PROJECT #0234411-0005 GIS # BAC-06-215b October 08 2014

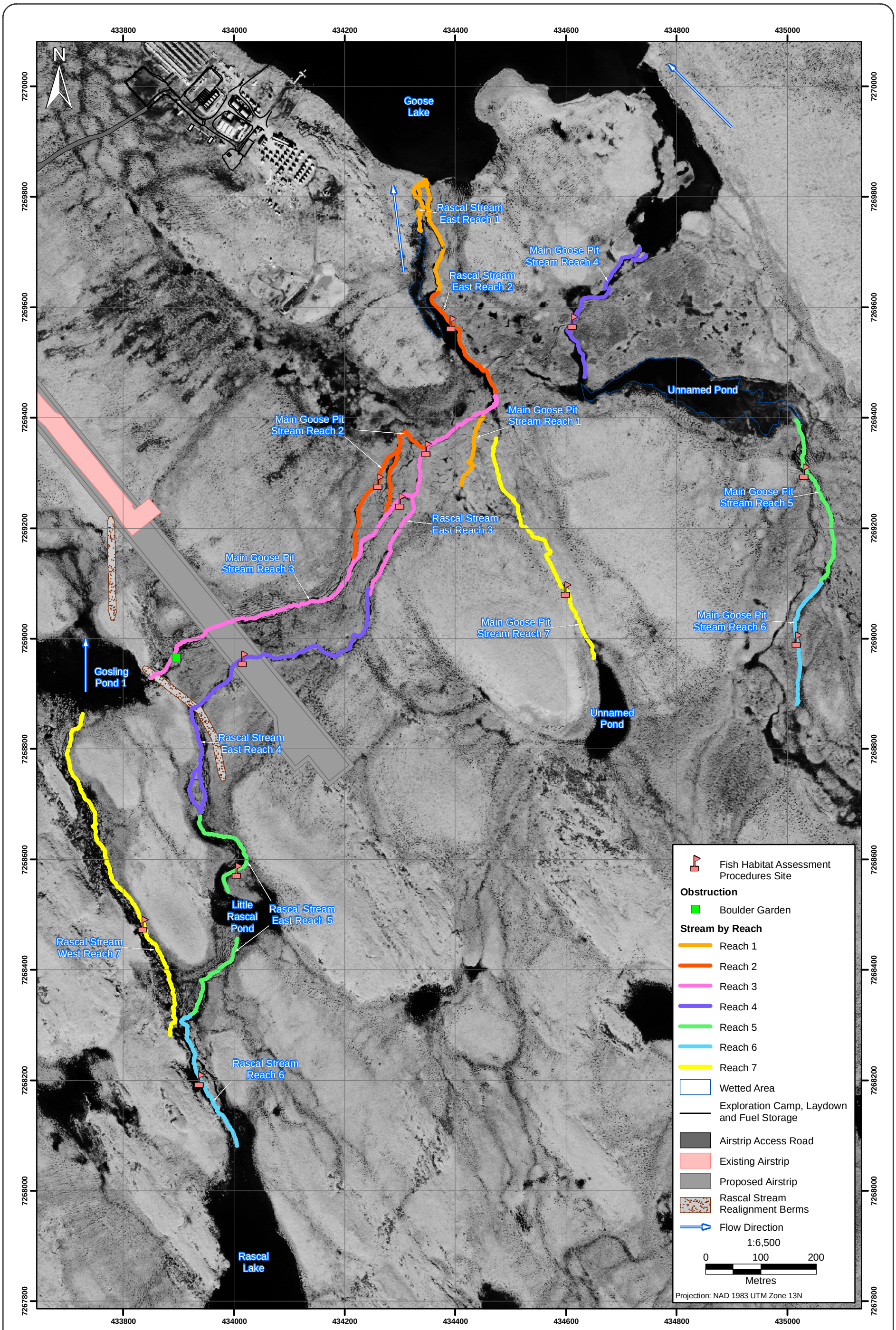


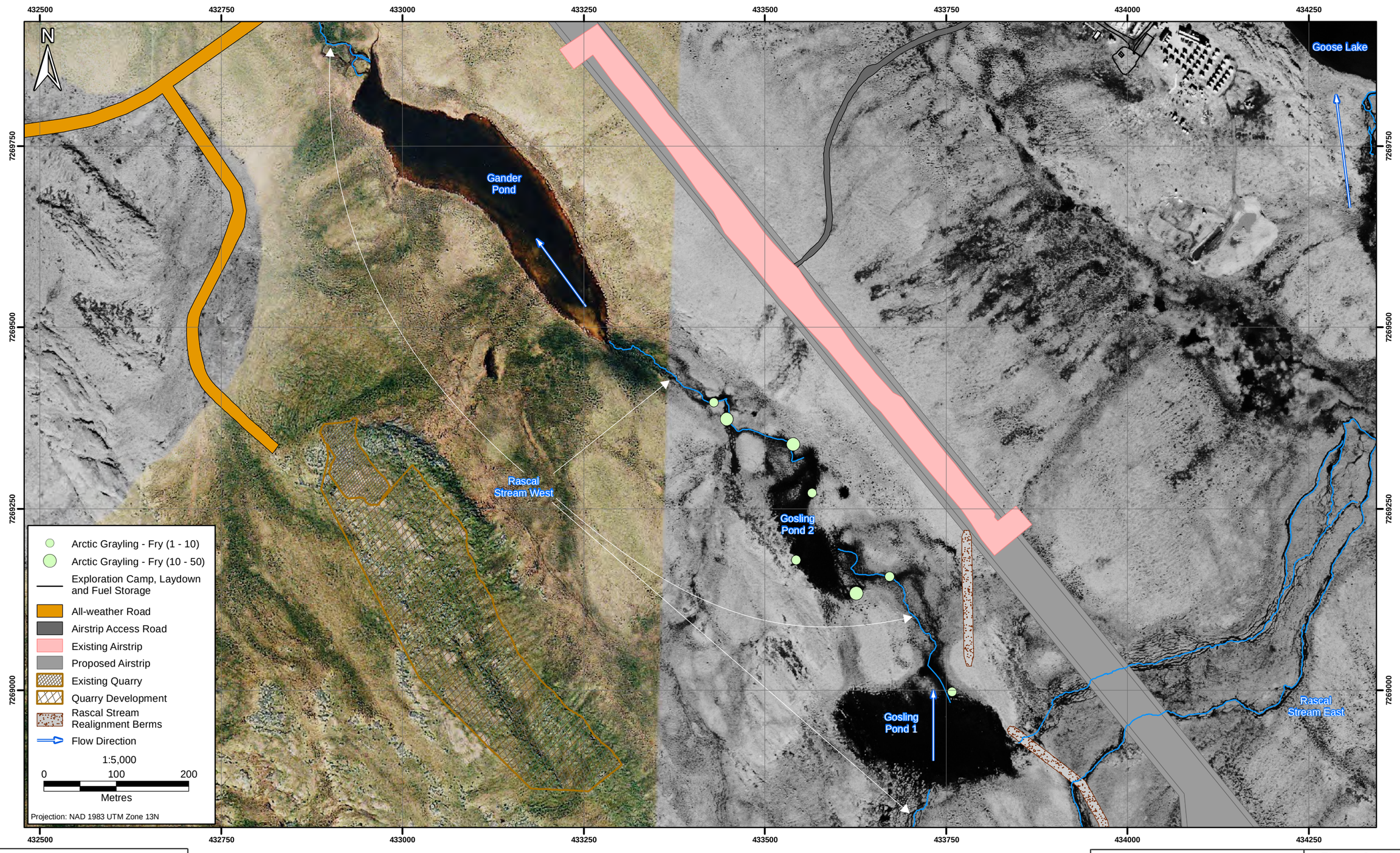
Figure 3.2-2

Sabina GOLD & SILVER CORP.

Rascal Stream East and Main Goose Pit Stream Reaches and Survey Sites, 2013

Figure 3.2-2

Rescan an ERM company



Sabina GOLD & SILVER CORP.

Rescan an ERM company

Figure 3.2-3

Rascal Stream West Fry Survey Observations, 2013

PROJECT # 0194096-0026 GIS # BAC-06-219 October 15 2014

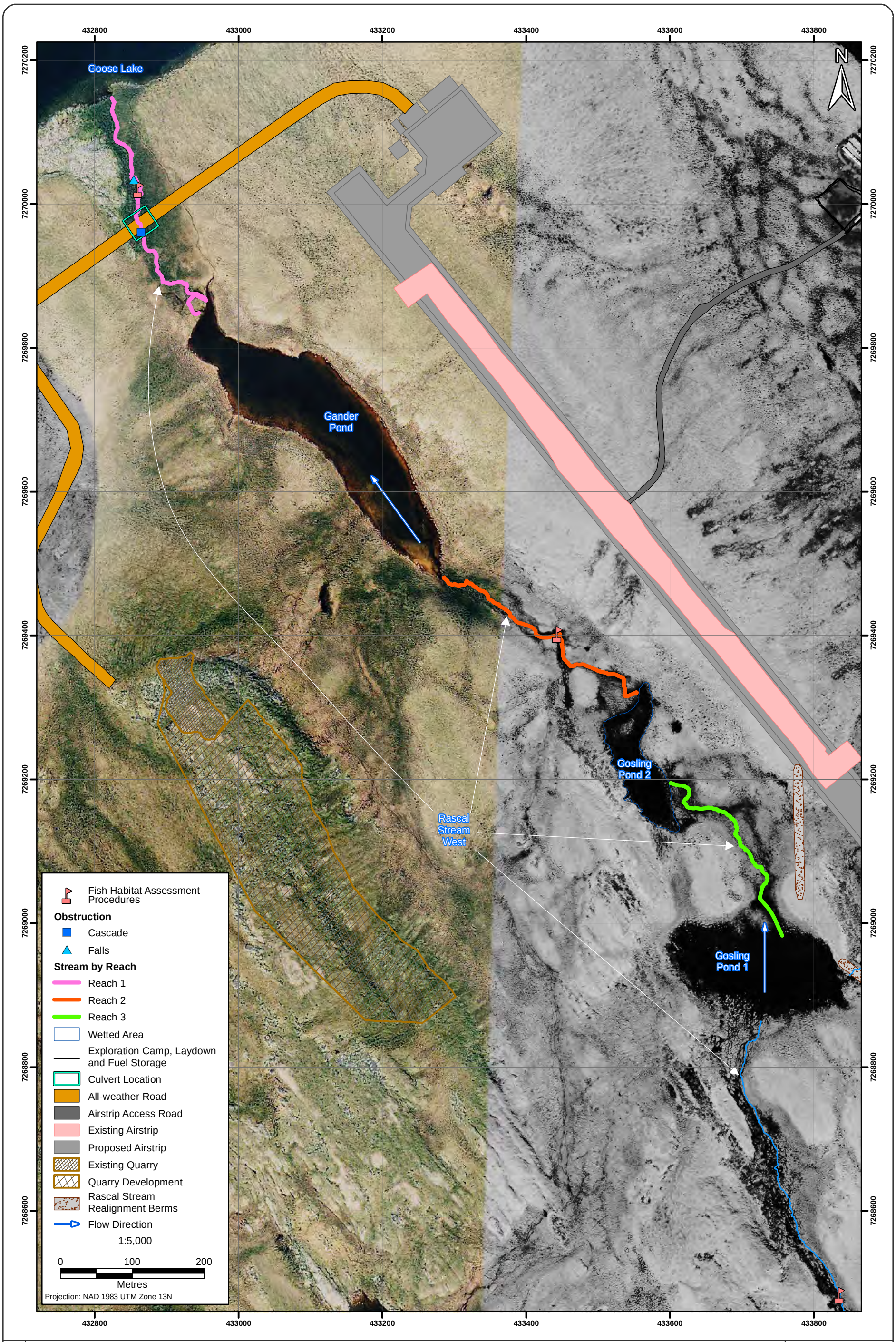


Figure 3.2-4

Sabina GOLD & SILVER CORP

Rascal Stream West Stream Reaches and Survey Sites, 2013

Figure 3.2-4

Rescan an ERM company

Plate 3.2-2. The cascade in RSW Reach 1 is impassable at low flows, June 22, 2013.

The remaining two reaches (between Gander Pond and Gosling Ponds 1 and 2) are of marginal fisheries value. Channelization is intermittent at Reach 2 (between Gander Pond and Gosling Pond 2), the Gander Pond inflow with low bankfull depth (0.15 m) indicating this reach is shallow at normal flows. The substrate is primarily fine substrate with some embedded boulder and cobbles. The quality of the habitat for rearing is fair, although the intermittent channelization and shallow depths make it unsuitable for larger stream fish. Spawning habitat is poor due to the high proportion of fine sediments. Reach 2 has marginal fish habitat overall from the intermittent channelization.

At Reach 3 (between Gosling Ponds 1 and 2), there was no visible channel and was deemed a non-classified drainage unsuitable as fish habitat (Appendix 3.2).

3.2.3 Gosling Ponds and Gander Pond along Rascal Stream West (RSW)

Gosling Ponds 1 and 2 are shallow waterbodies that are located between Rascal Lake (upstream) and Gander Pond (downstream) on RSW (Figure 2-1). Both ponds are likely shallow (< 1 m depth) with predominately fine substrates. In August 2013, the inflows and outflows of Gosling Pond 1 and 2 contained isolated pools; there was no flow in the channel at that time (Rescan 2014a). Arctic Grayling fry were observed in both ponds at relatively low numbers: likely the result of ephemeral flow conditions in the inflows and outflows and poor connectivity with overwintering habitat (Figure 3.2-3).

Gander Pond is located downstream of Gosling Ponds 1 and 2 and it drains north into Goose Lake (Figure 3.2-4). The shoreline of Gander Pond is composed almost entirely of fine sediment (Figure 3.2-5). One permanent inflow and two ephemeral inflows were present during habitat surveys in July 2011, and the pond has one outflow to Goose Lake (Rescan 2012c). Gander Pond has a maximum depth of approximately 1.5 m. Habitat quality of Gander Pond is poor due to its shallow nature and due to the near total absence of cover available to fish.

PROJECT #0234411-0008 GIS # BAC-06-218 October 03 2014

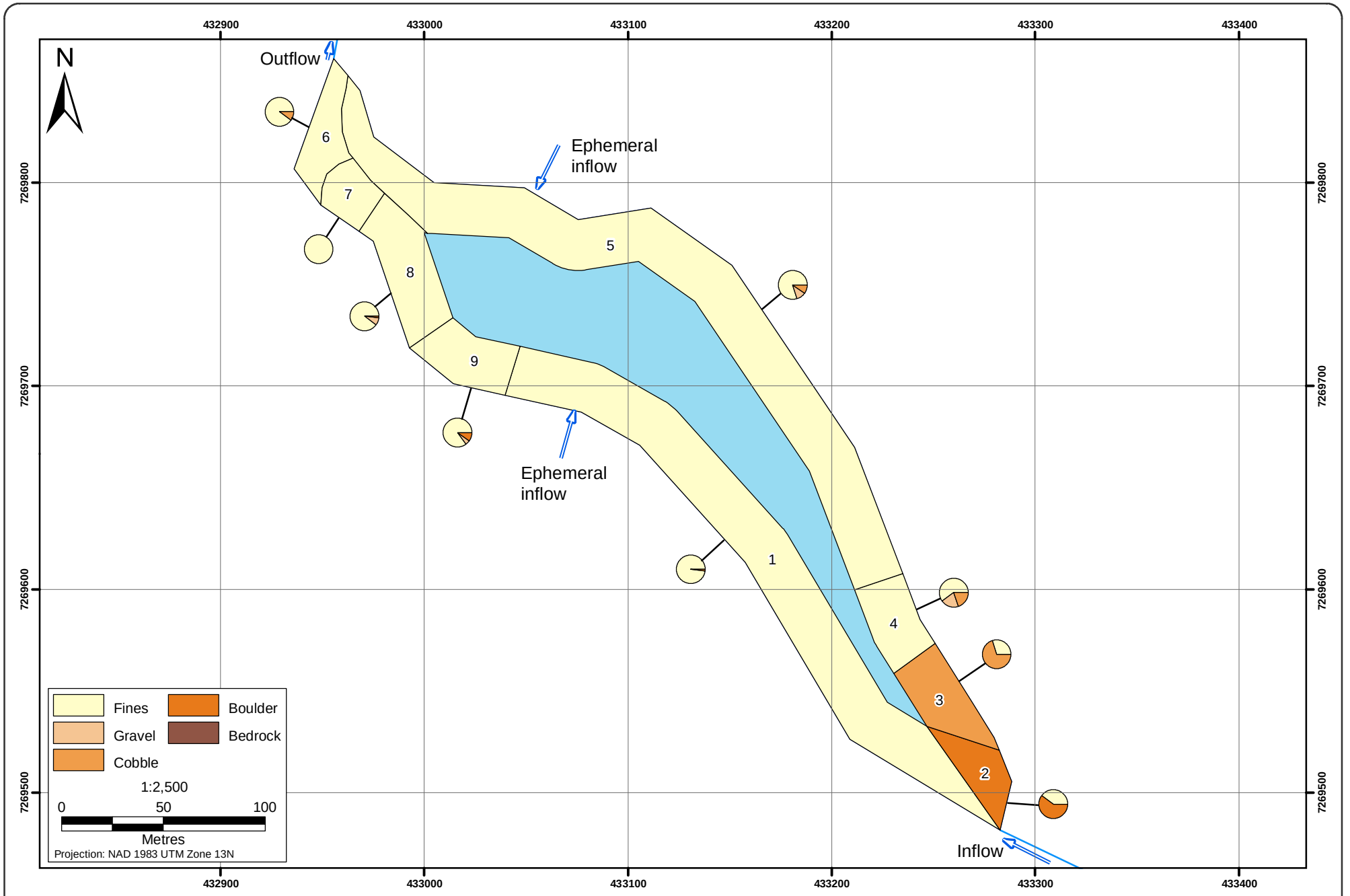


Figure 3.2-5

Sabina GOLD & SILVER CORP.

Shoreline Substrate of Gander Pond, Back River Project

Figure 3.2-5

Rescan an ERM company

4. Proposed Activities

4. Proposed Activities

4.1 STREAM RE-ALIGNMENT

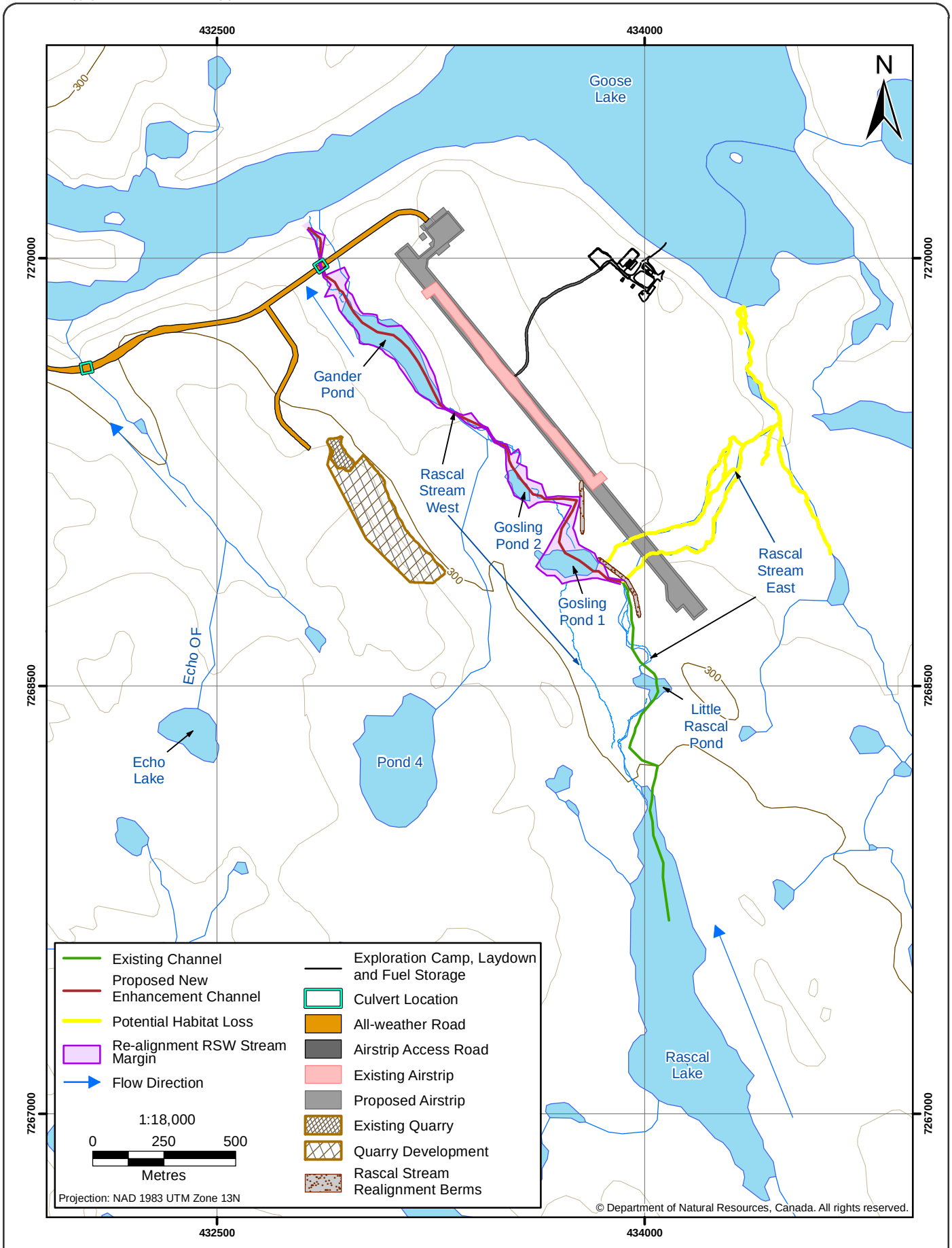
The proposed stream re-alignment will permanently divert the flow from RSE into RSW by placing a set of two rock berms just north of Gosling Pond 1 (Figure 4.1-1). The two berms will be 180 and 270 m in length, lined with a geomembrane, 2.3 m in height, 6 m wide and with 1.5:1 H:V side slopes (Appendix 2.1). The proposed time for construction is during the spring of 2015 (Table 4.1-1), prior to snow melt and fish access to the streams. All construction materials will be sourced from locally developed, geochemically suitable rock quarries already permitted or under application.

Table 4.1-1. Timing of Proposed Stream Re-alignment Activities

Activity	Year 1 (2015)	Year 2 (2016)	Year 3 to 5 (to be determined)
Fisheries Losses	RSE (8,702 m^2) RSW (52,350 m2 of existing habitat)		
Fisheries Gains	RSW (103,887 m^2)		
Construction	Installation of berms and culverts during airstrip expansion and road construction.		culvert removal from all-weather road
Mitigation/ Fisheries Offsetting	Fisheries Offsetting: boulder and gravel/cobble placement in ponds. Stockpiling exposed cobble and boulder substrates, including from lost stream channel. Placement of sediment curtains to minimize sediment/erosion potential downstream in to Goose Lake.	Rascal-Gander-Goose Stream (quantity, spawning gravel). Strategic Placement of Spawning gravels and cobble along length of stream.	Channel restoration when culverts removed from all-weather road. Sediment/erosion control measures.
Monitoring	Hydrological and fisheries assessments during high (freshet) and low (summer) flows (results used to determine strategic placement of gravels and cobble in 2016). Arctic Grayling and Fish Habitat Monitoring.	Arctic Grayling and Fish Habitat Monitoring.	Arctic Grayling and Fish Habitat Monitoring for Years 3, 5 and 6.

4.2 CULVERT INSTALLATION

To facilitate fish passage across the proposed temporary all-weather road, two 2.5 metre diameter by 16.5 metre-long box or Corrugated Steel Pipe (CSP) culverts will be installed approximately 109 metres upstream of the inflow of RSW to Goose Lake (Appendix 2.1). All rock used as construction material will be sourced from locally developed, geochemically suitable rock quarries already permitted or under application. The proposed time for installation is during the spring of 2015 (Table 4.1-1), prior to snow melt and fish access to the streams. Culverts will remain in place temporarily from two to five years, after which the channel will be restored to a natural substrate or the crossing will be re-evaluated should the road be used by a greater range of vehicles/machinery.



Sabina GOLD & SILVER CORP

Proposed Stream Re-alignment to Accommodate Airstrip Expansion

Figure 4.1-1

Rescan an ERM company

5. Effects Assessment

5. Effects Assessment

5.1 POTENTIAL EFFECTS OF AIRSTRIP EXPANSION TO FISHERIES

The following three key potential effects to Arctic Grayling productivity are anticipated:

1. Habitat losses in Rascal Stream East (RSE);
2. Habitat gains in Rascal Stream West (RSW); and
3. Sedimentation and erosion in Rascal Stream West (RSW).

5.1.1 Habitat Losses in RSE

The re-alignment of Rascal Stream to divert all water from RSE downstream of the berm location into RSW will result in the loss of 8,702 m^2 (17,203 habitat units) of fish bearing habitat in RSE (see Appendix 5.1 for the habitat loss budget). RSE is used heavily by Arctic Grayling for spawning and rearing (for further information, refer to Section 3.2-1). The re-alignment of this watercourse will result in the original highly productive stream being re-directed through the enhanced RSW before entering Goose Lake.

Post-alignment flow in RSE will continue, though at much reduced level during freshet and the stream channel is likely to become dry and ephemeral when snow melt is complete. There is a potential for stranding Arctic Grayling which may enter RSE post-alignment. However, the species is highly mobile and adapted to migrating to lakes and larger streams as flow becomes reduced in smaller tributaries. Arctic Graying show some fidelity to both spawning and overwintering sites (Stewart et al. 2007) and may fail to use newly constructed spawning grounds, or select less optimal habitat for spawning, reducing their population abundance.

5.1.2 Habitat Gains in RSW

The re-alignment of Rascal Stream to divert all water from RSE downstream of the berm location into RSW will open up 103,887 m^2 (51,984 habitat units) of available fish bearing habitat in RSW (see Appendix 5.3 for the habitat gain budget). This will yield a net gain of 51,537 m^2 (38,896 habitat units) when removing the fisheries value of the existing, low quality fish habitat (see Appendix 5.2 and 5.3 for the habitat loss and gain budgets).

The gain in habitat area and value (habitat units) within RSW is predicted from the increase in flow within the channel and the strategic placement of substrates to promote spawning and rearing for Arctic Grayling (Figure 5.1-1). Baseline flow was insufficient to support Arctic Grayling throughout most of RSW and predicted flows suggest spawning, rearing and foraging within the stream sections of the re-aligned RSW will be within the acceptable set of ranges for all life history stages of Arctic Grayling (Figure 5.1-1): 0.05 – 0.15 m/s (rearing fry), 0.25-0.50 m/s (spawning), 0.15- 0.8 (juvenile foraging) and less than approximately 1.5 m/s for migration.

The design of spawning and rearing habitat within the re-aligned stream reaches and pond sections of RSW (Figure 5.1-1) will involve placing substrates suited for Arctic Grayling production over a two year period. Prior to snowmelt in year one (2015), the habitat design will include the placement of boulder and gravel groynes within each of the three ponds along the re-aligned RSW (Figures 5.1-2 and 5.1-3). Approximately 800 to 1600 m^3 of boulder and gravel sized substrate will be distributed among Gander Pond (5% boulder and gravel) and Gosling Ponds 1 and 2 (2.5% boulder and gravel) to enhance the quality of rearing habitat for Arctic Grayling (Figures 5.1-2 and 5.1-3). In year 2 (2016), following the first season

of monitoring and the redistribution of fine sediments in the stream, gravel will be placed in areas of higher flow and slope to enhance the spawning capacity of streams for Arctic Grayling (Figure 5.1-1).

There will be substantially more gravel substrate in the realigned RSW channel compared to baseline conditions. As gravel is the preferred spawning substrate for Arctic Grayling, this increase will likely improve the overall availability of spawning habitat. Currently, there is a total of 756 m^2 of gravel substrate in RSE and RSW (700 m^2 in RSE and 56 m^2 in RSW). There will be 1525 m^2 in RSW after the stream has been realigned and enhanced, providing a net gain of 768 m^2 over existing conditions.

5.1.3 Sedimentation and Erosion in RSW

Increased sedimentation and erosion may occur as a result of construction near and within the stream channel and through increased flow in the re-aligned stream. The construction of berms and culverts will occur during winter, when streams remain frozen and unable to suspend particulate matter. Increased flow resulting from the stream re-alignment has the potential to increase the erosive potential and increase the amount of suspended material, particularly during freshet and in the year immediately following construction, but also during spawning gravel placement in year 2 and culvert removal (potentially in years 3 to 5). The suspension of fine particulate matter could result in decreased Arctic Grayling production through avoidance of turbid sections of stream, or by smothering eggs laid within the channel. This could result in fewer migrants between Rascal and Goose lakes and decreased spawning production.

5.2 IDENTIFICATION OF MITIGATION AND MANAGEMENT MEASURES

The main mitigation measure for the adverse effect of habitat loss in RSE will be the gain in fish habitat in RSW. The objective when designing the re-aligned/enhanced RSW was to replace the natural habitat found in RSE with habitat of equal or greater value and size.

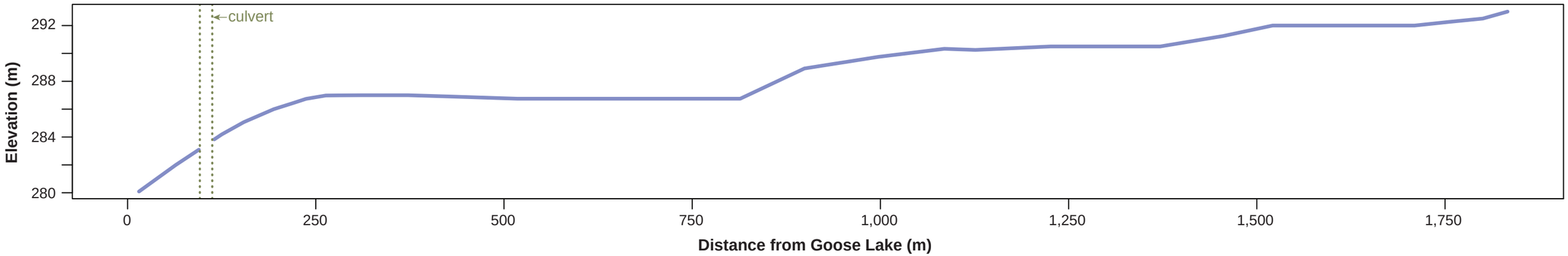
5.2.1 Habitat Mitigation

The fisheries enhancement in RSW is proposed to occur over two years, with the first activities commencing as early as April 2015, prior to the start of freshet and co-occurring with berm and culvert construction. By coordinating the enhancement over two, successive years, the mitigation measures will account for any uncertainty in the modelled wetted perimeters and flow path of the re-aligned RSW, by allowing for distribution of substrate after the first year habitat evaluation. The first year of habitat mitigation will focus on improving existing pond habitats provided by Gosling Ponds 1 and 2, and Gander Pond, and areas just slightly upstream and downstream of the pond habitats, known to be limiting in spawning gravels (Figure 5.1-1). The second year of habitat mitigation will focus on improving spawning habitat in the channels between ponds by distributing spawning sized gravel and cobble in appropriate sections of stream (Figure 5.1-1). Most of the spawning gravel placement will take place in Year 2 to prevent smothering of this habitat by sediment that is mobilized during the first flush after diversion.

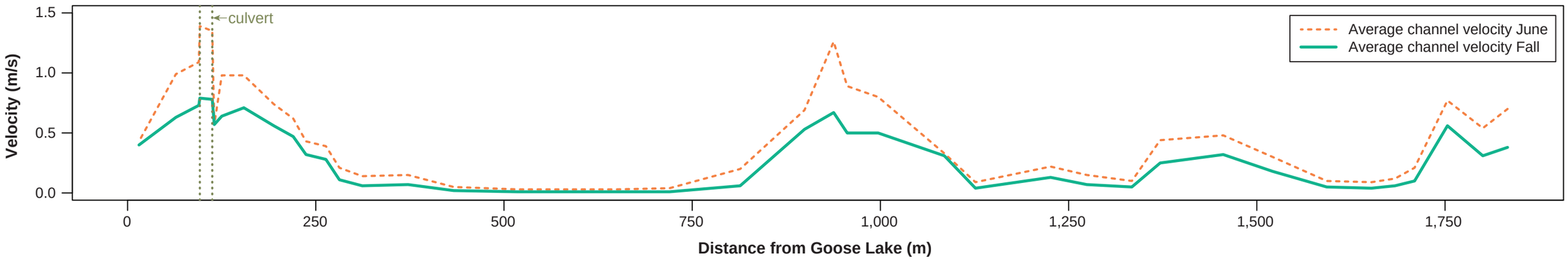
5.2.2 Prevention of Fish Use in Rascal Stream East

The re-alignment of flow from RSE to RSW will permanently reduce the discharge of water into RSE to levels that likely prevent adult Arctic Graying from accessing the decommissioned stream. However, all potential spawning activity and egg stranding in the decommissioned RSE resulting from fish entering via the inflow to Goose Lake will be prevented by blocking the channel prior to ice melt during the construction period. Blocking fish access to the channel will involve the construction of a gravel berm dug into the streambed approximately 5 meters upstream of the Goose Lake inflow from RSE. The berm will be constructed using small diameter washed crush (~60 mm) lined with a permeable or semi-permeable membrane, to allow water flow but prevent fish passage. As Arctic Grayling often begin spawning migrations under ice, the construction of the berm will occur in winter prior to freshet and coinciding with the construction of the airstrip berms.

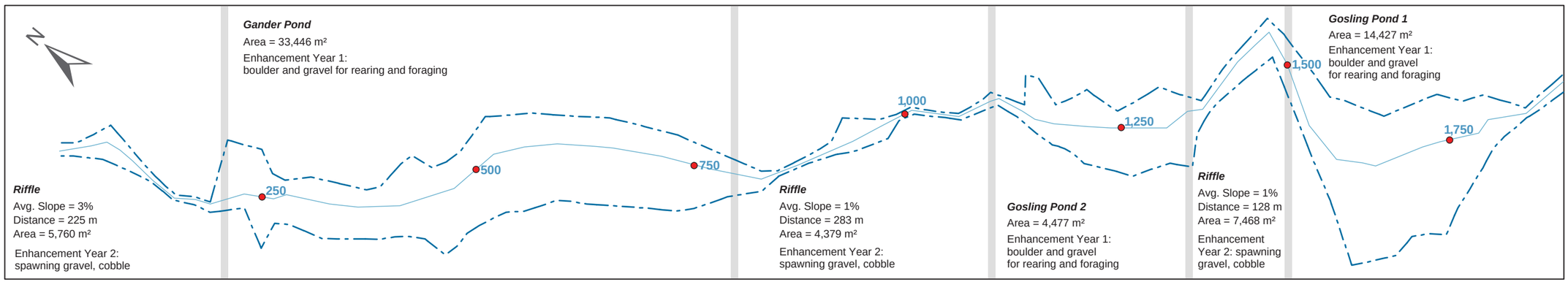
a) Elevation Profile



b) Velocity Profile



c) Plan View



Sabina GOLD & SILVER CORP.
Rescan an ERM company

Figure 5.1-1

Design Plans for Re-aligned Rascal Stream West