content than that permitted by local health regulations (Cidu, Frau & Tore, 2011). Bacteria levels are also more likely to be higher in bottled water due to the omission of the chlorination process; consequently, bacterial colonies are able to grow during

the transportation and storage process (Copes, Evans & Verhille, 2009). The belief that the recycling of plastic bottles eliminates all negative impacts on the environment is false. Not all plastic bottles are recycled; in the United States, only 20% of plastic beverages are recycled while the rest end up in landfills (Saylor & Prokopy, 2011). Using sight, taste, and odour to determine the quality of water is also erroneous. The quality of drinking water is dependent on its chemical composition, rather than its physical characteristics; specifically, the concentrations of each ion or compound that can affect human health. Some examples of ions and compounds that may contribute include chloride (salty), copper (metallic), foaming agents (bitter), iron (metallic), manganese (bitter), pH (bitter or soda taste), total dissolved solids (salty), and zinc (metallic)(Napier & Kodner, 2008).

### **Local and Global Bottle Water Free Initiatives and Events**

There have been many initiatives around the globe to promote tap water use at public and private events. For example, at the University of Guelph during a student orientation event, a water dispenser truck was hired to provide participants with tap water instead of providing 5,000 people with bottled water (Food and Water Watch, 2009). At the Slow Food Nation in San Francisco attended by 60,000 participants, water trucks refilled outdoor locations while indoor locations were supplied from potable water source points in the building (Food and Water Watch, 2009). Promotion through media outlets and print advertisement promoted the event as bottled water free before the event took place and contributed to its success (Food and Water Watch, 2009). Raising awareness through social media, posters during the event, and public demonstrations on the benefits of tap water were some of the authors' suggestions in their study (Cheong, Davies, Tulipano & Wong, 2013). Organizations such as UNICEF TAP Project, Inside the Bottle, and Think Outside the Bottle have investigated the best possible ways of holding bottled water free events (Napier & Kodner, 2008).

## 5. Methodology

The project was divided into six stages, as listed below. A literature review was first performed to gain a better understanding of the benefits of tap water and the reasons behind why bottled water has been a preferred drink of choice. It allowed for the investigation of past national and international events that were bottled water free, and how event coordinators accomplished this. Furthermore, a contextual fact-finding process was also initiated in order to formulate ways in which such an event could be held at UBC. As it is important to know how much water should be provided for each venue, we also predicted the expected number of attendees per event per day based on preliminary numbers provided by the Games Organizing Committee. A survey was also sent out to athletes, coaches, and Chefs to better understand their water usage habits during each respective sport practices, and whether they had any concerns regarding the 2014 Games being bottle-water free. An assessment system was developed for social, environmental, and economic factors, based on key concepts identified in the literature review. Lastly, tap water distribution plans were put together based on the calculated number of attendees per venue, feedback from the survey, and physically visiting each of the sites to determine what scenarios were plausible.

1. Literature Review and Fact-Finding
2. Water Consumption and Attendance Estimates
3. Ethics Approval and Nation-wide “Tap Water Perception” Questionnaire
4. Development of Options and a Social, Environmental, and Economic Assessment System
5. Assessing Options and Assigning Tap Water Distribution Plans per Venue

### 5.1 Literature Review and Fact-Finding

The findings from our literature review have been included in Section 4 of this report, *Background Information*. Additional fact-finding included acquiring contextual information from local managers (both on- and off-campus) about the venues and tap water sources, as well as information about companies that offer tap water distribution services.

### 5.2 Water Consumption and Attendance Estimates

To determine the minimum amount of water needed, attendee and water estimates were derived from our knowledge of the event schedule, the number of athletes/teams for each sport and the estimated populations for other participants (technical officials, mission staff, friends and family of the athletes, Special Olympics Family, volunteers, sponsors, spectators and media outlets).

From the 2014 Summer Games Competition schedule (see Appendix B.1), three timeslots for each competition per day are shown. We assumed for every team-oriented sport that only one game between two teams would be played during each timeslot. Thus, the number of athletes, coaches and chefs at each venue at each timeslot per day was equivalent to two teams.

For the non-team sports we assumed:

- For powerlifting, that all athletes would participate in powerlifting in the first timeslot and only half would remain for the second timeslot.
- For rhythmic gymnastics, that all athletes would participate in the first two timeslots but only half will remain for the last two timeslots.
- For athletics (track and field), that the number of athletes, coaches and chefs were divided equally amongst all timeslots.

For golf, we looked at the golf schedule for the Olympic qualifying games and found all golfers played three days in a row. Since there are two timeslots, we assumed that half of the golfers (and their coaches and chefs) would play at each timeslot for all three days.

There are an additional 8000 attendees (technical officials, mission staff, friends & family, volunteers, sponsors, spectators and media outlets) that will be attending (Vancouver 2014 Games Organizing Committee, 2013). We added an additional 20% buffer in case this value was an underestimate, as well as to account for the possibility that certain games may be more popular than others or for potentially higher than average summer temperatures resulting in more water consumption. This translates into a 20% buffer for water as well, and will ensure that there is sufficient water for all prospective spectators. With this buffer, we expect ~9800 additional attendees. Since the aquatic center's seating is capped at 100, we assumed there would be 100 attendees at each timeslot for swimming. The remaining 9000 expected attendees were divided equally amongst the other venues, which lead to 118 attendees at each timeslot for each venue each day. The estimated amount of people (athletes, coaches, the public etc) for the venues ranged from 135-180 for each time slot. The water and attendance calculations can be seen in Appendix B.2.

To determine how much water a person would drink on average at a summer event, we used a literature consumption value of 1.5L per person/game (Food & Water Watch, 2008) and assumed this amount would sufficient for athletes as well as for spectators. This value was later confirmed as an adequate amount for most sports by our survey.

### **5.3 Ethics Approval and Nation-wide “Tap Water Perception” Questionnaire**

To identify potential social barriers to implementation, a nation-wide survey was conducted to better understand how athletes, coaches and chefs/mission staff perceive drinking Vancouver tap water. In order to do so, an ethics approval was acquired on February 14, 2014 from the Behavioural

Research Ethics Board (BREB) at UBC (application number H13-03220). This required all researchers to take the introductory tutorial for the Tri-Council Policy Statement (TCPS2) for the ethical conduct of research involving humans, with the principal investigator being Dr. Sara Harris of the Earth, Ocean and Atmospheric Sciences Department at UBC.

The survey was distributed online via FluidSurveys and comprised of questions found through our literature research as well as from general interest. These questions went through multiple rounds of revision by our community partners, professors, friends and family, grad students, and the Special Olympics committee. The end result was a concise five-minute survey that would:

- (i) Determine participant's perception of their hometown's tap water,
- (ii) Determine the level of trust in Vancouver's tap water and the ability of the 2014 Games committee in providing clean abundant tap water,
- (iii) Determine how well-acquainted participants are with the use of tap water for sports, and
- (iv) Determine whether our water estimates per person were accurate.

For distribution, the survey link was sent to the Chefs of each province, who then distributed to coaches and mission staff. The coaches would then distribute the survey to athletes who were of 19 years of age. Responses from athletes below the age of 19 were not included.

We received 291 complete and consented surveys. As a result, this served as an opportunity to highlight major concerns to take into consideration as well as confirm the accuracy of our water consumption and attendance estimates. A summary of survey results is included in the Results and Discussion section below. The complete survey and results can be seen in Appendix C.

## **5.4 Development of Options and a Social, Environmental, and Economic Assessment System**

The social, environmental, and economic tables that were used to assess each tap water distribution plan were developed based on key concepts identified in the literature review. Based on a respective scoring system for each subcategory that encompassed a tap water distribution plan, categories were rated on a three-star system. Justifications for each score were provided.

### **Social Assessment Categories:**

Four categories were created for the social assessment table based: "perceived sanitation", "accessibility", "promotion", and "incentive". While they do not constitute the majority of the attendees, athletes were targeted as the focus group during the assessment as they are expected to make up the majority of the participants. In many surveys, health risks were identified as being more strongly associated with tap water than bottled water, which is why sanitation was included as a major category in our table. While MetroVancouver tap water is safe to drink, people's perceived perception

of tap water sanitation by adding ice or passing it through additional filtrations systems can increase their willingness to drink tap water. Therefore, it is important to note that a 1-star rating for sanitation represents only the relative perception of sanitation held by athletes/public. Accessibility of water refill locations was also taken into consideration as many of the athletes and coaches in the survey had voiced concerns regarding how convenient it would be for athletes to refill their water during a game. The amount of promotional material a tap water management plan has for the bottle-water free Games is also important, as lack of participation can sometimes be attributed to unawareness about the event. Promotional material can also help educate and inform participants of the Games on tap water and bottled water usage and dispel previous misconceptions. Lastly, incentive to participate can be greatly influenced by how tap water is presented. The addition of ice, mint leaves or lemons can greatly add to appeal. A subcategory rated 3-star would mean there was relatively high social appeal for athletes to participate in bottle-water free event, while a 1-star rating would mean there was a low social appeal to participate in the event.

#### **Economic Assessment Categories:**

Each tap water management plan was assessed for economic feasibility and an approximated total cost calculated for the entire event at one venue. Please refer to Appendix D for a complete list of item costs and descriptions, which was used in calculations of total cost in our economic assessment table. “Promotional”, “ecological management”, “transportation”, “operational”, and “equipment” costs were considered. For promotional cost, we assumed that emails, posters and signs would be used and the total cost for posters will be approximately \$5 for each venue. The only ecological management cost associated with our plans is waste management cost. Since the Games are taking place at the UBC campus, the waste management team of UBC will be responsible for the disposal. Transportation cost of rented equipment was taken into account. For this event, we assumed the equipment was rented from companies within Vancouver, which means the average distance travelled would not exceed 10km. The average fuel consumption of small trucks is 10L/100km and the average price for gasoline is \$1.5/L. Under these assumptions, the average fuel cost for equipment transportation turned out to be around \$3.00 per return. For operational cost, we assumed volunteers would be available at every venue to monitor water wagons and refill portable water containers at no cost associated. For equipment rental, the prices listed were the lowest we could find in the market but cheaper options may be available. A four-day total cost of each of these categories of each option was calculated and assessed. The rating of each of these categories was assigned such that no cost corresponded to a 3-star rating, cost higher than \$1000 received a 1-star rating, and any cost between \$0 and \$1000 received a 2-star rating.

#### **Environmental Assessment Categories:**

The environmental assessments for each tap-water distribution management plan included electricity consumption, fossil fuel consumption, GHG emissions, off-site water usage, waste production, and the quality and fate of the waste. Electric input considered the operation of the set-up, i.e. whether

or not the equipment required power, as well as for refrigeration of water and/or ice. The power used by an average home refrigerator (1.5 kWh/day) was used to estimate for refrigeration of water and ice. Given that the majority of fossil fuel consumption was for equipment transportation, estimates were made using an average fuel efficiency rate of 10 litres of fuel per 100 kilometers of city roads. Other sources of fossil fuel consumption include the internal transport of the Metro Vancouver water wagon and Event Water Solutions refill station across campus. Off-site water consumption was included as a criterion despite never being applicable for our options; this will eventually allow us to draw comparisons between the possibilities of providing and not providing bottled water at the event. Two main forms of output were considered – solid waste and greenhouse gas emissions. Production of waste was mainly due to disposable cups provided with portable water containers, and any posters used as signage and user-friendly fact sheets. The end-of-life fate of the generated waste comprise of three treatment methods – landfills, incineration and recycling and/or compost. For the purposes of our management plan assessments, second-degree impacts of these treatments were not incorporated; however, it is important to note that in order to rank each process over another, the GHG emission factors for each treatment method were used according to the Greenhouse Gas Protocol, an international accounting tool for government and business leaders to quantify GHG emissions. To account for GHG emissions caused by fossil fuel consumption, Environmental Protection Agency (EPA) estimates of emissions from typical passenger vehicles were used based on the Motor Vehicle Emission Simulator (MOVES) model (8887 grams CO<sub>2</sub> equivalents per gallon of gasoline). It is important to note that the ratings were assigned to each category in terms of the relative feasibility and sustainability between each management plan, unlike an absolute scoring system that quantitatively assigns its final score, such as that used for the economic assessments.

## 5.5 Assessing Options and Assigning Tap Water Distribution Plans per Venue

All tap water management plans were developed based on research on past methods in which bottle water free events have been carried out. The results from our survey, especially from athletes playing a certain sport were incorporated into the tap water management plans of the respective venues when possible. Members of our team also physically visited some of the venues to identify where water sources such as drinking water fountains, taps, or ice dispensers are located. As some of the water distribution units we researched have water and electrical requirements, we also had to make sure the location of where we wanted to place the unit would meet those requirements.

Tap water management plans in this project were created according to the specifications of each venue location as every location has its unique attributes and limitations on what plans can be implemented before it becomes too economically, environmentally, or socially unfeasible. Many of the indoor locations have a small number of predicted attendees throughout the Games, which makes warranting the rental of an expensive distribution unit economically unfeasible. Many of the outdoor locations were limited by the lack of a close tap water source and refrigeration system for ice storage. Some venues were grouped together for the tap water management plans if they shared similarities or

were located close to each other, while other venues were evaluated on their own. A “central location” between the Rhaspal Dhillion Track & Field Oval and the Baseball Diamond was identified as a major area where a high traffic of athletes and attendees are expected (approximately 304 people per session; 762 people in total per day), due to many events being held in its surrounding fields. Large water distribution units, such as the MetroVancouver Water Wagon, that can serve a high volume of people, was assessed for this location.

## 6. Results and Discussion

### 6.1 Options Development and Assessment

Options were found through our literature review, brainstorming sessions and through community partner suggestions. Below is an overview of 5 potential options for tap water distribution, some of which are technological implementations that increase the availability of tap water at the sites. These major purchases or rentals were assessed and the most feasible and sustainable options were incorporated into our tap water management plans.

#### Option 1: MetroVancouver Water Wagon

The MetroVancouver Water Wagon is a mobile drinking water distribution system owned by MetroVancouver that operates during the summer months. The water wagon is part of MetroVancouver's Tap Water Campaign to educate residents about the quality of Vancouver's tap water.

The stainless steel Water Wagon operates by being hooked up to a potable water source and a power outlet. Attendees can fill up their water bottle at any one of the 3 fill compartments or at the water fountain on the side.



#### Option 2: The Clean Water Foundation Fill Stations

The Clean Water Foundation (CWF) is an organization dedicated to engaging communities in actions that promote sustainable water usage (Clean Water Foundation). As a result, the CWF (with help from Imperial Oil) is willing to donate up to 4 water permanent water fountains (2 indoor, 2 outdoor) that can be used for the refilling of re-useable water bottles. Depending on the installation costs for each water fountain, this may or may not be a viable option.



### Option 3: Event Water Solutions Portable Water Stations

Event Water Solutions is a company that specializes in providing water stations for small and large scale events. The stainless steel water stations are connected directly to tap water sources and water is filtered, sterilized (UV light), and chilled before being dispensed. Run by Event Water Solutions staff, each water station can service up to 8000 individuals if necessary. A water source within 300 feet and a 110 volt 15 amp electrical outlet will be needed for each station.



### Option 4: Lonsdale Event Rentals Portable Water Containers

Portable water containers (19L) can be rented from Lonsdale Event Rentals at a cost of \$10.75/container/day. Portable water containers will be useful for event areas where tap water fountains or water stations are not easily accessible for the public. Most team/athlete resting areas will also most likely need their own individual containers.



### Option 5: UBC Building Operations Gooseneck Nozzles Upgrades

The installation of gooseneck nozzles onto existing drinking water fountains can increase the ease in which to fill water bottles. Currently most drinking water fountains on campus do not have this feature. Any conversions made require the consent of UBC Building Operations and notice a couple of months in advance.



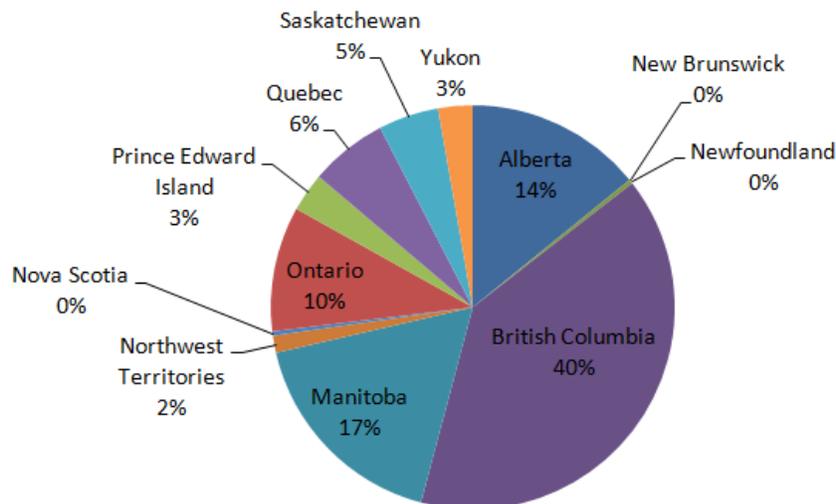
## 6.2 Survey: Gauging perceptions of tap water nationwide

As mentioned previously, the main overarching goal of our survey was to identify any social implementation barriers to having a bottled water free Summer Games. To achieve this goal, we aimed to:

- (i) determine participants perception of their hometown's tap water quality
- (ii) determine participants trust in Vancouver's tap water and the ability of the Games committee in providing clean abundant tap water
- (iii) determine how well-acquainted participants are with the use of tap water for sports
- (iv) determine whether our water estimates per person were accurate

Overall, the response to our nation-wide survey was a success and we obtained 293 responses. Of those 293 responses, 2 answered they were below the age of consent (below 19) and were excluded from our survey analysis. Of the remaining 291 responses, 142 (49.3%) are athletes, 113 (38.7%) are coaches, and 32 (12.0%) are chefs/mission staff . For the 2014 Summer Games, there is an anticipated 1296 athletes, 336 coaches and 97 chefs/mission staff.

For the survey, our hope was to have a fairly even representation from all provinces; however, out of the 290 responses that gave their city and province, 115 (39.7%) were from BC. This is most likely because BC has the second highest number of participants (360) in the 2014 Summer Games so for distribution we looked at the number of responses received compared to the total possible responses for each province. This produced province participation percentages ranging from 0.00% (New Brunswick) to 39.7% (Manitoba), with an average province participation percentage of 16.1%. Since the responses from each province are not equally distributed, it is important to keep in mind during the survey discussion that although a majority of comments or concerns may come from BC, this does not necessarily mean BC's water is the most concerning for taste or safety. Moreover, it may appear that a high proportion of a certain province has concerns over tap water when in actuality there were less than a handful of their responses, which skewed the percentages.

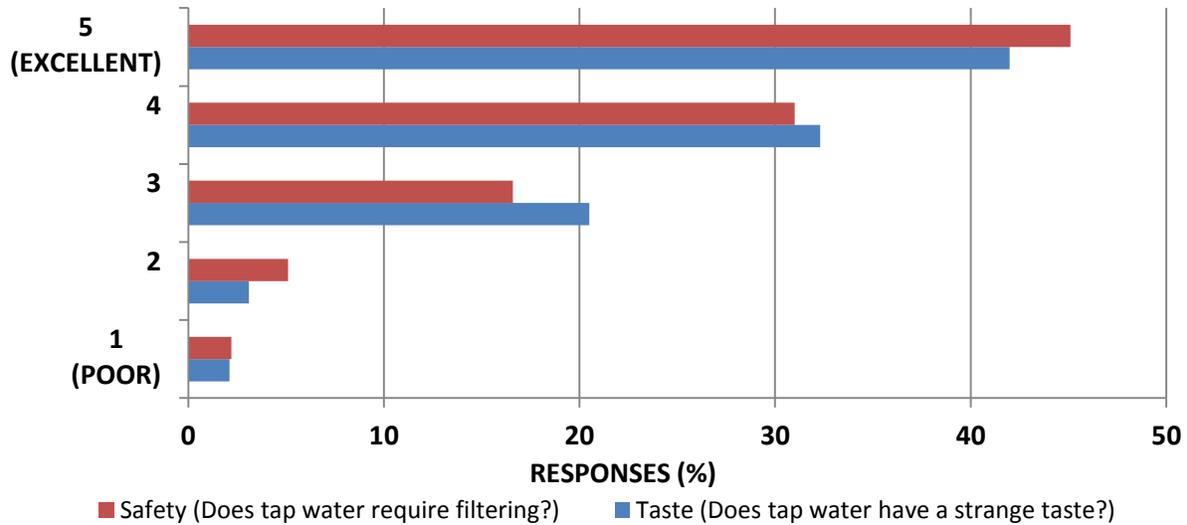


**Q5. Survey Response Distribution**

**(i) Perception of hometown tap water quality**

From the survey, most of the participants are confident in the taste and safety of tap water at their hometown, as only 15 (5.2%) responses ranked taste as 1 or 2 out of 5 and only 20 (7.3%) responses ranked safety a 1 or 2 out of 5.

**Q6. Where you currently live, how would you rate tap water quality in terms of taste and perceived safety on a scale of 1 (poor) to 5 (excellent)?**



Alternatively, we can view the distribution of responses based on provinces. Although there were limited responses from some provinces, we are able to gain a sense of understanding for the overall provincial feeling towards tap water taste. For example, 95% of Albertans (41 total responses) feel satisfied with the taste of their tap water and rated tap water either a 4 or 5. In comparison, only 45% of Manitobans (51 total responses) rated tap water taste a 4 or 5.

Taste (288 responses)	Responses	1 (poor)	2	3 (neutral)	4	5 (excellent)
British Columbia	115	3 (3%)	6 (5%)	23 (20%)	28 (24%)	55 (48%)
Alberta	41	0 (0%)	0 (0%)	2 (5%)	20 (49%)	19 (46%)
Saskatchewan	14	0 (0%)	0 (0%)	5 (36%)	5 (36%)	4 (29%)
Manitoba	51	2 (4%)	0 (0%)	21 (41%)	19 (27%)	9 (18%)
Quebec	17	1 (6%)	0 (0%)	0 (0%)	8 (47%)	8 (47%)
Ontario	28	0 (0%)	1 (4%)	5 (18%)	10 (36%)	12 (43%)
Prince Edward Island	8	0 (0%)	2 (25%)	1 (13%)	2 (25%)	3 (38%)
Newfoundland	1	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)

Nova Scotia	1	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)
New Brunswick	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Northwest Territories	4	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)
Yukon	8	0 (0%)	0 (0%)	1 (13%)	1 (13%)	6 (75%)

For the responses that ranked taste 1 or 2 out of 5, 9 were from BC (Maple Ridge, Summerland, Langely, Burnaby, Delta, Trail, Surrey and 2 did not list a city), 2 were from Manitoba (Winnipeg and did not list), 1 was from Quebec (Joliette) and 2 were from Prince Edward Island (Charlottetown and did not list).

Similarly for safety, we're able to see the provincial feeling towards tap water safety. Comparing British Columbia (109 responses) and Alberta (40 responses) to Quebec (17 responses) and Ontario (29 responses), we can see the percentage of participants in western and central that rated tap water safety a 4 or 5 was fairly consistent (BC: 78%, AB: 83%, QC: 82% and ON: 73%) despite their varying number of responses.

<b>Safety (277 responses)</b>	Responses	1 (poor)	2	3 (neutral)	4	5 (excellent)
British Columbia	109	2 (2%)	5 (5%)	17 (16%)	28 (26%)	57 (52%)
Alberta	40	0 (0%)	4 (10%)	3 (8%)	16 (40%)	17 (43%)
Saskatchewan	14	1 (7%)	0 (0%)	3 (21%)	5 (36%)	5 (36%)
Manitoba	49	1 (2%)	3 (6%)	21 (43%)	21 (43%)	10 (20%)
Quebec	17	1 (6%)	1 (6%)	1 (6%)	7 (41%)	7 (41%)
Ontario	29	1 (3%)	1 (3%)	6 (21%)	6 (21%)	15 (52%)
Prince Edward Island	6	0 (0%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)
Newfoundland	1	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
Nova Scotia	1	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)
New Brunswick	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Northwest Territories	4	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)
Yukon	7	0 (0%)	0 (0%)	1 (14%)	0 (0%)	6 (86%)

For the responses that ranked safety as a 1 or 2 out of 5, 7 were from BC (Burnaby, Mission, Summerland, Langely, Trail, Surrey and did not list), 4 were from Alberta (3 Edmonton, 1 Calgary), 4 were from Manitoba (Brandon, Winnipeg, Winkler and did not say), 1 was from Saskatchewan (Regina), 2 were from Quebec (Quebec City, Montreal) and 2 were from Ontario (Hamilton and did not say). Only

4 responses ranked both taste and safety a 1 or 2 out of 5 and they were all from BC (Summerland, Trail, Surrey and did not list).

**(ii) Level of trust in Vancouver’s tap water and the ability of the Games committee in providing clean abundant tap water**

In terms of confidence of drinking Vancouver's tap water, 35 participants selected a 1 (would not drink) or 2 out of a scale of 5. Out of the 4 responses mentioned above, 2 said they would not drink Vancouver's tap water, 1 said they were neutral and 1 said they had no concerns at all. Of the 35, 17 respondents selected 1 (would not drink); 5 responses were from British Columbia (Summerland, Mission, Surrey, Penticton, and Prince George), 2 were from Alberta (Calgary, Edmonton), 3 were from Saskatchewan (Donwell, Saskatoon and Regina), 5 were from Manitoba (Brandon, Winnipeg, Winkler, and 2 did not list), and 2 were from Ontario (both did not specify cities/towns). Similarly, when asked on a scale of 1 (not happy) to 5 (completely fine) of how happy they felt that the 2014 Summer Games would be completely bottled water free, 41 (14.2%) respondents chose 1 or 2 out of 5.

**Q7. How concerned are you about drinking Vancouver's tap water on a scale of 1 (would not drink) to 3 (neutral) to 5 (no concerns at all)?**

Response	Chart	Percentage of Responses	Number of Responses
1 (would not drink)		5.9%	17
2		6.2%	18
3 (neutral)		29.7%	86
4		13.4%	39
5 (no concerns at all)		44.8%	130
		<b>Total Responses</b>	<b>290</b>

From the survey, the most common concern (37.2%; 108 responses) among participants was how convenient the water fill stations will be and whether there would be enough water. This concern was the most prevalent throughout the comments where the ease of filling up water bottles was rated as the highest factor towards encourage tap water consumption over bottled water, followed by readily available and clean/well-maintained fountains. The second and third most prevalent concerns were smell/taste (23.4%; 68 responses) and health/sanitation (23.1%; 67 responses). From the survey, 128 (44.1%) respondents said they had no concerns at all. For the responses that selected "Other" the main concerns were related to temperature, contaminants in water (chlorine, fluoride, javex bleach, pesticides, herbicides), and to their sensitivity to water quality changes (causes stomach aches).

**Q8. What are your main concerns, if any, regarding drinking tap water during the games? (select all that apply)**

Response	Percentage of Responses	Number of Responses
a) None (I have no concerns regarding tap water at the 2014 Games!)	44.1%	128
b) Health/Sanitation	23.1%	67
c) Convenience/Not enough water in the vicinity (Will water refill stations be close by?)	37.2%	108
d) Smell/Taste (Will tap water taste strange in Vancouver?)	23.4%	68
e) Other:	10.7%	31
<b>Total Responses</b>		<b>290</b>

**Q11. Select the factors that would make you most likely to consume tap water over bottled water. 1 is Least Likely, 3 is Neutral and 5 is Very Likely**

	1 (least likely)	2	3 (neutral)	4	5 (very likely)	Total Responses
Water is readily available	16 (5.7%)	10 (3.5%)	46 (16.3%)	47 (16.3%)	165 (58.3%)	285
Water is from a clean and well maintained fountain and/or faucet	19 (6.7%)	9 (3.2%)	43 (15.1%)	50 (17.6%)	163 (57.4%)	284
You trust and know about where the water comes from	17 (6.0%)	9 (3.2%)	59 (21.0%)	65 (23.1%)	131 (46.6%)	281
Water is filtered/ purified onsite	9 (3.2%)	7 (2.5%)	82 (29.3%)	58 (20.7%)	124 (44.3%)	280
Able to easily fill own water bottle/container	5 (1.8%)	6 (2.1%)	33 (11.8%)	44 (15.4%)	194 (68.9%)	280
Water is of a preferred temperature	6 (2.2%)	9 (3.3%)	74 (26.8%)	57 (20.3%)	131 (47.5%)	276

Although some respondents did not trust Vancouver's tap water or had concerns, 284 (97.9%) of respondents said they trusted the Games Organizing Committee with providing quality water. For the 6 respondents that said no, one participant commented that previously there have been issues with having enough water, having run out before. Another said that there are a lot of details to take care of, and water quality is low on the list. Another response said bottled water would be safer since it was questionable whether someone would clean the water containers.

### **(iii) Familiarity with using tap water for during games and practice**

To determine how well-acquainted participants were with tap water, we asked athletes to rank their most preferred beverages (choices: tap water, bottled water, and non-water beverages like gatorade) during games. From the survey, 47 responses chose tap water as their first preference, 49 chose bottled water and 36 chose non-water beverages.

### **Q12. (Athletes-only Question) Which of the following beverages do you prefer during games? Please rank the following beverages from most preferred to least preferred:**

	1 (most preferred)	2	3 (least preferred)	Total Responses
Tap Water	47 (43.1%)	29(26.6%)	33 (30.3%)	109
Bottled water	49 (43.0%)	51 (44.7%)	14 (12.3%)	114
Non-water beverages (ie. Sports beverages like Gatorade, Vitamin water, etc)	36 (30.0%)	31 (25.8%)	53 (44.2%)	120

Although the choice of bottled water was quite high, this may be attributed to the convenience of bottled water rather than the belief that bottled water is cleaner or tastier than tap water. We came to this conclusion because 73.7% of 289 responses stated they drank tap water (filtered or unfiltered) the most over the past week. If bottled water was preferred over tap water for safety/taste preferences, this figure would be much lower. In addition, it was pointed out by the Chef of Nova Scotia that their annual Provincial Games use tap water and as a result all Nova Scotia athletes would be fine with tap water. We're unaware if any other provinces use tap water for official games, however since 71.1% of coaches, chefs and mission staff provide only water during games/practices, we believe a bottled water free Summer Games will not be too surprising for most participants. We also asked participants what factors would make them more inclined to consume tap over bottled water so we could identify or highlight an area to focus on in our assessments. We found the main incentives to be water that is readily available (165; 58.3%), clean and from a well maintained fountain or faucet (163; 57.4%) and that it was easy for them to fill their own bottle or container (194; 68.9%).

### **(iv) Confirming water estimates per person are accurate**

Lastly, from the survey we hoped to confirm whether our water estimates per person were accurate. Coaches, chefs and mission staff were also asked to estimate the amount of water per person for someone on the team to drink per game. Regardless of sport, the average was 1.32L with a median of 1.00L from the 65 responses received. Since 8 of the 65 responses gave the quantity of water in terms of bottled waters, we assumed each water bottle was a typical size of 500mL. To ensure that this

assumption was accurate, we averaged the 57 responses that used litres as a measure and got 1.33L per person per game.

Moreover, we filtered the responses to see which sports had water estimates greater than 1.5L (swimming and athletics) so we can adjust the amount of water provided or the frequency at which the portable water container stations are refilled. The two sports that need more water was swimming (average 2.57L) and athletics (average 1.65L). Aside from these 2 sports, our survey was able to confirm that our current estimate of 1.5L per person per game will suffice.

Overall, the survey showed that although some respondents did not trust Vancouver's tap water or had concerns, close to 98% of respondents trust the Games Organizing Committee with providing quality tap water. In addition, it may be very beneficial for the Games Organizing Committee to send out a fact sheet highlighting Vancouver's tap water quality to participants since respondents may not trust Vancouver's tap water because they are simply unaware of the quality. Aside from that, we do not foresee any major barriers to implementation for our plans since most participants are familiar with drinking tap water for games and practice. However this survey definitely highlighted some key areas that we will pay extra care and attention to, such as the placement of our options to ensure convenience.

## 6.3 Options Assessment for Venues

### 1) UNIVERSITY GOLF COURSE

**Sport(s):** Golf

**Number of Expected Attendees:** 292 (146 individuals/session, 2 sessions of golf per day)

**Description:** During the Games, only the north section of the golf course utilized; these include courses 1 and 10-18.

#### Tap Water Distribution #1 – Distribution of Tap Water Via Golf Carts

**Proposed Plan:** In the survey results, hydration was noted as an important issue by some of the golf coaches as athletes are often in the sun for several hours at a time. The range of water estimates by golf athletes and coaches ranged from 0.5L to 3L per athlete per day. The proximity of water refill stations for the athletes was also another concern. After discussion with the manager of the golf course, it was decided that tap water would be distributed to attendees and athletes via a golf cart carrying 2 portable water containers (2x19L) which would make rounds around the north section of the golf course. Posters will also be placed on the golf cart to differentiate it from any others present. The water would also be served chilled by adding ice directly into the portable water containers. Biodegradable disposable cups would also be distributed due to the isolated location of some of the courses for those without reusable water bottles. Refills for water and ice can be made at the clubhouse kitchen.

**Equipment Needed:** 2 portable water containers (19L each), 1 box of disposable cups, 1 golf cart, 1 ice dispenser

**Map:**



Figure 1 UBC Golf Course

#### Summary of Assessment Results:

	FEASIBILITY	RATIONALE	
SOCIAL	Perceived Sanitation	★	Sanitation and incentive is rated on the lower end because ice is the only extra addition to tap water that will be provided.
	Accessibility	★★★★	
	Promotion	★★★★	
	Incentive	★★	
ECONOMIC	Equipment Costs (Rental, Installation, Purchase)	★★	The overall economic feasibility of this option is high. The only cost involved is equipment purchase.
	Operational Costs	★★★★	
	Transportation Costs	★★★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★★★	
	<b>Total cost</b>	\$40	
ENVIRONMENTAL	Electricity	★★	The golf carts are electric powered. Refrigeration of ice is also considered. 8.8 L of fuel consumed (80 km) for pick-up and drop-off of equipment from North Vancouver. Negligible water consumption for off-site procedures. Produces paper waste from disposable cups only (no signage). All waste is compostable and/or recyclable. Recycling and/or compost. 20.7 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
	GHG emission	★★	

Please refer to Appendix E for complete assessment tables.

## 2) THE ZONE BOWLING CENTRE

**Sport(s):** Bowling

**Number of Expected Attendees:** 858 (286 individuals/session, 3 session of bowling per day)

**Description:** Located in Richmond, this bowling alley will be used to host the 5-Pin and 10-Pin bowling event.

### 1) Tap Water Distribution Plan #1 – Portable Water Containers

**Proposed Plan:** Among the bowling participants of the survey, an average of 1.08L water per athlete per day was recommended by bowling coaches and athletes, which is below our literature value of 1.5L per individual per day. It is noted that one individual did respond and say that they would not drink the provided tap water. For those individuals, they have the option of purchasing beverage from the bowling alley cafeteria store that will be operating during the Games. The bowling center has one existing water fountain located by the café/dining area, which means no disposable cups will need to be provided. Two tables will be set up at opposite ends of the bowling area, each with a portable water container (19L) which will make refilling refillable water bottles easier. As ice can be easily obtained from the cafeteria, the water will also be served chilled by placing ice along with tap water into the portable water containers. Ice and tap water can be refilled in the cafeteria area.

**Equipment Needed:** 2 portable water containers, 2 tables, disposable cups

**Map:**

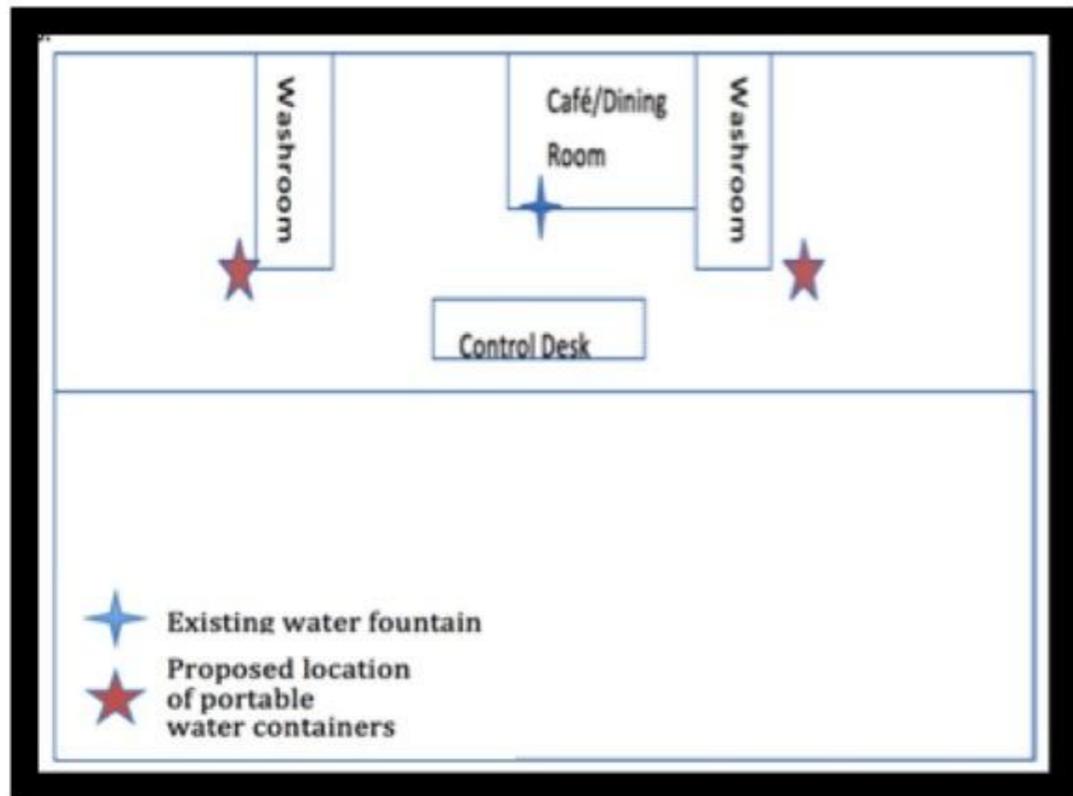


Figure 2 The Zone Bowling Centre Richmond

### Summary of Assessment Results:

	FEASIBILITY	RATIONALE	
<b>SOCIAL</b>	Perceived Sanitation	★	Scores are generally low across all categories due to limitations with what major changes can be made to the venue.
	Accessibility	★	
	Promotion	★	
	Incentive	★	
<b>ECONOMIC</b>	Equipment Costs (Rental, Installation, Purchase)	★★	Equipment rental is the main contributor to the overall cost and operation. Ecological management do not generate a cost.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	\$233.2	
<b>ENVIRONMENTAL</b>	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone. 4.4 L fuel for equipment transportation from UBC to Richmond (40 km total) at the start and end of the Games. Negligible water consumption for off-site procedures. Paper waste from disposable cups and signage. Paper only; compostable and recyclable waste. Recycling and/or compost. 10.4 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
	GHG emission	★★	

Please refer to Appendix E for complete assessment tables

### 3) UBC CAMPUS – INDOOR VENUES

#### a) UBC Aquatic Centre

**Sport(s):** Swimming

**Number of Expected Attendees:** 360 (180 individuals/session, 2 sessions of swimming per day)

**Description:** Only the indoor pool will be used during the Games. According to the Chefs de Mission Manual, the capacity of spectators will also be limited to 100 individuals.

#### 1) Tap Water Distribution Plan #1 – Portable Water Containers

**Proposed Plan:** Survey results from swimming athletes and coaches indicated that the expected amount of tap water an athlete will drink per day per game is 1.83L which is higher than our literature value of 1.5L though the number may be an overestimate due to only 6 participants providing water consumption estimates. Several participants also noted that they preferred the tap water to be chilled and easily accessible due to the warm temperatures in the summer. As the Aquatics Centre lacks a kitchen area, a cooler in which ice can be stored should be rented for the duration of the games. As the spectators can easily access the 2 water fountains located in the Aquatics Centre, no tables with portable water containers will be set up for them. For the athletes, 1 table with 2 water containers (2x19L) will be set up near the pool, by the southeast entrance along with the cooler of ice. The portable water containers and cooler can be filled up at the up in the Student Union Building (SUB) at the Servery Room between the Party Room and Ballroom.

**Equipment Needed:** 2 portable water containers, 1 table, one cooler, 1 ice scoop

**Map:**

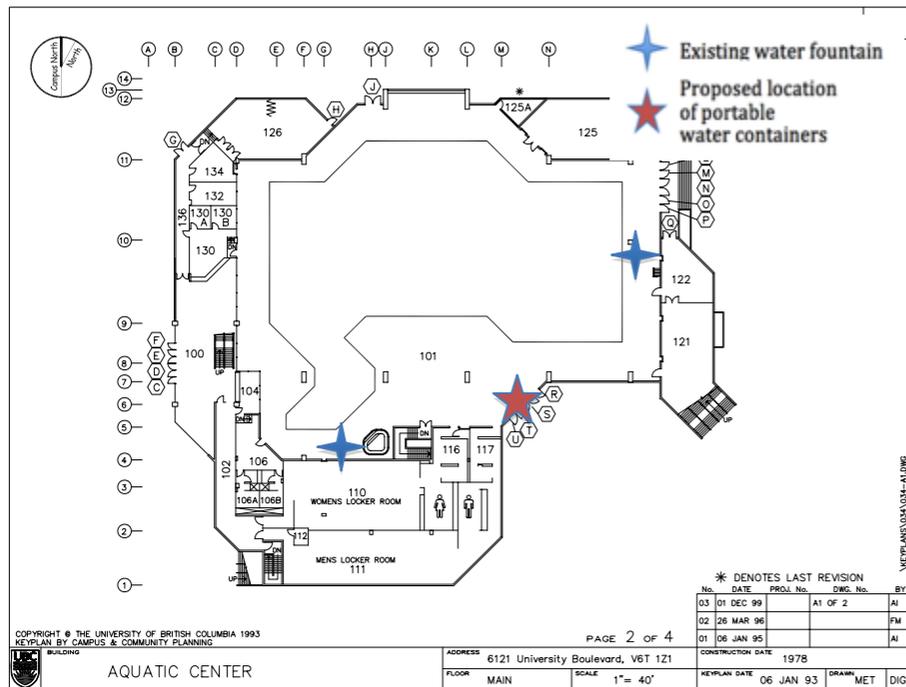


Figure 3 UBC Aquatic Centre

#### Summary of Assessment Results:

		FEASIBILITY	RATIONALE
SOCIAL	Perceived Sanitation	★★	While three water fountains do exist in the building, accessibility was rated low as the one drinking water fountain with a gooseneck nozzle is located in the basement and will not easily accessible for the athletes during games.
	Accessibility	★	
	Promotion	★	
	Incentive	★	
ECONOMIC	Equipment Costs (Rental, Installation, Purchase)	★★	Equipment rental is the main contributor to the overall cost and operation.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	<b>\$211.6</b>	
ENVIRONMENTAL	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone. ~9 L fuel for equipment transportation from North Van to UBC (80 km total) and back. Negligible water consumption for off-site procedures. Paper waste from disposable cups and signage. Paper only; compostable and recyclable waste. Recycling and/or compost. 21 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
	<b>GHG emission</b>	<b>★★</b>	

Please refer to Appendix E for complete assessment tables

**UBC Aquatic Centre Continued**

**1) Tap Water Distribution Plan #2 – No Additional Equipment or Changes Needed**

**Proposed Plan:** As there are already three water fountains in the Aquatics Centre, some with gooseneck nozzles, no additional equipment needs set up during the games. Both athletes and spectators can obtain their tap water refills from the water fountains. Signs may need to be set up through the Aquatics Centre for athletes, coaches, and spectators to locate the water fountains more easily.

**Equipment Needed:** None  
**Map:**

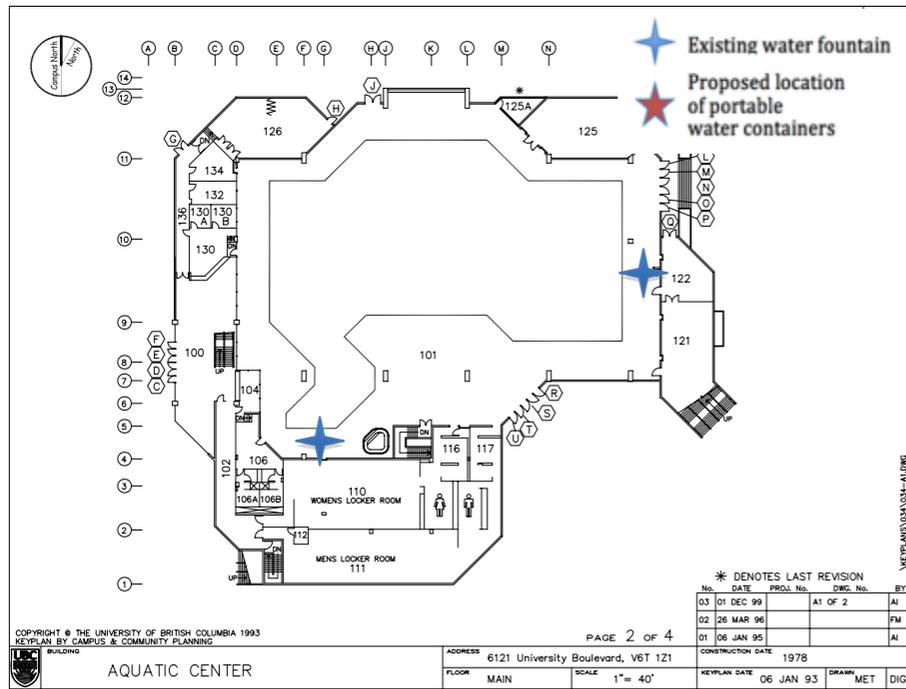


Figure 4 UBC Aquatic Centre

**Summary of Assessment Results:**

		FEASIBILITY	RATIONALE
<b>SOCIAL</b>	Perceived Sanitation	★	There is overall a low social appeal for encouraging athletes to drink tap water during the games if no changes are made to the venue.
	Accessibility	★	
	Promotion	★	
	Incentive	★	
<b>ECONOMIC</b>	Equipment Costs (Rental, Installation, Purchase)	★★★★	Promotional material purchase is the only cost.
	Operational Costs	★★★★	
	Transportation Costs	★★★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	<b>\$ 5</b>	
<b>ENVIRONMENTAL</b>	Electricity	★★★★	No spent energy.
	Fuel consumption	★★★★	No fuel consumption.
	Water consumption	★★★★	No off-site water consumption.
	Waste production	★★★★	No waste generated.
	Biodegradation of Materials	n/a	
	End-of-life treatment	n/a	
	GHG emissions	★★★★	No GHG emissions.

Please refer to Appendix E for complete assessment tables

**b) War Memorial Gym**

**Sport(s):** Basketball

**Number of expected attendees:** 288-432 (118 individuals/session, 2-3 sessions basketball per day)

**Description:** The War Memorial gymnasium, located adjacent to the Student Union Building (SUB) and Aquatic Centre, has a total seating capacity of 2862, and will be used for basketball. The lobby area has an EZH2O water fountain that has a motion sensor-activated refill dock (Figure 3). Additionally, there is a water fountain with a gooseneck nozzle in the men and women’s locker rooms each. The Allan McGavin Sports Medicine Centre located in the basement also has a gooseneck water fountain; however, *as of right now, Building Operations has advised to section it off due to a flooding incident in the summer.*



Figure 5: EZH2O Water refill station at War Memorial Gym.

**1) Tap Water Distribution Plan #1 – Portable Water Containers**

**Proposed Plan:**

The only possible option for tap water distribution here is the use of portable water containers inside the gymnasium off on the side benches in the northeast corner, in addition to leaving it as is. All athletes will have access to the locker room water fountains (reusable water bottles can be filled here), and spectators will have access to the refill station in the lobby area adjacent to the kitchenette. Disposable paper cups should be provided beside the EZH2O refill station for spectators who wish to take it inside the gym, as well as next to the portable water container inside the gym.

**Equipment Needed:** 1 portable water container

**Map:**

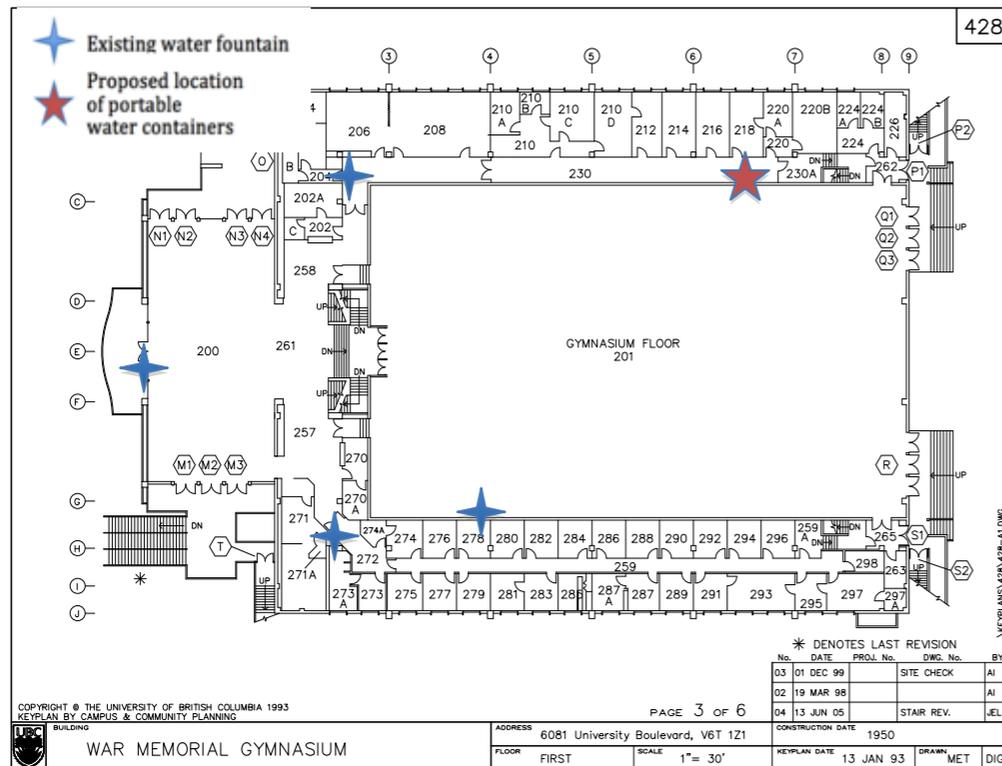


Figure 6 UBC War Memorial Gym

**Summary of Assessment Results:**

		FEASIBILITY	RATIONALE
SOCIAL	Perceived Sanitation	★	The incentive of water is raised by the addition of ice into the portable water containers.
	Accessibility	★	
	Promotion	★	
	Incentive	★★	
ECONOMIC	Equipment Costs (Rental, Installation, Purchase)	★★	Portable water container rental is the main contributor to the overall cost.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	<b>\$51</b>	
ENVIRONMENTAL	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone.
	Fuel consumption	★★	
	Water consumption	★★★★	Negligible off-site water consumption.
	Waste production	★★	Paper waste from disposable cups and signage.
	Biodegradation of Materials	★★★★	Paper only; compostable and recyclable.
	End-of-life treatment	★★★★	Recycling and/or compost.
	GHG emission	★★	20.7 kg CO2 emitted from equipment transportation.

Please refer to Appendix E for complete assessment tables

## 2) Tap Water Distribution Plan #2 – No Additional Equipment or Changes Needed

### Proposed Plan:

Alternatively, the other option is to have no additional equipment, and use the existing water fountains as the only refill stations for drinking water. However, having no portable water containers inside the gymnasium may cause some inconveniences for athletes or coaches who would have to go back to the changing rooms to refill their bottles. Relative to the previous plan, spectators would not see any changes in the amount of refill stations.

Equipment Needed: None

Map:

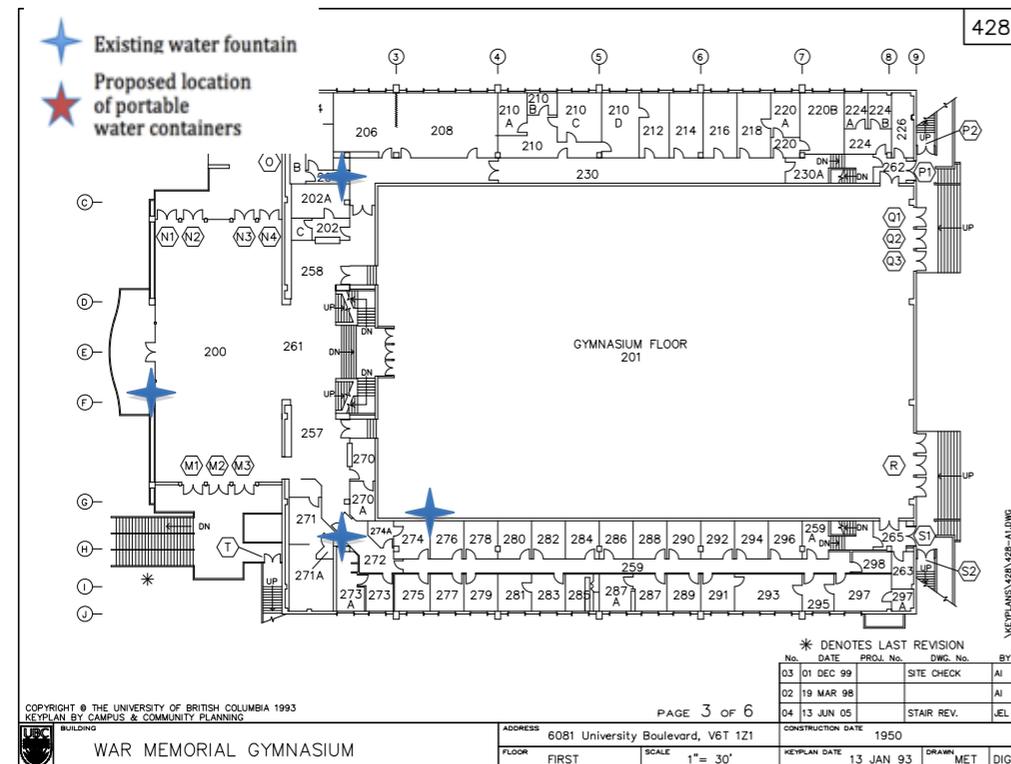


Figure 7 UBC War Memorial Gym

## Summary of Assessment Results:

		FEASIBILITY	RATIONALE
SOCIAL	Perceived Sanitation	★	The incentive of water is raised by the addition of ice into the portable water containers.
	Accessibility	★	
	Promotion	★	
	Incentive	★★	
ECONOMIC	Equipment Costs (Rental, Installation, Purchase)	★★	Portable water container rental is the main contributor to the overall cost.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	<b>\$51</b>	
ENVIRONMENTAL	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone. 8.8 L of fuel used for equipment transportation from North Vancouver. Negligible off-site water consumption. Paper waste from disposable cups and signage. Paper only; compostable and recyclable. Recycling and/or compost. 20.7 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
GHG emission	★★		

Please refer to Appendix E for complete assessment tables

c) Doug Mitchell Thunderbird Sports Centre

**Sport(s):** Powerlifting and Rhythmic Gymnastics

**Number of Expected Attendees:** 288-308 (144-154 per session depending on sport, 2 sessions (either Powerlifting or Rhythmic Gymnastics per day)

**Description:** The Thunderbird Area has the capacity to hold up to 7000 individuals and will also be used during the opening ceremony.

**1) Tap Water Distribution Plan #1 – Portable Water Containers**

**Proposed Plan:** From the survey results for powerlifting and rhythmic gymnastics, participants expected at least 0.83L of water to be prepared for each athlete. Two portable water containers can be set up on the countertop located in the atrium and will primarily be for spectators (Figure 6). There is also a drinking fountain located at the other end of the atrium that is available for spectators without reusable water bottles. Inside the arena, where the competition will be taking place, two tables with one portable water container each should be placed at each end of the arena and will primarily supply the athletes, coaches with their water needs. As chilled water was highly requested from the survey results, both ice and tap water can be obtained from the cafeteria area located in the building. Posters will also be necessary due to the hidden location of some of the posters



Figure 8 – Countertop space in the atrium, located across from the washrooms

**Equipment Needed:** 2 tables, 4 portable water containers

**Map:**

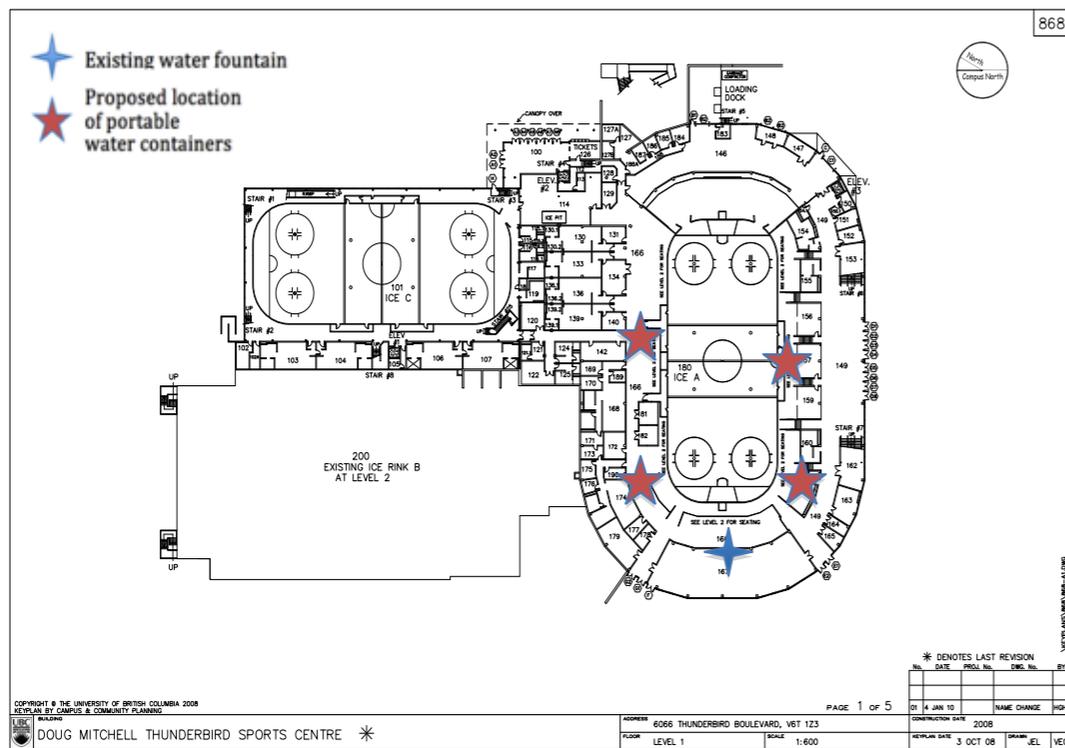


Figure 9 UBC Doug Mitchell Thunderbird Sports Centre (Map Data 2014 Google)

Summary of Assessment Results:

		FEASIBILITY	RATIONALE
SOCIAL	Perceived Sanitation	★	The incentive of water is raised by the addition of ice into the portable water containers.
	Accessibility	★	
	Promotion	★	
	Incentive	★★	
ECONOMIC	Equipment Costs (Rental, Installation, Purchase)	★★	Four portable water containers are needed so the cost is a bit high.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	<b>\$319.2</b>	
ENVIRONMENTAL	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone. 8.8 L fuel for equipment transportation from North Van to UBC (~80 km total) and back. Negligible water consumption for off-site procedures. Paper waste from disposable cups and signage. Paper only; compostable and recyclable waste. Recycling and/or compost. 20.7 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
	GHG emission	★★	

Please refer to Appendix E for complete assessment tables

2) Tap Water Distribution #2 – Gooseneck Nozzle Conversions

**Proposed Plan:** A gooseneck nozzle can be added onto the one drinking water fountain located in the atrium where spectators can refill their water bottles (Figure 8). Two tables, each with one portable water container should be placed inside the stadium for the use of the athletes and coaches. Water refills for the portable water containers can be obtained from the cafeteria by volunteers. As the water fountain is largely noticeable, poster will be needed to guide people of the direction of its location.



Figure 10 – Location of current drinking fountain at Thunderbird Stadium

**Equipment Needed:** 2 tables, 2 portable water containers, 1 gooseneck nozzle  
**Map:**

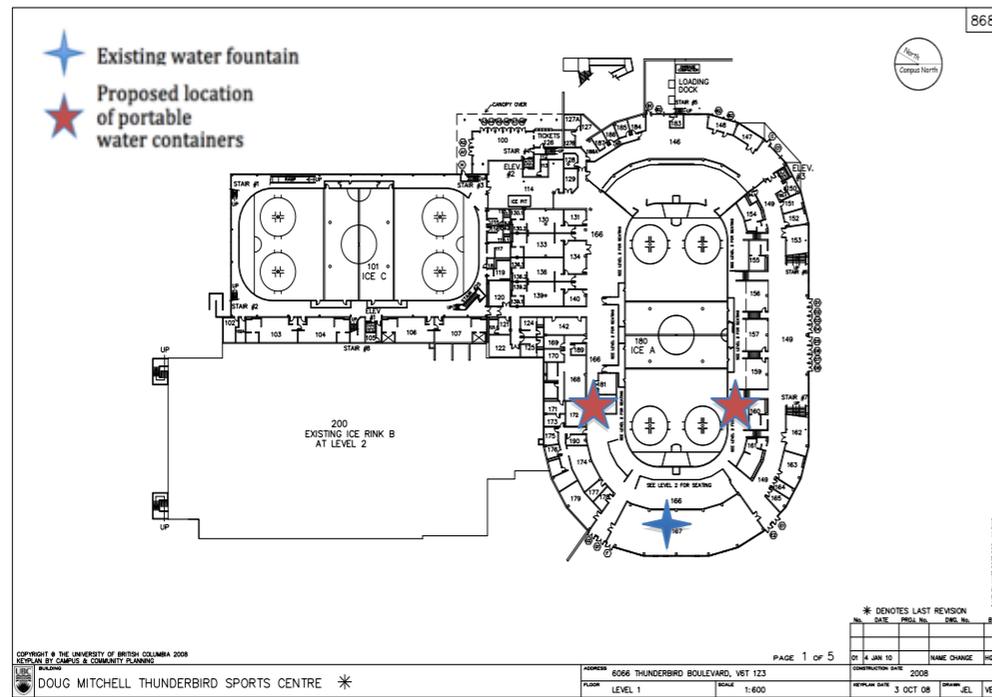


Figure 11 UBC Doug Mitchell Thunderbird Sports Centre (Map Data 2014 Google)

Summary of Assessment Results:

	Feasibility	Rationale	
<b>SOCIAL</b>	Perceived Sanitation	★	The installations of gooseneck nozzles will increase require increased promotion.
	Accessibility	★	
	Promotion	★★	
	Incentive	★	
<b>ECONOMIC</b>	Equipment Costs (Rental, Installation, Purchase)	★★	Gooseneck nozzle purchase and installation cost is the major contributor to the total cost.
	Operational Costs	★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	\$410.2	
	<b>ENVIRONMENTAL</b>	Electricity	
Fuel consumption		★★	
Water consumption		★★	
Waste production		★	
Biodegradation of Materials		★★	
End-of-life treatment		★	
GHG emission		★★	

Please refer to Appendix E for complete assessment tables

3) UBC CAMPUS – OUTDOOR VENUES

a) Varsity Field

**Sport(s):** Soccer

**Number of expected attendees:** 300-450 (150 individuals/session, 2-3 sessions per day)

**Description:** Varsity Field which is next to the Thunderbird Park sports fields hosting Bocce, will be used for soccer.

1) Tap Water Distribution #1 – Portable Water Containers

**Proposed Plan:** Responses from soccer coaches and athletes showed that they expect at least 1 litre of water is expected to be consumed by a single athlete per day. Convenience and health also ranked first and second in terms of major concerns about the event. To ensure that athletes are properly hydrated 2 tables with 1 portable water container each will be placed near each team area during the games. Spectators will be able to obtain their water from the one existing water fountain located near room 202. Water can be refilled at concessions. There is a training room with ice machine and ice tubes inside the venue, so we are able to provide iced water during the games.

**Equipment Needed:** 2 portable water containers, 2 tables

**Map:**



Figure 12 UBC Thunderbird Stadium and Park

Summary Of Assessment Tables:

	Feasibility	Rationale	
<b>SOCIAL</b>	Perceived Sanitation	★	The provision of ice will increase the incentive of athletes to drink chilled tap water.
	Accessibility	★	
	Promotion	★	
	Incentive	★★	
<b>ECONOMIC</b>	Equipment Costs (Rental, Installation, Purchase)	★★	The cost is mainly generated by table and water container rental.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★	
	<b>Total cost</b>	\$153.2	
<b>ENVIRONMENTAL</b>	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone. ~9 L fuel for equipment transportation from North Van to UBC (~80 km total) and back. Negligible water consumption for off-site procedures. Paper waste from disposable cups and signage. Paper only; compostable and recyclable waste. Recycling and/or compost. ~21 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
	GHG emission	★★	

Please refer to Appendix E for complete assessment tables

**b) Bocce Outdoor Fields**

**Sport(s):** Bocce

**Number of expected attendees:** 270-405 (135 individuals/session, 2-3 sessions per day)

**Description:** Three UBC outdoor fields will be used for bocce; they are the Wolfson Fields, Frank Buck and Whit Mathews Field.

**1) Tap Water Distribution #1 – Portable Water Containers**

**Proposed Plan:** Bocce athletes indicated that at least 1.4L of water will be required for one athlete per day and the majority did not have any major concerns regarding the event being bottled water free. In the survey it was indicated that athletes often help each other refill during the games, which is why it is decided that a centralize location at each field for water refill will be adequate. As there are no existing water fountains near the fields, 2 portable water containers will be provided for the Gerald McGavin and one will be provided for Whit Mathews. A total of 3 tables will be needed to hold the portable water bottles. Spectators can be expected to obtain their water from the Gerald McGavin Rugby Centre a three minute walking distance away. Water will be served chilled by placing ice into the refillable containers. Refilling can take place at the bar counter of the Gerald McGavin Rugby Centre as it has a sink easily accessible for refill for the Wolfson and Frank Buck Field. For the Whit Mathews Field located by Thunderbird Stadium, refill can be take place at the water fountain inside the stadium.

**Equipment Needed:** 3 tables, 3 water containers

**Map:**

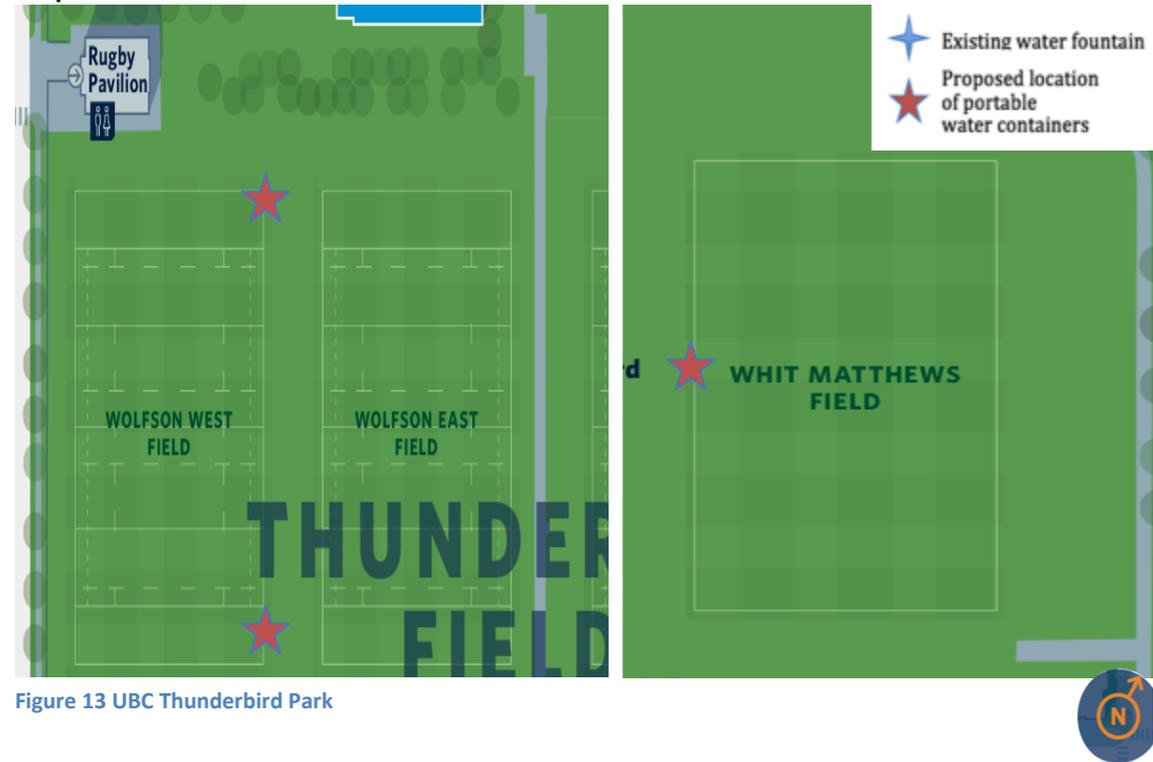


Figure 13 UBC Thunderbird Park

**Summary of Assessment Tables:**

		FEASABILTIY	RATIONALE
SOCIAL	Perceived Sanitation	★	The provision of ice will increase the incentive of athletes to drink chilled tap water especially bocce will take place outdoors in the Summer.
	Accessibility	★	
	Promotion	★	
	Incentive	★★	
ECONOMIC	Equipment Costs (Rental, Installation, Purchase)	★★	Equipment rental and transportation is the only cost.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★★★	
	<b>Total cost</b>	\$340.8	
ENVIRONMENTAL	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone. ~9 L fuel for equipment transportation from North Van to UBC (80 km total) and back. Negligible water consumption for off-site procedures. Paper waste from disposable cups and signage. Paper only; compostable and recyclable waste. Recycling and/or compost. 21 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
	GHG emission	★★	

Please refer to Appendix E for complete assessment tables

c) Athletics (Track and Field) and Softball Outdoor Fields

Sport(s): Athletics (Track and Field), softball

Number of expected attendees: 762 (304 individuals/session, 2-3 sessions for each sport per day)

Description:

1) Tap Water Distribution #1 – Portable Water Containers

**Proposed Plan:** For both the softball and athletics, 1 portable water container containing iced water will be placed at each team seating areas as it was requested in one of our survey responses due to concerns about warm temperatures expected in July. Water will also be served chilled for the same reason by having a cooler of ice available at each field. For the softball, no additional tables will need to be set up as they can be placed directly on the benches. It is expected that the athletes will require at least 1.4L of water each. Chilled water can be refilled at the “Centralized Outdoor Location” water distribution unit used primarily for spectators.

**Equipment Needed:** 4 portable water containers, 2 tables, 2 cooler, 2 ice scoop

**Map:**

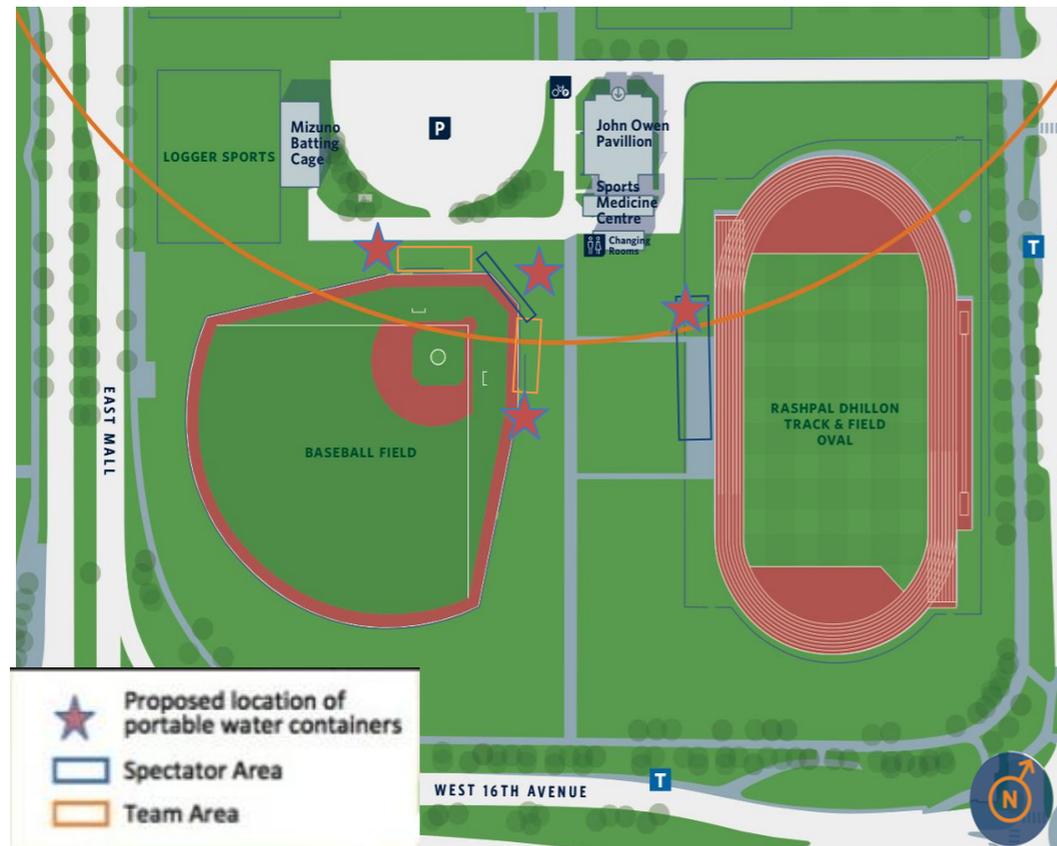


Figure 14 Rashpal Dhillon Track & Field Oval and Baseball Centre

Summary of Assessment Table:

	Feasibility	Rationale	
<b>SOCIAL</b>	Perceived Sanitation	★	The provision of ice will increase the incentive of athletes to drink chilled tap water.
	Accessibility	★	
	Promotion	★	
	Incentive	★★	
<b>ECONOMIC</b>	Equipment Costs (Rental, Installation, Purchase)	★★	Four water containers are rented, the cost is a bit high.
	Operational Costs	★★★★	
	Transportation Costs	★★	
	Ecological	★★★★	
	Management Costs	★★★★	
	Promotional Costs	★★★★	
	<b>Total cost</b>	<b>364.6</b>	
<b>ENVIRONMENTAL</b>	Electricity	★★★★	Refrigeration of ice is considered; highly feasible because no spent energy for event alone. ~9 L fuel for equipment transportation from North Van to UBC (80 km total) and back. Negligible water consumption for off-site procedures. Paper waste from disposable cups and signage. Paper only; compostable and recyclable waste. Recycling and/or compost. 21 kg CO2 emitted from equipment transportation.
	Fuel consumption	★★	
	Water consumption	★★★★	
	Waste production	★★	
	Biodegradation of Materials	★★★★	
	End-of-life treatment	★★★★	
	GHG emission	★★	

Please refer to Appendix E for complete assessment tables

**d) Central Outdoor Location**

**Description:** Located between the Rhaspal Dhillon Track & Field and the Baseball Diamond, the centralized location was established mainly to service spectators and athletes at the UBC outdoor fields on a large scale.

**1) Tap Water Distribution #1 – Event Water Solution**

**Proposed Plan:**

The Water Wagon is mobile drinking water distribution system owned by MetroVancouver that operates during the summer months. The stainless Water Wagon operates by being hooked up to a potable water source and a power outlet which can be obtained at from the Sports Medicine Centre. Then, attendees can fill up their water bottle at any one of the 3 fill compartments or at the water fountain on the side.

**Equipment Needed:** Event Water Solution’s distribution unit

**Map:**

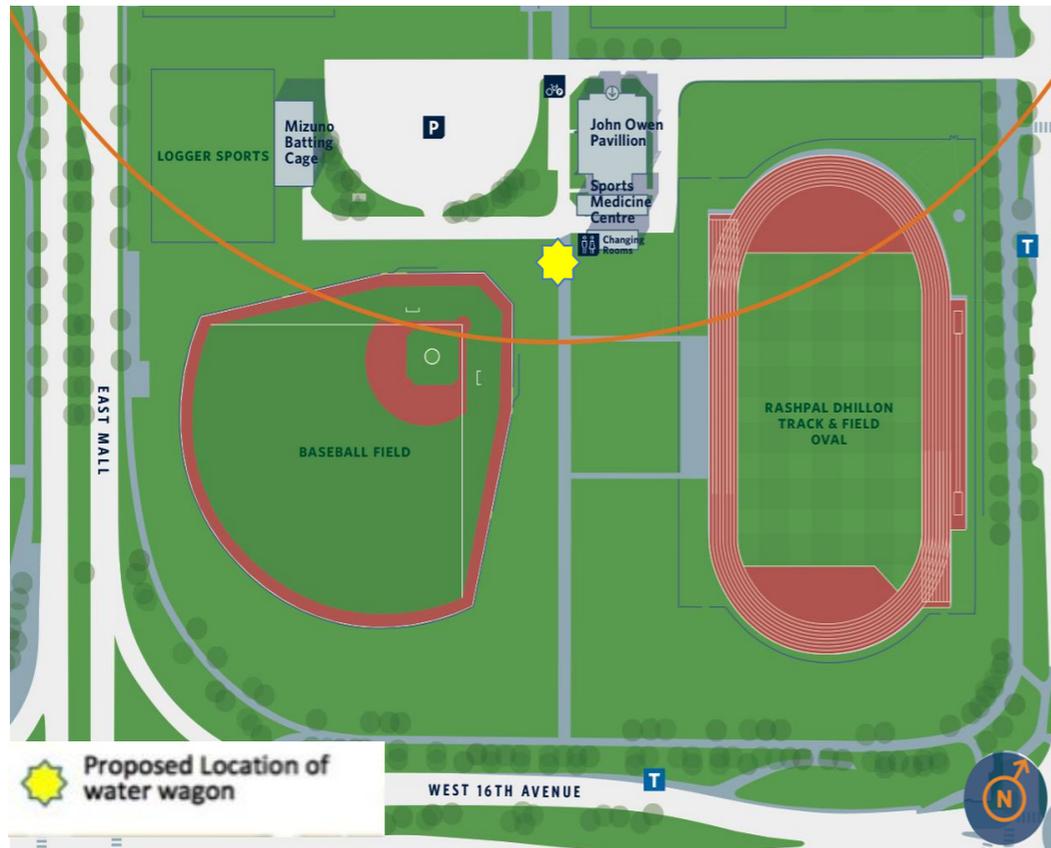


Figure 15 Rhaspal Dhillon Track & Field Oval and Baseball Centre

**Summary of Assessment Tables:**

		Feasibility	Rationale
<b>SOCIAL</b>	Perceived Sanitation	★★★★	Water distribution units by Event Waters Solutions ensures a high quality sanitation.
	Accessibility	★★	
	Promotion	★★	
	Incentive	★	
<b>ECONOMIC</b>	Equipment Costs (Rental, Installation, Purchase)	★	Water wagon rental cost is the major contributor to this overall high cost of this option. The overall economic feasibility is low due to this high cost.
	Operational Costs	★★★★	
	Transportation Costs	★★★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★★★	
	<b>Total cost</b>	<b>\$1544.2</b>	
	<b>ENVIRONMENTAL</b>	Electricity	
Fuel consumption		★	
Water consumption		★★	
Waste production		★★	
Biodegradation of Materials		★★★★	
End-of-life treatment		★★★★	
GHG emission		★	
			Emissions from equipment transportation could potentially result in over 235 kg CO2.

Please refer to Appendix E for complete assessment tables

## 2) Tap Water Distribution #2 – Metro Vancouver Water Wagon

**Proposed Plan:** The Water Wagon is mobile drinking water distribution system owned by MetroVancouver that operates during the summer months. The stainless Water Wagon operates by being hooked up to a potable water source and a power outlet, which can be hooked up to the Sports Medicine Centre. Then, attendees can fill up their water bottle at any one of the 3 fill compartments or at the water fountain on the side.

**Equipment Needed:** Metro Vancouver Water Wagon

**Map:**

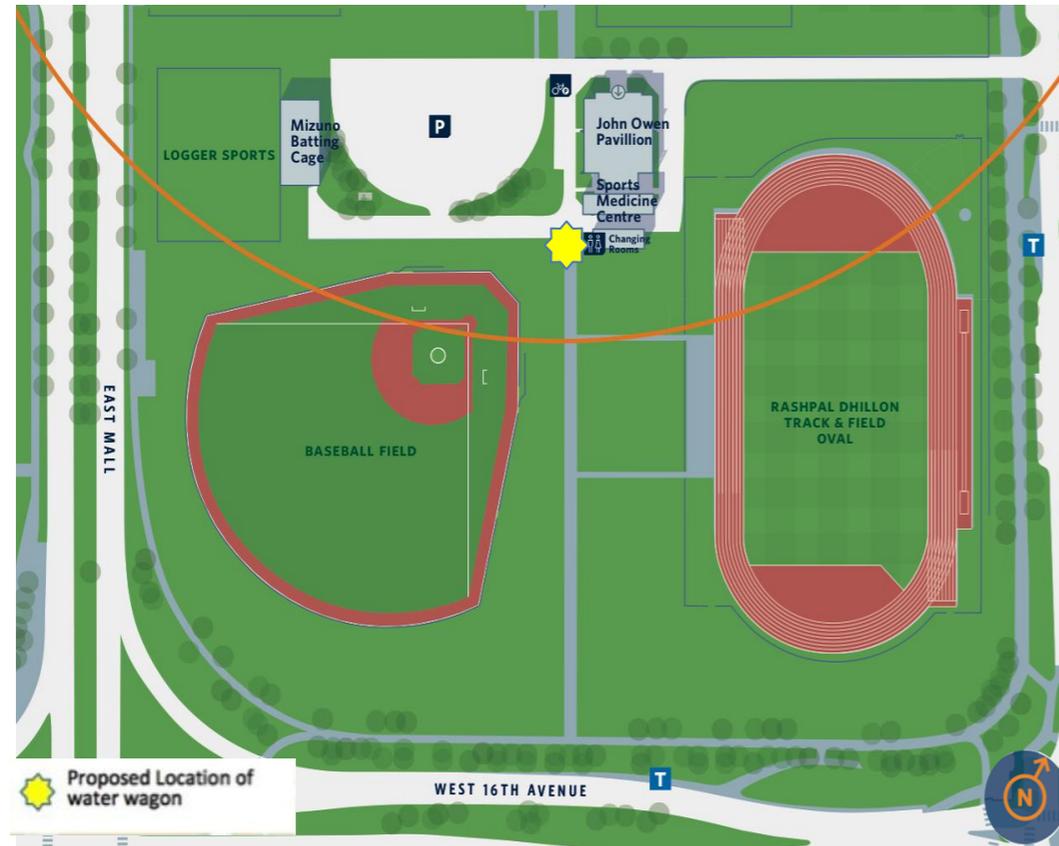


Figure 16 Rashpal Dhillon Track & Field Oval and Baseball Centre (Map data 2014 Google)

## Summary of Assessment Tables:

		Feasibility	Rationale
SOCIAL	Perceived Sanitation	★★	While the MetroVancouver Water Wagon may lack the high sanitation levels that Event Water Solutions provides, it still scores moderately well across 3 of the 4 main categories.
	Accessibility	★★	
	Promotion	★★	
	Other Participation	★	
ECONOMIC	Equipment Costs (Rental, Installation, Purchase)	★★★★	There will be no cost associated with this option and the overall economic feasibility is high.
	Operational Costs	★★★★	
	Transportation Costs	★★★★	
	Ecological Management Costs	★★★★	
	Promotional Costs	★★★★	
	<b>Total cost</b>	<b>\$0.00</b>	
	ENVIRONMENTAL	Electricity	
Fuel consumption		★★	
Water consumption		★★★★	
Waste production		★★	
Biodegradation of Materials		★★★★	
End-of-life treatment		★★★★	
GHG emission		★★	

Please refer to Appendix E for complete assessment tables

## 6.4 Scoping the Significance of a Bottled water Free Event and Future Directions

As part of the initiatives of the Games Organizing Committee, holding a bottled water free event is a crucial step towards sustainable event planning. Given the expected number of participants and spectators during the weeklong celebrations, this event is bound to be one of the first and largest nation-wide events to explicitly promote the use of tap water. For the purposes of comparison, if this event were carried out in a manner where 100% of drinking water was sourced by bottled water, the environmental and economic costs would be enormous. According to a life-cycle assessment comparison between bottled water and tap water conducted by at the University of Michigan, the total energy use per 0.5 L bottled water adds up to 2.46 MJ, GHG emissions of 0.122 kg CO<sub>2</sub>, and 0.5 L additional water use (Dettore, 2009). Furthermore, not only would this result in 0.026 kg solid waste per bottle that would end up in a landfill, the financial cost of ordering bottled water for over 2000 participants alone would be over two thousand dollars.

Recently, the city of San Francisco has successfully banned bottled water on a municipal scale (starting October 2014), making history in sustainable practices and waste management. The implication of holding such an event at one of Canada's biggest universities will likely have a big influence on the movement towards zero-waste initiatives and sustainable event planning, which in the future may lead to municipal or even national policy changes.

## 7. Conclusion

While our options have been assessed using various social, economic and environmental factors, no single option can be considered a solution for all venues; therefore, it is imperative that we implement any action by taking into account the type of venue and the type of sport.

Most indoor venues are clearly limited in either having a portable water container system set-up and/or an upgrade of existing water fountains to gooseneck nozzles. While the latter does not increase the number of water refill stations itself, it does make it more socially feasible. Portable water containers will need to be rented out, and a system specific to each venue must be established so that volunteers are able to refill these containers accordingly. While these options may have a 1-star rating on the social aspects, it is important to note that they only represent relative perceptions of the public; for example, while mint leaves and lemons were shown to increase social appeal, they were not included due to limitations at venues and the fact that they were optional (i.e. social appeal would not be low if participants do not have an alternative with mint leaves/lemon included).

Outdoor venues were found to have more options for the distribution of tap water. In addition to portable water containers, the Metro Vancouver Water wagon and Event Water Solutions offer the possibility of bringing in third party organizers to help with the distribution of tap water out on the Thunderbird fields. While the Metro Vancouver water wagon would likely be sponsored by the city, the EWS would be financially unfavorable. In general, having this event to be bottled water free would serve as a milestone for not only the Special Olympics, but also the City of Vancouver and UBC.

Venues/Fields	Tap water distribution plan
University Golf Course	Water containers carried by golf carts
The Zone bowling Centre	Portable water containers
UBC Aquatic Centre	1:Portable water containers 2:No changes
War Memorial Gym	1:Portable water containers 2:No changes
Doug Mitchell Sports Centre	1:Portable water containers 2: Gooseneck Nozzle upgrade
Thunderbird Stadium	Portable water containers
Athletics and Baseball Diamond	Portable water containers
Bocce fields	Portable water containers
Central outdoor Location	1:Event Water solution 2:Metro Vancouver water wagon

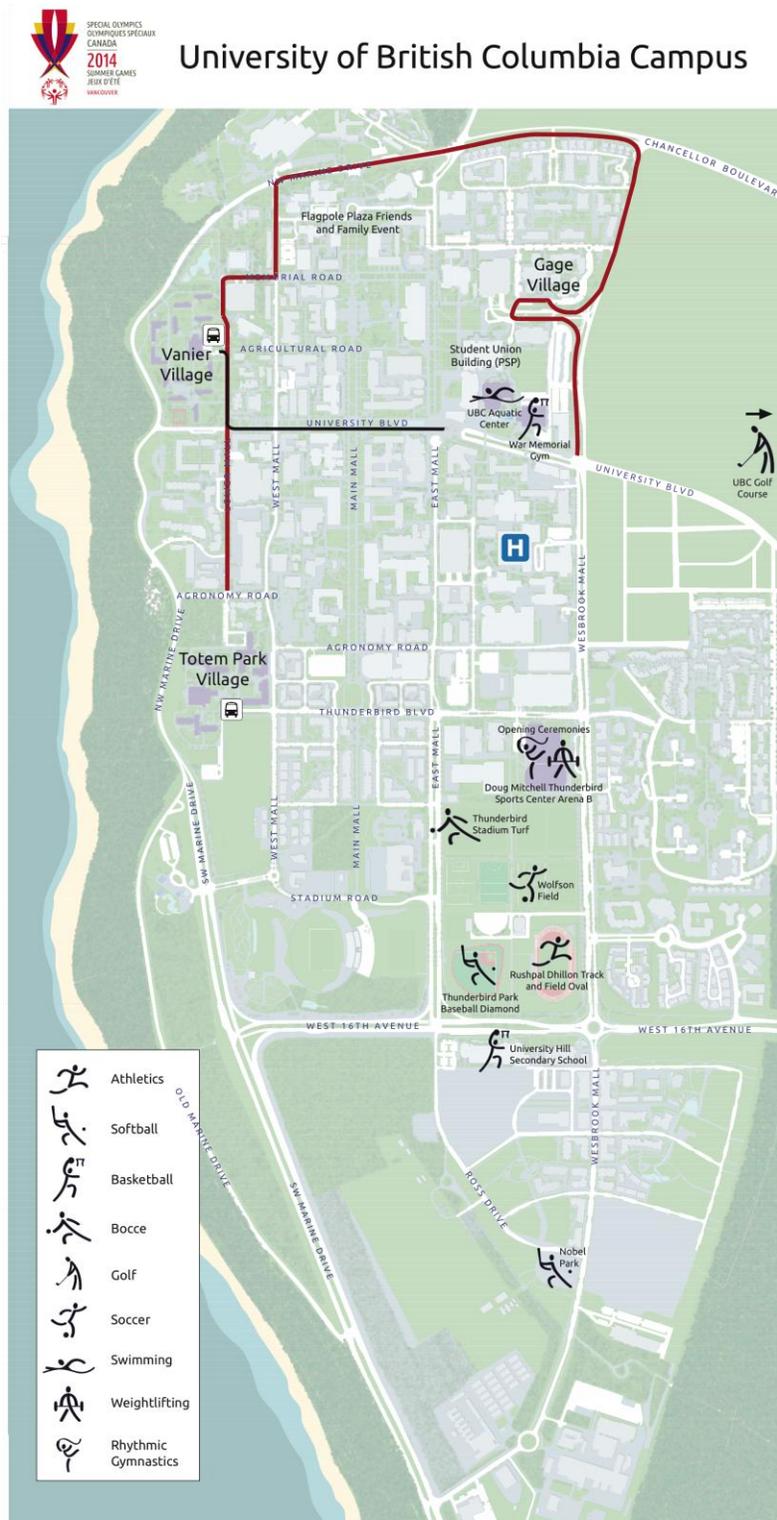
It is important to note that the options listed in Section 6.3 and in the table above are amongst the most favourable tap water distribution plans, and that options from Section 6.1 may not have been used at all. The Clean Water Foundation installations and gooseneck nozzle upgrades were not suggested extensively (or at all) due to time constraints of the 2014 Games, as well as due to financial restrictions, despite being the more sustainable options in the long run. The CWF fill stations have been considered by campus officials, and will likely be taken on in the future.

The survey results indicate that the majority of the athletes support the Games being bottled water free and are primarily concerned about the sanitation and accessibility of the water for the athletes during competition. A few individuals, however, have indicated that they dislike drinking tap water. As a result, these individuals have the option of purchasing bottled water from vending machines on the UBC campus or from the cafeteria at the bowling alley. Because the option exists to purchase bottled water, to say that the Special Olympics Canada 2014 Games is completely bottled water free is inaccurate however our survey shows that the majority of the athletes is going to actively participate by choosing tap water over bottled drinks.

Lastly, the success of a bottled water free event will cut down on environmental and economic costs, and will promote awareness of sustainable event planning. Consumption of 2.46 MJ of energy, 0.122 kg of CO<sub>2</sub> emissions, 0.5 L of additional water usage and 0.026 kg of solid waste will be avoided for every bottled water not consumed at the 2014 Games, likely having an impact on the movement towards zero-waste initiatives not only on campus, but also on a municipal and/or national level.

# Appendix A: 2014 Summer Games Venues and Locations

The following images and descriptions were taken from <http://www.vancouver2014.com/the-games/location/>





**5 PIN BOWLING  
10 PIN BOWLING**

The Zone (Richmond)  
150-14200 Entertainment Blvd.  
Richmond, BC



**ATHLETICS**

Rashpal Dhillon Track & Field Oval  
3055 Wesbrook Mall



**BASKETBALL**

War Memorial Gym  
6121 University Blvd.

University Hill Secondary (Preliminary  
Rounds Only)  
3228 Ross Drive



**BOCCE**

Wolfson Fields (Grass)  
Frank Buck  
Whit Mathews (at Stadium)

3055 Wesbrook Mall



## **GOLF**

University Golf Course  
5185 University Blvd



## **POWER LIFTING RHYTHMIC GYMNASTICS**

Doug Mitchell Thunderbird Sports  
Centre Arena B  
3055 Wesbrook Mall



## **SOCCER**

Varsity Field  
3055 Wesbrook Mall



## **SOFTBALL**

Thunderbird Park - Baseball Diamond  
3055 Wesbrook Mall



## **SWIMMING**

UBC Aquatics Centre  
6121 University Blvd.

# Appendix B.1: 2014 Summer Games Competition Draft Schedule

## Special Olympics Canada 2014 Summer Games - Vancouver Sport Competition Schedule

Draft Version 2 - September 13, 2013

\*\*\*For planning purposes only as not all venues are confirmed\*\*\*

■ Venue Setup ■ Training ■ Competition ■ Opening & Closing Ceremonies

VENUE	SPORT OR EVENT	MON JULY 7			TUES JULY 8			WED JULY 9			THU JULY 10			FRI JULY 11			SAT JULY 12					
		07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30			
<b>UBC CLUSTER</b>																						
Doug Mitchell Thunderbird Sports Centre	Ceremonies	■	■	■	■	■	■										■	■	■	■	■	■
	Powerlifting			■	■	■		■	■													
	Rhythmic Gymnastics									■	■	■		■	■		■	■		■	■	
Rashpal Dhillon Track & Field Oval	Athletics	■	■	■	■			■	■		■	■		■	■		■	■		■	■	
Gerald McGavin Centre	Bocce	■	■	■				■	■		■	■		■	■		■	■		■	■	
Thunderbird Stadium and Park	Soccer	■	■	■	■			■			■	■	■	■	■	■	■	■		■	■	
UBC Aquatic Centre	Swimming	■	■	■		■	■	■	■		■	■		■	■		■	■		■	■	
War Memorial Gym and University Hill Secondary School	Basketball	■	■	■	■	■		■	■		■	■	■	■	■		■	■		■	■	
Thunderbird Park Baseball Field and Nobel Park	Softball	■	■	■	■	■		■	■		■	■	■	■	■	■	■	■		■	■	
<b>CITY VENUES</b>																						
The Zone Bowling Centre Richmond	5-Pin Bowling	■	■	■	■			■	■	■	■	■	■	■	■	■	■	■		■	■	
	10-Pin Bowling	■	■	■	■			■	■	■	■	■	■	■	■	■	■	■				
University Golf Club	Golf	■	■	■	■			■	■		■	■		■	■							

## Appendix B.2: Water and Attendance Calculation

■ Venue Setup ■ Training ■ Competition ■ Opening & Closing Ceremonies

VENUE	SPORT OR EVENT	WED JULY 9			THU JULY 10			FRI JULY 11			SAT JULY 12			Total Attendance Each session	Water Each Session (L)	
		07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30	07:30-12:30	12:30-16:30	16:30-20:30			
<b>UBC CLUSTER</b>																
Doug Mitchell Thunderbird Sports Centre	Ceremonies															
	Powerlifting	36 (118)	18 (118)												154	231
	Rhythmic Gymnastics														144	216
Rashpal Dhillon Track & Field Oval	Athletics	32 (118)	32 (118)		32 (118)	32 (118)		32 (118)	32 (118)		32 (118)	32 (118)		150	225	
Gerald McGavin Centre	Bocce	17 (118)	17 (118)		17 (118)	17 (118)		17 (118)	17 (118)		17 (118)	17 (118)		135	202.5	
Thunderbird Stadium and Park	Soccer	32 (118)			32 (118)	32 (118)	32 (118)	32 (118)	32 (118)	32 (118)	32 (118)	32 (118)		150	225	
UBC Aquatic Centre	Swimming	80 (100)	80 (100)		80 (100)	80 (100)		80 (100)	80 (100)		80 (100)	80 (100)		180	270	
War Memorial Gym and University Hill	Basketball	26 (118)	26 (118)		26 (118)	26 (118)	26 (118)	26 (118)	26 (118)		26 (118)	26 (118)		144	216	
Thunderbird Park Baseball Field and Nobel Park	Softball	36 (118)	36 (118)		36 (118)	36 (118)	36 (118)	36 (118)	36 (118)	36 (118)	36 (118)	36 (118)		154	231	
<b>CITY VENUES</b>																
The Zone Bowling Centre Richmond	5-Pin Bowling	30 (118)	30 (118)	30 (118)	30 (118)	30 (118)	30 (118)	30 (118)	30 (118)	30 (118)	30 (118)	30 (118)		148	222	
	10-Pin Bowling	20 (118)	20 (118)	20 (118)	20 (118)	20 (118)	20 (118)	20 (118)	20 (118)	20 (118)				138	207	
University Golf Club	Golf	28 (118)	28 (118)		28 (118)	28 (118)		28 (118)	28 (118)					146	219	

The number of athletes and coaches listed for each timeslot at each venue with the number of additional participants (technical officials, mission staff, friends & family, volunteers, sponsors, spectators and media outlets) in the brackets. Total attendance and water estimates (1.5L per person) is listed in the table to the right.

## Appendix C: Results for "Drinking Water at the 2014 Summer Games: A Questionnaire"

### 1) Are you 19 years of age or older?

Response	Chart	Percentage of Responses	Number of Responses
a) Yes		99.3%	291
b) No		0.7%	2
		<b>Total Responses</b>	<b>293</b>

In total we received 293 responses however 2 were below the age of consent so their responses were excluded from our survey analysis.

### 2) Do you identify as male or female?

Response	Chart	Percentage of Responses	Number of Responses
a) Male		48.0%	140
b) Female		52.0%	151
		<b>Total Responses</b>	<b>291</b>

### 3) Are you an Athlete, Coach, or Chef/Mission staff?

Response	Chart	Percentage of Responses	Number of Responses
a) Athlete		49.3%	142
b) Coach		38.7%	113
c) Chef/Mission staff		12.0%	35
		<b>Total Responses</b>	<b>290</b>

**4) Which sport(s) at the Games will you be playing or coaching (write N/A if you are Chef or Mission staff)?**

Response	Percent of Response from each Sport	Total Athletes + Coaches for each Sport	Percentage of Responses	Number of Responses
Power Lifting	13.89%	36	1.89%	5
Rhythmic Gymnastics	21.15%	52	4.17%	11
Athletics	17.39%	253	16.67%	44
Bocce	15.28%	72	4.17%	11
Soccer	8.33%	156	4.92%	13
Swimming	19.22%	255	18.56%	49
Basketball	17.95%	156	10.61%	28
Softball	15.28%	216	12.50%	33
Bowling (5-Pin/10-Pin)	14.47%	380	20.83%	55
Golf	26.79%	56	5.68	15
			<b>Total Responses</b>	<b>264</b>

**5) What city and province are you from? For convenience, only the provinces are given here.**

Response	Percent of Chapter Response	Total Participants from each Province	Percentage of Responses	Number of Responses
British Columbia	31.94%	360	39.66%	115
Alberta	25.47%	161	14.14%	41
Saskatchewan	14.00%	100	4.83%	14
Manitoba	39.68%	126	17.24%	50
Quebec	9.38%	192	6.21%	18
Ontario	6.40%	453	10.00%	29
Prince Edward Island	14.75%	61	3.10%	9
Newfoundland	2.00%	50	0.34%	1
Nova Scotia	3.33%	30	0.34%	1
New Brunswick	0.00%	64	0.0%	0
Northwest Territories	25.00%	16	1.38%	4
Yukon	21.62%	37	2.76%	8
			<b>Total Responses</b>	<b>290</b>

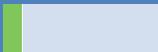
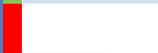
**6) Where you currently live, how would you rate tap water quality in terms of taste and perceived safety on a scale of 1 (poor) to 5 (excellent)?**

	1 (poor)	2	3	4	5 (excellent)	Total Responses
Taste (Does tap water have a strange taste?)	6 (2.1%)	9 (3.1%)	59 (20.5%)	93 (32.3%)	121 (42.0%)	288
Safety (Does tap water require filtering?)	6 (2.2%)	14 (5.1%)	46 (16.6%)	88 (31.0%)	125 (45.1%)	277

For responses that rated the taste of water quality at their current location as poor, 3 participants were from British Columbia (Summerland, Surrey, and did not list), 1 was from Quebec (Joliette) and 2 were from Manitoba (Winnipeg, did not list city).

For responses that rated the safety of water quality at their current location as poor, 2 participants were from British Columbia (Langley, Burnaby), 1 from Saskatchewan (Regina), 1 from Quebec (Quebec), 1 from Manitoba (did not list city) and 1 from Ontario (Hamilton).

**7) How concerned are you about drinking Vancouver's tap water on a scale of 1 (would not drink) to 3 (neutral) to 5 (no concerns at all)?**

Response	Chart	Percentage of Responses	Number of Responses
1 (would not drink)		5.9%	17
2		6.2%	18
3 (neutral)		29.7%	86
4		13.4%	39
5 (no concerns at all)		44.8%	130
		<b>Total Responses</b>	<b>290</b>

For the responses that selected "1 (would not drink)", 5 responses were from British Columbia (Summerland, Mission, Surrey, Penticton, and Prince George), 2 were from Alberta (Calgary, Edmonton), 3 were from Saskatchewan (Donwell, Saskatoon and Regina), 5 were from Manitoba (Brandon, Winnipeg, Winkler, and 2 did not list), and 2 were from Ontario (both did not specify cities/towns).

**8) What are your main concerns, if any, regarding drinking tap water during the games? (select all that apply)**

Response	Percentage of Responses	Number of Responses
a) None (I have no concerns regarding tap water at the 2014 Games!)	44.1%	128
b) Health/Sanitation	23.1%	67
c) Convenience/Not enough water in the vicinity (Will water refill stations be close by?)	37.2%	108
d) Smell/Taste (Will tap water taste strange in Vancouver?)	23.4%	68
e) Other:	10.7%	31
<b>Total Responses</b>		<b>290</b>

For the responses that selected "Other" the main concerns were related to temperature, contaminants in water (chlorine, fluoride, javex bleach, pesticides, herbicides), and to their sensitivity to water quality changes (causes stomach aches)

**9) Do you trust the Games Organizing Committee to provide high quality water?**

Response	Chart	Percentage of Responses	Number of Responses
a) Yes		97.9%	284
b) No		2.1%	6
<b>Total Responses</b>			<b>290</b>

For the responses that said "No", one participant commented that previously there have been issues with having enough good quality water and they have run out before. Another said that there are a lot of details to take care of, and water quality is low on the list. Another response said bottled water would be safer since who would clean the containers.

**10A) Over the last week, in which of the following forms have you consumed the most water?**

Response	Chart	Percentage of Responses	Number of Responses
a) Tap Water		49.1%	142
b) Filtered Tap Water		24.6%	71
c) Bottled Water (Mineral Water only)		14.2%	41
d) Other bottled drinks (Gatorade, Vitamin Water etc)		4.8%	14
e) Other:		7.3%	21
		<b>Total Responses</b>	<b>289</b>

For the responses that said "Other", text comments said spring water (2), coffee (1), lemon flavoured water (1), mineral water (1), carbonated water (1), water jugs from grocery stores (3), water coolers/machines (4), reversed osmosis water (2) and a combination of the choices given (2).

**10B) On a scale of 1 (not happy) to 5 (completely fine), how do you feel about the 2014 Games being completely bottled water free (i.e. only tap water being provided)?**

Response	Chart	Percentage of Responses	Number of Responses
1 (not happy)		8.3%	24
2		5.9%	17
3 (neutral)		27.7%	80
4		13.1%	38
5 (completely fine)		45.0%	130
		<b>Total Responses</b>	<b>289</b>

For the responses that gave a rating of 1 (not happy), 9 participants were from British Columbia (Summerland, Surrey, North Vancouver, Penticton, Burnaby, Kelowna, Prince George and 2 did not specify), 4 were from Alberta (2 Edmonton, Olds, and Calgary), 2 were from Saskatchewan (Donwell, Regina), 3 were from Manitoba (Brandon, Winkler and did not specify), 3 were from Ontario (Toronto, 2 did not specify), and 2 from Prince Edward Island (Charlottetown, 1 did not specify). One participant did not specify his city or province.

**11) Select the factors that would make you most likely to consume tap water over bottled water. 1 is Least Likely, 3 is Neutral and 5 is Very Likely**

	1 (least likely)	2	3 (neutral)	4	5 (very likely)	Total Responses
Water is readily available	16 (5.7%)	10 (3.5%)	46 (16.3%)	47 (16.3%)	165 (58.3%)	285
Water is from a clean and well maintained fountain and/or faucet	19 (6.7%)	9 (3.2%)	43 (15.1%)	50 (17.6%)	163 (57.4%)	284
You trust and know about where the water comes from	17 (6.0%)	9 (3.2%)	59 (21.0%)	65 (23.1%)	131 (46.6%)	281
Water is filtered/ purified onsite	9 (3.2%)	7 (2.5%)	82 (29.3%)	58 (20.7%)	124 (44.3%)	280
Able to easily fill own water bottle/container	5 (1.8%)	6 (2.1%)	33 (11.8%)	44 (15.4%)	194 (68.9%)	280
Water is of a preferred temperature	6 (2.2%)	9 (3.3 %)	74 (26.8%)	57 (20.3%)	131 (47.5%)	276

**12) (Athletes-only Question) Which of the following beverages do you prefer during games? Please rank the following beverages from most preferred to least preferred:**

	1 (most preferred)	2	3 (least preferred)	Total Responses
Tap Water	47 (43.1%)	29(26.6%)	33 (30.3%)	109
Bottled water	49 (43.0%)	51 (44.7%)	14 (12.3%)	114
Non-water beverages (ie. Sports beverages like Gatorade, Vitamin water, etc)	36 (30.0%)	31 (25.8%)	53 (44.2%)	120

*The remainder of the survey was for Coaches/Chefs/Mission staff only.*

**13) Do you provide athletes with other beverages aside from water? If so, what other beverages are provided?**

Response	Chart	Percentage of Responses	Count
a) Yes		28.9%	44
b) No		71.1%	108
		<b>Total Responses</b>	<b>152</b>

For responses that "Yes", the responses are given below. Note the count is more than 44 because some responses listed more than 1.

Response	Percentage of Responses	Number of Responses
Gatorade	23.91%	11
Sport Drinks	15.22%	7
Juice	36.96%	17
Pop	2.17%	1
Milk	6.52%	3
Chocolate Milk	13.04%	6
Flavoured Water	2.17%	1
<b>Total Count</b>		<b>46</b>

**14) During practice and/or games, water bottles are refilled by:**

Response	Chart	Percentage of Responses	Number of Responses
a) the athletes		39.6%	61
b) other individuals (ex. coaches, parents, volunteers)		4.5%	7
c) combination of options a) and b)		45.5%	70
d) we use bottled water		3.9%	6
e) Other:		6.5%	10
<b>Total Responses</b>			<b>154</b>

**15) How much water on average does an athlete or other person on the team drink during one Game/event? If you don't know, leave this question blank.**

From the 65 responses, regardless of sport, the average amount of water coaches/chefs/mission staff estimated was 1.32L and the median was 1.0L. Since 8 of the 65 responses gave the quantity of water in terms of bottled waters, we assumed each water bottle was a typical size of 500mL. To ensure that this assumption was accurate, we averaged the 57 responses that used litres as a measure and got 1.33L.

The main purpose for this question was to determine which sports would require greater amounts of water supplied so we could adjust our calculations. The sports that listed quantities greater than our current estimate of 1.5L were:

Sport	Average Amount of Water (Litres)
Swimming	2.57
Athletics	1.625

## Appendix D: Item and Cost Description

\*In alphabetical order

### Food Items

<p><u>Ice:</u> \$3.49/20Lb</p>	
<p><u>Lemons:</u> \$3.5/Lb</p>	
<p><u>Mint Leaves:</u> \$4.99/0.75Oz bag</p>	

## Non Food Items

<p><b><u>Biodegradable Cups</u></b></p> <p><b>Price:</b> \$9.99/50 cups <b>Material:</b> Biodegradable <b>Max. Water Capacity:</b> 12 oz (355ml) /cup <b>Requirements:</b> Not Applicable <b>Transportation:</b></p> <ul style="list-style-type: none"><li>• Can be delivered or picked up; price will vary depending on transportation choice</li></ul> <p><b>Installation:</b> Not Applicable <b>Additional Info:</b> Not Applicable <b>Contact:</b></p> <ul style="list-style-type: none"><li>• BSI Biodegradable Solutions: <a href="http://www.biodegradablesolutions.com">www.biodegradablesolutions.com</a></li></ul>	
<p><b><u>Clean Water Foundation (CWF)</u></b></p> <p><b>Price:</b> Potentially no cost (maybe sponsored by the Imperial Oil Company) <b>Material:</b> Stainless steel <b>Max. Water Capacity:</b> Unlimited <b>Requirements:</b> Close to a water line <b>Transportation:</b> <b>Installation:</b> <b>Additional Info:</b> <b>Contact:</b></p> <ul style="list-style-type: none"><li>• Bradley Thomas (UBC Facility Manager): <a href="mailto:Bradley.Thomas@ubc.ca">Bradley.Thomas@ubc.ca</a></li></ul>	
<p><b><u>Event Water Solutions (EWS)</u></b></p> <p><b>Price:</b> Approx. \$5000-\$7000 for the entire event <b>Material:</b> Stainless steel <b>Max. Water Capacity:</b> Unlimited <b>Requirements:</b></p> <ul style="list-style-type: none"><li>• Require 110 V 15AMP outlet</li><li>• Water source must be within 300 feet</li></ul> <p><b>Transportation:</b></p> <ul style="list-style-type: none"><li>• Responsibility of EWS</li></ul> <p><b>Installation:</b></p> <ul style="list-style-type: none"><li>• Responsibility of EWS</li></ul> <p><b>Additional Info:</b></p> <ul style="list-style-type: none"><li>• Includes UV lights, refrigeration, filtration system</li><li>• EWS provides trained staff to run the stations</li><li>• Must contact EWS for official price quote</li></ul> <p><b>Contact:</b></p> <ul style="list-style-type: none"><li>• EWS: <a href="mailto:info@eventwatersolutions.com">info@eventwatersolutions.com</a></li></ul>	

<p><b><u>Gooseneck Nozzle (for Existing Water Fountains)</u></b></p> <p><b>Price:</b> \$120  <b>Material:</b> Stainless steel  <b>Max. Water Capacity:</b> Unlimited  <b>Requirements:</b> Existing water Fountains  <b>Transportation:</b> Free delivery  <b>Installation:</b> Not Applicable  <b>Additional Info:</b> Not Applicable  <b>Contact:</b></p>	
<p><b><u>Ice Cooler</u></b></p> <p><b>Price:</b> \$2.10/container/day or 5.25/container/week  <b>Material:</b> Plastic  <b>Max. Water Capacity:</b> 40L of liquid/cooler  <b>Requirements:</b> Not Applicable  <b>Transportation:</b></p> <ul style="list-style-type: none"> <li>• Can be delivered or picked up; price will vary depending on transportation choice</li> </ul> <p><b>Installation:</b> Not Applicable  <b>Additional Info:</b> Not Applicable  <b>Contact:</b></p> <ul style="list-style-type: none"> <li>• Lonsdale Event Rentals:  <a href="http://www.lonsdaleevents.com">www.lonsdaleevents.com</a></li> </ul>	
<p><b><u>Ice Scoop</u></b></p> <p><b>Price:</b> \$2.10/container/day or 5.25/container/week  <b>Material:</b> Stainless steel  <b>Max. Water Capacity:</b> Not Applicable  <b>Requirements:</b> Not Applicable  <b>Transportation:</b></p> <ul style="list-style-type: none"> <li>• Can be delivered or picked up; price will vary depending on transportation choice</li> </ul> <p><b>Installation:</b> Not Applicable  <b>Additional Info:</b> Not Applicable  <b>Contact:</b></p> <ul style="list-style-type: none"> <li>• Lonsdale Event Rentals:  <a href="http://www.lonsdaleevents.com">www.lonsdaleevents.com</a></li> </ul>	

### Metro Vancouver Water Wagon

**Price:** No cost

**Material:** Stainless steel

**Max. Water Capacity:** Unlimited

**Transportation:**

- Responsibility of Metro Vancouver

**Installation:**

- Responsibility of Metro Vancouver

**Requirements:**

- Space required: 10'x10' tent, 6'x3' water wagon
- Power Source
- Water source must be within 100 feet

**Additional Info:**

- Assessment form must be completed to book the water wagon by April 2014

**Contact:**

- Email: [tapwaterteam@metrovancover.org](mailto:tapwaterteam@metrovancover.org)



### Portable Water Containers (Plastic)

**Price:** \$10.75/container/day or 26.88/container/week

**Material:** Plastic

**Max. Water Capacity:** 5 gal (19 L)/container

**Requirements:**

- Space required: 20" x 11"/container

**Transportation:**

- Can be delivered or picked up; price will vary depending on transportation choice

**Installation:** Not Applicable

**Additional Info:**

- Thermally insulated to keep beverage cold

**Contact:**

- Lonsdale Event Rentals:  
[www.lonsdaleevents.com](http://www.lonsdaleevents.com)



**Portable Water Containers (Acrylic)**

**Price:** \$13.95/container/day or \$34.88/container/day

**Material:** Acrylic

**Max. Water Capacity:** 11L / container

**Requirements:**

- Required space: 18" x 10"

**Transportation:**

- Can be delivered or picked up; price will vary depending on transportation choice

**Installation:** Not Applicable

**Additional Info:** Not Applicable

**Contact:**

- Lonsdale Event Rentals:  
www.lonsdaleevents.com



**Water Pitchers**

**Price:** \$2.70/pitcher/day or \$6.75/pitcher/week

**Material:** Glass

**Max. Water Capacity:** 44oz (1.3L) /pitcher

**Requirements:**

- Space requirement per pitcher: 8"x5"

**Transportation:**

- Can be delivered or picked up; price will vary depending on transportation choice

**Installation:** Not Applicable

**Additional Info:** Not Applicable

**Contact:**

- Lonsdale Event Rentals:  
www.lonsdaleevents.com



**Table**

**Price:** \$7.40/table/day or 18.50/table/week

**Material:** Wood

**Requirements:**

- Space required: 4' x 30"

**Transportation:**

- Can be delivered or picked up; price will vary depending on transportation choice

**Installation:**

- Self installation; fold up table

**Additional Info:**

- Linen cover recommended by rental company

**Contact:**

- Lonsdale Event Rentals:  
www.lonsdaleevents.com



## Appendix E: Tap Water Distribution Plans' Indicator Assessments

### University of Golf Course: Tap Water Distribution Plan #1 – Distribution of Tap Water Via Golf Cart

SOCIAL

CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e carbon filters, reverse osmosis)	✘	★	All water served will be chilled. While there is a stainless steel drinking fountain within the clubhouse, it is unlikely that the majority of athletes will refill at that location which is why stainless steel was not taken into account for applicability.
	<b>UV Lights</b>	✘		
	<b>Stainless Steel</b>	✘		
	<b>Chilled</b>	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	✓	★★★★	The golf cart will be driving from course to course during the games. Disposable cups will also be available for those without any refillable bottles due to the remote locations of some of the courses.
	<b>Location of Distribution Unit</b> (i.e. centralized location, remote location)	✓		
	<b>Free Disposable Cups</b>	✓		
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	✓	★★★★	Posters will be placed on the golf karts.
	<b>Visual Appeal of Distribution Units</b>	✓		
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mint Leaves</b>	✘	★	Only ice will be added to the water.
	<b>Ice</b>	✓		

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICABILITY	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	✗	\$0.00	\$10.00 * 4 days = 40.00	★★★	Total cost: \$ 20.00. Golf cart and ice maker will be provide by the golf course. Only disposable cups will need to be purchased
	Rent Water Refill Station from Event Waters Solutions	✗	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	✗	\$0.00			
	Rent Portable Water Container	✗	\$0.00			
	Rent Tent(s)	✗	\$0.00			
	Rent Table(s)	✗	\$0.00			
	Rent Ice Cooler(s) + Ice scoop(s)	✗	\$0.00			
	Rent Golf Cart(s)	✓	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	✗	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00			
	Purchase Bottled Water	✗	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Volunteers	✗	\$0.00	\$0.00	★★★★★	Staff who usually runs the snack golf court will just replace purchasable bottled water with the refill station.
	Hired Staff	✓	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Fuel			\$0.00	★★★★★	Fuel costs will be covered by the golf course as the golf cart will also be selling other food items while distributing water.
		✓	\$0.00			
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★★★	Disposable cups will generate waste however disposal costs will be covered by the golf course.
<b>Promotional Costs</b>	Posters	✗	\$0.00	\$0.00	★★★★★	No posters regarding the the event being tap water free will be placed at the venues due to the small number of attendees. It will be assumed that the email sent to the athletes and coaches prior to the event will suffice. As the golf carts are very noticeable and eye-catching, we decided to rate the visual appeal of cart as 3 stars
<b>TOTAL COST (\$)</b>				<b>\$40.00</b>		

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - <i>Will it require electricity? How much?</i>	<b>Operation of System</b>	Yes	Average refrigerator = 1.5 kWh/day	★★	The operation of golf carts across the course will be electric-powered. Electric golf carts are relatively more environmentally feasible than a gas carts. Refrigeration of ice is being considered, however the rating is 2-star because whether or not ice were to be used from the club house pantry at the Golf course, the refrigerator would still likely be operating, therefore avoiding additional energy use for the purposes of this plan.
	<b>Refrigeration</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - <i>Will it require fossil fuel consumption (on-site)? How much?</i>	<b>Operation of System</b>	No	Average fuel efficiency = 21 mpg (11 L/100km); 8.8 L for 80 km trip	★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 80-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this 80 km trip would require 8.8 L of fuel.
	<b>Transportation</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - <i>How much water will be used for off-site processes?</i>	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - <i>How much solid waste does this scenario generate?</i>	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day 1-2 kg for the whole week	★★★★	Posters and/or cardboard used for signage would result in paper waste, though relatively "trivial". Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethelene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes		★★	
	<b>Posters/Signage</b>	Yes		★★	
<b>Biodegradation of Materials</b> - <i>What is the biodegradability of the waste materials?</i>	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethelene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - <i>What is its fate?</i>	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - <i>Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.</i>		Yes	8887 g CO2/gallon (3.79 L); 8.8 L of gasoline produces 20.66 kg CO2	★★	According to estimates used by the EPA, about 20kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from North Vancouver.

The Zone Bowling Centre: Tap Water Distribution Plan #1 – Portable Water Containers

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e carbon filters, reverse osmosis)	x	★	All water served will be chilled. While the drinking water fountain is made of stainless, no gooseneck nozzle is available which makes it difficult for the athletes to refill their water.
		<b>UV Lights</b>	x		
		<b>Stainless Steel</b>	x		
		<b>Chilled</b>	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	x	★	The portable water containers will be placed at the two ends of the building directly beside the bowling lanes.	
	<b>Location of Distribution Unit</b> (i.e. centralized location)	✓			
	<b>Free Disposable Cups</b>	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	x	★	No posters regarding the bottle water free event will be placed at the venue due to the small number of attendees. It will be assumed that the survey and email sent out to athletes and coaches prior to the event will suffice.	
	<b>Visual Appeal of Distribution Units</b>	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mint Leaves</b>	x	★	Only ice will be added to the water.	
	<b>Lemons</b>	x			
	<b>Ice</b>	✓			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$ 56.3 * 4 days = 225.2	★★	Ice will be provided by the dining place in the bowling center but we will have to rent portable water containers and tables and also purchase biodegradable cups for people who do not have their own reusable bottles. The equipment rental is essential but cheaper options or free equipment may be available. At this location, two sets of equipment are needed.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	✓	\$10.75 * 2			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	✓	\$7.40 * 2			
	Rent Ice Cooler(s) + Ice scoop(s)					
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00 * 2			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★	Volunteers will refill water containers.
	Hired Staff					
		x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel	✓	\$3.00	\$3.00	★★	Assume the equipment is rented from companies within Vancouver, the average volume of fuel used for transportation is 2L and the cost is around \$3.00
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★	Disposable cups will generate waste however disposal costs will be covered by UBC.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters	✓	\$5	\$5.00	★★	One poster will be placed beside each water container.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>				<b>\$ 233.2</b>		

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - <i>Will it require electricity? How much?</i>	<b>Operation of System</b>	No	Average refrigerator = 1.5 kWh/day	n/a	The only electric energy considered for this plan is for the purposes of refrigeration. Assuming that the ice brought to the Bowling venue utilizes the same amount of energy as the average refrigerator.
	<b>Refrigeration</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - <i>Will it require fossil fuel consumption (on-site)? How much?</i>	<b>Operation of System</b>	No	Average fuel efficiency = 21 mpg (11 L/100km); 4.4 L for 40 km trip	★★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 40-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this trip would require 4.4 L of fuel.
	<b>Transportation</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - <i>How much water will be used for off-site processes?</i>	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - <i>How much solid waste does this scenario generate?</i>	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day 1-2 kg for the whole week	★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethelene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes		★★	
	<b>Posters/Signage</b>	Yes		★★	
<b>Biodegradation of Materials</b> - <i>What is the biodegradability of the waste materials?</i>	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethelene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - <i>What is its fate?</i>	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - <i>Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.</i>		Yes	8887 g CO2/gallon (3.79 L); 4.4 L of gasoline produces 10.4 kg CO2	★★	According to estimates used by the EPA, about 11 kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from Richmond.

UBC CAMPUS – INDOOR VENUES

UBC Aquatic Centre: Tap Water Distribution Plan #1 – Portable Water Container

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. DISCLAIMER: The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e carbon filters, reverse osmosis)	x	★★★	All water served from the portable water containers will be chilled. The drinking water fountains are also stainless steel, some with gooseneck nozzles, which will also make it easy for bottle refill.
		<b>UV Lights</b>	x		
		<b>Stainless Steel</b>	✓		
		<b>Chilled</b>	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	x	★	The portable water containers will be placed directly beside the athletes for easy access. Athletes can also obtain tap water from the three tap water fountains located in the building.	
	<b>Location of Distribution Unit</b> (i.e. centralized location)	✓			
	<b>Free Disposable Cups</b>	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	x	★	No posters will be provided as the portable water containers will be placed in an obvious location beside the pool.	
	<b>Visual Appeal of Distribution Units</b>	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mint Leaves</b>	x	★	Only ice will be added to the water.	
	<b>Lemons</b>	x			
	<b>Ice</b>	✓			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$ 50.9 * 4 days = 203.6	★★★	Since there is no kitchens in aquatic center, we will have to rent ice coolers and scoops in addition to portable water containers. We will also purchase biodegradable cups for people who do not have their own reusable bottles.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	✓	\$10.75 * 2			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	x	\$0.00			
	Rent Ice Cooler(s) + Ice scoop(s)	✓	\$4.70 * 2			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00 * 2			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★★★	Volunteers will refill water containers so there is no operational cost.
	Hired Staff	x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Fuel	✓	\$3.00	\$3.00	★★★	Assume the equipment is rented from companies within Vancouver, the average volume of fuel used for transportation is 2L and the cost is around \$3.00
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★★★	Disposable cups will generate waste but UBC will take care of the waste.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Posters	✓	\$5	\$5.00	★★★	Posters and signs will be placed inside the venue.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>				<b>\$ 211.6</b>		

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	No	Average refrigerator = 1.5 kWh/day	n/a	The only electric energy considered for this plan is for the purposes of refrigeration. Assuming that the ice will be brought from the SUB's Servery Room, it will utilize the same amount of energy as the average refrigerator, albeit not specifically for the event.
	<b>Refrigeration</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	No	Average fuel efficiency = 21 mpg (11 L/100km); 8.8 L for 40 km trip	★★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 80-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this trip would require 8.8 L of fuel.
	<b>Transportation</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day 1-2 kg for the whole week	★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethelene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes		★★	
	<b>Posters/Signage</b>	Yes		★★	
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethelene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon (3.79 L); 8.8 L of gasoline produces 20.7 kg CO2	★★	According to estimates used by the EPA, about 21 kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from North Vancouver.

**UBC CAMPUS – INDOOR VENUES**

**UBC Aquatic Centre: Tap Water Distribution Plan #2 – No Additional Equipment or Changes Needed**

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e carbon filters, reverse osmosis)	x	★	One of the three stainless steel drinking water fountain have a gooseneck nozzle, which is where athletes can refill at.
		<b>UV Lights</b>	x		
		<b>Stainless Steel</b>	✓		
		<b>Chilled</b>	x		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	x	★	The water fountain with the gooseneck nozzle is located in the basement which may make it difficult for the athletes to locate.	
	<b>Location of Distribution Unit</b> (i.e. centralized location)	x			
	<b>Free Disposable Cups</b>	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	✓	★	Posters will be needed as the one drinking water fountain with a gooseneck nozzle is located in an obscure location.	
	<b>Visual Appeal of Distribution Units</b>	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mine Leaves</b>	x	★	This option would be difficult to implement for this tap water distribution plan especially with drinking water fountains as the only source.	
	<b>Lemons</b>	x			
	<b>Ice</b>	x			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$0.00	★★★	No equipment needed.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	x	\$0.00			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	x	\$0.00			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	x	\$0.00			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	x	\$0.00	\$0.00	★★★	No operation needed.
	Hired Staff					
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel	x	\$0.00	\$0.00	★★★	No transportation needed.
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal	x	\$0.00	\$0.00	★★★	No potential waste generation.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters	✓	\$5	\$5.00	★★	An email detailing the bottle water free event will be sent out the coaches and athletes before the Games begin. There are three existing water fountains in total and we will place signs directing to these fountains and one poster beside each of them.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>				\$5		

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - <i>Will it require electricity? How much?</i>	<b>Operation of System</b>	No		n/a	No power will be required.
	<b>Refrigeration</b>	No		★★★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - <i>Will it require fossil fuel consumption (on-site)? How much?</i>	<b>Operation of System</b>	No		★★★★	No fuel will be consumed.
	<b>Transportation</b>	No		★★★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - <i>How much water will be used for off-site processes?</i>	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - <i>How much solid waste does this scenario generate?</i>	<b>Bottles</b>	No		★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible.
	<b>Disposable Cups</b>	No		★★★★	
	<b>Posters/Signage</b>	Yes	1-2 kg for the whole week	★★	
<b>Biodegradation of Materials</b> - <i>What is the biodegradability of the waste materials?</i>	<b>Plastic</b>	No		★★★★	Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - <i>What is its fate?</i>	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration).
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - <i>Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.</i>		No		★★★★	No GHG emissions will be emitted.

War Memorial: Tap Water Distribution Plan #1 – Portable Water Containers

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. DISCLAIMER: The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e carbon filters, reverse osmosis)	x	★	Water will be served chilled.
		<b>UV Lights</b>	x		
		<b>Stainless Steel</b>	x		
		<b>Chilled</b>	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	x	★	The portable water containers will be placed by each team area during the games. No disposable cups will be handed out as water fountains can be located in the venue.	
	<b>Location of Distribution Unit</b> (i.e. centralized location)	✓			
	<b>Free Disposable Cups</b>	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	x	★	No promotional posers will be required.	
	<b>Visual Appeal of Distribution Units</b>	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mint Leaves</b>	x	★★★	Ice will be the only additional that will be served with the tap water.	
	<b>Lemons</b>	✓			
	<b>Ice</b>	✓			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICA TION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$10.75 * 4 days = 43	★★	Since there are four existing water fountains in this venue, adding only one additional portable water containers will be enough to meet the demand. No disposable cups are needed.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	✓	\$10.75			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	x	\$0.00			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	x	\$0.00			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★	Volunteers will refill water Containers so there will be no cost associated with this option.
	Hired Staff	x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel	✓	\$3.00	\$3.00	★★	We assumed the water containers are rented and transported from companies in Vancouver.
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★	Disposable cups will generate waste but disposal costs will be covered by UBC.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters	✓	\$5	\$5.00	★★	An email detailing the bottle water free event will be sent out the coaches and athletes before the Games begin. There will be five water distribution units in this venue according to the plan, and we will place one poster beside each unit.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>			<b>\$ 51</b>			

# ENVIRONMENTAL

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	No	Average refrigerator = 1.5 kWh/day	n/a	The only electric energy considered for this plan is for the purposes of refrigeration. Assuming that the ice will be brought from the SUB's Servery Room, it will utilize the same amount of energy as the average refrigerator, albeit not specifically for the event.
	<b>Refrigeration</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	No	Average fuel efficiency = 21 mpg (11 L/100km); 8.8 L for 40 km trip	★★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 80-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this trip would require 8.8 L of fuel.
	<b>Transportation</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day 1-2 kg for the whole week	★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethelene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes		★★	
	<b>Posters/Signage</b>	Yes		★★	
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethelene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon (3.79 L); 8.8 L of gasoline produces 20.7 kg CO2	★★	According to estimates used by the EPA, about 21 kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from North Vancouver.

**War Memorial: Tap Water Distribution Plan #2 – No Additional Equipment Or Changes Needed**

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e carbon filters, reverse osmosis)	x	★	Tap water drinking fountains are made of stainless steel.
		<b>UV Lights</b>	x		
		<b>Stainless Steel</b>	✓		
		<b>Chilled</b>	x		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	x	★	Water fountains in the locker rooms are inconvenient for the athletes to access in order to refill their water bottle during the games.	
	<b>Location of Distribution Unit</b> (i.e. centralized location)	x			
	<b>Free Disposable Cups</b>	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	✓	★★★	Poster will be required to direct the athletes to the correct locations in which they can refill water.	
	<b>Visual Appeal of Distribution Units</b>	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mint Leaves</b>	x	★	No modifications will be made to the tap water.	
	<b>Lemons</b>	x			
	<b>Ice</b>	x			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$0.00	★★★	No equipment needed.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	x	\$0.00			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	x	\$0.00			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	x	\$0.00			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	x	\$0.00	\$0.00	★★★	No operation needed.
	Hired Staff					
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel			\$0.00	★★★	No transportation needed.
		x	\$0.00			
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal			\$0.00	★★★	No potential waste generation.
		x	\$0.00			
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters			\$5.00	★★	An email detailing the bottle water free event will be sent out the coaches and athletes before the Games begin. There are four existing water fountains in total and we will place signs directing to these fountains and one poster beside each of them.
		✓	\$5			
<b>TOTAL COST FOR FOUR DAYS (\$)</b>			<b>\$5</b>			

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - <i>Will it require electricity? How much?</i>	<b>Operation of System</b>	No		n/a	No power will be required.
	<b>Refrigeration</b>	No		★★★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - <i>Will it require fossil fuel consumption (on-site)? How much?</i>	<b>Operation of System</b>	No		★★★★	No fuel will be consumed.
	<b>Transportation</b>	No		★★★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - <i>How much water will be used for off-site processes?</i>	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - <i>How much solid waste does this scenario generate?</i>	<b>Bottles</b>	No		★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible.
	<b>Disposable Cups</b>	No		★★★★	
	<b>Posters/Signage</b>	Yes	1-2 kg for the whole week	★★	
<b>Biodegradation of Materials</b> - <i>What is the biodegradability of the waste materials?</i>	<b>Plastic</b>	No		★★★★	Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - <i>What is its fate?</i>	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration).
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - <i>Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.</i>		No		★★★★	No GHG emissions will be emitted.

Doug Mitchell Thunderbird Sports Centre: Tap: Water Distribution Plan #1 – Portable Water Containers

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e carbon filters, reverse osmosis)	x	★	Chilled water will be served.
		<b>UV Lights</b>	x		
		<b>Stainless Steel</b>	x		
		<b>Chilled</b>	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	x	★	No disposable cups will be provided as a drinking water fountain is available for those without a refillable water bottle. The portable water containers will also be placed near where the athletes will be competing.	
	<b>Location of Distribution Unit</b> (i.e. centralized location)	✓			
	<b>Free Disposable Cups</b>	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	x	★	No additional promotional material will be required.	
	<b>Visual Appeal of Distribution Units</b>	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mint Leaves</b>	x	★★★	Ice will be the only addition that will be served with the tap water.	
	<b>Lemons</b>	x			
	<b>Ice</b>	✓			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$ 77.8*4 days = 311.2	★★	4 containers are needed to serve the attendees. Two of them can be placed on benches inside the venue and the other two will be placed on rented tables.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	✓	\$10.75*4			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	✓	\$7.40 * 2			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00*2			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★	Volunteers will refill water containers, so there is no cost associated with this option.
	Hired Staff	x	\$0.00			
		x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel			\$3.00	★★	
		✓	\$3.00			
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★	Disposable cups will generate waste but disposal costs will be covered by UBC.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters	✓	\$5.00	\$5.00	★★	This venue is large so we decide to have four posters along with signs.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>				<b>\$319.2</b>		

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	No		n/a	The only electric energy considered for this plan is for the purposes of refrigeration. Assuming that the ice will be brought from the SUB's Servery Room, it will utilize the same amount of energy as the average refrigerator, albeit not specifically for the event.
	<b>Refrigeration</b>	Yes	Average refrigerator = 1.5 kWh/day	★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	No		★★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 80-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this trip would require 8.8 L of fuel.
	<b>Transportation</b>	Yes	Average fuel efficiency = 21 mpg (11 L/100km); 8.8 L for 40 km trip	★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No		★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethelene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes	10g/cup; 200 cups/day; 2 kg/day	★★	
	<b>Posters/Signage</b>	Yes	1-2 kg for the whole week	★★	
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethelene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon (3.79 L); 8.8 L of gasoline produces 20.7 kg CO2	★★	According to estimates used by the EPA, about 21 kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from North Vancouver.

Doug Mitchell Thunderbird Sports Centre Tap: Water Distribution Plan #2 – Gooseneck Nozzles

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	Filtration Units (i.e carbon filters, reverse osmosis)	x	★	The additional of the gooseneck nozzle, will athletes to refill their refillable water bottles from the stainless steel drinking water fountains. Chilled water can be obtained from the portable water containers.
		UV Lights	x		
		Stainless Steel	✓		
		Chilled	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mobility (of tap water station)	x	★	The location of the drinking water fountain is in the atrium where a large amount of traffic can be expected.	
	Location of Distribution Unit (i.e. centralized location)	✓			
	Free Disposable Cups	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	Promotional material(i.e. handouts, posters)	✓	★★★	Posters will be needed as the one drinking fountain in the atrium may not be immediately noticeable.	
	Visual Appeal of Distribution Units	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mint Leaves	x	★	Ice will be added directly into the portable water containers.	
	Lemons	x			
	Ice	✓			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$56.3 * 4 days + \$ 120 = 345.2	★★	The average price for a gooseneck nozzle in the market is \$120 each. In order to meet the demand of water, two portable water containers will also be
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	✓	\$120.00			
	Rent Portable Water Container	✓	\$10.75 * 2			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	✓	\$7.40 * 2			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00 * 2			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$60.00	★★	Staff will be hired to install the gooseneck nozzles. The average hourly wage for staff is \$ 20. Assume it takes 3 hours to install one gooseneck nozzle.
	Hired Staff	✓	\$80.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel	✓	\$0.00	\$0.00	★★★	No transportation needed.
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★★	Disposable cups will generate waste but UBC will take care of the waste.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters	✓	\$5.00	\$5.00	★★	The venue is large so we decided to place four posters along with signs.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>				<b>\$ 410.2</b>		

ENVIRONMENTAL	CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
	<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	No	Construction associated with gooseneck installation will use electric powered tools.	n/a	Electricity will be used during construction of the gooseneck nozzles as well as for tools used during the upgrade itself.
		<b>Refrigeration</b>	No		n/a	
		<b>Other</b>	Yes		★	
	<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	No	Average fuel efficiency = 21 mpg (11 L/100km); 0.3 L for 3 km trip Construction tools may use negligible amounts of gasoline	n/a	Transportation of staff and equipment for the upgrade across campus (~3km) would require about 0.3 L of gasoline, as well as if some tools that may use negligible amounts of fuel.
		<b>Transportation</b>	Yes		★★	
		<b>Other</b>	Yes		★★	
	<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	Yes	Manufacturing of gooseneck nozzles utilize water in the process.	★★	The production of gooseneck nozzles as well as the consumption of water during the construction process will add up to a relatively significant amount.
		<b>Other</b>	Yes	Other construction-related water consumption	★★	
	<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day 1-2 kg for the whole week Construction waste (3-5 kg)	★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethelene to consider for a more sustainable end-of-life treatment. Waste produced from construction may include non-recyclable metallic waste, or other building materials.
<b>Disposable Cups</b>		Yes	★★			
<b>Posters/Signage</b>		Yes	★★★★			
<b>Other</b>		Yes	★			
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No	Metallic waste; construction-related material waste	★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethylene (PE). Paper and cardboard used for signage will be recyclable. Metallic waste, as well as building material waste will be produced as a result of the upgrade.	
	<b>Paper</b>	Yes				
	<b>Other</b>	Yes				
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well. Some metallic waste may be recycled, however, a lot of spare parts are likely to end up in a landfill.	
	<b>Incineration</b>	No				
	<b>Landfills</b>	Yes				
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon; 0.3 L of gasoline produces 0.75 kg CO2	★★	According to estimates used by the EPA, about 1 kg of CO2 will be emitted during on-campus transportation and other fuel use.	

Varsity Field: Tap Water Distribution Plan #1 – Portable Water Containers

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. DISCLAIMER: The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	Filtration Units (i.e. carbon filters, reverse osmosis)	x	★	Water will be served chilled.
	UV Lights	x			
	Stainless Steel	x			
	Chilled	✓			
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mobility (of tap water station)	x	★	The portable water containers will be placed near the team areas for easy access by the athletes.	
Location of Distribution Unit (i.e. centralized location)	✓				
Free Disposable Cups	x				
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	Promotional material(i.e. handouts, posters)	x	★	No posters will be required.	
Visual Appeal of Distribution Units	x				
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mint Leave	x	★★★	Ice will be the only addition that will be served with the tap water.	
Lemons	x				
Ice	✓				

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$36.3 * 4 days = 145.2	★★	Two sets of tables and water containers will be needed. Water can be refilled at concessions and ice can be obtained from the ice machine in training room. Cups will not provided because there is a water fountain available for people who do not have their own cups.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	✓	\$10.75 * 2			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	✓	\$7.40 * 2			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	x	\$0.00			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★★	Volunteers will refill water containers so there will be no operational cost.
	Hired Staff	x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel	✓	\$3.00	\$3.00	★★	Assume the equipment is rented from companies within Vancouver, the average volume of fuel used for transportation is 2L and the cost is around \$3.00
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★★	Disposable cups will generate waste but the disposal costs will be covered by UBC.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters	✓	\$5.00	\$5.00	★★	This centre is not very large so it is easy for attendees to spot the water containers. We decided to place two posters inside this venue along with signs.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>				<b>\$153.2</b>		

# ENVIRONMENTAL

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	No		n/a	The only electric energy considered for this plan is for the purposes of refrigeration. Assuming that the ice will be brought from the SUB's Servery Room, it will utilize the same amount of energy as the average refrigerator, albeit not specifically for the event.
	<b>Refrigeration</b>	Yes	Average refrigerator = 1.5 kWh/day	★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	No		★★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 80-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this trip would require 8.8 L of fuel.
	<b>Transportation</b>	Yes	Average fuel efficiency = 21 mpg (11 L/100km); 8.8 L for 40 km trip	★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No		★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethylene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes	10g/cup; 200 cups/day; 2 kg/day	★★	
	<b>Posters/Signage</b>	Yes	1-2 kg for the whole week	★★	
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethylene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon (3.79 L); 8.8 L of gasoline produces 20.7 kg CO2	★★	According to estimates used by the EPA, about 21 kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from North Vancouver.

**Bocce Outdoor Fields: Tap Water Distribution Plan #1 – Portable Water Containers**

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	Filtration Units (i.e. carbon filters, reverse osmosis)	x	★	Ice will be added directly into the portable water containers.
		UV Lights	x		
		Stainless Steel	x		
		Chilled	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mobility (of tap water station)	x	★	As there will be one portable water container pre field, refills should be easily accessible for all bocce teams.	
	Location of Distribution Unit (i.e. centralized location)	✓			
	Free Disposable Cups	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	Promotional material(i.e. handouts, posters)	x	★	No promotional material will be needed as the tables should be easily visible on the field.	
	Visual Appeal of Distribution Units	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mint Leave/Lemons	x	★★★	Ice will be the only addition served with the tap water.	
	Lemons	x			
	Ice	✓			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$84.45*4 = 337.8	★★	Three water containers, three tables are needed.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	✓	\$10.75 * 3			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	✓	\$7.40 * 3			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00 * 3			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★	Volunteers will refill water containers at nearby kitchen, so there is no operational cost.
	Hired Staff	x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Fuel			\$3.00	★★	Assume the equipment is rented from companies within Vancouver, the average volume of fuel used for transportation is 2L and the cost is around \$3.00
		✓	\$3.00			
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★	
<b>Promotional Costs</b>  <b>Scoring System</b> ★★: No cost ★★: < \$1000 ★: > \$1000	Posters			\$0.00	★★★	No posters regarding the event being tap water free will be placed at the venues due to the small number of attendees. It will be assumed that the email sent to the athletes and coaches prior to the event will suffice.
		✓	\$0.00			
<b>TOTAL COST FOR FOUR DAYS (\$)</b>				<b>\$ 340.8</b>		

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	No	Average refrigerator = 1.5 kWh/day	n/a	The only electric energy considered for this plan is for the purposes of refrigeration. Assuming that the ice will be brought from the SUB's Servery Room, it will utilize the same amount of energy as the average refrigerator, albeit not specifically for the event.
	<b>Refrigeration</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	No	Average fuel efficiency = 21 mpg (11 L/100km); 8.8 L for 40 km trip	★★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 80-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this trip would require 8.8 L of fuel.
	<b>Transportation</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day 1-2 kg for the whole week	★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethylene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes		★★	
	<b>Posters/Signage</b>	Yes		★★	
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethylene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon (3.79 L); 8.8 L of gasoline produces 20.7 kg CO2	★★	According to estimates used by the EPA, about 21 kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from North Vancouver.

**Athletics and Softball Outdoor Fields: Tap Water Distribution Plan #1 – Portable Water Containers**

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	OVERALL RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	Filtration Units (i.e. carbon filters, reverse osmosis)	x	★	Water will be served chilled.
		UV Lights	x		
		Stainless Steel	x		
		Chilled	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mobility (of tap water station)	x	★	As there will be one portable water container at each team area, tap water should be easily accessible for all athletes.	
	Location of Distribution Unit (i.e. centralized location)	✓			
	Free Disposable Cups	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	Promotional material(i.e. handouts, posters)	x	★	No promotional material will be needed as the tables should be easily visible on the field.	
	Visual Appeal of Distribution Units	x			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	Mint Leave/Lemons	x	★★★	Ice will be stored in coolers at each of the fields.	
	Lemons	x			
	Ice	✓			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$ 90.4 *4 days = 361.6	★★★	4 containers are needed to serve the attendees. Each bench will have one.
	Rent Water Refill Station from Event Waters Solutions	x	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	✓	\$10.75*4			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	✓	\$7.40			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$0.00			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	x	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00*4			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★★★	Volunteers will refill water containers, so there is no cost associated with this option.
	Hired Staff	x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Fuel			\$3.00	★★★	
		✓	\$3.00			
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Waste Disposal	✓	\$0.00	\$0.00	★★★★★	Disposable cups will generate waste but disposal costs will be covered by UBC.
<b>Promotional Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Posters	x	\$0.00	\$0.00	★★★★★	No promotion needed as the water containers are right beside team area.
<b>TOTAL COST FOR FOUR DAYS (\$)</b>						
				<b>\$364.6</b>		

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	No	Average refrigerator = 1.5 kWh/day	n/a	The only electric energy considered for this plan is for the purposes of refrigeration. Assuming that the ice will be brought from the SUB's Servery Room, it will utilize the same amount of energy as the average refrigerator, albeit not specifically for the event.
	<b>Refrigeration</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	No	Average fuel efficiency = 21 mpg (11 L/100km); 8.8 L for 40 km trip	★★★★	Transportation is being considered for the rental of the portable water containers from Lonsdale Event Rentals in North Vancouver. A 20-km route to and from UBC during pick-up and drop-off results in a total of 80-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this trip would require 8.8 L of fuel.
	<b>Transportation</b>	Yes		★★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	No		★★★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day 1-2 kg for the whole week	★★★★	Posters and/or cardboard used for signage would result in paper waste, though negligible. Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethylene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes		★★	
	<b>Posters/Signage</b>	Yes		★★	
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No		★★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethylene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon (3.79 L); 8.8 L of gasoline produces 20.7 kg CO2	★★	According to estimates used by the EPA, about 21 kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from North Vancouver.

Central Location: Tap Water Distribution Plan #1 – Event Water Solutions

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Perceived Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<p><b>Filtration Units</b> (i.e. carbon filters, reverse osmosis)</p>	✓	★★★★	<p>The Event Water Solution' water distribution unit is a stainless steel unit that is able to provide chilled, filtered water as long as power and water supply requirements are met.</p>
		<p><b>UV Lights</b></p>	✓		
		<p><b>Stainless Steel</b></p>	✓		
		<p><b>Chilled</b></p>	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<p><b>Mobility</b> (of tap water station)</p>	✓	★★	<p>The water distribution unit will be placed in the middle of the UBC outdoor fields, where we expect the highest density of athletes, coaches, and spectators.</p>	
	<p><b>Location of Distribution Unit</b> (i.e. centralized location)</p>	✓			
	<p><b>Free Disposable Cups</b></p>	✗			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<p><b>Promotional material</b>(i.e. handouts, posters)</p>	✓	★★	<p>The water distribution units are brightly coloured and very eye-catching plus there will be Event Water Solutions Staff at each of these locations.</p>	
	<p><b>Visual Appeal of Distribution Units</b></p>	✗			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<p><b>Mint Leave/Lemons</b></p>	✗	★	<p>The water distribution units come with these additions.</p>	
	<p><b>Lemons</b></p>	✗			
	<p><b>Ice</b></p>	✗			

**ECONOMIC**

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★ ★: No cost ★★ ★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	x	\$0.00	\$1544.2	★	The rental cost is high but the event water solution company will take care of the transportation and operation throughout the games. .
	Rent Water Refill Station from Event Waters Solutions	✓	\$1,500			
	Install Gooseneck Nozzles to Existing Water Fountains	x	\$0.00			
	Rent Portable Water Container	x	\$0.00			
	Rent Tent(s)	x	\$0.00			
	Rent Table(s)	x	\$0.00			
	Rent Ice Cooler(s) + Ice scoop(s)	x	\$4.20			
	Rent Golf Cart(s)	x	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	<input type="checkbox"/> x	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$10.00 * 4 days			
	Purchase Bottled Water	x	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★ ★: No cost ★★ ★: < \$1000 ★: > \$1000	Volunteers	x	\$0.00	\$0.00	★★★ ★	Water stations will be managed by trained staff from the event water solution
	Hired Staff	x	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★ ★: No cost ★★ ★: < \$1000 ★: > \$1000	Fuel	x	\$0.00	\$0.00	★★★ ★	The event water solution will be responsible for the transportation.
		x	\$0.00			
<b>Ecological Management Costs</b>  <b>Scoring System</b> ★★ ★: No cost ★★ ★: < \$1000 ★: > \$1000	Waste Disposal	x	\$0.00	\$0.00	★★★ ★	Disposable cups will generate waste however disposal costs will be covered by UBC.
		x	\$0.00			
<b>Promotional Costs</b>  <b>Scoring System</b> ★★ ★: No cost ★★ ★: < \$1000 ★: > \$1000	Posters	✓	\$0.00	\$0.00	★★★ ★	The water station itself is already eye-catching so no promotion needed.
		✓	\$0.00			
<b>TOTAL COST FOR FOUR DAYS (\$)</b>			<b>\$1544.2</b>			

**ENVIRONMENTAL**

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
<b>Electricity Consumption</b> - Will it require electricity? How much?	<b>Operation of System</b>	Yes	Requires 15 A outlet for refrigeration, UV sanitation and filtration Average refrigerator = 1.5 kWh/day	★	The operation of the EWS refill unit will require power for refrigeration, UV sanitation and filtration of tap water. This will utilize more than an average home refrigerator, around 2.5 kWh/day; the feasibility score is therefore lower than other management plans.
	<b>Refrigeration</b>			★★	
	<b>Other</b>	No	n/a		
<b>Fossil Fuel Consumption</b> - Will it require fossil fuel consumption (on-site)? How much?	<b>Operation of System</b>	Yes	Average fuel efficiency = 21 mpg (11 L/100km); 5.5 L for 40 km + 5 km trip	★★	Transportation is being considered for the rental of the refill unit from EWS. For the purposes of an assumption, a local delivery will be considered. However, it is important to note that the delivery could be from another location; therefore the rating is 1 star. A 20-km route to and from UBC during pick-up and drop-off results in a total of 40-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, this 40 km trip would require 5.5 L of fuel.
	<b>Transportation</b>	Yes		★	
	<b>Other</b>	No		n/a	
<b>Water consumption</b> - How much water will be used for off-site processes?	<b>Manufacturing</b>	No		★★	Excluding the initial production of the portable water containers, the water consumption during off-site procedures may be significant when considering delivery of the unit, as well as rinsing of refillable water bottles.
	<b>Other</b>	No		n/a	
<b>Waste production</b> - How much solid waste does this scenario generate?	<b>Bottles</b>	No	10g/cup; 200 cups/day; 2 kg/day	★★★	Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethylene to consider for a more sustainable end-of-life treatment.
	<b>Disposable Cups</b>	Yes		★★	
	<b>Posters/Signage</b>	Yes		★★★	
<b>Biodegradation of Materials</b> - What is the biodegradability of the waste materials?	<b>Plastic</b>	No		★★★	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethylene (PE). Paper and cardboard used for signage will be recyclable.
	<b>Paper</b>	Yes			
<b>End-Of-Life Treatment</b> - What is its fate?	<b>Recycling</b>	Yes		★★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	<b>Incineration</b>	No			
	<b>Landfills</b>	No			
<b>GHG emissions</b> - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon; 5.5 L of gasoline produces 12.9 kg CO2	★★	According to estimates used by the EPA, about 13kg of CO2 will be emitted during the pick-up and drop-off of the portable water containers to and from a local EWS location.

Central Location: Tap Water Distribution Plan #1 – MetroVancouver Water Wagon

SOCIAL	CATEGORY	SUBCATEGORY	APPLICABILITY	RATING	JUSTIFICATION
	<p><b>Sanitation</b> - In many surveys, health risks are more strongly associated with tap water than bottled water. Providing quality tap water during the event will encourage participation and reduce consumption of bottled water during the event. <b>DISCLAIMER:</b> The items in the subcategories only serve to improve and enhance the appeal of "drinkable" tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3-4 subcategories                      ★★★ = 2/4 subcategories                      ★ = 0-1 subcategories</p>	<b>Filtration Units</b> (i.e. carbon filters, reverse osmosis)	x	★★★	The MetroVancouver Wagon is stainless steel unit that is able to provide chilled water as longer as power and water supply requirements are met.
		<b>UV Lights</b>	x		
		<b>Stainless Steel</b>	✓		
		<b>Chilled</b>	✓		
<p><b>Accessibility</b> - Inconvenience was found to be a common reason behind why people choose to drink bottled instead of tap water.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mobility</b> (of tap water station)	✓	★★★	The water distribution unit will be placed in the middle of the UBC outdoor fields, where we expect the highest density of athletes, coaches, and spectators.	
	<b>Location of Distribution Unit</b> (i.e. centralized location)	✓			
	<b>Free Disposable Cups</b>	x			
<p><b>Promotion</b> - Many surveys found there is a lack of knowledge and many misconceptions surrounding bottled and tap water. Education can play an important role in encouraging participation in our bottle water free event.</p> <p><b>Scoring System</b>                      ★★★★★: High promotional activity and high visual appeal                      ★★★: High promotional activity and low visual appeal or low promotional activity and high visual appeal                      ★: Low promotional activity and low visual appeal</p>	<b>Promotional material</b> (i.e. handouts, posters)	x	★★★	The water distribution units are brightly coloured and very eye-catching.	
	<b>Visual Appeal of Distribution Units</b>	✓			
<p><b>Incentive</b> - The appearance of how tap water is served can influence its appeal to the general public.</p> <p><b>Scoring System</b>                      ★★★★★ = 3 subcategories                      ★★★ = 2 subcategories                      ★ = 0-1 subcategories</p>	<b>Mint Leave/Lemons</b>	x	★	The water distribution units do not come with these additions.	
	<b>Lemons</b>	x			
	<b>Ice</b>	x			

# ECONOMIC

CATEGORY	SUBCATEGORY	APPLICATION	INDIVIDUAL COST (\$)	TOTAL COST (\$)	RATING	JUSTIFICATION
<b>Rental/Installation/Purchase Costs (i.e. Equipment)</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Rent Mobile Water Wagon From Metro Vancouver	✓	\$0.00	\$0.00	★★★	Metro Vancouver provides free water wagon during the games.
	Rent Water Refill Station from Event Waters Solutions	✗	\$0.00			
	Install Gooseneck Nozzles to Existing Water Fountains	✗	\$0.00			
	Rent Portable Water Container	✗	\$0.00			
	Rent Tent(s)	✗	\$0.00			
	Rent Table(s)	✗	\$0.00			
	Rent Ice Cooler(s) + Ice scoop(s)	✗	\$0.00			
	Rent Golf Cart(s)	✗	\$0.00			
	Purchase Food (i.e. Lemons, mint leaves)	☐✗	\$0.00			
	Purchase Biodegradable Disposable Cups	✓	\$0.00			
	Purchase Bottled Water	✗	\$0.00			
<b>Operational Costs - Water Stations will need to be refilled and restocked during the duration of the Games</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Volunteers	✓	\$0.00	\$0.00	★★★★★	No refill needed. Volunteers will be monitoring the station.
	Hired Staff	✗	\$0.00			
<b>Transportation Costs</b>  <b>Scoring System</b> ★★★★★: No cost ★★★: < \$1000 ★: > \$1000	Fuel	✗	\$0.00	\$0.00	★★★★★	Metro Vancouver will be responsible for the transportation.
		✗	\$0.00			
<b>TOTAL COST FOR FOUR DAYS (\$)</b>			<b>\$ 0</b>			

ENVIRONMENTAL

CATEGORY	SUBCATEGORY	APPLICABILITY	FIGURES / EVIDENCE	RATING	JUSTIFICATION
Electricity Consumption - Will it require electricity? How much?	Operation of System	Yes	Average refrigerator = 1.5 kWh/day	★★	The operation of the water wagon will require a power outlet for refrigeration purposes. Assuming the input is equivalent to that of an average refrigerator, it will use roughly 1.5 kWh/day, resulting in a 2 star rating, since it is an expense that would otherwise not be utilized.
	Refrigeration				
	Other	No		n/a	
Fossil Fuel Consumption - Will it require fossil fuel consumption (on-site)? How much?	Operation of System	Yes	Average fuel efficiency = 21 mpg (11 L/100km); 5.5 L for 40 km + 10 km trip	★★	Transportation is being considered for the rental of the water wagon from the Metro Vancouver head office in Burnaby. A 20-km route to and from UBC during pick-up and drop-off results in a total of 40-km of fuel usage. Assuming the use of a mid-sized gasoline car with an average fuel efficiency of 21 mpg, and an addition of 10 km for on-campus transportation, this 40 km trip would require 5.5 L of fuel.
	Transportation	Yes		★★	
	Other	No		n/a	
Water consumption - How much water will be used for off-site processes?	Manufacturing	No		★★★★	Excluding the initial manufacturing of the water wagon, the water consumption during off-site procedures is negligible - mainly includes production of paper cups and paper/cardboard for signage. The washing of reusable water bottles can also be considered.
	Other	No		n/a	
Waste production - How much solid waste does this scenario generate?	Bottles	No	10g/cup; 200 cups/day; 2 kg/day	★★★★	Disposable paper cups will be provided for spectators without reusable water bottles. These cups will be lined with PLA instead of regular polyethylene to consider for a more sustainable end-of-life treatment.
	Disposable Cups	Yes		★★	
	Posters/Signage	No		★★★★	
Biodegradation of Materials - What is the biodegradability of the waste materials?	Plastic	No		n/a	Disposable paper cups lined with PLA (bio-plastic) are fully compostable and are sustainable alternatives to those that are lined with regular polyethylene (PE). Paper and cardboard used for signage will be recyclable.
	Paper	Yes		★★★★	
End-Of-Life Treatment - What is its fate?	Recycling	Yes		★★	The paper waste produced will be sent in for recycling and/or composting, reducing GHG emissions that would otherwise be significant and unsustainable (via incineration). Landfills often produce methane under anaerobic conditions as well.
	Incineration	No		★★★★	
	Landfills	No		★★★★	
GHG emissions - Will GHG's be emitted as a result (including production, distribution and end-of-life treatment)? Industrial processes, fossil fuel combustion, etc.		Yes	8887 g CO2/gallon; 5.5 L of gasoline produces 12.9 kg CO2	★★	According to estimates used by the EPA, about 13 kg of CO2 will be emitted during the pick-up and drop-off of the water wagon to and from Burnaby.

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