CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

Environmental Management Plan

Fitzsimmons Creek Channel Maintenance Program

Version 3

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File No.: 013-09-15
Date: November 8, 2016

Executive Summary

This environmental management plan was created to be Standard Operating Procedures (SOP) that can be used during all subsequent Fitzsimmons Creek gravel management operations. Standard and consistent terminology presented herein should be used by all future consulting firms that are involved in gravel management in Fitzsimmons Creek. This plan was prepared considering many different gravel extraction scenarios that may occur during gravel management. The scenarios are comprehensive to include varying intensities of gravel removal that can be used at different locations along the creek. Each scenario is paired with optimal fish salvage protocols and existing access points, while also considering special situations such as high creek flows. While acting as a pre-works planning tool, this environmental management plan can also be used as a quick reference during gravel extraction operations when conditions suddenly change. These tools are presented in the form of environmental checklists, quick reference guides, and emergency procedure guidelines specifically prepared for use during Fitzsimmons Creek gravel management operations.

Emergency Contact List

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Cascade Contact Numbers	**Office**		**604-938-1949**
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Spill Contact Personnel			
Provincial Emergency Program	24 Hour Spill Reporting		1-800-663-3456
Whistler RCMP			604-932-3044
CANUTEC	Spill Response Advice	Chemical Accident Emergency Advisory Service (Transport Canada)	613-996-6666 or *666 on cell
Quantum Murray Environmental Group	Spill Disposal Waste Transportation	24 hour response line	1-877-378-7745
Ministry of Environment	Surrey Regional Office		604-582-5200
Fire Agency Personnel		**EMERGENCY**	**911**
Coastal Fire Center			250-951-4222
Duty Officer			1-800-663-5555
Whistler Fire Rescue Service	RMOW		604-935-8260
Emergency Medical Services		**EMERGENCY**	**911**
Emergency – Whistler			**911**
Fire – Whistler			911 or 604-935-8260
Ambulance – Whistler			911 or 604-932-5894
BC Poison Control Centre	BC Drug & Poison Info Center		1-800-567-8911 or 604-682-5050
Whistler Health Care Centre	Vancouver Coastal Health		604-932-4911
Environmental/ Conservation			
Remko Rosenboom	Ministry of Forest, Lands and Natural Resource Operations		604-586-2803
Environment Canada			604-666-0370
Bear Conservation Officer	Ministry of Environment		604-905-2327
BC Conservation Officer Service	Ministry of Environment		1-877-952-7277 or *7277 on cell
Conservation and Protection Field Supervisor	Fisheries and Oceans (DFO)		1-604-892-3230
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1 Introduction

This Environmental Management Plan (EMP) is prepared as a prescription based planning tool for the Resort Municipality of Whistler (RMOW) to use in Fitzsimmons Creek gravel management planning. The EMP is prepared to plan for multiple gravel management scenarios indicating appropriate fish salvage protocols for each scenario, and identifying existing access points within the seven reaches of Fitzsimmons Creek. The seven reaches of Fitzsimmons Creek from upstream to downstream are:

1. Blackcomb Way
2. Day Parking
3. White Gold
4. Spruce Grove
5. Mons
6. Riverside
7. Nicklaus North

The EMP, prepared by Cascade Environmental Resource Group Ltd. (Cascade), provides measures to prevent and mitigate adverse environmental impacts associated with gravel extraction operations. Adherence to the protocols described in the EMP should ensure that all environmental issues including, but not limited to, the health of streams and watercourses, air and water quality, wildlife and wildlife habitats, and riparian vegetation are protected and maintained. This document is intended for use by RMOW decision makers to assist in the design, management, and operation of the Fitzsimmons Creek gravel extraction program.

While this plan will aid RMOW staff in gravel extraction planning, site specific plans should be discussed with the Environmental Monitor (EM) during the planning stages and immediately prior to works commencing. Every attempt was made for this Standard Operating Procedures (SOP) document to be a guide for gravel extraction at all gravel bars within the Fitzsimmons Creek system, although site specific conditions may require field fitting of each scenario/ fish salvage protocol to suit existing conditions.

This document functions to provide standardized and consistent terminology to be used by all firms and organizations involved in gravel management planning.

1.1 Goals and Objectives

The goal of the EMP is to provide environmental protection guidance to the RMOW to aid in gravel extraction planning by identifying scenarios and associated salvage protocols for likely conditions of the Fitzsimmons Creek system. This goal is met by the following three objectives:

1. Provide the Fitzsimmons Creek Channel Maintenance Program supervisor and contractors with prescription based scenarios to facilitate annual project planning, through describing procedures and protocols to minimize potential environmental impacts associated with gravel extraction operations.
2. Protect valued ecological components within the floodplain area of Fitzsimmons Creek in the Resort Municipality of Whistler,
3. Assist the RMOW in meeting compliance conditions of environmental certificates and approvals from regulatory agencies.

1.2 Environmental Permitting

The EMP is designed to meet all applicable Municipal, Provincial and Federal legislation, regulations, orders, standards and guidelines. The EMP assumes that all necessary permits, permissions, allowances

and licenses issued by governing bodies are obtained and their provisions complied with. Permission to conduct the works associated with the Fitzsimmons Creek gravel extraction project must be received from the BC Ministry of Environment (MOE) *Water Act* and *Dike Maintenance Act*, the federal Fisheries and Oceans Canada (DFO) *Fisheries Act,* and the *Canadian Environmental Assessment Act (CEAA)*. Approval under the Transport Canada's *Navigable Waters Protection Act* may be required. Notification under the BC *Wildlife Act* is required if beaver dams must be removed.

1.3 Environmental Monitor (EM) Responsibilities

Prior to the field season, the lead Environmental Monitor (EM) will liaise with the project manager, contractors and regulatory agencies to review bar specific gravel extraction plans, including procedures such as access /egress, and refuelling locations.

The EM must be consulted and knowledgeable on all activities proposed to occur within 30 m of the stream to ensure that all works requiring monitoring are monitored. Works within 5 m of the stream channel or instream works are considered sensitive works and will require monitoring on a full time basis. Works occurring further than 5 m from the wetted channel still require prior consultation with the EM, but may not require full time monitoring. It is at the discretion of the EM to decide if works further than 5 m from the wetted channel constitutes sensitive works and require full time monitoring.

When multiple bars are being excavated concurrently, the lead EM will organize environmental monitors to be stationed at each bar to ensure documentation of works and to provide direction to the operators when needed. The lead EM will be in regular contact with each environmental monitor, and will visit each active site every day to ensure that works are conducted according to this plan or the annual project plan. Additionally, the lead EM will ensure that completed sites are deactivated according to this plan.

In general, the monitoring program will include:

- delineation of the sediment removal area with wooden stakes marked with surveyor paint to provide reference for the monitor and to ensure that the contractor is working within the delineated area;
- on-site monitoring of gravel bar extraction, including gravel loading and transport in and about Fitzsimmons Creek, including access and egress activities;
- monitoring of water quality throughout the work sites to demonstrate compliance with regulatory requirements,
- fish salvage (as described in section 2.0) to capture, record, and re-locate fish from gravel extraction areas to appropriate habitat;
- ensuring that hazardous materials (i.e., fuel and / or lubricants) used by excavators and gravel transport vehicles are properly used, stored, transported, and disposed of in compliance with applicable legislation and regulations;
- ensuring that deleterious materials associated with the gravel extraction program are not released into the waters of Fitzsimmons Creek;
- ensuring that environmental features, such as riparian buffers and / or high value habitat areas are adequately protected and are not disturbed by gravel extraction activities, and
- ensuring that all personnel working on the Project have received environmental training to ensure personnel understand the potential environmental impacts associated with gravel extraction and are able to respond to environmental emergencies (e.g., fire or spill) that may result from the gravel extraction works.

The EM suggests that contractors and supervisors keep a copy of this EMP at each extraction site at all times.

2 Fish Salvage Protocols

Fitzsimmons Creek supports rainbow trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), kokanee (*O. Nerka*), threespine sticklebacks (*Gasterosteus* sp.) and sculpins (*Cottus* sp.). All fish and fish habitat are protected under the federal *Fisheries Act*. Gravel extraction activities can adversely affect fish by clogging and abrasion of gills from increased stream turbidity, impairment of visual feeders, and stranding, unless they are re-located away from active extraction areas. Efficient and low risk methods of fish salvage are employed, which is particularly important for bull trout, a provincially blue listed species of special concern. Fish salvage can be conducted in a few ways depending on site conditions and level of flows. Three fish salvage protocols are described below and include approved salvage methods of electrofishing and minnow trapping. All fish that are caught during salvage efforts will be relocated away from gravel extraction activities.

The goal of the fish salvage is to remove 100% of the fish in the workzone that will be at risk of harm during gravel extraction. When appropriate, minnow traps can be used to capture and relocate fish from the work site. Minnow trapping rarely captures all fish and electrofishing is conducted following minnow trapping, or depending on site conditions, it may be the only method of salvage utilized. A minimum of two passes of the worksite will be made with the electrofisher. Ideally, the number of fish captured will decrease with each pass to a final pass with no observation or capture of fish. In some cases where the fish salvage is dependent on concurrent instream works, for example when access for electrofishing personnel is dependent on a machine altering the site for safety, then the best effort for fish salvage is the goal.

2.1 Protocol 1 – Fence and fish

This method of fish salvage involves erecting fish exclusion fencing in any wetted area. Wetted areas may be a small channel between the shore and the dry bar, a portion of the perimeter of the bar where flows are shallow, or the entire channel. To be effective, fencing must be erected prior to salvage efforts, must prevent fish from swimming under or between sections of fence. And the fence mesh size must be appropriately sized. Depending on the size of the area to be salvaged, one or two electrofishing teams will begin at either the downstream or upstream end of the bar and work towards the opposite end. All fish observed will be captured using a mesh net and placed in a bucket filled with creek water. Should other non-fish aquatic species such as tailed frogs be observed, capture and relocation will be attempted. Fishing will continue until no fish are observed during a pass or until the rate of return is less than 10 percent. Any non-fish species such as tailed frogs will also be salvaged from worksites.

Conditions that decrease the effectiveness of this method are flows that are too strong and deep, floating debris, excessive turbidity, low conductivity, and low temperatures. If conditions do not permit this salvage protocol, protocol 2 should be considered prior to considering protocol 3. Should the EM determine that flows are acceptable for this protocol, an excavator should be prepared to begin cutting off flows immediately following salvage efforts.

In lower flow conditions, the EM may determine that in order to effectively see fish, suspended sediments must be allowed to settle once the bar is isolated. This may mean that the site is left overnight and salvage efforts resume early the following morning.

Depending on the time available, and flow conditions, minnow trapping can be utilised prior to electrofishing efforts. The benefit of minnow trapping is that it is gentler on fish, has a low fisher/effort ratio and the traps are not restricted by turbid water. Minnow traps should be checked a minimum of every 24 hours.

Effectiveness: High

2.2 Protocol 2 – Partial fence and fish

Partial fence and fish is when fish exclusion fencing is erected only at the top or top and sides of a bar. The difference of this protocol from protocol 1 is that the salvage area is not isolated from creek flows and

fish can swim into and out of the site. Fencing does not surround the entire wetted area and is considered incomplete, or a partial fence. The purpose of erecting the fence at the top and sides of a bar is to prevent fish from being flushed into the site from upstream of the bar, but does not prevent fish from swimming into the site where there are no fences. This protocol should be used at sites where flows are too deep or fast flowing to erect and maintain effective isolation fencing. The site will be salvaged by means of electrofishing beginning at the upstream fence and working downstream to encourage fish to swim out of the area to be impacted. Construction of an isolation berm by mounding gravel from the gravel bar around the worksite should occur immediately following the salvage effort to minimize the time when fish can re-populate the salvaged area.

Effectiveness: Low / medium. While bar to bar conditions vary, it is the experience of Cascade that when a large amount of gravel is required to build an isolation berm, the amount of gravel that is actually removed from the stream channel is greatly decreased. In other words, instead of removing the gravel from the bar out of the channel, the gravel is kept in the channel to construct the isolation berm. Berms around excavation sites must be left after excavation is complete to allow sediments to settle prior to breaching of the berms. For this reason, it may not be economical to pursue sites where protocol 2 is used.

2.3 Protocol 3 – Fishing without fencing

Fishing without fencing can be used when a small bar or portion of a bar is submerged in shallow water. Construction of an isolation berm must occur immediately following salvage efforts, so access to the bar must be in place prior to salvage completion. Salvage will occur by electroshing from the upstream area of impact moving downstream to encourage fish to swim out of the area. If site conditions permit, an additional salvage effort should occur after the isolation berm is in place. A deeper site may have isolated pools where fish could be trapped warranting additional salvage effort.

Effectiveness: low / medium

2.4 Protocol 4 – Salvage for full channel diversion

If flows permit electrofishing personnel to safely enter the mainstem of Fitzsimmons Creek prior to construction of diversion structure, then fish salvage should be initiated at that time. The preferred method of salvage is Protocol 1 – fence and fish, although environmental conditions such as flow velocities and channel depth may prevent its use. If it is impractical to erect fencing, Protocol 3 – fishing without fencing should be initiated in the area of impact of the diversion structure.

If access to the mainstem is not feasible prior to initiation of berm construction, then electrofishing should commence as soon as the berm has decreased flows to a level that is safe to access. This may be when the diversion structure is half built. Two or more electrofishing teams should be salvaging the entire area that will be dewatered during the diversion. Water will be turbid, and visibility difficult. Therefore electrofishers should use large dip nets and place them in the direction of flow, downstream of the electrofishing current, to catch fish as they become stunned and drift into the net. The turbid water makes electrofishing in these conditions difficult, although salvage is much more effective using this method, rather than waiting for flows to decrease and attempting to salvage stranded fish from gravel bars.

Effectiveness: low / medium

3 Gravel Extraction Management Scenarios

Gravel bars and sediment accumulations in the Fitzsimmons Creek system vary from each other and from year to year depending on flow conditions and the amount of sediment that is transported in the system. Therefore, preparing a bar specific plan is not as useful as a management plan outlining standard operating procedures for the various methods of gravel extraction. Five scenarios are presented that vary from low environmental impact such as dry gravel bar scalp, to higher environmental impact such as full channel wet extraction. The intended scenarios should be determined for each bar during the planning stages of each gravel extraction year. Immediately prior to gravel extraction works, these scenarios

should be re-assessed to ensure that environmental conditions still fall within recommended conditions for that scenario. It is possible that the intended scenario may need to be altered prior to works to meet the current conditions. Gravel extraction under any scenario should be completed as soon as possible once initiated. If possible, Cascade recommends a longer work day, with adequate gravel transport trucks available to bars where gravel extraction is occurring. This should eliminate excavator idling and minimize the period of impact in the creek.

These scenarios are not intended to be specific design proposals; intent is to provide guidance to decision makers on the benefits and impacts for a variety of scenarios.

While the Environmental Monitor should monitor all aspects relating to protecting the aquatic and terrestrial environment of Fitzsimons Creek, the Project Engineer or a representative from the RMOW should monitor excavation depth and berm/ bank angles. Maintenance of recommended depth and bank angles are essential in maintaining the stability of the Fitzsimmons Creek channel. Excavation stability monitoring frequency will depend on the size of the excavation, but should at minimum be checked at the beginning of excavation and at one point mid-excavation.

3.1 Scenario 1 – Bar Scalp

Bar scalping presents the lowest environmental impact as only gravel above the level of the creek is removed from the top of the gravel bar. When conducting this method of gravel removal, the outer 0.5 m of the bar should not be disturbed. Additionally, maintaining a relatively steep bar head helps to encourage bar re-formation and should ensure that downstream river flow remains non-linear. Gravel should be removed by an excavator scraping gravel towards the center of the bar.

While the bar scalp does not involve works within the wetted channel, the dry bar may be separated from the stream bank by a wetted area. In this case, the fence and fish salvage method should be used prior to excavator access to the bar. Flow into the wetted area must be cut off by constructing a berm on the inside of the fish fencing using gravel from the gravel bar. The EM will determine if a downstream fish exclusion fence is required. If a downstream fence is installed, gravel can be infilled to create access to the bar up to the downstream fence. Otherwise, access to the bar should occur on a dry section of bar that was created by building the upstream berm.

The benefit of this method of gravel extraction is that all work occurs in the dry and water quality should not be impacted. The disadvantage of this method is that it may not allow for gravel extraction at quantities required to meet flood protection maintenance requirements of the RMOW.

When to implement

Implement scenario 1 when there is substantial gravel accumulation on dry bars above the water level, or when working in a period of high risk to fish. Significant gravel accumulation on dry bars could occur after a flood event.

Suggested salvage method

Fish salvage will only be required when a wetted area must be crossed in order to access the dry bar. In this case, protocol 1 – fence and fish, should be implemented. If the site access is dry then fish salvage is not required.

3.2 Scenario 2 – Full Bar Excavation

A gravel bar located on either side of the thalweg will be accessed from the stream bank closest to the bar. Occasionally a small flow of water between the bank and the bar must be crossed to access the bar. Upon gaining access to the bar, the excavator begins by constructing a berm around the perimeter of the bar using gravel from the bar. The berm must be contained on the existing bar and gravel must not fall into the main channel. The berm should be built to be large enough to ensure that a rise in creek level does not breach the berm and flood the work site. This is especially important when excavating large bars that take multiple days to complete. Should water levels rise overnight and flood the site, a mid-bar berm will have to be left (i.e., not excavated) to re-isolate the work site. This will mean that less gravel will

be available for extraction. Recommended berm height is 0.5 m and 1 m in width, although site conditions may warrant a larger berm. Additionally, maintaining a relatively steep bar head should encourage bar re-formation and ensure that downstream river flow remains non-linear.

Gravel bars are generally excavated to a depth of 1 – 2 m from the level of the creek. When conducted in accordance with this plan, this method of gravel extraction can be relatively low impact to the aquatic environment. A few days after the bar extraction is complete and turbid water within bar berms has settled, the isolation berm should be breached at an upstream and downstream location to prevent isolating fish should the river flood. Breaching by hand-held shovel may be the only means of breaching if the bar is now inaccessible by an excavator.

The benefit of this method is that the amount of gravel extracted is maximized while minimizing impacts to the aquatic environment. The disadvantage of this method is that there is potential for the aquatic environment to be impacted through increased water turbidity, the potential for fish kill and the potential for deleterious materials to enter the creek.

When to implement

This method of gravel extraction can be utilized when works are conducted during the instream works window of August 15 to 30, and when a significant amount of gravel below the water level must be removed from the Fitzsimmons Creek system.

Suggested salvage method

Protocol 1 – fence and fish

3.3 Scenario 3 – Wet Channel Crossing for Bar Access

Wet channel crossings are generally avoided due to their environmental impact to the aquatic environment. A onetime crossing of an excavator to the bar and back may be considered by Fisheries and Oceans' (DFO) during the planning stages prior to each year's project. However, wet crossings by machinery are not DFO's preference and likely will not be approved under normal circumstances. Additionally, decision makers must consider the logistical difficulties for gravel transport trucks to access the bar while minimizing environmental impact.

A possible exception to this is if an excavator makes a wet crossing in order to install a temporary bridge, such as a rail car, or to facilitate the installation of a culvert crossing. Such a crossing would enable gravel transport vehicles to access the site without entering the wetted channel. A bridge crossing may be suitable to cross the main thalweg depending on the flow conditions, although a culvert crossing is not recommended for use on the main thalweg and should be restricted to side channels or areas of partial flow.

There are only a few bars in the Fitzsimmons Creek system that are large enough to be considered for excavation and that are not accessible from the nearest bank. During annual project planning a list of bars that fall into this category should be drafted and the size and type of the temporary crossing should be sized by an engineer to ensure adequate flow conveyance and structure stability. Culvert or bridge abutments may need to be constructed to ensure the temporary bridge is secure during use. Access to rock or concrete loc blocks must not increase the required number of wet stream crossings.

If a wet crossing is required to access a bar for full bar excavation, wet crossings should be restricted to one or two trips by the excavator. To mitigate the impact of such an event the crossing would be isolated and a fish salvage carried out prior to a wet crossing (Photo 1). Once the side channel is isolated and the fish salvage is complete the excavator can cross the channel to the bar. Upon gaining access to the bar, the excavator begins by constructing a berm around the perimeter of the bar using gravel from the bar (Photo 2 and Photo 4).

Effort must be taken to minimize water turbidity during berm construction. Downstream water quality will be monitored, recorded and submitted to regulatory agencies.

Photo 1: Isoslation of side channel in preparation or wet crossing

Photo 2: Fish salvage in isolated side channel

Photo 3: Excavator corssed side channel to gravel bar preparing to construct isolation berm

Photo 4: Isolation berm and partially excavated gravel bar.

Prior to crossing the channel, the excavator must be cleaned of excess oil, dirt or other hazardous materials. The crossing should be conducted in a shallow location where risk of excavator tipping is reduced or eliminated. The non-toxic and biodegradable hydraulic fluid, *Environ*^{TM}, or its equivalent should be used in all machinery working in or near water. Additional permitting may be requirement under the *Navigable Waters Protection Act* if a temporary bridge is to be installed in the channel.

When to implement

Scenario 3 should be implemented when there is no same-side of the creek access to a large gravel bar, and when there is a safe (i.e., shallow) access route for the excavator to utilise.

Suggested salvage method

Protocol 3 – fishing without fencing as long as flow conditions permit safe access to the channel for electrofishers.

3.4 Scenario 4 – Full channel excavation with creek diversion

The full channel excavation scenario involves dewatering a section of the creek by diverting flows to an alternative channel to bypass the extraction site. Flows are diverted by constructing a diversion berm at the upstream boundary of the extraction site by beginning at one side of the channel and working towards the opposite bank. This method should minimize the need for wet crossings with equipment. Full channel diversion is generally avoided as impact to the aquatic environment is certain. Depending on the amount of gravel accumulated in an area where diversion can be conducted, full channel diversion may be considered to meet flood protection requirements. A well constructed diversion structure will minimize seepage and water in the work site as the main flow is diverted to the secondary channel. Materials that can be used in berm construction include dam sacks (i.e., cubic meter sand bags), and large, angular rip rap backfilled with river gravels. A combination of both rip rap and sand bag can be used with a polyethylene liner used as a sealer either on the front side, middle or backside of the structure. Methods to minimize turbidity during diversion construction are:

1. Building the diversion berm during low flow conditions,
2. Completing works as quickly as possible once initiated, and ensuring diversion materials are available on site prior to construction commencement,
3. Clearing rip rap of dirt and other deleterious substances, and securely fastening dam sacks so they do not open in the stream,
4. Using river gravels from Fitzsimmons Creek as backfill if needed.
5. Constructing the diversion to minimize or prevent seepage into the worksite,
6. Once the diversion structure is complete, the downstream excavation boundary will be delineated and depending on site conditions, a berm constructed to prevent turbid water flowing from the worksite into the main channel.

Photo 5: Constructing diversion berm with material from the left bank

Photo 6: Constructing berm bridge from river left across to river right diversion channel

Effort must be taken to minimize water turbidity during berm construction. Downstream water quality will be monitored, recorded and submitted to regulatory agencies.

The fish salvage should occur concurrent to the construction of the diversion berm when flow conditions permit access to the channel, because the channel will become dry when berm construction is complete. It is very difficult to salvage fish without flows as fish get lodged between rocks as they seek diminishing wetted areas. Therefore, electrofishing salvage efforts must be initiated as soon as conditions permit,

and continue until all fish are salvaged, or until electrofishing is no longer feasible and salvage efforts must resort to salvaging fish on bars by hand

When flows in the main channel are eliminated, personnel should walk the dewatered bars looking for stranded fish. Once flows are diverted into the temporary channel, it is essential that they are maintained in the temporary channel until flows are re-diverted back into the main channel as fish will immediately populate the temporary channel and could be at risk of stranding if flows decrease. The same salvage procedure should be followed when flows are diverted back into the main channel.

The advantages of this method of gravel extraction are that a large area of gravel can be excavated, and once the initial diversion is complete, the site is generally fairly secure with minimal impacts to water quality or risk to fish. The disadvantage of this method is that it causes short term but significant impacts to water turbidity. Additionally, the time allowed to salvage fish is finite and restricted to the period in which flows are adequately reduced to allow safe passage into the main channel and the time when construction of the berm is complete and the channel dries up. Lastly, the temporary diversion of creek flows into an alternative channel may result in decreased flood protection during the work period.

When to implement

When significant volumes of gravel can be excavated from the main Fitzsimmons Creek channel and an alternative channel is available to accept creek flows scenario 4 can be implemented.

Suggested salvage method

Protocol 4 – Salvage for full channel diversion

3.5 Scenario 5 – Full channel without creek diversion

The environmental impacts associated with this type of gravel removal are significant and this scenario is not recommended under normal circumstances. If all of the other four scenarios have been assessed and can not be utilised in the current circumstances, and gravel extraction cannot be postponed to the following summer season, then the RMOW and their Environmental Monitor, should begin the emergency works approval process. Both DFO and MOE have emergency work approval processes and if the works are deemed an emergency by the agencies then emergency approval will be granted. Such approvals still require inventory of the work conducted including excavation locations, and volume extracted, and may involve an obligation for post-works compensation.

If emergency approval is granted, conditions of approval must be followed including mitigation to minimize impacts to the environment. The excavator must be free of excess oil, grease and dirt and must be fuelled using *Environ*^{TM} fuel or equivalent. If possible, the excavator should work from a dry location, and if this is not possible, the excavator must work from a wetted location where it is not at risk of tipping into the stream. Extraction using this method can occur by a clean excavator ideally working from an elevated bar and extracting gravel from the main channel, or the machine can be perched in the stream. Gravel can be placed at a location where it will not be re-introduced to the channel.

When to implement

This scenario may be used during emergency situations when gravel or debris management must be expedited and dry bar maintenance is not feasible.

Suggested salvage method

Protocol 3 – Fish without fencing

3.6 Timing

All instream works in the Fitzsimmons Creek channel should be conducted during the instream works window of August 15-30. This window is two weeks later than the Ministry of Environment Reduced Risk Instream Works Window (MOE, 2006) to correspond with the later emergence of rainbow trout in the cold

water of Fitzsimmons Creek, and typical lower flows occurring after the usual peak flows at the end of July. Instream works must be complete before bull trout begin to spawn in the fall.

3.7 Evaluation of Gravel Extraction Scenarios

While the purpose of this plan is to identify potential environmental impacts associated with each scenario, and offer mitigation methods to manage/ minimize impacts, Cascade also realizes that the RMOW has flood hazard protection goals to achieve. The lowest impact method of gravel extraction (i.e., scenario 1) will result in the lowest yield of gravel at potentially higher cost per unit of gravel excavated. As this plan outlines standard operating procedures and does not consider actual amounts of gravel in the channel, a yield/ cost assessment is outside of the scope of this plan. Decision makers must take into account likely environmental impacts and flood protection goals/ requirements when selecting the scenario that is most appropriate for each bar.

4 Bar Access Points

Bar access points and chainages (i.e., distance between sites) are presented in tabular format in Table 1 and are illustrated on Map 1 through Map 8. The lower gradient portion of Fitzsimmons Creek in which gravel extraction has occurred in the past was divided into seven sub-reaches and named after significant landmarks or the neighbourhoods that the creek passes through. The reaches, beginning with the most upstream reach are Blackcomb Way Bridge, Day Parking, White Gold, Spruce Grove, Mons, Riverside, and Nicklaus North. Within each reach, all known access points are identified and numbered from the upstream to downstream. Additionally, gravel bars are numbered and associated with the appropriate access points (Table 1). While the location of gravel bars does not stay static in a system such as Fitzsimmons Creek, the general location does not change greatly from year to year. For this reason, assigning numbers to each bar will create consistency for planners during future gravel extraction planning. It is possible that bar locations may change and require renumbering following a significant flood event, although the frequency of such events is low.

Each of the seven reaches support different numbers of established access points. Creation of new access points is not recommended or desired by decision makers. In some cases ramps onto a bar is maintained from year to year, although ramps at other sites must be assembled and disassembled prior to and after gravel extraction to ensure that flood protection is maintained. While most access points provide access to bars on the same side of the creek and are thus reasonable options for gravel extraction, a few access points (e.g., Nick North Access 3) are located across the channel from the bar and may only be appropriate with a stream crossing.

The purpose of this section is to inventory all access points and to list the reaches in which they exist. As previously mentioned, the location of gravel bars does not change significantly from year to year, although the orientation of the thalweg to the bar can change. For example, an access point could be used when the thalweg flows on the right side of the bar, but cannot be used if the thalweg flows on the left side of the bar. Annual flow fluctuations and previous gravel extractions are causes of thalweg flow changes. Therefore, access points must be reviewed every year prior to gravel extraction to ensure that bars listed in Table 1 can, in fact, be accessed from the identified access points.

The Spruce Grove Access 1 point, located at 1+330 provides access to the creek but not to a numbered gravel bar. This is likely because when gravel bars in Fitzsimmons Creek were numbered, this particular bar did not exist. It is worthwhile to keep this access point as the bar may reform in the future.

4.1 Blackcomb Way Bridge

The Blackcomb Way sub-reach extends from the Blackcomb Way Bridge to the Municipal Skate Park (-0+400 to 0+000), and supports one existing access point which provides access to river left. A description of the access points is provided in Table 1 and is illustrated on Map 2.

4.2 Day Parking

The Day Parking reach extends from the Municipal Skate Park to the Lorimer Road Bridge (0+000 to 0+350 m), and supports four existing access points. Two of the points provide access to river left and two points provide access from river right. A description of the access points is provided in Table 1, and is illustrated on Map 3.

4.3 White Gold

The White Gold reach extends from the Lorimer Roads Bridge to the Nancy Greene Bridge (0+350 to 1+240 m), and supports four existing access points. Two of the points provide access to river right and two points provides access to river left. A description of the access points is provided in Table 1, and is illustrated on Map 4.

4.4 Spruce Grove

The Spruce Grove reach extends from the Nancy Greene Bridge to the Spruce Grove Way Bridge (1+240 to 1+905 m), and supports six existing access points. Four of the points provide access to river right and two points provide access to river left. A description of the access points is provided in Table 1, and is illustrated on Map 5.

4.5 Mons

The Mons reach extends from the Spruce Grove Way Bridge to the Scandinave Bridge (1+905 to 2+430 m), and supports seven existing access points to Fitzsimmons Creek. Two of the points provide access to river right and five points provide access to river left. A description of the access points is provided in Table 1, and is illustrated on Map 6.

4.6 Riverside

The Riverside reach extends from the Scandinave Bridge to the Disc Golf footbridge (2+430 to 3+081 m), and supports one existing access point to Fitzsimmons Creek. The access is to river left, and is described in Table 1 and illustrated on Map 7.

4.7 Nicklaus North

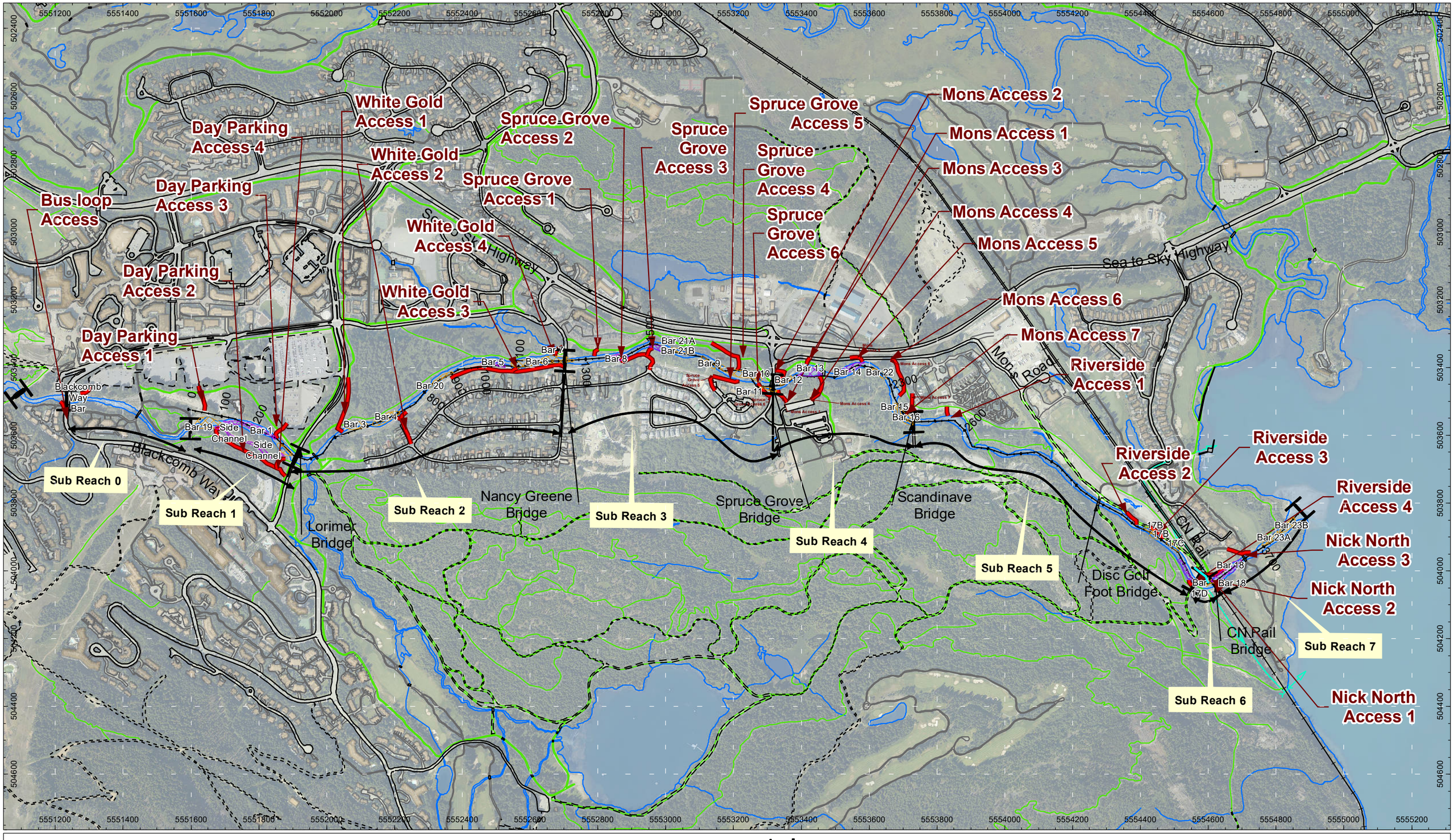
The Nicklaus North reach extends from the Disc Golf footbridge to Green Lake (3+081 to 3+807 m), and supports six existing access points to Fitzsimmons Creek. All six points provide access to river right, while access to river right is possible at 3+487 with permission from CN rail to cross the rail bridge. A description of the access points is provided in Table 1, and is illustrated on Map 8.

Table 1: Fitzsimmons Creek gravel bar access points.

Approximate Distances	Access Point Name	Access Points	Bar no. Access	Description
Sub-Reach 0 - Blackcomb Way				
-0+500	Bus Loop Access 1	River Right	Bus Loop	Access from river left south of the Blackcomb Way Bridge
-0+400 to -0+370	Bus Loop Access 2	River Left	Blackcomb Way	Access from river left though Day Lot #1
Sub-Reach 1 - Day Parking				
0+016 to 0+100	Day Parking Access 1	River Left	19	Access from river left though pump track from Day Lot #3
0+138 to 0+313	Day Parking Access 2 and 4 (Valley Trail Access)	River Right	Side Channel	Access from river right from Valley Trail opposite Skate Park or Valley Trail under Lorimer Rd. Bridge
0+170 to 0+242	Day Parking Access 1 and 3	River Left	1	Access from river left though pump track from Day Lot #3 OR Access from river left though Day Lot #5
0+290 to 340	Day Parking Access 3	River Left	2	Access from river left though Day Lot #5
Sub-Reach 2 - White Gold				
0+552 to 0+583	White Gold Access 1	River Left	3	Access from river left from valley trail located north of Lorimer Road. Machine access valley trail across from the entrance to day lots 4/5.
0+599 to 0+688	White Gold Access 1 and 2	River Left from Bar 3 OR River Right from Ambassador Crescent	4	Access from Bar 3 OR Access to dyke on river right from Ambassador Crescent.
0+820 to 0+900	N/A	River Left	20	Bar 20 is not accessible nor is it a proper bar. It is narrow and appears that it is primarily bank material.
0+988 to 1+067	White Gold Access 3 or 3	River Right	5	Access to dyke on river right from Nancy Green Bridge or Ambassador Crescent.
1+080 to 1+160	N/A	River Left	6	Bar 6 is on River Left and is not currently accessible. Accessing this bar and carving out an access ramp will compromise the wetland west of the bar.
1+183 to 1+245	White Gold Access 3	River Right1	7	Access to dyke on river right from Nancy Green Bridge

Approximate Distances	Access Point Name	Access Points	Bar no. Access	Description
Sub-Reach 3 - Spruce Grove				
1+361 to 1+415	Spruce Grove Access 2	River Right	8	Access to dyke on river right from Nancy Green Bridge Spruce Grove Way.
1+500 to 1+570	Spruce Grove Access 3	River Right	21A	Access to dyke on river right from Spruce Grove Way.
1+560 to 1+625	Spruce Grove Access 4	River Left	21B	Access to Valley Trail on river left from Spruce Grove Bridge or Hwy 99 right of way.
1+658 to 1+715	Spruce Grove Access 5	River Right	9	Access to dyke on river right from Spruce Grove Bridge.
1+720 to 1+860	Spruce Grove Access 4	River Left	10	Access to Valley Trail on river left from Spruce Grove Bridge or Hwy 99 right of way.
1+880 to 1+900	Spruce Grove Access 6	River Right	11	Access to dyke on river right from Spruce Grove Bridge.
Sub-Reach 4 - Mons Road				
1+930 to 1+975	Mons Access 2	River Left	12	Access river left from Valley Trail at Spruce Grove Way and Mons Road.
1+991 to 2+058	Mons Access 3 and 4	River Right or Left	13	Access river right from Spruce Grove Park parking area
2+114 to 2+193	Mons Access 5	River Left	14	Access river left from Mons Road.
2+220 to 2+275	N/A	River Left	22	Access river left from Valley Trail located south of Scandinave Spa access road. Valley Trail access from Mons Road
2+358 to 2+365	N/A	River Left	15	Access to river left on the south side of the bridge to the ScandinaveSspa from Bar 16
2+392 to 2+448	Mons Access 7	River Left	16	Access to river left on the south side of the bridge to the Scandinave Spa
Sub-Reach 5 – Riverside				
3+240 to 3+270	Riverside Access 2	River Left	17A	Access from the gravel frontage road that descends from the Mons Road dyke crossing.
3+260 to 3+390	N/A	River Right	17B	Bar 17B is on river right and is not currently accessible.
3+315 to 3+361	Riverside Access 3	River Left	17C	Access to river left from access road at junction to existing left bank dyke.

Approximate Distances	Access Point Name	Access Points	Bar no. Access	Description
3+362 to 3+428	Riverside Access 4	River Right	17D	Access to river right on the north side of the Zappa Trails Bridge
Sub-Reach 7 - Nicklaus North				
3+506 to 3+569	Nick North Access 1	River Left	18	Access to river left upstream of CN rail bridge. Must obtain permission from CN rail to cross bridge for river right access. Access to golf course grounds by crossing train track.
3+703 to 3+757	Nick North Access 2	River Left	23A	Access golf course grounds from Nick North Access 1 and from golf course paved trail and riparian edge.
3+782 to 3+826	Nick North Access 2	River Right	23B	Access from Bar 23A



GIS Cartographer: Nicola Church
Date: November 1st, 2016
CERG File#: 013-09-15
Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 200 400 600 800

Meters

ReachBreaks
AccessRoutes
Gravel bar
2016 Gravel bar
Paved Roads
Gravel Roads
Rough Roads
Railways
Paths/Driveways
Trails
Creeks

Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia

Map Overview

5551200
5551400
5551600
503400
503600
Bus Loop Access 1
Bus Loop Access 2
Day Parking Lot 1
Day Parking Lot 2
Day Parking Lot 3
Day Parking Access 1
Blackcomb Way Bar
Rebagliatti Park
Bar 19
Sub Reach 0
Blackcomb
500
300
200
100
000
GIS Cartographer: Nicola Church
Date: November 1st 2016
CERG File#: 013-09-15
Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm
CASCADE ENVIRONMENTAL RESOURCE GROUP LTD
N
0 50 100 150 200
Meters
ReachBreaks
AccessRoutes
Gravel Bar
Paved Roads
Gravel Roads
Rough Roads
Railways
Paths/Driveways
Trails
Dikes
Creeks
Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia
Map 1: Subreach 0 - Blackcomb way

5551600
5551800
5552000
503800
503600
Day Parking Access 1
Day Parking Lot 5
Day Parking Access 3
White Gold Access 1
Rebagliatti Park
Bar 19
Bar 1
Bar 4
Bar 3
Bar 2
Side Channel
Lorimer Road
Day Parking Access 4
Day Parking Access 2
Blackcomb Way
Sub Reach 1
Lorimer Bridge
0
100
200
300
400
500
600
800

GIS Cartographer: Nicola Church
Date: November 1st, 2016
CERG File#: 013-09-15
Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

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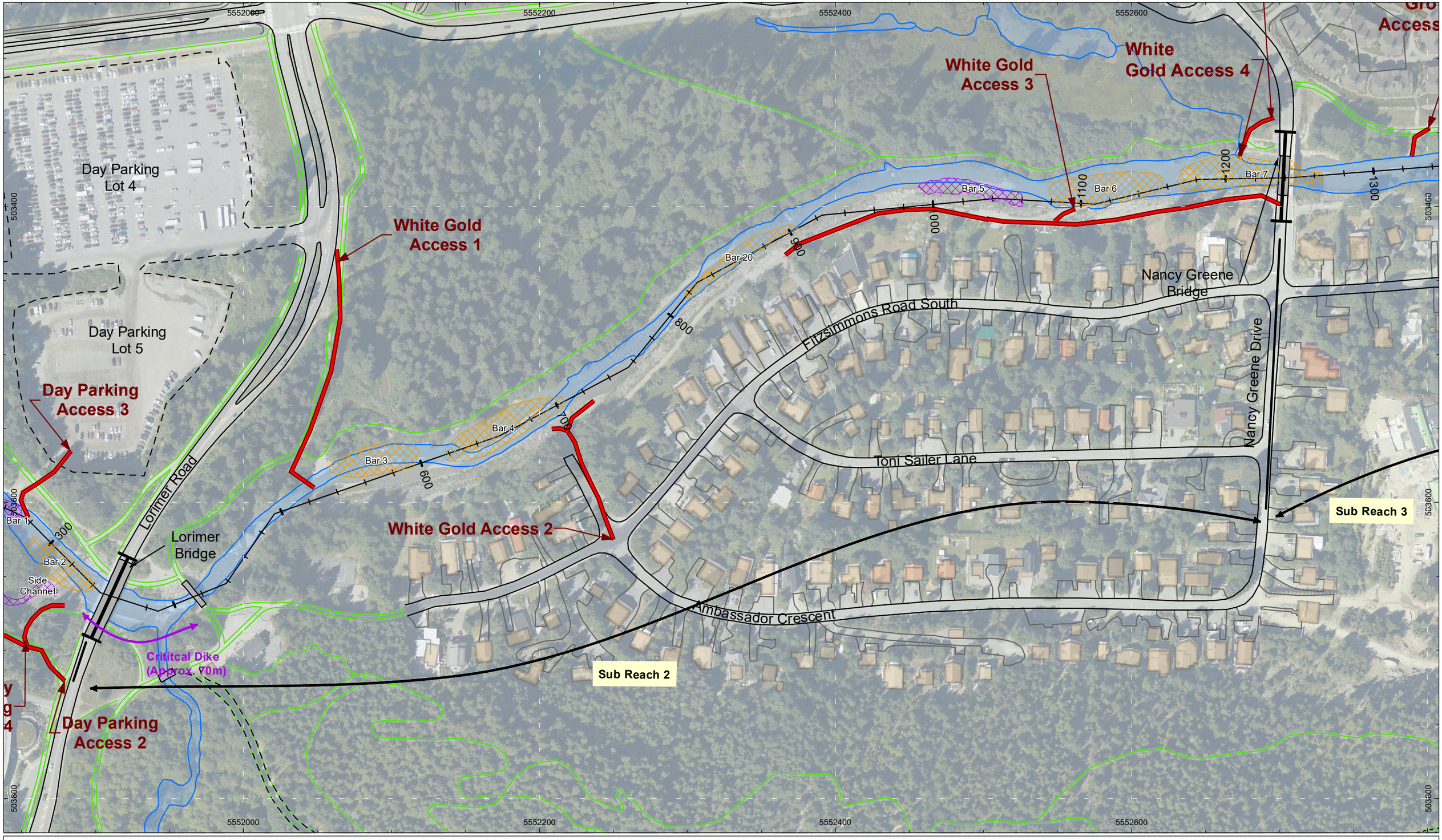
0 50 100 150 200 250
Meters

ReachBreaks
AccessRoutes
Gravel bar
2016 Gravel bar
Paved Roads
Gravel Roads
Rough Roads
Railways
Paths/Driveways
Trails
Dikes
Creeks

Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia

Map 2: Sub-Reach 1 - Day Parking



GIS Cartographer: Nicola Church
Date: November 1st, 2016
CERG File#: 013-09-15
Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

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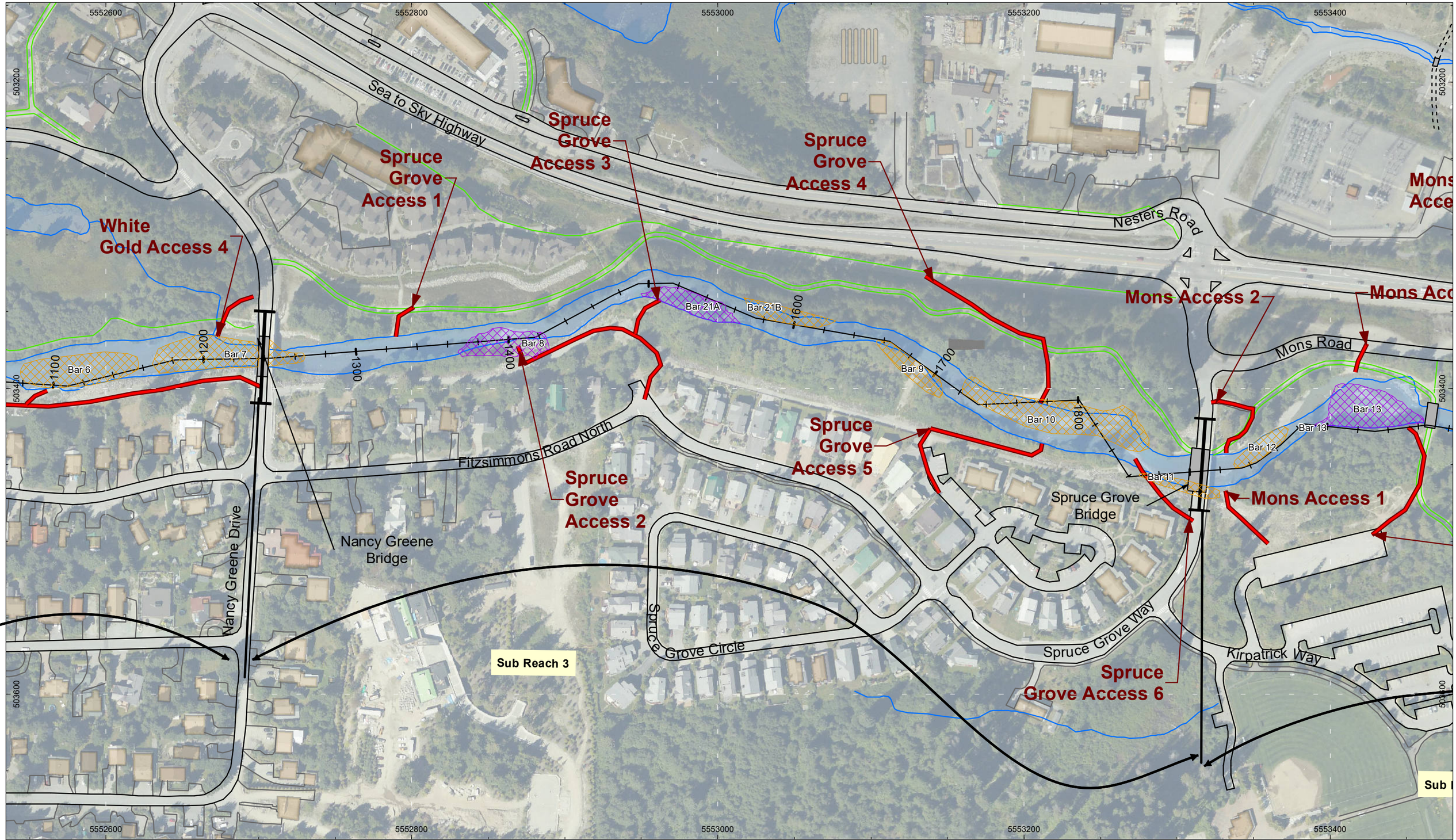
0 50 100 150 200

Meters

ReachBreaks
AccessRoutes
Gravel bar
2016 Gravel bar
Paved Roads
Gravel Roads
Rough Roads
Railways
Paths/Driveways
Trails
Creeks

Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia

Map 3: Sub-Reach 2 - White Gold



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Date: November 1st, 2016
CERG File#: 013-09-15
Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

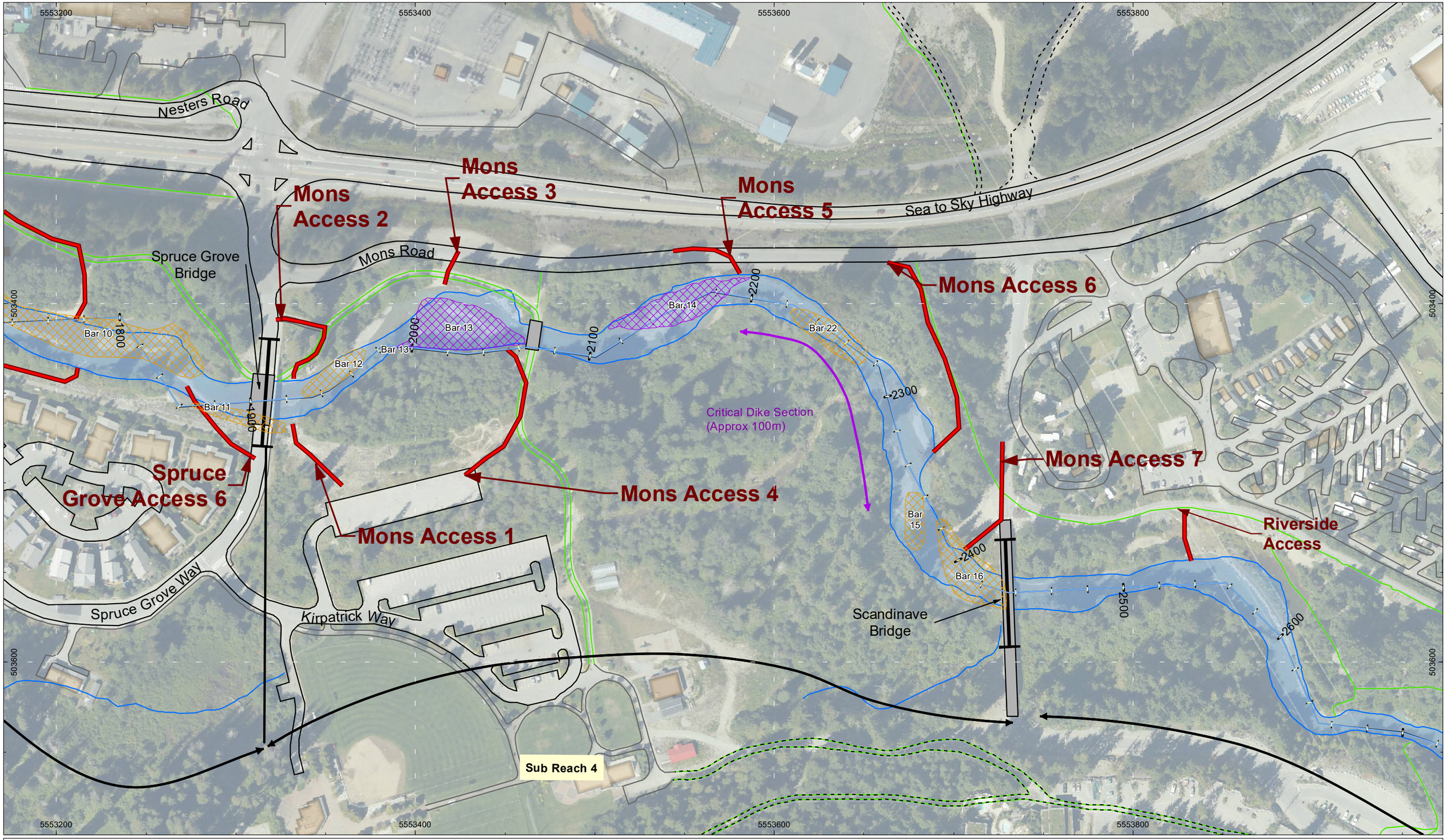
N

0 50 100 150 200
Meters

ReachBreaks
AccessRoutes
Gravel bar
2016 Gravel bar
Paved Roads
Gravel Roads
Rough Roads
Railways
Paths/Driveways
Trails
Creeks

Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia

Map 4: Sub-Reach 3 - Spruce Grove



GIS Cartographer: Nicola Church
Date: November 1st, 2016
CERG File#: 013-09-15
Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 50 100 150 200

Meters

ReachBreaks
AccessRoutes
Gravel bar
2016 Gravel bar
Paved Roads
Gravel Roads
Rough Roads
Railways
Paths/Driveways
Trails
Creeks

Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia

Map 5: Sub-Reach 4 - Mons Road

5553800 5554000 5554200 5554400 5554600

503600 503800 504000

Bar 15
Bar 16
2400
2500
2600
Riverside Access 1
Scandinave Bridge
Disc Golf Foot Bridge
Riverside Access 2
Riverside Access 3
Bar 17A
Bar 17B
Bar 17C
Glen Abbey Lane
CN Rail
Nick North Access 2
Critical Dike Section (Approx 350m)
Sub Reach 5
Riverside Access 4
Bar 17D
Bar 18
Bar 18B
CN Bridge

GIS Cartographer: Nicola Church
Date: November 1st, 2016
CERG File#: 013-09-15
Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

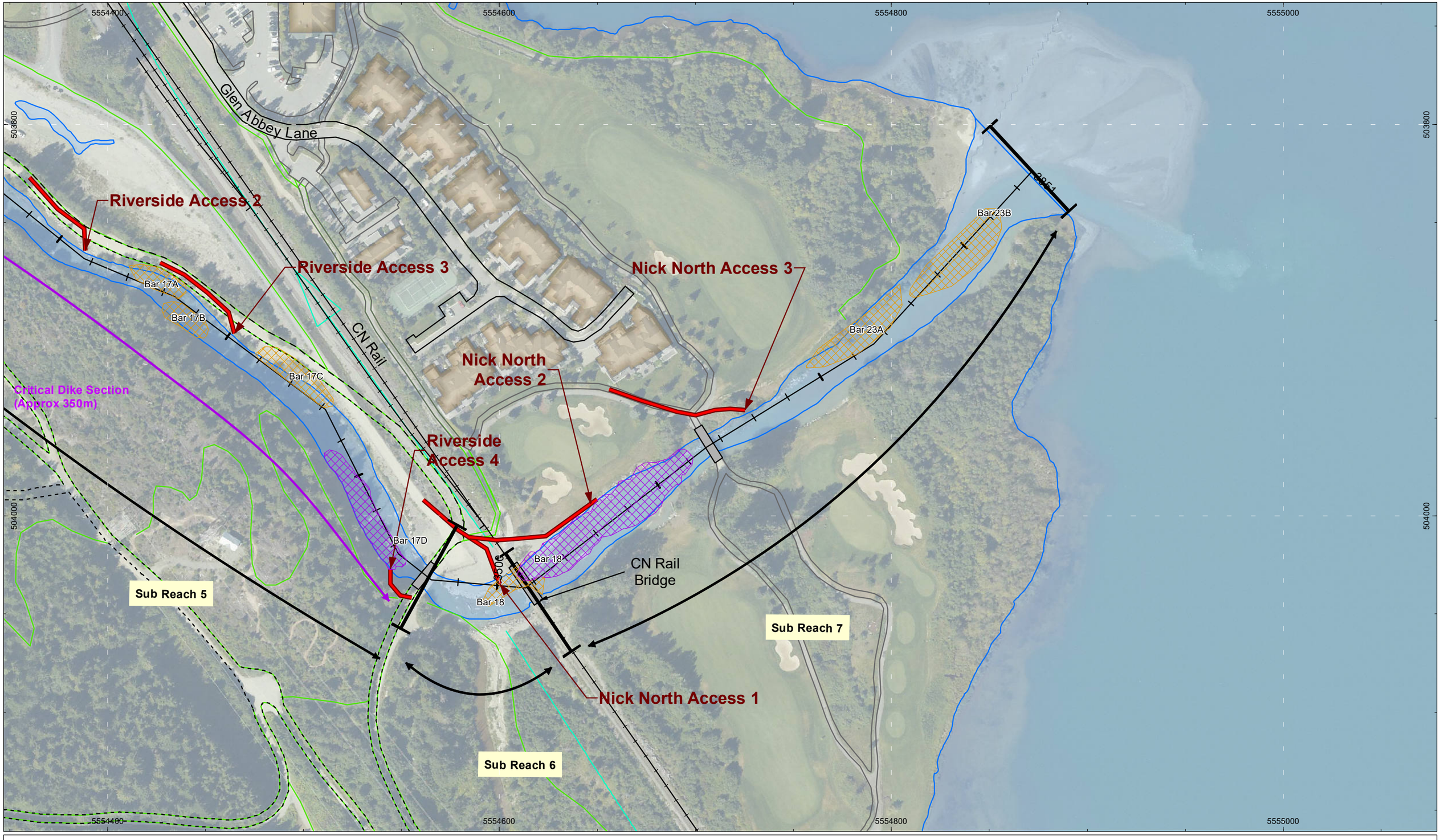
N

0 50 100 150 200
Meters

ReachBreaks
AccessRoutes
Gravel bar
2016 Gravel bar
Paved Roads
Gravel Roads
Rough Roads
Railways
Paths/Driveways
Trails
Creeks

Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia

Map 6: Sub-Reach 5 - Riverside



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Date: November 1st, 2016
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Projection: UTM 10N NAD83
Orthophoto/Data: RMOW 2012 20cm

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 50 100 150 200

Meters

ReachBreaks
AccessRoutes
Gravel bar
2016 Gravel bar
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Gravel Roads
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Creeks

Fitzsimmons Creek Environmental Management Plan
Whistler, Biritish Columbia

Map 7: Sub-Reach 6 & 7 - Nicklaus North Reach

5 Environmental Monitoring and Mitigation

5.1 Instream Works Best Management Practices

The following steps should be followed to minimize and mitigate any damage to fish and fish habitat during gravel extraction operations. All mitigative strategies outlined in this document should be strictly adhered to by all contractors. To ensure that the proposed Works proceed in accordance with *Standards and Best Practices for Instream Works* (MWLAP, 2004) and *A Users' Guide to Working In and Around Water* (MWLAP, 2005), the following conditions should be adhered to:

- Work will be completed as soon as possible once initiated.
- Gravel extraction activities will preferably occur in isolation of flowing water and will be carried out in such a manner as to prevent the release of deleterious substances into any local surface drainage. Deleterious substances include, but are not limited to, silt, sediment, sediment-laden water, raw concrete, concrete leachate, concrete wash water, hydrocarbons, oil and grease, and chemical products associated with construction activities.
- Gravel extraction activities should not be initiated during heavy precipitation or high water flows. Should water levels rise during gravel extraction, actions will be taken to mitigate potential impacts by increasing berm size, and ensuring that works are completed as soon as possible.
- Machinery is to be removed from the Fitzsimmons Creek channel when the operator is not in attendance for more than 0.5 hours (i.e., after working hours or during work stoppages) and will be stored a minimum of 30 m from the wetted margin where practical.
- All equipment and machinery involved in the works will be in good operating condition, free of leaks. Machinery will be power washed prior to works to eliminate excessive oil or grease and sediment.
- All hydraulic machine used in the channel of the stream will use environmentally sensitive hydraulic fluids which are non-toxic to aquatic life and which are readily or inherently bio-degradable
- Servicing and refuelling of equipment will be conducted in designated areas outside of the stream channel, isolated from any surface water drainage and more than 30 m removed from the watercourse.
- Machinery shall not operate from the wetted channel, except in emergency situations.
- All trucks and excavation equipment will minimize disturbance to the riparian vegetation by working from previously disturbed areas or areas designated by the Environmental Monitor.
- Vegetation cutting / removal will be restricted to designated access / egress locations to minimize loss of riparian vegetation and to retain important wildlife trees. If vegetation management is required, it is preferred that vegetation be cut, while maintaining portions of the plant and root structures.
- Large woody debris will be retained where possible and, if moved, shall be repositioned in the channel following gravel removal activities.
- The environmental monitor will monitor all environmentally sensitive works, as defined in section 1.3, on a full time basis. The monitor will ensure that best management practices are followed throughout sensitive works, and that appropriate water quality parameters are monitored. Regular turbidity sampling should be conducted during all insteam works.
- In accordance with the BC Ministry of Environment Ambient Water Quality Guidelines for Turbidity, Suspended and Benthic Sediments

(http://www.env.gov.bc.ca/wat/wq/BCguidelines/turbidity/turbidity.html#tab1), the EM will ensure that the turbidity of Fitzsimmons Creek will not:

- Change from background of 8 NTU at any one time for a duration of 24 hours in all waters during clear flows or in clear waters
- Change from background of 2 NTU at any one time for a duration of 30 days in all waters during clear flows or in clear waters
- Change from background of 5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters
- Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters

Should turbidity levels exceed the above guidelines, works will be halted or suspended until turbidity levels comply.

- Works will occur in isolation of flowing water. Isolated turbid water will not be released back into the creek until suspended solids have settled and the turbidity is at background levels or at a maximum of 25 NTU.
- Works conducted in and about Fitzsimmons Creek shall only be conducted under the direction and approval of the Environmental Monitor. The Environmental Monitor will have written authority to alter or suspend works that are deemed to be detrimental to aquatic or terrestrial life.
- All sensitive works will be documented in monitoring memos as part of the Environmental Reporting process.

5.2 Mitigation Products

The following products are to be employed by the contractors:

- *Environ*^{TM} non-toxic and biodegradable hydraulic fluid, or equivalent, will be used by all contractors during works in or around Fitzsimmons Creek.
- *Clean rip rap* will be used when building access ramp or creek diversion structures.

6 Water Quality Protection

All works shall be conducted in a manner to minimize impacts to the water quality of Fitzsimmons Creek. In order to do so, gravel extraction shall occur in isolation of flowing water, while ensuring that water flowing past a work site does not become contaminated as a result of the work activities. Work site isolation can be achieved by the construction of berms and diversions. These structures must effectively isolate the work site from flowing creek water. Bar perimeter berms and channel diversion structures will be left in place following gravel extraction activities except when the thalweg was diverted to obtain a bank-to-bank extraction. Deconstruction of berms or diversion structure will be conducted under the supervision and guidance of the EM to ensure that water quality and fisheries values are maintained.

As riparian vegetation functions to stabilize stream banks and slow run off, protection of riparian vegetation is essential. Appropriate measures will be taken to protect or minimize damage to riparian vegetation.

6.1 Sediment and Erosion Control Strategies

Silt and sediment are considered deleterious substances to aquatic life. Efforts to reduce silt and sediment entering Fitzsimmons Creek should include:

- Access / egress to Fitzsimmons Creek will only occur at existing access points identified in Table 1 and on Maps 2 through 7. Should a different or new access point be proposed, the

Environmental Monitor, the RMOW project director, and DFO should all be in agreement to its development and use.

- Ramps, berms and diversions should use material from the Fitzsimmons Creek bed, and clean rip rap. Any other materials used in the Fitzsimmons Creek channel, must be certified as clean (i.e., not contaminated)
- Excavated material is to be removed to a stable area above the high-water mark and as far as possible from any watercourse to prevent entry into a watercourse or stormwater system. Should excavated material be stored temporarily within an area that has potential to enter into a watercourse or stormwater system, materials will be covered to prevent runoff in the likelihood of inclement weather.
- Gravel extraction/ diversion construction is to proceed in a manner that will minimize silting and sediment discharge to Fitzsimmons Creek, including
    - Select the lowest impact scenarios for gravel extraction (i.e., avoid full channel excavations and excavation of inundated bars when possible),
    - Ensure berms around gravel bars are adequately sized to withstand normal water levels fluctuations to ensure work sites remain isolated from the main channel,
    - Encourage operators to conduct a two step gravel excavation method. By this method, gravel is excavated from the isolated wetted pool and temporarily stockpiled on a dry section of the bar to allow water to drain from the material prior to loading transport vehicles. This method minimizes the sediment laden water dripping from vehicles as they leave the bar, while maximizing the amount of gravel that can be transported in each load.
    - Diversion berm materials can include dam sacks (i.e., cubic meter sand bags), and large, angular rip rap backfilled with river gravels. Polyethylene liners assist in 'waterproofing' the berm and can be used in combination of both materials.
    - Diversion berm construction material must be available on site prior to initiation of berm construction,
    - Diversion berm construction should be completed as soon as possible once initiated, and
    - Diversion berm should be built during low flow conditions.

7 Air Quality, Dust, and Noise Control Strategies

The following mitigation measures will be implemented by the contractor to minimize the release of air pollutants from the movement of heavy-duty vehicles and equipment:

- All equipment shall be fitted with standard emission control devices appropriate to the equipment and in compliance with Federal, Provincial, and Municipal regulations and standards.
- Heavy equipment and on-site vehicles not in use shall be turned off and not left idling, as per the RMOW's Traffic and Parking Bylaw (Bylaw 1807, 2007), which restricts vehicles idling time to a maximum of 3 minutes.
- Diesel equipment shall be equipped with devices to reduce emissions such as diesel oxygen catalysts (DOCs), flow through mesh filters or diesel particulate traps.
- The RMOW Noise Control Bylaw No. 1660, 2004, which limits hours and magnitude of noise pollution to between 8 a.m. and 8 p.m. in residential areas and between 7 a.m. and 10 p.m. in industrial zoned areas, shall be adhered to.

7.1 Emissions from Worker Commuter Trips

To decrease emissions of air contaminants resulting from worker commuter trips, contractors will be encouraged to source local workers and facilitate carpool and public transit options for transportation of workers to and from the site.

8 Hazardous Materials Handling and Storage

General best practices for hazardous substance storage and handling include:

- The refuelling of equipment will be conducted in the designated areas, away from creeks and surface water drainages. Refuelling will take place at designated staging areas.
- Equipment is to be in good operating condition, leak free, and free of excess oil and grease. Any machinery working in proximity of water and found to be leaking fuel, oil, grease or any other deleterious material will be removed from the site at the direction of the EM.
- The spill response plan to deal with spillage or leakage of fuel shall include an on-site spill response kit with an appropriate supply of oil absorbent material designated for use in and around streams, including absorbent booms.
- Any spill of petroleum products greater than 1000 ml (1.0 litre) shall be reported immediately to the EM. Clean up of such spills is the responsibility of the contractor and will commence immediately. Reporting of petroleum spills to authorities shall be as set out in the appropriate legislation and regulations. Such reporting is the responsibility of the Contractor. The Contractor is also responsible for reporting all spills larger than 100 litres of flammable liquids to the Provincial Emergency Program (PEP) of the Ministry of the Solicitor General.
- Waste fuel, oil, solvents, and other petroleum products shall be disposed off site at a location that is approved by regulatory authorities.
- All vehicles involved in the gravel extraction, including but not limited to excavators, bull dozers, trucks, and pick-up trucks, shall be equipped with a spill response kit with a supply of oil absorbent material.

9 Spill Response Plan

During operations, the Construction Supervisor and associated contractors will:

- Ensure all equipment operating on the work site is equipped with absorbent spill pads.
- Ensure all employees are familiar with spill response protocol and ensure a copy of this Spill Response Plan is accessible to all persons on-site.
- Ensure proper spill containment material is in place (e.g., absorbent pads, booms).
- Ensure all employees are familiar with spill kit locations, function, and use.

9.1 Emergency Action Plan - Spills to Land

1. **Identify** the nature of emergency:
    a. Any injuries?
    b. Is it safe?
    c. Do we need special safety or protective gear?
2. **Locate** source, area of risk, and potential for escalation.
    a. Tank volume?

b. **Notify** fire department and PEP if spill is gas or flammable liquid.

c. **Suppress** fires

d. Use foam not water.

3. **Protect** personnel, property, and the environment.

a. Evacuate if necessary.

b. Shut down operations if necessary.

4. **Contain** spill at source or downstream and **stop** release.

a. Construct berms and/or ditches.

b. Use absorbent products.

5. **Recover** product.

a. Use absorbent products.

6. **Clean up** site.

a. Remove contaminated soil and place in a water tight container for removal by a certified hazardous material disposal company.

b. Cover the affected area with a waterproof plastic membrane.

c. Use photos, notes, and samples to document clean-up.

d. Get approval for contaminated soil disposal.

7. **Report**.

a. Report all spills to Emergency Coordinator and Environmental Monitor

b. Report spills greater than 100 L to PEP (1-800-663-3456).

9.2 Emergency Action Plan - Spills to Water

1. **Identify** the nature of emergency:

a. Any injuries?

b. Is it safe?

c. Do we need special safety or protective gear?

2. **Locate** source, area of risk, and potential for escalation.

a. Tank volume?

b. **Notify** fire department and PEP if spill is gas or flammable liquid.

c. **Suppress** fires

d. Use foam not water.

3. **Protect** personnel, property, and the environment.

a. Evacuate if necessary.

b. Shut down operations if necessary.

4. **Identify** extent of spill

a. Where is spill going?

b. Can we use tailrace, eddies, pools, or culverts to divert spill?

5. **Remove** vehicle from in stream
6. **Contain** spill, and **Stop** release.
    a. Use absorbent booms, construct berms as needed to contain spill
7. **Clean up site**
    a. Use absorbent materials
    b. Remove contaminated absorbant materials and place in a water tight container for removal by a certified hazardous material disposal company.
    c. Take photos, notes and samples to document the clean-up.
8. **Report**
    a. Report all spills to Emergency Coordinator and Environmental Monitor.
    b. The Environmental Monitor will ensure that all spills of deleterious substances to water or fish habitat are reported to DFO, and that all spills greater than 100 L are reported to PEP (1-800-663-3456).

9.3 Disposal of Contaminated Materials

Municipal contractors are responsible for collecting and appropriate disposal of spilled material, diapers, containment booms, absorbent pads, and all other spill containment products. Prior to removing contaminated or treated soil from spill sites for disposal or other use, written approval must be obtained from the BC MOE Regional Office. This may be coordinated by a certified hazardous materials disposal company.

10 Black Bear Management

When confronted with a situation where black bears are blocking access to a work site, or are feeding, sleeping or walking in or adjacent to work areas, the Construction Supervisor and their contractors are encouraged to behave in the following manner:

- Avoid creating bear situations by ensuring all food wastes, scraps, and food containers are stored and disposed of in bear proof waste disposal containers.
- If a bear is spotted in the vicinity of the work site, notify supervisor, and people working in the immediate area.
- Keep back 30 meters, and attempt to scare bear away by yelling or making noise.
- Bear proof any potential attractants that may encourage the bear to approach or continue approaching.
- Notify the EM and call the conservation officer in Whistler at (604) 905-BEAR (2327).

11 Wildland Fire Prevention

Fitzsimmons Creek gravel extraction is conducted during the month of August and /or September when creek flows and impacts to fish are lowest. August and September are typically dry months in Whistler and regularily experience high fire risk ratings. Fire prevention is essential to protecting the natural environment of Whistler and Fitzsimmons Creek. The following guidelines should be followed while working on the project:

- Smoking shall be limited to designated smoking areas only.

- Smokers must ensure that cigarettes and matches are fully extinguished and discarded in an appropriate receptacle and that **no cigarette butts are discarded on site.**
- Ensure that garbage and oily rags are properly disposed of in appropriate receptacle and that refuse does not accumulate on site.
- Ensure spills of oil and other combustible material are promptly cleaned using absorbent materials and properly disposed of in appropriate receptacles.
- The EM will monitor the Canadian Fire Weather Index and communicate hazard rating to Project Supervisor.