Urine Diversion Toilets of Strathcona Provincial Park

Client Testimonial by Andy Smith, Retired BC Parks Area Supervisor, July 2022

1. Background - what was in place and why alternatives were being sought?

Strathcona Provincial Park is British Columbia's first provincial park designated in 1911. It encompasses over 250,000 hectares of mostly mountain wilderness and although it is located on Vancouver Island, it experiences harsh weather with winter snow accumulation sometimes being the deepest and heaviest in the world and resulting in short 4 month hiking seasons. The terrain, climate and remoteness, coupled with high popularity, present many management challenges, including human waste.

2. What alternatives were considered and why UDT was selected?

While frontcountry day-use and campground locations are generally serviced with pump-out style toilet buildings, prior to 2015, the backcountry areas were serviced using either traditional shallow dug pit toilets (where terrain and soils seldom permitted) or more often, custom fly-out toilets using 75gal/355L fly-out drums (2 per toilet) which, depending on location, were replaced between once and up to three times per season. Relying exclusively on helicopters with support ground crews, the cost of managing human waste in the backcountry was the single most expensive annual contractual item.

Although at that time, standard composting style toilets were being experimented with in other less remote parks with lower elevation and easier accessibility, these were never considered for Strathcona due to the short summer season, lower alpine temperatures and insufficient staff to provide consistent, continuous maintenance. Even those parks that did try some simple or even elaborate, expensive compost toilets were having mixed results along with maintenance issues.

Strathcona needed a new system that would work within its challenging parameters. After reading an early article by Geoff Hill regarding vermi-composting/urine diversion toilets being introduced in Europe, I arranged a meeting to discuss the possibilities of a trial in Strathcona.

After Geoff Hill explained how Toilet Tech Solutions urine diversion toilet system works, the potential for significant savings easily justified a pilot project at BC Parks first location at Bedwell Lake in Strathcona Provincial Park. The new system would eliminate numerous seasonal fly-outs of mostly urine filled drums, while leaving behind a much smaller volume of solid waste that could be allowed to decompose in place over a number of years. At that time, there was also a plan to add Red Wriggler worms to the waste to help speed decomposition over the short alpine season (hence the alternative name was "vermi-composting toilets"). This initial plan created a conflict with the Park Act as it would mean the potential introduction of a non-native species into the park. As a result, the best option was to design a "closed" waste containment system which in our case, utilized 1 cubic metre construction tote bags. The bags were light and easy to handle and store, while strong and inexpensive. Using the bags ensured that any additives, such as worms, etc., would stay contained and not impact the park land. A minor downside of this however, would commit us to eventually flying out full bags of partially decomposed waste. Our initial cycle target was 8 years, based on a two bag facility, filling one bag over 3 years, switching to a new bag for an additional 3

years, then topping up both bags over the next two years before flying them both out and starting the process over. While not completely eliminating fly-outs in our case, reducing the number from multi-times per season to once every 8 years was an incredible potential cost savings while also reducing our carbon footprint.

The next challenge was designing the actual facility to house the toilet system. Again, Geoff Hill and Toilet Tech, helped immensely to work with BC Parks staff and contractors through various concepts to come up with a final building design that would meet BC Parks requirements as well accommodate the severe weather/climate conditions of the high alpine. Although Strathcona Park has continued to utilize our first "L" shape design to allow swiveling the toilet system towards each waste compartment, it should be noted that building designs can easily change dictated by site conditions and agency requirements with only the toilet system itself being the only one important consistent component.

3. Capital costs and operational costs

The cost of a new backcountry toilet is quite dependent on size, preferred materials, accessibility and how elaborate of a design is wanted/required. However in our case, we chose a wood design with corrugated metal siding for durability and erected it on the existing cement pad of the previous toilet. Due to the heavy snow loads our design was a bit heavier. To ease installation and reduce costs, the building was prefabricated in sections off site and then flown in for quick assembly. The cost of prefabricating our first facility was approximately $22k (Canadian) with an additional $12K for installation. This cost was only negligibly higher than reconstructing a new heavy snow load fly-out toilet facility.

Our goal was not focused on a break-even solution, but rather to find the most cost efficient, effective option for managing human waste in the remote backcountry. That said, every year that a fly-out was not required a savings was accumulated.

4. *Review of the system*

Total savings is dependent on a number of variables, i.e. using a "closed" fly-out system or not, cycle period between fly-outs, location, staffing cost and disposal. However, most of those variables exist regardless of the system used, so in our case, we could confirm a savings in just one season compared to our previous fly-out toilet system. Our target had been 8 years for a two bag system, but due to an increase in visitation, the volume exceeded expectations and we only got 6 years. We may have been able to gain an additional year by "working/mixing" the waste more often and thoroughly, but we didn't want to increase staff maintenance time which would have cost us more contractual dollars. Also, it should be noted that we have never added worms as originally planned. This alone could potentially speed decomposition and reduce volume to gain additional time. Although not done yet, I believe our facility design could also be tweaked to provide a storage compartment for a third bag under the entrance stairs. This would potentially add an additional 3 years to the cycle. The same theory could be applied for adding any number of additional bags if a simple storage bin is built adjacent to the toilet facility where full bags could be easily rolled into, allowing them to sit and decompose while waiting for fly-out. Although the construction tote bags worked well as planned, we did identify an issue during the disposal process. The bags being so flexible are much harder to handle when full and may require a machine to offload. Waste in bags

also required us to seek approvals for disposal at a local landfill site, which in our case worked out as they had a bio-soil operation which our waste could be easily added to. However, it may be worth considering changing to a similar size, solid wall plastic container suitable for fly-outs. This would not only ease handling, but could also provide an option to add some water after fly-out and then have local septic service pump out containers. This could either be done at staging area or where-ever convenient and cost effective. The containers could then be reused.

5. Recommendations or Concerns

Strathcona Park now has a total of 10 Urine Diversion Toilets purchased through Toilet Tech. While prefabrication costs have increased to approximately $28K (Canadian), installation didn't increase significantly due to lumping the quantity of units together and also combining work with other construction. Additionally, based on our early successes, there have been numerous other Toilet Tech UD toilets installed throughout BC Parks. Some of these have been "closed" systems like Strathcona, while others have opted for either large sealed accessible vaults behind the toilet or even open floors depending on site conditions. Even considering a minimal increase in maintenance time, based on successes to date and user satisfaction, coupled with flexibility of building design, comparable costs to earlier options, and immediate savings compared to traditional fly-out waste type toilets, I'm convinced the UD toilets offered by Toilet Tech Solutions are certainly worth considering for most backcountry and even some frontcountry sites.

6. Photos

Bedwell Lake UD Toilet (first one in Strathcona Park/BC Parks)

Bedwell Lake UD Toilet #2

Prefabrication of Bedwell Lake toilet building

Andy Smith, worked for the BC Provincial Government for approximately 27 years, predominantly for BC Parks and retired from his Strathcona Area Supervisor position in 2022.