

# Bin Placement Pilot Program



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## **Abstract**

This project was conceived as an initiative to solve the problem of waste disposal in Vancouver parks. Based on our observations, it became evident that the current waste disposal system implemented in the parks around the city was not adequate enough to achieve the Zero Waste Goal set out by the 2020 Greenest City Action Plan. Research was conducted to determine how other cities have implemented garbage and recycling programs in their public spaces to help formulate a system for Vancouver's parks. After consulting with several city officials, field research was necessary to further understand the seemingly impossible problem of public waste. Studies were conducted in four different parks: Queen Elizabeth, Hillcrest, John Hendry, and Memorial South. A GPS device was used to pinpoint the location of every waste container in each park. Using GRASS GIS software, maps of all the parks were created that illustrate where the bins are currently located and where the proposed location should be to increase the efficiency of each bin and to achieve proper waste diversion.

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## Introduction

Vancouver has a goal of becoming the world's greenest city by 2020. To help achieve this goal the city wants to create zero waste through diversion programs. The vast amount of tourism and outdoor activities in the City of Vancouver leads to more waste in public spaces. Therefore, to reduce the amount of waste in public spaces, a better system needs to be employed to dispose and collect trash in an appropriate manner. Unfortunately, because of the lack of public recycling bins, recyclables are also being added to the public trash cans. By designing a pilot project for bin placement we plan to find a solution to collecting waste and diverting recycling from the landfill in a more efficient way to achieve the goal of zero waste.

Placement of bins must be considered when trying to improve recycling compliance in public spaces. A study published in the Journal of Applied Behaviour Analysis concluded that placement of recycling bins closer to the theoretical point of consumption greatly improved recycling compliance (O'Connor, Lerman, Fritz, & Hodde 713-714). The authors conducted their study in an academic building in which recycling bins were only located in hallways, but not in classrooms. There were many more trash bins than recycling bins, with trash bins located in every classroom. When the recycling bins were moved into the classroom there was a significant decrease in the amount of recyclables ending up in the trash, as well as a significant increase in recyclables in the recycling bins (O'Connor et al., 713). With respect to the City of Vancouver and the placement of recycling bins in parks, this suggests that placement of bins is important in increasing waste diversion. By identifying where the likely point of consumption of food and beverages is, as well as identifying high-traffic areas in parks, the City of Vancouver could potentially help solve the problem of waste and recycling ending up in the wrong bins, enabling the goal of more recycling bins in parks and public areas.

Undoubtedly, the City of Vancouver will have to look at the public space recycling programs of other major cities around the world to understand how to implement such a

program successfully. New York City is just one example of a major city that has implemented a public space recycling pilot project. A report by the New York City Department of Sanitation was compiled in 2007 to show preliminary results on the pilot program that the city had begun that same year. Recycling bins for both paper and combined metals/glass/plastics had been placed in six parks and two ferry terminals, with green bins for paper and blue bins for metals/glass/plastics (Doherty, 3). Bins were placed in pairs in strategic locations and the results were fairly successful; paper recycling bins had a reported trash contamination rate of only 5% for all sites combined, although the metals/glass/plastics bins had a higher contamination rate of 37% (Doherty, 3). The higher contamination rate of the mixed recyclable bins could have potentially been the result of combining metals, glass, and plastics all in one bin, leading to more confusion about what materials were acceptable, however this is simply speculation and more studies would need to be conducted to make this correlation. In any case, the City of New York found that the collection of the recyclables was complex and required multiple levels of coordination between departments to ensure regular collection was taking place (Doherty, 3).

## **The Problem**

Our preliminary data showed that the current waste collection system in Vancouver's Parks is very inadequate. In the four parks that were observed, we found that there are redundant garbage bins partly because there is no standardized recycling system implemented by the city. In the garbage bins we found vast amounts of recyclable and organic waste which could be diverted to minimize overflowing bins. The bins seemed to be placed randomly throughout the parks causing some high traffic areas to be voided of garbage disposal. We also found that the number and placement of the garbage bins varied over the three weeks. The bins have to be mobile so they can be easily emptied, but the problem with this is that people tend to move the bins around the parks. In the past, bins were chained in place, but this isn't the case with all of our current bins. All of these factors add to the obsolete system that is currently observed in Vancouver parks.

# **Approach**

## **Strategy**

Through literature research, data collection, and consultation with officials, we have developed a workable problem with a feasible solution. We decided to focus on the waste problem at four local Vancouver parks: Queen Elizabeth, Hillcrest, Memorial South and John Hendry. Queen Elizabeth and Hillcrest are located in the Riley Park neighbourhood in the center of Vancouver. John Hendry is located in the Kensington Cedar Cottage area of east Vancouver, and Memorial South is located in the Sunset neighbourhood in south Vancouver.

These parks have high visitor traffic on a daily basis due the recreational facilities they offer. For instance, Hillcrest Park offers four baseball diamonds, an ice skating rink, an indoor pool, three soccer fields, a jogging trail, and more. The community center containing the pool and gym attracts a wide range of people from the surrounding areas. Queen Elizabeth Park offers the most leisure activities with a golf course, several tennis courts and sports facilities, a zip line, a restaurant, and a botanical conservatory. South Memorial has a regular flow of visitors all year long due its numerous sports facilities. There are venues for multiple sports including soccer, field hockey, baseball, lacrosse, tennis, cricket, and ball hockey. There is also a full sized track that attracts visitors from all over the city. Likewise, John Hendry has a various sports fields, a lake and a community center that gives it regular attendance. These parks represent a small fraction of the 230 parks and gardens the Vancouver Parks Board maintains. Parks altogether occupy 11% of Vancouver's land mass making them prime locations for study to achieve the 2020 Zero Waste goal.

## **Methodology**

Preliminary research shows that foot traffic is a key factor in studying park recycling behaviour. After choosing these four parks based on their characteristics and amenities, field work was required to further understand the problem of bin placement. By creating a

system of data collection, we are able to determine where bins are currently located in those parks as well as the percentage of waste, recyclables and organic material in the bins. The data collected was digitized in GRASS software to produce maps of where bins are currently placed, and the recommended location for efficient use. This method of mapping allows us to visually create an effective system of bin placement and waste diversion.

## **Background and Qualifications**

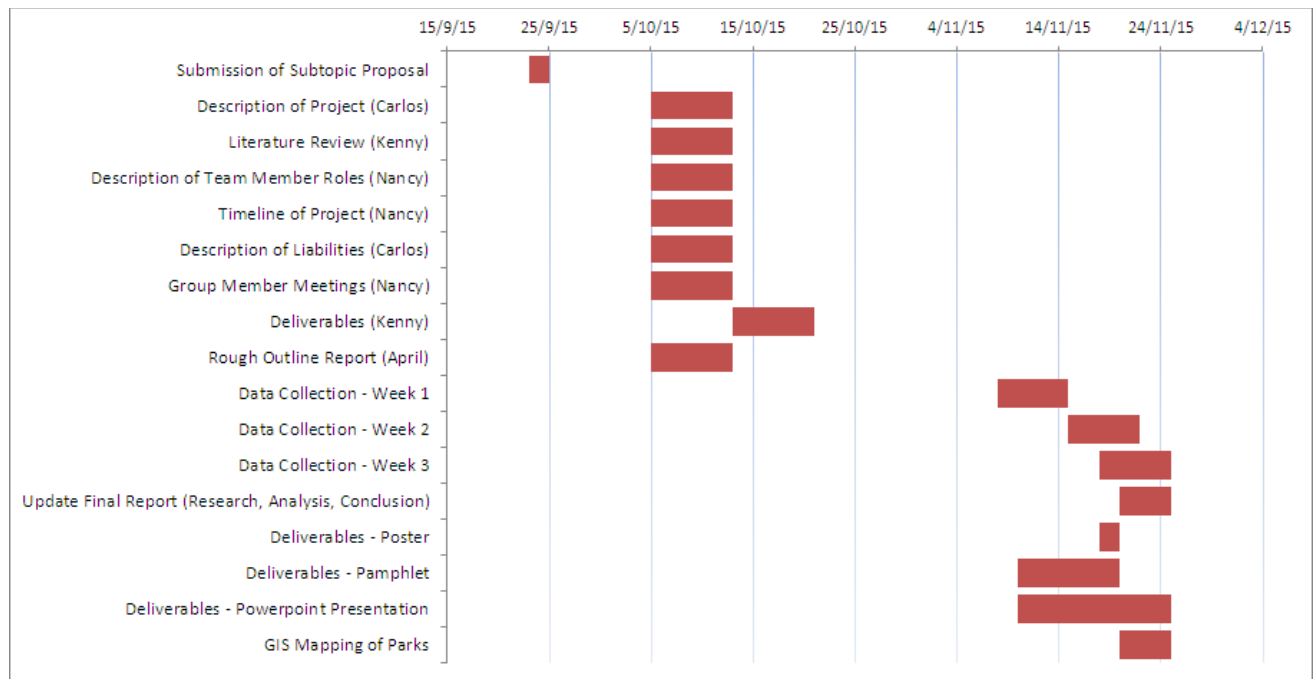
All four members of this research project are residents of the Greater Vancouver area; having been to all of these parks, and has noticed this pressing issue in the past. We are also all students in the Environmental Studies program which has provided background education and experience in the field of waste diversion. Past visitation in these parks show that most of the garbage containers in open green spaces are used incorrectly. They tend to have mixed waste and sometimes there are issues with placement of bins. Park goers sometimes lack a convenient way to dispose of waste, so they are forced to use the wrong bin. This occurs mostly because the current garbage disposal system, or lack of garbage disposal system, makes it difficult for people to rid their garbage in an appropriate manner. In the context of the Greenest City Action Plan 2020, we found in the Zero Waste Goal an opportunity to develop a new system that is more efficient and practical than the one that is currently in use. This project not only aims to aid the city in waste diversion, but also to create a better park experience in the City of Vancouver.

## **Work Plan**

In order to create a new system to maximize garbage disposal and reduce waste in parks, the group proceeded to collect data from the four different parks over the course of three weeks. Data Collection started in the week of November 8, 2015 and ended the week of November 22, 2015. Each member conducted fieldwork at their assigned park, using a GPS to mark the exact location of each bin and a data collection sheet to record the amount of waste, recyclable and organic material in the containers. Immediately noticed was that



the detrimental conditions at some locations were in contradiction to the city's Zero Waste Goal. This provided incentive to further the research into studies done in other cities around the world who have implemented a similar project. Due to the time restraints of this project, it was not possible to collect data for additional weeks, or to deepen the research globally.



## Results

### Queen Elizabeth

Queen Elizabeth had the most garbage bins of all the parks we surveyed with an average of 56, but had the second lowest bin density at 105.53 bins/km<sup>2</sup> (Tables 1 & 2). The road in the northeast corner of the park had a stretch of more than eight garbage cans that were never full each week. The majority of the bins were located adjacent to the roads, parking lots and the main pavilion. The golf course had seven garbage cans scattered throughout, with four of them being empty or close to empty on week one, also most of the bins are not emptied and many of the material inside them stays there for several weeks. Of all the parks Queen Elizabeth had the most bins containing recyclable waste (fig 1). The majority of the garbage cans didn't move significantly. There was one bin in week one near the road that comes in from Midlothian Avenue, one in the southwest corner of the golf course, and another three in the south parking lot that wasn't there in the following weeks (Fig. 2). Week two saw a decrease in garbage cans and the least amount of movement from the previous week (Fig. 3 & Table 1). In week three there was a garbage can in the main parking lot by the pavilion that was possibly moved there from its location previously (Fig. 3).

### Hillcrest

Hillcrest had an average of 7.33 bins, the majority of which were less than half full. Hillcrest Park had the smallest bin density with 97.42 bins/km<sup>2</sup> with all of them being around the perimeter (Tables 1 & 2). There are areas of high traffic, such as the playground in the east corner, that do not have any garbage cans. In the first week the south corner had five bins; one blue, one grey, and three black (Fig. 2). All of these five bins had a mix of recyclables, organics, and waste, with none of them more than a third full. Four of the eight bins in week one were empty. Hillcrest had the most bins with organic matter (Fig. 1). Each

week there was a soccer game in the fields, the two garbage cans closest to the games were the fullest, containing a large number of coffee cups. The number of bins didn't change significantly, although there was a decrease of one bin between weeks one and two (Table 1). Over the weeks the bins didn't move significantly staying relatively in the same areas (figs. 2, 3, &4).

## John Hendry (Trout Lake)

There was an average of 51.33 bins over the observation period, with only 1 of these bins dedicated to paper recycling located at the south end of the park near the field house/concession stand (Table 1). At 188.77 bins/km<sup>2</sup>, John Hendry had the highest bin density of all the four parks we surveyed (Table 2). A majority of the bins were located at the south end, with many bins also concentrated around the community centre and playground at the western side of the park. Large gaps exist in the placement of bins along walking paths on both the western and eastern sides of the lake. A 280m long section of the walking path along the eastern side of the lake had no bins at all, the largest gap found in the park. In general, the bin locations themselves didn't move more than a few metres over the 3 weeks of observation, but the amount of bins at each location varied. From week 1 to week 2, 3 bin locations lost bins while 1 location gained bins. From week 2 to week 3, another 2 locations lost bins and 2 locations gained bins. During the observation period, most of the bins were less than half full. The only dedicated recycling bin in the park, a paper and cardboard bin, was observed to have a high amount of garbage contamination. Most of the garbage bins observed had some amount of recyclable and organic material.

## Memorial South

There was an average of 17.67 bins over the course of three weeks (Table 1). Based on observations, the bins currently located at Memorial South are inefficiently placed which

lead to misuse. Nearly 80% of all the bins had a recyclable container that could have been diverted had there been a blue bin nearby (Figure 3). The five bins located east of the soccer field were all misused with the blue bin reserved for recyclable containers entirely filled with newspapers. There was a mix of compostable waste along with non-recyclable waste in all three green bins. Location wise, the soccer field is an optimal spot for waste disposal because it is regularly used and has high foot traffic. The problem here was that there were too many bins spaced in close proximity to one another of the same kind. Three green bins along the same path only meters away from another are inefficient and ineffective. Bin density was second highest out of the four parks at 129.66bins/km<sup>2</sup> (Table 2).

## Our Solution

Field work in conjunction with a program already implemented in New South Wales, Australia, we have formulated a criteria for the placement of bins. We developed a point system in which we assigned features a value of 1 and any location that has at least two points and is not closer than 25m to any of the same variety of bin (waste, organics, or recycling) will receive a bin according to its characteristics of waste type. For example, a high traffic walkway near a parking lot would receive three points because it is also nearby an entrance/exit. It would be optimal to place all three bins at this location. 15 meters down the path is a bench next to a playground, but it is not on the walkway. Although this location would receive two points, it is too close to the previous bins. This would not be an optimal position for bins.

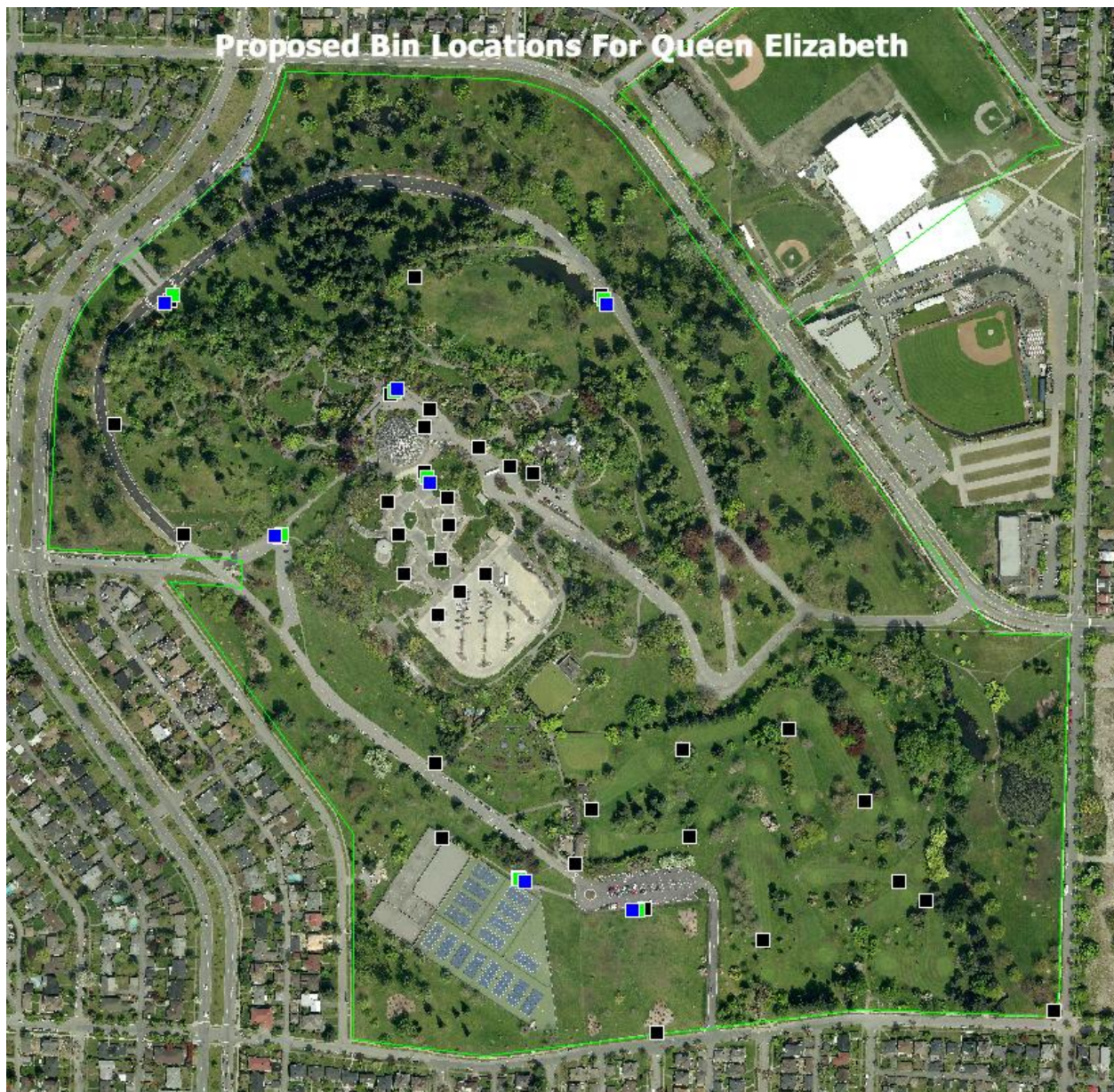
- ☐ Parking lots
- ☐ Points of consumption
  - ☐ benches or tables
  - ☐ restaurants
- ☐ Sports facilities (fields, courts, tracks, etc.)
- ☐ Entrances or exits
- ☐ High traffic walkways
- ☐ Playgrounds
- ☐ Toilets & utilities

Using these criteria we identified areas in the four parks where a waste, organics, or recycling bin should be placed in order to increase the efficiency of waste diversion.

## **Recommendations**

### **Queen Elizabeth**

The number of garbage bins was decreased to 37, with the addition of 7 organics and recycling bins. The stretch of eight bins along the road in the north of the park was redistributed to high traffic areas where bins were needed. One bin was eliminated from the golf course as it was in close proximity to another bin and both bins were nearly empty week to week. The six stationary metal bins in the main pavilion remained where they are with the addition of a waste, organics, and recycling bins between the fountain and conservatory. A recycling and organics bins were added where the path meets the road by the pond as there was always high traffic and a big amount of recycling in that bin. A garbage bin was eliminated by the tennis courts and a recycling and organics bin were added as this was an area of high consumption, and the previous bin contained recyclable beverage containers and organics. By the dog park we added an organics and recycling bin, as this was another area of high consumption. Additional recycling and organics bins were added to entrances to the parks where foot and vehicle traffic would be high.

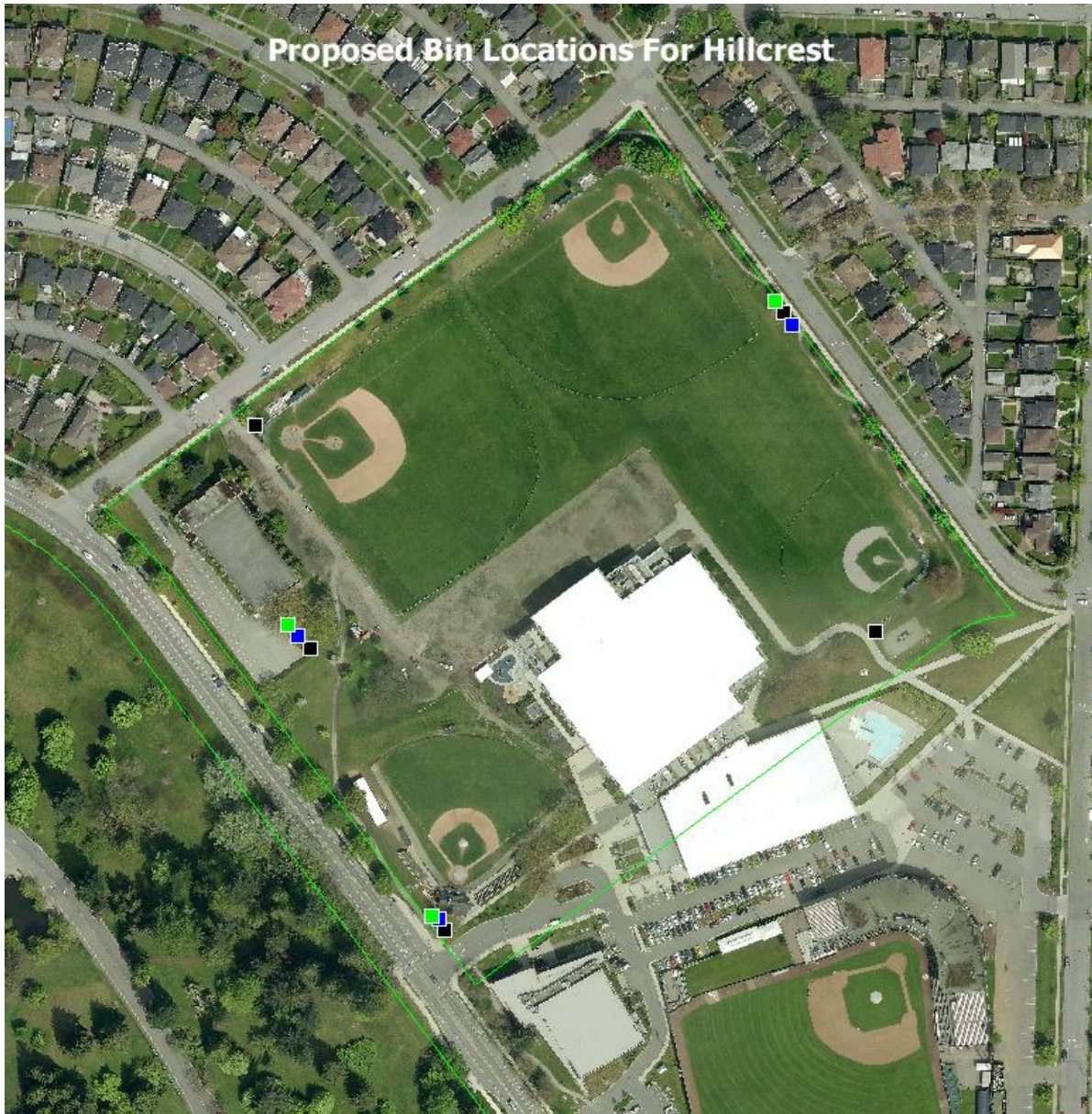


## Hillcrest

The total number of bins in Hillcrest increased, but we were able to decrease the number of waste bins to 5 with the addition of three recycling and organics bins. The two garbage cans that were along the northeast side were relocated; one to the playground and the other to the bench along the same street. The bin on the northwest side was relocated closer to the baseball diamond to cover the gap in coverage that was there previously. One of the bins that were in the south corner was moved to the west parking lot as the majority



of the people playing soccer in the field parked there. Recycling and organics bins were added to three locations where the previous bins contained high amounts of recycling and organic matter; by the parking lot, by the southeast bench and in the south corner of the park.





## John Hendry

Using our criteria, our proposal for John Hendry Park will see a decrease in garbage bins from an average of 51.33 down to 29. In place of these bins we propose a major increase in recycling bins and an introduction of organic waste bins. 16 recycling bins and 16 organic waste bins are recommended, bringing the total number of bins in the park to 61. The garbage bins closest to the community centre should stay in the same location and do not need recycling or organic bins as the community centre has those bins inside the facility. The proposed locations for recycling and organic bins are based primarily on high-traffic areas, with fewer gaps along the walking paths and more even spacing overall. The south end of the park will still need a high bin concentration due to the concession stand, playground and beach area all being located here. The 3 most used baseball fields on the east side of the park were chosen as efficient locations for recycling and organic bins due to their high amount of use during the spring and summer, as well as being a likely point of consumption of food and beverages during games. The baseball field in the northwest corner of the park did not seem to be well maintained during the observation period, so only 1 garbage bin was proposed. At the north end of the lake there are 2 wooden platforms as well as large wooden benches. This location seems to be a likely point of consumption as well as being a high-traffic area close to walking paths, so 2 new bin locations were proposed, each with all 3 bin types.

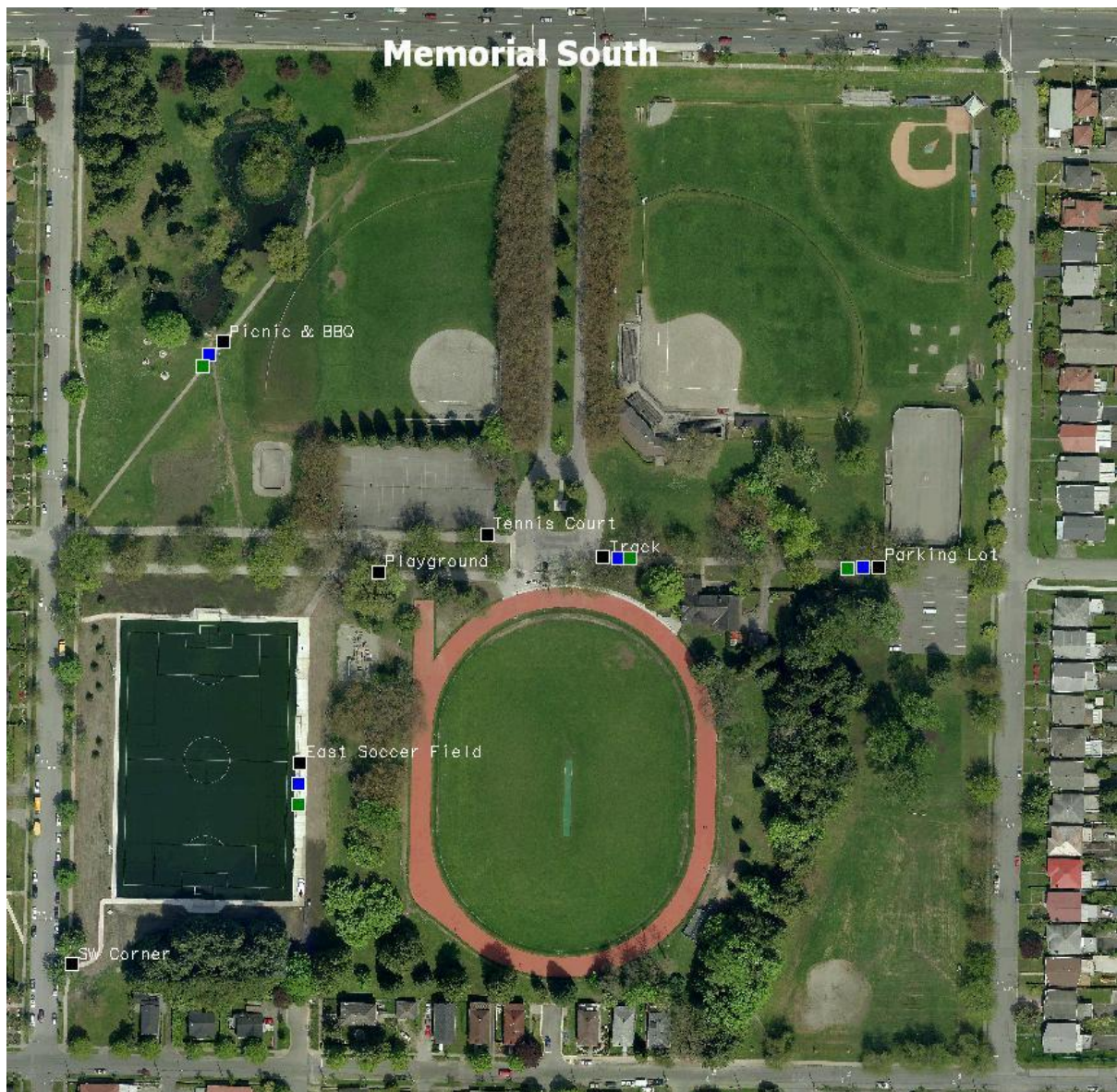


## Memorial South

Based on the criteria, Memorial South will see a decrease in bins from 17.67 down to 15. It is recommended that there be a decrease in black bins and an increase in blue bins. The study shows that the amount of green bins is efficient, but it is the placement that needs to be addressed. With this proposal, waste diversion is maximized through placement of organic and recyclable container bins at points of consumption. The Picnic &



BBQ area needs all three types of bins because there is heavy foot traffic along the NE path and several picnic tables which are a popular seating area near the pond. This location satisfies 2/7 criteria points making it an optimal position for bin placement. There are currently two black bins located west of the picnic area along Prince Albert Street. By moving the bin location to the east side, the problem of domestic waste is also minimized.



## Conclusion

In all of the parks the number of bins for recycling or organics was very limited and all of the parks were in need of recycling and organic bins. We prioritized the locations of such bins in high traffic areas where there was evidence of recyclables or organics in the previous bins. In all four of the parks; Queen Elizabeth, Hillcrest, John Hendry, and Memorial South, the overall number of bins increased by 6. By reinventing the current system the overall cost of this project was kept at a minimum. Each bin costs \$60, making the total cost of additional bins \$360. The bins should be clearly marked and should all be facing in the same direction as clear signage are essential for running successful public place recycling collection services (Department of Environment and Conservation NSW, 2005). Having lone recycling or organics bins not beside a garbage bin increases the amount of contamination, as we noticed people tend to deposit their waste in the first bin they see. By adding recycling and organic bins to Vancouver Parks the amount of waste being collected will become reduced.

We made sure that all of the bins were still easily accessible by sanitation workers so they can be efficiently emptied. By eliminating redundant bins that were found to be empty or nearly empty week to week this will reduce the sanitation workers unnecessary hours and increasing their efficiency. However, to solve the problem of the varying locations of bins week to week they should be locked to their proposed locations. By restricting bin movement the sanitation workers will know the exact locations and types of bins in the parks.

This pilot program can easily be applied to any of Vancouver's parks. The data was collected over a short period of time and using our criteria we were able to create maps of the proposed locations in one day making the expansion to other parks realistically possible. The low cost of just adding bins makes it very feasible to expand. Our solution will not only streamline the waste collection process but will help Vancouver move closer to their goal of being a zero waste city by 2020.

## Works Cited

City of Vancouver. 'Parks, Gardens, and Beaches'. [www.vancouver.ca/parks-recreation-culture.aspx](http://www.vancouver.ca/parks-recreation-culture.aspx). 2015. Web. 25 Nov. 2015.

Department of Environment and Conservation, New South Wales. *Better Practice Guide for Public Place Recycling*. Sustainability Programs Division, 2005. pp. 6.

Doherty, New York City Public Space Recycling Pilot Program: Report on Results September 2007. New York City Dept. of Sanitation, pp. 1-292

O'Connor, Hodde, Lerman & Fritz. "Effects of Number and Location of Bins on Plastic Recycling at a University". *Journal of Applied Behaviour Analysis*, 2010, 43, pp. 711-715

## Appendix

Table 1. The number of Bins Over the Three Week Period

Parks	week one	week two	week three	average
Queen Elizabeth	58.00	55.00	55.00	56.00
Hillcrest	8.00	7.00	7.00	7.33
John Hendry	53.00	51.00	51.00	51.67
Memorial South	18.00	17.00	18.00	17.67

Table 2. Bin Density on the Parks

Parks	average # of bins	area of park (km <sup>2</sup> )	bin density (# of bins / square km)
Queen Elizabeth	56.000	0.531	105.528
Hillcrest	7.333	0.075	97.418
John Hendry	51.667	0.274	188.770
Memorial South	17.667	0.136	129.661

Figure 1. Percentage of Bins with Organics or Recyclables

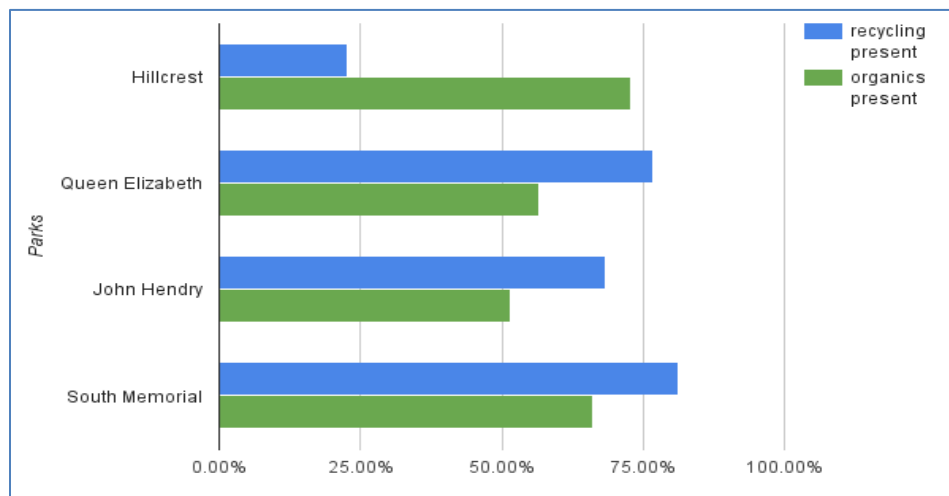




Figure 2. Queen Elizabeth & Hillcrest - Week 1





Figure 3. Queen Elizabeth & Hillcrest - Week 2





Figure 4. Queen Elizabeth & Hillcrest - Week 3





[illegible]



An aerial photograph of a large park area featuring a central pond, several baseball fields, and numerous trees. The map is overlaid with labels indicating the placement of waste management facilities. These labels include "1BIN", "TL2BINS", "TL1BIN", "TL1BIN NS", "TL4BINS", "TL1TRASH1PAI", "TL5BINS", and "TL1BINS". The labels are distributed across the park, often near paths or open areas. The surrounding urban environment, including residential buildings and streets, is visible at the edges of the frame.



An aerial photograph of a park with a large central pond. The park is surrounded by green grass, trees, and walking paths. Several trash bin locations are marked with yellow labels: '1BIN' (10 locations), '2BINS' (5 locations), '3BINS' (1 location), '4BINS' (2 locations), and '1TRASH+1PAPER' (1 location). The labels are placed at various points around the pond and along the paths.



Figure 8. Memorial South - Week 1





Figure 9. Memorial South - Week 2

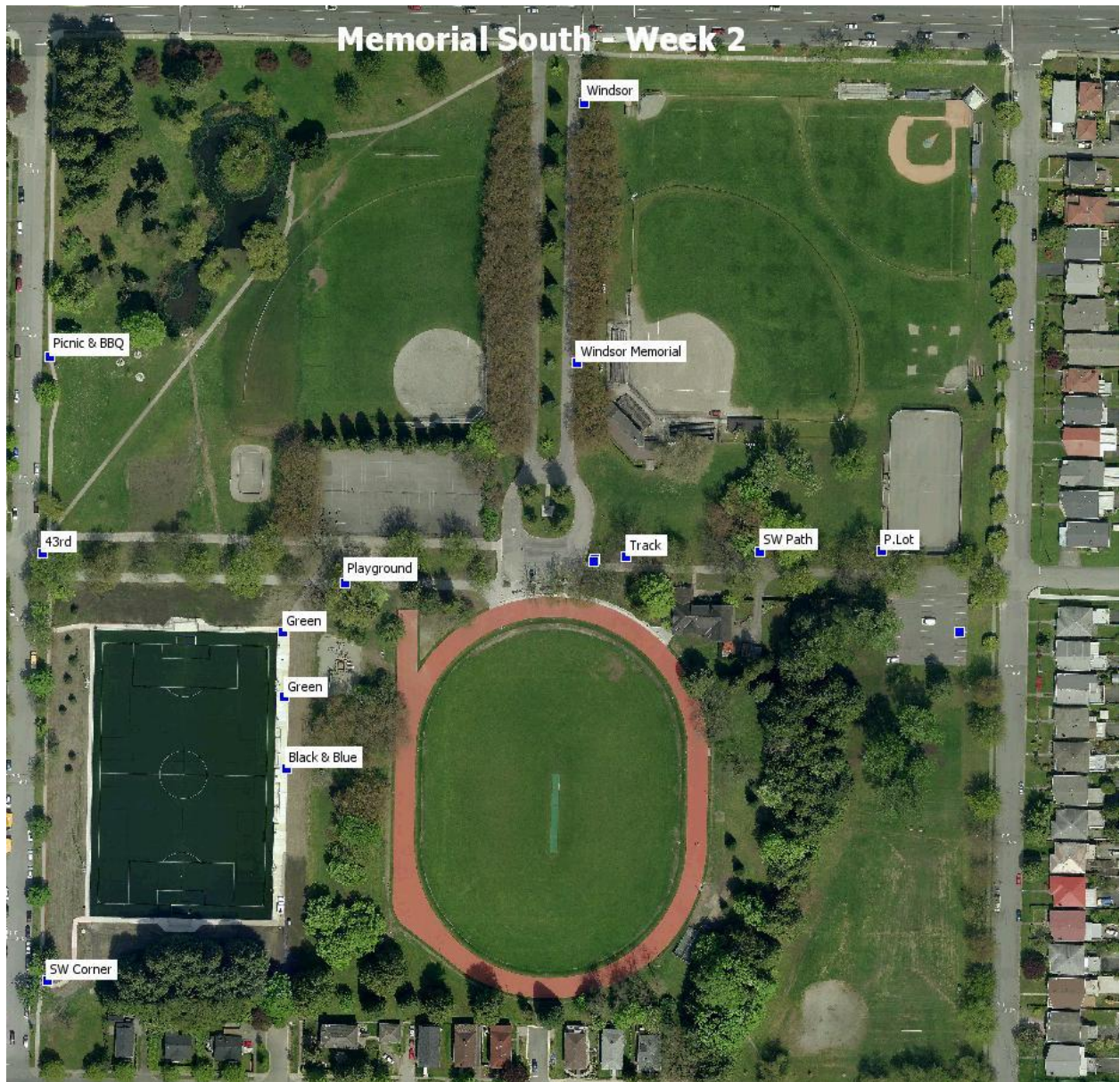




Figure 10. Memorial South - Week 3

