Silver Springs Backcountry Toilet - Phase 1 Feasibility Study

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Date: February 15, 2018
Project #: **BC Rural Dividend Program (Project # 2016100218)**

The Elk River Watershed Alliance gratefully acknowledges the financial support of the Province of British Columbia, BC Rural Dividend Program for funding this project. In-kind services provided by Align Surveys Ltd., Canfor, College of the Rockies-Mountain Adventure Skills Training Program, Fernie Christian Youth Group and Elk River Alliance volunteers.

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1.0 Introduction

1.1 Executive Summary

Silver Springs is a popular recreational site near Elko, BC that has been drawing larger crowds every year, particularly in the summer months. The Elk River Alliance (ERA) along with its partners and volunteers have been actively stewarding the site since 2011, primarily through annual cleanups on BC Rivers Day, trail improvements, creating safe sanctioned public parking and installing directional and interpretive signage.

In order to assess the user impacts on Silver Springs, ERA has been monitoring the site and in 2014 developed a report to improve the sustainability of the environment and protect the exceptional recreational experiences. The Silvers Springs Stewardship Solutions (Walker, 2014) report outlined recommendations for stewardship options ranging from installing a backcountry toilet, stewardship teams to do periodic clean up throughout the summer/fall, signage posting 'Day use only - No Backcountry Camping' and the construction of a designated parking area.

ERA has been working within their capacity as a community-based water group to implement these recommendations. The current report details the stewardship actions have been taken to date, along with the challenges ERA has experienced, and recommendations for further stewardship activity, particularly in regards to the installation of a backcountry toilet and the land use management of the area.

The issues surrounding Silver Springs' growing popularity, the excessive use it experiences and the absence of authority to monitor and maintain the site are numerous and complex. This report clarifies the options available and outlines responsible solutions that would allow for long lasting sustainable use of the site with improved environmental and recreational outcomes. As there are concerns regarding the land management of Silver Springs and how it would impact the installation and supervision of a backcountry toilet, the current report covers both the specific toilet options and recommendations to improve the land use at Silver Springs.

1.2 Silver Springs Stewardship Solutions: A Summary of ERA Efforts

Silver Springs Lakes is a natural jewel and a recreational magnet located approximately 5km SE of Elko, BC. In a magnificent slot canyon, located on the west side of the Southern Canadian Rockies, this chain of three pristine, blue-green, spring-fed, alpine lakes are restricted to the west by multi-coloured fluorescent yellow, orange, and green lichen covered vertical cliffs. The site has relatively easy hiking access, making it a very popular recreational destination, especially in the summer months.

Locals and tourists alike enjoy the diverse recreational experience at Silver Springs: hiking, swimming, cliff jumping, lake fishing and nature watching in the summer, and in the winter snowshoeing, wildlife viewing, ice fishing and skating (when the conditions permit). As Silver Springs is steadily increasing in popularity, it is clear that it does not currently have the infrastructure to support the number of people that are recreating there without damaging the fragile and spectacular natural environment, which is located on BC Provincial Crown Land.

The greatest impact to the area is from people carelessly misusing the site from large parties, extremely high volume of day use and some overnight camping. Visitors leave garbage, numerous fire rings and human waste (frequently from toileting) littered about the area. This is especially concerning given that the site is in a high risk, dry forest within close proximity (5 km) to the Canfor Elko lumber mill, an important local employer, as well as residents of Elko and the valley. Downwind are the communities of Morrissey and Fernie.

Elk River Alliance (ERA) volunteers have been stewarding Silver Springs since 2011, as part of the Great Canadian Shoreline Cleanup. They were motivated to do so after hearing that locals no longer wanted to visit the site, heart broken by the degradation and unruly atmosphere. Since cleaning up the site, volunteers have noticed continued damage to a point where the impact is becoming extensive, with the most troublesome impacts being human waste and feminine hygiene products, as well as garbage left by random camping such as numerous fire rings. Many shards of broken glass left on the rocks are also a hazard to people walking barefoot to jump off the cliffs.

In order to address the problems associated with Silver Springs' growing popularity, ERA produced the Silver Springs Stewardship Solutions Report in 2014 based on background research, on-site interviews and on-line community surveys. Specific recommendations from this report included: 1) a backcountry toilet be installed in order to reduce human waste being left on site; 2) ongoing cleanups throughout the summer/fall from ERA stewardship teams; 3) posted signage stating 'Day use only - No Backcountry Camping' and; 4) designate an established parking area. ERA has implemented recommendations 2-4, organizing bi-annual site cleanups, posting information and interpretive signage to educate visitors, though this has had limited success due to vandalism that occurred two months after installation.

In 2016-17, ERA constructed and graveled a parking lot to provide safe, legal parking at the base of Silver Springs with a new hiking trail following the historic access road to Silver Springs. The new parking lot and hiking trail directs users away from the illegal non-motorized area and out from under the BC Hydro Right of Way.

With encouragement from ERA, BC Hydro installed a gate that blocks vehicle access up the hill preventing erosion and the potential for accidents at the tight turn-around. This BC Hydro Right of Way is also listed as 'non-motorized' as indicated in the Provincial Regulations for the Wigwam Flats Access Management Area (FLNRO, n.d.). BC Hydro does not want people parking on their Right of Way due to the risk of the overhead hydro lines and blocked access in the event maintenance is required for the line.

Three interpretive signs were developed, printed and installed in the spring of 2017 guiding visitors from the parking area to the first lake. These signs were developed using a positive message to help educate guests about the natural history and significance of Silver Springs and to encourage no trace use ethics and safe recreational activities. Unfortunately, within several weeks, the interpretive signs were stolen and/or vandalized. Fortunately the directional signs remained intact. The signs were reprinted and will be re-installed in summer 2018.

ERA is committed to continue working with the BC Government to steward this area and encourage its sustainable use. However, the camping situation has not been addressed due to the site's location on Crown Land, where camping is technically allowed for up to 14 days. Camping prevalence has increased.

Additionally, the area continues to see an increase in usage, likely due to the ongoing tourism promotion of the area. Silver Springs has been promoted by Tourism Fernie on their website as a destination location, including a printable PDF with a map, directions and advertisement activities for Silver Springs. Further, the webpage also promotes a "second parking area," referring to the unsanctioned parking on the BC Hydro Right of Way. See Appendix A for the Tourism Fernie webpage and associated downloadable PDF.

Tourism Fernie has posted a promotional video of Silver Springs to their YouTube account (https://www.youtube.com/watch?v=B0p7ZY3uvMw) that they have linked to their website and vice versa. The video was produced by Module Creative Agency, a marketing agency based out of Calgary, and it depicts groups of young adults recreating by the Silver Springs cliffs, drinking and cliff jumping on a beautiful sunny day. An electronic song titled "Brazilian Blowjob" accompanies the video. The video is designed to endorse Silver Springs as a sexy and carefree tourist destination in the summer where anything goes, yet there are no facilities available to support its increased use.

Silver Springs' popularity continues to grow at an unsustainable rate. The problems associated with managing the area also grow to such an extent that the community cannot keep up with the challenges. Increased garbage and toileting waste (i.e. toilet paper, human waste and feminine hygiene products) pose the greatest threat to the site. Further,

there has been increased vandalism, with the interpretive signs installed in spring of 2017 having been destroyed and/or stolen, and the gate that was installed in spring of 2015 having been smashed with a vehicle in an attempt to pull it out. The motivation behind the vandalism is unclear and deserves further investigation.

1.3 Silver Springs Backcountry Toilet – Phase 1: Feasibility Study Purpose

Silver Springs is an easily accessed backcountry site that has seen increased visitation annually. It has high ecological, conservational and recreational values that need to be maintained. In order to do so, given its increased use, the area requires a greater degree of management. Ensuring the sustainability of the environment and protection of the exceptional recreational experiences will require ongoing planning, community engagement and increased involvement from the BC Provincial Government.

Since ERA has been working on the recommendations 2-4, as noted above, the purpose of this report is to address recommendation 1, which is that a backcountry toilet be installed in order to reduce human waste being left on site. This report outlines the different options for backcountry toileting use that are available for Silver Springs, including the potential risks and rewards.

While surveying the site and its users, it became clear that the popularity of the site has increased significantly in the few years since the initial Silver Springs Solutions Report (Walker, 2014) was developed. The site now sees hundreds of visitors on any given weekend during the months of June, July and August. There is a need to address issues of proper legislation, policy, regulations and enforcement to appropriately manage the volume of visitors using the site. This needs to include not only the issue of toileting waste but also garbage collection, overnight camping, fires and parking. The parking issue is a growing concern with people continuing to park on the BC Hydro Right of Way, but also along the River Forest Service Road, where trucks are actively hauling logs destined for the Elko Mill. This poses extreme danger to the public visiting Silver Springs, since most are without radio contact with industrial vehicles.

This report makes several suggestions on how to manage the Silver Springs BC Crown Land in order to ensure its sustainable recreational use. There are several ways that community may still continue to steward Silver Springs, such as periodic cleanups of the site, but it is clear that the Provincial Government will need to demonstrate leadership as the statutory decision maker on how the land will be managed and implement the change with some means of enforcement. The route that the Provincial Government chooses to take in order to better regulate land use at Silver Springs will determine the success of the different toilet options available to be used at Silver Springs. As a result, proper land management moving forward will be as important as the decision to install a backcountry toilet, and will affect the toilet selection and its success.

2.0 Literature Review

2.1 Toileting Options for the Backcountry

Humans produce, on average, 128 g of feces every day (Rose *et al.*, 2015). Waste management is extremely important in order to appropriately deal with the health concerns surrounding the accumulation of human waste. The presence of bacteria in the human intestinal tract is a critical factor in proper digestion, but as a result anywhere from a quarter to a third of human feces consist of bacteria (Kowal, 1982). Many of the bacteria found in human feces, such as *Escherichia coli Salmonella spp.*, and *Campylobacter spp.*, are infectious and exposure to feces puts people at risk of disease (Strauss, 1985). The improper management of human feces may result in the contamination of ground and/or drinking water, leading to human illness significant distances away from the feces deposit.

In most inhabited areas of British Columbia, the issue is dealt with using sewage systems or septic fields that properly treat human waste before it re-enters the environment. However, there are many wild places where people choose to recreate where amenities such as running water and sewage disposal are not available. Depending on the popularity, access, geology and management of the site, different options may be utilized in order to address this issue. The following is a review of the different methods commonly used in the management of human waste in remote locations, along with the important considerations for each option.

The first two options (digging a cat hole and packing out human waste) offer unique solutions in that, instead of involving a centralized collection of human waste that becomes the responsibility of land managers to collect, they put the onus of removing human waste on the individual who created it. While it may initially seem that this will require less effort and infrastructure on the part of the land manager, this is not necessarily the case as it involves significant user compliance.

These two wilderness methods for managing human waste, cat holes and pack-out programs, are first discussed below, followed by four common centralized waste collection options, each with varying costs, user compliance and ongoing maintenance. The four centralized waste collection options discussed are: pit toilets, vault toilets, barrel toilets and composting toilets.

2.2 Cat Hole

The digging of a “cat hole” in which to bury a small amount of human waste is a common option in many wilderness situations. Studies conducted on this practice and the rate of bacterial decline after burial have found that burials of fecal matter at different sites of unique elevations, soil type, vegetation and depth did not have a significant impact on the rate to which bacteria breaks down (Temple *et al*., 1982) and that, in general, bacteria will still be present after a year of decomposition (Reeves, 1979). As such, this technique is appropriate for recreational sites that see low human use and have

suitable environmental conditions, such as significant soil depth and availability to completely cover the feces. Stirring the feces with soil will help promote a faster decomposition rate (Temple *et al*., 1982). The location should be 60 m from a potential watercourse, so as to avoid the contamination of groundwater (Cilimburg *et al.*, 2000). Users are requested to pack out or burn paper products. However, if any of these conditions are not met, or if there is not sufficient education regarding the appropriate procedure, this method may yield unsightly and potentially unhealthy results for future site users.

2.3 Pack-out Programs

Pack-out programs involve site visitors packing out their feces, toilet paper, and other garbage such as feminine hygiene products, and disposing of them offsite. In order for this method to be a successful waste management technique, there are a number of criteria that need to be met, including education with the users on the expectations, benefit of user compliance and, ideally, a centralized location for bag drop-offs at all exits and an agreement with landfills to accept this waste (White, 2010).

As a result, this option is ideal in situations where people might be going a long distance into a wilderness area, will be staying one or more nights, or are spread out over a large area and a single location for centralized waste collection is not feasible (Robinson, 2016). The practice of “packing out what you pack in” especially in regards to waste is not one that necessarily all people are familiar with and so there is a need for education and materials that better enable this behaviour. (e.g. provided bags, disposal waste containers for collection; White, 2010; Robinson, 2010). Changing the habits and toilet culture of the site users is the most difficult part and often requires staff to monitor and implement this plan with an extensive education program.

2.4 Pit Toilet

The pit toilet, also known as a ‘privy’, is one of the most common backcountry toilets, likely due to it being the cheapest and easiest to construct of all the centralized toilet options. Pit toilet designs can range from very small and simple options to much larger and more complex designs. On the one end of the spectrum, a pit toilet may simply consist of a small hole that is dug in the ground with no aboveground structure, and individuals will squat over the hole when they excrete waste or sit on an outdoor ‘throne’ exposed to the elements. On the other end of the spectrum are designs that may include large holes to a depth of 3 m that are reinforced with rot resistant wood. An aboveground toilet structure complete with walls, a door and a toilet seat on a riser can then be installed on top. Once the pit is filled or decommissioned, the aboveground structure can be moved to a new pit or dismantled and the pit can be covered with earth.

While inexpensive to install and manage, there are health and environmental issues regarding the use of pit toilets. There is not a significant degree of research into the breakdown of pathogens in pits, as most of the existing research pertains to shallow holes (Temple, 1982; Cilimburg, *et al*., 2000; Sherlock *et al.*, 2002) where there is a greater

degree of microbial and plant activity. However, pit toilets have been considered by many to be one of the least healthy ways of disposing of human waste and may pose a hazard to human health depending on its construction or location (Interior Health BC, 2006). This is due to the fact that, without containing the waste within the pit with an impermeable barrier, these toilets have the highest risk of pathogen and nutrient transmission (Hill, 2013).

While dry soils attenuate bacterial growth and help facilitate the uptake of excess nutrients through plant and microbial pathways, saturated soils sustain pathogens and increase the risk of transmission by leaching into the ground water (Moore *et al.*, 2010). Therefore, despite the hopes that natural processes in the soil will treat the human waste on site in a pit toilet, this often does not occur, especially in instances where the ground water is not far from the bottom of the pit. Worse, these carry the highest risk of polluting the ground water, resulting in a greatly increased transmission distance and rate, along with improved survival rates for different pathogens (Moore *et al*., 2010; Cilimburg *et al*., 2000).

In British Columbia, there are no standards or regulations on how or where to construct a pit toilet. BC Parks uses pit toilets on their property and they try to follow a personal code of best practice recommending digging a hole for a pit toilet to a depth of 2.4 m (K. Villeneuve 2017, Personal Communications, November 29, 2017). However, this practice has been criticized as the depth poses greater risks from pathogen and nutrient transfer into ground water (Hill, 2013).

Interior Health BC (2006) similarly warns of the risks to human health from improperly built or located pit toilets, and recommends much stronger guidelines for locations and building parameters. These guidelines suggest the pit be dug to a depth of 1 to 1.5 m, reinforced with crib sides to prevent sloughing. Interior Health BC further recommends analyzing the soil composition and water table to ensure that in silt or clay soils that retain water more efficiently the bottom of the pit be at least 0.6 m above the water table. In sandy soil and gravels, a minimum difference of 3 m is recommended. Further, privies should be a minimum of 30 m from water sources (Interior Health BC, 2006). Determining the potential pathogen and nutrient pathway into waterways involves expensive and challenging ground water studies (R. MacDonald, Personal Communications, December 28, 2017). As such, it is suggested to follow the guidelines provided by Interior Health BC as a precautionary approach.

2.5 Vault Toilet

Vault toilets are not so much a “backcountry” toilet option as they are a “frontcountry” option, as they require road access in order to construct, install and maintain them. Road access is required in order to periodically remove the septic waste from the containing vault, which may then be removed for treatment at an agreed facility. In backcountry areas that are easily accessible (less than an hour walk) to a road access point, and parking area where parties will begin and end at, this option may work to reduce on-site toilet waste.

Vault toilets are designed to be impermeable to the surrounding environment and thus reduce many of the negative effects of pit toilets in terms of leaching pathogens and nutrients into the ground water. Vaults are essentially built as a septic holding tank, where a pit is dug, lined with free draining rock and filled with a concrete septic tank upon which a cover, toilet riser and building can be installed. The addition of a vent stack is important in order to make the structure odor-free (K. Villeneuve, Personal Communications, November 29, 2017). Vault toilets are also reusable, and do not require that a new pit be dug when the old one is full. Handling of the material is significantly less than that involved in barrel and composting toilet options (discussed later).

This option is more expensive than a pit toilet, and it requires periodic removal of the vault contents by a septic pump truck and an agreement with a treatment facility to accept the waste, but it will not need to be relocated when it is full. This is a preferred option for many BC Parks where it is accessible to do so (K. Villeneuve, Personal Communications, November 29, 2017).

2.6 Barrels

The barrel is a common backcountry hut toilet option, especially for popular high alpine sites in the Columbia Mountains and Canadian Rockies. The barrel is placed either in a dugout that is accessible from below, or on the ground and then a structure is placed above that within which there is a toilet. When the barrel is full of waste it is flown by helicopter offsite to be treated (Hill, 2013). This option in essence works similar to the vault, where the sewage waste is maintained separate from the surrounding soil until it can be removed and treated elsewhere, but at a much greater cost. The cost of helicopter flight and the challenges of moving barrels of sewage from one location to another vary from location to location, but are never insignificant amounts and depend primarily on flight time (G. Lavery, Personal Communications, November 28, 2017). In addition to the costs of flying the barrels to the site, there are costs associated with handling the waste for treatment at an appropriate, agreed upon facility.

Barrels have been used in BC Parks, and also in conjunction with some composting toilets that were not breaking down the material at a great enough rate to keep up with the use, or were defective and did not break down material at all (K. Villeneuve, Personal Communication, November 29, 2017). These systems have been replaced by composting toilets built by a business called Toilet Tech Solutions and will be reviewed in composting toilets. Urine diversion from solid human waste has also been shown to help reduce the frequency of flights by reducing the mass of the deposits left after each use (Hill and Henry, 2013). This can easily be done using a urine diversion seat; however, another important factor to consider with this system is how likely the user group is to misuse the barrel and drop garbage inside, increasing the rate at which the barrel will fill and therefore increasing the frequency of trips and associated costs.

2.7 Composting Toilets

There are different kinds of composting toilets that have been developed for use in backcountry environments with the primary goal being to break down human waste on-site. These waterless systems are designed to, as the name suggests, break down the material into safe, pathogen-free compost. However, it has been found that many composting toilets did not meet this goal and the final product is still very high in pathogens (Hill *et al*., 2013). This may occur because of overuse of the facility, a lack of maintenance, low temperatures and a large quantity of urine. Urine results in a high pH and ammonia that weakens the microbes' ability to break down the matter into useable compost (Hill, 2013).

Composting toilets available for use in North America generally fall into two categories: mixed latrine style composting and urine-diverting composting. In mixed latrine style composting toilets, a bulking agent such as sawdust is added along with toilet paper and human waste to the holding container with each use. The bulking agent adds the necessary microbes and aerobic bacteria needed to aid in decomposition of fecal matter. The bulking agent also helps absorb the urine, creating a dryer environment for the microorganisms to work. Urine-diverting composting toilets separate urine from fecal matter prior to entering a holding container in order for the feces to be broken down more effectively. This process often requires the use of a conveyor belt to separate solids from liquids; the liquids are discharged onto a dispersal field on the ground and the solids are held for further decomposition.

In the Elk Valley, mixed-latrine style composting toilets have been used at the Thunder Meadows hut and the Tunnel Creek hut for several years. These toilets have, to date, provided an alternative to flying barrels of human waste out from the backcountry huts without requiring any maintenance **(**Ian Stokie, Personal Communications, December 1, 2017). They are designed to allow urine to discharge after they have entered into the containment portion of the composting toilet, to create a drier, more microbe-friendly environment. This has resulted in the breakdown of the human waste matter and to date there has been no need to remove any human waste material from the sites (Ian Stokie, Personal Communications, December 1, 2017). The solid material does occasionally need to be moved to the side as a tower forms, and if garbage were placed in the facility then it would need to be removed for full decomposition to occur. There has been no testing to confirm that the material is suitable for use as compost, but as it has not accumulated to a great enough degree to require removing the material, it has not been an issue. Should it be necessary to remove the compost due to a greater accumulation, it would be necessary to test the material as it may result in pathogen transmission to the ecosystem (Wichuk and McCartney, 2010). If the material is not suitable for compost application, it may need to be flown out in a barrel to an agreed upon waste treatment facility.

It should be noted that these huts see the majority of their use in the winter, when no decomposition will occur, and the human waste is simply stored until it can begin to breakdown in the summer, when there is significantly lower use rates. These huts will see overnight guests every weekend over the winter and so will receive regular inputs.

However, it should be noted that, at most, ten people are likely to use these huts for a weekend and are generally away from the facility during the day. As such, the collected waste is mostly feces and has the summer to decompose without receiving further inputs. Furthermore, the users of these backcountry sites are more cognisant of the "pack out what you pack in" rule and are more likely to comply with important guidelines in maintaining the toilet (e.g. not putting garbage and feminine hygiene products down the toilet, adding sawdust with each use, etc.). The backcountry ski touring hut user group is likely different than that of the user group at Silver Springs in terms of size and likeliness to comply with procedures. This will be discussed further in the Community Engagement and Toilet Technology Review chapters.

BC Parks has also been utilising composting toilets in several remote sites on their property and have selected urine-diverting composting toilets to manage human waste at these locations. These toilets have been highly successful in reducing human waste build-up and have eliminated the need for barrels to be flown in and out of the sites to date (K. Villeneuve, Personal Communications, November 29, 2017). The composting toilets are comprised of a urine-diverting conveyor, a throne and a building structure for privacy. The first two were purchased through Toilet-Tech Solutions and can easily be installed on a site upon being first flown in (see Appendix E). The diverted urine is discharged onto the ground and the fecal matter is either placed into a holding container or directly onto the ground to be decomposed; sites that see ~10,000 users per year are considered high use and it is suggested that they use a container option as decomposition might not keep up with deposition, requiring that at some point the materials will need to be removed from beneath the facility (S. Kerr, Personal Communications, December 7, 2017). The decomposing solids could be moved to another location on site for further decomposition, but this is challenging to do when it is a high-use facility that will likely have garbage placed in the receptacle. The facility is promoted as being easy to use and requiring very little maintenance. A single maintenance visit is encouraged annually to clean the urine tray and pipe, wipe down the conveyor belt and shovel the solids to the side to create more room for future uses (S. Kerr, Personal Communications, December 7, 2017). Overall, users appreciate this style of composting toilet due to the absence of odours and unappealing visuals (S. Kerr, Personal Communications, December 7, 2017).

3.0 Site Survey and Selection

Silver Springs is located approximately 3 km east of Elko, BC on the River Forest Service Road (Figure 1). As it is part of the Wigwam Flats Access Management Area (AMA), it has restricted motorized vehicle access in order to reduce detrimental impacts to the local wildlife. As part of this AMA, only the River Forest Service Road (main gravel road) accessing Silver Springs is open year round, and all other roads that access the site are closed to motorized traffic (FLNRO, n.d.).

The parking lot developed by ERA is located on the River Forest Service Road at 49° 18’ 10.342”, -115° 4’ 44.075”. The first information sign is located here and provides basic information for safe, healthy backcountry use (Figure 2a). From the parking lot, the improved access trail begins upward to the first Silver Springs lake. The terrain is rocky and occasionally steep (>30 degrees). At 49° 18’ 10.581”, -115° 4’ 25.372” the trail meets with the old, unsanctioned parking area on the BC Hydro Right of Way. After 480 m, approximately a twenty-minute walk, the trail reaches the base of the first Silver Springs lake. From here the trail dissipates and there are many walking options around the first lake until it reconvenes further on where a single trail continues to the second and third lakes. There were three interpretive signs installed in the spring of 2017, all of which were vandalized within two months of installation. Two were stolen and one has been cut and shot at (Figure 2b).

Figure 1. Overview of Silver Springs location relative to Elko, BC.

Figure 2. First information sign located at parking lot (a), and vandalized interpretive sign located at the jumping cliffs (b).

In May of 2016 an archeological assessment was conducted with Tipi Mountain Eco-Cultural Services Ltd. examining 1.1 km of trail from the trailhead of the parking lot to the first lake, as a preliminary reconnaissance of the area. No archaeological materials or sites were observed, recorded or are otherwise suspected within the proposed boundaries of the Silver Springs Stewardship development. From the report, archaeological potential was deemed low for the project due to the steeply sloping terrain surrounding the sign 1 location and exposed bedrock at the sign 2 and 3 locations, as well as the lack of developed soil horizons and the saturated nature of the sediment cap at the proposed dry toilet location. The full archeological assessment is attached as Appendix B.

In December of 2017, a site assessment was conducted with Align Surveys to determine elevations for different backcountry toilet options available for Silver Springs users. The completed survey map is attached as Appendix C. Soil analysis for two prospective pit toilet locations was conducted on the same day.

A test pit was dug at 49° 17’ 55.327”, -115° 4’ 24.464” to investigate the potential to install a pit toilet. This site was selected from a preliminary site assessment looking for the following characteristics: level ground, minimal exposed rock at surface, enough soil

to dig a pit approximately 1 m in diameter and 2 m deep and large enough to allow multiple pits so that when the first one is full it can be covered and the structure moved to an adjacent pit. This site was the only potential location for a pit toilet, as the surrounding ground either consisted of exposed bedrock or thinly covered shale deposited by an adjacent slope. The area is easily accessible by users, and is often the site selected by users to leave toileting waste, regardless of the current absence of a facility. The results of the pit yielded that a hardpan layer existed at a depth of approximately 60 cm, which halted further excavation. Of the material that was excavated the top 10 cm consisted of soil overburden and the remainder consisted of dense silt. The conclusion from this test pit is that it is not feasible to install a pit toilet at the higher use location near the cliffs.

Another pit analysis was to be conducted at the parking lot. However, the pit was not completed, as the preliminary soil assessment using a soil augur revealed that at a depth of 80 cm the ground was waterlogged, despite the absence of any recent precipitation. Further, the elevation of the test pit in the parking pit was only 3.4 m above and approximately 30 m away from a nearby stream channel of an adjacent wetland to the road. Given the sandy loam composition found in the soil augur samples and the potential for pathogen transmission to ground water and nearby wetland, this site would similarly not work for a pit toilet.

At 49° 18’ 2.047”, -115° 4’ 26.299” is the selected location for a potential composting toilet to be installed. This site was selected because it is relatively flat, in a wide, open area to allow sunlight to help with the breakdown of materials stored in in the containment portion of the composting toilet and is visible to people as they come to the cliff-jumping area. The site is approximately 70 m away from the first lake, but is located approximately 13 m above it, and the facility could be positioned so that any fluids draining would be directed away from the lake as there is adequate vegetation and soil available to absorb any fluids that leak from the structure before they would meet ground water.

4.0 Community Engagement: Site Survey and Visitor Counts

In August of 2017, an ERA summer student and ERA Program Coordinator conducted 125 on-site surveys at the Silver Springs first lake and an additional 78 surveys collected online, for a total of 203 respondents. The survey questions are available in Appendix D. In addition to quantitatively assessing Silver Springs' visitor experience and thoughts regarding human waste and garbage, a qualitative assessment has also been done taking comments, concerns and suggestions from site users either on-site or online.

4.1 Quantitative Analysis:

Summary of assessment of the need for a backcountry toilet:

- Respondents were overwhelmingly in favour of a backcountry toilet, with 39.8% stating that it was desperately needed; 52.8% ranged in their feelings that it could help but is not essential; and 7.4% saying that Silver Springs would not benefit from a back country toilet.
- 55.1% of site users said that they needed to use a toilet during their last visit to Silver Springs.
- When users are faced with the need to use a toilet while currently recreating at Silver Springs, 15.3% said that they use a toilet before arriving at the parking lot; 54.6% said they will urinate at Silver Springs but will otherwise hold it; 4.1% said they will hold it regardless of the type of bodily function; and 26.0% say they will relieve themselves on-site at an undisclosed location.

Summary of user group knowledge/compliance regarding composting toilets:

- 16.0% of Silver Springs users were very familiar with composting toilets having used one before; 39.9% were fairly familiar, knowing a little about the process; 23.9% were only a little familiar with the idea of them; and 20.2% were completely unfamiliar with composting toilets.
- The majority of respondents said that they were likely to follow the instructions when using a composting toilet, with 57.6% saying they were very likely to follow instructions and 34.2% saying they were likely to; 6.6% of respondents said they were unlikely to follow instructions and 1.6% said they very likely would not follow instructions.
- When asked how likely the respondent thought other Silver Springs' users were to follow instructions when using a composting toilet, 43.0% said that it was unlikely for instructions to be followed; 37.2% said it was likely for instructions to be followed; 14.0% said that it was very unlikely; and 5.8% said that directions would very likely be followed properly by other users.
- The majority of respondents also believe that a backcountry toilet would be misused, such as being vandalized, with 47.7% saying it would likely be vandalized; 17.8% saying it would very likely be vandalized; 32.0% said it was

unlikely that the structure would be misused; and 2.5% said it was very unlikely that the facility would be misused.

- Most of the respondents wanted the outhouse to be located near the first lake, either at the top of the hike (39.0%) or further along the trail and closer to the first lake (33.2%), while 23.2% wanted it situated at the trailhead and 4.6% suggested somewhere else altogether.
- In the event that a toilet was installed at the trailhead and the respondent needed to use it during their visit, 59.2% of respondents said they would use it prior to hiking up to the lakes or 'go before you go' to Silver Springs; 11.7% said they would hike back down to use it if they needed to; 13.7% said they would hold it until they left; 6.7% said they would plan their visit so as to not need to use it; and 8.8% said they would not use the outhouse and would relieve themselves at the first lake.
- In the event that an outhouse be installed at the first lake, most respondents believed this would encourage camping, with 24.2% saying it would definitely encourage overnight camping and 53.8% saying that it would likely encourage camping; 20.4% said it was unlikely to result in overnight camping and only 1.7% said it would definitely not result in camping.

4.2 Qualitative Analysis:

Based on comments from site users, garbage continues to be a primary concern for many and is degrading the experience for other site users, many of whom refuse to recreate at Silver Springs anymore due to the negative experiences they have had. Major garbage-related themes found in visitor comments can be summarized as follows:

- Seeing messes such as garbage or human waste infuriates and disgusts visiting parties and degrades their recreational experience.
- When people have been seen littering there are three common outcomes:
    - Polite encouragement to do the right thing: many people have tried to educate the litterers about packing out what they pack in, to varying degrees of success.
    - Direct confrontation: many people angrily confronted the litterers tending to escalate the problem.
    - Ignoring litterers: many recreationalists listed that they were concerned for their own safety should they confront the litterers.
- A large number of people that visit Silver Springs state that they expect there to be garbage and that they regularly pack out other people's garbage, but many expressed that they are tired of doing so.
- A common suggestion is to have a greater presence from Province of BC Conservation Officers or another person of authority (e.g. BC Parks Park Facility Operator (PFO), campground attendants etc.) as people do not listen to other civilians.
- A common theme is the need for better protection of the area and the need to turn it into a BC Provincial Park in order to properly maintain it and provide the necessary services required for the number of people visiting the area.

- Many people pointed out that there is no way to "undo" the damage that has been done by promoting the area and drawing the attention of so many people. People cannot be stopped from going there and so proper amenities and ongoing management are immediately required in order to promote responsible stewardship of the area.
- Parking continues to be a major concern, as there is not enough space even in the expanded new parking lot and people continue to park on the BC Hydro Right of Way and on the active logging road. In order to help with this, it has been suggested that BC Provincial Government buy the private property at the base of Silver Springs that is currently for sale and develop part of it for parking.
- Many people are concerned about the kinds of people visiting the site and the amount of alcohol being consumed; many have chosen to stop recreating at Silver Springs either because they felt unsafe or they felt that the experience was degraded. One commenter said that; "I have not gone back to this place since I took my kids there and had to step around passed out teens, human feces, and empty alcohol bottles."

4.3 Summary of Community Response

The local community is concerned about the frequent toileting that is occurring at Silver Springs without proper treatment, but the issue is much greater than this. There are concerns over the unsafe, illegal parking (non-motorized in the AMA regulations) that is occurring on the BC Hydro Right of Way and along the River Forest Service Road, especially given the excessive industrial traffic there. There continues to be concerns regarding the amount of garbage left by others and especially over how to respond to people that litter. The kinds of people that are visiting Silver Springs and the activities they are engaging in (i.e. drug and alcohol consumption) have resulted in a general concern for personal safety and in the decline in user experience. The combination of drug and alcohol use along with the risks associated with cliff jumping pose a major safety concern, particularly difficulty of evacuation if an incident were to occur. The need for a member of authority, whether that be a Conservation Officer or a Park Facility Operator, was expressed, as was the need for a change in legislation to manage user activities e.g. Wildlife Management Area (WMA).

In regards to the installation and use of a composting backcountry toilet, most users are in agreement that one is needed. There is debate over the best location for an outhouse, but there is a fear that, especially at the first lake location, the toileting facility will be misused or even vandalized, especially without either garbage service or a person of authority present to monitor activities.

Most respondents want to see an outhouse at Silver Springs, especially one installed at the top of the lake where the problematic toileting is occurring. However, the majority of respondents are confident that this would encourage overnight camping. Further, there was little confidence that the general type of user group at Silver Springs would properly follow the directions for a composting toilet, that garbage would likely be put in the toilet facility and that the structure would be vandalized.

5.0 Toilet Technology Review

For the purpose of reducing the human waste at Silver Springs there are a number of toilet options. These options are described below. It should be noted that there is no perfect option and all of these options will require some degree of ongoing maintenance or management (i.e. education and enforcement) to ensure proper use. Many of the risks associated with each option are known, but how likely they are to occur and to what degree they will impact the success of that option and its costs cannot be quantified (for example, it is unknown if and how much garbage may be put in a toilet located at the first lake, affecting the cost of servicing that facility). And finally, important considerations include: cleaning the facility, as people are likely to create a mess of outhouses; if the facility will be stocked with toilet paper; and how the site users' behaviour will be monitored.

The Silver Springs first lake, the infamous cliff-jumping site and most popular location at Silver Springs, is approximately a twenty-minute hike from the parking lot. It is not unreasonable to place a toilet at the base of the hike and ask patrons to walk back to use it. However, there are site users that will not return to use this toilet if needed while they are at the lake because of the distance, in which case the problem will persist, though likely to a lesser degree. There are three options of outhouse that are available for Silver Springs located at the public parking lot: a pit toilet, a vault toilet, and/or a portable toilet.

A pit toilet is the cheapest option available. However, this option is strongly not recommended due to the sandy composition of the surrounding ground and the proximity to a nearby stream channel and wetland. The stream is only 3.4 m beneath this location in low water and approximately 30 m away, so the risk of pathogen transmission to the surrounding ground water and back into the Elk River is significant. In its place a vault toilet could be used that could be easily accessed and maintained due to its proximity to the road. There are two vault toilet options available that were examined in this report. A third option that is similar to a vault toilet but that is temporary and cheaper in the short term is a portable toilet. However, this option is not advised in a remote location such as Silver Springs. When portable toilets are left unattended, "people love to push them over" as was noted by Len Wright of Wright Septic. Furthermore, a portable toilet costs $100 to rent/month and will likely need to be serviced between two and four times a month, at $75/service. The question is then raised: who will pay for the monthly bill? This is only a temporary option requiring a more permanent solution to the problem.

The toilet options at the first lake are limited due to the geology of the surrounding area, as it contains primarily exposed or loosely covered bedrock. There is only one location that has soil in which a potential pit was explored, but was found unsuitable due to its limited soil depth. Further, the site is at the base of a shale slope and therefore likely a part of a drainage ditch and not an appropriate location for a pit toilet. Due to the remoteness and lack of access, a vault toilet is not an option either. Pack-out programs are also unlikely to work due to the resistance that has been presented by a significant portion of the Silver Springs user population to pack out garbage let alone human waste. Fly out barrels are an option for this location, but carry a large, ongoing expense. As

such, they have not been considered as a sole option, but as an option that may be used in conjunction with an on-site composting toilet. Composting toilets also offer a potential solution, but have the potential to carry a more significant amount of ongoing maintenance costs. A mixed latrine style composting toilet and a urine-diverting composting toilet option are discussed below. However, both these options will require maintenance, education and monitoring to ensure that the facility is not misused.

Especially without any garbage service, it is likely that this facility will be used as a garbage receptacle. Vandalism will be higher consequence, as both composting toilets are expensive to produce and fly in, and less resilient to vandalism due to the lack of durability such as a concrete building. Further, having an on-site toilet option at the first lake will encourage overnight camping at Silver Springs.

Portable Toilet

A portable toilet rental is a short-term option that could be placed at the Silver Springs parking lot. The prices below are quoted from Wright's Vacuum & Septic Service, (6850 Rosen Lake E Rd, Jaffray, BC V0B 1T0, (250) 429-3779) but there are many other portable toilet services available in the Fernie-Elko-Jaffray-Cranbrook area. The cost to rent a portable toilet is $100/month and there is a $75/service fee. Likely the unit will need to be serviced at least twice a month, if not weekly. Important considerations for this option are:

1) Though it requires little upfront cost, the ongoing rental and service fees will add up quickly and it is not financially feasible in the long run to create an ongoing expense.
2) The unit may be tipped over, especially given the remoteness of its location, resulting in a large mess. If it tipped over, the provider may refuse ongoing service.
3) People may still choose to not hike back from the first lake if they need to use a toilet and instead relieve themselves near the first lake despite the portable toilet at the parking lot.

Pit Toilet

A pit toilet is a mid-term option that could be installed at the Silver Springs parking lot at the River Forest Service Road. However, due to the geology at the parking lot and its proximity to a nearby stream channel and private land currently for sale, the Elk River Alliance does not endorse this as an option. This private land contains wetlands and ephemeral stream channels. The soil composition under the parking lot is sandy in nature and therefor the site is at greater risk for pathogen transmission into the ground water. The Elk River Alliance strongly discourages this option, but has provided price quotes and further considerations in the interest of providing a comprehensive comparison.

A pit toilet would be one of the least expensive options and would not require a significant financial investment upfront, approximately $2500 to install (price quoted

from Stokie Enterprise; Fernie, (250) 423-0726), nor would it incur significant maintenance costs. The structure would need to be moved once the pit is full of waste and then the pit would need to be filled in. How often this would need to occur is unknown as there is currently no toilet at Silver Springs to base activity use on and it cannot be speculated if/to what extent garbage might be dumped in the pit; if it is used as a garbage receptacle it will fill faster. A further consideration is that if people still choose not to hike back from the first lake if they need to use a toilet, they will instead excrete near the first lake.

Vault Toilet – Option 1

A vault toilet constructed and installed by Tri-Kon Precast Concrete Products (601 Patterson Street West P.O. Box 491 Cranbrook, BC, (250) 426-8162) is a long-term toilet option. These toilets are commonly used by BC Parks and BC Ministry of Transportation, and have demonstrated professional and durable products that are less susceptible to damage from unruly site users. The initial cost for the structure to be built and installed is $13, 500, and will require seasonal maintenance ranging from $150-$250 per service, depending on the size of the septic tank (quote from Wright's Vacuum & Septic Service). Further considerations are: septic tank may fill faster, especially if it is used as a garbage receptacle, and may require more frequent emptying; people may still choose to not hike back from the first lake if they need to use a toilet and instead excrete near the first lake.

Figure 3. Single stall outhouse units developed by Tri-Kon Precast Concrete Products; photos from http://www.trikonprecast.com/outhouses

Vault Toilet – Option 2

A vault toilet constructed and installed by Beau West Contracting (Grasmere, BC, (250) 278-3475) is another long-term option. These toilets have been used by the Ktunaxa Tobacco Plains Band at their Big Springs Campground and have demonstrated durable products at a more affordable price than the first vault toilet option. These products have been designed to be heavy to avoid being tipped over, though one facility was been knocked over from extreme weather conditions that toppled several trees. The initial cost for the structure to be built and installed is approximately $4000 and will require seasonal maintenance ranging from $150-$250 per service, depending on the size of the septic tank (quote from Wright's Vacuum & Septic Service). Further considerations are: septic tank may fill faster, especially if it is used as a garbage receptacle, and require more

frequent emptying; people may still choose to not hike back from the first lake if they need to use a toilet and instead excrete near the first lake.

Figure 4. Single stall outhouse unit developed by Beau West Contracting.

Composting Toilet – Option 1

A composting toilet developed by Toilet Tech Solutions (Scott@toilettech.com, (604) 828-3608, http://www.toilettech.com) would provide a long-term, on-site toilet option at Silver Springs' first lake. A urine-diverting composting toilet has demonstrated the ability to most effectively breakdown human waste and is more likely to yield compost when compared to a mixed latrine-style composting toilet, according to the literature. This option will cost approximately $5000 for the urine diverting conveyor and a throne (see figure 5). It may also require a small platform to be developed upon which it can sit as it would be located on rock that may be uneven. The surrounding building would also be required. This will cost approximately $1000 for the platform and $2500 for the structure. All of the components and materials will need to be flown in via helicopter, at a rate of approximately $600/flight, and will require a minimum of two flights. Two contractors will need to install the unit once it is delivered onsite (see Appendix E for installation guide). Paid at a rate of $50/hr for one 8-hour day, this brings the total installation cost of $10, 500. Further ongoing maintenance is required, and will likely be above and beyond the quoted amount provided by Toilet Tech Solutions, as the site users are more likely to abuse and vandalize the facility. At a minimum, maintenance will be $150 a season, but likely more. Further considerations are: the addition of garbage will likely require that the solid waste need to be flown off-site for treatment, possibly once a season; garbage services will need to be provided at the trailhead to discourage people from throwing

garbage into the toilet, though this will likely still occur, but hopefully to a lesser extent; this style of composting toilet is the most susceptible to being damaged as it contains moving parts, and once damaged will likely not function and will be difficult to repair; someone may need to shovel the mostly decomposed material into a barrel to be flown out for treatment off-site if the toilet is used as a garbage receptacle. BC Parks has had no issue with this happening while using these toilets, but likely do not have the same user group concerns that Silver Springs does. Overall, this composting toilet option installed at the first lake has the greatest chance of stopping toileting activity at the first lake and breaking down materials onsite. However, this options is also more vulnerable and susceptible to misuse and vandalism compared to the vault toilets. For this reason, improved land management will be even more important for this option to be a success, as will a greater number of maintenance visits and improved user education.

Figure 5. Urine diverting throne developed and distributed by Toilet Tech Solutions; photos retrieved from www.toilettech.com

Composting Toilet – Option 2

A composting toilet constructed by Stokie Enterprises (Fernie, BC, istokie@yahoo.com, (250) 423-0726) would provide a long-term, on-site toilet option at Silver Springs' first lake. Considered a mixed-latrine composting toilet, this toilet option does not have the same demonstrated ability to effectively decompose high usage human waste and remove pathogens to a safe level, having never undergone the same testing as the first option. However, the material will likely not be able to be disposed of on-site due to the presence of garbage and feminine hygiene products that will likely end up in the facility, so this may not be important. Ian Stokie has monitored the composting toilets installed at Thunder Meadows and Tunnel Creek and has observed significant breakdown at these locations, though no tests have been conducted. It is important to note that if the breakdown of the organic material cannot keep up with the rate of deposition, then this method will likely fill up faster due to the addition of a the bulking agent. This option will cost approximately $10,000 for the facility. All of the components will need to be flown in via helicopter, at a rate of approximately $600/flight, and will require a minimum of two flights for a total installation cost of $11, 200. Further ongoing maintenance is required and, similar to the first composting toilet option, is highly variable as site users are more likely to abuse and vandalize the facility. The minimum

maintenance will be $150 a season, but likely more, especially if the structure is misused and the facility fills too quickly, requiring barrels to be flown out seasonally. Further considerations are: the addition of garbage will require that the solid waste will likely need to be flown off-site and accepted for treatment, possibly once a season; garbage services will need to be provided at the trailhead to discourage people from throwing garbage into the toilet, though this will likely still occur, but hopefully to a lesser extent; the bulking agent will need to be stocked at the facility at the first lake, and maybe require being flown in or hiked in in smaller amounts, both of which will add an additional expense. This option would also require the agreement of the City of Fernie to treat the human waste or the RDEK for disposal in their Hosmer Exfiltration Pond if the materials need to be flown offsite. Similar to the first composting toilet option, this option would likely stop toileting activity at the first lake, but is also susceptible to vandalism and misuse, though likely to a lesser degree, as it does not have any moving parts to break. Again, improved land management will be critical for this option to be a success, as will a greater number of maintenance visits and improved user education.

Figure 6. A composting toilet constructed by Stokie Enterprises.

Summary of Toilet Options – Cost-Benefit Analysis

Toilet Option	Location	Maintenance Requirements	Potential Benefits	Potential Concerns/Risks	Approximate Installation Cost	Maintenance Costs	Total Cost over 10 years
Portable Toilet	Parking lot	Ongoing weekly or bi-weekly service and cleaning	No install required Short term solution	Vandalism (if tipped over) Ongoing higher maintenance costs Unwanted toileting at first lake may still occur	$100/monthly for 4 months (rental)	$150-$300/month	$10,000 - $16,000
Pit Toilet	Parking lot	Once full will need to be relocated and filled in Bi-weekly cleaning	Inexpensive and easy to construct and maintain	May result in groundwater contamination due to shallowness May be vandalized Unwanted toileting at first lake may still occur	~ $2500	$500/5 years (depending on depth)	$3500
Vault Toilet 1	Parking lot	Seasonal removal of vault contents Bi-weekly cleaning	Long term solution Least likely to be significantly damaged from vandalism Proven reliability	Most expensive option Ongoing maintenance costs Unwanted toileting at first lake may still occur May be vandalized	~$13, 500	~$150-$250/season	$15, 000 - $16, 000
Vault Toilet 2	Parking lot	Seasonal removal of vault contents Bi-weekly cleaning	Long term solution Less likely to be damaged from vandalism	Ongoing maintenance costs Unwanted toileting at first lake may still occur May be vandalized	~$4000	~$150-$250/season	$5500 - $6500

Continued on next page.

Toilet Option	Location	Maintenance Requirements	Potential Benefits	Potential Concerns/Risks	Approximate Installation Cost	Maintenance Costs	Total Cost over 10 years
Composting Toilet 1	First lake	Annual cleaning and moving of waste material Bi-weekly cleaning	Provides healthy toileting option at the first lake	Potential for contamination of first lake if vandalized May encourage camping Likely to be used as a garbage receptacle which will require removal May still require waste to be removed off site	~$10, 500	~$150/season (unless barrels must be flown, then more, likely $750/ season)	$12, 000 - $18, 000
Composting Toilet 2	First lake	Annual cleaning and moving of waste material Stocked with sawdust or similar Bi-weekly cleaning	Provides healthy toileting option at the first lake	Potential for contamination of first lake if vandalized May encourage camping Likely to be used as a garbage receptacle which will require removal May still require waste to be removed off site	$11, 200	~$150/season (unless barrels must be flown, then more, likely $750/ season)	$12, 700 - $19, 500

Note: Prices do not include potential costs of cleaning, toilet paper or management, except in the case of servicing a portable toilet where the unit would be cleaned and stocked with toilet paper. All other options would require this to be an additional cost, but would depend on how the Provincial Government chooses to proceed with the management of Silver Springs. The decisions regarding land management (i.e. legislative land use restrictions, enforcement, servicing, etc) will significantly impact the success of whichever toileting option is selected for use at Silver Springs.

6.0 Sustainable Operations and Maintenance Plan

Management and care of Silver Springs has been a growing issue for years. Currently, Silver Springs is BC Crown Land managed by the Ministry of Forest, Lands and Natural Resources Operations. Silver Springs falls under the Wigwam Flats AMA designation (FLNRO, n.d.), which does not provide Silver Springs any special treatment or management distinct from other Crown Land. As such, visitors are allowed to camp at Silver Springs for up to fourteen consecutive days (FLNRO, 2014). Littering and dumping is not permitted on Crown Land, and may be penalized by a fine of up to $20, 000 (Land Act, 1996). Without enforcement, this penalty does not appear to be deterring offenders from leaving garbage. Damaging wildlife habitat and leaving substances that may harm wildlife is also an offence (Wildlife Act, 1996) but similarly does not appear to be impacting users' decisions to leave broken glass, plastic six-pack rings and similar harmful items at Silver Springs. Best practices and etiquette of Crown Land use similarly promote leave-no-trace practices, to pack out what is packed in and to dispose of human waste in a responsible manner (FLNRO, n.d.). It also encourages respecting the rights of other users, but many site users are ignoring these "common sense" practices, destroying the natural environment and the recreational experience of other site users.

The current management of Silver Springs, in combination with the growing popularity of the site and the absence of any enforcement, has been a driving force in ERA's attempts to increase stewardship of the site. However, ERA and its volunteers cannot keep up with the number of visitors and have no ability to enforce best practices (i.e. packing out what you pack in). Further, the increasing number of people, along with the consumption of drugs and alcohol by site users, is creating an environment in which it is unsafe to confront people who are littering or being aggressive to other site users.

In reference to maintaining a vault or composting toilet (i.e. cleaning the facility, stocking it with toilet paper, arranging for the removal of waste material, etc.), ERA does not have the means or manpower to take on this challenge without an ongoing funding source. Further, the current legislation governing the land use at Silver Springs similarly does not dictate a party that would manage or maintain this infrastructure.

In order to properly manage Silver Springs and improve both the environmental and recreational experience, one option to provide increased protection would be to designate the area a Wildlife Management Area under section 4 of the Wildlife Act. This would protect the area and the environmental values it provides to fish and wildlife and allow more control over the public use of the land (Wildlife Act, 1996). Through the development of a specific Management Area Plan for Silver Springs, day-use only could then be enforced. Another option to better manage Silver Springs would be to designate it as a Class A Park under section 5 of the Park Act. This would further increase the management of public land use at Silver Springs to preserve the environment for the use and enjoyment of the public (BC Parks, 2016).

Finally, in order to help enforce this designation and maintain a toilet facility, a Parks Facility Operator attendant (potentially engaging the same company as provides service to Kikomun and Mount Fernie Provincial Parks), be responsible to ensure the facility is not misused and monitor Silver Springs, on behalf of the Provincial Government. A combination of education, enforcement and engineering is required in order to properly maintain the ecological and recreational values that Silver Springs provides and an on-site authority figure is the only way to ensure this.

ERA will continue to partner on the stewardship of Silver Springs, organizing volunteers for an annual cleanup. ERA could also seek funding to help continue user education for proper ‘leave no trace’ ethics and to replace any signs that may be vandalized in the future.

7.0 Recommendations for Ongoing Management and Backcountry Toilet Options for Silver Springs

1. BC Provincial Government purchase the private land below Silver Springs, currently for sale, and develop a larger, safer parking area. Parking is a major issue and needs to be addressed, as people are still parking on the BC Hydro Right of Way and along an active logging road. This is extremely dangerous with the busy industrial traffic on the road.

2. BC Hydro move the restricted access gate further east to the River Forest Service Road, providing access to only BC Hydro vehicles on the Right of Way, otherwise it will continue to be utilized for parking. Conservation Officers could ticket motorized vehicles in violation of the AMA if found parked on the BC Hydro Right of Way.

3. BC Provincial Government install a backcountry toilet facility (whether at the first lake, where appropriate to do so, or at beginning of the trail head) based on cost-benefit analysis provided. The Elk River Alliance would strongly encourage that the BC Provincial Government install a vault toilet at the base of the hike until there is a change in the designation of the site and improved enforcement and education.

4. BC Provincial Government either designate Silver Springs as a Wildlife Management Area or as a Class A Park in order to increase the level of protection for the site's ecological and recreational values.

5. BC Provincial Government designate an authority figure such as a Conservation Officer or Park Facility Operator to monitor the area, providing education to site users, delivering fines to site abusers and other duties normally assigned to park officials.

6. BC Provincial Government legislate land use at Silver Springs and develop the capacity to promote Silver Springs as a 'day use only' recreation area with 'no overnight camping' signs. This will need to be enforced by an approved authority.

7. BC Provincial Government increase funding for the protection of Silver Springs to pay for toilet maintenance and increased visitor services at Silver Springs including amenities such as wildlife-proof garbage cans at the base of the trail.

8. Continue to work with community groups such as the Elk River Alliance to help steward the site with periodic site cleanups, assisting with public education of 'leave-no-trace' ethics, and other conservation efforts.

8.0 Conclusion

Stewardship of Silver Springs has been an ongoing activity for several years, with the local watershed stewardship group ERA taking a leadership role in organizing community action. However, due to increased usage of the site and resistance from locals and visitors that have vandalized initial attempts to improve the area, the management of the area needs to be revisited and improved. The installation of a backcountry toilet would further improve the environmental and recreational experience of Silver Springs, but increased management will be imperative for it to be a success. It will only be through a combination of engineering, education and enforcement that a backcountry toilet will not be misused or vandalized.

The different toilet options and their subsequent benefits, locations, costs and risks have been described, but there is no perfect answer. Each option carries its own shortcomings, including cost and maintenance, and all risk vandalism, though to varying degrees. Further, the maintenance of the facility is critical and will need to be considered when selecting an option. It is therefore not a simple matter of constructing a backcountry toilet, but rather will involve revisiting the current land use management of Silver Springs, determining the most appropriate management designation and developing maintenance and enforcement procedures to ensure the toilet structure and site are not misused.

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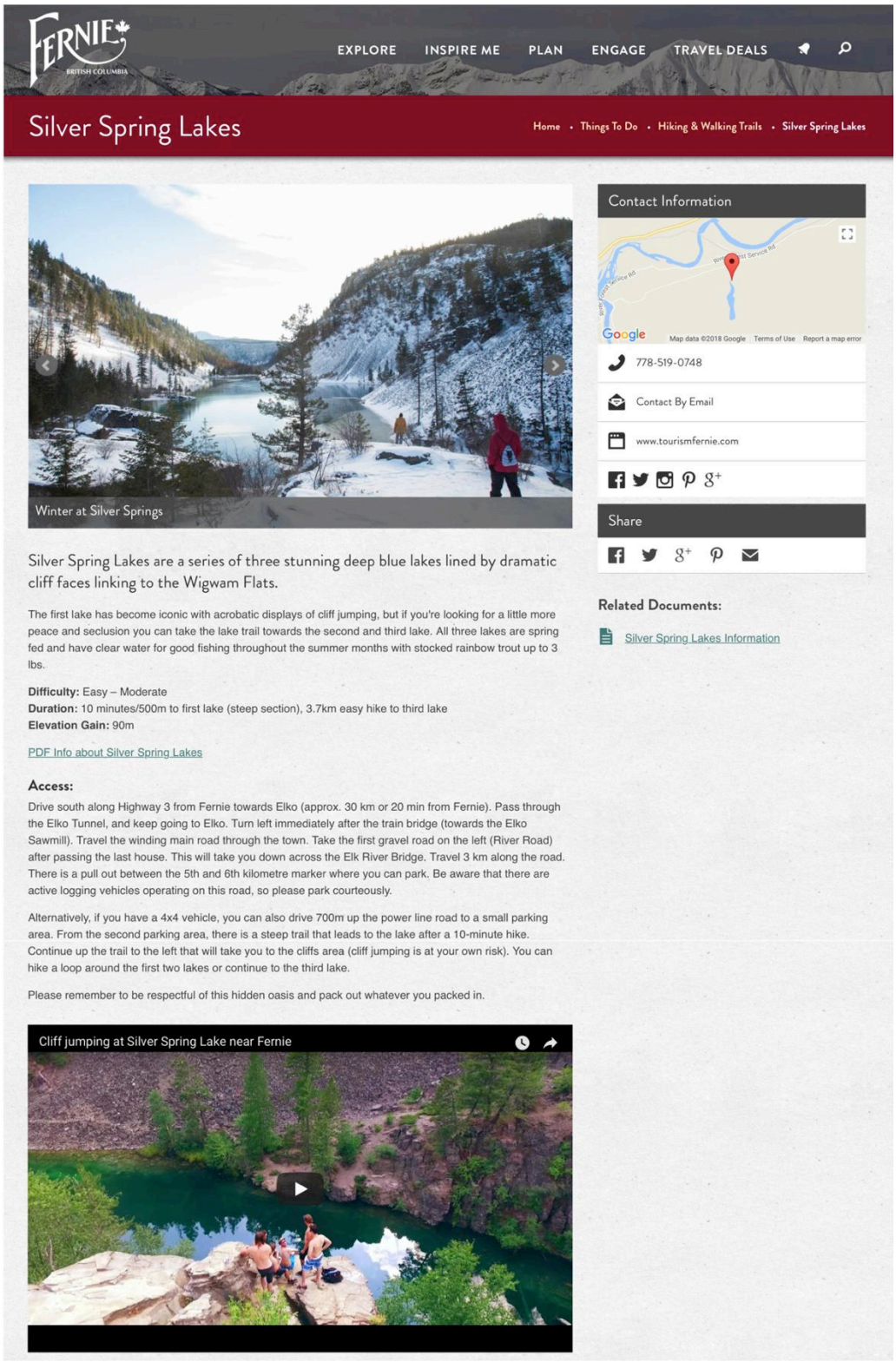
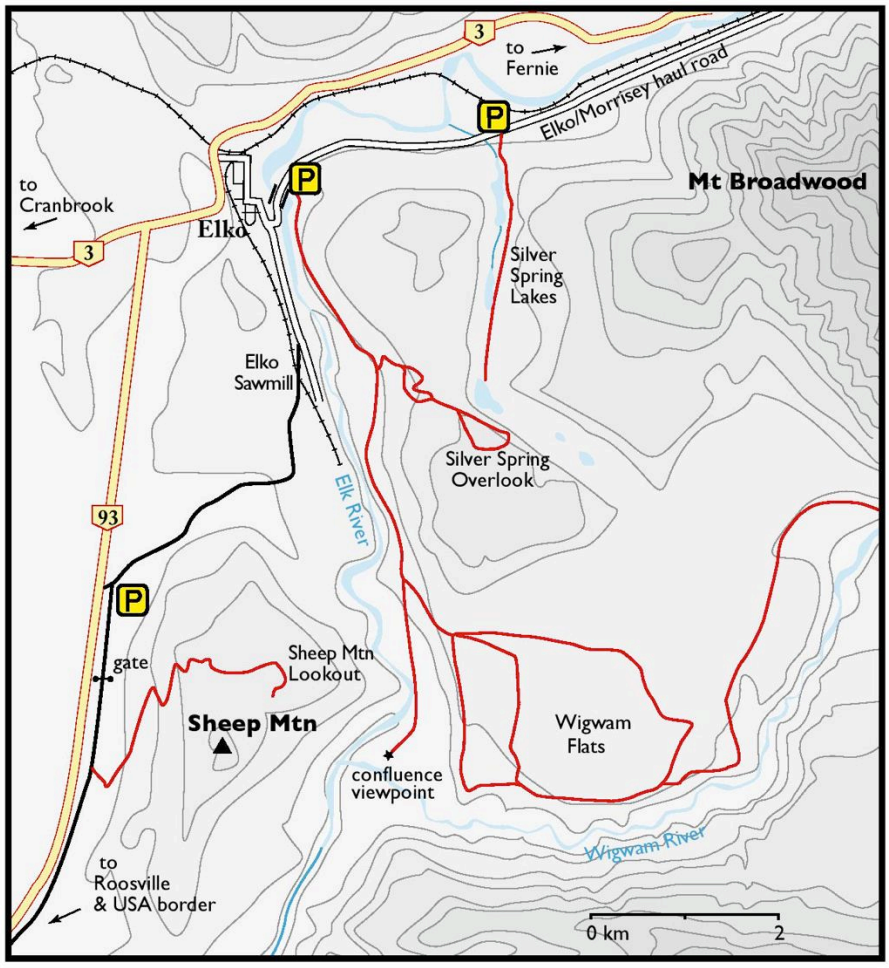
Appendix A – Tourism Fernie Silver Springs Webpage and Downloadable PDF





Elko Trails Map

Hikes; Silver Spring Lakes, Silver Spring Overlook, Wigwam Flats, Sheep Mtn Lookout

Great painterly light on the Silver Springs Lakes in an autumn storm.

#64 SILVER SPRING LAKES

Rating: easy
Time: short day hike
Distance: 3.7 km
Elevation gain: 90 m (300 ft.)
Lakes elevation: 1006 m (3,300 ft.)
Trail: one short steep section; indistinct trail; wet spots; slippery talus; trail to three mid-elevation lakes
Map: 82G/6 Elko *(NAD 27)*
Trail map: page ####

Drive

Road map: page ####
Road: any vehicle; mostly pavement

0 km: Turn east from Highway 3 in to Elko, N62200-E37100. The Elko townsite is not visible from the highway. The turnoff is south (slightly downhill) from the prominent gas station/ restaurant along Highway 3. The paved Bate Avenue in Elko winds through town around several corners. Stick to the main road.

1.1 km: Turn sharp left (east) and head downhill 400 m to cross the Elk River. Drive the industrial gravel Elko/ Morrissey haul road 2.3 km east from the bridge. The river bends away from the road for a couple of kilometres.

3.8 km: Notice when the river flows close to the road again and drive another 200 m. Turn left at the first left fork past the bridge onto a small dirt road, N62791-E39791, and park. From the parking spot, hike back along the

Silver Spring Lakes is one of my favourite early season or autumn trips. The hike follows a chain of three deep lakes at the base of steep cliffs not far from Elko. Each lake has its own distinct colour, depth and plant habitat. Hikers are rewarded with views of rolling mountains to the north and picturesque cliffs to the south. These dramatic cliffs surround the third lake and soar about 150 m (500 ft.) straight up from the water and they buttress the shores of the other lakes. The cliffs can be seen clearly throughout most of the hike.

A well-travelled trail winds along the eastern shores of these scenic, long, narrow, lowland lakes. The trail crosses exposed bedrock and lakeside talus slopes and winds through the forest. After the initial 500 m up a steep section, the rest of the hike is easy and mostly level. But there is about a kilometre of level, but lichen-coated talus to walk on and it is very slippery when wet.

In springtime (early May to early June) the lakeside meadows are awash in the glorious colours of wildflowers, bees and butterflies. The clematis vines climb up rose bushes and the fairy slippers hide in the darker shadows of the woods. Mid-September to early October is when the aspens around the lakes are ablaze in yellow.

Further Explorations

Silver Springs Rim Overlook

Imagine standing atop the cliffs overlooking the three Silver Spring Lakes and the Rockies to the north. The Silver Springs Rim Overlook on page ### is just the hike.

main road for about 150 m and look for a well-worn footpath heading uphill in the forest (south). The trailhead is unsigned.

Trail

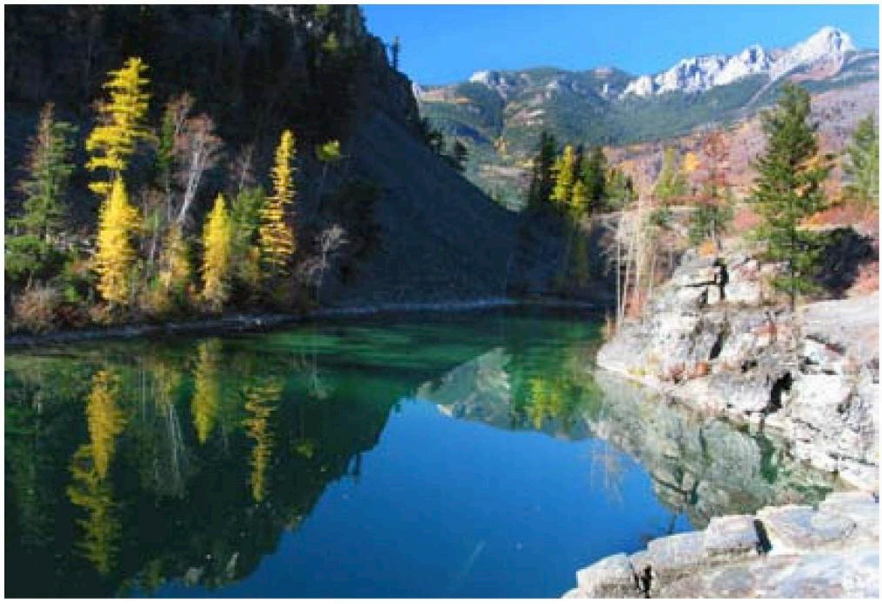
0 km: From the parking spot, hike west (back toward the bridge) on the main road for about 150 m to the well-worn footpath. Climb the trail to intersect with the powerline.

100 m: Cross the powerline and hike south, up a steep small trail beside the washed-out gravel road. The entire steep section takes about 20–30 minutes and gains 100 m (300 ft.) to the northern shore of the first scenic lake.

600 m: At the shore of the first lake, turn left (east) and hike up a short, steep, rocky section. Follow the trail south as it winds along the bedrock banks. The main trail edges the base of the prominent bedrock platforms, but a 1-minute hike upward to the right offers a breathtaking view of the navy-blue first Silver Spring Lake, rimmed with cliffs, N62219-E40106. Many visitors stop there, as it one of the highlights of the whole trail. Continue along the eastern side of the first lake and the trail heads into the forest.

2.4 km: Second Lake. Between the second and third lake, cross a level section of talus that may be slippery. The trail winds in sections of forest and talus. Gain very little elevation.

3.7 km: Third Lake. The best viewpoint for the third lake is on a low rock platform near its north end, N60027-E39941, another highlight of the trip. Navy-blue water flows below cliffs that rise hundreds of feet straight up. If you reach the eastern shore of the third lake, backtrack a bit and find a faint trail heading west into the forest by the shore. This will lead you to a well-used picnic area and a bedrock platform a couple of metres above the water with a great view of the cliffs and clear lake.



Silver Springs Lakes are three deep and scenic lakes near Elko. The lakes are surrounded by steep walls and the third lake has cliffs straight up from the shore.

Appendix B – Archeological Assessment

Tipi Mountain Eco-Cultural Services Ltd.
PO Box 957
Cranbrook BC V1C 4J6
Phone 250 420 2724
Fax 250 489 4142

Preliminary Field Reconnaissance
Archaeological Assessment
Non-permit

Date:	June 8th, 2016	
To:	Lisa Cox	*Recreation Officer*, Ministry of Forests, Lands and Natural Resource Operations
Prepared by:	Andrea Thompson	*Archaeologist*, Tipi Mountain Eco-Cultural Services Ltd. (TMECS)

Re: **Silver Springs Stewardship Solutions Project, Elko, B.C.**

On May 24th, 2016, TMECS completed a preliminary field reconnaissance (PFR) of the proposed Silver Springs Stewardship Solutions Project, near the community of Elko, British Columbia (Figure1, below). The proposed development consists of the three following components (Figure 2):

1) The building of a parking lot off of the Lodgepole River FSR, just east of the trailhead and on the south side of the FSR.
2) The installation of three information kiosks (sign posts) at the intersection of the trail and the power line, at the head of the northernmost lake, and at the most widely-used cliff jumping area just south of the head of the lake.
3) The installation of a cement slab foundation for a dry toilet facility on the north-east side of the northernmost lake, approximately 60 metres east of the shoreline.

The project area can be located on map sheets 82G.025 & .035 (BC TRIM) and 82G/06 (NTS).

The archaeological assessment was triggered by, and based on, the locations of the signage and dry toilet components of the proposed project being situated within Archaeological Overview Assessment polygons C13-93 and C13-95 (Choquette 1998). These polygons were produced for the Ministry of Forests, Cranbrook District, in association with forestry-related development protocols.

Survey Results: The project area was surveyed via pedestrian traverse by a team of three from TMECS, with in-field assistance from Lee-Anne Walker and Marsha Clarke of the Elk River Alliance. The survey included approximately 1.1 km of the trail extending from the proposed parking lot location to the dry toilet location, as well as approximately 0.13 hectares of terrain surrounding the dry toilet install area. Terrain surrounding the lower to mid elevation portions of the trail is steeply sloping (± 30 degrees) and generally very rocky. Terrain at the head of the lake and along the north-eastern side consists primarily of exposed bedrock above the water and small areas of undulating and damp to saturated ground to the east of the lake at the base of the slope break (trending upslope to the east). All three proposed locations for the sign posts are found within either steeply sloping terrain (sign 1) or rocky and disturbed terrain (signs 2 and 3). The dry toilet location is situated in an area of damp to saturated terrain (swale) to the east of the lake; the substrate in this location is comprised of a shallow mud and silt stratum overlaid by a mossy litter mat of variable thickness (1-3 cm). Fortuitous exposures at the dry toilet location (tree throw

and root exposures) did not provide evidence of soil development. The forest cover in this locale is comprised of a birch and aspen tree stand with an understory consisting mainly of alder and juvenile aspen, and horsetail ground cover.

No archaeological materials or sites were observed, recorded or are otherwise suspected within the proposed boundaries of the Silver Springs Stewardship development.

Archaeological potential is deemed low for all components of the proposed project, this is primarily due to the steeply sloping terrain surrounding the sign 1 location and exposed bedrock at the sign 2 and 3 locations, as well as the lack of developed soil horizons and the saturated nature of the sediment cap at the dry toilet location. Significant disturbance was also noted throughout the area assessed, mainly in the form of clearing of the level areas for camping, the building of fire rings and the use of local wood for fires, the burying of garbage and human waste, and the use of ATV vehicles on the trail leading to the lake. Historical use of the area has also impacted both the lake shore and the trail; this was evidenced by exposed pipes along the trail from the defunct *Elko Water, Light and Power Company* distribution system that was installed at the outflow of the northernmost lake and followed the trail downslope and west to the community of Elko (Walker 2014).

Recommendations: Additional archaeological assessment is not required for the above-detailed development, provided that ground disturbing activities are contained within the areas assessed in the field and detailed in the present report.

It is also recommended that the proponent inform all staff and contractor(s) that archaeological remains, located on both public or private lands and predating AD 1846, or sites containing rock art or human burials, are automatically protected within the Province of British Columbia from disturbance, both intentional and inadvertent, by the *Heritage Conservation Act* (BC Law 1996). In the event that any archaeological material is observed or suspected to be present during the implementation of this development, please be aware of the following:

- All ground disturbance in the immediate vicinity of the suspected find(s) must be suspended at once,
- Ministry of Forest, Lands and Natural Resource Operations, Archaeology Branch (250-953-3334) must be informed, as soon as possible, of the location of the archaeological remains and the nature of the disturbance.
- First Nations groups with interest in the region should also be informed, as soon as possible, of the finds.

Should you have any questions or require further information regarding this project, please contact me at your convenience.

Andrea Thompson, Archaeologist
Tipi Mountain Eco-Cultural Services Ltd.
Office: 250-420-2724
Email: ian@tipimountain.com

References Cited:

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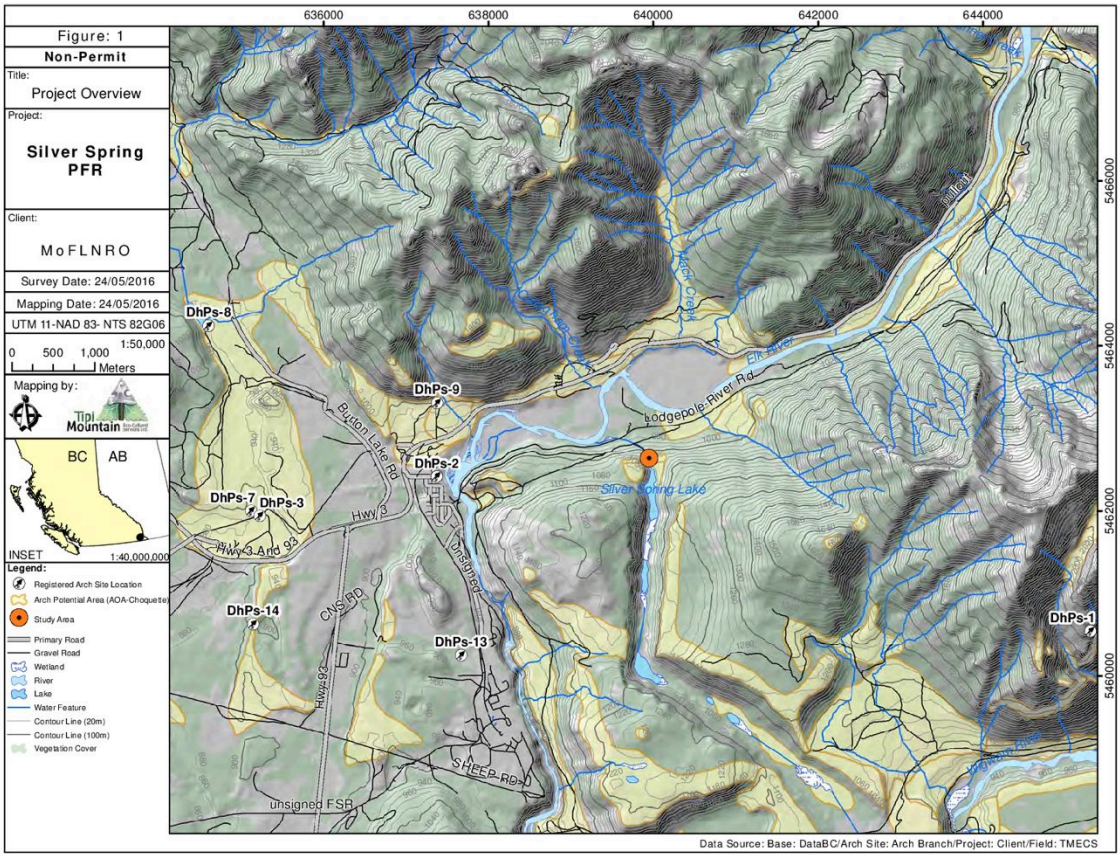
Walker, L.
2014 Silver Springs Stewardship Solutions Report. Prepared for the Regional District of the East Kootenay (RDEK) - CBHT 2013/2014. On file at TMECS.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Silver Spring PFR
Client:
MoFLNRO
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Mapping Date: 24/05/2016
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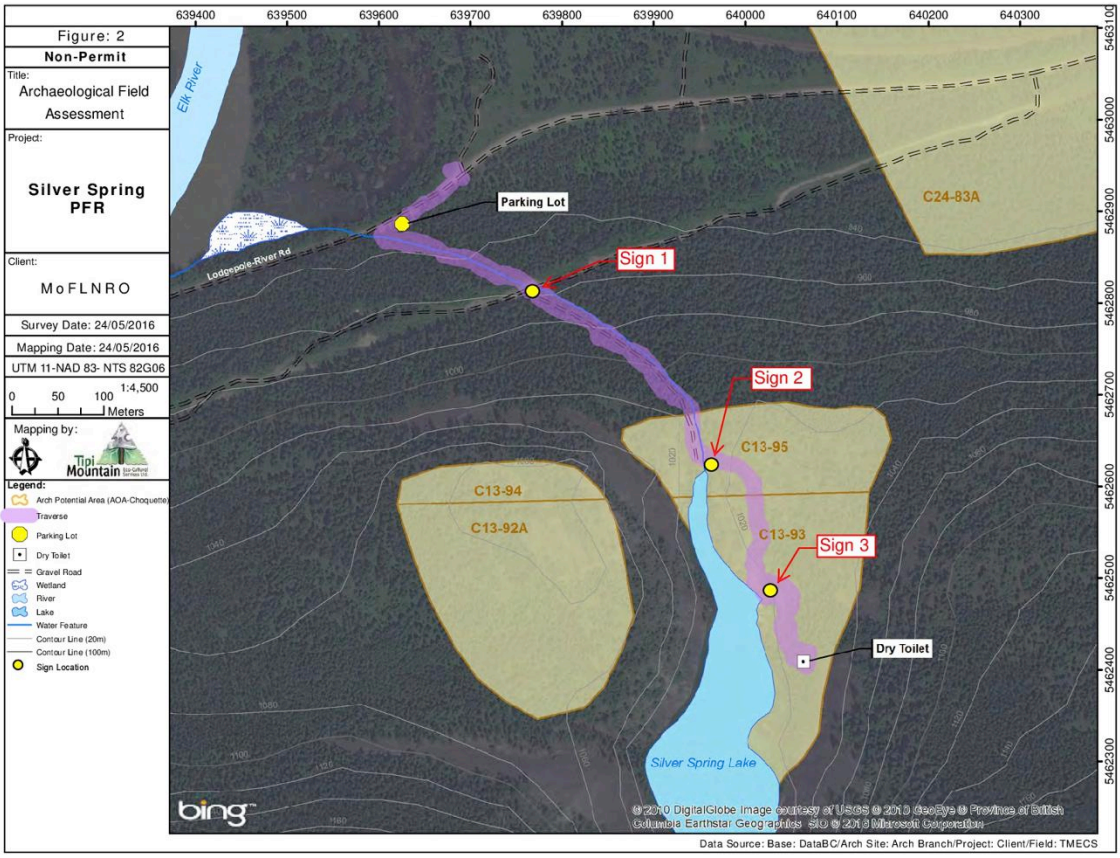
0 500 1,000 Meters
1:50,000
Mapping by:
Tipi Mountain
BC AB
INSET
1:40,000,000
Legend:
Registered Arch Site Location
Arch Potential Area (AOA-Choquette)
Study Area
Primary Road
Gravel Road
Wetland
River
Lake
Water Feature
Contour Line (20m)
Contour Line (100m)
Vegetation Cover
636000
638000
640000
642000
644000
5466000
5464000
5462000
5460000
DhPs-8
DhPs-9
DhPs-2
DhPs-7
DhPs-3
DhPs-14
DhPs-13
DhPs-1
Hwy 3
Hwy 3 And 93
Hwy 93
Burton Lake Rd
Lodgepole River Rd
Silver Spring Lake
Elk River
Match Creek
CNS RD
unsigned FSR
SHEEP RD
Data Source: Base: DataBC/Arch Site: Arch Branch/Project: Client/Field: TMECS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Silver Spring PFR
Client:
MoFLNRO
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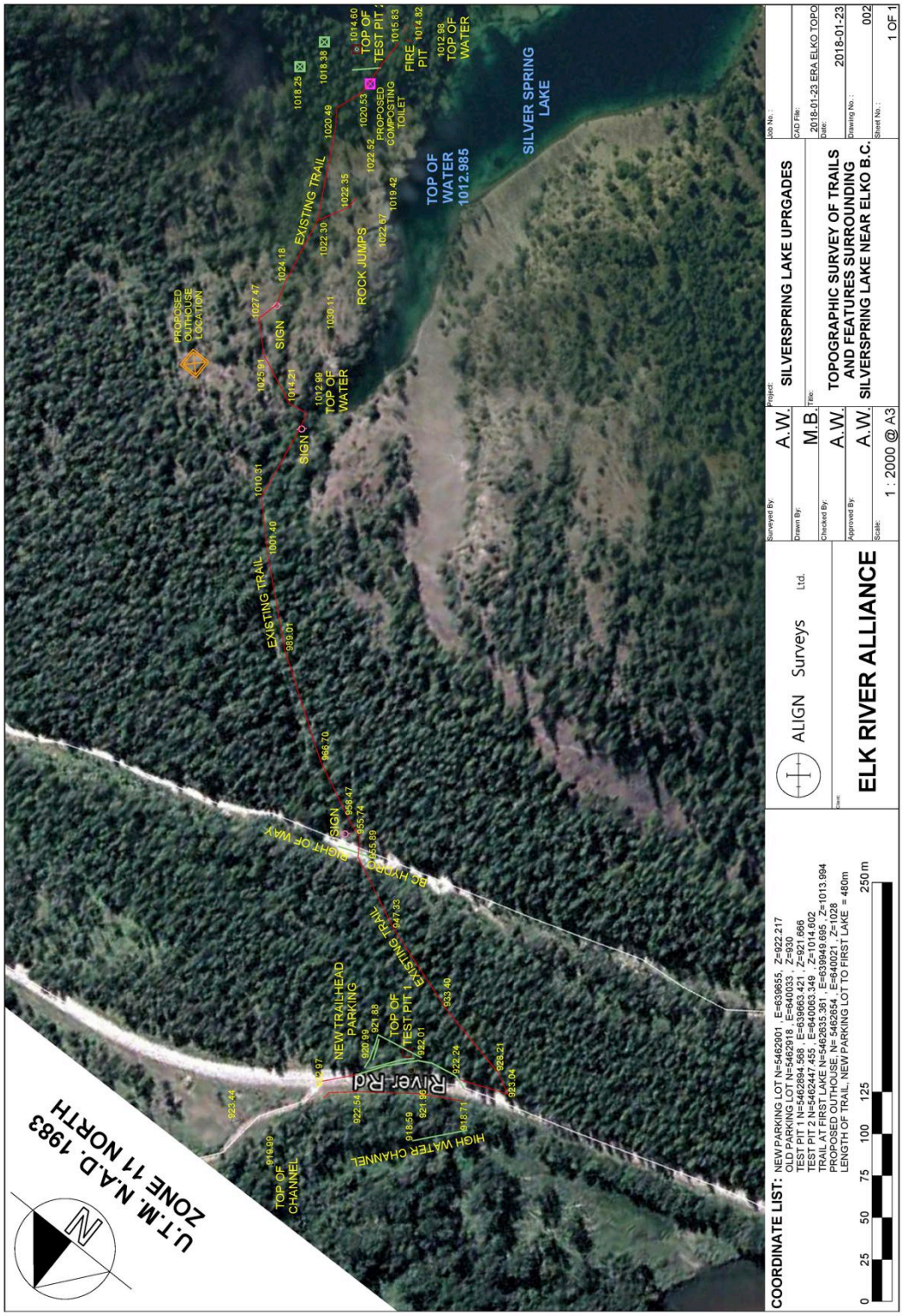
Mapping Date: 24/05/2016
UTM 11-NAD 83- NTS 82G06
0 50 100 1:4,500 Meters
Mapping by:
Tipi Mountain
Legend:
Arch Potential Area (AOA-Choquette)
Traverse
Parking Lot
Dry Toilet
Gravel Road
Wetland
River
Lake
Water Feature
Contour Line (20m)
Contour Line (100m)
Sign Location
639400
639500
639600
639700
639800
639900
640000
640100
640200
640300
5463100
5463000
5462900
5462800
5462700
5462600
5462500
5462400
5462300
Elk River
Lodgepole River Rd
Parking Lot
Sign 1
Sign 2
Sign 3
Dry Toilet
C24-83A
C13-95
C13-94
C13-92A
C13-93
Silver Spring Lake
bing
© 2010 DigitalGlobe Image courtesy of USGS © 2010 GeoEye © Province of British Columbia Earthstar Geographics SIO © 2013 Microsoft Corporation
Data Source: Base: DataBC/Arch Site: Arch Branch/Project: Client/Field: TMECS

Appendix C – Align Site Survey



Appendix D – User Survey

Do you believe silver springs needs a backcountry toilet?
1 not - 4 very

Did you need to use a toilet during your visit today/last time you visited Silver Springs?
Yes/No

How familiar are you with composting toilets (i.e. have you ever used one, do you know how they work, etc)?
1 not - 4 very

Do you think that you would follow the instructions (e.g. pumping the waste back, separating urine and fecal matter, not putting garbage in, etc.)
1 not – 4 very

How likely do you think others would follow the instructions (e.g. pumping the waste back, separating urine and fecal matter, not putting garbage in, etc.)
1 not – 4 very

How likely do you think it would be that the general populous of Silver Spring users would misuse a backcountry toilet (i.e. vandalize the structure)?
1 not – 4 very

Would you be willing to volunteer to help steward Silver Springs and help with a composting toilet if one were to be installed?

Where do you think the best location would be for a composting toilet?
At the parking lot
At the top of the hike
By the first lake's cliff jumping
Elsewhere

If you needed to use an outhouse and there was only one available at the parking lot, would you
Use it on your way down
Plan your trip prior to going to not use one
Use it prior to hiking (go before you go)
Not use it but go in the woods.

Do you think people would be more likely to camp at Silver Springs if there was an outhouse located at the top of the hike/by the first lake?
1 not – 4 very

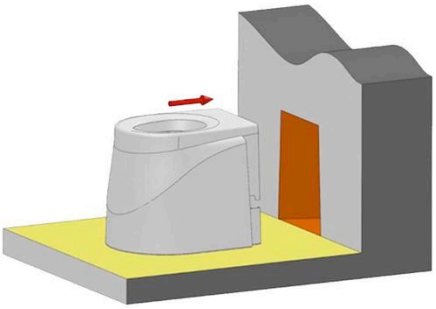
Other comments?

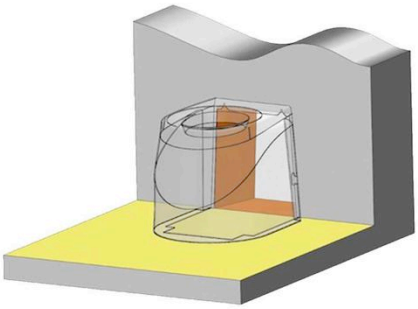
Appendix E – Installation Guide for Toilet Tech Solutions Urine Diverting Composting Toilet

INSTALLATION GUIDE

INSTALLING THE SEAT

PLACE THE TOILET INFRONT OF THE HOLE IN THE WALL, MAKING SURE THAT IT IS CENTERED





AJUST THE SEAT AGAINST THE WALL'S SURFACE

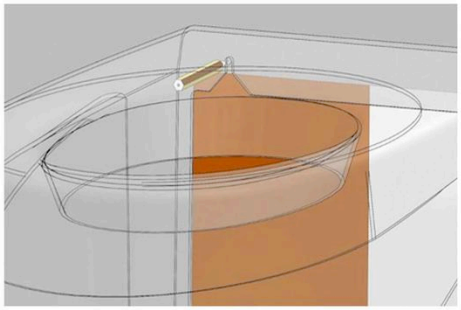
You can rasp up until 5 mm on the back of the seat to adjust its position.

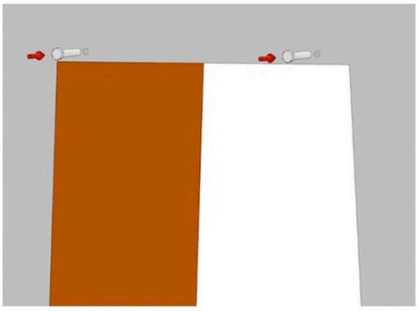
POSITIONNING AND INSTALLING THE TOILET

OPTION 1 : With self blocking screws (usually for wood walls)

Trace the notches on the wall with a pencil

Remove the seat and secure the self-blocking screws (6x40) into the wall based on the pencil marks

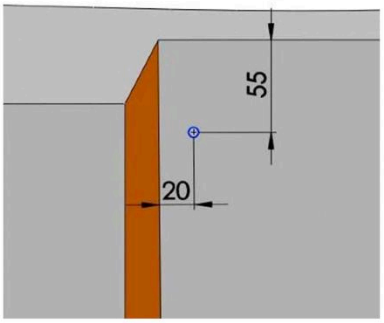


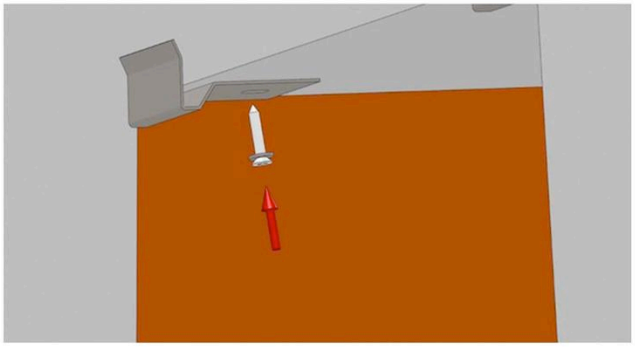


When doing so, make sure that the self-bloking screws are positioned so as that the toilet can easily remove without force

OPTION 2 : for a wall in brick or cement

With a pencil, trace the position of the screws for the hinges on the side of the hole depending on the following diagrams.





Screw the hinges using the oblong hole in order to ajust the position.

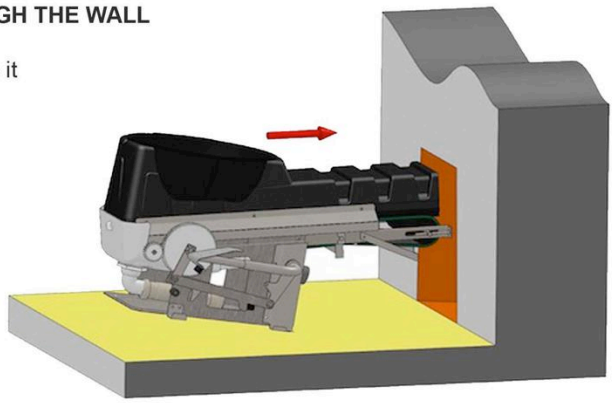
The seat should be able to be removed and repositioned without forcing

INSTALLING THE ECODOMEO SYSTEM

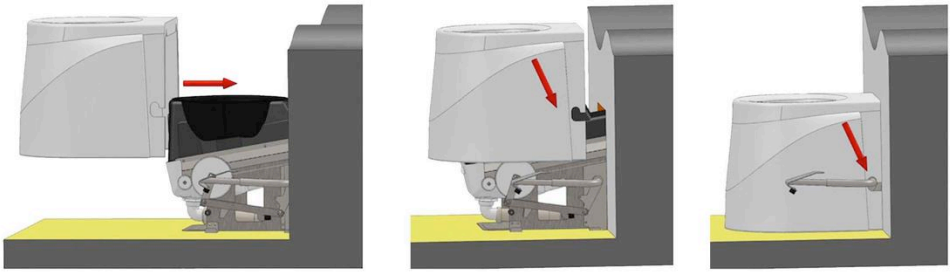
INSERTING THE BELT THROUGH THE WALL

Incline the belt and carefully slide it through the wall until the foot is aligned with the wall itself.

Carefully center the belt and it's foot



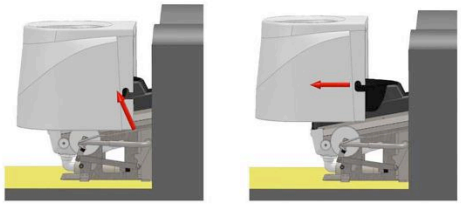
PUTTING THE SEAT INTO PLACE

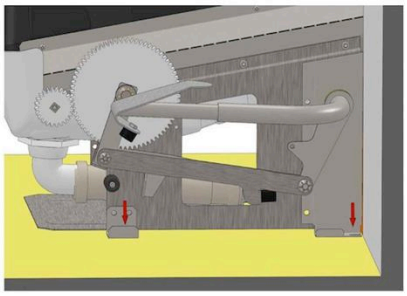


Following the diagram, place the seat above the system, carefully alinging the hole for the foot pedal. When that has been done and the seat is against the wall, gently slide the seat down paying attention to the hole corresponding to the pedal.

You may, at this moment, adjust the placement of the system to insure that the seat is well positioned and centered as well as the belt

REMOVING THE SEAT TO INSTALL THE SYSTEM

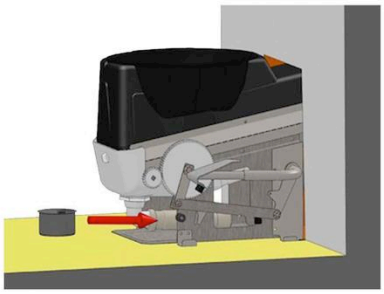


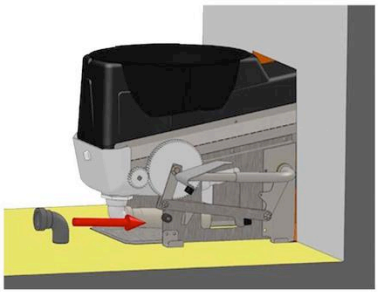


This piece is locked into place by four screws

CONNECTING THE URINE EVACUATION HOSE

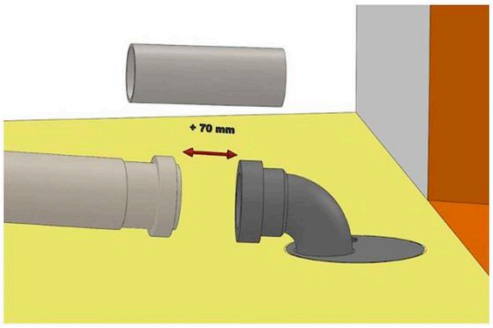
PUT THE TAMPON WITH THE PVC PIPE (90° ELBOW) INTO THE EVACUATION HOLE

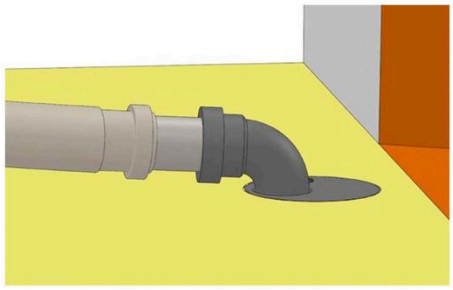




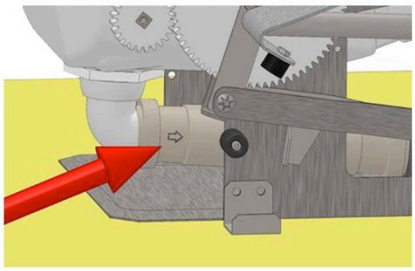
CONNECTING THE SIPHON AND THE PVC ELBOW

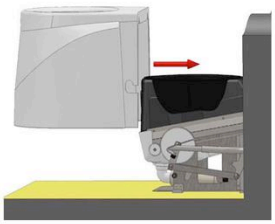
Measure the distance between the siphon and the elbow pipe
Add 70 mm to that distance to assure the ideal length of the 40 mm pipe. Cut this pipe to the correct length then using this same one as a joint, connect the two.

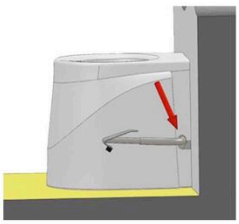




MAKE CERTAIN THAT THE SIPHON IS IN THE RIGHT DIRECTION BEFORE PUTTING THE SEAT BACK IN PLACE



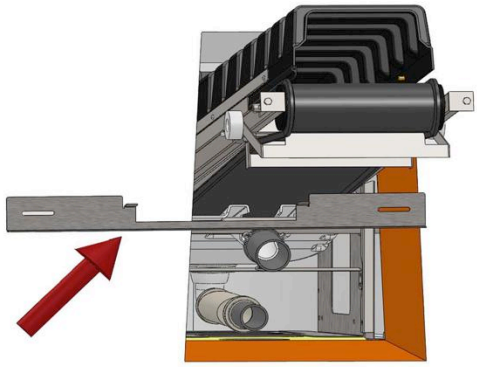




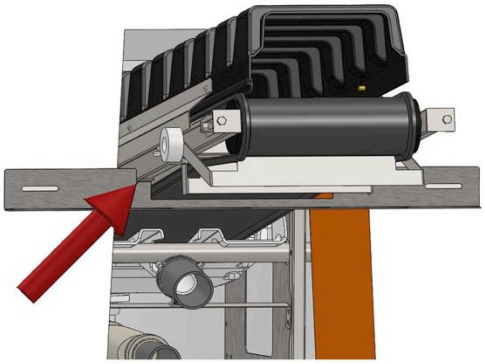
YOUR TOILET IS NOW READY TO BE USED. PLEASE DO SO !

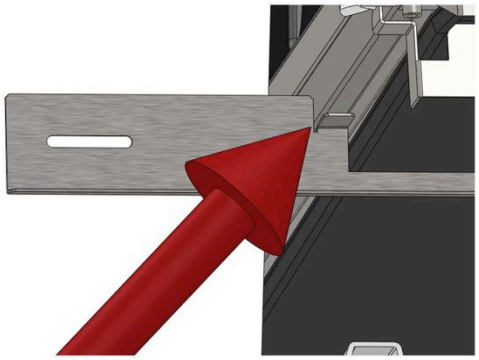
SETTING UP THE STABILISER FOR THE BELT

ON THE EXIT / COMPOST SIDE, PLACE THE STABILISER UNDER THE BELT

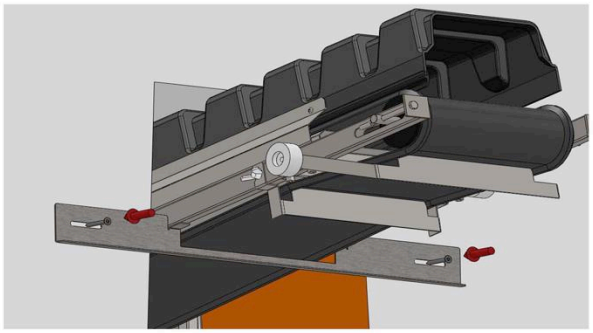


WHEN PLACING IT UNDER THE BELT, THE TWO BLADES WHICH SHOULD BE IN CONTACT WITH THE TWO BARS OF THE BELT



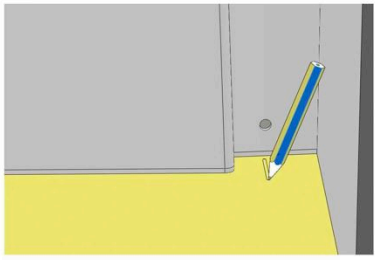


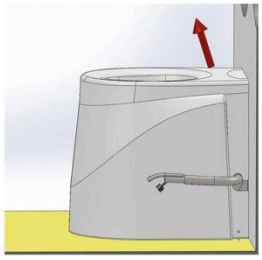
POSITION AND SCREW
THE STABILISER INTO PLACE

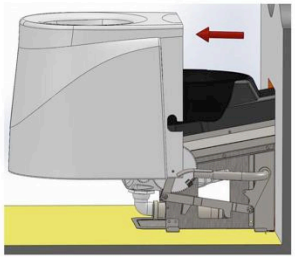


INSTALLING THE ANTI THEFT BOLTS FOR THE SEAT

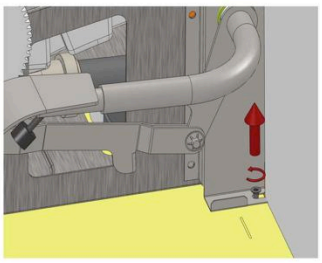
ONCE THE TOILET'S SEAT IS IN PLACE AND THE BELT IS SECURED, TRACE A LINE WITH A PENCIL ON EACH SIDE OF THE SEAT DIRECTLY INFRONT OF THE HOLES AT THE BASE. REMOVE THE TOILET FROM IT'S POSITION

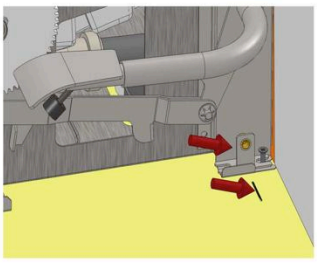


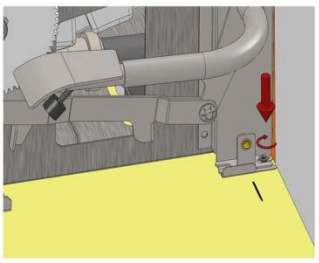




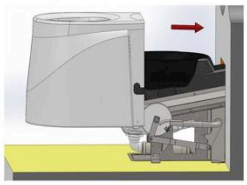
SLIGHTLY UNSCREW THE BELT UNIT FROM THE FLOOR, POSITION THE ANTI-THEFT HINGES UNDER THE SIDE CAREFULLY, ASSURING THAT THE HOLE ARE IN LINE WITH THE MARKS ON THE FLOOR. SECURE THE BELT AND THE HINGES IN PLACE.

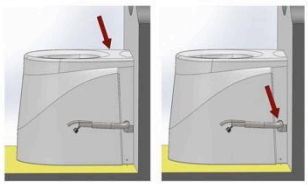






PUTTING THE SEAT BACK INTO PLACE.





GENTLY SCREW THE BOLTS INTO PLACE THEN WITH THE BTR SERRER, TIGHTEN BY HALF A TURN.
DO NOT OVER TIGHTEN